To: Anderson, RobinM[Anderson.RobinM@epa.gov]
From: Fonseca, Silvina
Sent: Tue 11/17/2015 9:18:39 PM
Subject: FW: Portland Harbor - summary of key stakeholder comments

Silvina Fonseca, Environmental Engineer
Office of Superfund Remediation and Technology Innovation

Phone #: 703-603-8799
Fax #: 703-603-9104

From: Legare, Amy
Sent: Wednesday, November 04, 2015 8:42 AM
To: OSWER OSRTI RRB <OSWER_OSRTI_RRB@epa.gov>; OSWER OSRTI CSTAG <OSWER_OSRTI_CSTAG@epa.gov>
Cc: Fonseca, Silvina <Fonseca.Silvina@epa.gov>; Charters, David <Charters.DavidW@epa.gov>
Subject: Portland Harbor - summary of key stakeholder comments

Personal Privacy / Ex. 6

Comments to NRRB CSTAG all

To: Anderson, RobinM[Anderson.RobinM@epa.gov]
From: Cora, Lori
Sent: Mon 10/19/2015 10:48:01 PM
Subject: RE: ph decision tree ATTORNEY CLIENT PRIVILEGE

Robin: The chart appears legally correct to me on this issue, subject to the comments I previously made.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Anderson, RobinM
Sent: Monday, October 19, 2015 1:06 PM
To: Cora, Lori
Subject: RE: ph decision tree ATTORNEY CLIENT PRIVILEGE

Attorney Client / Ex. 5

Robin

From: Cora, Lori
Sent: Monday, October 19, 2015 4:01 PM
To: Anderson, RobinM
Subject: RE: ph decision tree ATTORNEY CLIENT PRIVILEGE

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

From: Anderson, RobinM
Sent: Monday, October 19, 2015 12:51 PM
To: Cora, Lori
Subject: RE: ph decision tree ATTORNEY CLIENT PRIVILEGE

Attorney Client / Ex. 5

Attorney Client / Ex. 5

Sorry to be dense on this – but the langauge is not working for me.

Robin

From: Cora, Lori
Sent: Monday, October 19, 2015 3:43 PM
To: Anderson, RobinM; Koch, Kristine; Allen, Elizabeth; Legare, Amy; Fonseca, Silvina; Ells, Steve; Charters, David; Christopher, Anne
Subject: RE: ph decision tree ATTORNEY CLIENT PRIVILEGE

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

From: Anderson, RobinM
Sent: Monday, October 19, 2015 12:35 PM
To: Cora, Lori; Koch, Kristine; Allen, Elizabeth; Legare, Amy; Fonseca, Silvina; Ells, Steve; Charters, David; Christopher, Anne
Subject: RE: ph decision tree ATTORNEY CLIENT PRIVILEGE

Attorney Client / Ex. 5

Robin M Anderson

OSRTI/ARD/SARDB

703-603-8747

From: Cora, Lori
Sent: Monday, October 19, 2015 3:01 PM
To: Koch, Kristine; Allen, Elizabeth; Anderson, RobinM; Legare, Amy; Fonseca, Silvina; Ells, Steve; Charters, David; Christopher, Anne
Subject: RE: ph decision tree ATTORNEY CLIENT PRIVILEGE

Hello, Team. The diagram is looking pretty good to me.

Attorney Client / Ex. 5

Attorney Client / Ex. 5

Comment on Note 1:

Attorney Client / Ex. 5

Lori Houck Cora | **Assistant Regional Counsel**
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

From: Koch, Kristine
Sent: Monday, October 19, 2015 11:02 AM
To: Cora, Lori; Allen, Elizabeth; Anderson, RobinM; Legare, Amy; Fonseca, Silvina; Ells, Steve; Charters, David; Christopher, Anne
Subject: FW: ph decision tree ATTORNEY CLIENT PRIVILEGE

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
Region 10
1200 Sixth Avenue, Suite 900, M/S ECL-122
Seattle, Washington 98101-3140

(206)553-6705
(206)553-8581 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: Coffey, Scott [mailto:CoffeySE@cdmsmith.com]
Sent: Monday, October 19, 2015 10:35 AM
To: Koch, Kristine; Allen, Elizabeth
Cc: Chan, Arthur; Blischke, Eric; Foster, Malena L.; Jones, Jennifer M.
Subject: FW: ph decision tree ATTORNEY CLIENT PRIVILEGE

Here is the latest Disposal Decision Tree with Amy's comments incorporated.

From: Foster, Malena L.
Sent: Monday, October 19, 2015 10:15 AM
To: Blischke, Eric <blischkee@cdmsmith.com>; Coffey, Scott <CoffeySE@cdmsmith.com>
Cc: Sayler, Cheryl Ann <saylerc@cdmsmith.com>; Hazen, Gary <HazenGL@cdmsmith.com>; Jones, Jennifer M. <JonesJM@cdmsmith.com>
Subject: RE: ph decision tree ATTORNEY CLIENT PRIVILEGE

Here's the latest version with the edits.

Malena

From: Blischke, Eric
Sent: Monday, October 19, 2015 9:57 AM
To: Foster, Malena L. <fosterml@cdmsmith.com>
Subject: RE: ph decision tree ATTORNEY CLIENT PRIVILEGE

I made a few revisions to footnotes 1 and 4 as highlighted in purple. Please incorporate these into your version and then we should be good to go.

Thanks, Eric

From: Foster, Malena L.
Sent: Monday, October 19, 2015 10:40 AM
To: Blischke, Eric <blischkee@cdmsmith.com>
Cc: Coffey, Scott <CoffeySE@cdmsmith.com>
Subject: RE: ph decision tree ATTORNEY CLIENT PRIVILEGE

Hi Eric,

Attached are the changes we discussed. Let me know if everything works okay.

Scott, Eric will review and then send on to the group.

Thanks,

Malena

From: Blischke, Eric
Sent: Monday, October 19, 2015 6:06 AM
To: Foster, Malena L. <fosterml@cdmsmith.com>; Coffey, Scott <CoffeySE@cdmsmith.com>; Jones, Jennifer M. <JonesJM@cdmsmith.com>
Cc: Hazen, Gary <HazenGL@cdmsmith.com>; Sayler, Cheryl Ann <saylerc@cdmsmith.com>
Subject: RE: ph decision tree ATTORNEY CLIENT PRIVILEGE

Hi Malena. Let me know when you want to talk. I do not see the need for many changes in response to Amy's comments – perhaps the statement about treatment to the extent practicable in our new first bullet.

Deliberative Process / Ex. 5

Eric

From: Foster, Malena L.
Sent: Monday, October 19, 2015 2:15 AM
To: Blischke, Eric <blischkee@cdmsmith.com>; Coffey, Scott <CoffeySE@cdmsmith.com>; Jones, Jennifer M. <JonesJM@cdmsmith.com>
Cc: Hazen, Gary <HazenGL@cdmsmith.com>; Sayler, Cheryl Ann <saylerc@cdmsmith.com>
Subject: RE: ph decision tree ATTORNEY CLIENT PRIVILEGE

I will have to talk to Eric on Monday about the latest changes.

Malena

From: Blischke, Eric
Sent: Sunday, October 18, 2015 9:16 AM
To: Coffey, Scott <CoffeySE@cdmsmith.com>; Foster, Malena L. <fosterml@cdmsmith.com>; Jones, Jennifer M. <JonesJM@cdmsmith.com>
Cc: Hazen, Gary <HazenGL@cdmsmith.com>; Sayler, Cheryl Ann <saylerc@cdmsmith.com>
Subject: RE: ph decision tree ATTORNEY CLIENT PRIVILEGE

Hi Scott. Here are my thoughts on Lori's comments in Red Text. Malena, can you make these revisions? I do not think that I can edit this effectively in Blue Beam. Proposed text revisions are garishly highlighted in blue.

Thanks, Eric

From: Coffey, Scott
Sent: Friday, October 16, 2015 7:50 PM
To: Blischke, Eric <blischkee@cdmsmith.com>; Foster, Malena L. <fosterml@cdmsmith.com>; Jones, Jennifer M. <JonesJM@cdmsmith.com>
Subject: Fwd: ph decision tree ATTORNEY CLIENT PRIVILEGE

Sorry. I just got through all of the email that came in while I was in my meeting. Kristine didn't Ccussations Jennifer on this email. Attached are Lori Cora's comments. Not sure if this changes much from what was sent. Her commments start with a lot of "agreed" statements.

Sent via the Samsung Galaxy S™ III, an AT&T 4G LTE smartphone

-------- Original message --------

From: "Koch, Kristine"

Date:10/16/2015 2:59 PM (GMT-08:00)

To: "Coffey, Scott"

Subject: FW: ph decision tree ATTORNEY CLIENT PRIVILEGE

Here are Lori's comments on Robins comments. I have not heard from CDM on this or water. I'm leaving shortly and will not be back on-line until Sunday. I was hoping to get these from you before I quit working today in case I have any questions. I guess that won't be happening. Please sent the information ASAP. I will be working on this tonight and tomorrow, but will not be connected.

Thanks,

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
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1200 Sixth Avenue, Suite 900, M/S ECL-122
Seattle, Washington 98101-3140

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1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: Cora, Lori
Sent: Friday, October 16, 2015 2:51 PM
To: Anderson, RobinM; Koch, Kristine; Allen, Elizabeth; Fonseca, Silvina; Legare, Amy; Sheldrake, Sean; Christopher, Anne; Ells, Steve; Charters, David
Subject: RE: ph decision tree ATTORNEY CLIENT PRIVILEGE

See my comments below.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

From: Anderson, RobinM
Sent: Friday, October 16, 2015 9:09 AM
To: Koch, Kristine; Allen, Elizabeth; Fonseca, Silvina; Legare, Amy; Cora, Lori; Sheldrake, Sean; Christopher, Anne; Ells, Steve; Charters, David
Subject: FW: ph decision tree

Thank you for the opportunity to review the draft Sediment Soil Disposal Decision Tree. My

comments are in pen on the chart itself. Since so much of this (at least half is regulatory) I am interested in hearing Lori's take as well.

Comments

Attorney Client / Ex. 5

Attorney Client / Ex. 5

Attorney Client / Ex. 5

From: VA-PYS-5251-M@EPA.GOV [mailto:VA-PYS-5251-M@EPA.GOV]
Sent: Friday, October 16, 2015 11:26 AM
To: Anderson, RobinM
Subject: ph decision tree

To: Anderson, RobinM[Anderson.RobinM@epa.gov]
From: Fonseca, Silvina
Sent: Mon 9/28/2015 3:09:18 PM
Subject: RE: McCormick and Baxter remedial action summary -- Jim Woolford request

I have already been tasked with this by Jim. I spoke with Kristine about it last week and she wants to help us

Deliberative Process / Ex. 5

Deliberative Process / Ex. 5

Deliberative Process / Ex. 5 Let's talk. I have a webinar at 12:30 and trying to bang out the rest of my decision documents.

Silvina Fonseca, Environmental Engineer
Office of Superfund Remediation and Technology Innovation

Phone #: 703-603-8799
Fax #: 703-603-9104

From: Anderson, RobinM
Sent: Monday, September 28, 2015 10:57 AM
To: Fonseca, Silvina
Subject: RE: McCormick and Baxter remedial action summary -- Jim Woolford request

Doug has asked that you and I put together something on PTW related to Portland harbord. Given the discuss below—we probably need to give a nod to this as well. Don't know when this is due but I suspect it is soon. Let me know how you want to work on this. I think that you have information that I may not have.

Robin

From: Fonseca, Silvina
Sent: Monday, September 28, 2015 10:38 AM
To: Woolford, James; Legare, Amy; Rigger, Don; Stalcup, Dana; Fitz-James, Schatzi; Ammon, Doug; Ells, Steve; Charters, David
Cc: Anderson, RobinM
Subject: RE: McCormick and Baxter remedial action summary

The ROD does not identify NAPL and high concentration soil as PTW, but like Jim said they identify them as follows:

"The selected remedy is a series of remedial actions that address the principal threats at the site by treating the most

highly contaminated soil, extracting nonaqueous phase liquid (NAPL) and treating

contaminated groundwater, and capping the most highly contaminated sediment."

Deliberative Process / Ex. 5

Deliberative Process / Ex. 5

It is important to note that the RAOs for sediment are for direct contact only for human and ecological receptors. No RAO associated with risk associated with the consumption of fish. Sediment cleanup goals are for direct contact only. And further the ROD identifies the issue with sediment is related to the NAPL coming from the sediment.

In addition NAPL (considered to be PTW) is further discussed as:

The shallow and intermediate, aquifers at the site are contaminated with large quantities of

NAPL and some related residual dissolved-phase contaminants. No technology exists for

complete removal of all NAPL from the shallow and intermediate aquifers; however, the

selected remedy will remove as much NAPL from the aquifers as is practical and prohibit the

use of the aquifers as.sources of drinking water. Remaining-NAPL will continue to act as a

source of contamination to groundwater, making it technically impracticable to restore

groundwater to drinking water standards

The document does not have a discussion on PTW, as suggested by the ROD Guidance (1999) that came after this ROD was signed. They do discuss the statutory determinations of treatment as a principal element:

11.6 Preference for Treatment as a Principal Element

The selected remedy satisfies the statutory preference for treatment by utilizing treatment as a

main method to permanently reduce the toxicity, mobility, and volume of the most highly

contaminated soil. Biological treatment will be used to reduce PAH and PCP toxicity and

volume, and stabilization will be used to reduce the mobility of arsenic and other metals.

NAPL at the site will be extracted from groundwater and taken for disposal in accordance

with applicable hazardous waste regulations (e.g., incineration), or alternatively, the NAPL

may be reused by another wood-treating facility if such a facility is identified that will

beneficially use the product.

Groundwater extracted with the NAPL will be treated. Biological treatment may be

incorporated as a system component in a new system to reduce the volume of generated

wastes requiring off-site disposal.

In addition, in the comparative analysis section the ROD mentions that any sediment dredging would need approval from DEQ.

9.6.3 Sediment

All sediment cleanup alternatives involve capping which is a well established and reliable

technology. Dredging (SD-3 and SD-4) will increase the complexity of the cleanup due to

the difficulties in preventing releases of sediment contaminants to the river. Similar

institutional controls will be implemented for all sediment alternatives (except no action).

Dredging of contaminated sediment will be restricted or prohibited without prior approval

from DEQ.

Reminder that this ROD also included ACLs which we have had several discussions with the Region on, since it is one of those sites where ACLs were used incorrectly. Region had drafted a ROD Amendment to deal with that issue but they have not signed it. They are waiting to see what happens on Portland Harbor.

Silvina Fonseca, Environmental Engineer
Office of Superfund Remediation and Technology Innovation

Phone #: 703-603-8799
Fax #: 703-603-9104

From: Woolford, James
Sent: Sunday, September 27, 2015 6:30 PM
To: Legare, Amy; Rigger, Don; Stalcup, Dana; Fitz-James, Schatzi; Ammon, Doug; Fonseca, Silvina; Ells, Steve; Charters, David
Subject: RE: McCormick and Baxter remedial action summary

Deliberative Process / Ex. 5

Jim Woolford, Director

Office of Superfund Remediation & Technology Innovation
US EPA

Sent from my Windows Phone
Please excuse typos

From: Legare, Amy
Sent: 9/27/2015 10:04 AM
To: Woolford, James; Rigger, Don; Stalcup, Dana; Fitz-James, Schatzi; Ammon, Doug; Fonseca, Silvina; Ells, Steve; Charters, David
Subject: McCormick and Baxter remedial action summary

Jim, as requested, attached is a summary of the remedial action taken in sediment at McCormick and Baxter.

The ROD was signed in 1996, after the PTW fact sheet was issued, however the ROD did not consider sediment in the determination of PTW. By today's standards the logic used in the comparative analysis would be inadequate. The selected remedy does not use treatment to the maximum extent practical. Capping, instead of dredging or treatment, NAPL in the top 5-7 feet of sediment would probably not be the preferred alternative in 2015.

The five year reviews state that the remedy is protective.

Let me know if you'd like additional information.

Amy Legare

EPA/OSWER/OSRTI/ARD/SARDB

5828 Potomac Yard South

703-347-0124

From: Legare, Amy
Location: Personal Privacy / Ex. 6 - Room 12 Maple
Importance: Normal
Subject: FW: Meeting with Yakama Tribe on FS Review and possibly funding - see attached
Start Date/Time: Thur 9/24/2015 4:30:00 PM
End Date/Time: Thur 9/24/2015 6:00:00 PM
2015-09-01 Yakama FS Review_draft_FS4.docx

-----Original Appointment-----
From: Robinson, Deborah
Sent: Friday, September 18, 2015 12:31 PM
To: Robinson, Deborah; Zhen, Davis; Cora, Lori; Koch, Kristine; Christopher, Anne; Allen, Elizabeth
Cc: Grandinetti, Cami; Legare, Amy; Ells, Steve; Charters, David
Subject: Meeting with Yakama Tribe on FS Review and possibly funding - see attached
When: Thursday, September 24, 2015 9:30 AM-11:00 AM (UTC-08:00) Pacific Time (US & Canada).
Where: Personal Privacy / Ex. 6 - Room 12 Maple

Davis conference line

Technical discussion/FS - Attached is the memo that Rose sent which outlines their comments and questions.

- 9:30 - 10:30 am staff level
- 10:30 - 11:00 check in with management

Rose Longoria
Callie, Bill, Bob - Ridolfi
Tom Zeilman, Attorney
McClure Tosch
Kristine, Elizabeth, Annie, Lori, Davis, Cami (optional)
Remainder of team will be invited as optional.

2. Funding for PP and development of ROD - I will try to handle this topic by telephone so that a meeting is not necessary.
Debbie, Kristine and Annie (if desired), Lori (if needed), Davis/Cami

NOTES from Conversation with Rose:

1. Need more clarity on how EPA is evaluating some things e.g., ARARs and protection of HH&E. I asked Rose to tell us more about what she hopes to accomplish so that we can

be prepared.

2. Funding: LWG will not provide funding for moving forward with drafting PP

Cooperative Agreement - Harbor Oil - could not be more than $30,000/year. Their costs went over the $30,000, and Yakama did not get authorization for it. ***Will there be a limit on funding?***

Rose has a budget that was proposed to LWG group - they are funding part of it but not the part related to PP.
Rose will send me the email if approved to do so by her attorney.
Yakama's overall budget for FY 16 is $299,406.

- RI/FS LWG will pay
- PP and ROD - $134,216
- Consultation costs - LWG will pay

Options - go directly to some funding parties within LWG -
Getting ready to request authorization for litigation (costs related to PP and development of ROD) have something in place so that they can file a complaint to get costs recovered if not able to get the costs covered.

What will administrative process be and timing - for application and procedure for coop agreement?

Expect to stay on budget.

To: Anderson, RobinM[Anderson.RobinM@epa.gov]
From: Legare, Amy
Sent: Wed 9/23/2015 7:42:03 PM
Subject: RE: ARAR issues: FW: Yakama Significant Issues with the draft PH FS
2015-08-04_Portland Harbor FS Section 4.doc

Robin – here is the section of the FS in question. Section 4.2.2.2 page 4-15 is where the text starts.

From: Anderson, RobinM
Sent: Tuesday, September 22, 2015 12:05 PM
To: Legare, Amy
Subject: RE: ARAR issues: FW: Yakama Significant Issues with the draft PH FS

I am working at home on Wed and Thursday. – cell phone is Personal Privacy / Ex. 6 home is Personal Privacy / Ex. 6 Personal Privacy / Ex. 6

My calendar is up to date – at this time Wed is the best day. Seems I am available until 2:00.

From: Legare, Amy
Sent: Tuesday, September 22, 2015 11:12 AM
To: Anderson, RobinM
Subject: ARAR issues: FW: Yakama Significant Issues with the draft PH FS

Robin – this is Portland Harbor. We have a call with R10 and the tribe at 12:30pm on Thursday. Please let Silvina and I know if you'll have time to discuss the issues before Thursday's call.

From: Woolford, James
Sent: Thursday, September 17, 2015 8:37 PM
To: Stalcup, Dana; Fonseca, Silvina; Legare, Amy; Charters, David; Ells, Steve; Gartner, Lois
Subject: FW: Yakama Significant Issues with the draft PH FS

Jim Woolford, Director
Office of Superfund Remediation & Technology Innovation
US EPA

Sent from my Windows Phone
Please excuse typos

From: Robinson, Deborah
Sent: 9/17/2015 4:37 PM
To: Woolford, James; McLerran, Dennis
Subject: FW: Yakama Significant Issues with the draft PH FS

From: Koch, Kristine
Sent: Friday, September 11, 2015 9:02 AM
To: Zhen, Davis; Robinson, Deborah
Subject: FW: Significant Issues with

FYI…

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
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Seattle, Washington 98101-3140

(206)553-6705
(206)553-8581 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: Rose Longoria [mailto:rose@yakamafish-nsn.gov]
Sent: Wednesday, September 02, 2015 3:05 PM
To: Koch, Kristine
Cc: Sheldrake, Sean; Allen, Elizabeth; Grandinetti, Cami; callie@ridolfi.com; Tom Zeilman; tosm@yakamafish-nsn.gov; Paul Ward; Lee Carlson
Subject: Significant Issues with the draft PH FS

Hello Kristine -

Attached is a memo highlighting some significant concerns regarding the Portland Harbor draft Feasibility Study. I suggest meeting in person to discuss these concerns in more detail. I respect the fact that you are busy and will have no time prior to the release of the conceptual remedy, so I propose meeting after the release of the conceptual remedy document. Would a meeting on September 22nd work for your schedule?

Also, the LWG has determined that they will not funding Yakama Nation's work on the development of the proposed plan or ROD since these activities are not part of the AOC. I would like to discuss this issue with EPA, but I am unsure if this discussion would be with you, Cami Grandinetti, or Rick Albright. Your guidance on who I should contact would be greatly appreciated.

Thank you,

rose

--

Rose Longoria

Regional Superfund Projects Manager

COLUMBIA RIVER | Honor. Protect. Restore.

Yakama Nation Fisheries

PO Box 151

Toppenish, WA 98948
509-865-5121 x6365
rose@yakamafish-nsn.gov

To: Anderson, RobinM[Anderson.RobinM@epa.gov]
From: Fonseca, Silvina
Sent: Thur 8/27/2015 4:13:20 PM
Subject: FW: Portland Harbor FS Section 4
2015-08-18 Portland Harbor FS Section 4.doc
2015-08-18 Section 4 Tables.xlsx
2015-08-18 Table 4.3-1_Comparative Analysis.docx
2015-08-18 Table 4.3-2 Qualitative Comparative Analysis.docx
2015-08-18 Appendix F_HST Evaluation.pdf
2015-08-18 Appendix G_Cost.pdf
2015-08-18 Appendix H_Residual Risk.pdf
2015-08-18 Appendix I_Rolling Rivermile Curves.pdf
2015-08-18 Appendix J_404 mitigation strategy.pdf
Figure 4.1-4_Absolute Bathymetric Change.pdf
Figure 4.1-5a-h_Bathymetry Compare Maps.pdf
Figure 4.1-6_2007_2012 Fish Tissue Data.pdf

Silvina Fonseca, Environmental Engineer
Office of Superfund Remediation and Technology Innovation

Phone #: 703-603-8799
Fax #: 703-603-9104

From: Koch, Kristine
Sent: Wednesday, August 19, 2015 12:06 AM
To: Alex Liverman (liverman.alex@deq.state.or.us); Allen, Elizabeth; Audie Huber (audiehuber@ctuir.com); Blischke, Eric; brandy.humphreys@grandronde.org; Brian Cunninghame (cunninghame@gorge.net); callie@ridolfi.com; Christopher, Anne; Coffey, Scott; Conley, Alanna; Courtney Johnson (courtney@crag.org); Elmer Ward; Fuentes, Rene; Personal Privacy / Ex. 6 Personal Privacy / Ex. 6; Gail Fricano (gfricano@indecon.com); Genevieve Angle (Genevieve.Angle@noaa.gov); Hagerman, Paul; Holly Partridge (Holly.Partridge@grandronde.org); JD Williams (jd@williamsjohnsonlaw.com); Jeanette Mullin (mullinjm@cdmsmith.com); peterson.Jennifer@deq.state.or.us; Jeremy_Buck@fws.gov; Julie Weis (jweis@hk-law.com); Gustavson, Karl; Matt McClincy (mcclincy.matt@deq.state.or.us); Michael.karnosh@grandronde.org; poulsen.mike@deq.state.or.us; Morrison, Kay; Paul Bianco; rdelvecchio@indecon.com DelVecchio; Rita Cabral (rcabral@indecon.com); Robert.Neely@noaa.gov; Robinson, Deborah; rose@yakamafish-nsn.gov; Sheldrake, Sean; Shephard, Burt; Todd King (kingtw@me.com); tomd@ctsi.nsn.us; Tom Roick (roick.tom@deq.state.or.us); Zhen, Davis
Cc: Fonseca, Silvina; Legare, Amy; Ells, Steve; Charters, David
Subject: FW: Portland Harbor FS Section 4

Included in this email is Section 4 of the Portland Harbor Draft Final FS for your review and comment per the Portland Harbor MOU. This has also been provided to the LWG for their review and comment. Please see the directions to download the remainder of the figures, below.

Due to the heightened interest in this project, parties beyond the LWG, MOU partners and CAG may receive copies of the transmitted information. Therefore, the following provides an update of where we are in the process and steps we expect to occur over the next several months. If any party requests a copy of this information, please provide a copy of this email, too.

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
Region 10
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Seattle, Washington 98101-3140

(206)553-6705
(206)553-8581 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: Koch, Kristine
Sent: Tuesday, August 18, 2015 8:58 PM
To: Bob Wyatt (rjw@nwnatural.com); Jim McKenna (jim.mckenna@verdantllc.com)
Cc: Jennifer Woronets (jworonets@anchorqea.com)
Subject: Portland Harbor FS Section 4

Jim and Bob – EPA's draft modifications to the 2011 Draft FS submitted by the LWG regarding the detailed evaluation of the alternatives and comparative analysis is attached. The figures are attached and the rest are provided in the FTP link, below. This information has been combined into a new Section 4 and Appendices F, G, H, I and J for the draft Final FS. Per the agreed process between the LWG and EPA, the LWG has 15 days to identify significant issues and until October 10, 2015 to review and provide comments to EPA from the time they receive FS Section 4. Therefore, the LWG is to identify significant issues by September 2, 2015. Additionally, if you have any technical issues that you would like to discuss in this time frame, please contact me. Further, per the agreed process, any issues raised during the 30-day review period are to be

resolved within the subsequent 14-day period.

Regards,

Kristine

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Use the following password when prompted:

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EPA is transmitting Section 4 of the Portland Harbor Draft Final Feasibility Study for review and comment to the Lower Willamette Group (LWG), the Oregon Department of Environmental Quality (ODEQ), six federally recognized tribal governments, other federal and state partners, and the Community Advisory Group (CAG). These parties are receiving these documents because they have been working with EPA under special agreements in developing the Remedial Investigation and Feasibility Study for the Portland Harbor Superfund Site.

Section 4 presents the detailed evaluation of 7 NCP criteria, 2 threshold criteria and 5 balancing criteria, and a comparative analysis of the alternatives.

EPA is working to address concerns that have been raised both regionally and nationally regarding how it addresses sediment sites. The EPA draft FS is responsive to many of the

concerns in the following specific ways:

•□□□□□□□□ Regional and Headquarters staff and management are working together to ensure the FS complies with CERCLA, the NCP, EPA policy and guidance. The Headquarters team has experience with sediment sites nation-wide. Therefore, lessons learned at other sites including sediment sites, are used to inform decision-making at Portland Harbor.

•□□□□□□□□ EPA is including an appropriate range of technologies to address contaminated sediment such as dredging, capping, enhanced monitored natural recovery, monitored natural recovery, ex-situ treatment, in-situ treatment and institutional controls.

•□□□□□□□□ EPA has evaluated and is including natural recovery in all cleanup alternatives.

•□□□□□□□□ EPA's evaluation of remedial alternatives is focused on risk reduction with achievable cleanup goals over the long term.

•□□□□□□□□ When developing the alternatives, EPA will consider the environmental conditions of the river (erosional, transitional or depositional) the current and potential future uses (industrial, recreational, etc.) and will seek to limit the use restrictions. For example:

o EPA will consider limiting the use of caps in locations where commercial and shipping activities occur.

o EPA will also consider future navigation and maintenance dredging when determining the appropriate cleanup technology.

o Appropriate beach material will be placed in sediment cleanup locations that serve as public access points for recreation or wildlife habitat.

Next Steps

Internal EPA meeting with the National Remedy Review Board (NRRB) and the Contaminated Sediment Technical Advisory Group (CSTAG) is scheduled for November 18 and 19 in Portland, Oregon. EPA policy requires a conceptual remedy to be presented to the NRRB and the CSTAG for internal review prior to issuing the Proposed Plan for sites where cleanup will cost more than $50 million. The Portland Harbor cleanup will require this review. The NRRB and CSTAG review conceptual remedies to ensure national consistency with CERCLA, the NCP, and EPA policies and guidances. Both groups also take into consideration past practice at sites similar magnitude and provide advisory recommendations for the concept remedy. The EPA Portland Harbor team will use the advisory recommendations from the NRRB and CSTAG in developing the Proposed Plan. The LWG, ODEQ, six federally recognized tribal governments, and CAG can provide input to the NRRB and CSTAG on the concept remedy. To facilitate their ability to provide input, EPA will share the concept remedy with these parties on September 18, 2015.

EPA expects to release a proposed cleanup plan for public review and comment in the spring of 2016. EPA has several internal steps to complete before releasing the Proposed Plan.

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
Region 10
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Seattle, Washington 98101-3140

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(206)553-8581 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

To: Anderson, RobinM[Anderson.RobinM@epa.gov]; Scozzafava, MichaelE[Scozzafava.MichaelE@epa.gov]; Walker, Stuart[Walker.Stuart@epa.gov]; Fonseca, Silvina[Fonseca.Silvina@epa.gov]; Stalcup, Dana[Stalcup.Dana@epa.gov]; Fitz-James, Schatzi[Fitz-James.Schatzi@epa.gov]
From: Ammon, Doug
Sent: Fri 7/31/2015 9:22:49 PM
Subject: Re: Portland Harbor -- Requested Information by Jim Woolford for his trip to Region 10 next week.

I think Jim is looking to relate PT determination at Portland Harbor with our guidance. While this may be good background information, it does get to the specifics in the draft FS.

From: Anderson, RobinM
Sent: Friday, July 31, 2015 5:09 PM
To: Ammon, Doug; Scozzafava, MichaelE; Walker, Stuart; Fonseca, Silvina; Stalcup, Dana; Fitz-James, Schatzi
Subject: Portland Harbor -- Requested Information by Jim Woolford for his trip to Region 10 next week.

Deliberative Process / Ex. 5

The Principal Threat Waste guidance notes the following:

Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained or would present a significant risk to human health or the environment should exposure occur. They include liquids and other highly mobile materials (e.g., solvents) or materials having high concentrations of toxic compounds. No "threshold level" of toxicity/risk has been established to equate to "principal threat." However, where toxicity and mobility of source material combine to pose a potential risk of 10^{-3} or greater, generally treatment alternatives should be evaluated.

The 10-3 excess cancer is just one example of something that could be a Principal Threat Waste. Other things that could also be a Principal threat Waste are materials are volatiles, mobile in the environment (so they would bleed into the groundwater at levels above protective levels) that might be wind blown, etc.

Deliberative Process / Ex. 5

Deliberative Process / Ex. 5

I would like to schedule a meeting on this with management the week after next.

Thank you

Robin M Anderson

OSRTI/ARD/SARDB

703-603-8747

To: Anderson, RobinM[Anderson.RobinM@epa.gov]
From: Ammon, Doug
Sent: Fri 7/31/2015 2:34:47 PM
Subject: Principal Threat information for Jim

Robin,

Deliberative Process / Ex. 5

Oregon Environment Laws and Regulations
Codified Regulations
Chapter 340 Department of Environmental Quality
Division 122 Hazardous Substances Remedial Action Rule

340-122-0115 Definitions

(32) “Hot spots of contamination” means:

(a) For groundwater or surface water, hazardous substances having a significant adverse effect on beneficial uses of water or waters to which the hazardous substances would be reasonably likely to migrate and for which treatment is reasonably likely to restore or protect such beneficial uses within a reasonable time, as determined in the feasibility study; and

(b) For media other than groundwater or surface water, (e.g., contaminated soil, debris, sediments, and sludges; drummed wastes; “pools” of dense, non-aqueous phase liquids submerged beneath groundwater or in fractured bedrock; and non-aqueous phase liquids floating on groundwater), if hazardous substances present a risk to human health or the environment exceeding the acceptable risk level, the extent to which the hazardous substances:

(A) Are present in concentrations exceeding risk-based concentrations corresponding to:

(i) 100 times the acceptable risk level for human exposure to each individual carcinogen;

(ii) 10 times the acceptable risk level for human exposure to each individual noncarcinogen; or

(iii) 10 times the acceptable risk level for exposure of individual ecological receptors or populations of ecological receptors to each individual hazardous substance.

(B) Are reasonably likely to migrate to such an extent that the conditions specified in subsection (a) or paragraphs (b)(A) or (b)(C) would be created; or

(C) Are not reliably containable, as determined in the feasibility study.

From: Anderson, RobinM
Sent: Friday, July 31, 2015 9:24 AM
To: Ammon, Doug
Subject: RE: IROD Excerpts

Thank you - -will get back to you.

From: Ammon, Doug
Sent: Friday, July 31, 2015 8:50 AM

To: Anderson, RobinM
Subject: Fwd: IROD Excerpts

DCA Iphone

Begin forwarded message:

From: "Ammon, Doug" <Ammon.Doug@epa.gov>
Date: July 22, 2015 at 10:44:43 AM EDT
To: Silvina Fonseca <Fonseca.Silvina@epa.gov>
Subject: FW: IROD Excerpts

From: Woolford, James
Sent: Wednesday, July 22, 2015 9:39 AM
To: Ammon, Doug; Stalcup, Dana
Subject: FW: IROD Excerpts

Jim Woolford, Director

Office of Superfund Remediation and Technology Innovation

Office of Solid Waste and Emergency Response

US Environmental Protection Agency

1200 Penn. Ave., NW

Washington, DC 20460

(Mail Code 5201-P)

Phone: (703) 603 8960– Main Office Line

Physically located at:

Room 5622

One Potomac Yard (South)
2777 S. Crystal Dr.
Arlington, VA 22202

To: Anderson, RobinM[Anderson.RobinM@epa.gov]
From: Fonseca, Silvina
Sent: Mon 6/29/2015 7:27:10 PM
Subject: FW: Portland Harbor - Ex-situ treatment

Silvina Fonseca, Environmental Engineer
Office of Superfund Remediation and Technology Innovation

Phone #: 703-603-8799
Fax #: 703-603-9104

From: Koch, Kristine
Sent: Friday, June 26, 2015 1:14 PM
To: Ells, Steve; Fonseca, Silvina; Legare, Amy
Cc: Allen, Elizabeth; Christopher, Anne
Subject: RE: Portland Harbor - Ex-situ treatment

Even better.

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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(206)553-8581 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: Ells, Steve
Sent: Friday, June 26, 2015 8:09 AM
To: Koch, Kristine; Fonseca, Silvina; Legare, Amy
Cc: Allen, Elizabeth; Christopher, Anne
Subject: RE: Portland Harbor - Ex-situ treatment

I understand that and think we are in agreement, note the title of that section is "NCP Expectations", which trumps the PTW memo.

From: Koch, Kristine
Sent: Friday, June 26, 2015 11:05 AM
To: Ells, Steve; Fonseca, Silvina; Legare, Amy
Cc: Allen, Elizabeth; Christopher, Anne
Subject: RE: Portland Harbor - Ex-situ treatment

Steve – See highlighted text on page 1 from PTW guidance.

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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Seattle, Washington 98101-3140

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(206)553-8581 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: Ells, Steve
Sent: Friday, June 26, 2015 7:57 AM
To: Koch, Kristine; Fonseca, Silvina; Legare, Amy
Cc: Allen, Elizabeth; Christopher, Anne
Subject: RE: Portland Harbor - Ex-situ treatment

I don't think the PTW policy considers cost-effectiveness. Although more costly, it is practicable to treat PCBs in dredged sediments prior to landfilling and to treat PCB in-situ with broadcasting GAC, or with GAC as a layer in a cap. We need to rely on the NCP and CERCLA requirement for cost-effectiveness when comparing alternatives to not include treatment in a proposed remedy.

From: Koch, Kristine
Sent: Thursday, June 25, 2015 2:34 PM
To: Ells, Steve; Fonseca, Silvina; Legare, Amy
Cc: Allen, Elizabeth; Christopher, Anne
Subject: Portland Harbor - Ex-situ treatment

I drafted some language for ex-situ treatment based on our discussion yesterday. Let me know if you have any edits or concerns.

Thanks!!!

Ex-Situ Treatment

Deliberative Process / Ex. 5

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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(206)553-8581 (fax)
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To: Anderson, RobinM[Anderson.RobinM@epa.gov]
From: Fonseca, Silvina
Sent: Mon 6/29/2015 7:26:21 PM
Subject: FW: Portland Harbor - Ex-situ treatment
kk highlight_PTW Guidance.pdf

Silvina Fonseca, Environmental Engineer
Office of Superfund Remediation and Technology Innovation

Phone #: 703-603-8799
Fax #: 703-603-9104

From: Koch, Kristine
Sent: Friday, June 26, 2015 11:05 AM
To: Ells, Steve; Fonseca, Silvina; Legare, Amy
Cc: Allen, Elizabeth; Christopher, Anne
Subject: RE: Portland Harbor - Ex-situ treatment

Steve – See highlighted text on page 1 from PTW guidance.

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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Cc: Allen, Elizabeth; Christopher, Anne

Subject: RE: Portland Harbor - Ex-situ treatment

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Sent: Thursday, June 25, 2015 2:34 PM
To: Ells, Steve; Fonseca, Silvina; Legare, Amy
Cc: Allen, Elizabeth; Christopher, Anne
Subject: Portland Harbor - Ex-situ treatment

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Thanks!!!

Ex-Situ Treatment

Deliberative Process / Ex. 5

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

To: Ells, Steve[Ells.Steve@epa.gov]
Cc: Legare, Amy[Legare.Amy@epa.gov]; Ammon, Doug[Ammon.Doug@epa.gov]; Scozzafava, MichaelE[Scozzafava.MichaelE@epa.gov]; Anderson, RobinM[Anderson.RobinM@epa.gov]
From: Fonseca, Silvina
Sent: Wed 5/27/2015 3:40:12 PM
Subject: RE: PH - Discuss comments on revised Section 3 of draft FS

Can you let me know what big issues you still have, if you can. We will have the line open. You can also contact me on email if you need to reach me. We also have a 3 pm with the TCT.

Silvina Fonseca, Environmental Engineer
Office of Superfund Remediation and Technology Innovation

Phone #: 703-603-8799
Fax #: 703-603-9104

From: Ells, Steve
Sent: Wednesday, May 27, 2015 11:36 AM
To: Fonseca, Silvina; Legare, Amy; Anderson, RobinM; Charters, David; Gustavson, Karl; Koch, Kristine; Allen, Elizabeth; Sheldrake, Sean
Cc: Ammon, Doug; Stalcup, Dana; Grandinetti, Cami; Scozzafava, MichaelE
Subject: RE: PH - Discuss comments on revised Section 3 of draft FS

I have not completed my review of this new version and have two fire drills I need to attend to today. I may be able to join in later.

Steve

From: Fonseca, Silvina
Sent: Wednesday, May 27, 2015 11:24 AM
To: Ells, Steve; Legare, Amy; Anderson, RobinM; Charters, David; Gustavson, Karl; Koch, Kristine; Allen, Elizabeth; Sheldrake, Sean
Cc: Ammon, Doug; Stalcup, Dana; Grandinetti, Cami
Subject: PH - Discuss comments on revised Section 3 of draft FS

Personal Privacy / Ex. 6

Silvina Fonseca, Environmental Engineer
Office of Superfund Remediation and Technology Innovation

Phone #: 703-603-8799
Fax #: 703-603-9104

To: Anderson, RobinM[Anderson.RobinM@epa.gov]; Openchowski, Charles[openchowski.charles@epa.gov]; Fonseca, Silvina[Fonseca.Silvina@epa.gov]
Cc: Koch, Kristine[Koch.Kristine@epa.gov]; Sheldrake, Sean[sheldrake.sean@epa.gov]
From: Cora, Lori
Sent: Thur 5/14/2015 6:06:06 PM
Subject: RE: Oregon Hazardous Waste -- pesticide rule -- ARAR question

Attorney Client / Ex. 5

I agree that there may be good stuff to be used as RAR which will be a technical call by the RPMs.

Lori Houck Cora | **Assistant Regional Counsel**
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Anderson, RobinM
Sent: Thursday, May 14, 2015 10:58 AM
To: Cora, Lori; Openchowski, Charles; Fonseca, Silvina
Cc: Koch, Kristine; Sheldrake, Sean
Subject: RE: Oregon Hazardous Waste -- pesticide rule -- ARAR question

Attorney Client / Ex. 5

In looking through the list below – some looks like procedural elements:

(-OAR 340-093-0130, Site Characterization Report;

-OAR 340-093-0140, Detailed Plans and Specifications;

-OAR 340-093-0150, Construction Certification;

Some such as waste characterization to determine if it is RCRA HW does not seem relevant.

Getting them to talk about what is in each of the substantive requirements and why they think that it should constitute RAR would be helpful.

Thank you

Robin M Anderson

OSRTI/ARD/SARDB

703-603-8747

From: Cora, Lori
Sent: Thursday, May 14, 2015 1:48 PM
To: Anderson, RobinM; Openchowski, Charles; Fonseca, Silvina
Cc: Koch, Kristine; Sheldrake, Sean
Subject: FW: Oregon Hazardous Waste -- pesticide rule -- ARAR question

Hi, Robin. In case I forgot to forward this recent State ARAR communication to you, here it is. Again, any input you have as to whether disposal of contaminated media on-site is disposal of solid waste would be helpful in any further discussions I have with Oregon on their proposed ARARs list below.

Lori Houck Cora | **Assistant Regional Counsel**
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Vrooman Gary L [mailto:Gary.L.Vrooman@doj.state.or.us]
Sent: Monday, May 11, 2015 8:38 AM
To: Cora, Lori
Subject: RE: Oregon Hazardous Waste -- pesticide rule -- ARAR question

Lori,

Here are DEQ's answers to your questions below.

1) Yes, DEQ would view an in-water CDF complying with substantive ARAR requirements of 404 or MSPRA as meeting the substantive requirements of the HWIR.

2) Not in circumstances where the substantive requirements of the HWIR rule were met as in question 1.

3) DEQ does believe that substantive solid waste requirements are ARARs for CDFs if the CERCLA remedy requirements for the CDFs are not otherwise at least as protective as the solid waste requirements. The substantive requirements DEQ believes might be applicable to a CDF, depending on the other controls established by the CERCLA remedy, are located in OAR Chapter 340 division 093 and 095, including specifically the applicable portions of the following:

-OAR 340-093-0130, Site Characterization Report;

-OAR 340-093-0140, Detailed Plans and Specifications;

-OAR 340-093-0150, Construction Certification;

-OAR 340-093-0170, Cleanup Materials Contaminated with Hazardous Substances;

-OAR 340-093-0190, Wastes Requiring Special Management;

-OAR 340-095-0010, Location Restrictions;

-OAR 340-095-0020, Operating Criteria;

-OAR 340-095-0030, Design Criteria;

-OAR 340-095-0050(1) & (2), Groundwater Monitoring;

-OAR 340-095-0070(2), Closure Requirements.

Please let me know if you need any more information.

Gary Vrooman

Assistant Attorney General

Natural Resources Section

Oregon Department of Justice

971.673.1878.

From: Vrooman Gary L
Sent: Monday, April 13, 2015 4:45 PM
To: 'Cora, Lori'
Subject: RE: Oregon Hazardous Waste -- pesticide rule -- ARAR question

Hi Lori,

We will review this and get back to you.

Gary Vrooman

Assistant Attorney General

Natural Resources Section

Oregon Department of Justice

From: Cora, Lori [mailto:Cora.Lori@epa.gov]
Sent: Monday, April 13, 2015 4:41 PM
To: Vrooman Gary L
Cc: Koch, Kristine; Sheldrake, Sean
Subject: Oregon Hazardous Waste -- pesticide rule -- ARAR question

Hello, Gary. Hope all is well. As EPA continues to develop the Portland Harbor Feasibility Study and the cleanup alternatives, we would like some clarity on DEQ's view of its application of Oregon solid and hazardous waste regulations as they may relate to placement of dredged material in an in-water disposal facility. Attached is previous correspondence we have gotten from DEQ regarding the HWIR rule and its application to dredged material taken from the Arkema site. This correspondence is clear that its hazardous waste characterization and disposal requirements would apply to any upland disposal outside the jurisdiction of a 404 permit or permit under MSPA. But leaves in question whether a CDF authorized by a CERCLA ROD is "subject to a permit that has been issued under Clean Water Act

(CWA) section 404 or the Marine Protection, Research and Sanctuaries Act (MPRSA)". Also, in earlier discussions about the Port of Portland's design of the CDF, DEQ indicated it may see that its solid waste regulations may have some application to an in-water disposal site even though the material being placed in the CDF is contaminated media and would be meeting the substantive criteria of Section 404 of the Clean Water Act.

Our questions are:

1. Does DEQ view an in-water CDF or other type of in-water disposal facility authorized by a CERCLA ROD and designed and constructed to meet the substantive requirements of Section 404 of the Clean Water Act as meeting the substantive conditions of Oregon's HWIR exemption to hazardous waste characterization and disposal requirements? If not, can you explain why not and provide the hazardous waste regulations DEQ would apply to an in-water disposal facility?

2. Would DEQ apply its pesticide residue rule to Arkema dredged sediment if placed in an in-water disposal facility authorized by a CERCLA ROD?

3. What Oregon solid waste regulations, if any, does DEQ believe are applicable or relevant and appropriate to the design and management of an in-water disposal facility selected under a CERCLA ROD?

As EPA is currently considering the screening of technologies, including disposal options, and developing the remedial alternatives for further 7 criteria analysis, we would appreciate your responses as soon as possible, but at least by early May. Thanks. If you have questions or wish to discuss our request, please don't hesitate to call me.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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This e-mail may contain information that is privileged, confidential, or otherwise exempt from disclosure under applicable law. If you are not the addressee or it appears from the context or otherwise that you have received this e-mail in error, please advise me immediately by reply e-mail, keep the contents confidential, and immediately delete the message and any attachments from your system.

****

To: Anderson, RobinM[Anderson.RobinM@epa.gov]; Openchowski, Charles[openchowski.charles@epa.gov]
From: Cora, Lori
Sent: Thur 5/14/2015 3:25:30 PM
Subject: RE: Portland Harbor -- Oregon Std and ICs -- follow-up from discussion on ICs last night on call I was not on.

Attorney Client / Ex. 5

465.315 Standards for degree of cleanup required; Hazard Index; risk protocol; hot spots of contamination; exemption; rules. (1)(a) Any removal or remedial action performed under the provisions of ORS 465.200 to 465.545 and 465.900 shall attain a degree of cleanup of the hazardous substance and control of further release of the hazardous substance that assures protection of present and future public health, safety and welfare and of the environment.

(b) The Director of the Department of Environmental Quality shall select or approve remedial actions that are protective of human health and the environment. The protectiveness of a remedial action shall be determined based on application of both of the following:

(A) The acceptable risk level for exposures. For protection of humans, the acceptable risk level for exposure to individual carcinogens shall be a lifetime excess cancer risk of one per one million people exposed, and the acceptable risk level for exposure to noncarcinogens shall be the exposure that results in a Hazard Index number equal to or less than one. “Hazard Index number” means a number equal to the sum of the noncarcinogenic risks (hazard quotient) attributable to systemic toxicants with similar toxic endpoints. For protection of ecological receptors, if a release of hazardous substances causes or is reasonably likely to cause significant adverse impacts to the health or viability of a species listed as threatened or endangered pursuant to 16 U.S.C. 1531 et seq. or ORS 496.172, or a population of plants or animals in the locality of the facility, the acceptable risk level shall be the point before such significant adverse impacts occur.

(B) A risk assessment undertaken in accordance with the risk protocol established by the Environmental Quality Commission in accordance with subsection (2)(a) of this section.

(c) A remedial action may achieve protection of human health and the environment through:

(A) Treatment that eliminates or reduces the toxicity, mobility or volume of hazardous substances;

(B) Excavation and off-site disposal;

(C) Containment or other engineering controls;

(D) Institutional controls;

(E) Any other method of protection; or

(F) A combination of the above.

Lori Houck Cora | **Assistant Regional Counsel**
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Anderson, RobinM
Sent: Thursday, May 14, 2015 7:30 AM
To: Cora, Lori; Openchowski, Charles
Subject: FW: Portland Harbor -- Oregon Std and ICs -- follow-up from discussion on ICs last night on call I was not on.

The the stuff below and reading 340-122-0115 (definition that mentions HI of 1 and 10-5 excess cancer is in 047 which is referenced in 040 which is the standards sections has the following:

"The fifth bullet should be about resolution of the State's cleanup standards that do not account for anthropogenic background. We discussed whether an ARAR waiver may be needed. The specific regulation is OAR 340-122-040(2) under Standards:

(2) In the event of a release of a hazardous substance, remedial actions shall be implemented to achieve:

(a) Acceptable risk levels defined in OAR 340-122-0115, as demonstrated by a residual risk

assessment; or

(b) Numeric cleanup standards developed as part of an approved generic remedy identified or developed by the Department under OAR 340-122-0047, if applicable; or

(c) For areas where hazardous substances occur naturally, the background level of the hazardous substances, if higher than those levels specified in subsections (2)(a) through (2)(b) of this rule."

Attorney Client / Ex. 5

340-122-0040

Standards

(1) Any removal or remedial action shall address a release or threat of release of hazardous substances in a manner that assures protection of present and future public health, safety, and welfare, and the environment.

(2) In the event of a release of a hazardous substance, remedial actions shall be implemented to achieve:

(a) Acceptable risk levels defined in OAR 340-122-0115, as demonstrated by a residual risk assessment; or

(b) Numeric cleanup standards developed as part of an approved generic remedy identified or developed by the Department under OAR 340-122-0047, if applicable; or

(c) For areas where hazardous substances occur naturally, the background level of the hazardous substances, if higher than those levels specified in subsections (2)(a) through (2)(b) of this rule.

(3) In the event of a release of methane from a historic solid waste landfill, removal or remedial actions shall be implemented to prevent concentrations of methane exceeding or likely to exceed 1.25% by volume in confined spaces and structures, other than in equipment, piping, wells, or other structures designed for the collection and management of methane and approved by the Department.

(4) In the event of a release of hazardous substances to groundwater or surface water constituting a hot spot of contamination, treatment shall be required in accordance with OAR 340-122-0085(5) and 340-122-0090.

(5) A removal or remedial action shall prevent or minimize future releases and migration of hazardous substances in the environment. A removal or remedial action and related activities shall not result in greater environmental degradation than that existing when the removal or remedial action commenced, unless short-term degradation is approved by the Director under OAR 340-122-0050(4).

(6) A removal or remedial action shall provide long-term care or management, as necessary and appropriate, including but not limited to monitoring, operation, maintenance, and periodic review.

Stat. Auth.: ORS 465.400(1), 466 & 468.020
Stats. Implemented: ORS 465.200 - 465.455 & 465.900
Hist.: DEQ 26-1988, f. & cert. ef. 9-16-89; DEQ 12-1992, f. & cert. ef. 6-9-92; DEQ 2-1997, f. & cert. ef. 2-7-97; DEQ 3-2002(Temp), f. 2-21-02 thru 8-20-02; DEQ 9-2002, f. & cert. ef. 8-22-02; DEQ 3-2006, f. & cert. ef. 3-17-06

From: Fonseca, Silvina
Sent: Thursday, May 14, 2015 10:05 AM
To: Anderson, RobinM
Subject: FW: 4/8 EPA/DEQ Next Steps and 4/21 Execs Schedule

FYI…

Silvina Fonseca, Environmental Engineer
Office of Superfund Remediation and Technology Innovation

Phone #: 703-603-8799
Fax #: 703-603-9104

From: Stalcup, Dana
Sent: Wednesday, May 13, 2015 6:34 PM

To: Ammon, Doug; Fonseca, Silvina; Legare, Amy; Ells, Steve; Charters, David; Gustavson, Karl
Subject: FW: 4/8 EPA/DEQ Next Steps and 4/21 Execs Schedule

I think this is the note that might have been discussed today….

Dana Stalcup

Director, Assessment and Remediation Division

OSWER/Office of Superfund Remediation and Technology Innovation (OSRTI)

Desk – 703-603-8702

Cell – 202-309-5473

From: PARRETT Kevin [mailto:Parrett.Kevin@deq.state.or.us]
Sent: Friday, April 10, 2015 12:20 PM
To: Robinson, Deborah; Grandinetti, Cami; Yamamoto, Deb; Cohen, Lori; Koch, Kristine; Sheldrake, Sean; Muza, Richard; Christopher, Anne; Allen, Elizabeth; Cora, Lori; Conley, Alanna; DECONCINI Nina; JOHNSON Keith; GAINER Tom; MCCLINCY Matt; gilles.bruce@deq.state.or.us; Fonseca, Silvina; Legare, Amy; Stalcup, Dana; Ammon, Doug
Subject: RE: 4/8 EPA/DEQ Next Steps and 4/21 Execs Schedule

Hi Debbie. The fifth bullet should be about resolution of the State's cleanup standards that do not account for anthropogenic background. We discussed whether an ARAR waiver may be needed. The specific regulation is OAR 340-122-040(2) under Standards:

(2) In the event of a release of a hazardous substance, remedial actions shall be implemented to achieve:

(a) Acceptable risk levels defined in OAR 340-122-0115, as demonstrated by a residual risk assessment; or

(b) Numeric cleanup standards developed as part of an approved generic remedy identified or developed by the Department under OAR 340-122-0047, if applicable; or

(c) For areas where hazardous substances occur naturally, the background level of the hazardous substances, if higher than those levels specified in subsections (2)(a) through (2)(b)

of this rule.

-Kevin

From: Robinson, Deborah [mailto:Robinson.Deborah@epa.gov]
Sent: Wednesday, April 08, 2015 3:42 PM
To: Grandinetti, Cami; Yamamoto, Deb; Cohen, Lori; Koch, Kristine; Sheldrake, Sean; Muza, Richard; Christopher, Anne; Allen, Elizabeth; Cora, Lori; Conley, Alanna; DECONCINI Nina; PARRETT Kevin; JOHNSON Keith; GAINER Tom; MCCLINCY Matt; GILLES Bruce A; Fonseca, Silvina; Legare, Amy; Stalcup, Dana; Ammon, Doug
Subject: 4/8 EPA/DEQ Next Steps and 4/21 Execs Schedule

Please forward this to whoever should receive it:

EPA/DEQ Monthly Meeting - 4/8/15

Next Steps:

- Lori Cohen - Invite Dana to the LWG meeting next week.
- Cami/Debbie - Set up briefing for Dick and Dennis on FS Sec 3 and 4 prior to 7/29
- Kristine/Debbie - Be sure TCT understands that we will not release preferred alternative prior to completion of Sec 4 comments.
- Cami - Send Kevin sample conceptual remedy and that state's package submitted to NRRB.
- Debbie/Kristine - Are Fed agencies invited to present to Board? Follow up on how many presentations to expect.
- Cami - talk to Lori Cora - Future conversation on background (?) Involve Silvina and Robin.
- Matt - DEQ find out about which WQS to use and let EPA know.
- Debbie/Cami - Schedule next execs meeting before NRRB
- Kevin - To prep for Execs meeting on 4/21, State meet with Dennis at noon on 4/21.

Schedule for 4/21 Meetings with Dennis, Jim, Dick and LWG, and follow up stakeholder meetings:

12:00 – 1:00 – OOO - Pre-brief for Dennis, Jim and State over lunch

1:30-3:00 - City Hall, Rose Room – Execs meeting

3:30 – 4:15 – OOO – Follow up meeting with TCT/MOU partners

4:30 – 5:15 – OOO – Follow up meeting with community groups

==========

From the Desk of:
Debbie Robinson
US EPA Region 10, M/S OMP-211, 1200 Sixth Avenue, Suite 900, Seattle, WA 98101
Tel: 206-553-4961
robinson.deborah@epa.gov

To: Anderson, RobinM[Anderson.RobinM@epa.gov]
From: Fonseca, Silvina
Sent: Thur 3/26/2015 5:23:11 PM
Subject: FW: LWG Comments on EPA's FS Revised Draft Section 2
2015-03-25 LWG Comments on 2015-02-23_Table 2_1-1_ARARs.pdf

Silvina Fonseca, Environmental Engineer
Office of Superfund Remediation and Technology Innovation

Phone #: 703-603-8799
Fax #: 703-603-9104

From: Koch, Kristine
Sent: Thursday, March 26, 2015 11:12 AM
To: Fonseca, Silvina; Ells, Steve; Legare, Amy
Cc: Cora, Lori
Subject: FW: LWG Comments on EPA's FS Revised Draft Section 2

Here are the LWG's comments on FS Section 2.

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
Region 10
1200 Sixth Avenue, Suite 900, M/S ECL-122
Seattle, Washington 98101-3140

(206)553-6705
(206)553-8581 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: Jennifer Woronets [mailto:jworonets@anchorqea.com]
Sent: Thursday, March 26, 2015 7:02 AM
To: Koch, Kristine
Cc: Amanda Shellenberger; Bob Wyatt; Carl Stivers; Jim McKenna

(jim.mckenna@verdantllc.com); King, Todd W.; Koch, Kristine; Mullin, Jeanette; Patty Dost; Scott Coffey (coffeyse@cdmsmith.com); Sheldrake, Sean; audiehuber@ctuir.com; Bob Wyatt; callie@ridolfi.com; cunninghame@gorge.net; Dave Livesay; erin.madden@gmail.com; Gabriel Moses (Personal Privacy / Ex. 6 Gail Fricano (gfricano@indecon.com); Holly Partridge (Holly.Partridge@grandronde.org); JD Williams (jd@williamsjohnsonlaw.com); Jennifer Kassakian (jkassakian@indecon.com); Jim McKenna (jim.mckenna@verdantllc.com); Julie Weis; Kim Cox (kim.cox@portlandoregon.gov); Koch, Kristine; Madalinski, Kelly; MCCLINCY Matt; Michael.karnosh@grandronde.org; Rachel DelVecchio (rdelvecchio@indecon.com); Robert.Neely@noaa.gov; rose@yakamafish-nsn.gov; ryan sudbury (Ryan.Sudbury@grandronde.org); Sheldrake, Sean; Tom Gainer (GAINER.Tom@deq.state.or.us); Jennifer Woronets
Subject: RE: LWG Comments on EPA's FS Revised Draft Section 2

Kristine,

The attached LWG comments on the February 23 Table 2.1-1 should have been included in yesterday's email. I apologize for the error.

Thank you,

Jen Woronets ☺

Anchor QEA, LLC

jworonets@anchorqea.com

421 SW Sixth Avenue, Suite 750

Portland, OR 97204

503-972-5014

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The information is intended to be for the use of the individual or entity named above. If you are not the intended recipient, please be aware that any disclosure, copying, distribution or use of the contents of this information is prohibited. If you have received this electronic transmission in error, please notify us by electronic mail at jworonets@anchorqea.com

From: Jennifer Woronets

Sent: Wednesday, March 25, 2015 4:44 PM
To: Koch, Kristine (Koch.Kristine@epa.gov)
Cc: Jennifer Woronets; Amanda Shellenberger; Bob Wyatt; Carl Stivers; Jennifer Woronets; Jim McKenna (jim.mckenna@verdantllc.com); King, Todd W.; Koch.Kristine@epamail.epa.gov; Mullin, Jeanette; Patty Dost; Scott Coffey (coffeyse@cdmsmith.com); Sean Sheldrake; audiehuber@ctuir.com; Bob Wyatt; Callie Ridolfi; cunninghame@gorge.net; Dave Livesay; erin.madden@gmail.com; Gabriel Moses Personal Privacy / Ex. 6 ; Gail Fricano (gfricano@indecon.com); Holly Partridge (Holly.Partridge@grandronde.org); JD Williams (jd@williamsjohnsonlaw.com); Jennifer Kassakian (jkassakian@indecon.com); Jennifer Woronets; Jim McKenna (jim.mckenna@verdantllc.com); Julie Weis; Kim Cox (kim.cox@portlandoregon.gov); Koch.Kristine@epamail.epa.gov; Madalinski, Kelly; MCCLINCY Matt; Michael Karnosh (Michael.Karnosh@grandronde.org); Rachel DelVecchio (rdelvecchio@indecon.com); Robert Neely; Rose Longoria (rose@yakamafish-nsn.gov); ryan sudbury (Ryan.Sudbury@grandronde.org); Sean Sheldrake; Tom Gainer (GAINER.Tom@deq.state.or.us)
Subject: LWG Comments on EPA's FS Revised Draft Section 2

Kristine,

Please see attached LWG comments on EPA's FS revised draft Section 2.

Let us know if you have any questions.

Thank you,

Jen Woronets ☺

Anchor QEA, LLC

jworonets@anchorqea.com

421 SW Sixth Avenue, Suite 750

Portland, OR 97204

503-972-5014

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To: Anderson, RobinM[Anderson.RobinM@epa.gov]
From: Fonseca, Silvina
Sent: Thur 3/26/2015 5:22:37 PM
Subject: FW: LWG Comments on EPA's FS Revised Draft Section 2
2015-03-25 LWG Comments on Revised FS Section 2 Cover Letter.pdf
2015-03-25 LWG Comments Section 2 FS.pdf

Silvina Fonseca, Environmental Engineer
Office of Superfund Remediation and Technology Innovation

Phone #: 703-603-8799
Fax #: 703-603-9104

From: Koch, Kristine
Sent: Thursday, March 26, 2015 11:59 AM
To: Fonseca, Silvina; Ells, Steve; Legare, Amy
Cc: Cora, Lori
Subject: FW: LWG Comments on EPA's FS Revised Draft Section 2

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
Region 10
1200 Sixth Avenue, Suite 900, M/S ECL-122
Seattle, Washington 98101-3140

(206)553-6705
(206)553-8581 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: Jennifer Woronets [mailto:jworonets@anchorqea.com]
Sent: Wednesday, March 25, 2015 4:44 PM
To: Koch, Kristine

Cc: Jennifer Woronets; Amanda Shellenberger; Bob Wyatt; Carl Stivers; Jennifer Woronets; Jim McKenna (jim.mckenna@verdantllc.com); King, Todd W.; Koch, Kristine; Mullin, Jeanette; Patty Dost; Scott Coffey (coffeyse@cdmsmith.com); Sheldrake, Sean; audiehuber@ctuir.com; Bob Wyatt; callie@ridolfi.com; cunninghame@gorge.net; Dave Livesay; erin.madden@gmail.com; Gabriel Moses Personal Privacy / Ex. 6 Gail Fricano (gfricano@indecon.com); Holly Partridge (Holly.Partridge@grandronde.org); JD Williams (jd@williamsjohnsonlaw.com); Jennifer Kassakian (jkassakian@indecon.com); Jennifer Woronets; Jim McKenna (jim.mckenna@verdantllc.com); Julie Weis; Kim Cox (kim.cox@portlandoregon.gov); Koch, Kristine; Madalinski, Kelly; MCCLINCY Matt; Michael.karnosh@grandronde.org; Rachel DelVecchio (rdelvecchio@indecon.com); Robert.Neely@noaa.gov; rose@yakamafish-nsn.gov; ryan sudbury (Ryan.Sudbury@grandronde.org); Sheldrake, Sean; Tom Gainer (GAINER.Tom@deq.state.or.us)
Subject: LWG Comments on EPA's FS Revised Draft Section 2

Kristine,

Please see attached LWG comments on EPA's FS revised draft Section 2.

Let us know if you have any questions.

Thank you,

Jen Woronets ☺

Anchor QEA, LLC

jworonets@anchorqea.com

421 SW Sixth Avenue, Suite 750

Portland, OR 97204

503-972-5014

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From: Robinson, Deborah
Location: Personal Privacy / Ex. 6 Room 12 Maple
Importance: Normal
Subject: FW: Meeting with Yakama Tribe on FS Review and possibly funding - see attached
Start Date/Time: Thur 9/24/2015 4:30:00 PM
End Date/Time: Thur 9/24/2015 6:00:00 PM
2015-09-01 Yakama FS Review_draft_FS4.docx

-----Original Appointment-----
From: Robinson, Deborah
Sent: Friday, September 18, 2015 12:31 PM
To: Robinson, Deborah; Zhen, Davis; Cora, Lori; Koch, Kristine; Christopher, Anne; Allen, Elizabeth
Cc: Grandinetti, Cami; Legare, Amy; Ells, Steve; Charters, David
Subject: Meeting with Yakama Tribe on FS Review and possibly funding - see attached
When: Thursday, September 24, 2015 9:30 AM-11:00 AM (UTC-08:00) Pacific Time (US & Canada).
Where: Personal Privacy / Ex. 6 Room 12 Maple

Davis conference line

Technical discussion/FS - Attached is the memo that Rose sent which outlines their comments and questions.

- 9:30 - 10:30 am staff level
- 10:30 - 11:00 check in with management

Rose Longoria
Callie, Bill, Bob - Ridolfi
Tom Zeilman, Attorney
McClure Tosch
Kristine, Elizabeth, Annie, Lori, Davis, Cami (optional)
Remainder of team will be invited as optional.

2. Funding for PP and development of ROD - I will try to handle this topic by telephone so that a meeting is not necessary.
Debbie, Kristine and Annie (if desired), Lori (if needed), Davis/Cami

NOTES from Conversation with Rose:

1. Need more clarity on how EPA is evaluating some things e.g., ARARs and protection of HH&E. I asked Rose to tell us more about what she hopes to accomplish so that we can

be prepared.

2. Funding: LWG will not provide funding for moving forward with drafting PP

Cooperative Agreement - Harbor Oil - could not be more than $30,000/year. Their costs went over the $30,000, and Yakama did not get authorization for it. ***Will there be a limit on funding?***

Rose has a budget that was proposed to LWG group - they are funding part of it but not the part related to PP.
Rose will send me the email if approved to do so by her attorney.
Yakama's overall budget for FY 16 is $299,406.

- RI/FS LWG will pay
- PP and ROD - $134,216
- Consultation costs - LWG will pay

Options - go directly to some funding parties within LWG -
Getting ready to request authorization for litigation (costs related to PP and development of ROD) have something in place so that they can file a complaint to get costs recovered if not able to get the costs covered.

What will administrative process be and timing - for application and procedure for coop agreement?

Expect to stay on budget.

From: Fonseca, Silvina
Required Attendees: Anderson, RobinM; Legare, Amy; Ells, Steve; Charters, David
Location: DCRoomPYS5662/OSRTI-Potomac-Yard-South
Importance: Normal
Subject: Discuss RAO #3 and principle language
Start Date/Time: Tue 3/3/2015 2:00:00 PM
End Date/Time: Tue 3/3/2015 3:00:00 PM
2015_02_23 Portland Harbor FS Section 2.docx

Deliberative Process / Ex. 5

To: Cora, Lori[Cora.Lori@epa.gov]; Zhen, Davis[Zhen.Davis@epa.gov]; Ingemansen, Dean[Ingemansen.Dean@epa.gov]
From: Grandinetti, Cami
Sent: Fri 12/11/2015 5:48:26 PM
Subject: RE: "Fleshed Out" options for finalizing the Portland Harbor FS
Options 3 and 4 fleshed out-deans and cg comments-12-10-15.docx

Lori—I just left you a voice message and the message includes a description of my comment in your options paper

Attorney Client / Ex. 5

Attorney Client / Ex. 5

Cami Grandinetti

Program Manager, Remedial Cleanup Program

USEPA

1200 6th Ave, Suite 900

ECL-123

Seattle, Wa. 98101

206-553-8696 (desk)

206-390-8890 (cell)

206-553-0124 (fax)

From: Cora, Lori
Sent: Friday, December 11, 2015 9:41 AM
To: Grandinetti, Cami <Grandinetti.Cami@epa.gov>; Zhen, Davis <Zhen.Davis@epa.gov>
Subject: FW: "Fleshed Out" options for finalizing the Portland Harbor FS

See Cyndy's comments below.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Mackey, Cyndy
Sent: Friday, December 11, 2015 9:33 AM
To: Northridge, Michael <Northridge.Michael@epa.gov>
Cc: Cora, Lori <Cora.Lori@epa.gov>; Ingemansen, Dean <Ingemansen.Dean@epa.gov>; Mott, Patricia <Mott.Patricia@epa.gov>; Cathey, Tawanna <Cathey.Tawanna@epa.gov>
Subject: Re: "Fleshed Out" options for finalizing the Portland Harbor FS

Hey All

I am working from my cell phone (and can't read the attachment very well), so am further explaining OSRE comments below .

Attorney Client / Ex. 5

You can call me on any of my phone numbers to reach me today since my phones should be forwarded. Best chance of reaching me is my personal cell which is Personal Privacy / Ex. 6 Regardless, we should find a time to talk on Monday morning.

By this message, I'm asking Tawanna Cathy to schedule 30 minutes for all to talk in Monday noon or so eastern time .

Thanks

Cyndy

Sent from my iPhone

On Dec 11, 2015, at 12:04 PM, "Northridge, Michael" <Northridge.Michael@epa.gov> wrote:

Confidential and privileged

Cyndy,

I have to leave the office for the rest of the day Personal Privacy / Ex. 6 FYI – Lori and Dean had provided a fleshed-out draft for options 3 and 4. I'm proposing that the draft

Attorney Client / Ex. 5

Feel free to call my cell Personal Privacy / Ex. 6 with any questions...

From: Ingemansen, Dean
Sent: Thursday, December 10, 2015 11:56 PM

To: Cora, Lori <Cora.Lori@epa.gov>; Grandinetti, Cami <Grandinetti.Cami@epa.gov>; Zhen, Davis <Zhen.Davis@epa.gov>; Northridge, Michael <Northridge.Michael@epa.gov>
Subject: RE: "Fleshed Out" Options 3 and 4 -- Finalizing the FS

Folks,

My comments are attached in track changes view of Word. Thanks, and good job!

-Dean

From: Cora, Lori
Sent: Thursday, December 10, 2015 3:32 PM
To: Grandinetti, Cami <Grandinetti.Cami@epa.gov>; Zhen, Davis <Zhen.Davis@epa.gov>; Ingemansen, Dean <Ingemansen.Dean@epa.gov>; Northridge, Michael <Northridge.Michael@epa.gov>
Subject: "Fleshed Out" Options 3 and 4 -- Finalizing the FS

A follow-up to yesterday's meeting was for me to flesh out Options 3 and 4 for a briefing with Administrator McCarthy as soon as it can be scheduled. Let me know if you think this draft as the fat Dennis was looking for. Thanks.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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<Options 2 and 3 and 4 fleshed out-osre comments-12-11-15.docx>

To: Cora, Lori[Cora.Lori@epa.gov]; Grandinetti, Cami[Grandinetti.Cami@epa.gov]
From: Robinson, Deborah
Sent: Tue 12/8/2015 4:49:29 AM
Subject: Is this ready to send to Dennis and Jim? FW: Options Memo for RA conference call at 2:30 p.m. Wednesday -- re: Portland Harbor FS
PH finalizing FS options 12_7_2015.docx
ATT00001.htm

Hi Cami and Lori,

Is this option paper ready to send to Dennis, Jim, Michelle and the team in preparation for the briefing on Wednesday?

Thanks,

Debbie

==========

From the Desk of:
Debbie Robinson
Tel: 206-553-4961
robinson.deborah@epa.gov

US EPA Region 10, M/S ECL 122, 1200 Sixth Avenue, Suite 900, Seattle, WA 98101

From: Zhen, Davis
Sent: Monday, December 07, 2015 4:08 PM
To: Robinson, Deborah <Robinson.Deborah@epa.gov>
Subject: Fwd: Options Memo for RA conference call at 2:30 p.m. Wednesday -- re: Portland Harbor FS

Sent from my iPhone

Begin forwarded message:

From: "Cora, Lori" <Cora.Lori@epa.gov>
Date: December 7, 2015 at 10:20:34 AM PST

To: "Magorrian, Matthew" <Magorrian.Matthew@epa.gov>
Cc: "Grandinetti, Cami" <Grandinetti.Cami@epa.gov>, "Zhen, Davis" <Zhen.Davis@epa.gov>, "Koch, Kristine" <Koch.Kristine@epa.gov>, "Ingemansen, Dean" <Ingemansen.Dean@epa.gov>
Subject: Options Memo for RA conference call at 2:30 p.m. Wednesday -- re: Portland Harbor FS

Hi, Matt. Could you send this options memo around to the staff and managers that you have invited to Dennis' 2:30 p.m. call on Wednesday, December 9th? Thanks.

Cami, Davis, Dean, and Kristine: Please note the memo has been revised to discuss another option of

Attorney Client / Ex. 5

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

To: Cora, Lori[Cora.Lori@epa.gov]
From: Grandinetti, Cami
Sent: Fri 12/4/2015 4:49:21 PM
Subject: RE: Portland Harbor review part 3

We are going over the NRRB comments. We're meeting in my office.

Cami Grandinetti
Program Manager, Remedial Cleanup Program
USEPA
1200 6th Ave, Suite 900
ECL-123
Seattle, Wa. 98101
206-553-8696 (desk)
206-390-8890 (cell)
206-553-0124 (fax)

From: Cora, Lori
Sent: Friday, December 04, 2015 7:42 AM
To: Allen, Elizabeth <allen.elizabeth@epa.gov>; Koch, Kristine <Koch.Kristine@epa.gov>; Grandinetti, Cami <Grandinetti.Cami@epa.gov>
Subject: RE: Portland Harbor review part 3

I can participate in this proposed meeting up to1:30 p.m. Can someone describe the purpose and topic of the meeting? Thanks.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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-----Original Appointment-----
From: Allen, Elizabeth
Sent: Friday, December 04, 2015 6:32 AM
To: Koch, Kristine; Grandinetti, Cami; Cora, Lori
Subject: Portland Harbor review part 3
When: Monday, December 07, 2015 11:00 AM-2:00 PM (UTC-08:00) Pacific Time (US & Canada).
Where: 14-Elwha

I reserved the14th floor conference room

Personal Privacy / Ex. 6

To: Cora, Lori[Cora.Lori@epa.gov]
Cc: DeMaria, Eva[DeMaria.Eva@epa.gov]
From: Sheldrake, Sean
Sent: Thur 12/3/2015 8:21:18 PM
Subject: RE: DEQ - Evraz Mn concerns-- Additional considerations for reviewing PRG table based on 304(a) criteria

Oh good, thanks Lori. **Attorney Client / Ex. 5**

Attorney Client / Ex. 5

S

Sean Sheldrake, Unit Diving Officer, RPM

EPA Region 10, 1200 Sixth Ave., Suite 900; Mailstop DOC-01

Seattle, WA 98101

206.553.1220 desk

206.225.6528 cell

http://yosemite.epa.gov/r10/cleanup.nsf/sites/ptldharbor

http://www.epa.gov/region10/dive/

206.553.6379 Dive Operations Center

206.369.7500 Dive Unit cell

Like us on Facebook! https://www.facebook.com/EPADivers

From: Cora, Lori
Sent: Thursday, December 03, 2015 12:02 PM
To: Sheldrake, Sean <sheldrake.sean@epa.gov>
Cc: DeMaria, Eva <DeMaria.Eva@epa.gov>
Subject: RE: DEQ - Evraz Mn concerns-- Additional considerations for reviewing PRG table based on 304(a) criteria

Eva and I have talked, but not sure what "how I would advise proceeding" means.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Sheldrake, Sean
Sent: Thursday, December 03, 2015 9:34 AM
To: Cora, Lori <Cora.Lori@epa.gov>
Cc: DeMaria, Eva <DeMaria.Eva@epa.gov>
Subject: RE: DEQ - Evraz Mn concerns-- Additional considerations for reviewing PRG table based on 304(a) criteria

Atty client priv.

Lori, That's very helpful, thank you. Have you and Eva caught up to talk regarding how you'd advise proceeding if the superfund value is used?

S

Sean Sheldrake, Unit Diving Officer, RPM

EPA Region 10, 1200 Sixth Ave., Suite 900; Mailstop DOC-01

Seattle, WA 98101

206.553.1220 desk

206.225.6528 cell

http://yosemite.epa.gov/r10/cleanup.nsf/sites/ptldharbor

http://www.epa.gov/region10/dive/

206.553.6379 Dive Operations Center

206.369.7500 Dive Unit cell

Like us on Facebook! https://www.facebook.com/EPADivers

From: Cora, Lori
Sent: Wednesday, December 02, 2015 4:38 PM
To: Koch, Kristine <Koch.Kristine@epa.gov>; DeMaria, Eva <DeMaria.Eva@epa.gov>; Allen, Elizabeth <allen.elizabeth@epa.gov>; Fuentes, Rene <fuentes.rene@epa.gov>; Shephard, Burt <Shephard.Burt@epa.gov>; Sheldrake, Sean <sheldrake.sean@epa.gov>; Ebright, Stephanie <EBRIGHT.STEPHANIE@EPA.GOV>; Christopher, Anne <Christopher.Anne@epa.gov>
Cc: Zhen, Davis <Zhen.Davis@epa.gov>
Subject: RE: DEQ - Evraz Mn concerns-- Additional considerations for reviewing PRG table based on 304(a) criteria

Attorney Client / Ex. 5

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

From: Koch, Kristine
Sent: Wednesday, December 02, 2015 8:20 AM
To: Cora, Lori <Cora.Lori@epa.gov>; DeMaria, Eva <DeMaria.Eva@epa.gov>; Allen, Elizabeth <allen.elizabeth@epa.gov>; Fuentes, Rene <fuentes.rene@epa.gov>; Shephard, Burt <Shephard.Burt@epa.gov>; Sheldrake, Sean <sheldrake.sean@epa.gov>; Ebright, Stephanie <EBRIGHT.STEPHANIE@EPA.GOV>; Christopher, Anne <Christopher.Anne@epa.gov>
Cc: Zhen, Davis <Zhen.Davis@epa.gov>
Subject: RE: DEQ - Evraz Mn concerns

Attorney Client / Ex. 5

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
Region 10
1200 Sixth Avenue, Suite 900, M/S ECL-122
Seattle, Washington 98101-3140

(206)553-6705
(206)553-8581 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: Cora, Lori
Sent: Tuesday, December 01, 2015 4:16 PM
To: DeMaria, Eva <DeMaria.Eva@epa.gov>; Koch, Kristine <Koch.Kristine@epa.gov>; Allen, Elizabeth <allen.elizabeth@epa.gov>; Fuentes, Rene <fuentes.rene@epa.gov>; Shephard, Burt <Shephard.Burt@epa.gov>; Sheldrake, Sean <sheldrake.sean@epa.gov>; Ebright, Stephanie

<EBRIGHT.STEPHANIE@EPA.GOV>; Christopher, Anne <Christopher.Anne@epa.gov>
Cc: Zhen, Davis <Zhen.Davis@epa.gov>
Subject: RE: DEQ - Evraz Mn concerns

Attorney Client / Ex. 5

http://www.deq.state.or.us/wq/standards/metals.htm#Fe

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: DeMaria, Eva
Sent: Tuesday, December 01, 2015 2:48 PM
To: Koch, Kristine <Koch.Kristine@epa.gov>; Allen, Elizabeth <allen.elizabeth@epa.gov>; Fuentes, Rene <fuentes.rene@epa.gov>; Shephard, Burt <Shephard.Burt@epa.gov>; Cora, Lori <Cora.Lori@epa.gov>; Sheldrake, Sean <sheldrake.sean@epa.gov>; Ebright, Stephanie <EBRIGHT.STEPHANIE@EPA.GOV>; Christopher, Anne <Christopher.Anne@epa.gov>
Cc: Zhen, Davis <Zhen.Davis@epa.gov>
Subject: DEQ - Evraz Mn concerns

Hi all-

Fyi-I just got a call from Jennifer Sutter, the PM for Evraz OSM regarding their Mn plume. She wants to understand EPA's position as to why we believe the Mn plume is such a risk to the environment, i.e., how would it adversely impact water drawn from the Willamette? I've

repeated to her everything that you've stated to me (see attached email train - it's a PRG likely to become an ARAR, it's a neurotoxin at 430 ug/l and the sampling blows that number away, etc.) and that we need better data to characterize the plume because the sampling has been inconsistent. She responds that they have over 20 years of data and more data won't help and do we expect them to build a wall, there has to be reasonableness in this, if anyone draws water from the Willamette it wouldn't be in TZW, etc. She's basically saying dilution will reduce any risk to acceptable levels. She has raised this concern to her management and it will likely go to you Davis.

Eva

To: Cora, Lori[Cora.Lori@epa.gov]
From: Woolford, James
Sent: Thur 11/19/2015 6:10:19 PM
Subject: FW: Straw Approach

See what I sent this AM

Jim Woolford, Director

Office of Superfund Remediation and Technology Innovation

Office of Solid Waste and Emergency Response

US Environmental Protection Agency

1200 Penn. Ave., NW

Washington, DC 20460

(Mail Code 5201-P)

Phone: (703) 603 8960– Main Office Line

Physically located at:

Room 5622

One Potomac Yard (South)
2777 S. Crystal Dr.
Arlington, VA 22202

From: Woolford, James
Sent: Thursday, November 19, 2015 9:23 AM
To: McLerran, Dennis <mclerran.dennis@epa.gov>; Grandinetti, Cami <Grandinetti.Cami@epa.gov>; Dana Stalcup <Stalcup.Dana@epa.gov>
Cc: Mackey, Cyndy <Mackey.Cyndy@epa.gov>; RobinH Richardson <Richardson.RobinH@epa.gov>
Subject: Straw Approach

Here is a first attempt – trying to build off what I heard yesterday. Not saying we have to all items in the outline, but I think it reflects what sense of what the members would like to hear/discuss. One thing I am consciously doing is calling this the Portland Harbor Team vs. Region 10. I want to continue to convey the message that this is not simply a R 10 effort. Bringing in OSRE bcz of recent comments re: allocation.

Straw Plan

1. Develop new set of slides for Cong. Brief – straw outline below
2. Provide the ppt slides given to the NRRB/CSTAG – 3 sets
3. After briefing Hill post the slides the Region used –
4. Strongly consider posting the comments from the LWG, Tribes, States
5. Need to decide whether we bifurcate the Boards' comments vs the Regional responses
6. ?? Do we need to brief Gina in December with an update??

Outline

Cover slide – Summary of Portland Harbor Team Presentation to NRRB/CSTAG November 18, 2015

Slide 2 - What this slide deck covers

- Overview of Briefing
- Highlights from RI
- Highlights from FS
- Highlights from Preliminary Preferred Alternative
- Focused Requests to NRRB/CSTAG for Input
- Summary of Comments from States and Tribes
- Decision Tree Explanation
- Cost Estimation
- Allocation Process
- Public/Decision Process Going Forward

Slide 3 – Overview of the Briefing

KEY TAKEAWAYS

- NRRB/CSTAG members were provide before the meeting with comments from..
- Portland Harbor Team provided…..
- On First Day of meeting the Team presented details on the RI, FS and Preliminary Preferred Alternative over the course of 6 hours
- The Team requested NRRB/CSTAG comments on xxx particular items
- States and Tribes provided presentations as well.

Slide 4 – RI Highlights

What are the key takeaways the members need to know

- Pick the no more than top 6 items from the RI that affect the remedy decision and bullet them. During brief explain why impt.

Slide 5 – FS Highlights

What are the key takeaways the members need to know

- Pick the no more than top 6 items from the FS that affect the remedy decision and bullet them. During brief explain why impt.

Slide 6/7 – Portland Harbor Team's Preliminary Preferred Alternative

KEY Takeaways

- First Bullet Point – As part of the NRRB/CSTAG process a Region must submit a preferred alternative
- Why did Team start with E (say vs. B or G)
- Why did the Team then modify/adjust from E – what were the driving factors?
- What does the preferred achieve in terms of HH and Eco risk reduction
- What's the cost
- How do the RAOs/RALs compare vs other sites

Slide 8 – Areas where the Team asked for specific Board input

- Bullet the items – verbally explain why asked/impt to remedy and how the answer could alter the remedy

Slide 9 – Summary / Highlights of comments from States and Tribes provided to NRRB/CSTAG

Slide 10 – Decision Tree Explanation

- Need to review at some level, explain how it works, how flexible it is etc. Might be useful to go through one of the SDUs to illustrate

Slide 11 – Cost Estimation

- 2 Questions I heard here to answer – 1) EPA consistently underestimates costs – what are we doing to ensure accuracy

- 2) Second Q was related to allocation process – How can the performing parties be assured that cost are accurate whether for settlement negs. Or planning to do work.

- How do these costs compare vs other sites

Slide 12 – Allocation Process

- Explanation of it, how it is intended to work, EPA, DOJ role

- What happens when the process breaks down – i.e., enforcement tools

- What is EPA's plan to go after non-settling parties

Slide 13 – Public/Decision Process

- What is EPA doing to "set the table" for when the Proposed Plan goes out – Looking for detail – I think we need to put together a pre-proposed plan outreach strategy document NLT mid-December and then NLT mid-Jan a strategy/plan for how we will handle the public comment period

Deliberative Process / Ex. 5

- Timing on posting NRRB/CSTAG comments and Team responses.

Jim Woolford, Director

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Washington, DC 20460

(Mail Code 5201-P)

Phone: (703) 603 8960– Main Office Line

Physically located at:

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One Potomac Yard (South)
2777 S. Crystal Dr.
Arlington, VA 22202

To: Cora, Lori[Cora.Lori@epa.gov]
From: Woolford, James
Sent: Thur 11/19/2015 5:40:36 PM
Subject: FW: Cong call

Not advocating any changes to PH team presentation. It is a Q of timing.

Jim Woolford, Director
Office of Superfund Remediation & Technology Innovation
US EPA

Sent from my Windows Phone
Please excuse typos

From: Cora, Lori
Sent: 11/19/2015 11:24 AM
To: Fonseca, Silvina; Woolford, James; Grandinetti, Cami; Stalcup, Dana; Mackey, Cyndy; Legare, Amy; Koch, Kristine; Ells, Steve; Deitz, Randy
Subject: RE: Cong call

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Fonseca, Silvina
Sent: Thursday, November 19, 2015 7:04 AM
To: Woolford, James <Woolford.James@epa.gov>; Grandinetti, Cami <Grandinetti.Cami@epa.gov>; Stalcup, Dana <Stalcup.Dana@epa.gov>; Mackey, Cyndy <Mackey.Cyndy@epa.gov>; Cora, Lori <Cora.Lori@epa.gov>; Legare, Amy <Legare.Amy@epa.gov>; Koch, Kristine <Koch.Kristine@epa.gov>; Ells, Steve

<Ells.Steve@epa.gov>; Deitz, Randy <Deitz.Randy@epa.gov>
Subject: RE: Cong call

Jim and all,

I would Just add that Blumenauer also expressed an interest in how we will address/respond to the State's comments. He thought they had some really good points.

I also agree that we can use some of the NRRB's presentation in the call next week.

Silvina Fonseca, Environmental Engineer
Office of Superfund Remediation and Technology Innovation

Phone #: 703-603-8799
Fax #: 703-603-9104

From: Woolford, James
Sent: Wednesday, November 18, 2015 1:09 PM
To: Grandinetti, Cami <Grandinetti.Cami@epa.gov>; Fonseca, Silvina <Fonseca.Silvina@epa.gov>; Stalcup, Dana <Stalcup.Dana@epa.gov>; Mackey, Cyndy <Mackey.Cyndy@epa.gov>; Cora, Lori <Cora.Lori@epa.gov>; Legare, Amy <Legare.Amy@epa.gov>; Koch, Kristine <Koch.Kristine@epa.gov>; Ells, Steve <Ells.Steve@epa.gov>; Deitz, Randy <Deitz.Randy@epa.gov>
Subject: Cong call

Quick summary.

Dennis went thru ppt, but there were a number of Qs and concerns raised. There was some confusion regarding the presentation of a preferred alt. to the NRRB. At least Merkley expressed his understanding the NRRB / CSTAG was only going to get a range of options and not a preferred alt. That resulted in a request for another call next week if it can be scheduled. Or ASAP.

Much interest in learning next week what option / preferred alternative was presented to NRRB. And why.

They also expressed desire to release NRRB/CSTAG comments as soon as they are sent to Region.

Looking at presentation Kristen sent this AM, I think most of what we need is there for a call next week, but I would re-arrange the slides. I would drop term "optimized" from the preferred alt set of slides.

Also -

Other topics they hit and want more info on.

Costs - can we or will we break down costs by SDU (which the delegation believes will help the allocation process. Blumenauer asked for by PRP if we could). My take away is we need to educate about the PRP allocation process and what tools are available to help or compel cooperation.

Decision tree - how flexible is it? It appears to be inflexible . Explain better.

Cost vs. Risk reduction - what do we get for $$ invested. Blumenauer: What does spending $500 M at the site buy us from a risk reduction standpoint....

Cost - belief EPA consistently underestimates and it will be much higher ultimately. And longer too. How can everyone be assured the cost estimates are good. How do these cost compare vs other sites.

How can the remedy bring PRPs to table vs pushing them to litigation.

Public process - strong opinions 60 days won't be enough. Public getting short changed. Need to understand better our plans.

Dredging. Assumptions underlying dredging rates are Too optimistic - what is our level of certainty? Compare vs other sites. Costs will be higher. Community does not support 24 hr per day dredging.

That's about it...

Jim Woolford, Director
Office of Superfund Remediation & Technology Innovation
US EPA

Sent from my Windows Phone
Please excuse typos

To: Openchowski, Charles[openchowski.charles@epa.gov]; Anderson, RobinM[Anderson.RobinM@epa.gov]; Bradfish, Larry[Bradfish.Larry@epa.gov]; Catri, Cindy[Catri.Cynthia@epa.gov]; Cora, Lori[Cora.Lori@epa.gov]; Engeman, Diana[Engeman.Diana@epa.gov]; Estrada, Thelma[Estrada.Thelma@epa.gov]; Fagiolo, John[fagiolo.john@epa.gov]; Finch, Rhelyn[Finch.Rhelyn@epa.gov]; Fishburn, Meredith[Fishburn.Meredith@epa.gov]; Flanagan, Sarah[Flanagan.Sarah@epa.gov]; Hiltner, Allison[Hiltner.Allison@epa.gov]; Johnson, MaryC[Johnson.MaryC@epa.gov]; Legare, Amy[Legare.Amy@epa.gov]; Lukens, Elizabeth[Lukens.Elizabeth@epa.gov]; MacDonald, Jennifer[Macdonald.Jennifer@epa.gov]; Poetzsch, Michael[Poetzsch.Michael@epa.gov]; Quinones, Edwin[quinones.edwin@epa.gov]; Salo, Earl[Salo.Earl@epa.gov]; Sisk, Richard[Sisk.Richard@epa.gov]; Stevens, Jim[Stevens.Jim@epa.gov]; Tanasijevich, Rudy[Tanasijevich.Rudy@epa.gov]; Tucker, Marlene[Tucker.Marlene@epa.gov]; Tyner, Lee[tyner.lee@epa.gov]; VanItallie, Michael[vanItallie.Michael@epa.gov]; Williams, Thomas[williams.tom@epa.gov]
From: Buxbaum, David
Sent: Tue 11/17/2015 9:07:34 PM
Subject: RE: the November remedy selection call is this Thursday at 1:00 eastern Personal Privacy / Ex. 6
Personal Privacy / Ex. 6
PCB ARARs Table_11-16-2015rev.docx

Attorney Client / Ex. 5

Thanks,

David M. Buxbaum, Senior Attorney

U.S. Environmental Protection Agency Region 4, Office of Regional Counsel

Sam Nunn Atlanta Federal Center 61 Forsyth St. S.W.

Atlanta, GA 30303

Phone: 404 562-9549 Fax: 404 562-9486

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From: Openchowski, Charles
Sent: Monday, November 02, 2015 11:35 AM
To: Anderson, RobinM <Anderson.RobinM@epa.gov>; Bradfish, Larry <Bradfish.Larry@epa.gov>; Buxbaum, David <Buxbaum.David@epa.gov>; Catri, Cindy <Catri.Cynthia@epa.gov>; Cora, Lori <Cora.Lori@epa.gov>; Engeman, Diana <Engeman.Diana@epa.gov>; Estrada, Thelma <Estrada.Thelma@epa.gov>; Fagiolo, John <fagiolo.john@epa.gov>; Finch, Rhelyn <Finch.Rhelyn@epa.gov>; Fishburn, Meredith <Fishburn.Meredith@epa.gov>; Flanagan, Sarah <Flanagan.Sarah@epa.gov>; Hiltner, Allison <Hiltner.Allison@epa.gov>; Johnson, MaryC <Johnson.MaryC@epa.gov>; Legare, Amy <Legare.Amy@epa.gov>; Lukens, Elizabeth <Lukens.Elizabeth@epa.gov>; MacDonald, Jennifer <Macdonald.Jennifer@epa.gov>; Poetzsch, Michael <Poetzsch.Michael@epa.gov>; Quinones, Edwin <quinones.edwin@epa.gov>; Salo, Earl <Salo.Earl@epa.gov>; Sisk, Richard <Sisk.Richard@epa.gov>; Stevens, Jim <Stevens.Jim@epa.gov>; Tanasijevich, Rudy <Tanasijevich.Rudy@epa.gov>; Tucker, Marlene <Tucker.Marlene@epa.gov>; Tyner, Lee <tyner.lee@epa.gov>; VanItallie, Michael <vanItallie.Michael@epa.gov>; Williams, Thomas <williams.tom@epa.gov>
Subject: the November remedy selection call is this Thursday at 1:00 eastern Personal Privacy / Ex. 6
Personal Privacy / Ex. 6

Please send around any agenda items you would like to discuss – thanks!

To: Cora, Lori[Cora.Lori@epa.gov]
From: Northridge, Michael
Sent: Fri 11/13/2015 4:18:05 PM
Subject: Re: Portland Harbor -- Completing FS memo

Attorney Client / Ex. 5

From: Ingemansen, Dean
Sent: Thursday, November 12, 2015 9:10 PM
To: Cora, Lori
Cc: Northridge, Michael
Subject: RE: Portland Harbor -- Completing FS memo

Hi Lori,

I like your changes, and I responded to your last comment on the last page.

Attorney Client / Ex. 5

-Dean

From: Cora, Lori
Sent: Thursday, November 12, 2015 3:20 PM
To: Ingemansen, Dean <Ingemansen.Dean@epa.gov>
Cc: Northridge, Michael <Northridge.Michael@epa.gov>
Subject: RE: Portland Harbor -- Completing FS memo

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | **cora.lori@epa.gov**

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From: Ingemansen, Dean
Sent: Thursday, November 12, 2015 1:57 PM
To: Cora, Lori <Cora.Lori@epa.gov>
Cc: Northridge, Michael <Northridge.Michael@epa.gov>
Subject: RE: Portland Harbor -- Completing FS memo

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Lori and Mike,

Attorney Client / Ex. 5

Thanks!

-Dean

From: Cora, Lori
Sent: Monday, November 09, 2015 4:24 PM
To: Ingemansen, Dean <Ingemansen.Dean@epa.gov>
Subject: FW: Portland Harbor -- Completing FS memo

Hi, Dean. Mike Northridge and I drafted the attached memo. If you are ok with it, the next steps would be to send to both Region 10 ECL and HQs (Jim Woolford) and have a call to go over the options. Let me know how you think we should proceed. FYI, I know that ECL and Dennis are anxious to know our path forward on this issue.

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U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | **cora.lori@epa.gov**

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From: Northridge, Michael
Sent: Monday, November 09, 2015 2:29 PM
To: Cora, Lori <Cora.Lori@epa.gov>
Subject: RE: Portland Harbor -- Completing FS memo

I fiddled with the draft. See attached (especially new footnote --- I think it reflects my muddled understanding…).

From: Cora, Lori
Sent: Monday, November 09, 2015 12:14 PM
To: Northridge, Michael <Northridge.Michael@epa.gov>
Subject: Portland Harbor -- Completing FS memo

Hi, Mike. Sorry to press you, but the cleanup folks want to discuss the options for EPA completing the FS soon. Can you provide your remaining comments on the memo soon. Also, should we have a combined Regional/HQ call to discuss the topic? I'm thinking you and whatever level of management might want to participate, Jim Woolford (whoever else from OSRTI), Cami Grandinetti, me and probably Dean Ingemansen.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | **cora.lori@epa.gov**

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To: Cora, Lori[Cora.Lori@epa.gov]
From: Northridge, Michael
Sent: Fri 11/13/2015 12:02:20 AM
Subject: FW: Challenges to EPA takeover of RI/FS or RD/RA (or RV)

Confidential and privileged

Attorney Client / Ex. 5

From: Northridge, Michael
Sent: Thursday, November 12, 2015 6:34 PM
To: Linett, Janice <Linett.Janice@epa.gov>; Dixon, Douglas <Dixon.Douglas@epa.gov>
Cc: Worthman, Gary <Worthman.Gary@epa.gov>
Subject: Challenges to EPA takeover of RI/FS or RD/RA (or RV)

Confidential and privileged

Doug and Janice (cc: Gary, for his 'institutional memory'),

Attorney Client / Ex. 5

Thoughts?

Attorney Client / Ex. 5

My recollection is that this was sorta raised on an RC/BC call a while back, and didn't elicit much (if any) response from the other Regions.

From: Ingemansen, Dean
Sent: Thursday, November 12, 2015 4:57 PM
To: Cora, Lori <Cora.Lori@epa.gov>
Cc: Northridge, Michael <Northridge.Michael@epa.gov>
Subject: RE: Portland Harbor -- Completing FS memo

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Lori and Mike,

Attorney Client / Ex. 5

Thanks!

-Dean

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To: Cora, Lori[Cora.Lori@epa.gov]
From: Northridge, Michael
Sent: Thur 11/12/2015 11:57:59 PM
Subject: RE: Portland Harbor -- Completing FS memo

Confidential and privileged

Attorney Client / Ex. 5

Sorry, I'm off work tomorrow…

From: Cora, Lori
Sent: Thursday, November 12, 2015 5:57 PM
To: Ingemansen, Dean <Ingemansen.Dean@epa.gov>
Cc: Northridge, Michael <Northridge.Michael@epa.gov>
Subject: RE: Portland Harbor -- Completing FS memo

Hi, Dean. Thanks for your comments on the memo. Attorney Client / Ex. 5

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
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Cc: Northridge, Michael <Northridge.Michael@epa.gov>
Subject: RE: Portland Harbor -- Completing FS memo

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Lori and Mike,

Attorney Client / Ex. 5

Thanks!

-Dean

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Subject: RE: Portland Harbor -- Completing FS memo

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Sent: Monday, November 09, 2015 12:14 PM
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Subject: Portland Harbor -- Completing FS memo

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Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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To: Cora, Lori[Cora.Lori@epa.gov]; Ebright, Stephanie[EBRIGHT.STEPHANIE@EPA.GOV]
From: DeMaria, Eva
Sent: Mon 11/9/2015 7:04:55 PM
Subject: RE: 138 NWP Revision of 8/31/2015 DEQ Comments for Source Control Evaluation DEQ Response to October 5 2015 Email (Below)

Attorney Client / Ex. 5

From: Cora, Lori
Sent: Monday, November 09, 2015 9:25 AM
To: DeMaria, Eva <DeMaria.Eva@epa.gov>; Ebright, Stephanie <EBRIGHT.STEPHANIE@EPA.GOV>
Subject: RE: 138 NWP Revision of 8/31/2015 DEQ Comments for Source Control Evaluation DEQ Response to October 5 2015 Email (Below)

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
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P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: DeMaria, Eva
Sent: Monday, November 09, 2015 8:20 AM
To: Cora, Lori <Cora.Lori@epa.gov>; Ebright, Stephanie <EBRIGHT.STEPHANIE@EPA.GOV>
Subject: FW: 138 NWP Revision of 8/31/2015 DEQ Comments for Source Control Evaluation DEQ Response to October 5 2015 Email (Below)

Lori, Steph-

I'm not sure if you guys want a short download on what's happening at NW Pipe in preparation for our call with them on Tuesday? There's a VOC plume on their site which they claim originates from offsite, we and DEQ think it actually might be originating onsite (based on current sampling data) but we need more sampling to really confirm. However, the source control report that DEQ issued last winter shows two groundwater plumes in the vicinity of NWP, one offsite and one onsite. Let me know if you want a more detailed briefing.

Eva

From: HeldtSheller, Stephanie [mailto:SHeldtSheller@nwpipe.com]
Sent: Monday, October 19, 2015 3:42 PM
To: ORR Jim <orr.jim@deq.state.or.us>
Cc: MCCLINCY Matt <matt.mcclincy@state.or.us>; DeMaria, Eva <DeMaria.Eva@epa.gov>; Sheldrake, Sean <sheldrake.sean@epa.gov>; THIESSEN Kenneth <kenneth.thiessen@state.or.us>; ROMERO Mike <ROMERO.Mike@deq.state.or.us>; poulsen.mike@deq.state.or.us; Gretchen.Gee@ch2m.com; Wray, Mike <MWRAY@nwpipe.com>; Claudia Powers <Ckp@aterwynne.com>; 'Ken.Shump@CH2M.com' <Ken.Shump@CH2M.com>; mbm@bhlaw.com
Subject: RE: 138 NWP Revision of 8/31/2015 DEQ Comments for Source Control Evaluation DEQ Response to October 5 2015 Email (Below)

Good afternoon Jim,

Attached is NWP's response to DEQ & EPA comments, as promised within 2 weeks of the previous email below.

Northwest Pipe Company would like to move forward with our request to have a meeting with DEQ and EPA representatives. I've attached Mike Wray's 8/26/15 email request for your quick reference. Please let us know your earliest available time, and if we can assist in any way in setting up the meeting.

Thanks,
Steph.

Stephanie Heldt-Sheller, CHMM

Corporate Environmental Manager

Northwest Pipe Company | 12005 N. Burgard Rd. | Portland, OR 97203 USA

Direct (503) 382 2324 | Cell (419) 283 1890 | Fax (503) 382 2327

From: HeldtSheller, Stephanie
Sent: Thursday, October 08, 2015 10:02 AM
To: 'ORR Jim'
Cc: MCCLINCY Matt; 'DeMaria, Eva'; Sheldrake, Sean; Claudia Powers; 'Ken.Shump@CH2M.com'; THIESSEN Kenneth; ROMERO Mike; Wray, Mike; POULSEN Mike
Subject: RE: 138 NWP Revision of 8/31/2015 DEQ Comments for Source Control Evaluation DEQ Response to October 5 2015 Email (Below)

Thanks Jim.

We look forward to providing you with our response to DEQ's 10/01/2015 Report comments, in the next 2 weeks.

Thank you again,

Steph.

Stephanie Heldt-Sheller, CHMM

Corporate Environmental Manager

Northwest Pipe Company | 12005 N. Burgard Rd. | Portland, OR 97203 USA

Direct (503) 382 2324 | Cell (419) 283 1890 | Fax (503) 382 2327

From: ORR Jim [mailto:orr.jim@deq.state.or.us]
Sent: Wednesday, October 07, 2015 11:51 AM
To: HeldtSheller, Stephanie
Cc: MCCLINCY Matt; 'DeMaria, Eva'; Sheldrake, Sean; Claudia Powers; 'Ken.Shump@CH2M.com'; THIESSEN Kenneth; ROMERO Mike; Wray, Mike; POULSEN Mike
Subject: 138 NWP Revision of 8/31/2015 DEQ Comments for Source Control Evaluation DEQ Response to October 5 2015 Email (Below)

Stephanie,

Please consider my answers to your questions (found below in blue) and provide DEQ with NWP's responses to the Source Control Evaluation (SCE) comments.

DEQ had commented that the report combined the SCE and the upland No Further Action (NFA) evaluation in a report that we found to be confusing. At your request, DEQ has separated the SCE comments from the NFA comments in order to move the SCE process at the site forward as quickly as possible. DEQ had agreed to this request and will look forward to your SCE comment responses.

DEQ will produce comments on the upland NFA evaluation, as soon as possible. However, we will prioritize the review of NWP's SCE responses and the associated SCE process. That said, we still anticipate to provide comments on the upland NFA evaluation within two to three weeks. The submittal of NFA comments or work at the SBIP will not cause delay the SCE work.

Please consider my response to your comments (see below) and if there are additional issues or clarifications you wish to discuss with DEQ then we request that we set up a meeting or conference call to work through them.

Thank You

Jim Orr
DEQ Northwest Region

700 NE Multnomah St. Suite 600

Portland, Oregon 97232

503-229-5039

From: HeldtSheller, Stephanie [mailto:SHeldtSheller@nwpipe.com]
Sent: Monday, October 05, 2015 3:09 PM
To: ORR Jim
Cc: MCCLINCY Matt; POULSEN Mike; LIVERMAN Alex; THIESSEN Kenneth; ROMERO Mike; 'DeMaria, Eva'; Sheldrake, Sean; Wray, Mike; 'Ken.Shump@CH2M.com'; Claudia Powers
Subject: RE: 138 NWP Revision of 8/31/2015 DEQ Comments for Source Control Evaluation

Jim,

Thank you for your October 5, 2015 response. We remain unclear concerning your clarification of DEQ's Specific Comment 4 as follows:

(a) You stated "***Please address this comments [sic] in your response to DEQ No Further Action comments.***" What exactly is NWP supposed to address and when? Please refer to issues 1 and 2 in my email below.

(b) You stated: ***"A response to this comment is not required to address the source control comments."*** First, if the comment addresses a Site-Wide No Further Action determination (NFA), why is it included in DEQ's response to the source control decision? Second, do you mean that NWP does not need to address the DEQ Specific Comment 4 (second part) at all? What does NWP need to do to satisfy DEQ's comment?

Please consider our original Comment 4 to be withdrawn from the DEQ SCE comments. No

action relative to the SCE process is required at this time.

The proposed NFA comment schedule and process is discussed at the beginning of this email.

(c) You stated ***"DEQ, at your request has separated the comments for source control and No Further Action. I will provide a schedule for DEQ No Further Action comments by the end of the day October 8th."*** NWP has not requested any specific comments/feedback from the DEQ regarding the NFA. As recently as my 08/25/15 email to you (attached), we state that NWP's top priority is a Source Control determination. Copied and pasted from the attached email: *"For NWP, the most important action by DEQ is the Source Control Decision. This is our top priority; our main focus. If the site-wide NFA review is slowing the Source Control Decision process, we respectfully ask to please set it aside and focus on the Source Control process."* If the DEQ NFA slows down the Portland Harbor Source Control project, we will defer any NFA discussion until after our site has received a Source Control Determination from the DEQ. Please be advised, despite NWP's use of DEQ's definitions of "NFA" and "Source Control Determination," NWP still expects the Source Control Determination by DEQ to confirm that no further source control action is required at the NWP site.

As clarified at the beginning of this email, the NFA process will not delay SCE progress.

Again, If you have additional issues or clarifications to discuss, please contact me to schedule a meeting or conference call.

Thanks Jim Orr

Thank you,

Steph.

Stephanie Heldt-Sheller, CHMM

Corporate Environmental Manager

Northwest Pipe Company | 12005 N. Burgard Rd. | Portland, OR 97203 USA

Direct (503) 382 2324 | Cell (419) 283 1890 | Fax (503) 382 2327

From: ORR Jim [mailto:orr.jim@deq.state.or.us]
Sent: Monday, October 05, 2015 12:00 PM
To: HeldtSheller, Stephanie
Cc: MCCLINCY Matt; POULSEN Mike; LIVERMAN Alex; THIESSEN Kenneth; ROMERO Mike; 'DeMaria, Eva'; Sheldrake, Sean; Wray, Mike; 'Ken.Shump@CH2M.com'; Claudia Powers
Subject: RE: 138 NWP Revision of 8/31/2015 DEQ Comments for Source Control Evaluation

Stephanie, Please see my responses below.

Thank You

Jim Orr
DEQ Northwest Region

700 NE Multnomah St. Suite 600

Portland, Oregon 97232

503-229-5039

From: HeldtSheller, Stephanie [mailto:SHeldtSheller@nwpipe.com]
Sent: Monday, October 05, 2015 11:02 AM
To: ORR Jim
Cc: MCCLINCY Matt; POULSEN Mike; LIVERMAN Alex; THIESSEN Kenneth; ROMERO Mike; 'DeMaria, Eva'; Sheldrake, Sean; Wray, Mike; 'Ken.Shump@CH2M.com'; Claudia Powers
Subject: RE: 138 NWP Revision of 8/31/2015 DEQ Comments for Source Control Evaluation

Hi Jim,

And thank you for the revised comments. The letter states that clarifications are in italics. For revised Specific Comment 4 (second part), we asked for DEQ to please point out the statement in the Report, that triggered this comment. Since that was not provided by the DEQ, we are not sure what the problem is that warranted this DEQ comment. Could you please assist us with the remaining issues below?

Specific Comment 4 (second part) of the DEQ October 1, 2015 revised comments reads as follows:

Section 6.3.1.4 Conclusions for Human Health Risk Screening

Section 6.3.1.3 Human Health Risk Screening Results
Conclusions regarding risks from human exposure to zinc cannot be used as the basis for drawing ecological risk conclusions. Aquatic ecological screening levels for zinc are considerably lower than human health screening levels. Screening should be conducted for both human health and ecological receptors using the appropriate screening values. *The site maximum concentration should be compared with background UPL. This comment will also be addressed in pending No Further Action DEQ comments.*

The issues with this comment are:

(1) Section 6.3.1.3 does not draw ecological risk conclusions, or discuss aquatic ecological screening levels for zinc. Did you mean to withdraw these statements that are not in italics? Or is there still some issue here that I am missing? If there is an issue, could you please describe what DEQ needs from NWP to satisfy this statement in the comment?

(2) Section 6.3.1.3 refers to tables 6-9 and 6-10, which already do compare zinc max concentrations, as well as all metals max concentrations, to background UPL's from the "Development of Oregon Background Metals Concentrations in Soil," Table 3, Regional Background Calculations for Metals (attached for your quick reference). Is there something NWP is missing in the tables that DEQ needs in order to satisfy this comment?

(3) The revised comment states that "This comment will also be addressed in pending No Further Action DEQ comments." When should NWP expect to see the No Further Action DEQ comments?

[ORR Jim]

[ORR Jim] Please address this comments in your response to DEQ No Further Action comments.

A response to this comment is not required to address the source control comments.

DEQ, at your request has separated the comments for source control and No Further Action.

I will provide a schedule for DEQ No Further Action comments by the end of the day October 8th.

Once we get these lingering items rectified, NWP will be able to provide DEQ with a timeline as to when our responses and revised pages to the Report will be provided. DEQ timeliness would be appreciated.

[ORR Jim]

Please provide a timeline for your response to DEQ Source Control comments. Thanks

Thank you,

Steph.

Stephanie Heldt-Sheller, CHMM

Corporate Environmental Manager

Northwest Pipe Company | 12005 N. Burgard Rd. | Portland, OR 97203 USA

Direct (503) 382 2324 | Cell (419) 283 1890 | Fax (503) 382 2327

From: ORR Jim [mailto:orr.jim@deq.state.or.us]
Sent: Thursday, October 01, 2015 10:38 AM
To: Wray, Mike; 'Ken.Shump@CH2M.com'; HeldtSheller, Stephanie; Claudia Powers
Cc: MCCLINCY Matt; POULSEN Mike; LIVERMAN Alex; THIESSEN Kenneth; ROMERO Mike; 'DeMaria, Eva'; Sheldrake, Sean
Subject: 138 NWP Revision of 8/31/2015 DEQ Comments for Source Control Evaluation

Attached is a revision to DEQ's 8/31/2015 comments for the NW Pipe Source Control Evaluation.

Please contact me if you have questions.

Thank You

Jim Orr
DEQ Northwest Region

700 NE Multnomah St. Suite 600

Portland, Oregon 97232

503-229-5039

To: Fonseca, Silvina[Fonseca.Silvina@epa.gov]; Cora, Lori[Cora.Lori@epa.gov]; Anderson, RobinM[Anderson.RobinM@epa.gov]
Cc: Koch, Kristine[Koch.Kristine@epa.gov]
From: Grandinetti, Cami
Sent: Thur 11/5/2015 9:07:00 PM
Subject: RE: PH and PCBs
Capture 1.PNG
Capture.PNG

Attached are two files that comprise Table 26, ARARs for Lower Duwamish.

Cami Grandinetti

Program Manager, Remedial Cleanup Program

USEPA

1200 6th Ave, Suite 900

ECL-123

Seattle, Wa. 98101

206-553-8696 (desk)

206-390-8890 (cell)

206-553-0124 (fax)

From: Fonseca, Silvina
Sent: Wednesday, November 04, 2015 12:03 PM
To: Cora, Lori <Cora.Lori@epa.gov>; Anderson, RobinM <Anderson.RobinM@epa.gov>
Cc: Grandinetti, Cami <Grandinetti.Cami@epa.gov>; Koch, Kristine <Koch.Kristine@epa.gov>
Subject: RE: PH and PCBs

What did we do on Lower Duwamish?

Silvina Fonseca, Environmental Engineer
Office of Superfund Remediation and Technology Innovation

Phone #: 703-603-8799
Fax #: 703-603-9104

From: Cora, Lori
Sent: Wednesday, November 04, 2015 11:44 AM
To: Anderson, RobinM <Anderson.RobinM@epa.gov>
Cc: Fonseca, Silvina <Fonseca.Silvina@epa.gov>; Grandinetti, Cami <Grandinetti.Cami@epa.gov>; Koch, Kristine <Koch.Kristine@epa.gov>
Subject: RE: PH and PCBs

The last we heard from HQ on the Portland Harbor ARARs table (for FS purposes at least) was that it was acceptable. That is why it went out with the draft FS in late July. Where did the change in position come from?

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

From: Anderson, RobinM
Sent: Wednesday, November 04, 2015 6:04 AM
To: Cora, Lori <Cora.Lori@epa.gov>
Cc: Fonseca, Silvina <Fonseca.Silvina@epa.gov>
Subject: RE: PH and PCBs

This is a CERCLA decision and if it is delegated to the state – a state decision. We say in the ROD what is needed for disposal.

Attorney Client / Ex. 5

The RCRA site as I recall was over 50. They choose not to pursue this course of action.

Attorney Client / Ex. 5

Attorney Client / Ex. 5

Robin

From: Cora, Lori
Sent: Tuesday, November 03, 2015 4:04 PM
To: Anderson, RobinM <Anderson.RobinM@epa.gov>
Subject: RE: the November remedy selection call is this Thursday at 1:00 eastern
Personal Privacy / Ex. 6

Hi, Robin. Your RCRA site was in the Lower Duwamish Waterway and it was Boeing's RCRA

Attorney Client / Ex. 5

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

From: Anderson, RobinM
Sent: Tuesday, November 03, 2015 12:51 PM
To: Cora, Lori <Cora.Lori@epa.gov>
Subject: RE: the November remedy selection call is this Thursday at 1:00 eastern
Personal Privacy / Ex. 6

Attorney Client / Ex. 5

From: Cora, Lori
Sent: Tuesday, November 03, 2015 3:09 PM

To: Openchowski, Charles <openchowski.charles@epa.gov>; Anderson, RobinM <Anderson.RobinM@epa.gov>; Bradfish, Larry <Bradfish.Larry@epa.gov>; Buxbaum, David <Buxbaum.David@epa.gov>; Catri, Cindy <Catri.Cynthia@epa.gov>; Engeman, Diana <Engeman.Diana@epa.gov>; Estrada, Thelma <Estrada.Thelma@epa.gov>; Fagiolo, John <fagiolo.john@epa.gov>; Finch, Rhelyn <Finch.Rhelyn@epa.gov>; Fishburn, Meredith <Fishburn.Meredith@epa.gov>; Flanagan, Sarah <Flanagan.Sarah@epa.gov>; Hiltner, Allison <Hiltner.Allison@epa.gov>; Johnson, MaryC <Johnson.MaryC@epa.gov>; Legare, Amy <Legare.Amy@epa.gov>; Lukens, Elizabeth <Lukens.Elizabeth@epa.gov>; MacDonald, Jennifer <Macdonald.Jennifer@epa.gov>; Poetzsch, Michael <Poetzsch.Michael@epa.gov>; Quinones, Edwin <quinones.edwin@epa.gov>; Salo, Earl <Salo.Earl@epa.gov>; Sisk, Richard <Sisk.Richard@epa.gov>; Stevens, Jim <Stevens.Jim@epa.gov>; Tanasijevich, Rudy <Tanasijevich.Rudy@epa.gov>; Tucker, Marlene <Tucker.Marlene@epa.gov>; Tyner, Lee <tyner.lee@epa.gov>; VanItallie, Michael <vanItallie.Michael@epa.gov>
Subject: RE: the November remedy selection call is this Thursday at 1:00 eastern

Personal Privacy / Ex. 6

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

From: Openchowski, Charles
Sent: Monday, November 02, 2015 8:35 AM
To: Anderson, RobinM <Anderson.RobinM@epa.gov>; Bradfish, Larry <Bradfish.Larry@epa.gov>; Buxbaum, David <Buxbaum.David@epa.gov>; Catri, Cindy <Catri.Cynthia@epa.gov>; Cora, Lori <Cora.Lori@epa.gov>; Engeman, Diana <Engeman.Diana@epa.gov>; Estrada, Thelma <Estrada.Thelma@epa.gov>; Fagiolo, John <fagiolo.john@epa.gov>; Finch, Rhelyn <Finch.Rhelyn@epa.gov>; Fishburn, Meredith <Fishburn.Meredith@epa.gov>; Flanagan, Sarah <Flanagan.Sarah@epa.gov>; Hiltner, Allison <Hiltner.Allison@epa.gov>; Johnson, MaryC <Johnson.MaryC@epa.gov>; Legare, Amy <Legare.Amy@epa.gov>; Lukens, Elizabeth <Lukens.Elizabeth@epa.gov>; MacDonald, Jennifer <Macdonald.Jennifer@epa.gov>; Poetzsch, Michael <Poetzsch.Michael@epa.gov>; Quinones, Edwin <quinones.edwin@epa.gov>; Salo, Earl <Salo.Earl@epa.gov>; Sisk, Richard <Sisk.Richard@epa.gov>; Stevens, Jim <Stevens.Jim@epa.gov>; Tanasijevich, Rudy <Tanasijevich.Rudy@epa.gov>; Tucker, Marlene <Tucker.Marlene@epa.gov>; Tyner, Lee <tyner.lee@epa.gov>; VanItallie, Michael <vanItallie.Michael@epa.gov>; Williams, Thomas <williams.tom@epa.gov>
Subject: the November remedy selection call is this Thursday at 1:00 eastern Personal Privacy / Ex. 6
Personal Privacy / Ex. 6

Please send around any agenda items you would like to discuss – thanks!

To: Cora, Lori[Cora.Lori@epa.gov]
From: Ingemansen, Dean
Sent: Thur 11/5/2015 7:10:38 PM
Subject: RE: ATTORNEY CLIENT PRIVILEGE Portland Harbor revised ARARs chart

What reply did you get back from Robin or Silvina to your email?

-Dean

From: Cora, Lori
Sent: Wednesday, November 04, 2015 4:20 PM
To: Ingemansen, Dean <Ingemansen.Dean@epa.gov>
Subject: FW: ATTORNEY CLIENT PRIVILEGE Portland Harbor revised ARARs chart

Just to remind you of what was sent to HQ and our rationale for why "it was the best we could do" on specificity.

Lori Houck Cora | Assistant Regional Counsel
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Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

From: Cora, Lori
Sent: Monday, July 13, 2015 12:00 PM
To: Anderson, RobinM <Anderson.RobinM@epa.gov>; Fonseca, Silvina <Fonseca.Silvina@epa.gov>
Cc: Koch, Kristine <Koch.Kristine@epa.gov>; Sheldrake, Sean <sheldrake.sean@epa.gov>; Zhen, Davis <Zhen.Davis@epa.gov>; Grandinetti, Cami <Grandinetti.Cami@epa.gov>; Ingemansen, Dean <Ingemansen.Dean@epa.gov>
Subject: ATTORNEY CLIENT PRIVILEGE Portland Harbor revised ARARs chart

Hello, Robin and Silvina. Attached is are revised and updated ARARs tables for the Portland Harbor FS. New ARARs have been added given current FS alternatives include the possible

siting and operation of a transloading facility where contaminated dredged materials both non-hazardous waste (solid waste) and those determined to be hazardous waste and slated for off-site disposal would be staged (stored) and possibly treated prior to shipment off-site and further discussions with the State. The new ARARs are all action-specific so found in that table.

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

To: Cora, Lori[Cora.Lori@epa.gov]; Anderson, RobinM[Anderson.RobinM@epa.gov]
Cc: Fonseca, Silvina[Fonseca.Silvina@epa.gov]; Grandinetti, Cami[Grandinetti.Cami@epa.gov]
From: Koch, Kristine
Sent: Thur 11/5/2015 12:11:28 AM
Subject: RE: PH and ARARs

Silvina and I have spoken and we feel that it would be good to convene a meeting to discuss any outstanding issues with ARARs as they pertain to the alternatives in the FS. She is working on setting up the meeting.

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
Region 10
1200 Sixth Avenue, Suite 900, M/S ECL-122
Seattle, Washington 98101-3140

(206)553-6705
(206)553-8581 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: Cora, Lori
Sent: Wednesday, November 04, 2015 3:42 PM
To: Anderson, RobinM <Anderson.RobinM@epa.gov>
Cc: Fonseca, Silvina <Fonseca.Silvina@epa.gov>; Grandinetti, Cami <Grandinetti.Cami@epa.gov>; Koch, Kristine <Koch.Kristine@epa.gov>
Subject: RE: PH and ARARs

Attorney Client / Ex. 5

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U.S. Environmental Protection Agency | Region 10
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From: Anderson, RobinM
Sent: Wednesday, November 04, 2015 12:32 PM
To: Cora, Lori <Cora.Lori@epa.gov>
Cc: Fonseca, Silvina <Fonseca.Silvina@epa.gov>; Grandinetti, Cami <Grandinetti.Cami@epa.gov>; Koch, Kristine <Koch.Kristine@epa.gov>
Subject: RE: PH and ARARs

Attorney Client / Ex. 5

At no time did we say that we or I was OK with the ARARs table.

Thank you.

Robin M Anderson

OSRTI/ARD/SARDB

703-603-8747

From: Cora, Lori
Sent: Wednesday, November 04, 2015 11:44 AM
To: Anderson, RobinM <Anderson.RobinM@epa.gov>
Cc: Fonseca, Silvina <Fonseca.Silvina@epa.gov>; Grandinetti, Cami <Grandinetti.Cami@epa.gov>; Koch, Kristine <Koch.Kristine@epa.gov>
Subject: RE: PH and PCBs

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
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Cc: Fonseca, Silvina <Fonseca.Silvina@epa.gov>
Subject: RE: PH and PCBs

This is a CERCLA decision and if it is delegated to the state – a state decision. We say in the ROD what is needed for disposal.

Attorney Client / Ex. 5

The RCRA site as I recall was over 50. They choose not to pursue this course of action.

Attorney Client / Ex. 5

Attorney Client / Ex. 5

Robin

From: Cora, Lori
Sent: Tuesday, November 03, 2015 4:04 PM
To: Anderson, RobinM <Anderson.RobinM@epa.gov>
Subject: RE: the November remedy selection call is this Thursday at 1:00 eastern
Personal Privacy / Ex. 6

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
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From: Anderson, RobinM
Sent: Tuesday, November 03, 2015 12:51 PM
To: Cora, Lori <Cora.Lori@epa.gov>
Subject: RE: the November remedy selection call is this Thursday at 1:00 eastern
Personal Privacy / Ex. 6

Attorney Client / Ex. 5

From: Cora, Lori
Sent: Tuesday, November 03, 2015 3:09 PM
To: Openchowski, Charles <openchowski.charles@epa.gov>; Anderson, RobinM <Anderson.RobinM@epa.gov>; Bradfish, Larry <Bradfish.Larry@epa.gov>; Buxbaum, David <Buxbaum.David@epa.gov>; Catri, Cindy <Catri.Cynthia@epa.gov>; Engeman, Diana <Engeman.Diana@epa.gov>; Estrada, Thelma <Estrada.Thelma@epa.gov>; Fagiolo, John <fagiolo.john@epa.gov>; Finch, Rhelyn <Finch.Rhelyn@epa.gov>; Fishburn, Meredith <Fishburn.Meredith@epa.gov>; Flanagan, Sarah <Flanagan.Sarah@epa.gov>; Hiltner, Allison <Hiltner.Allison@epa.gov>; Johnson, MaryC <Johnson.MaryC@epa.gov>; Legare, Amy <Legare.Amy@epa.gov>; Lukens, Elizabeth <Lukens.Elizabeth@epa.gov>; MacDonald, Jennifer <Macdonald.Jennifer@epa.gov>; Poetzsch, Michael <Poetzsch.Michael@epa.gov>; Quinones, Edwin <quinones.edwin@epa.gov>; Salo, Earl <Salo.Earl@epa.gov>; Sisk, Richard <Sisk.Richard@epa.gov>; Stevens, Jim <Stevens.Jim@epa.gov>; Tanasijevich, Rudy <Tanasijevich.Rudy@epa.gov>; Tucker, Marlene <Tucker.Marlene@epa.gov>; Tyner, Lee

<tyner.lee@epa.gov>; VanItallie, Michael <vanItallie.Michael@epa.gov>
Subject: RE: the November remedy selection call is this Thursday at 1:00 eastern
Personal Privacy / Ex. 6

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
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P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Openchowski, Charles
Sent: Monday, November 02, 2015 8:35 AM
To: Anderson, RobinM <Anderson.RobinM@epa.gov>; Bradfish, Larry <Bradfish.Larry@epa.gov>; Buxbaum, David <Buxbaum.David@epa.gov>; Catri, Cindy <Catri.Cynthia@epa.gov>; Cora, Lori <Cora.Lori@epa.gov>; Engeman, Diana <Engeman.Diana@epa.gov>; Estrada, Thelma <Estrada.Thelma@epa.gov>; Fagiolo, John <fagiolo.john@epa.gov>; Finch, Rhelyn <Finch.Rhelyn@epa.gov>; Fishburn, Meredith <Fishburn.Meredith@epa.gov>; Flanagan, Sarah <Flanagan.Sarah@epa.gov>; Hiltner, Allison <Hiltner.Allison@epa.gov>; Johnson, MaryC <Johnson.MaryC@epa.gov>; Legare, Amy <Legare.Amy@epa.gov>; Lukens, Elizabeth <Lukens.Elizabeth@epa.gov>; MacDonald, Jennifer <Macdonald.Jennifer@epa.gov>; Poetzsch, Michael <Poetzsch.Michael@epa.gov>; Quinones, Edwin <quinones.edwin@epa.gov>; Salo, Earl <Salo.Earl@epa.gov>; Sisk, Richard <Sisk.Richard@epa.gov>; Stevens, Jim <Stevens.Jim@epa.gov>; Tanasijevich, Rudy <Tanasijevich.Rudy@epa.gov>; Tucker, Marlene <Tucker.Marlene@epa.gov>; Tyner, Lee <tyner.lee@epa.gov>; VanItallie, Michael <vanItallie.Michael@epa.gov>; Williams, Thomas <williams.tom@epa.gov>
Subject: the November remedy selection call is this Thursday at 1:00 eastern Personal Privacy / Ex. 6
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To: Openchowski, Charles[openchowski.charles@epa.gov]; Cora, Lori[Cora.Lori@epa.gov]
From: Anderson, RobinM
Sent: Wed 11/4/2015 8:28:15 PM
Subject: FW: PH and PCBs

From: Anderson, RobinM
Sent: Wednesday, November 04, 2015 3:27 PM
To: Fonseca, Silvina <Fonseca.Silvina@epa.gov>; Cora, Lori <Cora.Lori@epa.gov>
Cc: Grandinetti, Cami <Grandinetti.Cami@epa.gov>; Koch, Kristine <Koch.Kristine@epa.gov>
Subject: RE: PH and PCBs

To follow-up on Silvina's message – first we need an answer to her question.

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Robin M Anderson

OSRTI/ARD/SARDB

703-603-8747

From: Fonseca, Silvina
Sent: Wednesday, November 04, 2015 3:03 PM
To: Cora, Lori <Cora.Lori@epa.gov>; Anderson, RobinM <Anderson.RobinM@epa.gov>
Cc: Grandinetti, Cami <Grandinetti.Cami@epa.gov>; Koch, Kristine <Koch.Kristine@epa.gov>
Subject: RE: PH and PCBs

What did we do on Lower Duwamish?

Silvina Fonseca, Environmental Engineer
Office of Superfund Remediation and Technology Innovation

Phone #: 703-603-8799
Fax #: 703-603-9104

From: Cora, Lori
Sent: Wednesday, November 04, 2015 11:44 AM
To: Anderson, RobinM <Anderson.RobinM@epa.gov>
Cc: Fonseca, Silvina <Fonseca.Silvina@epa.gov>; Grandinetti, Cami <Grandinetti.Cami@epa.gov>; Koch, Kristine <Koch.Kristine@epa.gov>
Subject: RE: PH and PCBs

Attorney Client / Ex. 5

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From: Anderson, RobinM
Sent: Wednesday, November 04, 2015 6:04 AM
To: Cora, Lori <Cora.Lori@epa.gov>
Cc: Fonseca, Silvina <Fonseca.Silvina@epa.gov>
Subject: RE: PH and PCBs

This is a CERCLA decision and if it is delegated to the state – a state decision. We say in the ROD what is needed for disposal.

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Robin

From: Cora, Lori
Sent: Tuesday, November 03, 2015 4:04 PM
To: Anderson, RobinM <Anderson.RobinM@epa.gov>
Subject: RE: the November remedy selection call is this Thursday at 1:00 eastern

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From: Anderson, RobinM
Sent: Tuesday, November 03, 2015 12:51 PM
To: Cora, Lori <Cora.Lori@epa.gov>
Subject: RE: the November remedy selection call is this Thursday at 1:00 eastern

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From: Cora, Lori
Sent: Tuesday, November 03, 2015 3:09 PM
To: Openchowski, Charles <openchowski.charles@epa.gov>; Anderson, RobinM <Anderson.RobinM@epa.gov>; Bradfish, Larry <Bradfish.Larry@epa.gov>; Buxbaum, David <Buxbaum.David@epa.gov>; Catri, Cindy <Catri.Cynthia@epa.gov>; Engeman, Diana <Engeman.Diana@epa.gov>; Estrada, Thelma <Estrada.Thelma@epa.gov>; Fagiolo, John <fagiolo.john@epa.gov>; Finch, Rhelyn <Finch.Rhelyn@epa.gov>; Fishburn, Meredith <Fishburn.Meredith@epa.gov>; Flanagan, Sarah <Flanagan.Sarah@epa.gov>; Hiltner, Allison <Hiltner.Allison@epa.gov>; Johnson, MaryC <Johnson.MaryC@epa.gov>; Legare, Amy <Legare.Amy@epa.gov>; Lukens, Elizabeth <Lukens.Elizabeth@epa.gov>; MacDonald, Jennifer <Macdonald.Jennifer@epa.gov>; Poetzsch, Michael <Poetzsch.Michael@epa.gov>; Quinones, Edwin <quinones.edwin@epa.gov>; Salo, Earl <Salo.Earl@epa.gov>; Sisk, Richard <Sisk.Richard@epa.gov>; Stevens, Jim <Stevens.Jim@epa.gov>; Tanasijevich, Rudy <Tanasijevich.Rudy@epa.gov>; Tucker, Marlene <Tucker.Marlene@epa.gov>; Tyner, Lee <tyner.lee@epa.gov>; VanItallie, Michael <vanItallie.Michael@epa.gov>
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From: Fagiolo, John
Sent: Wed 11/4/2015 7:55:27 PM
Subject: RE: PCB Sediment Cleanup (example)
sheboygan-fyr-2014.pdf

hi - I think a good Region 5 example of this is the Sheboygan River cleanup.

Attached is the 2014 Five-Year Review Report that has some discussion on the details of what is being implemented for that project.

[I am not the RPM for that work]. Hope this helps somewhat.

thanks !!!

****

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Remedial Project Manager
EPA R5 SFD / Corps of Engineers Liaison
U.S. EPA Region 5 - Superfund Div.
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Chicago IL 60604
312.886.0800
FAX: 312.692.2015
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Cubicle # 06100

From: Catri, Cindy
Sent: Wednesday, November 04, 2015 1:05 PM
To: Cora, Lori; Openchowski, Charles; Anderson, RobinM; Bradfish, Larry; Buxbaum, David; Engeman, Diana; Estrada, Thelma; Fagiolo, John; Finch, Rhelyn; Fishburn, Meredith; Flanagan, Sarah; Hiltner, Allison; Johnson, MaryC; Legare, Amy; Lukens, Elizabeth; MacDonald, Jennifer; Poetzsch, Michael; Quinones, Edwin; Salo, Earl; Sisk, Richard; Stevens, Jim;

Tanasijevich, Rudy; Tucker, Marlene; Tyner, Lee; VanItallie, Michael
Subject: RE: the November remedy selection call is this Thursday at 1:00 eastern

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Lori,

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From: Cora, Lori
Sent: Tuesday, November 03, 2015 3:09 PM
To: Openchowski, Charles <openchowski.charles@epa.gov>; Anderson, RobinM <Anderson.RobinM@epa.gov>; Bradfish, Larry <Bradfish.Larry@epa.gov>; Buxbaum, David <Buxbaum.David@epa.gov>; Catri, Cindy <Catri.Cynthia@epa.gov>; Engeman, Diana <Engeman.Diana@epa.gov>; Estrada, Thelma <Estrada.Thelma@epa.gov>; Fagiolo, John <fagiolo.john@epa.gov>; Finch, Rhelyn <Finch.Rhelyn@epa.gov>; Fishburn, Meredith <Fishburn.Meredith@epa.gov>; Flanagan, Sarah <Flanagan.Sarah@epa.gov>; Hiltner, Allison <Hiltner.Allison@epa.gov>; Johnson, MaryC <Johnson.MaryC@epa.gov>; Legare, Amy <Legare.Amy@epa.gov>; Lukens, Elizabeth <Lukens.Elizabeth@epa.gov>; MacDonald, Jennifer <Macdonald.Jennifer@epa.gov>; Poetzsch, Michael <Poetzsch.Michael@epa.gov>; Quinones, Edwin <quinones.edwin@epa.gov>; Salo, Earl <Salo.Earl@epa.gov>; Sisk, Richard <Sisk.Richard@epa.gov>; Stevens, Jim <Stevens.Jim@epa.gov>; Tanasijevich, Rudy <Tanasijevich.Rudy@epa.gov>; Tucker, Marlene <Tucker.Marlene@epa.gov>; Tyner, Lee <tyner.lee@epa.gov>; VanItallie, Michael <vanItallie.Michael@epa.gov>
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To: Cora, Lori[Cora.Lori@epa.gov]
From: Catri, Cindy
Sent: Wed 11/4/2015 7:06:48 PM
Subject: RE: the November remedy selection call is this Thursday at 1:00 eastern 1.866.299.3188 2025645519#
Nuclear Metals 9.2015 sdms 582996.pdf

See Appendix G in Nuclear Metals, attached.

From: Cora, Lori
Sent: Tuesday, November 03, 2015 3:09 PM
To: Openchowski, Charles <openchowski.charles@epa.gov>; Anderson, RobinM <Anderson.RobinM@epa.gov>; Bradfish, Larry <Bradfish.Larry@epa.gov>; Buxbaum, David <Buxbaum.David@epa.gov>; Catri, Cindy <Catri.Cynthia@epa.gov>; Engeman, Diana <Engeman.Diana@epa.gov>; Estrada, Thelma <Estrada.Thelma@epa.gov>; Fagiolo, John <fagiolo.john@epa.gov>; Finch, Rhelyn <Finch.Rhelyn@epa.gov>; Fishburn, Meredith <Fishburn.Meredith@epa.gov>; Flanagan, Sarah <Flanagan.Sarah@epa.gov>; Hiltner, Allison <Hiltner.Allison@epa.gov>; Johnson, MaryC <Johnson.MaryC@epa.gov>; Legare, Amy <Legare.Amy@epa.gov>; Lukens, Elizabeth <Lukens.Elizabeth@epa.gov>; MacDonald, Jennifer <Macdonald.Jennifer@epa.gov>; Poetzsch, Michael <Poetzsch.Michael@epa.gov>; Quinones, Edwin <quinones.edwin@epa.gov>; Salo, Earl <Salo.Earl@epa.gov>; Sisk, Richard <Sisk.Richard@epa.gov>; Stevens, Jim <Stevens.Jim@epa.gov>; Tanasijevich, Rudy <Tanasijevich.Rudy@epa.gov>; Tucker, Marlene <Tucker.Marlene@epa.gov>; Tyner, Lee <tyner.lee@epa.gov>; VanItallie, Michael <vanItallie.Michael@epa.gov>
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REGION 1

RECORD OF DECISION

NUCLEAR METALS, INC. SUPERFUND SITE

SEPTEMBER 2015

SDMS Doc ID 582996

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DECLARATION FOR THE RECORD OF DECISION

A. SITE NAME AND LOCATION

Nuclear Metals, Inc. Superfund Site

Concord, Massachusetts

CERCLIS ID # MAD062166335

B. STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Nuclear Metals, Inc. Superfund Site (Site or NMI Site), in Concord, Massachusetts, which was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended (CERCLA), 42 USC §§ 9601 et seq., and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan, as amended (NCP), 40 CFR Part 300 et seq. The Director of the Office of Site Remedi ation and Restoration (OSRR) has been delegated the authority to approve this Record of Decision (ROD).

This decision was based on the Administrative Record, which has been developed in accordance with Section 113(k) of CERCLA, and which is available for review at the Concord Free Public Library and at the United States Environmental Protection Agency (EPA) Region 1 OSRR Records Center in Boston, Massachusetts. Th e Administrative Record Index (Appendix I to the ROD) identifies each of the items comprising the Administrative Record upon which the selection of the remedial action is based.

The Commonwealth of Massachusetts concurs with the Selected Remedy.

C. ASSESSMENT OF THE SITE

The response action selected in this ROD is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

D. DESCRIPTION OF THE SELECTED REMEDY

This ROD sets forth the selected remedy for the Site, which involves the excavation and off-site disposal of approximately 82,500 cubic yards of low-level threat contaminated sediments, underground drain lines and debris, and non-Holding Basin soils in various areas of the Site which exceed human health and/or ecological risk standards; in-situ stabilization of principal threat source materials within the Holding Basin to prevent leaching of contaminants to groundwater; and containment of Holding Basin stabilized soils with a low-permeability vertical wall and horizontal cover to isolate the stabilized soils and further limit mobility of contaminants by removing the flow of groundwater. The selected remedy also includes extraction and *ex-situ* treatment of volatile organic compounds (VOCs) and 1,4-dioxane in overburden and bedrock aquifers, and *in-situ* treatment of depleted uranium (DU) in the overburden aquifer and natural

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uranium in the bedrock aquifer, and long-term monitoring to monitor effectiveness of *in-* and *ex-situ* treatment. Institutional controls will be implemented to: 1) prevent unacceptable exposures to, and to prevent disturbance of, the Holding Basin area; 2) prohibit use of contaminated groundwater until cleanup levels are met; and 3) require installation of vapor mitigation systems should future structures be built above the VOC groundwater plume unless an evaluation of vapor intrusion risks is performed to show such systems are not required.

The selected remedy is a comprehensive approach for this Site that addresses all current and potential future risks caused by soil, sediment, and groundwater contamination. The remedial measures will prevent future leaching from the principal threat waste in the Holding Basin into the groundwater in excess of drinking water standards; restore groundwater within the contaminant plume to a level protective of human health and the environment, and that meets the performance standards; and ensure that exposure to low-level threat wastes in Site soils and sediments will be prevented; and will allow for restoration of the Site to beneficial uses. Institutional controls will be used as part of the selected remedy to prevent exposure to contaminated groundwater until the performance standards are met and to prevent exposure to stabilized soils in the Holding Basin.

The major components of the selected remedy are:

1. Excavation and off-site disposal of approximately 82,500 cubic yards of contaminated sediments, underground drain lines and debris, and non-Holding Basin soils (contaminated with DU, polychlorinated biphenyls (PCBs), and other contaminants of concern) in various areas of the Site;

2. *In-Situ* stabilization of DU contaminated soils in the Holding Basin via injection of a stabilization agent such as apatite (such as Apatite II™) or other comparable stabilization agent to prevent leaching of contaminants to groundwater, and containment of Holding Basin stabilized soils with a low-permeability vertical wall and horizontal sub-grade cover to isolate the stabilized soils and further limit mobility of contaminants by removing the flow of groundwater;

3. Extraction and *ex-situ* treatment of volatile organic compounds (VOCs) and 1,4-dioxane in overburden and bedrock aquifers, and *in-situ* treatment of DU in overburden aquifer and natural uranium in bedrock aquifer;

4. Long-term monitoring to monitor effectiveness of *in-* and *ex-situ* treatment; and

5. Institutional Controls to: 1) prevent unacceptable exposures to, and to prevent disturbance of, the Holding Basin area; 2) prohibit use of contaminated groundwater until cleanup levels are met; and 3) require installation of vapor mitigation systems should future structures be built above the VOC plume before groundwater cleanup levels are met, unless an evaluation of vapor intrusion risks is performed to show such systems are not required.

This ROD follows two time critical and one non-time critical removal actions which were

conducted between 2001 and the present. The Massachusetts Department of Environmental Protection also conducted a removal action at the Site from 2005-2006.

The selected remedy addresses principal and low-level threat wastes at the Site by: 1) the stabilization and containment of source soils in the Holding Basin to eliminate exposure to and leaching from the Holding Basin soils; and 2) the excavation and off-site disposal of remaining contaminated soils and sediments to eliminate exposure to these soils and sediments.

E. STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to the remedial action (unless justified by a waiver), is cost-effective, and utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable.

The Holding Basin soils and groundwater portions of the remedy also satisfy the statutory preference for treatment as a principal element of the remedy (i.e., reduce the toxicity, mobility, or volume of materials comprising principal threats through treatment). Based on the volume of contaminated soils located outside the Holding Basin, EPA concluded that it was impracticable to excavate and treat the chemicals of concern in a cost-effective manner. Thus, excavation and off-site disposal of those soils was chosen as a component of the selected remedy, although it does not satisfy the statutory preference for treatment as a principal element of the remedy.

Because this remedy will result in hazardous substances remaining on-site above levels that allow for unlimited use and unrestricted exposure (and groundwater and land use restrictions are necessary), a review will be conducted within five years after initiation of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

F. SPECIAL FINDINGS

Issuance of this ROD embodies the following specific determinations:

Wetland Impacts

Pursuant to Section 404 of the Clean Water Act (CWA), 40 CFR Part 230 (Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material), 21 M.G.L. §§ 26-53, and 314 CMR 9.06(1-2) (Criteria for the Evaluation of Applications for Discharge of Dredged or Fill Material), EPA has determined that there is no practicable alternative to conducting work that will impact wetlands and/or result in the discharge of dredged or fill material into waters of the United States because significant levels of contamination exist within wetlands and waters of the United States and these areas are included within the Site's cleanup areas.

For those areas impacted by cleanup activities, EPA has also determined that the cleanup alternatives that have been selected are the least damaging practicable alternatives.

EPA will minimize potential harm and avoid adverse impacts on resources, to the extent practical, by using best management practices to minimize harmful impacts on the wetlands, wildlife, or habitat. Impacted areas will be mitigated consistent with the requirements of federal and state laws.

Toxic Substances Control Act

In accordance with the requirements under the Toxic Substances Control Act (TSCA) and 40 CFR § 761.61(c), EPA has made a finding that the manner of sampling, storage, cleanup, and disposal of PCB-contaminated sediment and soil as set out in this Record of Decision will not pose an unreasonable risk of injury to health or the environment as long as the following conditions are met:

- The selected contractor for the PCB remediation work shall submit a contractor work plan describing the containment and air monitoring that will be employed during PCB remedial activities, including but not limited to site control, excavation, handling, storage, and disposal activities. This work plan should also include information on how and where all PCB-contaminated wastes (both less than ("<") 50 ppm and ≥ 50 ppm) will be stored and disposed of, how stormwater controls and runoff will be managed, how dust levels will be controlled and monitored, and on how field equipment will be decontaminated.

- Two PCB-contaminated sediment and soil samples with ≥ 50 ppm PCBs are located in Areas of Investigation (AOIs) 4 and 8, as shown in **Attachment 1 of Appendix G.** Identified PCB-contaminated soils and sediments with ≥ 50 ppm shall be excavated and disposed off-site at a TSCA-approved disposal facility or a RCRA hazardous waste landfill in accordance with 40 CFR § 761.61(a)(5)(i)(B)(*2*)(*iii*). Confirmatory sampling shall be conducted in accordance with 40 CFR Part 761, Subpart O to document that all PCBs with ≥ 50 ppm have been removed.

- Compliance with the PCB regulations at 40 CFR Part 761 is maintained during all phases of work involving ≥ 50 ppm PCB-contaminated soils and/or sediments, including but not limited to:

    - 40 CFR Part 761 Subpart C – Marking of PCBs and PCB Items
    - 40 CFR § 761.50(b)(7) – PCB/Radioactive waste
    - 40 CFR § 761.65 – Storage for Disposal
    - 40 CFR § 761.79 – Decontamination Standards and Procedures
    - 40 CFR Part 761 – Subpart K, PCB Waste Disposal Records and Reports

G. ROD DATA CERTIFICATION CHECKLIST

The following information is included in the Decision Summary section of this Record of Decision. Additional information can be found in the Administrative Record file for this Site.

1. Chemicals of concern (COCs) and their respective concentrations.

2. Baseline risk represented by the COCs.

3. Cleanup levels established for COCs and the basis for the levels.

4. Current and future land and ground-water use assumptions used in the baseline risk assessment and ROD.

5. Land and groundwater use that will be available at the Site as a result of the selected remedy.

6. Estimated capital, operation and maintenance (O&M), and total present worth costs; discount rate; and the number of years over which the remedy cost estimates are projected.

7. Decisive factor(s) that led to selecting the remedy.

H. AUTHORIZING SIGNATURES

This ROD documents the selected remedy for soil, sediment, and groundwater at the NMI Superfund Site. This remedy was selected by EPA with concurrence of the Massachusetts Department of Environmental Protection (MassDEP). A copy of MassDEP's concurrence letter is attached to this ROD.

U.S. Environmental Protection Agency

By: Nancy Barmakian Date: 09/28/15

Nancy Barmakian, Acting Director
Office of Site Remediation and Restoration
Region 1

DECISION SUMMARY FOR THE RECORD OF DECISION

A. SITE NAME, LOCATION AND BRIEF DESCRIPTION

Nuclear Metals, Inc. Superfund Site

2229 Main Street, Concord, MA 01742

CERCLIS ID # MAD062166335

Nuclear Metals, Inc. Superfund Site is PRP-lead.

The Nuclear Metals, Inc. Superfund Site (Site or NMI Site) includes a 46-acre property (NMI Property) located at 2229 Main Street in the western portion of the Town of Concord, Middlesex County, Massachusetts. The Site also consists of contaminated groundwater migrating to areas located off the NMI Property. Facility operations at the Site began in 1958 and ended in early November 2011. Nuclear Metals, Inc. (NMI) was originally a specialty metal research and development facility that was licensed to possess low-level radioactive substances including DU, but later developed into a large-scale industrial facility for the manufacturing of DU products.

The NMI Property is bordered by Main Street (Route 62) and several commercial and residential properties to the north, residential properties to the east, Town-owned open space and a health club with a children's summer camp to the south and southwest, and residential/woodland and commercial/industrial properties to the west. The Assabet River is situated approximately 300 feet north and at an elevation 20 to 30 feet below the NMI Property, on the opposite side of Route 62. The NMI Property is currently zoned light commercial/industrial and as currently configured includes eight interconnected buildings, several smaller outbuildings, paved parking areas, a Sphagnum Bog, a Cooling Water Recharge Pond, a former waste Holding Basin, and areas of fill and/or waste materials. The buildings are to be removed as part of an on-going Non-Time Critical Removal Action (Building NTCRA), a cleanup plan selected by EPA in 2008, and are not part of this remedy selection. Historical activities at the Site resulted in soil, sediment, and groundwater contamination. Groundwater is found both in the overburden and bedrock formations and migrates north/northwest, towards the Assabet River.

The Site was listed on the National Priorities List (NPL) on June 14, 2001, with the concurrence of the Governor of Massachusetts.

A more complete description of the Site can be found in Section 2 of the Remedial Investigation (RI) Report (*de maximis*, 2014)[1].

[1] *de maximis*, 2014. Remedial Investigation, Nuclear Metals Inc. Superfund Site; April 2014.

B. SITE HISTORY AND ENFORCEMENT ACTIVITIES

1. History of Site Activities

From 1957 to October 1972, the NMI Property was owned and operated by a succession of companies that were engaged principally in specialty metals research and development contract work. In September 1972, NMI employees purchased the operation. The focus of Site operations shifted from research and development to large-scale production in the mid-1970s. This included manufacture of DU shields, counter weights, armor penetrators, metal powders, beryllium and beryllium alloy parts production, and manufacture of specialty titanium parts.

In 1997, NMI was renamed Starmet Corporation (Starmet). Starmet's radioactive materials operations were historically regulated under a radioactive materials license from the U.S. Nuclear Regulatory Commission (NRC); however, in 1997, the NRC delegated regulatory authority to the Massachusetts Department of Public Health-Radiation Control Program (MADPH-RCP) as an agreement state licensee.

From the beginning of operations until a closed-loop system was installed in approximately 1985, an on-site holding basin was used to dispose of waste by-products, including DU, nitric acid, and copper. In late 1997, under the oversight of MassDEP and MADPH-RCP and with the financial support of the US Army, Starmet excavated approximately 8,000 cubic yards of soil contaminated with DU and copper from the Holding Basin and disposed of these soils at an off-site low-level radioactive waste disposal facility. The cleanup halted in late 1998 when Starmet determined that the cleanup level set by MassDEP could not be met without excavating significantly more material. Soon after the Site was listed on the National Priorities List (NPL) in June 2001, a time-critical removal action performed by EPA placed an interim cover over the Holding Basin. Anecdotal information indicates that volatile organic compounds (VOCs), which likely contained 1,4-dioxane as a stabilizer, used as solvents and degreasers were also discharged through floor drains to an on-site cooling water pond, resulting in contamination of an on-site supply well.

Other constituents were released or disposed of in ways that resulted in contamination that extends across multiple areas. Specifically, disposal or release of DU, PCBs, copper, lead, mercury, VOCs, and 1,4-dioxane appears to have occurred through: 1) direct disposal, spills or leaks from facility drain lines, drum burials, and waste storage areas; 2) dredging material and/or landfill disposal; and 3) aerial disposition and storm water runoff.

A more detailed description of the Site history can be found in Section 2 of the RI Report and Section 1 the Feasibility Study (FS).

2. History of Federal and State Investigations and Response Actions

Table B-1 provides a summary of Federal and State Site investigations and removal actions.

Table B-1

Date	Action	Legal Authority	Who Undertook	Results	Related Documents
2001-2002	Time-Critical Removal Action	CERCLA	EPA	Holding Basin interim cover, "Old Landfill" Cap and Fencing Installed	Pollution Reports
2004-2014	Remedial Investigation	CERCLA	PRPs	Remedial Investigation Report (April 2014)	Human Health and Ecological Risk Assessment Reports
2006	Removal Action	MCP 21E	MassDEP	Removal/Off-Site Disposal of DU drums and materials from facility buildings	
2007	Time-Critical Removal Action	CERCLA	EPA	Removal/Off-Site Disposal of Hazardous/Flammable Materials from facility buildings	Pollution Reports
2008	Non-Time Critical Removal Action	CERCLA	PRPs	Removal/Off-Site Disposal of remaining Facility building contents/equipment and building demolition	Action Memorandum
2014	Feasibility Study	CERCLA	PRPs	Evaluation of Remedial Alternatives	Proposed Plan
2015	Non-Time Critical Removal	CERCLA	To Be Determined	Acceleration of Groundwater Treatment for VOCs and 1,4-dioxane	Action Memorandum, Proposed Plan

3. History of CERCLA Enforcement Activities

EPA has performed a number of potentially responsible party (PRP) search related activities, including sending information requests pursuant to CERCLA Section 104(e), reviewing files,

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and performing record searches. As a result of those PRP search activities, EPA issued notice of potential liability letters to: Starmet Corporation and Starmet NMI Corporation on May 1, 2001, the United States Army on May 25, 2001, MONY Life Insurance Company, Whittaker Corporation, and Textron, Inc. on July 23, 2001, and the United States Department of Energy on March 18, 2002. These parties either owned or operated the Starmet/NMI facility, generated wastes that were shipped to the facility, or arranged for the disposal of wastes at the facility of their potential liability with respect to the Site.

On February 20, 2002, EPA issued special notice letters requesting participation in negotiations for performance of a remedial investigation and feasibility study (RI/FS) and/or engineering evaluation and cost analysis (EE/CA) to these potentially responsible parties with the exception of the U.S. Dept. of Energy (its special notice letter was sent by EPA on March 18, 2002 along with the notice of potential liability mentioned above).

On April 3, 2002, Starmet Corp. (Starmet) filed a petition for relief under Chapter 11 of the U.S. Bankruptcy Code in the U.S. Bankruptcy Court for the District of South Carolina (Bankruptcy Court). DOJ filed a proof of claim in the bankruptcy on behalf of EPA. On December 20, 2002, the Bankruptcy Court dismissed Starmet's case because Starmet failed to file a plan and disclosure statement within 180 days of its bankruptcy filing date as required by procedural rules. Before the case was dismissed, however, the Bankruptcy Court entered an order approving the sale of all or substantially all of Starmet's assets, other than real estate, for $600,000, with proceeds to be paid to Starmet's secured creditor, Citizens Bank.

On May 12, 2003, the MADPH-RCP modified Starmet's radioactive materials license for manufacturing or operations, allowing only their possession on-site.

On June 13, 2003, the U.S. Army, MONY Life Insurance Co., Whittaker Corp., Textron, Inc. and the U.S. Dept. of Energy entered into an Administrative Order By Consent For RI/FS (U.S. EPA Docket No. CERCLA 01-2003-0021) for the Site, which was amended on February 13, 2008 and again on October 2, 2012 as set forth in the Amendment to Administrative Order By Consent for RI/FS, U.S. EPA Docket No. CERCLA 01-2008-0007, and the Second Amendment to Administrative Order By Consent for RI/FS, U.S. EPA Docket No. CERCLA 01-2012-0096 (jointly, these three agreements are referred to herein as the "AOC for RI/FS"). The AOC for RI/FS also requires the respondents to that agreement to perform one or more EE/CAs, if requested to do so by EPA.

In June 2006, based on newly acquired information, EPA determined that MONY should no longer be considered a PRP for the Site.

On August 20, 2007, as a result of additional PRP search activities, EPA issued notice of potential responsibility letters to: Applied Technology Management, LLC, Applied Materials Science, Inc., and Advanced Specialty Metals, Inc.

On March 3, 2009, EPA issued special notice letters to U.S. Army, U.S. Dept. of Energy, Whittaker Corp., and Textron, Inc. requesting participation in negotiations for performance of a

non-time critical removal action (Building NTCRA) to address the contaminated buildings at the Site.

In August 2011, EPA and U.S. Army, U.S. Dept. of Energy, Whittaker Corp., and Textron, Inc. signed an Administrative Settlement Agreement and Order On Consent For Non-Time Critical Removal Action for the performance of the Building NTCRA to address the on-site buildings. Work began in 2011 and is currently on-going with anticipated completion in 2016.

Under the terms of a Consent Decree with the Massachusetts Department of Public Health (MADPH), Starmet vacated the Site on November 2, 2011. MADPH terminated the radioactive materials licenses on November 8, 2011.

The PRPs (U.S. Army, U.S. Dept. of Energy, Whittaker Corp., and Textron, Inc.), have been active in the remedy selection process for this Site. The PRPs funded and/or performed the studies and investigations upon which the Feasibility Study and Proposed Plan was based.

C. COMMUNITY PARTICIPATION

Throughout the Site's history, community concern and involvement has been high. The PRPs and EPA have kept the community and other interested parties apprised of Site activities through informational meetings, fact sheets, press releases, and public meetings. Below is a brief chronology of public outreach efforts.

- In September 2004 EPA released a community relations plan that outlined a program to address community concerns and keep citizens informed about and involved in remedial activities.

- On September 10, 2003 EPA held an informational meeting in Concord, Massachusetts to describe the plans for the RI/FS.

- After the start of the RI/FS, EPA and the PRPs held bi-monthly informational meetings in Concord to discuss various topics regarding the Site, including but not limited to: the community's review of work plans and other subject deliverables; results of on-going RI work; reasonably anticipated future use and potentially beneficial groundwater use at the Site; and other work, including past and on-going removal actions performed by MassDEP, EPA and the PRPs.

- EPA has also produced a number of fact sheets and held a number of meetings on various removal actions that have been and/or are being performed at the Site, including, two time-critical removal actions in 2001 and 2008, respectively, and a non-time critical removal action which began in 2011 and is still on-going.

- On November 1, 2014, EPA made the administrative record available for public review at EPA's offices in Boston and at the Concord Free Public Library. The Concord Library will be the primary information repository for local residents and will be kept up to date by EPA and the PRPs.

- On November 6, 2014, EPA published a notice and brief analysis of the Proposed Plan in the Concord Journal and made the plan available to the public at the Concord Free Public Library.

- From November 12 to December 15, 2014, the Agency held a 30-day public comment period to accept public comment on the alternatives presented in the Feasibility Study and the Proposed Plan and on any other documents previously released to the public. An extension to the public comment period was requested and as a result, it was extended to January 14, 2015.

- On November 12, 2014, EPA held an informational meeting to discuss the results of the RI and the cleanup alternatives presented in the FS and to present the Agency's Proposed Plan. At this meeting, representatives from EPA, MassDEP, and the PRPs consultant answered questions from the public.

- On December 10, 2014, the Agency held a public hearing to accept oral comments on the Proposed Plan. A transcript of this meeting, the comments, and the Agency's response to comments are included in the Responsiveness Summary, which is part of this Record of Decision.

- Local residents formed the group Citizen's Research and Environmental Watch (CREW) to monitor Site activities. They applied for and have been awarded a technical assistance grant (TAG) and have retained a TAG consultant that attends all bi-monthly technical advisory group meetings.

D. SCOPE AND ROLE OF OPERABLE UNIT OR RESPONSE ACTION

The selected remedy was developed by combining components of different source control and management of migration alternatives to obtain a comprehensive approach for Site remediation. In summary, the remedy consists of:

- excavation and off-site disposal of approximately 82,500 cubic yards of contaminated sediments, underground drain lines and debris, and non-Holding Basin soils in various areas of the Site;

- *in-situ* stabilization of DU contaminated principal threat soils in the Holding Basin via

injection of a stabilization agent such as apatite (Apatite II ™ [2]) or other comparable stabilization agent to prevent leaching of contaminants to groundwater;

- containment of Holding Basin stabilized soils with a low-permeability vertical wall and horizontal sub-grade cover to isolate the stabilized soils and further limit mobility of contaminants by removing the flow of groundwater;

- extraction and *ex-situ* treatment of volatile organic compounds (VOCs) and 1,4-dioxane in overburden and bedrock aquifers, and *in-situ* treatment of DU in overburden aquifer and natural uranium in bedrock;

- long-term monitoring of the effectiveness of *in-* and *ex-situ* treatment; and

- Institutional Controls to restrict Holding Basin excavation, prohibit groundwater use until cleanup levels are met; and require installation of vapor mitigation systems should future structures be built above the VOC plumes unless an evaluation of vapor intrusion risks is performed to show such systems are not required.

As with many Superfund sites, the problems at the NMI Site are complex. As a result, EPA has performed a number of removal actions, including:

- **Time-Critical Removal Action #1, 2002- 2003:** EPA installed an interim cover over the Holding Basin and a temporary cap over an area containing buried material referred to as the "Old Landfill", and fenced in the Old Landfill area.
- **Time-Critical Removal Action #2, 2007-2008:** As the result of a fire at the facility in June 2007, EPA removed hazardous materials that could present a fire or chemical hazards risk and that could increase the risk of accelerating a fire due to chemical reactivity or explosion and/or a risk to personnel involved in firefighting or response activities.

[2]. Apatite II ™ is a phosphate mineral derived primarily from fish bones, a waste product of the commercial fishing industry, making it highly cost-effective. The use of apatite sequesters uranium in two ways: 1) dissolution of apatite and subsequent precipitation of U(VI)-phosphate minerals, such as autunite (which has very low solubility and dissolution kinetics); and 2) direct sorption of uranium on the apatite mineral itself. The apatite stabilization technique assumes that sorbed uranium on soils that could become solubilized would come in contact with the apatite media or phosphate in the porewater and become sequestered. Because autunite sequesters uranium in the oxidized form U(VI) rather than forcing reduction to U(IV), the possibility of re-oxidation and subsequent remobilization is very low. Extensive testing has demonstrated the very low solubility and slow dissolution kinetics of autunite. In addition to autunite, excess phosphorous may result in apatite mineral formation, which provides a long-term source of treatment capacity (Pacific Northwest National Laboratory. *Uranium Stabilization through Phosphate Injection*. June 2009). More detailed information regarding uranium sequestration using apatite is presented in Appendix J of the Feasibility Study.

- **Non-Time Critical Removal Action (NTCRA), 2011 to Present:** In August 2011, EPA, with the concurrence of MassDEP, entered into a Settlement Agreement and Order on Consent for a NTCRA for the demolition and off-site removal of the on-site buildings and their contents with Whittaker Corp., Textron Inc., the U.S. Department of Energy, and U.S. Army. EPA anticipates the Building NTCRA will be completed in 2016.

The Commonwealth has also undertaken a prior response action at the Site. In 2006, MassDEP conducted a removal of over 4,000 drums and containers as well as 645,000 pounds of DU metal from the facility buildings. This action was performed with U.S. Army funding under an agreement reached with MassDEP in 2005.

This ROD addresses groundwater, soil, and sediment contamination. Ingestion of water extracted from the overburden and bedrock aquifers poses a current and potential risk to human health because EPA's acceptable risk range is exceeded and concentrations of contaminants are greater than the Maximum Contaminant Levels (MCLs) for drinking water (as specified in the Safe Drinking Water Act). Exposure to site-wide soils also poses a future risk to human health, and exposure to site sediments poses a current and future risk to ecological and human health. This ROD presents a comprehensive remedy for this Site and addresses a principal threat at the Site through treatment and containment of source area soils within the Holding Basin.

The principal and low-level threat wastes that this ROD addresses are summarized in the following table:

Principal Threat Wastes	**Contaminant(s)**	**Action To Be Taken**
Holding Basin Soils	Depleted Uranium (DU)	Stabilization/Containment
Low-Level Threat Wastes	**Contaminant(s)**	**Action To Be Taken**
Sitewide Soils and Sediments	DU, PCBs, PAHs, Copper	Excavation/Off-Site Disposal

E. SITE CHARACTERISTICS

Section 1 of the Feasibility Study contains an overview of the RI. The significant findings of the RI are summarized below.

The chemicals of concern (COCs) in this ROD are summarized in **Tables G-1** through **G-4** for sediment; surface and subsurface soil, and groundwater, respectively, and include but are not limited to the following:

Natural uranium, as found in the Earth's crust, is a mixture largely of two isotopes: uranium-238 (U-238), accounting for 99.28% and uranium-235 (U-235) about 0.72%. It also contains a very small amount of U-234 (about 0.005%). The RI found that, as a result of Site activities, natural uranium in the bedrock has been released into the bedrock groundwater at levels that exceed the MCL for uranium of 30 micrograms/liter (ug/L).

Depleted Uranium is uranium that has been stripped of most of the radioactive isotope U-235, such that it is comprised of mostly U-238, the least radioactive of the three isotopes. It also contains a very small amount (less than 0.001%) of U-234. Depleted uranium contains approximately 0.2% U-235 and 99.78% U-238. It is about half as radioactive as natural uranium. The RI found that as the result of disposal activities in the Holding Basin that the overburden groundwater is contaminated with DU in excess of the MCL for uranium (listed above). There are also widespread contaminated soils and sediments throughout the Site in excess of risk-based cleanup levels. Metals other than DU/natural uranium found at the Site are thorium and arsenic; however, these compounds are only found at levels that are related to background concentrations, and are therefore not related to historical Site activities.

PAHs or Poly Aromatic Hydrocarbons are a group of over 100 different chemicals that are formed during the incomplete burning of coal, oil and gas, garbage, or other organic substances like tobacco or charbroiled meat. They can also be found in asphalt pavement and roofing products, and a few are used in medicines or to make dyes, plastics, and pesticides. PAHs were detected at low concentrations but above risk-based cleanup levels in surface soil at the Site, particularly in soils that received runoff from parking lots. The PAHs found in the Site soils are: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene.

PCBs or Polychlorinated Biphenyls are manmade chemicals that were used in electrical manufacturing and were banned in 1979. Areas of the Site such as the Cooling Water Recharge Pond and the Sweepings Piles that accepted wastewater and dredged materials from the Pond, respectively, have been contaminated with PCBs above the cleanup level of 1 ppm.

VOCs or Volatile Organic Compounds include a variety of chemicals that are used in glue, paint, solvents, and other products and easily evaporate. Common VOCs include trichloroethylene (TCE) and tetrachloroethene (PCE). Both of these compounds are found in on-site groundwater at concentrations that exceed the MCL of 5 ug/L for both chemicals.

SVOCs or Semivolatile Organic Compounds are chemicals that may vaporize when exposed to temperatures above room temperature. The SVOC 1,4-dioxane is present in groundwater at

the Site above the risk-based cleanup level of 0.46 ug/L, and is believed to have been included as a stabilizer in solvents historically used at the Site.

Conceptual Site Model

The Conceptual Site Model (CSM) for contaminated soil, sediment, and groundwater at the Site is provided in **Figure E-1 in Appendix C.** The CSM is a three-dimensional "picture" of site conditions that illustrates contaminant sources, release mechanisms, exposure pathways, and migration routes. Potential human and ecological receptors are presented in Section G of this ROD. It documents current and potential future site conditions and shows what is known about human and environmental exposure through contaminant release and migration to potential receptors. The risk assessment and response action for the contaminated soil, sediment, and groundwater at the Site is based on this CSM.

For the purposes of the RI, the Site was organized into Areas of Investigation (AOIs). The AOIs, including their sources and receiving media, are discussed below (and shown on **Figure E-2**):

- AOI 1 – Holding Basin Soil: Neutralized nitric acid solution containing dissolved copper and DU was discharged to an unlined Holding Basin between 1958 and 1985. Various facility drain lines from the buildings also appear to have discharged to the Holding Basin. The primary receiving media were vadose zone soils and saturated soil below, adjacent, and surrounding the Holding Basin, and groundwater below the Holding Basin. The Holding Basin contains the highest concentration of DU in on-site soil, with an average concentration of 93 mg/kg, and a maximum concentration of approximately 12,000 mg/kg. The volume of DU impacted soil in the Holding Basin is approximately 32,000 cubic yards.

- AOI 2 – Drum Burial Area Soil: In addition to drums in the Old Landfill area (AOI 3), drums containing beryllium and possibly other materials were found (and subsequently removed) in a buried trench located between the Cooling Water Recharge Pond and the Holding Basin. Soil and groundwater would be the primary receiving media from drums that may have leaked or been damaged. Concentrations of DU in this area are generally two-times the cleanup level of 2.7 mg/kg.

- AOI 3 – Old Landfill Soil: The Old Landfill was reportedly used for disposal of solid waste that could include materials from the research and development laboratories, drummed material containing various metals, including DU and beryllium, and municipal and office waste. Soil would be the primary receiving medium from drums that may have leaked or been damaged.

- AOI 4 – Cooling Water Recharge Pond Surface Water, Sediment, and Bank Soil**:** Building floor drains and roof drains discharged to the Cooling Water Recharge Pond. Roof drains are a potential source of metals, because if machining dusts were deposited on the roofing material, they would collect in the roof drain system. The Cooling Water Recharge Pond also received direct discharge from the Holding Basin on at least two

occasions. Non-contact cooling water pumped from on-site wells contained VOCs, DU, and natural uranium. The primary receiving media include surface water and sediment in the Cooling Water Recharge Pond, and groundwater below the pond. In addition, sediments from the Cooling Water Recharge Pond may have been dredged and placed on the banks surrounding the pond and in an area known as the "sweepings" area (AOI 8), in an effort to increase the capacity of the Cooling Water Recharge Pond. Therefore, soil surrounding the Cooling Water Recharge Pond may also be a primary receiving medium.

- AOI 5 – Septic Fields Soil: On-site septic disposal has been utilized since facility start-up in 1958 and therefore, septic systems could have received site-related chemical or radiological wastes. The primary receiving media were soil and groundwater in and beneath the leach fields.

- AOI 6 – Sphagnum Bog Surface Water and Sediment: Supernatant liquid from the Holding Basin was reportedly discharged to the Sphagnum Bog between 1958 and possibly as late as the 1970s. In addition, sink and floor drains from laboratories located in Building A discharged to the Sphagnum Bog between 1958 and approximately 1975. The primary receiving media were surface water, sediment, and peat in the Sphagnum Bog.

- AOI 7 – Former Waste Handling Area Soil: An area located to the south of and beneath Building E was formerly used for waste handling and storage, prior to the construction of Building E. During that time, this area was not paved. The primary receiving medium for material that may have been spilled or disposed is soil.

- AOI 8 – Sweepings and Fill Area Soil: An area southwest of the main parking lot contains piles that reportedly include sweepings from building floors. It was later discovered that this area received dredged sediments from the Cooling Water Recharge Pond. The deposited material has soil-like characteristics (e.g., sand and gravel).

- AOI 9 – Parking Outfall Areas: Surface water from the parking lot areas discharges to this minor tributary leading to the Assabet River. This outfall area could have received site-related contamination via overland transport of sediments in surface water runoff.

- AOI 10 – Northeast Wetland Soils/Sediment: This is a wet area to the north of the Cooling Water Recharge Pond and south of Route 62. One historical aerial photograph (1981) indicates that a pipe existed in the Cooling Water Recharge Pond and, although it is not clear what the function of the pipe was or where it may have discharged, a possible scenario is that the pipe controlled pond level and discharged to the wet area to the north. If the pipe functioned to drain or maintain the level of the Cooling Water Recharge Pond, it is possible that the surface water drained from the pond was discharged to the wetland

area. Under these circumstances, constituents present in the recharge pond surface water could have been discharged to soils/sediment in the wetland area.

- AOI 11 – Drain Lines Soil: Drain lines carried process wastes, cooling water and storm water from the facility buildings to the Holding Basin, Sphagnum Bog, and Cooling Water Recharge Pond. If contaminated liqui ds leaked from underground piping, they would be released to soil beneath the pipes, and potentially to groundwater. Drain lines are generally located beneath the area of land east of Buildings C and D.

- AOI 12 – Underground Storage Tanks Soil: The facility maintained two 10,000-gallon USTs to store heating oil, located north of Building B. If these tanks have leaked, the oil would migrate to soil surrounding and beneath the tanks.

- AOI 14 – Down-Wind Surface Soils: Particulate emissions from the air handlers and stacks on the facility buildings may have migrated in the ambient air and been deposited in surficial soils down-wind of the buildings.

- AOI 15 – Transformer Pads Soil: Two outside transformer pads are present. A pad with one transformer is located adjacent to Building B and dates from facility start-up in 1958. A second pad with three transformers is located east of Building D and dates from construction of that building in 1978. Additional electrical units are located on the former switchgear pad located in the paved yard behind Buildings C and D. It is not known if the transformers ever contained petroleum-based dielectric fluid or if the fluid contained PCBs, as no fluid was found in the transformers at the time of the RI. If dielectric fluid spilled, the fluid would have been released to surface soil around the transformers.

- AOI 16 – Groundwater: Although groundwater was not an original source of contaminants, leaching is known to have occurred in the Holding Basin, where continuous discharge of DU, copper, and nitrate, and possibly other chemicals, has resulted in elevated concentrations of these constituents in deep subsurface soils and groundwater beneath the Holding Basin. The sources of VOCs and 1,4-dioxane are likely related to historical disposal of chlorinated solvents such as tetrachloroethene and 1,1,1-trichloroethane (which likely contained 1,4-dioxane as a stabilizer) to the Holding Basin, Cooling Water Recharge Pond, and/or Old Landfill. A uranium plume in bedrock groundwater was identified. However, the uranium in bedrock groundwater exhibits a natural isotopic signature, suggesting that it is not directly related to release of DU at the Site. Evaluation of bedrock groundwater data suggests that the presence of elevated concentrations of natural uranium in bedrock groundwater may be a result of site-related activities that may have altered bedrock groundwater geochemistry, resulting in leaching of natural uranium from the bedrock.

- AOI 17 – Background Areas: Samples were collected from background reference areas for soil, surface water, sediment, and groundwater. Background reference areas were closely matched to the characteristics of the AOIs evaluated.

- AOI 18 – Assabet River: The Assabet River could have potentially received site-related contaminated surface water and sediment via the minor tributary where parking area surface water was discharged. The Assabet River could also serve as a discharge location for site-related contaminated groundwater.

The major aspects of the CSM for the Site are as follows:

- Primary Release Mechanisms (All Media). Constituents were released or disposed in ways that resulted in contamination that extends across multiple AOIs. Specifically, disposal or release of these contaminants appears to have occurred through:

  - Direct disposal, spills, or leaks from drain lines (AOI 1 – Holding Basin, AOI 2 – Drum Burial Area, AOI 7 – Former Waste Storage Area, AOI 11 – Drain Lines; AOI 15 – Transformer Pads);

  - Disposal of dredging materials and/or land filling (AOI 3 – Old Landfill, AOI 4 – Cooling Water Recharge Pond, AOI 8 – Sweepings and Fill Area); and

  - Aerial deposition (AOI 14 – Perimeter Soils), and subsequent storm water runoff and deposition (AOI 9 – Pavement Drain Outfalls).

- Primary Soil Impacts. Among the constituents released by these mechanisms, DU, PCBs, and PAHs show the greatest frequency of contamination in unsaturated soil.

- Primary Sediment Impacts. Among the constituents released by these mechanisms, PAHs, PCBs, and metals, including DU and copper are considered the primary contaminants of potential concern for human and ecological receptors, although VOCs were also detected but at low frequency or low concentrations.

- Primary Groundwater Impacts. Groundwater data suggest that DU migrated to the overburden groundwater, natural uranium migrated to the bedrock groundwater and chlorinated VOCs, and 1,4-dioxane migrated to the overburden and bedrock groundwater. The groundwater flow is toward the north and northwest, resulting in overburden and bedrock plumes of VOCs and 1,4-dioxane that extend off the facility property toward and beneath the Assabet River. The 1,4-dioxane plume associated with the Site extends to deeper overburden as evidenced by monitoring results from wells located just south and northwest of the Assabet River.

Site Overview

The NMI Site includes the 46-acre NMI Property located at 2229 Main Street, Concord, Massachusetts, and also includes contaminated groundwater migrating to areas located off the NMI Property. The NMI Property is approximately 46 acres and as currently configured, includes eight interconnected buildings, several smaller outbuildings, paved parking areas, a Cooling Water Recharge Pond, a former waste Holding Basin, and areas of fill and/or waste materials. The buildings are to be removed as part of an on-going Non-Time Critical Removal Action (Building NTCRA), a cleanup plan selected by EPA in 2008, and are not part of this remedy selection. The buildings will be removed before the Remedial Design/Remedial Action (RD/RA) begins. The NMI Property is bordered by Main Street (Route 62) and several commercial and residential properties to the north, residential properties to the east, town-owned open space and a children's summer camp to the south and southwest, and woodland and commercial/industrial properties to the west. The Assabet River is situated approximately 300 feet north of the NMI Property, on the opposite side of Route 62.

In addition to the above features, there are two wetlands at the Site, the Sphagnum Bog and the Northeast Wetland located north of the Cooling Water Recharge Pond. The Sphagnum Bog is a palustrine, broad-leafed evergreen, scrub-shrub, saturated, acidic wetland. The bog is located approximately 75 feet east of the Cooling Water Recharge Pond and the Holding Basin. The bog covers an area of approximately 3.5 acres. The bog is composed primarily of sphagnum peat. The substrate of the bog varies from growing sphagnum at the surface, to decomposed peat below the surface. The Sphagnum Bog has no inlets or outlets and receives the bulk of its moisture from precipitation and run-off.

The Northeast Wetland is located approximately 200 feet north of the Cooling Water Recharge Pond, and just south of Route 62. This wetland possibly was formed during the construction of Main Street to prevent further runoff to the north. It is a palustrine, forested, broad-leafed, deciduous wetland, subject to seasonal flooding. The low lying area associated with this wetland covers approximately 0.8 acres.

The existing land use at the NMI Property is a mix of industrial use property, fenced undeveloped property, and unfenced undeveloped property. The industrial portion of the NMI Property is represented by the buildings and associated paved parking lots, paved staging areas, and small landscaped areas (mowed grass). A security fence with locking gates restricts access to the southern and eastern sides of the portion of the property where the buildings are located. The fence extends from that area to the Sphagnum Bog, encompassing the Cooling Water Recharge Pond, Holding Basin, and Old Landfill areas (see **Figure E-3**). This area is essentially 'restricted' open space, and is unpaved with varying amounts of vegetation (e.g., brush and grass) and wooded areas. The unfenced portion of the property is located outside of the security fence. This area is open space that is generally wooded. The Northeast Wetland and the Sphagnum Bog are within this area.

Topography

The Site is located in the Assabet River basin. The topography of the Site is characterized by typical glacial kame and kettle features, consisting of irregular steep-sided hills and closed depressions. The surface elevation of the Site varies from approximately 137 feet above mean sea level (msl) to 213 feet above msl, rising generally from north to the south.

Geology

There are three major geologic units in the Assabet River Basin: surficial stratified glacial drift deposits, glacial till, and bedrock. The surficial deposits are the most permeable and are generally found in valleys bounded and underlain by till and bedrock.

The Site is located on the eastern side of the Assabet River Valley, which is a buried glacial valley typical of many in the area. Along the axis of the valley, roughly aligned with the present day Assabet River, thick deposits of stratified glacial drift overlie till and bedrock. Along the sides of the valley, the unconsolidated glacial deposits are thinner and, at the margins, till or bedrock may outcrop.

Hydrogeology

The Site lies within the Assabet River basin. No natural streams are present on-site. The only apparent surface water body that pre-dates development of the Site is a Sphagnum Bog located in the eastern-central portion of the Site. The Assabet River flows in an easterly direction and merges with the Sudbury River to form the Concord River approximately 3.5 miles downstream of the Site.

A surface water divide is located in the upland to the south of the Site. Surface water runoff from areas north of this divide flow north to the Assabet River. Surface water runoff from areas south of this divide flow south to Second Division Brook, which flows in an easterly direction, and then north to join with the Assabet River.

Groundwater is found both in the unconsolidated and bedrock formations and migrates north/northwest, towards the Assabet River.

Remedial Investigation Sampling Strategy

An extensive sampling effort has been completed to support the RI, Risk Assessments and Feasibility Study for the Site. Physical and analytical data have been collected to develop the conceptual site model and identify the nature and extent of site-related constituents in the environment. The first phase of the RI field program (Phase IA) occurred from September 2004 to May 2005. Phase IA activities focused on gathering data across various site media (surface and subsurface soil, sediment, surface water, and groundwater) to characterize the nature and

extent of contamination from historical Site activities at each of the 18 AOIs. Samples were analyzed for chemical constituents including VOCs, semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), inorganics and radionuclides. In May and June of 2004, on-site habitats were qualitatively assessed and a portion of the wetland boundary along the on-site Cooling Water Recharge Pond was delineated. Candidate background locations for Site wetland and upland areas were identified using public information and field reconnaissance of those areas. Based on results of the Phase IA investigation, a Phase IB field program was initiated in October to November 2005 to further characterize the extent of contamination at the Site. The Phase IB field event included additional sampling in surface water, sediment, soil, and groundwater for both chemicals (VOCs, SVOCs, PCBs, inorganics) and radionuclides. **Figure E-4** shows the locations of the groundwater monitoring wells. The Phase IC field investigation was undertaken in 2006 and 2007, with minor re-sampling activities in 2008. Phase IC included activities to address data gaps identified in the Screening Level Ecological Risk Assessment (SLERA), and as outlined in the Risk Assessment Study Design. Phase IC field activities included collection of soil, surface water, and sediment samples for chemical analysis of SVOCs, PCBs, and metals. Surface water samples were also collected for Frog Embryo Teratogenesis Assay – *Xenopus* (FETAX) analyses, and sediment was collected for toxicity tests using *Chironomus dilutus*. Aquatic invertebrate and frog tissue was collected and analyzed for SVOCs, PCBs, metals, and lipids. A benthic community survey was also performed as part of the Phase IC investigation. In addition, supplemental surface soil sampling for PCBs was conducted at AOI 14, east of Sphagnum Bog, in November 2009. **Figures E-5 through E-11** present the locations of RI surface soil, subsurface soil, sediment, off-site sediment, surface water, off-site surface water, and soil vapor sampling, respectively. More information regarding the overall RI sampling strategy can be found in Section 2.12 of the RI Report. Additional samples will be taken during design to verify the nature and extent of contamination.

Nature and Extent

***Soil*:** Phases IA, IB, and IC soil sampling (surficial, shallow and deep) have served to provide adequate vertical and horizontal delineation of contaminant extent in nearly all cases. With the exception of AOI 2 (Drum Burial Area) and AOI 11 (Drain Line Area), the delineation of soil contamination is generally defined by the horizontal and vertical extent of DU and PCBs at concentrations greater than the cleanup levels in **Table L-2 in Appendix B**. Other contaminants that were detected at concentrations greater than the cleanup levels are bounded by non-detects or concentrations below cleanup levels, and are within the overall area and depth of soil that is contaminated with DU and/or PCBs at concentrations greater than cleanup levels. Where vertical delineation has not been achieved, it is typically associated with soils greater than 10 feet below ground surface, where potential human and ecological receptor contact with soil is improbable.

***Sediment*:** The extent of contamination in sediments is largely defined by areas where copper, PCBs, and/or DU exceed cleanup levels in **Tables L-3 and L-4**. These areas are within the

Cooling Water Recharge Pond and the Sphagnum Bog. Other contaminants detected at concentrations in excess of the cleanup numbers fall within the areas bounded by copper, PCBs, or DU. Concentrations of DU ranged from non-detect to 129 mg/kg, and PCB concentrations ranged from non-detect to 437 mg/kg. The volume of sediment to be addressed is approximately 6,700 cubic yards.

***Surface Water*:** Sampling of surface water has indicated little impact due to site conditions. The exceptions to this are at locations where surface water is relatively stagnant and in closer equilibrium with contaminated sediments, for example: copper at AOI 4 (Cooling Water Recharge Pond). The nature and extent of surface water contamination generally mirrors sediment contamination, particularly for water soluble compounds. Statistical evaluation of the Assabet River surface water data upstream of the Site with surface water data in the downstream reach and adjacent reach of the river revealed no statistically significantly higher concentrations of analytes in either the adjacent or downstream reaches of the river. Therefore, the nature and extent of contamination in the Assabet River has been adequately delineated, and there has been no site-related impact on the river.

Groundwater

Overburden Groundwater: In general, the extent of overburden groundwater contamination is limited to areas of the Site where concentrations of DU, TCE, PCE, 1,4-dioxane, or nitrate exceed MCLs in overburden groundwater (the "overburden plume") or risk based cleanup levels in **Table L-1**. Other contaminants detected in overburden groundwater are generally present within the delineated overburden plume or have been detected at low concentrations and/or infrequently at other locations.

Most overburden groundwater samples at the Site contain elevated concentrations of DU. The extent of the DU plume exceeding the MCL of 30 µg/L is laterally constrained to a narrow zone extending from the Holding Basin at the southeast to the northwest. The DU plume extends downgradient to just beyond Building D (**see Figure E-12**). Historically elevated nitrate has long since migrated through the Site, with only slightly elevated nitrate concentrations currently found on-property, therefore nitrate has a very limited impact on groundwater. The VOCs PCE, TCE, and 1,1-DCE were detected in excess of MCLs (for VOCs) and vapor intrusion screening levels, and the SVOC 1,4-dioxane was detected in excess of the risk-based cleanup level for 1,4-dioxane in overburden groundwater (**see Figure E-13**). It should be noted that vinyl chloride was detected in the same areas as the other VOCs which exceed MCLs, but was not detected at a concentration above its MCL. However, the maximum detection of vinyl chloride was above USEPA's most recent (June 2015) vapor intrusion screening level. Pre-design monitoring will be performed to further define extents of contaminants when refining any remedial design. While the lateral extent of VOCs is constrained by monitoring wells where VOCs were not detected, the downgradient extent of 1,4-dioxane extends underneath the Assabet River.

At the time that the RI was completed, sampling and analysis of 1,4-dioxane indicated that the Assabet River was the receiving medium for this contaminant, however; subsequent sampling of monitoring wells on the northern (opposite) side of the river have shown that 1,4-dioxane is apparently migrating underneath the Assabet River toward the town of Acton public water supply wells. It is not known at this time whether this source of contamination is from the overburden or bedrock aquifers.

Soil Gas: The overburden groundwater on the NMI Property exceeds USEPA's vapor intrusion screening levels (see **Figure E-14** for areas that exceed vapor intrusion screening levels).[3] Therefore, two buildings (Building 1 and Building 2) that overlie a portion of the VOC groundwater plume downgradient and north of the NMI Property were sampled for soil gas (see **Figure E-11** for building locations where vapor intrusion investigations were conducted). In Building 1, TCE concentrations measured in discrete sub-slab soil gas samples averaged 29 $\mu g/m^3$ in the late fall of 2009 and approximately 13 $\mu g/m^3$ in late spring of 2010. The total average over all four samples is approximately 19 $\mu g/m^3$; however, as a conservative measure, the maximum value (29 $\mu g/m^3$) was used for screening indoor air. Using the conservative "generic" sub-slab-to-indoor air attenuation factor of 0.1 from the USEPA *Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils* (USEPA, 2002),[4] the TCE concentration in sub-slab soil gas would need to be greater than 30 $\mu g/m^3$ to pose a potential ELCR above 1 in 1 million (10^{-6}). This threshold sub-slab soil gas concentration is more than any individual measurement from Building 1. As a protective measure, in August 2013, a mitigation system was installed in Building 1. This building is currently being used for light commercial purposes and the mitigation system started operation shortly after installation.

In Building 2, TCE was not detected in three sub-slab samples collected over two different seasons in 2009 and 2010. Two sub-slab soil gas samples were collected during the heating season and one in late spring (June). The lack of TCE in sub-slab soil gas, combined with the low VOC concentrations detected in groundwater samples, are strong evidence for an incomplete vapor intrusion pathway at this structure. No further action is recommended for this building.

Bedrock Groundwater: The extent of bedrock groundwater contamination is primarily limited to

[3] Note that **Figure E-14** was generated prior to generation of the most recent USEPA vapor intrusion screening levels (June 2015). While the screening levels presented on the figure are lower than the current screening levels, the extents presented are similar to current extents. As noted in other sections of this ROD, institutional controls require installation of vapor mitigation systems should future structures be built above the VOC plumes unless an evaluation of vapor intrusion risks (including comparison to the most current vapor intrusion screening levels) is performed.

[4] USEPA, 2002. United States Environmental Protection Agency, Office of Solid Waste and Emergency Response. Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance); EPA 530-D-02/004; November 2002.

areas of the Site where concentrations of natural uranium, TCE, 1,4-dioxane, or nitrate exceed MCLs in bedrock groundwater (the "bedrock plume"). Uranium detected in bedrock groundwater consistently has a natural isotopic signature. Uranium concentrations in bedrock groundwater are consistent with background conditions across much of the Site, with a zone of elevated natural uranium concentration extending southeast to northwest, from the region downgradient of the Holding Basin to just upgradient of the property boundary (**see Figure E-15).** Based on seven sampling rounds since 2005, these concentrations appear to be at steady-state. Slightly elevated uranium with a natural isotopic signature (12.8 µg/L) has been detected off-property. Nitrate exceeded the MCL in bedrock groundwater in only one location immediately downgradient of the Holding Basin. The VOCs TCE and 1,1,-DCE along with the SVOC 1,4-dioxane were detected at concentrations exceeding MCLs and the risk-based cleanup level, respectively, in bedrock groundwater, but at maximum concentrations lower than in overburden groundwater (**see Figure E-13**). The lateral and downgradient extent of the VOC plume is delineated by the monitoring well network. As in the overburden groundwater, the bedrock groundwater containing 1,4-dioxane in excess of the risk-based cleanup level extends past the downgradient edge of the monitoring well network on the southern side of the Assabet River to the northern or opposite side of the Assabet River.

Primary Sources and Routes of Migration

The waste streams from the major processes were discharged to or deposited in several locations at the Site. The release mechanisms resulting in contamination include direct discharge, waste disposal, and particulate emissions. Based on the information concerning sources of contamination and migration pathways, the following media are affected by releases from the Site:

- Residual soil/sludge at the bottom of and beneath the Holding Basin;
- Surface and subsurface soil surrounding (and beneath) the Holding Basin;
- Sediment at the bottom of the Cooling Water Recharge Pond;
- Surface water in the Cooling Water Recharge Pond;
- Surface and subsurface soils surrounding the Cooling Water Recharge Pond;
- Overburden and bedrock groundwater beneath and downgradient of the NMI Property;
- Sediment in the Sphagnum Bog;

- Subsurface soil in the vicinity of the Drain Lines, beneath the building floors, and the UST Area (located north of Building B);
- Soil in the vicinity of the Old Landfill, Sweepings and Fill Area, Drum Burial Area, Hazardous Waste Area, Transformer Pads, and the industrial courtyard area;
- Sediment in the Northeast Wetland, south of Route 62; and
- Surface soils that may have received deposition from stack emissions from the Site.

The Assabet River is a receiving medium for overburden groundwater. However, site-related contamination has not accumulated in the river as only low levels of VOCs have been detected in sediment, likely resulting from discharge of shallow overburden groundwater. Sediment contamination in the Assabet River Embayment Area is characterized by metals which have not been found to be site-related and that are found upstream at higher concentrations. It is hypothesized that this contamination has resulted from deposition of sediment associated with historic upstream sources during flooding events.

The details of the fate and transport of constituents present in contaminated media (soil, sediment, and groundwater) for the main constituents detected at the Site is as follows:

Sources

Depleted Uranium

The uranium COC in overburden groundwater is DU, and the uranium COC in bedrock groundwater is uranium with a natural isotopic signature. The following sections on the fate of uranium are equally relevant for depleted and naturally occurring uranium.

The primary demonstrated source of DU at the Site is historical disposal at the Holding Basin. Other potential sources of DU at the Site include particulate emissions from building roof stacks, spills, and discharge of contaminated water or fluids to the Cooling Water Recharge Pond.

Low concentrations of DU have been detected in surface soils at the Site, generally surrounding the buildings, as well as in soil/sediment in parking lot drainage swales and outfalls. This suggests that DU may have been released via stack emissions and settled onto surfaces in close proximity to the buildings. The RI delineated the extent of surface soils containing DU in excess of regional screening levels.

DU has also been detected at elevated concentrations in sediments within the Cooling Water Recharge Pond and the soils surrounding the Cooling Water Recharge Pond. This suggests that DU was released to the Cooling Water Recharge Pond, either by floor drain lines that discharged

to the pond, by historical breaches or overflow of the Holding Basin, or by discharge of cooling water that was contaminated with DU.

The remainder of this subsection specifically describes the source of DU to groundwater at the Holding Basin.

The extent of DU contamination in the Holding Basin area extends from the current base of the Holding Basin into the till, encompassing most of the Holding Basin footprint. In addition, DU is found at up to 100 mg/kg in an area of the saturated zone extending in the downgradient direction from the Holding Basin, between approximately 100 to 125 feet of elevation, or about 50 to 75 feet bgs and contiguous with the DU impacted soils located directly beneath the Holding Basin. The average concentration of unsaturated soils in the Holding Basin is 93.3 mg/kg DU and the saturated soils contain an average concentration of 29.5 mg/kg.

The pre-RI groundwater monitoring data in the area adjacent to and down gradient of the Holding Basin provide evidence of the strength of the Holding Basin DU source over time. The first groundwater monitoring data from the Holding Basin area, collected in 1983, indicate moderate groundwater impacts (up to 1,500 µg/L in groundwater). Decommissioning and covering of the Holding Basin in 1986 was followed by a decrease in groundwater impacts (below 200 µg/L). Excavation and uncovering of the Basin in 1998 with subsequent rainwater infiltration through the bottom of the Holding Basin resulted in a substantial release of DU to groundwater, increasing the concentration of DU near the Holding Basin to as high as 40,000 µg/L. Lining of the Holding Basin in 2002 has since limited the potential for releases to groundwater, and recent measurements indicated that groundwater near the Holding Basin contains up to 3,000 to 5,000 µg/L of DU.

Other potential sources of DU to groundwater exist, but none have shown a discernible impact on groundwater quality. These potential sources include subsurface drain lines located between the facility buildings and the Holding Basin, floor drains, sumps, and other potential release points within the buildings, sediments within the Cooling Water Recharge Pond and Sphagnum Bog, and other contaminated soils throughout the site.

Natural Uranium

Unlike the DU plume in overburden groundwater, there is no clear source of uranium with a natural isotopic signature for the bedrock groundwater. The source of elevated uranium in bedrock groundwater is most likely naturally occurring uranium minerals in bedrock. Uranium may have been released to groundwater from the bedrock matrix due to natural variability in groundwater geochemistry, or as a result of site-related activities that may have altered bedrock groundwater geochemistry.

VOCs

It is likely that incidental releases of VOCs have occurred at the Site in the past. Although there is no documentation of how these releases occurred, investigations at the Site have provided some information on possible VOC sources. According to the Phase II Site Assessment for the Site, TCE was used at the NMI Site for cleaning of machines and machined parts from 1958 to 1974, 1,1,1-TCA was used after 1974, and there may have been discharges from floor drains, which were sealed in the mid-1990s. Low concentrations of chlorinated VOCs have been detected in soils at the Drum Burial Area and Old Landfill (AOIs 2 and 3), suggesting that these areas could have functioned as historical sources of VOCs. Several VOCs were discovered in water pumped from supply well SW-1 in 1981; most of this extracted water was discharged to the Cooling Water Recharge Pond after use. Se veral VOCs, primarily toluene and acetone, were detected historically in samples collected from the two on-site septic tanks, indicating a potential for releases from the two leach fields at the Site.

Low concentrations and sparse detects of several VOCs, for example, 1,1,1-TCA and cis-1,2-DCE, suggest the possibility of other historical incidental releases of VOCs at the Site.

Groundwater data do not indicate the presence of any ongoing sources of VOCs at the Site.

1,4-dioxane

Used as a stabilizer in TCA and possibly other solvents, 1,4-dioxane may have been present in solvents used at the Site and released as a co-contaminant. 1,4-dioxane was not detected in soil, surface water, or sediment at the Site, suggesting that there are no residual sources of 1,4-dioxane in these media.

PCBs

There are no documented uses of PCBs at the Site. It is hypothesized that PCBs were released to the Cooling Water Recharge Pond, possibly through floor drains that discharged to the pond. Since PCBs adsorb strongly to particulates, PCBs became sorbed to sediments within the pond. It is recognized that pond sediments were occasionally dredged, and the dredging spoils were then used to build up the berm between the Cooling Water Recharge Pond (AOI 4) and the Sphagnum Bog (AOI 6). Dredging spoils were also believed to have been deposited in the Sweeping Piles Area (AOI 8).

Routes of Migration

Depleted Uranium

The primary migration pathway for DU released to overburden groundwater is expected to coincide with the preferred flow zone located in the central part of the Site, aligned southeast-northwest. The eventual fate of DU migrating along this pathway is discharge to the Assabet River located approximately 1,300 feet downgradient, although evidence collected to date

indicates this pathway remains incomplete (i.e., to date DU has migrated at least 350 feet from the downgradient edge of the Holding Basin, as defined by the extent of DU above 30 µg/L).The Cooling Water Recharge Pond sediments were occasionally dredged during historical operations to create more water storage capacity in the pond. DU that accumulated in the Cooling Water Recharge Pond sediments was relocated with the dredge spoils. Generally, the dredge spoils were piled around the east side of the Cooling Water Recharge Pond, creating a berm between the pond and the Sphagnum Bog. Dredge spoils were also believed to have been placed at AOI 8 (Sweepings and Fill Area); the sweepings piles may actually be dredge spoils. Elevated concentrations of DU have been detected in soils around the Cooling Water Recharge Pond and at AOI 8.

DU present in surface soil (from particulate deposition, spills, and Cooling Water Recharge Pond dredge spoils) does not appear to be a leaching source, as evidenced by concentrations that decrease substantially with depth. The primary migration pathway for DU in surface soil is erosion. The principal erosion migration area at the Site appears to have been associated with soils in the berm area between the Cooling Water Recharge Pond and the Sphagnum Bog. Elevated concentrations of DU have been detected in sediments within the bog, particularly in the eastern and southern areas of the bog, nearest the berm area. This suggests that an erosional migration pathway from the contaminated berm soils (which are believed to be dredge spoils from the Cooling Water Recharge Pond) to the bog existed. A minor erosional pathway is evidenced by low concentrations of DU in surface soils on the steep embankment between the parking lot and the Northeast Wetland, and low concentrations in the Northeast Wetland sediments.

DU was also detected in surface water in the Cooling Water Recharge Pond and Sphagnum Bog, suggesting that some partitioning between sediment and surface water has occurred.

Natural Uranium

As shown in **Figure E-15**, the elevated uranium plume in bedrock with a natural isotopic signature extends from the Holding Basin/SW-2A northwestward toward the Assabet River. Concentrations appear to be relatively steady over time with no plume expansion or uranium in excess of the MCL off-site. Migration appears to be confined to a relatively narrow zone encompassing the shallow bedrock around MW-BS15. Shallow bedrock wells to the west (MW-BS31), to the east (MW-BS26), and deeper (MW-BM15) all show less than 1 ppb of uranium.

VOCs

Similar to uranium, VOCs have migrated along the preferred flow zone extending across the Site northwest of the Holding Basin. However, the greater mobility of these constituents and the greater diversity of release points have resulted in historical and current migration pathways throughout the Site. For example, the presence of PCE and other VOCs in groundwater between

the Cooling Water Recharge Pond and SW-1 may reflect historical preferential groundwater flow between these features due to active recharge and pumping. Migration pathways from each of the septic leach fields (AOI 5) are also more important for VOCs than for uranium and have resulted in migration pathways in the western and eastern portions of the Site, outside of the primary migration pathway for uranium.

Migration between the buildings, SW-1, and off-property locations is generally north and northwesterly with TCE extending underneath the Assabet River into the overburden on the northern side of the Assabet River (**see Figure E-13**).

Migration pathways for VOCs in bedrock are expected to be oriented generally north and northwesterly, following the hydraulic gradient in the shallow, highly fractured bedrock.

1,4- dioxane

The fate of 1,4-dioxane in Site groundwater is similar to other chemicals; that is, local discharge to the overburden and shallow bedrock downgradient of Route 62 with eventual discharge to the Assabet River. Recent detections of 1,4-dioxane in deep overburden north of the Assabet River indicate the migration of 1,4-dioxane beneath the river. The current extent of 1,4-dioxane in both overburden and bedrock, respectively, is illustrated on **Figure E-13**. On the upper left of both figures, the locations of two public water supply wells for the Town of Acton, "Assabet IA" and "Assabet I" are shown. There is a clear grad ient in 1,4-dioxane concentrations, with a peak concentration on the eastern (NMI side) of the Assabet River of 97.9 ug/L at the bedrock MW-BS15 location, dropping to 33 ug/L at deep overburden PT-11B1, and then to 6.1 ug/L at monitoring well PT-03B1 nearest the Acton water supply wells. The concentration trends in these wells are increasing, although changes in analytical methods over the monitoring period make qualitative trend analysis difficult. Monitoring data at Assabet IA, the well in current use, shows an increasing trend in 1,4-dioxane, with several samples in 2014 greater than 0.3 ug/L. The blended output of the various Acton production wells is currently less than 0.3 ug/L. There is no enforceable federal or Massachusetts maximum contaminant level (MCL) for 1,4-dioxane. In 2011, MassDEP reduced the drinking water guideline for 1,4-dioxane from 3 µg/L to 0.3 µg/L. The MassDEP drinking water guideline is not considered an enforceable standard. Similarly, in 2014, MassDEP reduced the Method 1 GW-1 standard for 1,4-dioxane (used to regulate cleanup of MassDEP sites) from 3.0 µg/L to 0.3 µg/L but this does not apply directly to Superfund sites because the MCP allows for a site specific risk assessment which was used to generate the cleanup number for 1,4-dioxane.

PCBs

The principal migration pathway for PCBs is via migration of the particulates that they are adsorbed to. Particulate migration can occur via erosional transport, and by wind erosion and dispersion. PCBs have been detected in sediments within the Sphagnum Bog. Since the Sphagnum Bog is located at the base of the berm between the Cooling Water Recharge Pond and

the bog where PCB-impacted soils are located, it is possible that erosion of soils at the berm, with subsequent transport to the bog, has occurred. Sampling of soils on the opposite side of the bog, in the predominant down-wind direction of the buildings and Cooling Water Recharge Pond, did not identify PCBs. This suggests that wind erosion and dispersion is not a significant migration pathway for PCBs. PCBs have not been detected in surface water in the Cooling Water Recharge Pond or the Sphagnum Bog, indicating that partitioning between sediment and surface water is not a complete migration pathway for PCBs.

Routes of Exposure

Human Health

The potentially complete human health exposure pathways include:

- direct contact (incidental ingestion and dermal contact) with soil, surface water and sediment;
- external exposure to radiation in soil and unsubmerged sediment;
- inhalation of dust and vapor released from soil;
- potable use of groundwater (ingestion, dermal contact, and inhalation of vapors released from groundwater used as household tap water);
- vapor intrusion; and
- ingestion of radionuclides in home-grown produce.[5]

Presently, the Site is a mix of industrial buildings, adjacent open space areas that are within a fenced portion of the NMI Property, and undeveloped open space areas outside of the fenced portion of the NMI Property. Risks associated with potential exposures to the undeveloped open space areas of the Site under the current land use conditions were characterized using a current abutting resident/passive recreational visitor scenario. This scenario assumed that young children and adults would be exposed to contamination in surface soil within the open space (unfenced) portions of the Site, and surface water and sediment in the Sphagnum Bog, Northeast Wetland, Assabet River and associated Embayment Area, and the floodplain at the Rt. 62 Outfall area. This scenario is protective for other receptor populations that might access the unfenced areas of the Site under current use conditions, e.g., attendee at the adjacent day camp.

Risks associated with potential exposures to fenced (restricted) area of the Site under the current land use conditions were characterized using a current trespasser scenario, which evaluated an

[5] In accordance with USEPA guidance, only radionuclides are typically evaluated for uptake into home-grown produce.

older child/adolescent, assumed to be exposed to contamination in unpaved surface soil (within the fenced areas of the Site), as well as to surface water and sediment in the Sphagnum Bog and Cooling Water Recharge Pond.

The future use of the Site has not been determined. Therefore, health risks were evaluated for a range of possible future site uses, including passive recreational, residential, and commercial/industrial. Passive recreational use refers to land uses that involve passive leisure activities such as walking, hiking, picnicking, or nature study. The passive recreational use scenario evaluated young children and adults who were assumed to be exposed to soil, as well as to surface water and sediment if wading or swimming activities occur. Residential use refers to use of property for the location of a residential dwelling, with the conservative assumption that young children and adults spend the majority of their time each day at their property (i.e., at the Site). Residential land uses are assumed to involve exposure to soil and use of groundwater as a potable water source, as well as ingestion of home-grown produce. Risks associated with exposures to surface water and sediment were also evaluated for residential use. The evaluation of risks associated with commercial and industrial uses of the Site considered risks to full-time adult indoor workers (e.g., office workers) and risks to full-time adult outdoor workers (e.g., workers in a business such as a landscape supply depot), under the assumption that exposures to soil can occur to both types of workers. Althou gh the Site potentially could also be used for active recreational uses in the future (e.g., athletic fields), risks associated with residential land use can be used to conservatively represent the potential risks associated with active recreational land uses. Consequently, active recreational use was not evaluated in the HHRA.

Ecological

The potentially complete ecological exposure pathways are:

- Uptake of contaminants from sediment, surface water, shallow groundwater, and soil through roots (vegetation);
- Ingestion of contaminants bound to soil (terrestrial invertebrates, birds, mammals);
- Ingestion of contaminants bound to sediment (benthic invertebrates, fish, aquatic and wetland birds, mammals)
- Ingestion of dissolved and particulate contaminants in surface water (aquatic invertebrates, fish, semi-aquatic and wetland birds, mammals);
- Ingestion of contaminants through consumption of contaminated plants (herbivores, omnivores); and
- Ingestion of contaminants through consumption of contaminated prey (all predators).

Although inhalation and dermal absorption pathways are possibly complete for some receptors, these pathways are considered to be minor compared to dietary ingestion and are not evaluated. The exposure pathway is considered incomplete for media located below pavement, buildings or other impervious surfaces that are considered inaccessible to ecological receptors. In addition, since groundwater does not directly discharge to the ground surface (e.g., through seeps), there are no direct exposures to groundwater by environmental receptors.

Principal Threat Waste

Principal threat waste includes those source materials considered to be highly toxic or subsurface soil containing high concentrations of contaminants of concern that are (or potentially are) mobile due to sub-surface transport which generally cannot be contained in a reliable manner or would present a significant risk to human health or the environment should exposure occur. The manner in which principal threats are addressed generally will determine whether the statutory preference for treatment as a principal element is satisfied. Wastes generally considered to be principal threats are liquid, mobile, and/or highly-toxic source material.

There are under a dozen soil samples collected within the unsaturated zone of the Holding Basin with concentrations which exceed a 10^{-3} risk, making them highly toxic and therefore principal threat wastes. The soils within the Holding Basin footprint above and below the water table are identified as source material. The maximum concentration of DU in the Holding Basin soils is approximately 12,000 mg/kg and the average concentration is approximately 93 mg/kg. These materials are located at least 20 feet below ground surface, are covered by a temporary cap, and therefore currently do not allow for direct exposure. The temporary cap has reduced the rate of migration of the source materials located above the water table. However, the high concentrations of DU in the Holding Basin have historically been mobile, migrating or potentially migrating to the ground water. The apatite stabilization treatment and the containment of the holding basin with a barrier wall and cover address the mobility of the principal threat waste.

In addition, at one location in the industrial courtyard near an old transformer, DU exceeds the 10^{-3} risk. The 10^{-3} risk concentration for DU is 2,310 mg/kg, and the concentration in the surface soils in this location is 5,070 mg/kg. This area has been roped off until it is remediated.

Low-level threat wastes are those source materials that generally can be reliably contained and that would present only a low risk in the event of exposure. Wastes that are generally considered to be low-level threat wastes include non-mobile contaminated source material of low to moderate toxicity, surface soil containing chemicals of concern that are relatively immobile in air or ground water, or low leachability contaminants. The Holding Basin soils that do not constitute a 10^{-3} risk due to toxicity, do not contain high concentrations of DU that have (or potentially have) mobility due to subsurface transport and are therefore considered to be low-level threat wastes.

F. CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

The current land use at the NMI Property is a mix of former industrial use property, fenced undeveloped property, and unfenced undeveloped property. The industrial portion of the NMI Property is represented by the buildings and associated paved parking lots, paved staging areas, and small landscaped areas (mowed grass). The property is currently zoned as Limited Industrial Park, which among other things, allows accessory use as a residential area. A security fence with locking gates restricts access to the southern and eastern sides of the portion of the property where the buildings are located. The fence extends from that area to the Sphagnum Bog, encompassing the Cooling Water Recharge Pond, Holding Basin, and Old Landfill areas. The NMI Property is bordered by Main Street (Route 62) and several commercial and residential properties to the north, residential properties to the east, town-owned open space and a health club with a children's summer camp to the south and southwest, and residential/woodland and commercial/industrial properties to the west. Al though Starmet is the current owner of the NMI Property, Starmet vacated the Site in early November 2011, and the company is now defunct. Therefore, future use of the Site may depend on another party taking ownership of the NMI Property.

EPA is in discussions with the Town of Concord and the community group Citizen's Research and Environmental Watch (CREW) regarding the potential future uses for the Site. The community has indicated that it would like to see a future use other than commercial/industrial for the NMI Property, possibly recreation land or even residential use. In April 2015, the town authorized the Concord Board of Selectmen to acquire the 2229 Main Street property, provided the Site is cleaned up for residential use. The Town has cited commercial enterprise, affordable or other housing, recreation, or solar power generation as possible reuse options for the Site.

EPA evaluated residential use, recreational use, as well as commercial/industrial use as exposure scenarios in the overall Site Human Health Risk Assessment (HHRA). In the evaluation of those exposure scenarios and the level of cleanup necessary to achieve recreational versus residential use, the difference in the volume requiring remediation was negligible (2,500 cubic yards or 3% of total volume) considering the large quantity of soils requiring cleanup. For this reason as well as what the reasonably anticipated future use of the Site will be, EPA has chosen cleanup standards based upon future residential use for this remedy. As a result of discussions with the town, EPA believes the use of the NMI Property will either be some type of housing or other municipal use by the town, possibly a combination of the two. Based upon demographics and property use trends in the Concord area, the surrounding area will likely continue to be used for residential use in the foreseeable future.

Currently the town of Concord is on public water supply from the 2nd division supply well, which is not hydraulically connected to the Site groundwater. However, some of the town of Acton's public water supply wells are downgradient from the Site, and may become impacted by 1,4-dioxane that is migrating away from the Site. To address this issue, pursuant to the Action

Memorandum attached to this ROD in Appendix F, EPA is accelerating a portion of the proposed groundwater remedy as a non-time critical removal action (NTCRA).

Consistent with EPA's 1996 Final Ground Water Use and Value Determination Guidance, and the Commonwealth of Massachusetts' Comprehensive State Groundwater Protection Program (CSGWPP), MassDEP has developed a "Use and Value Determination" of the groundwater relative to the Site. The purpose of the Use and Value Determination is to identify whether the aquifer at the Site should be considered of "High," "Medium," or "Low" use and value. In the development of its Determination, MassDEP applied the criteria for groundwater classification as promulgated in the Massachusetts Contingency Plan (MCP). The classification contained in the MCP considers criteria similar to those recommended in the Use and Value Guidance. MassDEP determined that there is a High use and value for the Site area groundwater. Therefore, EPA is proposing cleanup levels based on federal and state drinking water standards, or Maximum Contamination Levels (MCLs), and risk-based criteria that support this use as a future potential drinking water source.

G. SUMMARY OF SITE RISKS

A baseline risk assessment was performed to estimate the probability and magnitude of potential adverse human health and environmental effects from exposure to contaminants associated with the Site assuming no remedial action was taken. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. The baseline health risk assessment followed a four step process: 1) hazard identification, which identified those hazardous substances which, given the specifics of the Site, were of significant concern; 2) exposure assessment, which identified actual or potential exposure pathways, characterized the potentially exposed populations, and determined the extent of possible exposure; 3) toxicity assessment, which considered the types and magnitude of adverse health effects associated with exposure to hazardous substances, and 4) risk characterization and uncertainty analysis, which integrated the three earlier steps to summarize the potential and actual risks posed by hazardous substances at the Site, including carcinogenic and non-carcinogenic risks and a discussion of the uncertainty in the risk estimates. A summary of those aspects of the human health risk assessment which support the need for remedial action is provided below followed by a summary of the environmental risk assessment.

1. Human Health Risk Assessment

A baseline human health risk assessment (HHRA), conducted pursuant to EPA Risk Assessment Guidance for Superfund (RAGS), was completed for the NMI Site to evaluate the likelihood and magnitude of potential human health effects associated with the current land use of the Site, as well as three possible future land uses of the Site, which included residential, passive

recreational, and commercial/industrial. The HHRA evaluated baseline risks which assume that current and future land uses occur in the absence of any remedial actions (*de maximus*, 2013).[6]

Section 1: Hazard Identification

Fifty-five of the approximately 130 chemicals detected at the Site were selected for evaluation in the baseline and Supplemental HHRAs as chemicals of potential concern (COPCs). The COPCs were selected to represent potential Site-related hazards based on toxicity, concentration, frequency of detection, and mobility and persistence in the environment and can be found in **Tables 2-1** through **2-16** of Appendix C of the baseline HHRA (*de maximus*, 2013).[7] From this, a subset of the chemicals were identified in the FS as presenting a significant current or future risk in AOIs across the Site and are referred to as the COCs in this ROD and summarized in **Tables G-1** through **G-4**. These tables contain the exposure point concentrations used to evaluate the reasonable maximum exposure (RME) scenario in the baseline HHRA for the chemicals of concern.

Section 2: Exposure Assessment

Current and potential future Site-specific pathways of exposure to COCs were determined. The extent, frequency, and duration of current or future potential exposures were estimated for each pathway. From these exposure parameters, a daily intake level for each Site-related chemical was estimated.

Presently, the Site is a mix of industrial buildings, adjacent open space areas that are within a fenced portion of the NMI Property, and undeveloped open space areas outside of the fenced portion of the NMI Property. Health risks were evaluated for a range of possible future Site uses, including passive recreational, residential, and commercial/industrial. Passive recreational use refers to land uses that involve passive leisure activities such as walking, hiking, picnicking, or nature study. The passive recreational use scenario evaluated young children and adults who were assumed to be exposed to soil, as well as to surface water and sediment, if wading or swimming activities occur. Residential use refe rs to use of property for the location of a residential dwelling, with the assumption that young children and adults spend the majority of their time each day at their property (i.e., at the Site). Residential land uses are assumed to involve exposure to soil and use of groundwater as a potable water source, as well as ingestion of home-grown produce. Risks associated with exposures to surface water and sediment were also evaluated for residential use. The evaluation of risks associated with commercial and industrial uses of the Site considered risks to full-time adult indoor workers (e.g., office workers) and risks

[6] *de maximis*, 2013. *Baseline Human Health Risk Assessment, Nuclear Metals Inc. Superfund Site*; September 4, 2013.

[7] *Id.*

to full-time adult outdoor workers (e.g., landscape supply depot worker), under the assumption that exposures to soil can occur to both types of workers. Although the Site potentially could also be used for active recreational uses in the future (e.g., athletic fields), risks associated with residential land use can be used to conservatively represent the potential risks associated with active recreational land uses. Consequently, active recreational use was not evaluated in the baseline HHRA. Evaluation of risks were also performed for future construction workers exposed to Site soils. Additional details on current and potential future land use can be found in Section 3.1 of the baseline HHRA (*de maximis*, 2013).[8]

The following is a brief summary of the exposure pathways that were found to present a significant risk (Incremental Lifetime Cancer Risk [ILCR] greater than 10^{-4} or a Hazard Index [HI]>1) at the Site. A more thorough description of all exposure pathways evaluated in the risk assessment, can be found in Section 3.2 and on Tables 4.1 through 4.12 of Appendix E of the baseline HHRA (*de maximis*, 2013).

The following current exposure pathways were found to present a significant risk at the Site:

- Trespasser (older child/adolescent) with exposure to Cooling Pond sediment (by ingestion and dermal contact);[9]

The following future exposure pathways were found to present a significant risk at the Site:

- Resident (adult and young child) with exposure to surface and/or subsurface soil (by ingestion, dermal contact, inhalation of particulates, produce ingestion, and external [radiological] exposure) at the following AOIs: AOI 14 North, AOI 8 Sweepings Area, AOI 7 & 11 Industrial Area East, AOI 2 & 4 Soils Area at Cooling Pond, Rt 62 Outfall and Embayment Area, and AOI 1 Holding Basin;[10]

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[8] *Id.*

[9] For current trespasser sediment exposures, an exposure frequency of 15 days/year was used, along with an exposure duration of 12 years. An ingestion rate of 100 mg/day was used. Dermal contact was assumed with 3,402 cm^2 of surface area and an adherence factor of 0.3 mg/cm^2-event. A body weight of 44 kg was used.

[10] For future residential soil exposures, exposure durations of 24 years and 6 years, respectively, were presumed for an adult and young child. Body weights of 70 kg and 15 kg were used for the adult and young child, respectively. Dermal contact was assumed with 5,700 cm^2 of surface area for the adult and 2,800 cm^2 for the young child, with adherence factors of 0.07 and 0.2 mg/cm^2-event for the adult and child, respectively. An exposure frequency of 161 days/year [see Appendix E.2 and Table 4.8 in Appendix E of baseline HHRA for calculation of exposure frequency] was used for a combined exposure duration of 30 years. For future residential dust exposures, exposure durations of 24 years and 6 years, respectively, were presumed for an adult and young child. Future indoor air exposures were assumed to occur 16.4 hours/day (adult) and 20 hours/day (child) for 350 days/year, while outdoor air exposures were assumed to occur 1.75 hours/day (adult) and 3 hours/day (child) for 161 days/year. Future indoor air inhalation rates were 13.3 m^3/day (adult) and 8.3 m^3/day (child), while outdoor air inhalation rates were 38.4 m^3/day (adult) and 28.8 m^3/day (child). The indoor dust dilution factor used was 0.4. For external radiological exposures, the indoor and outdoor exposure times (hours/day) were the same as for dust exposures, however, the outdoor exposure frequency

- ☐ Resident (adult and young child) with exposure to untreated groundwater (by ingestion, inhalation, and dermal contact) used as tap water from the following areas: on-property bedrock groundwater plume, on-property bedrock groundwater, on-property overburden groundwater plume, on-property overburden groundwater, off-property bedrock groundwater, and off-property overburden groundwater;[11]

- ☐ Abutting resident/recreational visitor (young child) with exposure to cooling pond sediment (by ingestion and dermal contact);[12]

- ☐ Recreational visitor (young child) with exposure to surface and/or subsurface soil (by ingestion, inhalation of particulates, and dermal contact) at the following AOIs: AOI 8 Sweepings Area, AOI 7 & 11 Industrial Area East, AOI 2 & 4 Soils Area at Cooling Pond, and AOI 1 Holding Basin;[13]

- ☐ Outdoor worker with exposure to surface soil (by ingestion, inhalation of particulates, dermal contact, and external [radiological] exposure) at AOI 7 & 11 Industrial Area East;[14]

- ☐ Construction worker with exposure to surface and/or subsurface soil (by ingestion,

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was a site-specific value of 186 days/year [see Appendix E.2 and Table 4.8 in Appendix E of baseline HHRA for calculation of exposure frequency]. An indoor shielding factor of 0.4 was used, while an outdoor shielding factor of 1 was used. In addition, an area correction factor of 0.9 was applied. For produce ingestion, an exposure frequency of 350 days/year was used for a combined exposure duration of 30 years. For both the child and adult, the ingestion rate of vegetables was 10 g/kgBW/day and the ingestion rate of fruit was 12 g/kgBW/day. The fractions of homegrown vegetables and fruits were 0.038 and 0.005, respectively.

[11] For future residential exposures to untreated groundwater, drinking water ingestion rates of 2 L/day and 1.5 L/day for the adult and young child, respectively, were assumed. An exposure frequency of 350 days/year was used for a combined exposure duration of 30 years. Dermal contact was assumed with 18,000 cm^2 of surface area for the adult, and 6,600 cm^2 for the young child. Showers/baths were assumed to occur 350 days/year for 0.58 hr/day for the adult and 1 hr/day for the young child. Inhalation during showers/baths evaluated using the Andelman model with a volatilization factor of 0.5 L/m^3.

[12] For a future young child abutting resident/recreational visitor sediment exposures, an exposure frequency of 26 days/year was used, along with an exposure duration of 6 years. An ingestion rate of 200 mg/day was used. Dermal contact was assumed with 1,560 cm^2 of surface area and an adherence factor of 0.3 mg/cm^2-event. A body weight of 15 kg was used.

[13] For future young child recreational visitor soil exposures, an exposure frequency of 80 days/year was used, along with an exposure duration of 6 years. A body weight of 15 kg was used. An ingestion rate of 200 mg/day was used. Dermal contact was assumed with 2,800 cm^2 of surface area and an adherence factor of 0.2 mg/cm^2-event. For outdoor air exposures, an exposure duration of 6 years was presumed. Future outdoor air exposures were assumed to occur 3 hours/day for 80 days/year.

[14] For future outdoor worker soil exposures, an exposure duration of 25 years was used. A body weight of 70 kg was used, as well as an ingestion rate of 100 mg/day. Dermal contact was assumed with 3,300 cm^2 of surface area and an adherence factor of 0.2 mg/cm^2-event. An exposure frequency of 161 days/year was used. For future outdoor worker dust exposures an exposure duration of 25 years was presumed. Future outdoor air exposures were assumed to occur 8 hours/day for 161 days/year. The future outdoor air inhalation rate used was 38.4 m^3/day. For external radiological exposures, the exposure time (3 hours/day) was the same as for dust exposures, however, the exposure frequency was 225 days/year. An outdoor shielding factor of 1 was used. In addition, an area correction factor of 0.9 was applied.

inhalation of particulates, and dermal contact) at the following AOIs: AOI 1 Holding Basin, AOI 8 Sweepings Area, AOI 7 & 11 Industrial Area East, AOI 2 & 4 Soils Area at Cooling Pond, and, based on updated toxicity values for uranium (see below, as well as Appendix E of this ROD), AOI 1 Holding Basin;[15]

In addition, the vapor intrusion pathway is considered to be potentially complete under future land use conditions if occupied buildings are constructed within 100 feet of overburden soil where VOCs have been detected (at any concentration), and within 100 feet of overburden groundwater in which VOCs have been detected at concentrations greater than vapor intrusion screening levels (VISLs). VOC-impacted soils are generally found within AOI 3 Old Landfill, AOI 2 Former Drum Burial Area and AOI 11 Industrial Drain Lines. The areas of VOC-impacted groundwater (above VISLs) are shown in **Figure E-14**. Refer to Section E for discussion of **Figure E-14** as it relates to the most current VISLs (June 2015).

Note that the baseline HHRA was completed in 2013. In February 2014, EPA finalized a Directive to update standard default exposure factors and frequently asked questions associated with these updates (located online at http://www.epa.gov/oswer/riskassessment/superfund_hh_exposure.htm; items # 22 and #23 of this web link). Applying these updated standard default exposure factors to the risk assessment would possibly result in a slight decrease of the risk estimates; however, it would not change the previous conclusions regarding unacceptable risks at the Site. These updated standard default exposure factors have been utilized during development of risk-based performance standards (see Section L of this ROD).

Section 3: Toxicity Assessment

Carcinogenic Effects

The potential for exposure to a chemical to result in a carcinogenic effect is generally described by two factors: a statement reflecting the degree of confidence that the compound causes cancer in humans and a potency estimate, indicating how potent the chemical may be at causing cancer, with the general assumption that every exposure has some probability of resulting in cancer. The descriptor reflecting the degree of confidence that the compound causes cancer in humans may be either an alpha-numeric value or a narrative. Both are closely tied to the nature and extent of information available from human and animal studies. The cancer potency estimate is a quantitative measure of a compound's ability to cause cancer, and is generally expressed as either a cancer potency factor or an inhalation unit risk value. Cancer potency estimates and unit

[15] For future construction worker soil exposures, an exposure frequency of 250 days/year was used, along with an exposure duration of 1 year. A body weight of 70 kg was used. An ingestion rate of 330 mg/day was used. Dermal contact was assumed with 3,300 cm^2 of surface area and an adherence factor of 0.3 mg/cm^2-event. For outdoor air exposures, an exposure duration of 1 year was presumed. Future outdoor air exposures were assumed to occur 8 hours/day for 250 days/year.

risk values are toxicity estimates developed by EPA based on epidemiological and/or animal studies, and they reflect a conservative "upper bound" of the potency of the carcinogenic compound. That is, the true potency is unlikely to be greater than the potency described by EPA. **Table G-5** presents these cancer toxicity values and cancer classifications for the COCs at the Site.

In some cases, however, EPA may conclude that it is not appropriate to generate a cancer potency estimate or unit risk value given the mode of action of the known or suspect carcinogen (e.g. chloroform). Currently, EPA's default procedure for characterizing cancer risk for compounds which may exhibit a threshold for carcinogenic effects, mirrors the process used to characterize the potential for adverse non-cancer effects, and is described in the section which follows. A summary of the cancer toxicity data relevant to the chemicals of concern at the Site is presented in **Table G-5**. EPA's Cancer Guidelines and Supplemental Guidance (March 2005) has been used as the basis for analysis of carcinogenicity risk assessment.

Non-Carcinogenic Effects and Non-Linear Carcinogenic Effects

For addressing non-carcinogenic effects and effects of carcinogenic compounds which exhibit a threshold, it is EPA's policy to assume that a safe exposure level exists, which is described by the reference dose (RfD) or reference concentration (RfC). RfDs and RfCs have been developed by EPA as estimates of a daily exposure that is likely to be without an appreciable risk of an adverse health effect when exposure occurs over the duration of a lifetime. RfDs and RfCs are derived from epidemiological and/or animal studies and incorporate uncertainty factors to help ensure that adverse health effects will not occur. The RfDs and RfCs relevant to the Site are presented in **Table G-6**.

The toxicity values presented in **Tables G-5** and **G-6** are those used in the baseline HHRA, except for compounds where a toxicity update occurred since the baseline HHRA was completed in 2013. The chronic and subchronic RfCs for uranium (lower) have changed since the time of the baseline HHRA. The subchronic RfD for uranium (lower) has also changed since the time of the baseline HHRA. The results presented in the following section (Risk Characterization) are based on the toxicity values used in the baseline HHRA. A technical memorandum (see Appendix E) has been developed which provides what the approximate changes to hazards would be for the applicable scenarios based on the revised uranium toxicity values. While the lower uranium RfCs would result in higher non-cancer hazards related to dust inhalation, based on a review of the results, the conclusions of the risk assessment presented below would not have changed. The change in the subchronic RfD fo r uranium would have resulted in uranium being selected as an additional COC for the construction worker for the AOI 7 & 11 Industrial Area East subsurface soil scenario. In addition, uranium would have been selected as a COC for the construction worker for the AOI 1 Holding Basin surface and subsurface soil scenarios. The revised toxicity values have been used during development of risk-based performance standards (see Section L of this ROD).

Additional changes in toxicity values are associated with 1,4-dioxane and 1,1-dichloroethane. In June 2015, EPA classified 1,4-dioxane as volatile (as defined in the Regional Screening Levels June 2015 update found at http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm). As 1,4-dioxane is already a COC for groundwater, this change does not impact the conclusions of the risk assessment presented below. However, inhalation toxicity values have now been used for development of risk-based cleanup levels (see Section L of this ROD) and have therefore been included in Tables G-5 and G-6. It should be noted that the inhalation Unit Risk value has changed since the time of the baseline HHRA, and although the chronic RfC value has not changed, the source and primary target organ did change. With respect to 1,1-dichloroethane, the inhalation RfC used in the BHHRA has been withdrawn and is no longer used by EPA during risk calculations. Therefore, development of risk-based cleanup levels (see Section L of this ROD) did not include the non-cancer inhalation pathway.

Section 4: Risk Characterization

The risk characterization combines the exposure estimate with the toxicity information to estimate the probability or potential that adverse health effects may occur if no action were to be taken at a site. A separate ch aracterization is generated depending on the nature of the adverse effect. Cancer risks are generally expressed as a probability whereas the potential for adverse non-cancer effects (and carcinogenic effects resulting from non-linear (i.e., exhibiting a threshold of toxicity) mode of action (MOA) compounds) are described in terms what is thought to be a safe exposure level.

For exposure to most known or potentially carcinogenic substances, EPA believes that as the exposure increases, the cancer risk increases. In characterizing risk to these types of carcinogenic compounds, a chemical- specific exposure level is generally multiplied with the cancer potency factor or inhalation unit risk to estimate excess lifetime cancer risk as a result of exposure to site contaminants. To the extent that EPA has deemed that data are sufficient to apply the provisions of the 2005 Children's Supplemental Cancer Risk Guidelines, special consideration of the increased susceptibility to carcinogenic effects that children may have, was included in the risk characterization. The 2005 Children's Supplemental Cancer Guidelines were used to describe any such heightened susceptibility among potentially exposed children. Typically, the resulting cancer risk estimates are expressed in scientific notation as a probability (e.g., 1×10^{-6} or 1E-06 for 1/1,000,000) and indicate (using this example), that an average individual is not likely to have greater that a one in a million chance of developing cancer over 70 years as a result of site-related exposure (as defined) to the compound at the stated concentration.

All risks estimated represent an excess risk of cancer from exposures to contamination originating from the Site. These are risks above and beyond that which we face from other

causes such as from cigarettes or ultra-violet radiation from the sun. The chance of an individual developing cancer from all other (non-site related) causes has been estimated to be as high as one in three. EPA generally views site related cancer risks in excess of 10^{-4} as unacceptable. Current EPA practice considers carcinogenic risks to be additive when assessing exposure to a mixture of hazardous substances.

In assessing the potential for adverse non-carcinogenic effects (and carcinogenic effects resulting from non-linear MOA compounds), a hazard quotient (HQ) is calculated by expressing the exposure (or the exposure concentration in the case of air exposures) as a ratio of the reference value (RfD or RfC). A $HQ \leq 1$ indicates that a receptor's exposure to a single contaminant is less than the safe value and that adverse effects are unlikely. Conversely, a $HQ > 1$ indicates that adverse effects as a result of exposure to the contaminant are possible. To account for additive effects resulting from exposure to more than one compound, a Hazard Index (HI) is generated by adding the HQs for all chemicals of concern that have the same or a similar mechanism or mode of action. As a conservative measure and a common practice, HQs are often added for all COPCs that affect the same organ or system (i.e., liver, nervous system) since the mechanism or mode of action is not always known. A $HI < 1$ indicates that adverse effects are unlikely whereas a $HI > 1$ indicates adverse effects are possible. Generally, EPA views HI values based on site-related exposure in excess of unity as unacceptable. It should be noted that the magnitude of the HQ or HI is not proportional to the likelihood that an adverse effect will be observed.

The following is a summary of the media and exposure pathways that were found to present a significant risk exceeding EPA's cancer risk range and non-cancer threshold at the Site. Only those exposure pathways deemed relevant to the remedy being proposed are presented in this ROD. Readers are referred to Section 5.2 and Appendices G, H, I, and M of the baseline HHRA (*de maximus*, 2013)[16] for a more comprehensive risk summary of all exposure pathways evaluated for all COPCs, as well the technical memorandum on impacts to the previously proposed cleanup levels showing results utilizing updated toxicity values for uranium (see Appendix E of this ROD).

Current Trespasser – Sediment

Table G-7 depicts the non-carcinogenic risk summary for the COCs in sediment evaluated to reflect potential future trespasser exposure at the Cooling Pond corresponding to the RME scenario. For the current older child/adolescent, non-carcinogenic risks exceeded the EPA target organ HI of 1. The exceedance is primarily due to PCBs in sediment.

Future Resident – Soil

[16] *Id.*

Tables G-8 and **G-9** depict the carcinogenic and non-carcinogenic risk summaries for the COCs in soil evaluated to reflect potential future residential exposure corresponding to the RME scenario. For the future young child and adult resident, carcinogenic and non-carcinogenic risks exceeded the EPA acceptable risk range of 10^{-4} to 10^{-6} and/or a target organ HI of 1 at multiple AOIs and in both surface and subsurface soil. The exceedances are primarily due to PAHs, PCBs, arsenic, uranium, and/or radionuclides (uranium and/or thorium isotopes/decay products) in soil at:

- AOI 14 North (surface soil) - primarily due to PCBs;
- AOI 8 Sweepings Area (surface soil) - primarily due to PAHs, PCBs, arsenic, and radionuclides (uranium and thorium isotopes/decay products);
- AOI 8 Sweepings Area (subsurface soil) - primarily due to PCBs;
- AOI 7 & 11 Industrial Area East (surface soil) - primarily due to PAHs, PCBs, arsenic, uranium, and radionuclides ;
- AOI 7 & 11 Industrial Area East (subsurface soil) - primarily due to PAHs, PCBs, arsenic, uranium, and radionuclides;
- AOI 2 & 4 Soils Area at Cooling Pond (surface soil) - primarily due to PAHs, PCBs, arsenic, and radionuclides;
- AOI 2 & 4 Soils Area at Cooling Pond (subsurface soil) - primarily due to PAHs, PCBs, arsenic, and radionuclides;
- Rt 62 Outfall and Embayment Area (surface soil) - primarily due to PAHs, arsenic, and radionuclides (thorium isotopes/decay products);
- AOI 1 Holding Basin (surface soil) - primarily due to arsenic, uranium, and radionuclides; and
- AOI 1 Holding Basin (subsurface soil) - primarily due to arsenic, uranium, and radionuclides.

Future Resident--Groundwater

Tables G-10 and **G-11** depict the carcinogenic and non-carcinogenic risk summaries for the COCs in groundwater evaluated to reflect potential future residential potable water exposure corresponding to the RME scenario (under the assumption that groundwater associated with the Site is used as a source of potable water in the future). For the future resident using untreated

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groundwater as household water, carcinogenic and non-carcinogenic risks exceeded the EPA acceptable risk of 10^{-4} and/or a target organ HI of 1 for groundwater. The exceedances were due primarily to the presence of 1,1-dichloroethane, tetrachloroethene, trichloroethene, vinyl chloride, 1,4-dioxane, bis(2-ethylhexyl)phthalate, arsenic, barium, chromium, cobalt, copper, iron, manganese, molybdenum, uranium, nitrate, nitrite, and radionuclides in these areas:

- On-Property Bedrock Groundwater Plume – primarily due to 1,1-dichloroethane, trichloroethene, 1,4-dioxane, bis(2-ethylhexyl)phthalate, arsenic, barium, chromium, cobalt, iron, manganese, molybdenum, uranium, nitrate, nitrite, and radionuclides;

- On-Property Bedrock Groundwater – primarily due to trichloroethene, bis (2-ethylhexyl)phthalate, arsenic, iron, manganese, uranium, and radionuclides;

- On-Property Overburden Groundwater Plume – primarily due to tetrachloroethene, trichloroethene, 1,4-dioxane, bis(2-ethylhexyl)phthalate, arsenic, chromium, cobalt, copper, iron, manganese, molybdenum, uranium, nitrate, nitrite, and radionuclides;

- On-Property Overburden Groundwater – primarily due to vinyl chloride, bis (2-ethylhexyl)phthalate, arsenic, cobalt, iron, manganese, and radionuclides;

- Off-Property Bedrock Groundwater – primarily due to trichloroethene, vinyl chloride, 1,4-dioxane, arsenic, cobalt, iron, manganese, uranium, nitrate, and radionuclides; and

- Off-Property Overburden Groundwater – primarily due to trichloroethene, 1,4-dioxane, bis(2-ethylhexyl)phthalate, arsenic, iron, and radionuclides.

Abutting Resident/Recreational Visitor - Sediment

Table G-12 depicts the non-carcinogenic risk summary for the COCs in sediment evaluated to reflect potential future young child abutting resident/recreational visitor exposure at the Cooling Pond corresponding to the RME scenario. For the future young child, non-carcinogenic risks exceeded the EPA target organ HI of 1. The exceedance is primarily due to PCBs in sediment.

Recreational Visitor – Soil

Table G-13 depicts the non-carcinogenic risk summary for the COCs in soil evaluated to reflect potential future young child recreational visitor exposure corresponding to the RME scenario. For the future young child, non-carcinogenic risks exceeded the EPA target organ HI of 1 at multiple AOIs and in both surface and subsurface soil. The exceedances are primarily due to PCBs and uranium in soil at:

- AOI 8 Sweepings Area (surface soil) - primarily due to PCBs;

- AOI 8 Sweepings Area (subsurface soil) - primarily due to PCBs;
- AOI 7 & 11 Industrial Area East (surface soil) - primarily due to uranium;
- AOI 7 & 11 Industrial Area East (subsurface soil) - primarily due to PCBs and uranium;
- AOI 2 & 4 Soils Area at Cooling Pond (surface soil) - primarily due to PCBs;
- AOI 2 & 4 Soils Area at Cooling Pond (subsurface soil) - primarily due to PCBs;
- AOI 1 Holding Basin (surface soil) - primarily due to uranium; and
- AOI 1 Holding Basin (subsurface soil) - primarily due to uranium.

Future Outdoor Worker – Soil

Table G-14 depicts the non-carcinogenic risk summary for the COCs in soil evaluated to reflect potential future outdoor worker exposure corresponding to the RME scenario. For the future adult outdoor worker, non-carcinogenic risks exceeded the EPA target organ HI of 1 at AOI 7 & 11 Industrial Area East in surface soil. The exceedance is primarily due to PAHs, PCBs, arsenic, and radionuclides (uranium and thorium isotopes/decay products) in soil.

Construction Worker – Soil

Table G-15 depicts the non-carcinogenic risk summary for the COCs in soil evaluated to reflect potential future construction worker exposure corresponding to the RME scenario. For the future adult construction worker, non-carcinogenic risks exceeded the EPA target organ HI of 1 at multiple AOIs and in both surface and subsurface soil. The exceedances are primarily due to PCBs and uranium in soil at:

- AOI 8 Sweepings Area (surface soil) - primarily due to PCBs;
- AOI 7 & 11 Industrial Area East (surface soil) - primarily due to uranium;
- AOI 7 & 11 Industrial Area East (subsurface soil) - primarily due to PCBs and, based on toxicity value updates (see above), uranium (not presented in Table G-15);
- AOI 2 & 4 Soils Area at Cooling Pond (surface soil) - primarily due to PCBs;
- AOI 2 & 4 Soils Area at Cooling Pond (subsurface soil) - primarily due to PCBs; and
- AOI 1 Holding Basin (surface and subsurface soil) – primarily due to uranium, based on toxicity value updates (see above; not presented in **Table G-15**).

Section 5: Uncertainties

The baseline HHRA showed that two of the most substantial contributors to cancer risks in soil are arsenic and thorium. However, the baseline HHRA concluded that arsenic and thorium concentrations in soil at the Site are consistent with local background concentrations. Consequently, the risks calculated in the HHRA for arsenic and thorium in soil are a reflection of the risks associated with ambient background conditions, and not a representation of risks associated with site-related contamination.

To further evaluate arsenic and thorium in Site soil, a statistically-based analysis was performed to determine if there was any statistically significant difference between the concentrations of arsenic and thorium in Site soil and background soil. The analysis concluded that the mean/median concentrations of arsenic and thorium in surface and shallow subsurface soils at the Site are equal to or less than the mean/median concentrations or arsenic and thorium in background samples. This evaluation was discussed in Section 5.3 of the baseline HHRA (*de maximis*, 2013).

The HHRA included an incremental risk analysis which identified the differences between risk for exposure to Site soil concentrations and risks for exposure to background levels.

The conclusions of the incremental risk analysis for the residential, passive recreational, and commercial/industrial future land use evaluations are that the majority of exposure areas that had total risks within EPA's cancer risk range have incremental cancer risks that do not exceed 10^{-6}. In addition, incremental cancer risk for future residential land use at the Rt 62 Outfall and Embayment Area and for future commercial/industrial land use at AOI 7 & 11 Industrial Area East are also reduced to be within EPA's cancer risk range. However, this does not change the non-cancer risk criteria exceedances listed in the Risk Characterization section (above) for each area.

Soil samples collected during the RI from the Old Landfill were used in the HHRA; the Old Landfill was included as part of one of the exposure areas evaluated. However, for safety reasons, soil sampling at the Old Landfill avoided metallic anomalies that were identified in ground penetrating radar scans. Therefore, if there is contamination associated with metallic anomalies, it is possible that soil samples collected from the Old Landfill did not characterize the highest levels of contamination. The Old Landfill was included in the FS because the metallic anomalies require removal. Once the metallic anomalies have been removed, soil samples will be collected from the adjacent soils and analyzed for the parameters evaluated in the RI. Soil data will be evaluated to determine if additional soil removal will be required. Therefore, although it is possible that the HHRA underestimates risk for that exposure area if elevated COPC concentrations are present near metallic anomalies in soil at the Old Landfill, the remedy will provide a mechanism to address potential risks if elevated COPC concentrations are

identified in soil during remedial design.

2. Ecological Risk Assessment

A Baseline Ecological Risk Assessment (BERA) was prepared for the Site to evaluate the likelihood and magnitude of potential ecological risks associated with the Site (*de maximis,* 2014a).[17] The technical guidance used to perform the BERA came primarily from "Ecological risk assessment guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments EPA/540/R-97/006." (EPA, 1997)

The Phase 1A and Phase 1B field work performed in 2005 and 2006 focused on field investigations to support a draft Screening Level Ecological Risk Assessment (SLERA) (*de maximis*, 2006).[18] Data gaps identified by the SLERA were addressed in 2006, 2007, and 2008 as part of the Phase 1C field investigations. The BERA (*de maximis*, 2014a) evaluated data collected during the Phase 1A, Phase 1B, and Phase 1C field programs to estimate the risk of ecological harm associated with site-related Chemicals of Potential Concern (COPCs) in surface soil as well as surface water and sediment associated with each of the Site surface water bodies evaluated in the RI.

Section 1: Identification of Chemicals of Potential Ecological Concern (COPCs)

A SLERA prepared for this Site in 2006 (*de maximis*, 2006) identified the COPCs which were further evaluated in the BERA based on pooled Phase 1A, 1B, and 1C datasets (*de maximis* 2014a, Appendix A).

The following ecologically-relevant areas of interest (AOIs) were identified during the Phase 1A, Phase 1B, and Phase 1C investigations:

- Cooling Water Recharge Pond
- Sphagnum Bog
- Northeast Wetland
- Assabet River Main Channel
- Assabet River Embayment Area

[17] *de maximis*, 2014a. *Baseline Ecological Risk Assessment, Nuclear Metals, Inc. Superfund Site*; June 2014.

[18] *de maximis*, 2006. Draft First Interim Deliverable, Screening-Level Ecological Risk Assessment, Nuclear Metals, Inc., Superfund Site, Concord, Massachusetts, June 2006.

- Site-Wide Surface Soil

In order to select COPCs, maximum detected chemical concentrations were compared to media-specific screening benchmarks for surface water, sediment, and soil. An analyte was retained as a COPC if (a) the maximum concentration equaled or exceeded the screening benchmark, or (b) it did not have a screening benchmark. A chemical was eliminated as a COPC if it was detected in less than five percent of the samples in the data set. To simplify the data presentation, only those habitats that showed significant risk in the BERA have been included in this ROD. Those habitats are the Cooling Water Recharge Pond and the Sphagnum Bog (**Tables G-16 to G-20).**

As part of the COPC screening (*de maximis*, 2014a,[19] Appendix A), COPCs were also selected in three other areas of concern: Northeast Wetland, the Assabet River Main Channel, Assabet River Embayment Area, and Site-Wide Surface Soil. Based on the evaluations in the BERA, no significant ecological risk was determined to be associated with media in any of these AOIs.

The Assabet River is a receiving medium for overburden groundwater, but is not a major receiving medium for site-related contamination, as only low levels of VOCs have been detected in sediment. Sediment contamination in the Assabet River Embayment Area is characterized by metals which have not been found to be site-related and that are found upstream at higher concentrations. It is hypothe sized that this contamination has resulted from deposition of sediment associated with historical upstream sources during flooding events and the elevated levels of COPCs in the river do not appear to be site-related.

Benchmark comparisons in the BERA characterized possible risk to benthic invertebrates and amphibians at Northeast Wetland as possible in surface water due to copper, lead, and manganese and as unlikely in sediment (*de maximus*, 2014a). Food chain models characterized risk to wetland birds and mammals as unlikely. Based on the weight of evidence and confidence and uncertainties in the data, ecological risk at the Northeast Wetland was determined in the BERA to be unlikely.

In addition, the preliminary screening of COPCs in the SLERA (*de maximis*, 2006)[20] selected COPCs in Site-Wide Surface Soils. Evaluation in the BERA, based on the weight of evidence and confidence and uncertainties in the data, determined that ecological risk in site-wide soils was possible from depleted uranium (DU) (plants and soil invertebrates), PCB Aroclor-1254 (birds), and PCB Aroclor-1260 (birds). However, the BERA conclusions indicated that these possible risks were not ecologically significant and were not addressed further in the FS (*de*

[19] *Id.*

[20] *Id.*

maximis, 2014b).[21]

Furthermore, the preliminary screening of COPCs in the SLERA (*de maximis*, 2006) concluded that risk of adverse radiological effects to ecological receptors is negligible and could be eliminated from further evaluation. Based on the concentrations of PCBs and uranium in the Cooling Water Recharge Pond the need for a remedy was identified. As a result, additional evaluation of ecological risk within the Cooling Water Recharge Pond was not necessary since risk associated with potential exposure to ecological receptors was to be addressed by a presumptive remedy (removal of sediments in the Cooling Water Recharge Pond).

Section 2: Exposure Assessment

The NMI Property is approximately 46 acres; the property is bordered by Main Street (Route 62) and several commercial and residential properties to the north, residential properties to the east, Town-owned open space and a children's summer camp to the south and southwest, and woodland and commercial/industrial properties to the west. The Assabet River is situated approximately 300 feet north of the NMI Property, on the opposite side of Route 62.

There are two wetlands at the Site, the Sphagnum Bog and the Northeast Wetland located north of the Cooling Water Recharge Pond. The Sphagnum Bog is a palustrine, broad-leafed evergreen, scrub-shrub, saturated, acidic wetland. The bog is located approximately 75 feet east of the Cooling Water Recharge Pond and the Holding Basin. The bog covers an area of approximately 3.5 acres. The bog is composed primarily of sphagnum peat. The substrate of the bog varies from growing sphagnum at the surface, to decomposed peat below the surface. The Sphagnum Bog has no inlets or outlets and receives the bulk of its moisture from precipitation and run-off.

The BERA was completed to estimate the risk of ecological harm associated with site-related COPCs in surface soil as well as surface water and sediment associated with each of the site surface water bodies evaluated in the RI (*de maximis*, 2014a).[22] Ecological risks were characterized using a weight-of-evidence approach that evaluated if the growth, survival, or reproduction of aquatic invertebrates, amphibians, wetland birds, and wetland mammals could be significantly affected by site-related contamination in aquatic habitats (Sphagnum Bog), and terrestrial plants, soil invertebrates, songbirds, and mammals terrestrial habitats (Site-Wide Surface Soils).

Complete exposure pathways identified in the BERA included: the uptake of COPCs from sediment, surface water, and soil through roots (vegetation); ingestion of COPCs bound to soil

[21] *de maximis*, 2014b. *Feasibility Study Report, Nuclear Metals, Inc. Superfund Site*; November 2014.

[22] *Id.*

(terrestrial invertebrates, birds, and mammals); ingestion of COPCs bound to sediment (benthic invertebrates, aquatic and wetland birds, and mammals); ingestion of dissolved and particulate COPCs in surface water (aquatic invertebrates, semi-aquatic and wetland birds, and mammals); ingestion of COPCs through consumption of contaminated plants (herbivores and omnivores); and ingestion of COPCs through consumption of contaminated prey (all predators).

Tables G-21 summarizes the receptor groups, lines of evidence, and endpoints evaluated in the BERA for the AOI that was determined to show potential risk, the Sphagnum Bog.

The Massachusetts Natural Heritage and Endangered Species Program (MANHESP; 2009a)[23] and United States Fish and Wildlife Service (USFWS) were consulted regarding the presence of state- and federal-listed rare, threatened, or endangered species and priority habitat at and in the vicinity of the Site during the preparation of the BERA (*de maximus*, 2014a). The USFWS indicated that there are no federally listed species known to occur in the project area (USFWS, 2009).[24] The MANHESP indicated that three species of freshwater mussels including the eastern pondmussel (*Ligumia nasuta*), triangle floater (*Alasmidonta undulata*), and creeper (*Strophitus undulates*) have been historically observed in surface waters in the vicinity of the Site and are listed as species of special concern (MANHESP, 2009b).[25] Responses from both agencies and fact sheets for these three state-listed special concern species are presented in Appendix B of the BERA (*de maximus*, 2014a). Based on the habitat and substrate preferences for these species, it is likely that their potential presence at the Site would be limited to the main channel of the Assabet River. Endpoints in the BERA evaluated the potential risk to these species, and concluded that as risk from surface water and sediment COPCs in the Assabet River Main Channel was characterized as unlikely, the risk to these species of special concern from COPCs is also considered unlikely.

Exposure Point Concentrations (EPCs) for COPCs in surface water, sediment, and prey were calculated in terms of Reasonable Maximum Exposures (RMEs) and Central Tendency Exposures (CTEs). CTE represents the most likely concentration to which a population of receptors would be exposed. CTE EPCs were calculated as the lower of either the maximum concentration or the arithmetic mean. RME EPCs were calculated as the lower of either the 95 percent UCL or the maximum concentration.

[23] MANHESP, 2009a. Massachusetts Natural Heritage and Endangered Species Program, Letter dated June 22, 2009 from Thomas W. French, PhD, Assistant Director, Division of Fisheries and Wildlife, Field Headquarters, Westborough, MA to Antony Rodolakis, MACTEC.

[24] USFWS, 2009. Letter dated July 14, 2009 from Thomas R. Chapman, Supervisor, New England Field Office, Concord, NH to Sarah Harding and Tony Rodolakis, MACTEC. July 2009.

[25] MANHESP, 2009b. Rare Species Fact Sheets. Available at: http://www.mass.gov/dfwele/dfw/nhesp/species_info/fact_sheets.htm.

Exposure of terrestrial and wetland wildlife (i.e., birds and mammals) to Site COPCs was estimated using food chain models. Biological tissue samples from representative prey species, such as frogs and aquatic invertebrates, were collected from the Site and background bogs to provide site-specific tissue data to be incorporated into the food chain models. Surface water, sediment, soil, and tissue EPCs were entered into the food chain model to calculate an estimated daily intake (EDI) to which the receptor may be exposed. EPCs for prey items were either directly measured in tissue samples, estimated using biota-sediment accumulation factors (BSAFs) or bioaccumulation factors (BAFs) derived from site-specific data, or estimated using literature-based BSAFs; literature-based BSAFs were used only when measured tissue concentrations or site-specific BSAFs were not available.

Food chain modeling was used to calculate COPC-specific EDIs for the piscivorous and omnivorous wildlife receptors foraging in the aquatic and terrestrial habitats at the Site. The food chain models quantified the EDIs by calculating the intake of COPCs via food ingestion, surface water drinking, and incidental soil or sediment ingestion, which were considered the primary exposure routes.

Section 3: Ecological Effects Assessment

In aquatic habitats, effects assessments included comparison of Site surface water concentrations to published chronic surface water benchmarks and to background, and comparison of concentrations of COPCs in solid media (mineral sediment, moss, and peat) to published sediment benchmarks. Effects evaluation for benthic invertebrates also included performing laboratory toxicity tests to measure survival and growth of a freshwater benthic invertebrate (*Chironomus dilutus*) exposed to sediments collected from the Site and from background sediment. Benthic community survey samples were collected from 13 locations in the Sphagnum Bog and from five locations in the background bog. These data were used to evaluate the community structure of benthic invertebrates in Site sediments compared to background.

Endpoints used to evaluate potential effects on amphibians included comparison of Site surface water and sediment concentrations to published chronic benchmarks and to background, and also included performing laboratory FETAX (Frog Embryo teratogenesis assay - using *Xenopus*) toxicity tests to measure survival, malformation, and growth of amphibians exposed to surface water.

Food chain models were also used to compare the EDIs for omnivorous waterfowl (mallard), predatory wading birds (great blue heron), omnivorous small mammals (shrew) and predatory large mammals (raccoon), based on exposure in the Sphagnum Bog, to published wildlife toxicity reference values (TRVs) and to background conditions.

Section 4: Ecological Risk Characterization

The following risk characterization includes a brief summary of the environmental risks

associated with the relevant media, the basis of these risks, how these risks were determined in the BERA. The BERA utilized a weight-of-evidence approach which consisted of evaluating several lines of evidence including comparing Site data (exposure point concentrations) to ecotoxicological benchmark values, food chain modeling, benthic community survey evaluations, and toxicity testing. Each of these lines of evidence is qualitatively weighted in consideration of how uncertain the results of the evaluation may be relative to site-specific attributes. Accordingly, ecotoxicological benchmark evaluations which incorporate little site-specific information are given a low to medium weight, whereas bioassay data which are highly site-specific are given a relatively high weight. The conclusions of the BERA, based on the weight-of-evidence approach, are summarized below for each of the exposure areas where it was determined that ecological risk is likely to be present. Ecological risk was also evaluated in the BERA, and concluded to be unlikely, for the Northeast Wetland, the Assabet River Main Channel, the Assabet River Embayment Area, and Site-Wide Surface Soil.

Hazard Quotients (HQs) were calculated to determine risk to (a) aquatic receptors directly exposed to surface water, mineral sediment, moss and peat, and (b) wildlife species exposed to contaminated media, plus prey items. An HQ shows how much the concentration of a COPC exceeds its benchmark or TRV. HQs were calculated as follows:

HQ = EPC / benchmark or TRV

The EPC can be based on either an RME or CTE scenario.

The risk characterization also includes an evaluation of incremental risks, which take into account the contribution of background concentrations to the overall Site risks:

Incremental Risk HQ (IR) = Site HQ – Background HQ

IRs above 1.0 represented the degree to which the site exposure, adjusted for background, exceeded its toxicity benchmark.

A weight-of-evidence analysis was used to evaluate how well the measurement endpoints represented their assessment endpoints. This analysis integrated all the BERA findings to help determine the potential for risk by: 1) assigning a weight (between "low" and "high") to all measurement endpoints; 2) evaluating the magnitude of risk with respect to each measurement endpoint; and 3) determining the concurrence among the measurement endpoints used to answer the questions posed by the assessment endpoints.

<u>Sphagnum Bog</u>

The potential for ecological risk to the benthic invertebrate community in the *Sphagnum* bog was identified by all the lines of evidence (**Table G-22**). The benchmark-driven measurement endpoints identified copper (Cu), lead (Pb), silver (Ag), and phenolic compounds as the major

risk drivers. Lesser risk drivers included molybdenum (Mo) and uranium (U). The sediment toxicity tests identified statistically significant effects in six of the 11 sediment samples used in the test. Toxicity in three of those six samples coincided with high levels of PCBs and Cu, whereas the most toxic of these three samples also had high levels of Pb and mercury (Hg). The benthic survey identified mild to moderate effects in four of the 11 sediment samples used in the toxicity test.

The potential for ecological risk to amphibians in the *Sphagnum* Bog was identified by two of the three lines of evidence. The two benchmark-driven measurement endpoints identified Cu, Pb, and Ag as the major risk drivers in surface water and mineral sediment. However, as presented in Appendix A of the FS (*de maximis,* 2014b),[26] the FETAX test performed on five surface water samples collected from the *Sphagnum* bog did not show any adverse effects to survival, malformation, or growth in embryonic *Xenopus*. Two of the five surface water samples used in the FETAX test were co-located with two of the three most toxic sediment samples. It would appear, therefore, that the high contaminant levels in the sediment at these two locations did not affect the quality of the surrounding water column in terms of toxicity to *Xenopus*.

Medium-weighted food chain models characterized risk to mallard duck and raccoon at the Sphagnum Bog as unlikely. Food chain models suggest that risk to great blue heron is possible from beryllium (Be) in mineral, peat, and moss sediment fractions. Food chain models also suggest that in the mineral and peat fractions, risk to shrews is possible from Mo.

The BERA concluded that risk to the benthic community is possible for the mineral sediment within the southwest corner of the Sphagnum Bog. Adverse effects in *C. dilutus* bioassays at two sample locations in the bog appear to be explained by elevated sediment metal and PCB concentrations at those specific locations, which are within the southwest corner of the Sphagnum Bog. Sediment contaminant levels at these locations in the *Sphagnum* bog could be expected to have direct, measurable impacts on the local benthic community based on the results of the site-specific testing. The mineral sediment fraction is the primary medium of concern in the *Sphagnum* bog. The peat and moss fractions are secondary and lesser media of concern to two of the four wildlife receptors groups evaluated in the BERA, namely the great blue heron and the short-tailed shrew. The analysis focused on mineral sediment as the medium of concern because it showed the highest amount of ecological risk to the receptor groups evaluated in the BERA, particularly the benthic invertebrate community. One sample outside of the southwest corner has been identified as exceeding the cleanup level for PCBs, but the benefits of physically removing this one area does not outweigh the damage that would occur to the bog, which has taken thousands of years to become established; so this one location will be left undisturbed to avoid impacting the well-established peat. Leaving one location of elevated PCBs represents a very low risk for receptor populations over the large area of the remaining bog.

[26] *Id.*

The refined list of COCs in the Sphagnum Bog, along with recommended protective levels and the basis for each level, are presented in **Table G-23.**

Cooling Water Recharge Pond

Based on the results of the previously completed SLERA, it was concluded that risks to benthic invertebrates at the Cooling Water Recharge Pond are likely due to Cu and PCBs based on benchmark comparisons. Therefore, the BERA carried forward the conclusion that sediment in the Cooling Water Recharge Pond would pose significant risks, and due to concurrent exceedances of USEPA target human health risk criteria (risk range of 10^{-4} to 10^{-6} and/or a target organ HI of 1), it was presumptively assumed that a response action will be required for this AOI.

Section 5: Uncertainties

There is uncertainty associated with estimates of risk in any BERA because the risk estimates are based on a number of assumptions regarding exposure and toxicity. More specifically, there is inherent variability and uncertainty associated with the data collected to characterize exposure concentrations and assumptions about the bioavialability of the selected COPCs. There are also assumptions and limitations inherent in food chain modeling, including selection of exposure and modeling parameters (e.g., dietary intake, body weight, and age), uptake factors, and toxicological data (e.g., TRVs).

The food chain models assumed that 100% of the metals ingested are absorbed. Beryllium is poorly absorbed by animals (ATSDR, 2002)[27] and molybdenum is not known to biomagnify. Overall, the conservative nature of the food chain models likely overestimate risk associated with beryllium and molybdenum.

Site-specific conditions also contribute to uncertainty. Due to the variability in media within the bog to which ecological receptors could potentially be exposed, sediment, peat, and sphagnum moss were sampled for analysis. There are no specific screening benchmarks available for peat or sphagnum, and therefore these two data sets are treated as sediment-like media in the BERA and are compared to sediment benchmarks. Both peat and sphagnum likely support some type of invertebrate community, and therefore the sediment benchmarks are the most appropriate benchmarks currently available for these media, however the bioavailability in these media is uncertain, and assumed by the analysis to be similar to mineral sediment.

[27] ATSDR, 2002. Toxicological Profile for Beryllium. U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, Division of Toxicology/Toxicology Information Branch, Atlanta, Georgia. September 2002.

It is also known that peat bogs bind metals strongly (Novak *et al.*, 2003).[28] Bioavailability of copper has also been reported to be low in bogs that have excessive amounts of this metal which, in turn, would explain a decrease in bioavailability (Brewina *et al.*, 2007).[29] These observations are important because the Sphagnum Bog may have much lower bioavailability of copper and other COPCs that were identified at a fairly high frequency, even though the pH is acidic. Humic and tannic acids are negatively charged compounds that can sequester metals, which would render the metals "dissolved" but still unavailable for uptake through the gills of aquatic organisms.

Considerable uncertainty exists with respect to the *Xenopus* testing due to overall poor test performance, therefore this test is not used as a major line of evidence for potential risk in the Sphagnum Bog, and is not line of evidence used to select of PRGs for the Bog (Feasibility Study, Appendix A; *de maximis,* 2014b).[30]

Site-specific prey tissue data were available for benthic macroinvertebrates and amphibians at the Sphagnum Bog. Site-specific tissue data reduce uncertainty and result in high confidence in the risk estimation because they are direct measures of potential exposures to receptors.

There is some uncertainty regarding the interpretation of the benthic community survey results in the Sphagnum Bog where the aquatic habitat is poorly suited to standard metrics for benthic community structure. Most benthic sampling also employs a minimum of three replicates because macroinvertebrates typically exhibit a clustered distribution in sediment. For the NMI study, only one sample was obtained per location, which reduces the statistical power when interpreting the results. Therefore, the benthic community survey was given a "low" weight in the interpretation scheme. The toxicity testing, which provides a more direct line of evidence, was given a higher weight in the evaluation of risk to the benthic community.

3. Basis for Response Action

The baseline human health and ecological risk assessments revealed that a future resident or ecological receptors potentially exposed to chemicals of concern in soil, sediment, or groundwater via direct contact, ingestion, inhalation or ionizing radiation may present an unacceptable human health or ecological risk. Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in this

[28] Novak, M., Emmanuel, S., Vile, M.A., Yigal, E., Veron, A., Paces, T., Wieder, R.K., Vanecek, M., Stepanova, M., Birzova, E. and Hovorka, J., 2003. Origin of lead in eight central European peat bogs determined from isotope ratios, strengths, and operation times of regional pollution sources. Environ. Sci. Technol. 37(3), p. 437-445.

[29] Brewina, L.E., Mehraa, A., Lyncha, P.T. and Faragob, M.E., 2007. Bioavailability of copper within Dolfrwynog Bog soils, North Wales, UK. Chemical Speciation and Bioavailability 19(4), p. 149-162.

[30] *Id.*

ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment. Remedial actions are focused on the following media: surface and sub-surface soils and debris throughout the Site, soils contained within the Holding Basin, sediments in the Cooling Water Recharge Pond and Sphagnum Bog, and overburden and bedrock groundwater throughout the Site.

H. REMEDIATION OBJECTIVES

Risk Management Discussion

As noted in section 2.4 of the Feasibility Study, based on incremental risk being less than 10^{-4} due to PAHs, the Route 62 outfall area is not included in areas subject to remediation in the ROD. The exposure area which encompasses the Route 62 outfall area has a cumulative HI value of less than 1 and the incremental cancer risk does not exceed 10^{-4}. Aside from naturally occurring arsenic and thorium, the only contaminants of concern are PAHs, which are likely attributable to storm water runoff from Route 62, and not to activities associated with the Site.

Based on the results of the previously completed SLERA, it was concluded that risks to benthic invertebrates at the Cooling Water Recharge Pond are likely due to Cu and PCBs based on benchmark comparisons. Therefore, the BERA carried forward the conclusion that sediment in the Cooling Water Recharge Pond would pose significant risks, and due to concurrent exceedances of USEPA target human health risk criteria (risk range of 10^{-4} to 10^{-6} and/or a target organ HI of 1), it was presumptively assumed that a response action will be required for this AOI.

The southwest corner of the bog contains sediment exceeding the PRGs that will be removed based on ecological risk to benthic invertebrates. One sample outside of the southwest corner has been identified as exceeding the 1 ppm cleanup level for PCBs at 4.8 mg/kg, but the benefits of physically removing this one area does not outweigh the damage that would occur to the bog, which has taken thousands of years to become established; so this one location will be left undisturbed to avoid impacting the well-established peat. Leaving one location of elevated PCBs represents a very low risk for receptor populations over the large area of the remaining bog.

Remedial Action Objectives

Remedial Action Objectives (RAOs) are medium-specific goals that define the objective of remedial actions to protect human health and the environment. RAOs specify the COCs, potential exposure routes and receptors and provide a general description of what the cleanup will accomplish. The RAOs are based on available information and standards, such as applicable or relevant and appropriate requirements (ARARs) and site-specific risk-based levels. These RAOs were developed to mitigate, restore and/or prevent existing and future potential threats to

human health and the environment.

The RAOs for the selected remedy for the Site are to:

(1) Prevent direct human exposure by a future resident (by dermal contact, ingestion, inhalation, or ionizing radiation) to soils or sediments with contaminants (DU, PCBs, PAHs, and other inorganics) that exceed risk-based standards;

(2) Prevent migration of DU/uranium from soils in the Holding Basin that would result in groundwater concentrations exceeding ARARs;

(3) Prevent potential future exposure to contaminated indoor air by a future resident/commercial worker;

(4) Prevent potential human exposure (ingestion, dermal contact, vapor inhalation) by a future resident to groundwater impacted by the Site that may be used as a domestic water supply with VOC, SVOC, DU, or inorganic contaminant concentrations that exceed ARARs or risk-based standards.

(5) Protect ecological receptors from exposure to contaminants (PCBs, copper) in sediments indicative of adverse effects at the Cooling Water Recharge Pond;

(6) Protect ecological receptors from exposure to contaminants (PCBs, copper, mercury, and lead) in sediments indicative of adverse effects at the Sphagnum Bog while maintaining the physical and ecological integrity of the bog;

(7) Restore groundwater within the contaminant plumes to its beneficial use as a potential drinking water supply by meeting ARARs including federal MCLs, or in their absence, by meeting cleanup levels protective of human health;

(8) Limit migration of VOCs, SVOCs, uranium (depleted and/or naturally occurring), PAHs, and other inorganics in groundwater within the contaminant plumes at concentrations that would exceed ARARs or risk-based standards.

I. DEVELOPMENT AND SCREENING OF ALTERNATIVES

A. Statutory Requirements/Response Objectives

Under its legal authorities, EPA's primary responsibility at Superfund sites is to undertake remedial actions that are protective of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences, including: 1) a

requirement that EPA's remedial action, when complete, must comply with all federal and more stringent state environmental and facility siting standards, requirements, criteria or limitations, unless a waiver is invoked; 2) a requirement that EPA select a remedial action that is cost-effective, and that utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and 3) a preference for remedies in which treatment that permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances is a principal element over remedies not involving such treatment. Response alternatives were developed to be consistent with these Congressional mandates.

B. Technology and Alternative Development and Screening

CERCLA and the National Contingency Plan (NCP) set forth the process by which remedial actions are evaluated and selected. In accordance with these requirements, a range of alternatives were developed for the Site.

With respect to source control, the RI/FS developed a range of alternatives in which treatment that reduces the toxicity, mobility, or volume of the hazardous substances is a principal element. This range included an alternative that removes or destroys hazardous substances to the maximum extent practicable, eliminating or minimizing to the degree possible the need for long term management. This range also included: alternatives that treat the principal threats posed by the Site, but vary in the degree of treatment employed and the quantities and characteristics of the treatment residuals and untreated waste that must be managed; alternative(s) that involve little or no treatment but provide protection through engineering or institutional controls; and a no action alternative.

With respect to the groundwater response action, the RI/FS developed a limited number of remedial alternatives that attain site specific cleanup levels within different time frames using different technologies, and a no action alternative.

As discussed in Section 3 of the FS, soil and groundwater treatment technology options were identified, assessed, and screened based on implementability, effectiveness, and cost. These technologies were combined into source control and management of migration alternatives. Sections 4 and 6 of the FS presented the remedial alternatives developed for soil and groundwater, respectively, by combining the technologies identified in the previous screening process in the categories identified in Section 300.430(e)(3) of the NCP. Each alternative was then evaluated in detail in these sections.

J. DESCRIPTION OF ALTERNATIVES

This Section provides a narrative summary of each source control and management of migration alternative evaluated. Refer to Section K of this ROD for a breakdown of costs (including

capital and O&M), as well as discussion on the time to construct and meet RAOs, for each alternative.

1. Source Control Alternatives Analyzed

Soil/Sediment Alternatives (Table J-1 in Appendix B provides a soil/sediment alternative matrix showing the general response action and technology type for each alternative)

SS-1: No Action

Under the no action alternative, no additional actions would be taken to address exposure to soils or sediments. Five-year reviews would still be performed as part of the no-action alternative. As required by the Superfund law, the no action alternative will serve as a baseline for comparing the effectiveness of other remedial alternatives to be developed for soils and sediments. Except for the cost of five-year reviews, there is no cost associated with this alternative.

SS-2: Excavation and On-Site Consolidation of Soils (Including Unsaturated Holding Basin Soils) and Sediments with a Cap and Liner System, and In-Situ Stabilization of Holding Basin Saturated Soils Using Apatite or a Comparable Stabilization Agent

Under this alternative, all Site soils, sediments, underground drain lines and debris exceeding cleanup levels (estimated to be 82,500 cubic yards) would be excavated and placed within an on-site lined consolidation area. These excavated areas would then be backfilled with clean soils. Approximately 12,500 cubic yards of Holding Basin soils in the unsaturated zone would be excavated (approximately 35 feet below the ground surface (bgs)) and placed within the on-site consolidation area.

In this alternative, the DU contaminated saturated soils from 35 feet to approximately 85 feet bgs would be stabilized *in-situ* using apatite or a similar stabilization agent. During construction, a temporary downgradient hydraulic containment well with *ex-situ* treatment would be installed to capture and treat DU impacted groundwater. The well would be removed following construction. With approximately 95,000 cubic yards of contaminated soils to be consolidated, the area would cover approximately 2.5 acres of property and would not extend deeper than four feet above the highest groundwater elevation.

This consolidation area would be designed to meet applicable landfill/ARAR requirements, including the construction of a bottom liner and leachate collection system. The estimated average concentration of DU in the soils to be excavated is 11 mg/kg. Soils and sediments containing PCBs greater than 50 mg/kg would be transported off-site for disposal in a TSCA-licensed facility. All disturbed areas would be restored to existing grades (where appropriate), top soiled, mulched and seeded. This alternative also includes operation and maintenance of the consolidation area as well as institutional controls to prevent disturbance of the consolidation area such as notices of activity and use limitations and/or local ordinances to prevent

unacceptable exposures to wastes left in place. The total estimated present value cost of this alternative is approximately $41.9 million.

SS-3: Excavation and Off-Site Disposal of Sediments and Non-Holding Basin Soils, Containment with Partial In-Situ Stabilization of Holding Basin Soils Using Cement and a Low-Permeability Horizontal Sub-Grade Cover

This alternative includes the excavation of approximately 82,500 cubic yards of non-Holding Basin soils, sediments, underground drain lines and debris exceeding cleanup levels and disposal of these materials at an approved off-site disposal facility pursuant to the off-site rule, 40 CFR § 300.440. Excavated areas would then be backfilled with clean soils.

Unsaturated soils within the Holding Basin footprint extend from the ground surface of the pit to the elevation of the water table (approximately 35 feet bgs). The highest concentrations of DU in soils at the Site are in this zone. The unsaturated soil volume within the Holding Basin is approximately 12,500 cubic yards. Saturated soils within the Holding Basin footprint that contain DU extend down to bedrock (from 35 feet to approximately 85 feet bgs). In this alternative, a portion of the DU contaminated unsaturated and saturated soils will be stabilized *in-situ* with cement-based soil mixing/jet grouting. A 20-foot thick wall of stabilized soils, functioning as a vertical containment wall, will circle the Holding Basin soils left untreated (a cement ring).

Approximately 22,700 cubic yards of spoils (left over by-product) are expected to be generated from stabilizing the saturated and unsaturated soils. Approximately 4,200 cubic yards will be used to cap the Holding Basin before installing the sub-grade low-permeability horizontal containment cover. The remaining 18,500 cubic yards of spoils would be disposed off-site instead of within the Holding Basin footprint. Th is allows space for 10 feet of clean soils to be placed on top of the Holding Basin cover which maximizes reuse options for the Holding Basin area. In total, approximately 101,000 cubic yards of soils and sediments would be disposed off-site.

A low-permeability cover would be installed over the stabilized soils to limit infiltration into the stabilized soils. The cover would be placed at a minimum depth of 10 feet below the surface of the excavation area to increase re-use options, with clean soil fill placed on top of the cover to restore the surface of the Holding Basin footprint to grade level. A temporary downgradient hydraulic containment well with *ex-situ* treatment would be installed to capture and treat DU impacted groundwater during construction.

All disturbed areas will be restored to existing grades (where appropriate), top soiled, mulched and seeded. This alternative also includes institutional controls such as notice of activity and use limitations and/or local ordinances to prevent unacceptable exposures to, and prevent disturbance of, the Holding Basin area, and long-term operation and maintenance of the remedy. The total estimated present value cost of this alternative is approximately $129.2 million.

SS-4: Excavation and Off-Site Disposal of Sediments and Non-Holding Basin Soils, Full In-Situ Stabilization of Holding Basin Soils Using Apatite or a Comparable Stabilization Agent, and Containment with Low-Permeability Vertical Wall and Sub-Grade Horizontal Cover

Alternative SS-4 includes the excavation of approximately 82,500 cubic yards of non-Holding Basin soils, sediments, and underground drain lines and debris exceeding cleanup levels and disposal of these materials at an approved off-site disposal facility. Excavated areas would be backfilled with clean soils. Materials (wastes, debris, etc.) previously disposed within the Old Landfill (AOI 3) will be removed and transported off-site at an appropriate disposal facility.

Soils within the Holding Basin footprint would be stabilized with a stabilization agent such as apatite or a comparable stabilization agent. Apatite works to immobilize the DU in the soils. The stabilized soils will then be contained within a low-permeability vertical containment wall and low-permeability horizontal cover. This alternative is expected to involve injection of apatite through specially-designed flights of a drill auger placed close together for full stabilization of the Holding Basin soils.

A low-permeability vertical containment wall would be constructed to be keyed into the bedrock (approximately 85 feet bgs) and a low-permeability horizontal sub-grade cover placed above the stabilized soils within the Holding Basin footprint. The horizontal cover would be placed at a minimum depth of 10 feet below the surface of the excavation area to increase re-use options. Clean soil fill will be placed on top of the cover to restore the surface of the Holding Basin footprint to grade level. This will minimize water from infiltrating to the stabilized soils within the containment, further minimizing the leaching potential of depleted uranium to the groundwater.

A temporary downgradient hydraulic containment well with *ex-situ* treatment will be installed to capture and treat DU impacted groundwater during construction.

All disturbed areas will be restored to existing grades (where appropriate), top soiled, mulched and seeded. This alternative also includes operation and maintenance of the remedy as well as institutional controls such as notice of activity and use limitations and/or local ordinances to prevent unacceptable exposures to, and to prevent disturbance of, the Holding Basin area. The total estimated present value cost of this alternative is approximately $104.7 million.

SS-5: Excavation and Off-Site Disposal of Sediments and Soils (Including Unsaturated Holding Basin Soils), and Containment with Full In-Situ Stabilization of Holding Basin Saturated Soils Using Cement and a Low-Permeability Horizontal Sub-Grade Cover

Alternative SS-5 includes the excavation of approximately 82,500 cubic yards of non-Holding Basin soils, sediments, underground drain lines and debris) exceeding cleanup levels and disposal of these materials at an approved off-site disposal facility. Excavated areas would be backfilled with clean soils. In addition, this alternative involves the excavation and off-site

disposal of approximately 12,500 cubic yards of unsaturated Holding Basin soils, for a total of 95,000 cubic yards.

The remaining Holding Basin soils, approximately 20,000 cubic yards of DU contaminated saturated soils, will be fully stabilized *in-situ* with cement. Using cement as a stabilization agent would result in approximately 28,750 cubic yards of spoils being generated to stabilize the saturated soils. Of that amount, approximately 16,000 cubic yards can be used to fill the Holding Basin. The remaining 12,750 cubic yards of spoils would be disposed of off-site along with the 95,000 cubic yards of Site soils and sediments exceeding cleanup levels noted above, for a total of 107,500 cubic yards.

A temporary downgradient hydraulic containment well with *ex-situ* treatment would be installed to capture and treat DU impacted groundwater during construction.

A low-permeability sub-grade cover would be installed within the Holding Basin footprint to act as a barrier layer to limit infiltration into the stabilized soils. The cover would be placed at least 10 feet deep within the excavation area to increase re-use options, and clean soil fill would be placed on top of the cover to restore the surface of the Holding Basin footprint.

Disturbed areas would be backfilled to existing grades (where appropriate), covered with top soil and mulch, and seeded to restore natural vegetation. This alternative also includes long-term operation and maintenance of the remedy, and institutional controls such as notice of activity and use limitations and/or local ordinances to prevent unacceptable exposures to and disturbance of the Holding Basin area. The total estimated present value cost of this alternative is approximately $147.9 million.

2. Management of Migration Alternatives Analyzed

Groundwater Alternatives[31] (**Table J-2** provides a groundwater alternative matrix)

GW-1: No Action

Alternative GW-1 is the no action alternative.

[31] The groundwater alternatives described below differ slightly from the alternatives presented in the Proposed Plan. A change to the institutional controls requirement for vapor intrusion mitigation systems was made to require installation of vapor mitigation systems should future structures be built above the VOC plumes unless an evaluation of vapor intrusion risks is performed to show such systems are not required. The groundwater alternatives in the Proposed Plan required evaluation of vapor intrusion risks and if necessary, installation of vapor mitigation systems should future structures be built above the VOC plumes. See Section N below.

This alternative provides no active groundwater treatment. Concentrations of VOCs and 1,4-dioxane in groundwater would be reduced somewhat through natural attenuation via dispersion, dilution, and volatilization. There is no cost estimate for this alternative.

GW-2: Limited Actions / Institutional Controls

Alternative GW-2 includes: (1) implementation of institutional controls to: (a) prohibit future use of impacted groundwater as a drinking water source, and (b) require installation of vapor mitigation systems should future structures be built above the VOC plumes unless an evaluation of vapor intrusion risks is performed to show such systems are not required; and (2) long-term groundwater monitoring for DU, VOCs/1,4-dioxane and natural uranium to monitor the plumes and evaluate concentration decreases due to natural attenuation. The total estimated present value cost of this alternative is approximately $2.9 million.

GW-3: Ex-Situ Treatment

Alternative GW-3 includes: (1) extraction of overburden groundwater downgradient of the Holding Basin (DU source area) with *ex-situ* treatment; (2) extraction of overburden and bedrock groundwater north and downgradient of the property boundary with *ex-situ* treatment for 1,4-dioxane and VOCs; (3) extraction of groundwater from shallow bedrock at the downgradient end of the natural uranium plume with *ex-situ* treatment for uranium removal; (4) implementation of institutional controls to: (a) prohibit future use of impacted groundwater as a drinking water source until cleanup levels are met, and (b) require installation of vapor mitigation systems should future structures be built above the VOC plumes unless an evaluation of vapor intrusion risks is performed to show such systems are not required; and (5) long-term groundwater monitoring for DU, VOCs/1,4-dioxane and natural uranium to monitor the effectiveness of *ex-situ* treatment and to evaluate concentration decreases due to natural attenuation. Methods of *ex-situ* treatment may include ion exchange and advanced oxidation (or other suitable technologies) and will be determined during the design. The total estimated present value cost of this alternative is approximately $29.3 million.

GW-4: Ex-Situ Treatment of VOCs/1,4-Dioxane, and In-Situ Treatment of DU And Natural Uranium

Alternative GW-4 includes: (1) extraction of overburden and bedrock groundwater with *ex-situ* treatment for VOCs and 1,4-dioxane with effluent discharge to surface water or recharge/reinjection into the aquifer; (2) injection of apatite /Zero Valent Iron (ZVI) based media or other comparable amendments in the overburden DU and natural uranium bedrock plumes to take uranium out of solution (remove uranium from groundwater in sorbed and mineral precipitate forms); (3) implementation of institutional controls to: (a) prohibit future use of impacted groundwater as a drinking water source until cleanup levels are met, and (b) require installation of vapor mitigation systems should future structures be built above the VOC plumes

unless an evaluation of vapor intrusion risks is performed to show such systems are not required; (4) long-term groundwater monitoring of the effectiveness of *in*- and *ex-situ* treatment and to evaluate concentration decreases due to natural attenuation. The total estimated present value cost of this alternative is approximately $20.2 million.

Recent sampling of monitoring wells on the northern side of the Assabet River has shown that 1,4-dioxane contamination from the Site appears to be migrating underneath the Assabet River toward the town of Acton public water supply wells. EPA requested public comment in the proposed plan on addressing this portion of the remedy (groundwater extraction and *ex-situ* treatment of 1,4-dioxane and VOCs in overburden and bedrock groundwater) in advance of implementing the full remedy at the Site and received wide acceptance of this proposal from the public (See Part 3: The Responsiveness Summary). Pursuant to the Action Memorandum attached to this ROD, EPA is accelerating this portion of the proposed remedy as a non-time critical removal action (NTCRA). Beginning the groundwater remedy for 1,4-dioxane before the rest of the remedial action could contain this plume from expanding further. If the plume continued to migrate, the time and cost for this component of the cleanup action could increase substantially. The cost of this portion of the remedy is approximately $5.2 million. This includes design, construction and up to four years of operation and maintenance until the full remedial action for the Site is underway. Long-term operation and maintenance and long-term monitoring of this NTCRA will be included as part of the remedial action for the Site.

K. SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

Section 121(b)(1) of CERCLA presents several factors that at a minimum EPA is required to consider in its assessment of alternatives. Building upon these specific statutory mandates, the NCP articulates nine evaluation criteria to be used in assessing the individual remedial alternatives.

A detailed analysis was performed on the alternatives using the nine evaluation criteria in order to select a site remedy. The following is a summary of the comparison of each alternative's strength and weakness with respect to the nine evaluation criteria. These criteria are summarized as follows:

Threshold Criteria

The two threshold criteria described below must be met in order for the alternatives to be eligible for selection in accordance with the NCP:

1. **Overall protection of human health and the environment** addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced or controlled through treatment, engineering controls, or institutional controls.

2. **Compliance with applicable or relevant and appropriate requirements (ARARs)** addresses whether or not a remedy will meet all Federal environmental and more stringent State environmental and facility siting standards, requirements, criteria or limitations, unless a waiver is invoked.

Primary Balancing Criteria

The following five criteria are utilized to compare and evaluate the elements of one alternative to another that meet the threshold criteria:

3. **Long-term effectiveness and permanence** addresses the criteria that are utilized to assess alternatives for the long-term effectiveness and permanence they afford, along with the degree of certainty that they will prove successful.

4. **Reduction of toxicity, mobility, or volume through treatment** addresses the degree to which alternatives employ recycling or treatment that reduces toxicity, mobility, or volume, including how treatment is used to address the principal threats posed by the site.

5. **Short term effectiveness** addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period, until cleanup goals are achieved.

6. **Implementability** addresses the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.

7. **Cost** includes estimated capital and Operation Maintenance (O&M) costs, as well as present-worth costs.

Modifying Criteria

The modifying criteria are used as the final evaluation of remedial alternatives, generally after EPA has received public comment on the RI/FS and Proposed Plan:

8. **State acceptance** addresses the State's position and key concerns related to the preferred alternative and other alternatives, and the State's comments on ARARs or the proposed use of waivers.

9. **Community acceptance** addresses the public's general response to the alternatives described in the Proposed Plan and RI/FS report.

Following the detailed analysis of each individual alternative, a comparative analysis, focusing on the relative performance of each alternative against the nine criteria, was conducted. This

comparative analysis for soil/sediment and groundwater, respectively, are attached to this ROD as **Tables K-1 and K-2** (see Appendix B).

The section below presents the nine criteria and a brief narrative summary of the alternatives and the strengths and weaknesses according to the detailed and comparative analysis. Only those alternatives which satisfied the first two threshold criteria were balanced and modified using the remaining seven criteria.

Soil/Sediment:

Overall Protection of Human Health and the Environment

All alternatives except for the No Action alternative are protective of human health and the environment when combined with a groundwater remedy. All the alternatives other than the No Action alternative provide for some level of *in-situ* stabilization of the unsaturated and/or saturated soils within the Holding Basin footprint. Alternative SS-2 provides for *in-situ* stabilization of the saturated Holding Basin soils, and consolidates all the other excavated Site soils and sediments within one consolidation area. Since the area containing untreated contaminated soils in SS-2 is more than three times larger than alternatives SS-3, 4, and 5, and since the materials are only 4 feet from the surface whereas the other alternatives (other than the no-action alternative) provide at least a 10 foot layer of clean soil on top of at least partially stabilized soils, SS-2 is considered to be less protective than SS-3, 4, and 5.

SS-3 provides for partial *in-situ* stabilization of the unsaturated and saturated soils within the Holding Basin footprint, contained within a cement ring which limits stabilization to just the inside perimeter of the Holding Basin , with a cover above the stabilized soils, and disposes of the other excavated Site soils and sediments off-site. SS-3 does not treat all of the Holding Basin soils, including some soils that are considered to be principal threat waste and therefore is less protective than SS-4 or SS-5. A lternative SS-4 provides for full *in-situ* stabilization of all the saturated and unsaturated soils within the Holding Basin, a vertical containment wall and horizontal cover around/above the stabilized soils, and disposes of the other excavated Site soils and sediments off-site. Alternative SS-5 provides for excavation and off-site disposal of the unsaturated soils within the Holding Basin, *in-situ* stabilization of all of the saturated soils within the Holding Basin, a cover above the stabilized soils, and disposes of the other excavated site soils and sediments off-site. Since SS-4 and SS-5 fully treat or remove contaminated soils from the Site, these two alternatives provide a similar level of protectiveness and are more protective than SS-1, 2, or 3.

Compliance with ARARs

All alternatives except for the No Action alternative have been developed to comply with ARARs. Alternative SS-2's 2.5-acre consolidation area would present more challenges with respect to active maintenance and monitoring due to its cap and liner, which the other

alternatives do not have. Alternative SS-2 would need to meet ARARs for land disposal of radioactive wastes (10 CFR Part 61, Subparts C and D) and Massachusetts' licensing and operational requirements for low-level radioactive waste facilities (105 CMR 120.800).

Alternatives SS-2, 3, and 4 will impact wetlands and in compliance with Section 404 of the Clean Water Act, 40 CFR Part 230 (Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material), 21 M.G.L. §§ 26-53, and 314 CMR 9.06(1-2) (Criteria for the Evaluation of Applications for Discharge of Dredged or Fill Material), EPA has determined that there is no practicable alternative to conducting this work and cleanup activities selected are the least damaging practicable alternatives. Alternatives SS-2, 3, and 4 will comply with the wetland ARARs by minimizing potential harm and avoid adverse impacts on wetland resources, to the extent practicable by using best management practices to minimize harmful impacts on wetlands, wildlife, or habitat. Wetlands will be restored and/or replicated consistent with the requirements of federal and state wetlands protection laws.

Alternatives SS-2, 3, and 4 will comply with 40 CFR § 761.61 of TSCA regarding management of PCB-contaminated soil. Under each of these alternatives sediments and soils at the Site with PCB concentrations greater than or equal to 50 ppm (*PCB remediation waste* as defined under 40 CFR § 761.3) will be excavated and disposed off-site at a TSCA-approved disposal facility or a RCRA hazardous waste landfill in accordance with 40 CFR § 761.61(a)(5)(i)(B)(*2*)(*iii*). PCB-contaminated soils and sediments with concentrations of PCBs above the 1 mg/kg cleanup level but less than 50 ppm will be excavated and disposed of in accordance with state requirements.

Long-Term Effectiveness and Permanence

Each of the alternatives has some degree of residual risk due to contamination that will remain on-site and will require five year reviews to assess the on-going protectiveness of the remedy and institutional controls to prevent exposure to the remaining contamination. The long-term effectiveness and permanence of the non-Holding Basin excavation and the horizontal cover is anticipated to be the same for each alternative. A much larger amount of contaminated soil will be left on-site and will be much closer to the surface in alternative SS-2 than SS-3, -4 or -5. Also, the on-site consolidation area in SS-2 will require more long-term operation and maintenance and institutional controls over a larger area of the Site.

Alternative SS-3 may provide a lesser degree of long-term effectiveness and permanence than SS-4 and SS-5 because the cement stabilization in SS-3 leaves an area of untreated Holding Basin soils which are contained in a 20-foot thick "ring". Alternative SS-4 provides two layers of protection by fully stabilizing all Holding Basin soils and then containing the soils with a vertical containment wall around and a horizontal cover over the stabilized soils. Alternative SS-5 leaves the least amount of contaminated soils on-site because all of the unsaturated Holding Basin soils are excavated and disposed of off-site. The remaining saturated Holding Basin soils are fully stabilized with cement.

Cement is a proven technology; however, it is a technology that does not allow easily for further actions to be easily implemented, and generates spoils in the process equal to approximately 40% of the contaminated soil treated. SS-2 provides for apatite stabilization of saturated soils in the Holding Basin. Alternative SS-4 provides for full *in-situ* stabilization of all the soils within the Holding Basin using apatite and for a containment wall and horizontal cover around the stabilized soils. Through bench-scale studies conducted at the Site, apatite has been shown to be extremely effective in preventing DU from becoming soluble in groundwater. However, if the apatite application technology is lacking in effectiveness in the future, SS-4 provides the added protection of a vertical containment wall, and additional actions are more easily implemented. The cement stabilized Holding Basin soils in SS-3 are providing containment of Holding Basin soils that are left untreated.

Reduction of Contaminant Toxicity, Mobility, or Volume through Treatment

All the alternatives, except the No Action alternative, reduce the mobility of DU and PCBs throughout the Site by providing for their on-site containment or off-site disposal. Alternative SS-2 consolidates all contaminated soils (except for saturated Holding Basin soils) and sediments on-site, SS-3 and SS-4 contain Holding Basin soils on-site and dispose of other contaminated soils and sediments off-site, and SS-5 disposes all contaminated soils and sediments off-site except for saturated Holding Basin soils. Alternatives SS-2, SS-3, SS-4, and SS-5 include treatment. In Alternatives SS-2 and SS-5, only the saturated soils within the Holding Basin footprint are stabilized in place. The unsaturated soils in SS-5 would be disposed off-site, and SS-2 consolidates the unsaturated soils on-site. Therefore, neither of these alternatives addresses the preference for treatment of principal threat waste.

In Alternatives SS-3 and SS-4, both saturated and unsaturated soils are stabilized in place, although SS-3 limits stabilization to just the inside perimeter of the Holding Basin, and therefore does not fully treat the principal threat waste. Stabilization reduces the mobility of DU from these soils. Alternative SS-4 uses apatite for stabilization of the Holding Basin soils and provides for the added containment of the entire footprint of the Holding Basin with a vertical containment wall, which further reduces the mobility of the DU in these soils. Alternatives SS-3 and SS-5 allow for stabilization to be performed with cement. Cement is a proven technology to reduce mobility of DU; however, it is a technology that does not allow easily for further actions to be easily implemented, and increases the volume of contaminated materials that need to be handled by generating spoils equal to 40% of the contaminated soil treated, as compared to apatite.

Short Term Effectiveness

SS-2, SS-3, SS-4 and SS-5 will meet the established Remedial Action Objectives for the soils and sediments in the same timeframe (within 2-3 years of remedial construction). However, in the short-term, there is a greater potential for additional DU to be released into the groundwater in the implementation of SS-2 and SS-5 during excavation of the Holding Basin soils down to

the water table because the interim cover must be removed for a longer period. The Holding Basin currently has an interim cover placed over the soils that when removed will allow infiltration of precipitation for as long as the excavation remains open. A temporary downgradient hydraulic containment groundwater well is planned for all alternatives to capture any DU that may be released during excavation and construction activities. However, the potential for DU release is lower for SS-3 and SS-4 because the current interim cover on the Holding Basin can remain in place for a longer time while remedial activities are conducted. All alternatives require the same amount of time to construct.

The community is protected the most in the short term by alternative SS-2 because no soils or sediments are transported off-site. Alternative SS-4 will require 82,500 cubic yards of DU contaminated soils and sediments to be transported off-site. Alternative SS-3 will require 101,000 cubic yards of materials to be transported off-site (82,500 cubic yards of DU contaminated soils and sediments and 18,500 cubic yards of spoils). Alternative SS-5 will require 107,500 cubic yards of materials to be transported off-site (95,000 cubic yards of DU contaminated non-Holding Basin soils and sediments, 12,500 cubic yards of the most heavily contaminated soil (the Holding Basin unsaturated soils) plus an additional 12,750 cubic yards of spoils). SS-5 requires the most off-site disposal and transportation due to additional spoils being generated through the cement stabilization method. Alternatives SS-2 and SS-5 are the least protective of workers, as these alternatives include the excavation down to 35 feet below the surface of the Holding Basin in soils that may become unstable due to the level of shoring needed for such a deep excavation. SS-3 involves the stabilization of saturated and unsaturated soils, exposing some workers to the soils and drilling muds or displaced soils (spoils). Cement stabilization will increase the exposure of workers to additional spoils, while apatite, projected to be used in SS-2 and SS-4, will not generate additional spoils. Alternative SS-4 is the most protective of workers because it requires the least amount of handling contaminated soils.

Implementability

Alternatives SS-2 and SS-5 are the most difficult to implement due to the difficulty in excavating Holding Basin soils down to 35 feet and then also procuring the equipment and stabilizing the saturated soils down to 85 feet below ground surface. Alternatives SS-3 and SS-5 utilize cement for stabilization/containment in the Holding Basin which is a proven effective and reliable technology but has the disadvantage of creating additional material/spoils which require disposal. Alternatives SS-2 and SS-4 utilize apatite to immobilize DU in Holding Basin soils. Apatite has been proven very effective in bench scale studies but there are some unknowns in using Apatite on a larger scale. An advantage of using apatite is that no additional materials/spoils are created. Future actions are not anticipated for the Holding Basin once the remedial action is complete, but if additional actions are required they will be more difficult to implement for alternatives SS-3 and SS-5 due to the use of cement. For SS-2, 3, 4 and 5, monitoring to determine the effectiveness of the remedy is equally implementable.

Cost

Off-site transport and disposal is an expensive component of the alternatives, making alternative SS-5 the most expensive because it requires the greatest volume of off-site disposal. Alternative SS-5 is more expensive than SS-3 because it is fully treating the saturated Holding Basin soils, whereas SS-3 only partially treats unsaturated and saturated soils. Alternative SS-2 involves on-site containment and disposal and is the least expensive alternative other than no action. For each of the alternatives, capital costs are the largest component, with operation and maintenance costs making up a small fraction of the total costs. See **Table K-1** (alternative comparison table) in Appendix B for the estimated costs for each alternative.

State and Community Acceptance

The State has expressed its support for Alternative SS-4. The State does not believe that Alternative SS-1 provides adequate protection of human health and the environment. The State does not support SS-2 because it does not use treatment as a permanent solution.

During the public comment period, members of the community expressed its support for either Alternatives SS-4 or SS-5. Alternatives SS- 1, 2 and 3 were not considered adequately protective, and the on-site containment component of alternative SS-2 was strongly opposed.

Groundwater

Overall Protection of Human Health and the Environment

The GW-2, GW-3, and GW-4 alternatives protect human health by prohibiting use of contaminated groundwater as a drinking water source via institutional controls until cleanup goals are met. The GW-3 and GW-4 alternatives also protect human health by (1) limiting migration of 1,4-dioxane and VOCs to and beyond the Assabet River via hydraulic containment and *ex-situ* treatment, (2) preventing migration of DU in overburden groundwater via hydraulic containment and *ex-situ* treatment (GW-3) or *in-situ* treatment (GW-4), and (3) preventing migration of natural uranium in bedrock groundwater hydraulic containment with *ex-situ* treatment (GW-3), or *in-situ* treatment (GW-4). Therefore, alternatives GW-3 and GW-4 are more protective of human health than GW-2. Alternative GW-1 does not reduce the potential for human exposure to contaminated Site groundwater; therefore, GW-1 is not protective of human health.

Compliance with ARARs

The key ARAR for groundwater is the MCL for uranium, and GW-4 would meet this ARAR sooner than the other alternatives. Alternative GW-4 provides the most robust strategy for meeting chemical-specific ARARs because it provides treatment throughout the overburden DU and bedrock natural uranium plumes via *in-situ* treatment. Implementation of this technology

has the potential to meet chemical-specific ARARs for uranium within a reasonable timeframe (i.e., 15 years).

Alternatives GW-1 and GW-2 are not likely to meet chemical-specific ARARs for DU or natural uranium within 200 years. Also, attainment of chemical-specific ARARs for VOCs is not likely to occur within 50 years for GW-1 and GW-2 alternatives, but may be achieved within 30 years for GW-3 and GW-4. Alternative GW-3 is unlikely be able to meet chemical-specific ARARs for DU and natural uranium via hydraulic containment and *ex-situ* treatment in a reasonable timeframe. Alternative GW-4 is likely to achieve chemical-specific ARARs for DU and natural uranium within 15 years.

Long-Term Effectiveness and Permanence

Alternative GW-3 is expected to have very good long-term effectiveness due to the combination of institutional controls and hydraulic containment with *ex-situ* treatment (along with source control of DU in the Holding Basin implemented as part of the soil remedy). Long-term monitoring will provide a reliable means of evaluating concentrations over time. GW-4 will also have good long-term effectiveness due to the combination of institutional controls, *ex-situ* treatment of VOCs/1,4-dioxane and the anticipated high stability of immobilized DU and natural uranium using *in-situ* treatment. GW-2 will have higher residual risk due to the lack of engineering controls to prevent off-property migration of impacted groundwater. GW-1 will have the highest residual risk due to lack of institutional controls or plume containment.

Reduction of Contaminant Toxicity, Mobility, or Volume through Treatment

Alternative GW-4 has the best potential for reducing the mass, volume and mobility of DU in groundwater because it provides treatment of DU and natural uranium throughout the overburden and bedrock plumes, respectively. This alternative includes injection of apatite and/or ZVI based media to immobilize uranium. Through bench-scale studies conducted at the Site, apatite has been shown to be extremely effective in removing uranium from groundwater, and ZVI is a proven technology for removal of uranium from groundwater. GW-4 will also reduce the mass, volume and mobility of VOCs and 1,4-dioxane through *ex-situ* treatment. *Ex-situ* treatment in GW-3 also has good potential to reduce mass, volume and mobility of contaminants and will provide some treatment of DU in overburden and natural uranium in bedrock. Mass reduction of DU and natural uranium will likely be less significant in GW-3 than for GW-4 because treatment is not distributed throughout the plume. Alternative GW-3 will provide similar performance to GW-4 with respect to VOCs and 1,4-dioxane. The treatment technologies associated with these alternatives are well-proven and irreversible.

GW-1 and GW-2 include no active treatment and would provide less reduction of toxicity, mobility and volume of contaminants than GW-3 and GW-4. Decreasing trends in the concentration and volume of VOCs in groundwater have been observed. These trends indicate that there may be some reduction of volume of those contaminants in GW-1 and 2 which do not

provide for active treatment. DU in overburden, natural uranium in bedrock, and 1,4-dioxane in both overburden and bedrock would persist for the reasonably foreseeable future.

Short Term Effectiveness

GW-2, GW-3, and GW-4 will prevent human exposure to contaminants in groundwater through institutional controls. GW-1 does not prevent human exposure to contaminants in groundwater at the Site. GW-3 and GW-4 limit migration of contaminants (through *ex-situ* or *in-situ* treatment). GW-1 and GW-2 will not limit migration of contaminants. GW-3 includes hydraulic containment and *ex-situ* treatment of the distal end of the DU plume rather than treatment throughout the plume; therefore, plume flushing times are expected to be longer for GW-3 than for GW-4. GW-4 is likely to achieve the MCLs for DU and natural uranium more quickly (15 years) than the other alternatives (greater than 200 years) because it includes *in-situ* treatment throughout the plumes. The estimated time to reach cleanup levels for VOCs/1,4-dioxane for GW-1 and 2 is greater than 50 years. GW-3 and GW-4 will likely meet cleanup levels for VOCs/1,4-dioxane within 30 years. ARARs for DU and natural uranium will not be achieved within a reasonable timeframe for alternatives GW-1 and GW-2 because they provide no treatment. It is relatively easy to monitor the effectiveness of GW-1, GW-2, GW-3 and GW-4 with long-term monitoring and 5-year reviews.

Implementability

Alternative GW-1 (No Action) is the easiest to implement because it does not involve the construction, operation or maintenance of remedial systems or enforcement of institutional controls. GW-2 is easier to implement than GW-3 or GW-4 because it does not require the construction, operation or maintenance of active remedial systems. However, GW-2 may be less reliable for limiting potential human exposure to contaminants in groundwater than GW-3 or GW-4 because it relies only on institutional controls. Of the active remedial alternatives considered for groundwater, GW-3 is easier to implement in the short term than GW-4 as the *in-situ* treatment portion of GW-4 could be impacted by subsurface conditions that affect direct-push injection equipment. The reliability of GW-3 is high because groundwater extraction and *ex-situ* treatment via ion exchange or advanced oxidation and discharge to surface water are relatively routine tasks. The reliability of *in-situ* treatment in alternative GW-4 has been proven at the bench scale for apatite and ZVI is a proven media. *In-situ* treatment technology allows for a passive remedy that does not depend on long-term manipulation of groundwater geochemistry; and if successful, implementation of GW-4 will not have the long-term operating requirements of the active groundwater extraction and *ex-situ* treatment system included in GW-3.

Cost

The range in estimated cost for all four alternatives is from $0 for GW-1 (No Action) to $29.3 million for GW-3. See **Table K-2** (alternative comparison table) in Appendix B for a summary of costs for all alternatives.

State and Community Acceptance

The State has expressed its support for Alternative GW-4. The State does not believe that Alternative GW-1 provides adequate protection of human health and the environment. The State does not support Alternative GW-2 because it does not use treatment as a permanent solution.

During the public comment period, the members of the community expressed its support for Alternative GW-4. Alternatives GW-1 and 2 were not considered adequately protective.

L. THE SELECTED REMEDY

1. Summary of the Rationale for the Selected Remedy

The selected remedy is a comprehensive remedy which utilizes source control and management of migration components to address the principal Site risks in soil, sediment, and groundwater. Source control measures are required to address soil and sediment at the Site that present unacceptable risks to human health or to environmental receptors, and/or exceed ARARs. The management of migration component addresses contaminants in groundwater underlying the Site that exceed ARARs or otherwise pose an unacceptable risk. Of all the alternatives, the selected remedy best satisfies the statutory criteria for remedy selection.

The major components of the remedy are as follows:

- Excavation and off-site disposal of approximately 82,500 cubic yards of contaminated sediments, underground drain lines, debris, and non-Holding Basin soils (contaminated with DU, PCBs and other contaminants of concern) in various areas of the Site (see **Figure L-1** for approximate excavation areas and depths);

- *In-Situ* stabilization of DU contaminated soils in the Holding Basin via injection using a stabilization agent such as apatite, or other comparable stabilization agent, to prevent leaching of contaminants to groundwater, and containment of Holding Basin stabilized soils with a low-permeability vertical wall and horizontal sub-grade cover to isolate the stabilized soils and further limit mobility of contaminants by removing the flow of groundwater (see **Figure L-2**);

- Extraction and *ex-situ* treatment of VOCs and 1,4-dioxane in overburden and bedrock aquifers, and *in-situ* treatment of depleted uranium in overburden aquifer and natural uranium in bedrock aquifer (see **Figure L-3**);

- Long-term monitoring for effectiveness of *in-* and *ex-situ* treatment; and Institutional Controls to: 1) prevent unacceptable exposures to, and to prevent disturbance of, the Holding Basin area; 2) prohibit use of contaminated groundwater until cleanup levels are met; and 3) require installation of vapor mitigation systems should future structures be built above the VOC plumes unless an evaluation of vapor intrusion risks is performed to show such systems are not required.

Excavation of Site soils and sediments will prevent contact and migration of contamination and will be protective of human and ecological health. Stabilization and containment of Holding Basin soils will limit leaching and migration of source materials. Groundwater treatment will limit migration of contaminants.

2. Description of Remedial Components

The selected remedy is consistent with EPA's preferred alternative outlined in the October 2014 Proposed Plan and is consistent with a combination of Alternatives SS-4 and GW-4.

Soil/Sediment Remediation

The selected remedy component for Site soil and sediment, Alternative SS-4, involves the excavation and off-site disposal of sediments and non-Holding Basin soils, *in-situ* stabilization of Holding Basin soils through the use of a stabilization agent such as apatite or other comparable stabilization agent, and containment with a low-permeability vertical wall and sub-grade horizontal cover.

The selected remedy includes the excavation of approximately 82,500 cubic yards of non-Holding Basin soils, sediments, underground drain lines, and debris exceeding cleanup levels and disposal of these materials at an approved off-site disposal facility. Excavated areas will be backfilled with clean fill. Materials (wastes, debris, etc.) previously disposed within the Old Landfill (AOI 3) will be removed and transported off-site at an appropriate disposal facility. Soils underlying the Old Landfill will be tested and excavated if they exceed the soil cleanup levels identified below.

The primary components of the soil/sediment portion of the selected remedy include:

- Developing an excavation plan through the use of topographical surveys and data evaluation tools to define quantities and locations of all soils and sediments to be excavated (currently estimated as 82,500 cy);
- Designing sampling plan to certify clean soils if on-site borrow area is used;
- Designing a low-permeability, sub-grade cover to be placed below grade within the Holding Basin footprint;

- Installing a temporary hydraulic containment well immediately downgradient of the Holding Basin to capture uranium-impacted groundwater generated during remedial construction;
- Further testing application rate for use of selected stabilizing reagent, and designing injection system to stabilize the soils beneath the Holding Basin;
- Excavating contaminated soils and sediments throughout the Site, including underground drain lines and debris;
- Solidification of soils, if needed to meet paint filter test and compaction requirements, for disposal in off-site facility;
- Transporting soils to disposal facility;
- Stabilizing soils beneath the Holding Basin;
- Installing vertical containment wall around perimeter of Holding Basin;
- Installing sub-grade low-permeability cover system;
- Transporting clean soil onto the Site to re-fill excavations;
- Restoring excavated areas to obtain original grades;
- Restoring Sphagnum Bog and the northeast wetland; and
- Implementing Institutional Controls to prevent unacceptable exposure to, and disturbance of the Holding Basin area, such as restricting excavation and construction of buildings.

Soils within the Holding Basin footprint will be stabilized with apatite, or other comparable stabilizing agent. Apatite works to immobilize the DU in the soils. The stabilized soils will then be contained within a low-permeability vertical containment wall and low-permeability horizontal cover. This alternative is expected to involve injection of apatite or other comparable agent, through specially-designed flights of a drill auger placed close together for full stabilization of the Holding Basin soils. Treatment with apatite (a form of calcium phosphate) sequesters uranium in two ways: 1) dissolution of apatite and subsequent precipitation of U(VI)-phosphate minerals, such as autunite (which has very low solubility and dissolution kinetics); and 2) direct sorption of uranium on the apatite mineral itself. The apatite stabilization technique assumes that sorbed uranium on soils that could become solubilized would come in contact with the apatite media or phosphate in the porewater and become sequestered. Bench scale tests performed at the Site on the use of apatite have proven successful in uranium sequestration (Further information on the bench scale study results can be found in Appendix J of the Feasibility Study).

A low-permeability vertical containment wall such as a slurry wall or grout curtain will be constructed to be keyed into the bedrock (approximately 85 feet below the ground surface) and a low-permeability horizontal sub-grade cover placed above the stabilized soils within the Holding Basin footprint (**Figure L-2** provides a conceptual layout). The horizontal cover is expected to be placed approximately 10 feet below the surface of the excavation area to increase re-use

options, with clean soil fill placed on top of the cover to restore the surface of the Holding Basin footprint to grade level. The cover system will minimize water from infiltrating to the stabilized soils within the containment area, further minimizing the leaching potential of the depleted uranium to the groundwater. In accordance with Nuclear Regulatory Commission regulation 10 CFR Part 40, Appendix A, Criterion 6(1), the containment wall and cover will be constructed to be maintained for a minimum of 200 years.

The Holding Basin is currently capped with an interim polyethylene cover which is minimizing current mobilization of DU. A concern during stabilization of the soils within the Holding Basin footprint is the mobilization of DU into the overburden groundwater when the existing interim cover is removed and the Holding Basin is open and receiving rainwater run-on. Historic excavation of the Holding Basin has resulted in pronounced increases of DU to the overburden for a long as the Holding Basin was open. Th erefore, a temporary downgradient hydraulic containment well with *ex-situ* treatment will be installed, as needed, to capture and treat uranium impacted groundwater during construction. Every attempt will be made to have the existing interim cover remain in place while the remedy is conducted in order to minimize infiltration of rainwater through the Holding Basin soils while remediation work is on-going.

The appropriate composition of the stabilizing agent and materials of construction for the vertical containment wall and horizontal cover will be evaluated and additional pre-design studies will be conducted, as necessary, as part of Remedial Design.

The contaminated soil and sediments excavated from throughout the Site will be transferred off-site for disposal at a properly licensed facility pursuant to the off-site rule, 40 CFR § 300.440. The excavations will need to be refilled with clean fill that is either borrowed from an area on-site, or brought on-site from clean off-site sources.

Restoration would include filling excavated areas with clean soils to return the area to the pre-existing conditions, and applying seed, mulch and/or soil amendments to restore the disturbed areas. Portions of the bog where sediment is removed to meet cleanup levels will be restored to return wetland areas to pre-remediation conditions, to the maximum extent practicable.

Under TSCA and 40 CFR § 761.61(c), the Region has made a finding that the manner of sampling, storage, cleanup, and disposal of PCB-contaminated sediment and soil as set out in this Record of Decision will not pose an unreasonable risk of injury to health or the environment. See TSCA Determination included as Appendix G to this ROD.

Groundwater Remediation

The selected remedy component for site-wide groundwater, Alternative GW-4, involves *ex-situ* treatment of VOCs/1,4-dioxane, and *in-situ* treatment of DU and natural uranium to meet the groundwater cleanup levels specified in **Table L-1** (see Appendix B).

The selected remedy includes:

- Extraction of overburden and bedrock groundwater with *ex-situ* treatment for VOCs and 1,4-dioxane and operation and maintenance of the treatment system;
- Injection of agents such as apatite and/or ZVI based media in the overburden DU and natural uranium bedrock plumes to remove uranium from groundwater in sorbed and mineral precipitate forms;
- Implementation of institutional controls to:
  - prohibit future use of impacted groundwater as a drinking water source, and
  - require installation of vapor mitigation systems should future structures be built above the VOC plumes unless an evaluation of vapor intrusion risks is performed to show such systems are not required; and
- Long-term groundwater monitoring of *in-* and *ex-situ* treatment effectiveness and evaluation of concentration decreases due to natural attenuation.

In order to ensure a timely response to contamination that may impact the existing public water supply for the town of Acton, concurrent with this Record of Decision, EPA has signed an Action Memorandum authorizing a Non-Time-Critical Removal Action (NTCRA). The NTCRA encompasses construction and startup of systems to capture and treat 1,4-dioxane and VOCs to halt migration of these groundwater contaminants. The components of the NTCRA are described in the Action Memorandum (Appendix F) and are also included in the description outlined below.

Figure L-3 provides a conceptual layout of the groundwater remedy.

VOCs and 1,4-dioxane

The selected remedy for VOCs and 1,4-dioxane in groundwater may include groundwater extraction from one deep overburden extraction well (approximate depth of 100 feet) and two bedrock extraction wells (approximate depth of 120 feet) with *ex-situ* treatment of extracted groundwater. Additional extraction wells could be included, if needed to provide adequate capture. The extraction wells are expected to be located off-property, north of Main Street and/or on the other side of the Assabet River from the Site, to capture deep overburden and bedrock groundwater containing VOCs and 1,4-dioxane before they discharge to the Assabet River or further migrate under the river toward the Assabet Wellfields. The locations of the extraction wells in Figure L-3 are subject to change based on the results of pre-design studies conducted during the NTCRA as outlined above.

A groundwater treatment plant (GWTP) will be constructed on-Site or in close proximity to the NMI property, likely in the vicinity of the extraction well network. Ex-situ treatment technologies such as advanced oxidation using ultra-violet light, hydrogen peroxide or equivalent, and/or other appropriate technologies will be considered during design of the

treatment system. Treated effluent from the GWTP will either be discharged to surface water or recharged/reinjected into the aquifer. GWTP location, processes, and appropriate discharge standards will be determined during the design of the system. As noted above, the construction and initial operation of this component of the selected remedy is expected to be conducted as a NTCRA.

Depleted Uranium

For DU in overburden groundwater, the selected remedy includes *in-situ* treatment (sequestration) of DU using agents such as apatite and ZVI (or other comparable agent) in In Situ Reactive Zones (ISRZs), which are injections of the agents placed close together. The ISRZ technology using apatite is based on an evaluation of existing literature and Site data, a Site specific pilot study discussed in the Feasibility Study, and the applicability of this technology to the hydrogeochemical conditions in the DU plume. The ISRZs used in this alternative will be passive (no mechanical operation required) and will not require *in-situ* redox control of the aerobic groundwater. Pilot testing and pre-design studies will be conducted to identify appropriate injection methods, media, and well spacing for remedial design; however, it is anticipated that this remedy will include either three separate apatite ISRZs or two apatite ISRZs followed by a ZVI ISRZ at the edge of the DU plume.

Natural Uranium

The selected remedy component for uranium in bedrock groundwater includes *in-situ* treatment (sequestration) of uranium by creating ISRZs amended with apatite and/or ZVI (or other comparable amendments).

Prior to designing an injection program for *in-situ* uranium sequestration, additional investigations will be completed in order to delineate the vertical extent of the uranium plume and evaluate hydraulic connectivity between the bedrock wells. To design an effective remedy, additional hydrogeological characterization will be completed during Remedial Design. Characterization activities will likely include bedrock drilling, rock coring, borehole geophysics, monitoring well installations and multi-well pump testing to identify and understand hydraulic connections within the bedrock. Further, each of the proposed ISRZ amendments will likely require bench and pilot testing to understand the degree of uranium sequestration possible given the bedrock mineralogy and groundwater geochemistry.

The ISRZs are intended to be passive remedies, but will likely require some temporary hydraulic manipulation (e.g., groundwater recirculation) to distribute amendments during or immediately following injection periods. Several *in-situ* amendments considered for remediation of overburden groundwater may be used for the bedrock remedy including apatite and ZVI ISRZs. Bench-scale testing can be used to evaluate the efficacy of these media.

A field-scale injection pilot will likely be necessary to assess appropriate well spacing needed for

adequate amendment distribution to provide a continuous treatment zone. A pilot test may be implemented to identify appropriate injection methods and likely include one to two injection wells (depending on results of hydraulic testing) and several observation wells monitored for amendment presence and geochemical changes during injections. It is likely that this alternative could include more injection rounds at a limited number of injection points compared to the ISRZs in overburden. The limited number of injection points in bedrock is due to the more difficult nature of installing deep open bedrock boreholes, the anticipated presence of a limited discrete fracture network in low porosity bedrock, and the likelihood of needing temporary pumping to distribute amendments in bedrock.

Long-Term Monitoring and Five-Year Reviews

Long-term monitoring of groundwater, surface water, and sediments will be conducted, as necessary, to evaluate contaminant status and migration, to determine long-term effectiveness of *in-* and *ex-situ* treatment, and to evaluate progress towards meeting cleanup levels.

The effectiveness of the groundwater remedy will be determined based upon attainment of the cleanup levels outlined in **Table L-1** (see Appendix B), as well as any additional site-related COCs added through subsequent decision documents. A monitoring program will be implemented in order to evaluate remedy performance and progress towards attainment. The details of the monitoring program will be established during the remedial design phase and will include the preparation of a long-term monitoring plan, but initial monitoring is expected to include evaluation of all site-related contaminants such as VOCs, 1,4-dioxane, and uranium (both natural and depleted). Monitoring scope and frequency could change over time based on technical analysis of the remedy, optimization studies, revised conceptual site model, or other information, as determined by EPA. Groundwater elevation, water quality and geochemistry will be monitored to evaluate groundwater remedy performance. Collection of soils from within the plume will be used to evaluate the type and distribution of uranium sequestration (sorbed or precipitated).

The determination that all cleanup levels have been met should consider historical and current monitoring data, contaminant distribution, trend analysis, and the appropriateness of the compliance monitoring program (i.e., locations, frequency of monitoring, sampling parameter). After all groundwater cleanup levels (as shown in **Table L-1** in Appendix B) have been met as determined by EPA consistent with Agency guidance, EPA will perform a risk evaluation which considers additive risk from remaining COCs considering all potential routes of exposure to document the residual risk based on exposure to groundwater at the Site. The residual risk evaluation will document the potential risk associated with the concentrations of the COCs remaining in groundwater at the Site (if detected).

At the conclusion of remedy construction, hazardous substances, pollutants or contaminants will remain at the Site. Therefore, as required by law, EPA will review the Site at least once every five years after the initiation of remedial action at the Site to assure that the remedial action

continues to protect human health and the environment. These Five-Year Reviews will evaluate the components of the remedy for as long as contaminated media above CERCLA risk levels remain in place. The purpose of this Five-Year Review is to evaluate the implementation and performance of the remedy in order to determine if the remedy is or will be protective of human health and the environment. The Five-Year Review will document recommendations and follow-up actions as necessary to ensure long-term protectiveness of the remedy or bring about protectiveness of a remedy that is not protective. These recommendations could include providing additional response actions, improving O&M activities, optimizing the remedy, enforcing access controls and institutional controls, and conducting additional studies and investigations.

Institutional Controls

In order to protect human health by controlling potential exposures to contaminated soils and groundwater, the selected remedy relies on the use of Institutional Controls including limitations on land and groundwater uses and activities. Institutional Controls are also necessary for the protection of the selected remedy including limitations on uses and activities that interfere with or disturb components of the remedy. Institutional Controls will be required to prevent unacceptable exposures to, and to prevent disturbance of, the Holding Basin area, such as restricting excavation and construction of buildings in the Holding Basin footprint. Institutional controls will also be necessary to: (a) prohibit future use of impacted groundwater as a drinking water source and (b) require installation of vapor mitigation systems should future structures be built above the VOC plumes unless an evaluation of vapor intrusion risks is performed to show such systems are not required. Should someone wish to demonstrate that there are no unacceptable risks from vapor intrusion and therefore mitigation systems are not required, an evaluation of vapor intrusion risks (subject to EPA approval) may be performed prior to building of structures above the VOC plume to demonstrate that vapor intrusion risks are within or below USEPA target risk levels (risk range of 10^{-4} to 10^{-6} and/or a target organ HI of 1). The details of the Institutional Controls will be resolved during the pre-design and remedial design phase in coordination with the parties performing the Remedial Action, impacted landowners, local officials, and MassDEP. Institutional Controls may be implemented through measures that include, but are not limited to, a local Town ordinance, a Notice of Activity and Use Limitation (NAUL), or a Grant of Environmental Restriction and Easement (GERE).

Restrictions on land use on the Site, in this case, restrictions on activities that might interfere with or disturb components of the remedy and restrictions to prevent exposure to contamination contained in the Holding Basin area, are expected to be memorialized in a NAUL or a GERE, as set forth in the Massachusetts Contingency Plan (MCP). Risks from exposure to contaminated groundwater (until cleanup levels are met) will also be controlled through the implementation of Institutional Controls. Within the NMI Property, groundwater use restrictions will be required to prohibit the extraction of groundwater for drinking water. Such restrictions will likely be incorporated into the NAUL to restrict land uses. In addition, for properties outside of the NMI

Property where groundwater exceeds cleanup levels, groundwater extraction may be restricted by a NAUL, GERE, a local Town ordinance, or other appropriate measure, as necessary. In addition, a buffer zone may be required to restrict the installation of wells within close proximity of the edge of the area exceeding groundwater cleanup levels that could impact performance of the groundwater cleanup or otherwise contribute to an unacceptable risk.

The selected remedy may change somewhat as a result of the remedial design and construction processes. Changes to the remedy described in this Record of Decision will be documented in a technical memorandum in the Administrative Record for the Site, an Explanation of Significant Differences (ESD) or a Record of Decision (ROD) Amendment, as appropriate.

3. Summary of the Estimated Remedy Costs

Tables L-5 and **L-6** in Appendix B list a summary of the major capital and O&M cost elements for the selected remedy. These tables present the major construction and O&M activities required to implement each remedy component along with their associated unit and total costs.

The information in the cost estimate summary tables is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. Major changes may be documented in the form of a memorandum in the Administrative Record file, an ESD, or a ROD amendment. This is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost.

The total estimated cost of the Selected Remedy is $125 million. This cost includes approximately $5.2 million for the construction and initial operation of the groundwater remedy to address 1,4-dioxane contamination which will be conducted as a NTCRA pursuant the Action Memorandum signed concurrent with this ROD.

4. Expected Outcomes of the Selected Remedy

The primary expected outcome of the selected remedy is that the soils underlying the Site will no longer present an unacceptable risk to human health via direct contact and will be suitable for residential use. Contamination in the Holding Basin will not pose a risk to human health via direct contact and will no longer act as a source of groundwater contamination after the remedy is put into place. Sediments in the Bog Area will no longer present risks to human health or the environment following completion of remedial construction. Groundwater contamination underlying the Site will be treated and not allowed to spread further once the extraction/treatment system is put into place. The groundwater is expected to be restored to its permissible, beneficial use as a future potential drinking water source within approximately 30 years and will no longer present an unacceptable risk to human health. It is anticipated that the selected remedy will also provide socio-economic and community revitalization impacts by allowing the currently

abandoned NMI Property to be used in the future. The effectiveness of the groundwater remedy will be determined based upon attainment of the cleanup levels outlined in **Table L-1** as well as any additional site-related COCs added through subsequent decision documents. A monitoring program will be implemented in order to evaluate remedy performance and progress towards attainment. The details of the monitoring program will be established during the remedial design phase and will include the preparation of a long-term monitoring plan, but initial monitoring is expected to include evaluation of all site-related contaminants such as VOCs, SVOCs, metals, PAHs. Monitoring scope and frequency could change over time based on technical analysis of the remedy, optimization studies, revised conceptual site model, or other information, as determined by EPA.

The determination that all cleanup levels have been met should consider historical and current monitoring data, contaminant distribution, trend analysis, and the appropriateness of the compliance monitoring program (i.e., locations, frequency of monitoring, sampling parameter). After all groundwater, soil, and sediment cleanup levels (as shown in **Tables L-1** to **L-3**) have been met as determined by EPA consistent with Agency guidance, EPA will perform a risk evaluation which considers additive risk from remaining COCs considering all potential routes of exposure to document the residual risk based on exposure to soil, sediment, and/or groundwater at the Site. The residual risk evaluation will document the potential risk associated with the concentrations of the COCs remaining in soil, sediment, and/or groundwater at the Site (if detected).

a. **Cleanup Levels**

Cleanup levels were developed for the COCs identified in the human health and ecological risk assessments. COCs are the chemicals found at the Site that, based on the results of the risk assessment, were determined to pose an excess lifetime cancer risk greater than 1 in 1 million (10^{-6}) or an HI greater than 1. CO Cs were identified for exposure areas that posed A) a cancer risk in excess of an ELCR of 10^{-4}, B) an HI greater than 1, or C) a significant ecological risk.

1. Ground Water Cleanup Levels

The cleanup levels for most Chemicals of Concern (COCs) in groundwater were selected based on federal Maximum Contaminant Levels (MCLs), or risk-based cleanup goals. For those COCs that do not have a federal or state ARAR at the time this ROD was developed, a site-specific, risk-based cleanup level was calculated. If a value described by any of the methods described above was not capable of being detected with good precision and accuracy, or was below what was deemed to be the background value, then the practical quantification limit or background value was selected as the cleanup level. The selected cleanup levels are shown in **Table L-1** (see Appendix B of this ROD, as well as Appendix E, which contains cleanup level development). Many of these cleanup levels represent federal MCLs, but some are based on a cancer risk level of 1×10^{-6} or an HQ of 1 (risk-based cleanup level).

The cleanup levels are based on a residential scenario with potential future cumulative cancer risks greater than 10^{-4} or target organ HIs greater than 1 considering the ingestion, dermal contact, and inhalation exposure pathways. Risk -based PRG development was required for each chemical with an individual cancer risk above 10^{-6} or with an HQ above 1 (see Appendix B of the FS). Based on USEPA revisions to default exposure parameters and toxicity values since the release of the FS, Appendix E of this ROD contains updated cleanup level development.

The human health risk-based PRGs provided in Appendix E of this ROD correspond to target cancer risk levels of 10^{-6}, 10^{-5}, and 10^{-4} and a target non-cancer HQ of 1. For each of the contaminants, risk-based PRGs were calculated using equations and exposure assumptions initially presented in Appendix B of the FS, which were the same as those used in the baseline HHRA except as noted in the following paragraphs. Note that the baseline HHRA conservatively used 1.5 L/day (typical EPA assumption at the time of the risk assessment) as the ingestion rate for a child. However, EPA's default value of 1 L/day has been used in development of the PRGs to be consistent with recommended national default standard values. In addition, for national consistency, an assumption was used that receptors are exposed to volatiles released during use of tap water 24 hours per day (as opposed to only during periods of bathing, as used in the baseline HHRA). Toxicity va lues used in the calculation of the risk-based PRGs are presented in Section G of this ROD.

As noted in Section G of this ROD, the baseline HHRA was completed in 2013. In February 2014, EPA finalized a Directive to update standard default exposure factors and frequently asked questions associated with these updates. These updated standard default exposure factors have been utilized to develop the risk-based cleanup levels for groundwater (see Appendix E of this ROD).

The human health risk-based PRG selection process for each contaminant is summarized in Appendix B of the FS and Appendix E of this ROD. It should be noted that due to the presence of contaminated groundwater in the vicinity of the site that is not attributable to releases from the site, the groundwater remediation at this Site addresses contaminants related to the Site only.

Consistent with EPA's 1996 Final Ground Water Use and Value Determination Guidance, and the Commonwealth of Massachusetts' Comprehensive State Groundwater Protection Program (CSGWPP), MassDEP has developed a "Use and Value Determination" of the groundwater relative to the Site. The purpose of the Use and Value Determination is to identify whether the aquifer at the Site should be considered of "High," "Medium," or "Low" use and value. In the development of its Determination, MassDEP applied the criteria for groundwater classification as promulgated in the Massachusetts Contingency Plan (MCP). The classification contained in the MCP considers criteria similar to those recommended in the Use and Value Guidance. MassDEP determined that there is a High use and value for the Site area groundwater. Therefore, EPA is proposing cleanup levels based on federal and state drinking water standards,

or Maximum Contamination Levels (MCLs), and risk-based criteria that support this use as a future potential drinking water source.[32]

2. Soil Cleanup Levels

Human health-based soil cleanup levels were developed in the FS (*de maximus*, 2014b)[33] for multiple exposure scenarios, based on risks presented earlier in Section G of this ROD. EPA has determined, based on input from the town on future use, that cleanup levels will be established which allow for unrestricted (e.g., residential) use over much of the Site.

Cleanup levels for chemicals of concern (COCs) in surface or subsurface soil exhibiting an unacceptable cancer or non-cancer risk have been established such that they are protective of human health. Risk-based Preliminary Remediation Goals (PRGs) were developed for soil associated with potential future cumulative cancer risks greater than 10^{-4} or target organ HIs greater than 1 considering the ingestion, dermal contact, and inhalation exposure pathways in a residential exposure scenario. For those soils, risk-based PRG development was required for each chemical with an individual cancer risk above 10^{-6} or with an HQ above 1 (see Appendix B of the FS). These contaminants include benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, indeno(1,2,3-cd)pyrene, PCBs, arsenic, uranium, and thorium. The baseline HHRA showed that two of the most substantial contributors to cancer risks in soil are arsenic and thorium. However, the baseline HHRA concluded that arsenic and thorium concentrations in soil at the Site are consistent with local background concentrations. Consequently, the risks calculated in the HHRA for arsenic and thorium in soil are a reflection of the risks associated with ambient background conditions, and not a representation of risks associated with site-related contamination.

The human health risk-based PRGs provided in Appendix E of this ROD correspond to target cancer risk levels of 10^{-6}, 10^{-5}, and 10^{-4} and a target non-cancer HQ of 1. For each of the contaminants, risk-based PRGs were calculated using equations and exposure assumptions presented in Appendix E of this ROD. Toxicity values used in the calculation of the risk-based PRGs are presented in Section G of this ROD, while Appendix E of this ROD presents the dermal absorption and plant uptake factors used during PRG development. In addition, Appendix E of this ROD includes the site-specific conversion of radionuclide COCs from activity-based concentrations to mass-based concentrations. An oral relative bioavailability factor of 0.6 is now recommended by EPA for evaluation of risks and calculation of PRGs for arsenic in soil. The bioavailability factor wa s not used in the baseline HHRA, but has been applied during PRG development.

[32] The risk associated with the MCLs for arsenic and vinyl chloride fall outside (above) the Superfund risk range; however, EPA has determined that MCLs are protective values for drinking water.

[33] *Id.*

As noted in Section G of this ROD, the baseline HHRA was completed in 2013. In February 2014, EPA finalized a Directive to update standard default exposure factors and frequently asked questions associated with these updates. These updated standard default exposure factors have been utilized to develop the risk-based cleanup levels for soil (see Appendix E of this ROD), along with the revised toxicity values for uranium, as discussed in Section G of this ROD.

The human health risk-based soil cleanup levels for each contaminant are summarized in **Table L-2** in Appendix B of this ROD. The cleanup levels are selected by considering the ARARs, risk-based PRGs, quantitation limits, and reference/background data.

Cleanup levels for soil correspond to a cancer risk level of 1 x 10^{-6} for benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, indeno(1,2,3-cd)pyrene, and uranium. Per CERCLA and the NCP, EPA does not require cleanup to below background or reference levels. Therefore, cleanup levels for arsenic and thorium are set at background levels. The cleanup level for PCBs is based on CERCLA policy.

These cleanup levels must be met at the completion of the remedial action in surface and sub-surface soils at the NMI Property. These soil cleanup levels attain EPA's risk management goal for remedial actions and have been determined by EPA to be protective.

3. Sediment Cleanup Levels

Human Health

Sediment cleanup levels were initially developed in the FS (*de maximus*, 2014b)[34] for an abutting resident/recreational visitor exposed to PCBs at the Cooling Water Pond. While there was also unacceptable risk calculated for a trespasser due to PCBs, the recreational visitor scenario is the more conservative scenario which results in a lower cleanup level. Similar to groundwater and soil, Appendix E of this ROD presents revised cleanup level development information.

The cleanup level for PCBs in sediment has been established such that it is protective of human health. Risk-based PRGs were developed for sedi ment associated with a potential future target organ HI greater than 1 considering the ingestion and dermal contact exposure pathways in a recreational visitor exposure scenario.

The human health risk-based PRGs provided in Appendix E of this ROD correspond to target cancer risk levels of 10^{-6}, 10^{-5}, and 10^{-4} and a target non-cancer HQ of 1. Risk-based PRGs were calculated using equations and exposure assumptions presented in Appendix E of this ROD. Toxicity values used in the calculation of the risk-based PRGs are presented in Section G of this ROD, along with the dermal absorption factors used during PRG development.

[34] *Id.*

As noted in Section G of this ROD, the baseline HHRA was completed in 2013. In February 2014, EPA finalized a Directive to update standard default exposure factors and frequently asked questions associated with these updates. These updated standard default exposure factors have been utilized to develop the risk-based cleanup levels for sediment (see Appendix E of this ROD).

The human health risk-based sediment cleanup level for PCBs is summarized in **Table L-3** in Appendix B of this ROD. The cleanup level is selected by considering the ARARs, risk-based PRGs, quantitation limits, and reference/background data.

The human health-based cleanup level for PCBs in sediment corresponds to a cancer risk level of 1×10^{-5}. See also the TSCA determination in Appendix G of this ROD and EPA policy (Guidance on Remedial Actions for Superfund Sites with PCB Contamination, OSWER Directive #9355.4-01, EPA/540/G-90/007, August 1990) for further information.

This cleanup level must be met at the completion of the remedial action in sediment in the Cooling Water Pond at the NMI Property. This sediment cleanup level attains EPA's risk management goal for remedial actions and has been determined by EPA to be protective.

Ecological

The results of the ecological risk assessment indicated that there are potential risks to the benthic community in the Sphagnum Bog, as determined by a weight-of-evidence evaluation which concluded that the hazard index for effects to the benthic community is greater than 1. Risks were determined to be primarily associated with sediment in the southwestern portion of the bog, as this area of the bog has higher concentrations of several Site-related COPCs.

An analysis of toxicity test data with sediment chemistry data indicated that risks to the benthic community were likely to be associated with two COPCs: PCBs; and copper. Lead and mercury were also identified as potential contributors to risk in the samples that contained elevated concentrations of PCBs and copper. Consequently, these four constituents were identified as COCs in Sphagnum Bog sediment.

PRGs for sediment in the Sphagnum Bog were derived by identifying "no effect" COC concentrations and 'effect' COC concentrations. The "no effect" concentrations were identified as the highest COC concentrations measured in sediment samples which exhibited no toxicity, as determined by the sediment toxicity tests performed in support of the BERA. The 'effect' concentrations were identified as the lowest COC concentrations measured in sediment samples which exhibited statistically significant toxicity, as determined by the sediment toxicity tests performed in support of the BERA. The selected cleanup levels were then calculated as the geometric mean of the "no effect" and "effect" values. Ecological cleanup levels for sediment are presented in **Table L-4** in Appendix B of this ROD. Docu mentation of the ecological PRGs is provided in Appendix A of the FS (*de maximus*, 2014b). Note that the ecological cleanup

levels for sediment were developed for the Sphagnum Bog, but will also be applied to the sediment in the Cooling Water Pond.

These cleanup levels must be met at the completion of the remedial action in sediment in the Sphagnum Bog and Cooling Water Pond at the NMI Property. These sediment cleanup levels attain EPA's risk management goal for remedial actions and have been determined by EPA to be protective.

M. STATUTORY DETERMINATIONS

The remedial action selected for implementation at the Site is consistent with CERCLA and, to the extent practicable, the NCP. The selected remedy is protective of human health and the environment, will comply with ARARs, and is cost effective. In addition, the selected remedy utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable, and satisfies the statutory preference for treatment that permanently and significantly reduces the mobility, toxicity, or volume of hazardous substances as a principal element.

1. The Selected Remedy is Protective of Human Health and the Environment

The Holding Basin soil component of the remedy will adequately protect human health and the environment by eliminating, reducing, or controlling exposures to human and environmental receptors through treatment, engineering controls, and institutional controls. More specifically, treatment and containment of principal threat waste material in the Holding Basin will be protective of human health and the environment through prevention of precipitation infiltration into the groundwater and prevention of direct contact with soils. The soil component of this remedy will prevent potential human health risks from direct contact with or leaching from contaminated soil that contain contaminants at concentrations that exceed ARARs and/or risk-based standards. Excavation and off-site disposal of non-Holding Basin soils that generally cannot be reliably contained will prevent direct contact with soils, prevent erosion, and runoff of hazardous waste/contaminated soils, and prevent precipitation infiltration into the groundwater. Excavation and off-site disposal of areas where PCB-contaminated soil exists over the cleanup level will meet TSCA requirements for disposal of PCB remediation waste. Institutional controls to prevent unacceptable exposures to, and disturbance of, the Holding Basin area are required.

The groundwater component of the selected remedy will adequately protect human health and the environment by eliminating, reducing and/or controlling exposures to human and environmental receptors through the treatment and containment of Holding Basin soils, removal of site-wide contaminated soil and sediments, and treatment of groundwater to reduce COC concentrations in groundwater to levels that meet ARARs. Institutional controls are required to prohibit use of contaminated groundwater until cleanup levels are met; and also require

installation of vapor mitigation systems should future structures be built above the VOC plumes unless an evaluation of vapor intrusion risks is performed to show such systems are not required.

Permanent removal of all contaminated sediment from the Cooling Water Recharge Pond will reduce the threat of human exposure to contaminants via direct contact. Removal of targeted areas of sediment contamination will also reduce risks to ecological receptors from sediment contact in the Sphagnum Bog to levels protective of the benthic invertebrate population. The excavation and removal of sediments will provide overall protection to human health and the environment by quickly reducing human health and ecological risks to acceptable levels. Institutional controls are not required for the sediment component of this remedy.

No unacceptable short-term risks to human health or cross media impacts are expected from construction of the selected remedy.

2. The Selected Remedy Complies With ARARs

The selected remedy will comply with all federal and any more stringent state ARARs that pertain to the Site. A detailed list of ARARs/To Be Considered requirements for the selected remedy is included in Appendix D of this ROD. A discussion of the more significant ARAR issues is included below.

Wetlands Impacts

The cleanup plan selected by EPA includes activities that impact wetlands. Before EPA can select a cleanup plan that will impact wetlands, EPA must make a determination that there is no practicable alternative to conducting this work. Pursuant to Section 404 of the Clean Water Act, 40 CFR Part 230 (Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material), 21 M.G.L. §§ 26-53, and 314 CMR 9.06(1-2) (Criteria for the Evaluation of Applications for Discharge of Dredged or Fill Material), EPA has determined that because significant levels of contamination exist in wetlands within the Site's cleanup areas, there is no practicable alternative to conducting work in these wetlands.

For those wetland areas that will be impacted by cleanup activities, including the northeast wetland and sphagnum bog (see **Figure L-1**), EPA is also required to make a determination that the cleanup activities that will be conducted are the least damaging practicable alternatives. EPA has determined that the cleanup activities selected are the least damaging practicable alternatives.

EPA will minimize potential harm and avoid adverse impacts on wetland resources, to the extent practicable by using best management practices to minimize harmful impacts on wetlands, wildlife, or habitat. Wetlands will be restored and/or replicated consistent with the requirements of federal and state wetlands protection laws.

TSCA Requirements

Management of PCB-contaminated soil at the Site must comply with 40 CFR § 761.61 of TSCA. EPA has determined that PCB-contaminated sediments and soils with PCB concentrations greater than or equal to 50 ppm at the Site meet the definition of a *PCB remediation waste* as defined under 40 CFR § 761.3. Therefore, cleanup and disposal of these PCB-contaminated sediments and soils is regulated under 40 CFR Part 761 which requires, among other things, excavation and disposal off-site at a TSCA-approved disposal facility or a RCRA hazardous waste landfill. PCB-contaminated soils and sediments with concentrations of PCBs above the 1 ppm cleanup level but less than 50 ppm will be excavated and disposed of in accordance with state requirements.

3. The Selected Remedy is Cost-Effective

In EPA's judgment, the selected remedy is cost-effective because the remedy's costs are proportional to its overall effectiveness (see 40 CFR § 300.430(f)(1)(ii)(D)). This determination was made by evaluating the overall effectiveness of those alternatives that satisfied the threshold criteria (*i.e.*, that are protective of human health and the environment and comply with all federal and any more stringent state ARARs, or as appropriate, waive ARARs). Overall effectiveness was evaluated by assessing three of the five balancing criteria—long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness, in combination. The overall effectiveness of each alternative then was compared to the alternative's costs to determine cost-effectiveness. The relationship of the overall effectiveness of this remedial alternative was determined to be proportional to its costs and hence represents a reasonable value for the money to be spent.

The selected remedy is more cost-effective than the other active alternatives considered. The active combined soil/sediment and groundwater alternatives range in cost from $0 to $177.2 million. The range in estimated cost for the five soil/sediment alternatives is $0 (SS-1: No-Action) to $147.9 million (SS-5) and the range for the four groundwater alternatives is from $0.0 (GW-1: No Action) to $29.3 million (GW-3).

Off-site transport and disposal is an expensive component of the alternatives, making alternative SS-5 the most expensive because it requires the greatest volume of off-site disposal. Alternative SS-5 is $43 million more than the selected remedy SS-4 because it involves the excavation and off-site disposal of an additional 24,000 cubic yards of unsaturated Holding Basin soil and cement stabilized spoils. Also, SS-5 would be extremely difficult to implement due to the need to excavate down to 40 feet below ground surface, and may not be more protective of human health.

SS-3 is $25 million more expensive than SS-4, in part, because it requires an additional 18,500 cubic yards of cement stabilized spoils to be shipped off-site. Alternative SS-3 does not meet the preference for treatment of principal threat waste as well as alternative SS-4, as it only partially treats unsaturated and saturated soils in the Holding Basin. Furthermore, based on bench-scale studies conducted at the Site, EPA believes that the apatite injection process in SS-4 will be as

effective as the cement grouting in SS-3 and SS-5. Since apatite is a phosphate mineral derived primarily from fish bones, a waste product of the commercial fishing industry, it is also highly cost-effective.

Alternative SS-2 involves on-site containment and disposal and is the least expensive alternative other than no action; however, this alternative requires that all contaminated soil remains on-site, and will be much closer to the surface than SS-4, and SS-2 will require long-term operation and maintenance and institutional controls over a larger area of the site than SS-4.

Table K-1 helps demonstrate the cost-effectiveness of the selected soil/sediment remedy.

For groundwater, the selected remedy, GW-4, costs $20.2 million. GW-3 and GW-4 are more expensive than GW-2 (institutional controls and long-term monitoring) because in addition to institutional controls and monitoring, they include active remedial measures. GW-3 includes groundwater extraction and *ex-situ* treatment for all plumes and is the most expensive by $9 million because it includes the most active remedial measures over 30 years. Even though the GW-4 alternative includes extensive bench and pilot scale testing for the DU remedy, the estimated cost is 69% of GW-3 because it includes a passive remedy for DU in overburden and for the uranium plume in bedrock (which is not migrating).

For each of the alternatives, capital costs are the largest component, with operation and maintenance costs making up a small fraction of the total costs[35]. See **Table K-2** (alternative comparison table) for the estimated costs for each groundwater alternative.

4. The Selected Remedy Utilizes Permanent Solutions and Alternative Treatment or Resource Recovery Technologies to the Maximum Extent Practicable

Once the Agency identified those alternatives that attain or, as appropriate, waive ARARs and that are protective of human health and the environment, EPA identified which alternative utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. This determination was made by deciding which one of the identified alternatives provides the best balance of trade-offs among alternatives in terms of: 1) long-term effectiveness and permanence; 2) reduction of toxicity, mobility, or volume through treatment; 3) short-term effectiveness; 4) implementability; and 5) cost. The balancing test emphasized long-term effectiveness and permanence and the reduction of toxicity, mobility, and volume through treatment; and considered the preference for treatment as a principal element, the bias against off-site land disposal of untreated waste, and community and state acceptance. The selected remedy provides the best balance of trade-offs among the

[35] While the NPV analysis of alternatives for comparative analysis purpose used a 7% discount rate in accordance with EPA guidance, however; the future discount rate may vary from this number.

alternatives.

The selected remedy is protective of human health and the environment, uses proven cleanup technologies such as excavation, treatment and disposal, and is cost effective, while achieving the site-specific cleanup objectives in a reasonable timeframe. This cleanup approach provides both short and long-term protection of human health and the environment; attains all applicable or relevant and appropriate federal and state environmental laws and regulations; reduces the toxicity, mobility, and volume of contaminated soil, sediment, and groundwater through treatment, to the maximum extent practicable; utilizes permanent solutions and uses land use restrictions to prevent unacceptable exposures in the future to the remaining site-related wastes that will be contained on-site.

SS-4 would best meet all of the RAOs. This alternative also meets ARARs. The threats of release and direct exposure would be best eliminated by removing contaminated soils at the surface for off-site disposal. Soils in the Holding Basin are more than 20 feet deep and extend to more than 85 feet deep from the ground surface, therefore it is only a source of groundwater contamination and does not have any other exposure routes. For this reason EPA has decided that stabilization and containment of the Holding Basin soils to prevent further groundwater contamination is the best alternative. The time to achieve RAOs is estimated to be within 2-3 years of remedial construction, which is the same for all the soil alternatives.

The use of both *in-situ* and *ex-situ* treatment in GW-4 is the only alternative that is expected to meet ARARs in a reasonable timeframe. *Ex-situ* and *in-situ* treatment limits migration and further spreading of the plumes. *Ex-situ* treatment will be used to meet risk-based cleanup goals for 1,4-dioxane, and chemical-specific ARARs for VOCs. ARARs pertaining to DU in overburden and natural uranium in bedrock groundwater will be met through the use of on-site ISRZs which will also limit off-property migration.

Tables K-1 and K-2 demonstrate how the respective selected remedies provide the best balance of trade-offs when compared against the evaluation criteria.

5. The Selected Remedy Satisfies the Preference for Treatment Which Permanently and Significantly Reduces the Toxicity, Mobility or Volume of the Hazardous Substances as a Principal Element

The principal elements of the selected remedy are source control and management of migration. These elements address the primary threats at the Site, contamination of the Holding Basin soils that contain DU principal threat waste at levels that represent a greater than 10^{-3} risk, and present a source for contamination of groundwater. The selected remedy satisfies the statutory preference for treatment as a principal element through stabilization and containment of the Holding Basin soils and treatment of the contaminated groundwater. The selected remedy also excavates and disposes off-site contaminated Site soils and sediment. Because of the large volume of Site soils and sediments (approximately 82,500 cubic yards), full scale

implementation of treatment is impracticable.

6. Five-Year Reviews of the Selected Remedy are Required

Because this remedy will result in hazardous substances remaining on-site above levels that allow for unlimited use and unrestricted exposure, a review will be conducted within five years after initiation of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment. EPA will continue to review the Site at least once every five years after the initiation of remedial action for as long as contaminated media above CERCLA risk levels remain in place.

N. DOCUMENTATION OF SIGNIFICANT CHANGES

EPA presented a Proposed Plan for remediation of the Site on October 31, 2014. The components of the preferred alternative included:

- Excavation and off-site disposal of approximately 82,500 cubic yards of contaminated sediments, underground drain lines, debris, and non-Holding Basin soils (contaminated with DU, PCBs and other contaminants of concern) in various areas of the Site;
- *In-Situ* stabilization of DU contaminated soils in the Holding Basin via injection using a stabilization agent such as apatite, or other comparable stabilization agent, to prevent leaching of contaminants to groundwater, and containment of Holding Basin stabilized soils with a low-permeability vertical wall and horizontal sub-grade cover to isolate the stabilized soils and further limit mobility of contaminants by removing the flow of groundwater;
- Extraction and *ex-situ* treatment of VOCs and 1,4-dioxane in overburden and bedrock aquifers, and *in-situ* treatment of depleted uranium in overburden aquifer and natural uranium in bedrock aquifer; and
- Long-term monitoring to monitor effectiveness of *in-* and *ex-situ* treatment; and Institutional Controls to: 1) prevent unacceptable exposures to, and to prevent disturbance of, the Holding Basin area; 2) prohibit use of contaminated groundwater until cleanup levels are met; and 3) to require evaluation of vapor intrusion risks and if necessary, installation of vapor mitigation systems should future structures be built above the VOC plumes.

EPA reviewed all written and verbal comments submitted during the public comment period. It was determined that no significant changes to the remedy, as originally identified in the proposed plan, were necessary. EPA made some changes to the proposed plan that were not significant in nature. These changes included:

- A change to the institutional controls requirement for vapor intrusion mitigation systems

as follows: EPA is now requiring installation of vapor mitigation systems should future structures be built above the VOC plumes unless an evaluation of vapor intrusion risks is performed to show such systems are not required. Should someone wish to demonstrate that there are no unacceptable risks from vapor intrusion and therefore mitigation systems are not required, an evaluation of vapor intrusion risks (subject to EPA approval) may be performed prior to building of structures above the VOC plume to demonstrate that vapor intrusion risks are within or below USEPA target risk levels (risk range of 10^{-4} to 10^{-6} and/or a target organ HI of 1).

- Based on changes made by EPA to default exposure parameters and toxicity values since release of the FS and Proposed Plan (see Sections G and L of this ROD for further discussion), cleanup levels were revised in this ROD. Following the revised calculations, groundwater cleanup levels for 1,1-dichloroethane, 1,4-dioxane, cobalt, iron, molybdenum, and thorium were changed from that presented in the Proposed Plan. With respect to soil, cleanup levels associated with benzo(a)anthracene, benzo(b)fluoranthene, indeno(l,2,3-cd)pyrene, and uranium were changed from that presented in the Proposed Plan.

O. STATE ROLE

The Massachusetts Department of Environmental Protection has reviewed the various alternatives and has indicated its support for the selected remedy. The Commonwealth has also reviewed the Remedial Investigation, Risk Assessments, and Feasibility Study to determine if the selected remedy is in compliance with applicable or relevant and appropriate state environmental and facility siting laws and regulations. The Commonwealth of Massachusetts concurs with the selected remedy for the NMI Superfund Site. A copy of the declaration of concurrence is attached as Appendix A.

STAKEHOLDER COMMENTS AND EPA RESPONSES

EPA published notices of availability of the Proposed Plan and Administrative Record in the Concord Journal on October 31, 2014 and released the Proposed Plan to the public on November 3, 2014. EPA also held a public information session on November 12, 2014 at the Concord Town House in Concord, MA. A Public Hearing was held on December 10, 2014, also at the Concord Town House. A transcript was created for the December 10, 2014 hearing and has been made part of the Administrative Record for this Record of Decision. Based upon a request by the Citizens Research and Environmental Watch (CREW), the Public Comment Period was extended until January 14, 2015. In addition to oral comments at the Public Hearing, a number of written comments were provided on the Proposed Plan. Outlined below is a summary of comments received from the public and other interested parties during the public comment period and EPA's response to those comments. Similar comments have been summarized and grouped together. The full text of all written and oral comments received during the comment period has been included in the Administrative Record.

Comment #1:
Several commenters expressed general support of key aspects EPA's proposed remedy, including the Commonwealth of Massachusetts, the Town of Concord, and Citizens Research and Environmental Watch (CREW), the Technical Assistance Grant (TAG) grantee for the Site. These comments supported the general approach to remediation, the disposal of excavated materials off-site, and the selection of residential future use and future groundwater use as the basis for cleanup levels.

EPA Response:
EPA appreciates the commenters' support for EPA's proposed remedy.

Comment #2:
Numerous comments were received in support of EPA's proposal to accelerate one aspect of the remedy, the extraction and treatment of groundwater contaminated with 1,4-dioxane and volatile organic compounds (VOCs), as a Non-Time Critical Removal Action (NTCRA). No comments were received that opposed this proposal. A number of commenters also noted concerns with the overall remedy implementation timeline and implored EPA not to delay the overall Site cleanup any further.

EPA Response:
EPA has decided to issue an Action Memorandum for a Non-Time Critical Removal Action to address the 1,4-dioxane and VOC contaminated groundwater (GW NTCRA). The Action Memorandum is attached to the ROD as Appendix F. In addition, EPA has requested that the potentially responsible parties begin investigations to determine the full extent of the 1,4-dioxane plume. The investigation work will include installing additional wells and performing additional sampling. Upon issuance of the Action Memorandum, EPA anticipates it will negotiate an agreement for the potentially responsible parties to perform the GW NTCRA at the Site.

The issuance of the ROD also begins a timeline to begin negotiations with potentially responsible parties for completion of the remedial design and remedial action (RD/RA). The GW NTCRA and RD/RA negotiations may proceed at the same time, if necessary.

Comment #3:
A number of commenters concurred with EPA's assessment that there is no less damaging practicable alternative than the proposed remedy in terms of wetlands impacts. Several commenters noted the need to properly restore and/or mitigate wetlands disturbed as part of the remedy.

EPA Response:
EPA will minimize potential harm and avoid adverse impacts on wetland resources, to the extent practical by using best management practices to minimize harmful impacts on the wetlands, wildlife or habitat. Wetlands will be restored and/or replicated consistent with the requirements of federal and state wetlands protection laws.

Comment #4:
Several commenters, including the Massachusetts Department of Environmental Protection (MassDEP) and Massachusetts Department of Public Health (MassDPH), wrote in support of EPA's proposed finding under the Toxic Substances Control Act (40 CFR Part 761) regarding the proposed PCB cleanup level for contaminated soil and sediments. Other commenters asked EPA to confirm that this proposed cleanup level (1 mg/kg PCBs) would also be protective of groundwater, while also citing lower PCB soil cleanup levels selected at other sites in the country.

EPA Response:
PCBs are primarily insoluble in water and adsorb strongly to organic carbon. As such, PCBs do not readily leach from soil or partition from sediment. This is evidenced by the finding that PCBs are primarily associated with surface soils at the Site, and the only locations where PCBs have been detected in subsurface soils are in areas with subsurface drain lines. In these areas, it is hypothesized that PCBs were released from leaks in the drain lines. PCBs are not present in saturated soils. This suggests that PCB migration to groundwater is an incomplete pathway. In addition, the OSWER directive "Guidance on Remedial Actions for Superfund Sites with PCB Contamination" August 1990, indicates that for a 20 ppm PCB source the corresponding concentration in groundwater would be under 0.5 ppm. As noted the soil cleanup level for PCBs is 1 ppm which corresponds to a 1 in 1 million excess cancer risk, and is therefore protective.

Comment #5:
Several comments were received that requested that the Record of Decision provide more detailed information regarding certain aspects of the remedy, including dust suppression techniques (citing numerous concerns regarding risks from air emissions during construction and suggestions for monitoring); measures to ensure the suitability of clean fill imported from off-site; methods of construction; off-site transportation plans; confirmation sampling; long-term monitoring programs; operation and maintenance plans; etc.

EPA Response:
Detailed information on the methods of construction, dust suppression techniques, and determination of suitable clean fill from off-site locations will be provided in the remedial design. The remedial design will be reviewed by and discussed with members of the Nuclear Metals, Inc. Technical Advisory Group, which consists of members from CREW and the town-appointed 2229 Main Street Committee, to ensure the concerns from community members are addressed. Long-term monitoring plans and operation and maintenance plans will be electronically filed in EPA's records center to ensure longevity of the plans, and will also be available for viewing at the Concord Public Library Repository.

Comment #6:
A number of questions were received regarding the extent of required excavation in soil, areas under existing buildings, the former landfill area, and wetland areas. Commenters requested extensive additional characterization of soils under building slabs and under the former landfill. Comments were also received requesting that EPA mandate the cleanup of all soils within the top 15 feet to be consistent with the Massachusetts Contingency Plan (MCP), which some commenters asserted should be considered an ARAR. Questions were also raised regarding the required depth of excavation beneath former building slabs.

EPA Response:
Subsurface soil is usually considered up to 10 feet deep based on the general depth of frost penetration in New England soil. Typically, soil is excavated to the depth of frost penetration when constructing a foundation for a house. Mixing of subsurface soil occurs due to frost heaving and also due to excavation. EPA assumes that the excavated soil will be used as fill; hence, exposures to soil composited from 1 to 10 feet are assessed under the future land use scenario. The approximate extent of excavation for Site soils and sediments, based on data collected to date, can be found in Figure L-1, however they generally consist of approximately 1-3 feet in depth.

Comment #7:
Some commenters suggested that EPA select Alternative SS-5 rather than SS-4 based on concerns about the long-term effectiveness of stabilization techniques as well as the desire to remove all contamination from the Site.

EPA Response:
Alternative SS-4 provides for full *in-situ* stabilization of all the soils within the Holding Basin using Apatite II, and for a containment wall and horizontal cover around the stabilized soils. Through bench-scale studies conducted at the Site, Apatite II has been shown to be extremely effective in preventing DU from becoming soluble in groundwater. However, if the Apatite II application technology is lacking in effectiveness in the future, SS-4 provides the added protection of a vertical containment wall, and additional actions are more easily implemented. In Alternative SS-5, only the saturated soils within the Holding Basin footprint are stabilized in place. The unsaturated soils in SS-5 would be disposed off-site. EPA considers treatment to be a preferential element for principal threat wastes, and SS-4 treats all principal threat wastes whereas Alternative SS-5 does not. Alternative SS-5 is $43 million more than SS-4, would be

extremely difficult to implement, and may not be more protective of human health. The excavation in the Holding Basin would start at a depth of 20 feet below ground surface and require an excavation of close to 20 feet in depth which would result in an excavation of approximately 40 feet from the ground surface. It would also require an extra 25,000 cubic yards of soil to be transported off-site compared to SS-4.

Comment #8:
Several commenters questioned EPA's proposal to use Apatite and ZVI as part of the groundwater remedy as well as the use of Apatite to stabilize residual contamination in the Holding Basin, based on concerns about the innovative nature of these methods and the need for certainty regarding long-term performance. Comparisons were made between this Site and the Hanford site regarding the use and injection of Apatite. Several commenters suggested additional testing and evaluation to determine the most appropriate construction and injection methods, ensure that the additive to be used is free of contamination, and to determine the long-term viability of Apatite and ZVI. Other comments suggested that EPA specify the use of concrete stabilization for contamination remaining in the Holding Basin either instead of Apatite or as a contingency should Apatite be deemed unacceptable in the future.

EPA Response:

Although EPA believes that the use of Apatite and ZVI as part of the In-Situ Reactive Zones (also known as Permeable Reactive Barriers) groundwater remedy as well as the use of Apatite for soil stabilization in the Holding Basin will prove effective, further treatment studies will be conducted during the remedial design to confirm the appropriate material to be used for both the Holding Basin soils and the groundwater. Should those studies confirm that the use of Apatite and/or ZVI is not the appropriate material for treatment of soils or remediation of groundwater, another suitable material will be chosen to ensure a permanent remedy at the Site. Any significant changes to the selected remedy as described in the ROD will be documented in an Explanation of Significant Differences or ROD Amendment.

Comment #9:
Some commenters questioned EPA's proposal to construct the slurry wall around the holding basin area using bentonite, suggesting the use of concrete instead. One commenter also provided additional suggestions on the methods of construction of the slurry wall to ensure long-term performance, including suggestions to construct the wall in a series of "panels" and "keying" the wall into the underlying bedrock.

EPA Response:

During the Remedial Design process, design studies will be conducted to determine the appropriate material and construction method for the containment wall around the Holding Basin. Although the proposed plan indicated the use of bentonite, other material such as concrete will be considered. EP A appreciates the attention to detail regarding the construction of the containment system and will take the information provided under advisement.

Comment #10:
The owner of the Valley Sports Arena expressed concern regarding plans for a groundwater treatment facility and the potential use of his property or adjacent properties for that purpose. This commenter, as well as the town's 2229 Main Street Oversight Committee, also expressed concern that the implementation of the groundwater remedy could impact operations at Valley Sports, either by use of a portion of the property or by impacts to the quality or quantity of water currently used by Valley Sports for their ice rink operations. The Valley Sports Arena owner pledged his willingness to work with those implementing the remedy but requested formal written assurance from EPA that his property would not be taken by eminent domain in order to carry out the remedy. Also, as an alternative to constructing a treatment plant at Valley Sports, several suggestions were made regarding the location of the proposed groundwater treatment plant, including suggestions to locate the plant on the Starmet property, directing extracted groundwater to the existing groundwater treatment facility at the W.R. Grace Superfund Site in Acton, or utilizing land acquired by the Acton Water District for that purpose. Comments were also submitted noting that such a treatment facility should be located outside of wetland buffer zones. A number of comments were also provided regarding a preference for recharge of treated groundwater to the ground rather than discharge to surface water as well as concerns that EPA set an appropriate discharge standard should surface water discharge be allowed.

EPA Response:
EPA is exploring options for locating the groundwater treatment system other than the Valley Sports Arena property. Investigations and design studies that will be conducted as part of the Groundwater Non-Time Critical Removal Action (GW NTCRA) will determine the most appropriate location of the treatment system. Should EPA need to consider the use of the Valley Sports Arena property for the groundwater treatment system, EPA will work with the property owner to the extent practicable to reach an amicable solution. Although EPA is considering all of the noted locations for the construction of the groundwater treatment system, the Acton Water District location looks to be the most promising and will be explored first. The exact location of the groundwater treatment system will depend on investigations currently being performed as well as design studies conducted during the NTCRA. Injection of treated groundwater into the aquifer as well as surface water discharge will be considered during the design phase.

Comment #11:
The Town of Concord's Natural Resources Commission requested that EPA conduct closer coordination with the Town's Natural Resources Division staff in order to substantially comply with the Massachusetts Wetlands Protection Act and the Town of Concord Wetlands Bylaw. In their comments, the Commission outlined their request for further wetlands delineation, review of wetland excavation and restoration/mitigation plans, and notification prior to starting any work in wetlands or buffer zones.

EPA Response: Though no permits are required for Superfund actions such as this, EPA has been and will continue to work with the town-appointed 2229 Main Street Committee, and through that committee information can be provided to the town's Natural Resources Commission with a reasonable opportunity to review and comment on various work plans associated with cleanup activities in the wetland and bog. The Massachusetts Wetlands

Protection Act is an ARAR and all work to be performed within wetlands and the 100 foot buffer zone will be in accordance with the substantive requirements of these regulations.

Comment #12:
The Town of Concord requested that the ROD specify a plan and cost estimate for addressing risks from vapor intrusion. The town's 2229 Main Street Oversight Committee suggested that the ROD identify specific areas for investigation, the responsibility for such investigations, the requirements for such investigations, and the responsibility and cost for implementation of any vapor intrusion mitigation. This comment suggested that an escrow account for future vapor mitigation be established and EPA outline processes for property owners to access these funds for vapor intrusion monitoring as well as design and installation of mitigation systems.

EPA Response:
The selected remedy for groundwater includes institutional controls to address risks from vapor intrusion. EPA is requiring installation of vapor mitigation systems should future structures be built above the VOC plumes unless an evaluation of vapor intrusion risks is performed to show such systems are not required. Should someone wish to demonstrate that there are no unacceptable risks from vapor intrusion and therefore mitigation systems are not required, an evaluation of vapor intrusion risks (subject to EPA approval) may be performed prior to building of structures above the VOC plume to demonstrate that vapor intrusion risks are within or below USEPA target risk levels (risk range of 10^{-4} to 10^{-6} and/or a target organ HI of 1).

Comment #13:
The Acton Water District (AWD) requested that EPA change its proposed groundwater cleanup level for 1,4-dioxane to match the MassDEP Drinking Water Guidance value (and MCP Method 1 GW-1 standard) of 0.3 ug/l. These comments also stated that, since groundwater on the Acton side of the Assabet River exceeded this guidance value, the remedy should include extraction and treatment of groundwater from that location as well. The District also requested that they be included during future planning for remedy implementation and monitoring.

EPA Response:
EPA used a site-specific risk assessment in calculating an acceptable risk-based cleanup number for 1,4-dioxane in groundwater, arriving at 0.46 which represents a 10-6 risk for drinking water. The MassDEP Drinking Water Guideline/MCP Method 1 GW-1 standard of 0.3 ug/l does not apply at the Site pursuant to Section 40.011 of the MCP which limits the applicability of the MCP to response actions at disposal sites that are deemed adequately regulated. The Nuclear Metals, Inc. Superfund Site is considered adequately regulated because MassDEP has concurred with this ROD (see 310 CMR 40.0111). EPA will coordinate with the AWD during design and construction of the remedy, as appropriate.

Comment #14:
The Acton Water District and the Acton Citizens for Environmental Safety (ACES) requested in their comments that additional groundwater characterization be conducted to ensure that the full extent of groundwater contamination is known, and the impacts of pumping on the Acton water supply's yield and the interaction between groundwater and surface water is adequately

understood. The District also questioned the usability of historic 1,4-Dioxane monitoring data due to changes in detection limits over time.

EPA Response:
Additional groundwater investigation work is being performed prior to the initiation of the GW NTCRA. This investigation work will fully characterize groundwater where 1,4-dioxane impacts are known or suspected. Further treatability studies to determine the most effective method of treatment and best location of the treatment system will be conducted during the GW NTCRA.

Comment #15:
The Acton Water District asked whether Institutional Controls included as part of Alternative GW-4 restricting use of groundwater for drinking water purposes will impact the current use of the aquifer by the District.

EPA Response:
The groundwater restrictions are intended to restrict use of contaminated groundwater that would pose an unacceptable risk until the cleanup levels in the ROD are met. At the time of the ROD's issuance, contamination levels in the Acton Water District wells do not exceeded the cleanup levels for 1,4-dioxane or other contaminants in this Record of Decision. Thus, EPA does not expect to restrict the use of the groundwater at the Acton Water District's wells. EPA will continue to coordinate closely with AWD regarding implementation of the groundwater remedy and continued monitoring to ensure that there are no unacceptable risks posed by Acton's drinking water.

Comment #16:
The Town of Concord and CREW noted their desire to maximize the ability to use the property in the future and limit the need for institutional controls and also requested clarification that any institutional controls on the Holding Basin area would not be an outright prohibition on use but would allow for certain uses (parking lot, playing field, park area, etc.).

EPA Response:
Institutional controls will be limited to the extent required to protect human health and the environment. Specifically, restrictions on the land above the Holding Basin footprint will allow for various uses as long as they do not allow for unacceptable exposures to, or disturbance of, the Holding Basin area.

Comment #17:
Two commenters, responding to information outlined at the public informational meeting regarding recently discovered depleted uranium debris on the Starmet property, requested additional investigation outside of the property at a reasonable distance to ensure that no additional debris exists outside of the Site fence line.

EPA Response:
Areas where DU fragments were discovered near the property line were located in areas where

historical waste processing activities were conducted; all other areas where DU fragments were found were well within Site boundaries. In locations where fragments were found at the fence line, the area outside the fence line was scanned for DU and no additional metal fragments were found. As a precaution, the fence was moved back in this area approximately 40 feet. During the design phase, contamination in areas where DU fragments were found will be fully delineated.

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PUBLIC HEARING ON THE PROPOSED REMEDIAL ACTION PLAN FOR THE NUCLEAR METALS, INC. SUPERFUND SITE LOCATED AT 2229 MAIN STREET, CONCORD, MASSACHUSETTS

Wednesday, December 10, 2014, 6:30 p.m.
Concord Town Hall
22 Monument Square
Concord, Massachusetts16

-------Reporter: Joan M. Cassidy, RPR, CRR-------
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1 PRESENT:
2
3 Robert G. Cianciarulo, Hearing officer,
4 EPA Region 1 -- New England,
5 Chief, Massachusetts Superfund Section
6
7 Melissa Taylor, EPA Project Manager,
8 USEPA New England
9
10 Kelsey O'Neil, Congressional Liaison and
11 Community Involvement Coordinator,
12 USEPA
13
14 Bruce Thompson, Project Coordinator,
15 de maximis, inc.
16
17
18
19
20
21
22
23
24

1 P R O C E E D I N G S
2 (Presentation by Melissa Taylor.)
3 MR. CIANCIARULO: We do have a court
4 reporter here, so I'm going to read a statement into
5 the record, which will be us kicking off the
6 hearing, and then I will turn the microphone over
7 to...
8 Good evening. My name is Bob
9 Cianciarulo. I'm the chief of the Massachusetts
10 Superfund Section in EPA's Boston office. I'll be
11 the hearing officer for tonight's hearing on the
12 proposed cleanup plan for the Nuclear Metals
13 Superfund site in Concord, Massachusetts.
14 The purpose of this hearing is to
15 formally accept oral comments on the proposed plan
16 which was released to the public on October 31,
17 2014.
18 As a reminder, the public comment period
19 has recently been extended and now runs until
20 January 14, 2015. We will not be responding to
21 comments tonight but will respond to them in writing
22 after the close of the comment period.
23 A public information meeting on EPA's
24 proposal was held on November 12, 2014, in this room

1 in Concord. At that meeting information concerning
2 the proposed cleanup plan was presented, and EPA
3 responded to questions about the site. The proposed
4 plan and the rest of the administrative record was
5 delivered to the site information repositories in
6 Concord and Boston, and the official comment period
7 began on November 13. There was also an informal
8 session tonight where EPA project manager Melissa
9 Taylor reviewed EPA's proposal.
10 For the record, the proposed plan
11 includes excavation and off-site disposal of
12 approximately 82,500 cubic yards of contaminated
13 materials, in-situ stabilization of depleted-uranium
14 contaminated soils in the holding basin using
15 Apatite II injection, extraction and ex-situ
16 treatment of groundwater for volatile organic
17 compounds and 1,4-dioxane, in-situ treatment of
18 depleted uranium and natural uranium in groundwater,
19 long-term monitoring to monitor the effectiveness of
20 the treatment, and institutional controls to prevent
21 disturbance of the holding basin area, prevent the
22 use of site groundwater, and address potential vapor
23 intrusion risks.
24 EPA is also proposing to accelerate the

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1 cleanup of 1,4-dioxane in groundwater by initially
2 addressing this contaminant under the non-time-
3 critical removal authority as outlined in the
4 proposal plan.
5 The total estimated cost of this
6 proposed remedy is approximately $125 million.
7 Copies of the proposed plan were
8 available outside of this room when you came in.
9 They're also available online. So those of you
10 wishing to make a comment should come to the front
11 of the room and state your name and address and your
12 affiliation. We would ask that we allow your
13 elected officials to testify first, and then we can
14 move on to those in the general public.
15 Please limit your oral comments to ten
16 minutes. If the extent of your comments will run
17 longer than ten minutes, I'm going to ask that you
18 summarize your major points and provide EPA with a
19 copy of the full text of your comments. The text in
20 its entirety will become part of the record.
21 After all the comments have been heard,
22 I will close the formal hearing. As Melissa
23 outlined earlier, if you do wish to submit written
24 comments, you can hand them to us tonight or mail,

1 fax or email them to Melissa as instructed in the
2 plan.
3 At the conclusion of the hearing, please
4 see any of the EPA representatives if you have any
5 questions on how to submit comments. All oral
6 comments that we receive tonight and written
7 comments that we receive during the comment period
8 will be addressed in a responsiveness summary and
9 become a part of the administrative record for the
10 site and will be included in the EPA's final
11 decision on the cleanup plan.
12 Thank you for coming. Your input into
13 this process is important, and it helps us in our
14 decision-making process.
15 I'm going to begin the formal process.
16 I'm just going to go back and sit down so I can take
17 my own notes on your comments. And we ask that
18 those who wish to make comments just approach the
19 microphone. Thank you.
20 SENATOR ELDRIDGE: Hi. Good evening.
21 I'm Senator Jamie Eldridge, and this is
22 Representative Jennifer Benson, and I'm speaking on
23 behalf of both of us as legislators who represent
24 the town of Acton.

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1 We wanted to be here because, of course,
2 environmental cleanups and environmentally
3 contaminated sites like the Nuclear Metals site
4 don't stop at the town border. So I want to be here
5 to say I had a staff member at the presentation in
6 November here in Concord, and I wanted to express my
7 strong support for the EPA's comprehensive proposal
8 for the cleanup of the Nuclear Metals site.
9 Specifically, I wanted to express my
10 strong support that the residential standard be the
11 standard that this site is cleaned up to. From just
12 a quick view at this map over here, you can see
13 residences very close to the outer edges of this
14 site.
15 And actually, just recently, the two of
16 us were at the Minute Man Arc for Human Services
17 nonprofit, which actually is in a similar area near
18 to this site, so it's an area where a lot of people
19 are coming through, living, working, and so we think
20 the residential standard is important, especially
21 given there are a lot of industrial sites in
22 Massachusetts that eventually homes are built there.
23 So I want to express my support for that.
24 I also wanted to express my support to

1 make sure that the 82,000-plus cubic yards of soil
2 sediment is shipped and removed from the site. So I
3 want to express my support for that. And I do
4 support the accelerated cleanup of the VOC dioxane.
5 Just listening to the presentation that
6 Bruce Thompson explained to me about the plumes that
7 are -- look like they could be headed towards the
8 Assabet River and therefore crossing over into the
9 Town of Acton, I think it's extremely important that
10 EPA take accelerated action through the wells and
11 through the bedrock to make sure that we don't have
12 some of these sediments cross over the river into
13 Acton.
14 So I just wanted to express my strong
15 support for the EPA's proposed cleanup. As a
16 resident of Acton, I'm grateful for the work that
17 the EPA's done to clean up the W.R. Grace site in
18 Acton, and I want to express my equal appreciation
19 for your proposed cleanup of this site in Concord.
20 Thank you very much.
21 REPRESENTATIVE BENSON: Thank you.
22 MR. CIANCIARULO: Are there any other
23 officials? I'm not sure if -- okay. So however
24 everybody wants to do this. I don't know who's

1 going to go first, but if others want to step up and
2 comment for the record.
3 (Pause.)
4 MR. CIANCIARULO: Or this could be the
5 fastest hearing we've ever seen.
6 (Laughter.)
7 Personal Privacy / Ex. 6: Could I have you put the map
8 up of the site, the one that shows the wells that
9 you wanted to --
10 (Map displayed.)
11 Personal Privacy / Ex. 6 I'm Personal Privacy / Ex. 6 owner of
12 Valley Sports, Inc., the building on the left where
13 those two loops are and then the overburden well
14 behind the property.
15 I asked the question at the other
16 hearing. I would like a formal letter saying that
17 you would not take the land by eminent domain. I'd
18 like it in a registered letter if that's going to be
19 the case.
20 I don't mind working with the people
21 that are over here on the left, John Hunt and his
22 superior; they've been quite helpful.
23 I don't want to put a 30-foot building
24 in the middle of my second parking lot and have to

1 close the business down. I don't mind working with
2 the developers of the remediation to put those
3 monitoring wells in, but I strongly recommend, which
4 I did to them informally tonight, that we pump the
5 fluid from the two baserock wells up onto the site,
6 existing site that you have, and from the overburden
7 one, the third one, up onto the site, process it up
8 there without having to take land from the doctor
9 next door or from Valley Sports.
10 And we have to work through a plan to be
11 able to do it. We're talking about 10,000 gallons
12 of water a day from each of those wells for forty
13 years. That's a lot of water, a lot there. It has
14 to be done.
15 I had to close -- you can see where
16 Route 62 or Main Street is there and the Assabet
17 River. I had to shut down on March 19 the well that
18 I had there because it's being contaminated by --
19 and I'll use it for right now -- road salt coming
20 down the Assabet River. I understand what that --
21 the water. I use 10 -- between 5,000 and 10,000
22 gallons of water a day to make ice for the ice
23 skating facility. I don't want to have to close the
24 business.

1 But this is a serious solution to this,
2 but you're going to have to take it back up onto the
3 site -- I don't mind wells being put in there, but
4 you're going to have to take it back up onto the
5 site, process it and then discharge it appropriately
6 either back into the ground up there or directly
7 into the Assabet River, where you see it at the top
8 of the picture here.
9 I don't mind working with 'em. There's
10 no specific plan in place right now, but I don't
11 want to put a building right in the middle of our
12 second parking lot, right in the flood plain. I
13 can't put any -- another rink in there. I've got
14 enough land to put a second, third rink in there,
15 but I can't do it because of the Federal Rivers Act,
16 a hundred-foot set back and a hundred-foot buffer
17 zone.
18 But you're going to ask me to bear the
19 burden of the solution. I don't mind working with
20 you, but I don't want to -- you're telling me that I
21 have to give up a business that I've taken forty
22 years to develop. I'll leave it at that for today.
23 MR. CIANCIARULO: Thank you.
24 MS. Personal Privacy / Ex. 6 Hello. My name is Personal Privacy / Ex. 6

1 Personal Privacy / Ex. 6 ,
2 and I am a long-term member of Acton Citizens for
3 Environmental Safety, which is an organization that
4 was formed back in the 1980s to provide a forum for
5 Acton residents to ensure the health and safety of
6 its population during the cleanup of the W.R. Grace
7 site in Acton.
8 Currently, Acton ACES is merging with a
9 group in Acton called Green Acton. They have
10 similar missions, and we are -- I am going to be
11 submitting these comments on behalf of, I will call
12 it ACES/Green Acton because we have not formalized
13 the merger yet.
14 Acton's population relies almost
15 entirely upon groundwater for its drinking water
16 supply. The most productive wells are located in
17 the Assabet aquifer just across the Assabet River
18 from the Nuclear Metals Superfund site in Concord.
19 ACES/Green Acton is very concerned about
20 the potential for depleted and natural uranium and
21 chemicals such as volatile organic chemicals, VOCs,
22 and 1,4-dioxane to migrate through the overburden
23 and bedrock groundwater to the Assabet wells.
24 Although Acton monitors the current

1 treatment online for VOCs and the Assabet wells,
2 this current treatment plan was not engineered to
3 remove radiological contaminants nor 1,4-dioxane
4 from the water.
5 We are particularly concerned about
6 1,4-dioxane reaching Acton's drinking water. The
7 chemical is a suspected human carcinogen known to
8 affect lymphatic, ocular and renal systems, and
9 removal of this compound is difficult and expensive.
10 To further complicate the issue,
11 1,4-dioxane is currently in regulatory limbo between
12 Massachusetts and federal health advisory levels.
13 We urge the EPA to ensure the
14 remediation efforts fully -- that all remediation
15 efforts fully address the treatment and removal of
16 these chemicals and halt their migration toward the
17 Assabet well field.
18 We remind EPA that it is critically
19 important at this stage to ensure that the nature
20 and extent of contaminant plumes are clearly
21 understood and delineated. Without good knowledge
22 of the extent of the plume, a situation similar to
23 what happened during the design of the W.R. Grace
24 remediation system could occur.

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1 Hydrogeologists now suspect that the
2 incomplete delineation of the extent of the VOC
3 plume around the industrial landfill at the Acton
4 W.R. Grace site led to installation of a treatment
5 system that did not fully capture the northeastern
6 migrating portion of the plume.
7 This section of the plume, uncaptured,
8 continued to migrate along groundwater gradients
9 toward the School Street well field in Acton.
10 Chemicals from the plume were eventually detected in
11 the School Street well field, necessitating a
12 separate remediation effort decades after the
13 original remediation was installed at the industrial
14 landfill.
15 We strongly encourage EPA to require an
16 efficient and thorough characterization of the plume
17 migrating from the Nuclear Metals site and a full
18 remediation of the harmful chemicals in these
19 plumes. This is Acton's most important groundwater
20 resource on which thousands rely. Please help us
21 protect it. Thank you.
22 MR. CIANCIARULO: Thank you.
23 MR. [Personal Privacy / Ex. 6] May I use the podium?
24 MR. CIANCIARULO: Yes, okay.

1 MR. Personal Privacy / Ex. 6: Thank you.
2 Good evening. My name is Personal Privacy / Ex. 6. I
3 reside at Personal Privacy / Ex. 6. I'm a
4 professional chemist and most recently taught
5 environmental chemistry at Brandeis University.
6 My involvement with Nuclear Metals began
7 in 1988, when I was on the Concord Board of Health,
8 and has continued to the present as a member of the
9 technical advisory group of Citizens Research &
10 Environmental Watch, more commonly known as CREW.
11 Tonight I am presenting comments on
12 behalf of CREW. CREW is an all-volunteer
13 organization citizens group that has been working
14 since 1989 to address issues of environmental
15 contamination and human health associated with the
16 NMI site.
17 Over the past 25 years, CREW has
18 interacted with numerous local and state interested
19 parties to advance the cause of a complete cleanup
20 of contaminated soil and groundwater at the NMI
21 site.
22 In addition to local advocacy, CREW
23 members have brought significant technical
24 capability to the oversight process, including

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1 expertise in chemistry, toxicology, hydrogeology,
2 nuclear physics, statistics and environmental law.
3 As part of its activity, CREW has used
4 grants obtained from private foundations, the state
5 and EPA to hire technical consultants to help
6 evaluate technical and regulatory submittals.
7 CREW has participated in the EPA
8 Technical Assistance Grant program since 2001.
9 During this period CREW retained GeoInsight, an
10 environmental consulting firm with significant
11 Superfund experience, to assist in reviewing and
12 commenting on Superfund issues and reports. CREW
13 and GeoInsight are thus extremely knowledgeable
14 about NMI-related issues, and the process has led to
15 the current proposed plan.
16 From its founding CREW has maintained a
17 focus on the following two objectives: A complete
18 cleanup of uranium and other constituents of concern
19 to levels that are safe for residential use of the
20 whole 46-acre NMI site and areas impacted by the NMI
21 site, and, secondly, the cleanup of groundwater to
22 safe drinking water standards.
23 To date, CREW has expended significant
24 time, effort, energy into following, understanding

1 and commenting on the Superfund process at the NMI
2 site. Technical advisory committee members have
3 regularly attended EPA-sponsored meetings with
4 representatives from EPA, de maximis and the state.
5 At the technical advisory committee
6 meetings, which have been conducted approximately
7 bimonthly over the last ten years, we have discussed
8 and resolved many of CREW's issues associated with
9 the remedial investigation (RI) and the feasibility
10 study (FS).
11 We've also provided EPA with our
12 perspective on NMI site conditions and CREW's
13 ultimate desire for cleanup and reuse of the site.
14 CREW is preparing detailed written comments on the
15 proposed plan. The following summarizes the major
16 points in CREW's response:
17 CREW wants to acknowledge and thank EPA
18 for including CREW in the RI/FS process. This
19 involvement has provided CREW with a detailed
20 understanding of the agency's rationale and approach
21 for the selection of the proposed remedy.
22 Throughout the process we have been
23 impressed with the thoroughness of the technical
24 review and the attention that EPA has brought to

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1 bear on the NMI site. Unlike the period when
2 Starmet/NMI was responsible for conducting
3 characterization activities, CREW can attest that
4 the NMI site received a thorough, rigorous
5 investigation by EPA. We are also confident that
6 the site-specific information and data are reliable
7 and were collected using appropriate methods.
8 CREW supports the general components and
9 the overall remedial approach that EPA selected in
10 the proposed plan. Thus, we are not proposing an
11 alternative remedial approach.
12 We understand that remedial actions at
13 the NMI site will be an intrusive and lengthy
14 process. We expect that the remedial actions will
15 be implemented safely and in a manner that
16 recognizes the proximity of the NMI site to
17 residential neighborhoods.
18 CREW is pleased with the careful and
19 controlled manner that Superfund activities have
20 been completed to date. However, with this comment,
21 CREW underscores the importance that future cleanup
22 activities be conducted in a similarly careful and
23 controlled manner.
24 Since its founding CREW has consistently

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1 voiced concern regarding the use and handling of
2 depleted uranium and other radioactive materials in
3 Concord. We repeatedly pointed out that the site is
4 located near many environmentally sensitive areas.
5 Unlike common environmental contaminants
6 such as petroleum or solvents, depleted uranium is
7 both a toxic heavy metal and radioactive with a very
8 long half-life. As a chemical element, it cannot be
9 destroyed and will be present at the site well into
10 the distant future.
11 CREW has consistently supported removing
12 as much of the depleted uranium from the NMI site as
13 is feasible and practicable. While EPA's proposed
14 plan is generally consistent with this objective,
15 CREW supports and encourages EPA to modify the
16 proposed plan to include excavation and off-site
17 disposal of all highly to moderately impacted soil
18 regardless of depth and location beneath the water
19 table.
20 CREW supports EPA's plan to accelerate
21 the installation of a groundwater system to treat
22 1,4-dioxane and VOCs as a non-time-critical removal
23 action prior to implementing the full proposed
24 remedy for the site. With adequate monitoring to

1 ensure that the treated water introduced to the
2 Assabet River is not polluted, we believe the action
3 is protective of the Assabet River and an aquifer
4 that the Town of Acton relies upon for drinking
5 water.
6 Based upon information obtained while
7 completing the RI, EPA determined that significant
8 levels of contamination exist in the northeast
9 wetland and southwest portion of the sphagnum bog
10 and that there was no practical alternative to
11 conducting work in the wetland areas.
12 CREW agrees with EPA's determination
13 that the cleanup activities proposed for these areas
14 are the least damaging practical alternatives. CREW
15 expects that EPA will employ best management
16 practices to minimize harmful impacts to the area
17 and that the wetlands will be restored or replicated
18 where feasible.
19 During the RI it was assumed that the
20 final remedy for the site would include complete
21 removal and off-site disposal of material in the old
22 landfill; therefore, the old landfill was not
23 characterized with the same level of detail as the
24 rest of the site.

1 The proposed plan currently includes
2 excavating four to six feet of material from the old
3 landfill. CREW's preference is that the landfill
4 area and associated debris and soil be completely
5 excavated and removed from the property and placed
6 into the landfill that was specifically sited and
7 engineered to handle this type of material.
8 CREW expects that all landfill and
9 associated soil/material will be removed vertically
10 and additional characterization of the remaining
11 soil/material will be conducted on a scale similar
12 to the RI to show that any remaining material meets
13 cleanup goals.
14 Available information suggests that it
15 is very likely that impacted soil and utilities are
16 present beneath the site building. CREW recognizes
17 that it was not practical to investigate conditions
18 beneath the buildings while the RI was being
19 completed.
20 The proposed plan currently includes the
21 investigation and off-site removal of four to six
22 feet of material from beneath each building. CREW
23 expects that all soils impacted by elevated
24 concentrations of site contaminants that are

1 encountered beneath the site buildings will be
2 excavated and disposed of off-site.
3 Although not specifically addressed in
4 the proposed plan, it is CREW's understanding that
5 miscellaneous depleted uranium billets were recently
6 found at unexpected locations on the site. CREW
7 expects that prior to the start of on-site remedial
8 actions, additional surveys will be completed to
9 evaluate further the possible presence of
10 miscellaneous depleted uranium billets around the
11 property.
12 Finally, CREW conditionally accepts the
13 in-situ treatment of DU-impacted groundwater that is
14 included in the proposed plan because the DU plume
15 movement in groundwater is slow. Since the apatite
16 injection in-situ treatment method selected for the
17 site has not received widespread application to
18 date, however, we expect that the proposed plan will
19 include a robust monitoring program to demonstrate
20 that the remedy is effective.
21 In addition, we recommend that the USEPA
22 amend the proposed plan to include a contingent
23 remedy for DU in groundwater that could be designed
24 and readily available if the selected remedy fails.

In conclusion, we appreciate USEPA's continuing efforts to provide CREW and the local community with opportunities to participate in the Superfund process at the NMI site. We look forward to continuing our work with EPA at the site and facilitating the successful implementation of the proposed plan. Thank you.

MR. CIANCIARULO: Thank you.

MR. MOSTOLLER: Good evening. My name is Matthew Mostoller. I'm the environmental manager for the Acton water District, 693 Massachusetts Avenue, Acton, Massachusetts.

First of all, I'd like to thank EPA for giving us the opportunity to speak this evening. We obviously have come late to the game relative to this site, but we do feel like we have been given quite a bit of information, and we appreciate being pulled into the cleanup process here.

Tonight I'm just going to briefly go through some of our concerns. We're working with our environmental consultant to come up with a more comprehensive review of the proposed remedial actions, but conceptually we do support the timely cleanup of the 1,4-dioxane and the VOC plume that

1 you can see here.
2 Admittedly, we have not given much
3 consideration to the on-site cleanup actions as we
4 don't see those being as prominent of a concern to
5 the water supply.
6 The reason that we conceptually support
7 the timely cleanup is we do have some concerns that
8 actually Jane Ceraso from ACES laid out pretty well
9 about our experience with the W.R. Grace cleanup.
10 There was some inadequate characterization that
11 occurred that created an ongoing contamination issue
12 that created greater risk to our customers and
13 ultimately cost more money both to the district and
14 to the cleanup efforts, and we would like to avoid
15 that.
16 So one of the things that we're looking
17 for is a better characterization of the aquifer in
18 this area. We believe, based on the data that we've
19 seen, that both the water quality data and some of
20 the subsurface investigation data has gaps in it.
21 Specifically, we have concerns about the
22 ongoing contribution of bedrock to the overburden
23 aquifer. We would like to understand the river area
24 better. Through a number of years working on the

1 W.R. Grace site, that cleanup process always said,
2 "Well, what's on the other side of the river isn't
3 our issue, and that can get dealt with in other
4 remedial cleanup actions." And, well, we view this
5 as that cleanup action coming due, so we would like
6 to understand what's going on relative to the river
7 interface better.
8 Additionally, there currently are
9 concentrations of 1,4-dioxane that are above the
10 proposed remediation goal on the northwestern side
11 of the river, and we believe that that should be
12 part of the cleanup in addition to the parts of the
13 plume on the southeast side of the river.
14 Furthermore, for 30 years there have
15 been certain assumptions made about the hydrogeology
16 in this area. In the past ten years, we have seen
17 some of those assumptions aren't necessarily true as
18 we once believed. In fact, we're starting to review
19 the Zone 2 delineations for our Assabet well field,
20 and we believe that during the course of that
21 redelineation, a better understanding of what's
22 happening in this area will be brought forth.
23 We do request participation in the
24 design of this remediation system. Additionally, we

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1 would like a seat at the table relative to the
2 ongoing monitoring that's been discussed as part of
3 this remedial alternative.
4 And we would also like to understand the
5 impacts of the ongoing withdrawal of water from
6 these aquifers relative to the flow in the Assabet
7 River, the potential impacts to the yield of our
8 wells and also to the ultimate discharge of that
9 treated water.
10 Finally, we would like to thank EPA for
11 extending the comment deadline. We certainly
12 appreciate that. Again, coming into the process
13 late, getting our environmental consultant and other
14 interested parties up to speed is greatly
15 appreciated. And again, we will be submitting
16 formal written comments before the deadline. Thank
17 you.
18 MR. CIANCIARULO: Thank you.
19 MR. Personal Privacy / Ex. 6 Hi. My name is Personal Privacy / Ex. 6
20 Personal Privacy / Ex. 6. I've been a long-term supporter and
21 member of CREW, although tonight I'm speaking as an
22 individual; I'm not representing CREW. Personal Privacy / Ex. 6
23 Personal Privacy / Ex. 6
24 The EPA under -- is recommending under

1 Soil Sediment Plan No. 4 -- asking us to approve it
2 to be used at the Starmet/NMI site.
3 This plan does not provide for any
4 removal of the 12,500 cubic yards of the depleted
5 uranium contaminated unsaturated soil that is
6 currently in the holding basin. Nor does Sediment
7 Plan No. 4 provide for any removal of the 20,000
8 cubic yards of the depleted uranium contaminated
9 saturated soil that also resides in the holding
10 basin.
11 The EPA wants to keep over 32,500 cubic
12 yards of depleted uranium contaminated soil inside
13 the holding basin forever. I find this totally
14 unacceptable.
15 Secondly, the EPA wants to treat
16 contaminated soils outside the holding basin with a
17 process called Apatite II injections. This
18 technology was used in Hanford, Washington, but some
19 of the results are disturbing.
20 When these injections are performed,
21 there can be a reaction of the soil's organic matter
22 with the fishbone-based Apatite II material. This
23 reaction can result in a reduction of the soil's
24 biomass. When this reduction occurs, the previously

1 bound depleted uranium could in fact return to the
2 soil.
3 Clearly, more work needs to be done
4 before we jump into the use of Apatite II injection
5 technology at the NMI/Starmet site.
6 MR. Personal Privacy / Ex. 6: Good evening. My name is
7 Personal Privacy / Ex. 6 I live at Personal Privacy / Ex. 6 in
8 Concord. I am an engineer by training, 42 years,
9 give or take another year, practicing underground
10 construction throughout Boston and the U.S.
11 I've read through the summary report and
12 some of the feasibility report; and as a result, I
13 have some concerns. Number one, though, I do
14 support the concept of containing the DU on-site
15 with a permanent retaining wall and also the in-situ
16 treatment of the DU, and thirdly, the use of
17 recovery wells to treat the 1,4-dioxane and other
18 VOCs. I think that's a reasonable plan.
19 I do have some concerns about some of
20 the details of what is proposed, and I do think
21 there is a solution; and I am going to present that.
22 And I have a written comment to present tonight, and
23 I'd like to review a few of those recommendations.
24 Number one, I would recommend using a,

1 what is called a concrete slurry wall to enclose the
2 radioactive DU around the old holding basin or
3 sludge pit.
4 Number two, I would recommend using an
5 installation method that excavates the wall in
6 individual panels and includes both what's called a
7 hydromill and clamshell to excavate the soil and
8 rock in order to create a keyway into the rock.
9 I would not recommend that we use a
10 soil/cement/bentonite wall as the underground
11 containment wall.
12 I think the proposed solutions, at least
13 a part of them, should be implemented as soon as
14 possible; for example, the wall is a good concept,
15 and we should go forward with that, and that is not
16 an impossible thing to activate quickly.
17 Likewise, the wells; they also are a
18 conventional procedure, and they should be
19 implemented quickly. I think at the last meeting a
20 date of 2016 was proposed for some remedial response
21 activities. In my mind that is very slow. Some of
22 our development work in Boston where we put slurry
23 walls around buildings would never tolerate a
24 schedule such as that.

1 So a little more detail on some of the
2 recommendations. I don't recommend that we select
3 the soil/bentonite wall as a permanent solution. I
4 have concerns about the vertical settlement of the
5 wall and about the homogeneity of the wall when it,
6 with time, becomes irregularly permeable, and I
7 don't believe that we can create a sound key at the
8 bottom of the wall.
9 The wall is proposed to be something
10 like 90 feet deep, and the soil is placed by
11 end-dumping in a manner that lets the soil travel
12 down the slope so at the bottom of the slope you
13 collect all the coarse, large-sized particles, and
14 this is just where you want the best conditions and
15 the finest soils. And there's no way to check the
16 conditions under construction since it's at the
17 bottom of the 90-foot slope. I don't recommend this
18 method.
19 We should use a concrete slurry wall
20 which is keyed into rock, and it should be excavated
21 conventional equipment, clamshell or hydromill,
22 which will allow us to clearly cut a slot in the
23 underlying bedrock.
24 And by excavating the wall in panels and

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1 using proper techniques, we can create a watertight
2 enclosure that is both concrete and solid; and we
3 should provide additives such as bentonite to
4 further reduce the permeability of the wall so for
5 longevity that wall is solid, it's going to be there
6 for that 200-year lifetime which was proposed.
7 I think we should confirm the use of
8 apatite as a stabilizing agent. From learning and
9 reading some of the Hanford work, I'm puzzled about
10 how it was used. At one point it appeared that the
11 way it was proposed to be used was to inject the
12 components of apatite, calcium, phosphorus and
13 hydroxide, into the ground and let the chemicals
14 react and precipitate in the site to form an apatite
15 crystal.
16 I think it was intended at that point
17 that the crystal would absorb in that case Strontium
18 90, which was the chemical of concern out there,
19 into the apatite and fix it in place. I'm not sure
20 if that procedure is supposed to be used in our
21 case, which is below the groundwater table; so I
22 don't know how apatite is going to be used, and I
23 don't know its effectiveness.
24 So I will concur that we need to monitor

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1 the soil and VOCs for any long-term release of the
2 DU from any soil layers that are not stabilized by
3 the apatite, and that we should provide for a
4 minimum of secondary and tertiary routing of the
5 soil and rock layers as needed to further contain
6 the release of DU.
7 We should also consider installation of
8 a safety net downstream, reactive -- either a
9 reactive wall or a cement grout barrier wall to
10 further trap any DU that may escape from untreated
11 layers in the soil.
12 Remember, this soil deposit contains
13 sand, silty sand, clay, so when something is
14 injected into the ground, it's a natural thing that
15 the chemical will be injected into the coarsest
16 layers first, and the silty layers will not accept
17 any injection.
18 So it's going to be a random process.
19 The only way to beat that is to use second- and
20 third-level graveling and try and make that a more
21 uniform distribution of chemicals. But I suspect in
22 the end there's still going to be a certain
23 percentage that's free to migrate, so we must be
24 prepared to trap that.

1 Finally, I think we have to clearly
2 prepare both a written and electronic design summary
3 and operation manual for use by future generations.
4 I know it sounds a little silly to talk about, but
5 I've looked at a lot of dams throughout New England
6 and looked at operation manuals that tell people
7 what to do.
8 We're talking about turning this project
9 over to generations in the future, and really, those
10 operation manuals usually reside on shelves
11 somewhere, and no one can remember what to do. So
12 it needs to be clearly and simply prepared, making
13 it simple and obvious for our future operators to
14 manage this project.
15 That summarizes some high points of my
16 concerns. I have additional, more detailed
17 recommendations contained in the report, which I
18 will be glad to submit; and if you're interested in
19 this, I can certainly make a copy available by
20 email. Thank you.
21 MR. CIANCIARULO: Others wishing to make
22 comments?
23 MR. Personal Privacy / Ex. 6 I'm Personal Privacy / Ex. 6 I
24 live at Personal Privacy / Ex. 6 I'm here

1 tonight as a representative of OARS. OARS is a
2 nonprofit organization, advocacy group for the
3 Assabet, Concord and Sudbury Rivers, so my comments
4 will be specifically focused on the potential
5 impacts of the project to the Assabet River.
6 We are greatly gratified with the
7 results which have been completed to date that
8 indicate that the Nuclear Metals site has not
9 adversely impacted the Assabet, and we want to
10 ensure going forward that the selected remedy does
11 not change that.
12 To that effect, the -- we support the
13 groundwater treatment system to contain the
14 1,4-dioxane and VOC plume. It would be our
15 preference that any treated effluent from this
16 system is discharged to groundwater rather than
17 being discharged directly to the Assabet to the
18 extent that that is feasible.
19 If the review process ends up in there
20 being groundwater -- excuse me, surface water
21 discharge, we trust that the permitting review
22 process will ensure that the discharge limit set
23 will be entirely protective of the Assabet, that
24 there will be no adverse effects from any future

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1 discharges. Thank you.
2 MR. CIANCIARULO: Thank you.
3 REPRESENTATIVE ATKINS: Good evening. I
4 am Cory Atkins. I live at Personal Privacy / Ex. 6
5 Mass. I am also the state representative for the
6 Fourteenth Middlesex District, and I am here to
7 reinforce the views of my colleagues, who I
8 understand have testified this evening, that the
9 cleanup should be done to residential standards, and
10 that the dirt and material be shipped off-site, and
11 that an accelerated program be put in place so that
12 the plume does not reach the Assabet River.
13 I also would like to take this
14 opportunity for the few seconds that I've had to
15 gaze around the room; there are people here who have
16 worked on this issue for more than two decades, and
17 I just want to applaud them for their efforts and
18 just their persistence, and the Town of Concord owes
19 them a great deal. So thank you.
20 MR. CIANCIARULO: Others wishing to
21 comment before we close the hearing?
22 (No response.)
23 MR. CIANCIARULO: Hearing none, you have
24 until I walk up to that podium.

(Laughter.)

MR. CIANCIARULO: Okay. If there's no one else wishing to make a comment, we're going to formally close the hearing. I appreciate your input and your involvement in the process. As a reminder, the public comment period will close on January 14, 2014. The hearing is now officially closed.

(Concluded at 7:35 p.m.)

C E R T I F I C A T E

I, Joan M. Cassidy, Registered Professional Reporter, do hereby certify that the foregoing transcript is a true and accurate transcription of my stenographic notes taken on December 10, 2014.

_____ _____

Date Joan M. Cassidy, RPR/CRR

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APPENDIX A

MASSDEP CONCURRENCE LETTER

Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

One Winter Street Boston, MA 02108 • 617-292-5500

Charles D. Baker
Governor

Karyn E. Polito
Lieutenant Governor

Matthew A. Beaton
Secretary

Martin Suuberg
Commissioner

September 25, 2015

Mr. Robert Cianciarulo.
Office of Site Remediation and Restoration
U.S. Environmental Protection Agency, Region 1
5 Post Office Square
Boston, MA 02109

Re: State Concurrence Determination
Record of Decision – Nuclear Metals Superfund Site
Concord, Massachusetts

Dear Mr. Cianciarulo:

The Department of Environmental Protection (MassDEP) has reviewed the Record of Decision (ROD) and the selected remedy recommended by the U.S. Environmental Protection Agency (EPA) for the Nuclear Metals Superfund Site date September 2015. For the reasons described below, MassDEP concurs with the recommended remedy for the Site.

The remedy set forth in the ROD addresses threats due to soils exposure and releases of contaminants from soils to other media such as groundwater and sediment. The components to the remedy are:

1. Excavation and off-site disposal of approximately 82,500 cubic yards of contaminated sediments, underground drain lines and debris, and non-Holding Basin soils (contaminated with depleted uranium (DU), polychlorinated biphenyls (PCBs) and other contaminants of concern) in various areas of the Site;

2. *In-Situ* stabilization of DU contaminated soils in the Holding Basin via injection of a stabilization agent such as Apatite II or other comparable stabilization agent to prevent leaching of contaminants to groundwater, and containment of Holding Basin stabilized soils with a low-permeability vertical wall and horizontal sub-grade cover to isolate the

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MassDEP Website: www.mass.gov/dep

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stabilized soils and further limit mobility of contaminants by removing the flow of groundwater;

3. Extraction and *ex-situ* treatment of volatile organic compounds (VOCs) and 1,4-dioxane in overburden and bedrock aquifers, and *in-situ* treatment of depleted uranium in overburden aquifer and natural uranium in bedrock aquifer;

4. Long-term monitoring to monitor effectiveness of *in-* and *ex-situ* treatment; and

5. Institutional Controls to: 1) prevent unacceptable exposures to, and to prevent disturbance of, the Holding Basin area; 2) prohibit use of contaminated groundwater until cleanup levels are met; and 3) require installation of vapor mitigation systems should future structures be built above the VOC plume before groundwater cleanup levels are met, unless an evaluation of vapor intrusion risks is performed to show such systems are not required.

The selected remedy addresses principal and low-level threat wastes at the site by: 1) the stabilization and containment of source soils in the Holding Basin to eliminate exposure to and leaching from the Holding Basin soils; 2) the excavation and off-site disposal of remaining contaminated soils and sediments to eliminate exposure to these soils and sediments; 3) *ex-situ* and *in-situ* treatment of contaminated groundwater to restore groundwater to levels protective of human health and the environment.

The selected remedy is a comprehensive approach for this site that addresses all current and potential future risks caused by soil sediment, and groundwater contamination. The plan is based on the maximum reuse of the site.

The Department agrees with the conclusions in the ROD, and therefore, DEP concurs with the EPA's selection of the remedy.

If you have any questions regarding this letter, please contact Mr. Garry Waldeck, Project Manager at (617) 348-4017 or Mr. Jay Naparstek, Deputy Division Director at (617) 292-5697.

Very truly yours,

Paul W. Locke
Acting Assistant Commissioner
Bureau of Waste Site Cleanup
Department of Environmental Protection

Copies to:

Jay Naparstek, MADEP Boston
Garry Waldeck, MADEP
Mellissa Taylor, USEPA

APPENDIX B

TABLES

ROD RISK WORKSHEET

Table G-1

Summary of Chemical of Concern and Medium-Specific Exposure Point Concentration

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Point	Chemical of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Minimum	Maximum					(1)
Cooling Pond								
	Aroclor-1254	0.436	366	mg/kg	6 / 6	366	mg/kg	Max

Key

(1) Statistics: Maximum Detected Value (Max); 95% UCL (95% UCL); Arithmetic Mean (Mean)

The table represents the current/future chemicals of concern (COCs) and exposure point concentrations (EPCs) for the COCs detected in sediment (i.e., the concentrations that will be used to estimate the exposure and risk for each COC in sediment). The table includes the range of concentrations detected for each COC, as well as the frequency of detection (i.e., the number of times the chemical was detected in the samples collected at the site), the EPC, and how the EPC was derived. This table indicates that Aroclor-1254 is the only COC in the Cooling Pond sediment. The maximum detected concentration was used as the EPC.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

Table G-2

Summary of Chemical of Concern and Medium-Specific Exposure Point Concentration

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point	Chemical of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Minimum	Maximum					(1)
AOI 14 North								
	Aroclor-1254	0.0077	4.91	mg/kg	6 / 8	3.5	mg/kg	95% UCL
	Aroclor-1260	0.0266	1.67	mg/kg	5 / 8	0.85	mg/kg	95% UCL
AOI 8 Sweepings Area								
	Benzo(a)pyrene	0.0187	0.307	mg/kg	13 / 26	0.12	mg/kg	95% UCL
	Aroclor-1254	0.0031	23.5	mg/kg	24 / 24	16.2	mg/kg	95% UCL
	Aroclor-1260	0.0058	3	mg/kg	19 / 24	2.37	mg/kg	95% UCL
	Arsenic	2.8	14.1	mg/kg	28 / 29	8.7	mg/kg	95% UCL
	Uranium (3)	1.1	311	mg/kg	29 / 29	82	mg/kg	95% UCL
	Uranium-238+D	--	--	pCi/g	--	27	pCi/g	(2)
	Uranium-235+D	--	--	pCi/g	--	0.36	pCi/g	(2)
	Uranium-234	--	--	pCi/g	--	4.6	pCi/g	(2)
	Thorium (3)	2.4	7.85	mg/kg	29 / 29	5.1	mg/kg	95% UCL
	Thorium-232	--	--	pCi/g	--	0.56	pCi/g	(2)
	Radium-228+D	--	--	pCi/g	--	0.56	pCi/g	(2)
	Thorium-228+D	--	--	pCi/g	--	0.56	pCi/g	(2)
AOI 7 & 11 Industrial Area East								
	Benzo(a)pyrene	0.0186	1.85	mg/kg	17 / 32	0.368	mg/kg	95% UCL
	Benzo(b)fluoranthene	0.0177	3.04	mg/kg	18 / 32	0.925	mg/kg	95% UCL
	Aroclor-1254	0.0012	9.07	mg/kg	20 / 22	2.6	mg/kg	95% UCL
	Arsenic	2	18	mg/kg	36 / 36	7.13	mg/kg	95% UCL
	Uranium	1.4	5070	mg/kg	36 / 36	793	mg/kg	95% UCL
	Uranium-238+D	--	--	pCi/g	--	265	pCi/g	(2)
	Uranium-235+D	--	--	pCi/g	--	3.4	pCi/g	(2)
	Uranium-234	--	--	pCi/g	--	45	pCi/g	(2)
	Thorium (3)	3.4	9.3	mg/kg	36 / 36	5.5	mg/kg	95% UCL
	Thorium-232	--	--	pCi/g	--	0.61	pCi/g	(2)
	Radium-228+D	--	--	pCi/g	--	0.61	pCi/g	(2)
	Thorium-228+D	--	--	pCi/g	--	0.61	pCi/g	(2)
AOI 2 & 4 Soils Area at Cooling Pond								
	Benzo(a)pyrene	0.0282	0.261	mg/kg	7 / 8	0.261	mg/kg	Max
	Aroclor-1254	0.0535	12.2	mg/kg	17 / 20	6.9	mg/kg	95% UCL
	Aroclor-1260	0.0187	38.1	mg/kg	19 / 20	28	mg/kg	95% UCL
	Arsenic	5.4	31.8	mg/kg	13 / 13	16.4	mg/kg	95% UCL
	Uranium (3)	4.5	46.1	mg/kg	14 / 14	31	mg/kg	95% UCL
	Uranium-238+D	--	--	pCi/g	--	10	pCi/g	(2)
	Uranium-235+D	--	--	pCi/g	--	0.14	pCi/g	(2)
	Uranium-234	--	--	pCi/g	--	1.8	pCi/g	(2)
	Thorium (3)	3.4	6.9	mg/kg	13 / 13	5.3	mg/kg	95% UCL
	Thorium-232	--	--	pCi/g	--	0.58	pCi/g	(2)
	Radium-228+D	--	--	pCi/g	--	0.58	pCi/g	(2)
	Thorium-228+D	--	--	pCi/g	--	0.58	pCi/g	(2)

Table G-2

Summary of Chemical of Concern and Medium-Specific Exposure Point Concentration

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface Soil

Exposure Point	Chemical of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Minimum	Maximum					(1)
Rt 62 Outfall and Embayment Area								
	Benzo(a)anthracene	0.849	4.12	mg/kg	4 / 9	2.1	mg/kg	95% UCL
	Benzo(a)pyrene	0.336	4.41	mg/kg	9 / 9	2.2	mg/kg	95% UCL
	Benzo(b)fluoranthene	0.221	6.82	mg/kg	9 / 9	3.5	mg/kg	95% UCL
	Indeno(1,2,3-cd)pyrene	0.222	2.19	mg/kg	8 / 9	1.0	mg/kg	95% UCL
	Arsenic	3	10.2	mg/kg	9 / 9	7.5	mg/kg	95% UCL
	Thorium (3)	2.9	7.8	mg/kg	9 / 9	5.3	mg/kg	95% UCL
	Thorium-232	--	--	pCi/g	--	0.58	pCi/g	(2)
	Radium-228+D	--	--	pCi/g	--	0.58	pCi/g	(2)
	Thorium-228+D	--	--	pCi/g	--	0.58	pCi/g	(2)
AOI 1 Holding Basin								
	Arsenic	2.9	15.8	mg/kg	26 / 26	8.29	mg/kg	95% UCL
	Uranium	1.2	1502	mg/kg	98 / 98	301	mg/kg	95% UCL
	Uranium-238+D	--	--	pCi/g	--	101	pCi/g	(2)
	Uranium-235+D	--	--	pCi/g	--	1.3	pCi/g	(2)
	Uranium-234	--	--	pCi/g	--	17	pCi/g	(2)
	Thorium (3)	0.84	24.7	mg/kg	24 / 26	7.35	mg/kg	95% UCL
	Thorium-232	--	--	pCi/g	--	0.81	pCi/g	(2)
	Radium-228+D	--	--	pCi/g	--	0.81	pCi/g	(2)
	Thorium-228+D	--	--	pCi/g	--	0.81	pCi/g	(2)

Key

(1) Statistics: Maximum Detected Value (Max); 95% UCL (95% UCL); Arithmetic Mean (Mean)

(2) Isotopes/decay products calculated from total concentrations (see Appendix D-2 in Baseline HHRA)

(3) Not a chemical of concern (COC), however isotopes/decay product concentrations calculated from total concentrations (see Appendix D-2 in Baseline HHRA), so basis information presented.

The table represents the future chemicals of concern (COCs) and exposure point concentrations (EPCs) for each of the COCs detected in surface soil at the following Areas of Interest: AOI 14 North, AOI 8 Sweepings Area, AOI 7 & 11 Industrial Area East, AOI 2 & 4 Soils Area at Cooling Pond, Rt 62 Outfall and Embayment Area, and AOI 1 Holding Basin (i.e., the concentrations that will be used to estimate the exposure and risk for each COC in surface soil). The table includes the range of concentrations detected for each COC, as well as the frequency of detection (i.e., the number of times the chemical was detected in the samples collected at the site), the EPC, and how the EPC was derived. This table indicates that: Aroclor-1254 and Aroclor-1260 are the only COCs in surface soil at AOI 14 North; benzo(a)pyrene, Aroclor-1254, Aroclor-1260, arsenic, uranium isotopes/decay products, and thorium isotopes/decay products are the only COCs in surface soil at the AOI 8 Sweepings Area; benzo(a)pyrene, benzo(b)fluoranthene, Aroclor-1254, arsenic, uranium (and its isotopes/decay products), and thorium isotopes/decay products are the only COCs in surface soil at the AOI 7 & 11 Industrial Area East; benzo(a)pyrene, Aroclor-1254, Aroclor-1260, arsenic, uranium isotopes/decay products, and thorium isotopes/decay products are the only COCs in surface soil at the AOI 2 & 4 Soils Area at Cooling Pond; benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, indeno(1,2,3-cd)pyrene, arsenic, and thorium isotopes/decay products are the only COCs in surface soil at the Rt 62 Outfall and Embayment Area; and arsenic, uranium (and its isotopes/decay products), and thorium isotopes/decay products are the only COCs in surface soil at the AOI 1 Holding Basin. The 95% UCL on the arithmetic mean was used as the EPC for all COCs. Isotope/decay product EPCs were calculated from the total uranium and thorium 95% UCL on the arithmetic mean.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

Table G-3

Summary of Chemical of Concern and Medium-Specific Exposure Point Concentration

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Subsurface Soil

Exposure Point	Chemical of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Minimum	Maximum					(1)
AOI 8 Sweepings Area								
	Aroclor-1254	0.0011	16.6	mg/kg	25 / 40	9.4	mg/kg	95% UCL
	Aroclor-1260	0.0016	2.24	mg/kg	20 / 40	1.3	mg/kg	95% UCL
AOI 7 & 11 Industrial Area East								
	Benzo(a)pyrene	0.0431	1.7	mg/kg	13 / 54	0.22	mg/kg	95% UCL
	Aroclor-1254	0.0012	44.1	mg/kg	16 / 27	18.2	mg/kg	95% UCL
	Aroclor-1260	0.0053	6.36	mg/kg	7 / 28	2.6	mg/kg	95% UCL
	Arsenic	1.3	13.3	mg/kg	67 / 67	5.2	mg/kg	95% UCL
	Uranium	0.9	3360	mg/kg	67 / 67	337	mg/kg	95% UCL
	Uranium-238+D	--	--	pCi/g	--	113	pCi/g	(2)
	Uranium-235+D	--	--	pCi/g	--	1.5	pCi/g	(2)
	Uranium-234	--	--	pCi/g	--	19	pCi/g	(2)
	Thorium (3)	3.5	34.5	mg/kg	67 / 67	7.3	mg/kg	95% UCL
	Thorium-232	--	--	pCi/g	--	0.80	pCi/g	(2)
	Radium-228+D	--	--	pCi/g	--	0.80	pCi/g	(2)
	Thorium-228+D	--	--	pCi/g	--	0.80	pCi/g	(2)
AOI 2 & 4 Soils Area at Cooling Pond								
	Benzo(a)pyrene	0.075	0.144	mg/kg	3 / 17	0.088	mg/kg	95% UCL
	Aroclor-1254	0.002	9.83	mg/kg	14 / 16	3.7	mg/kg	95% UCL
	Aroclor-1260	0.0096	22.9	mg/kg	10 / 16	16	mg/kg	95% UCL
	Arsenic	2.9	41	mg/kg	21 / 21	18	mg/kg	95% UCL
	Uranium (3)	1.4	51.7	mg/kg	21 / 21	29.3	mg/kg	95% UCL
	Uranium-238+D	--	--	pCi/g	--	9.8	pCi/g	(2)
	Uranium-235+D	--	--	pCi/g	--	0.13	pCi/g	(2)
	Uranium-234	--	--	pCi/g	--	1.6	pCi/g	(2)
	Thorium (3)	2.8	7.8	mg/kg	21 / 21	5.9	mg/kg	95% UCL
	Thorium-232	--	--	pCi/g	--	0.65	pCi/g	(2)
	Radium-228+D	--	--	pCi/g	--	0.65	pCi/g	(2)
	Thorium-228+D	--	--	pCi/g	--	0.65	pCi/g	(2)

Table G-3

Summary of Chemical of Concern and Medium-Specific Exposure Point Concentration

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Subsurface Soil

Exposure Point	Chemical of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Minimum	Maximum					(1)
AOI 1 Holding Basin								
	Arsenic	2.3	18.7	mg/kg	37 / 37	6.3	mg/kg	95% UCL
	Uranium	0.82	3400	mg/kg	152 / 152	359	mg/kg	95% UCL
	Uranium-238+D	--	--	pCi/g	--	120	pCi/g	(2)
	Uranium-235+D	--	--	pCi/g	--	1.6	pCi/g	(2)
	Uranium-234	--	--	pCi/g	--	20	pCi/g	(2)
	Thorium (3)	1.4	9	mg/kg	33 / 37	4.97	mg/kg	95% UCL
	Thorium-232	--	--	pCi/g	--	0.55	pCi/g	(2)
	Radium-228+D	--	--	pCi/g	--	0.55	pCi/g	(2)
	Thorium-228+D	--	--	pCi/g	--	0.55	pCi/g	(2)

Key

(1) Statistics: Maximum Detected Value (Max); 95% UCL (95% UCL); Arithmetic Mean (Mean)

(2) Isotopes/decay products calculated from total concentrations (see Appendix D-2 in Baseline HHRA)

(3) Not a chemical of concern (COC), however isotopes/decay product concentrations calculated from total concentrations (see Appendix D-2 in Baseline HHRA), so basis information presented.

The table represents the future chemicals of concern (COCs) and exposure point concentrations (EPCs) for each of the COCs detected in subsurface soil at the following Areas of Interest: AOI 8 Sweepings Area, AOI 7 & 11 Industrial Area East, AOI 2 & 4 Soils Area at Cooling Pond, and AOI 1 Holding Basin (i.e., the concentrations that will be used to estimate the exposure and risk for each COC in subsurface soil). The table includes the range of concentrations detected for each COC, as well as the frequency of detection (i.e., the number of times the chemical was detected in the samples collected at the site), the EPC, and how the EPC was derived. This table indicates that: Aroclor-1254 and Aroclor-1260 are the only COCs in subsurface soil at the AOI 8 Sweepings Area; benzo(a)pyrene, Aroclor-1254, Aroclor-1260, arsenic, uranium (and its isotopes/decay products), and thorium isotopes/decay products are the only COCs in subsurface soil at the AOI 7 & 11 Industrial Area East; benzo(a)pyrene, Aroclor-1254, Aroclor-1260, arsenic, uranium isotopes/decay products, and thorium isotopes/decay products are the only COCs in subsurface soil at the AOI 2 & 4 Soils Area at Cooling Pond; and arsenic, uranium (and its isotopes/decay products), and thorium isotopes/decay products are the only COCs in subsurface soil at the AOI 1 Holding Basin. The 95% UCL on the arithmetic mean was used as the EPC for all COCs. Isotope/decay product EPCs were calculated from the total uranium and thorium 95% UCL on the arithmetic mean.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

Table G-4

Summary of Chemical of Concern and Medium-Specific Exposure Point Concentration

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	Chemical of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Minimum (4)	Maximum		(4)			(1)
On-Property Bedrock Groundwater Plume Used As Tap Water								
	1,4-Dioxane	0.506	35.4	µg/L	22 / 49	35.4	µg/L	Max
	bis(2-Ethylhexyl)phthalate	2.49	13.3	µg/L	11 / 45	13.3	µg/L	Max
	1,1-Dichloroethane	0.184	15.7	µg/L	39 / 54	15.7	µg/L	Max
	Trichloroethene	0.277	10.8	µg/L	41 / 54	10.8	µg/L	Max
	Arsenic	0.96	59.5	µg/L	17 / 45	59.5	µg/L	Max
	Barium	5.6	4650	µg/L	45 / 45	4650	µg/L	Max
	Chromium	0.53	76.4	µg/L	23 / 45	76.4	µg/L	Max
	Cobalt	0.15	11.8	µg/L	44 / 45	11.8	µg/L	Max
	Iron	93	40500	µg/L	54 / 57	40500	µg/L	Max
	Manganese	1.6	1230	µg/L	52 / 55	1230	µg/L	Max
	Molybdenum	0.85	116	µg/L	42 / 45	116	µg/L	Max
	Nitrate as N	62	113000	µg/L	43 / 60	113000	µg/L	Max
	Nitrite as N	66	10600	µg/L	15 / 32	10600	µg/L	Max
	Uranium	0.001	217	µg/L	71 / 76	217	µg/L	Max
	Uranium-238+D	--	--	pCi/L	--	72	pCi/L	(2)
	Uranium-235+D	--	--	pCi/L	--	3.4	pCi/L	(2)
	Uranium-234	--	--	pCi/L	--	77	pCi/L	(2)
	Actinium-227+D	--	--	pCi/L	--	3.4	pCi/L	(2)
	Thorium-230	--	--	pCi/L	--	77	pCi/L	(2)
	Radium-226+D	--	--	pCi/L	--	77	pCi/L	(2)
	Lead-210	--	--	pCi/L	--	77	pCi/L	(2)
	Bismuth-210	--	--	pCi/L	--	77	pCi/L	(2)
	Polonium-210	--	--	pCi/L	--	77	pCi/L	(2)
	Thorium (3)	0.19	6.7	µg/L	17 / 45	6.7	µg/L	Max
	Thorium-232	--	--	pCi/L	--	0.74	pCi/L	(2)
	Radium-228+D	--	--	pCi/L	--	0.74	pCi/L	(2)
	Thorium-228+D	--	--	pCi/L	--	0.74	pCi/L	(2)
On-Property Bedrock Groundwater Used As Tap Water								
	bis(2-Ethylhexyl)phthalate	2.49	4.4	µg/L	11 / 45	4.4	µg/L	Max
	Trichloroethene	0.277	3.6	µg/L	41 / 54	3.6	µg/L	Max
	Arsenic	0.96	7.2	µg/L	17 / 45	7.2	µg/L	Max
	Iron	93	13500	µg/L	54 / 57	13500	µg/L	Max
	Manganese	1.6	352	µg/L	52 / 55	352	µg/L	Max
	Uranium	0.001	23.8	µg/L	71 / 76	23.8	µg/L	Max
	Uranium-238+D	--	--	pCi/L	--	7.9	pCi/L	(2)
	Uranium-235+D	--	--	pCi/L	--	0.37	pCi/L	(2)
	Uranium-234	--	--	pCi/L	--	8.5	pCi/L	(2)
	Actinium-227+D	--	--	pCi/L	--	0.37	pCi/L	(2)
	Thorium-230	--	--	pCi/L	--	8.5	pCi/L	(2)
	Radium-226+D	--	--	pCi/L	--	8.5	pCi/L	(2)
	Lead-210	--	--	pCi/L	--	8.5	pCi/L	(2)
	Bismuth-210	--	--	pCi/L	--	8.5	pCi/L	(2)
	Polonium-210	--	--	pCi/L	--	8.5	pCi/L	(2)
	Thorium (3)	0.19	0.98	µg/L	17 / 45	0.98	µg/L	Max
	Thorium-232	--	--	pCi/L	--	0.11	pCi/L	(2)
	Radium-228+D	--	--	pCi/L	--	0.11	pCi/L	(2)
	Thorium-228+D	--	--	pCi/L	--	0.11	pCi/L	(2)

Table G-4

Summary of Chemical of Concern and Medium-Specific Exposure Point Concentration

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	Chemical of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Minimum (4)	Maximum		(4)			(1)
On-Property Overburden Groundwater Plume Used As Tap Water								
	1,4-Dioxane	0.992	13	µg/L	14 / 147	13	µg/L	Max
	bis(2-Ethylhexyl)phthalate	2	9.18	µg/L	18 / 140	9.18	µg/L	Max
	Tetrachloroethene	0.11	60	µg/L	75 / 158	60	µg/L	Max
	Trichloroethene	0.258	13.5	µg/L	93 / 158	13.5	µg/L	Max
	Arsenic	0.84	12.8	µg/L	17 / 141	12.8	µg/L	Max
	Chromium	0.52	89	µg/L	53 / 141	89	µg/L	Max
	Cobalt	0.046	39.8	µg/L	128 / 141	39.8	µg/L	Max
	Copper	0.45	1590	µg/L	22 / 141	1590	µg/L	Max
	Iron	43.3	40400	µg/L	116 / 177	40400	µg/L	Max
	Manganese	0.51	884	µg/L	153 / 171	884	µg/L	Max
	Molybdenum	0.2	925	µg/L	66 / 141	925	µg/L	Max
	Nitrate as N	90	113000	µg/L	143 / 158	113000	µg/L	Max
	Nitrite as N	61	2130	µg/L	7 / 67	2130	µg/L	Max
	Uranium	0.01	5480	µg/L	132 / 188	5480	µg/L	Max
	Uranium-238+D	--	--	pCi/L	--	1833	pCi/L	(2)
	Uranium-235+D	--	--	pCi/L	--	24	pCi/L	(2)
	Uranium-234	--	--	pCi/L	--	308	pCi/L	(2)
	Thorium (3)	0.094	2.9	µg/L	30 / 141	2.9	µg/L	Max
	Thorium-232	--	--	pCi/L	--	0.32	pCi/L	(2)
	Radium-228+D	--	--	pCi/L	--	0.32	pCi/L	(2)
	Thorium-228+D	--	--	pCi/L	--	0.32	pCi/L	(2)
On-Property Overburden Groundwater Used As Tap Water								
	bis(2-Ethylhexyl)phthalate	2	4.1	µg/L	18 / 140	4.1	µg/L	Max
	Vinyl chloride	0.33	0.46	µg/L	2 / 158	0.46	µg/L	Max
	Arsenic	0.84	16.2	µg/L	17 / 141	16.2	µg/L	Max
	Cobalt	0.046	15.2	µg/L	128 / 141	15.2	µg/L	Max
	Iron	43.3	18200	µg/L	116 / 177	18200	µg/L	Max
	Manganese	0.51	1270	µg/L	153 / 171	1270	µg/L	Max
	Uranium (3)	0.01	4.5	µg/L	132 / 188	4.5	µg/L	Max
	Uranium-238+D	--	--	pCi/L	--	1.5	pCi/L	(2)
	Uranium-234	--	--	pCi/L	--	1.6	pCi/L	(2)
	Thorium-230	--	--	pCi/L	--	1.6	pCi/L	(2)
	Radium-226+D	--	--	pCi/L	--	1.6	pCi/L	(2)
	Lead-210	--	--	pCi/L	--	1.6	pCi/L	(2)
	Polonium-210	--	--	pCi/L	--	1.6	pCi/L	(2)
	Thorium (3)	0.094	2.3	µg/L	30 / 141	2.3	µg/L	Max
	Thorium-232	--	--	pCi/L	--	0.25	pCi/L	(2)
	Radium-228+D	--	--	pCi/L	--	0.25	pCi/L	(2)
	Thorium-228+D	--	--	pCi/L	--	0.25	pCi/L	(2)

Table G-4

Summary of Chemical of Concern and Medium-Specific Exposure Point Concentration

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Point	Chemical of Concern	Concentration Detected		Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
		Minimum (4)	Maximum		(4)			(1)
Off-Property Bedrock Groundwater Used As Tap Water								
	1,4-Dioxane	0.506	81.8	µg/L	22 / 49	81.8	µg/L	Max
	Trichloroethene	0.277	19.6	µg/L	41 / 54	19.6	µg/L	Max
	Vinyl chloride	0.375	0.375	µg/L	1 / 54	0.375	µg/L	Max
	Arsenic	0.96	6.1	µg/L	17 / 45	6.1	µg/L	Max
	Cobalt	0.15	28.4	µg/L	44 / 45	28.4	µg/L	Max
	Iron	93	31500	µg/L	54 / 57	31500	µg/L	Max
	Manganese	1.6	4130	µg/L	52 / 55	4130	µg/L	Max
	Nitrate as N	62	277000	µg/L	43 / 60	277000	µg/L	Max
	Uranium	0.001	19.9	µg/L	71 / 76	19.9	µg/L	Max
	Uranium-238+D	--	--	pCi/L	--	6.6	pCi/L	(2)
	Uranium-234	--	--	pCi/L	--	7.1	pCi/L	(2)
	Actinium-227+D	--	--	pCi/L	--	0.31	pCi/L	(2)
	Thorium-230	--	--	pCi/L	--	7.1	pCi/L	(2)
	Radium-226+D	--	--	pCi/L	--	7.1	pCi/L	(2)
	Lead-210	--	--	pCi/L	--	7.1	pCi/L	(2)
	Bismuth-210	--	--	pCi/L	--	7.1	pCi/L	(2)
	Polonium-210	--	--	pCi/L	--	7.1	pCi/L	(2)
	Thorium (3)	0.19	1.6	µg/L	17 / 45	1.6	µg/L	Max
	Thorium-232	--	--	pCi/L	--	0.18	pCi/L	(2)
	Radium-228+D	--	--	pCi/L	--	0.18	pCi/L	(2)
	Thorium-228+D	--	--	pCi/L	--	0.18	pCi/L	(2)
Off-Property Overburden Groundwater Used As Tap Water								
	1,4-Dioxane	0.992	42.2	µg/L	14 / 147	42.2	µg/L	Max
	bis(2-Ethylhexyl)phthalate	2	23.9	µg/L	18 / 140	23.9	µg/L	Max
	Trichloroethene	0.258	52.7	µg/L	93 / 158	52.7	µg/L	Max
	Arsenic	0.84	3.3	µg/L	17 / 141	3.3	µg/L	Max
	Iron	43.3	32800	µg/L	116 / 177	32800	µg/L	Max
	Uranium (3)	0.01	0.46	µg/L	132 / 188	0.46	µg/L	Max
	Lead-210	--	--	pCi/L	--	0.16	pCi/L	(2)
	Polonium-210	--	--	pCi/L	--	0.16	pCi/L	(2)
	Thorium (3)	0.094	1.6	µg/L	30 / 141	1.6	µg/L	Max
	Thorium-232	--	--	pCi/L	--	0.18	pCi/L	(2)
	Radium-228+D	--	--	pCi/L	--	0.18	pCi/L	(2)
	Thorium-228+D	--	--	pCi/L	--	0.18	pCi/L	(2)

Key

(1) Statistics: Maximum Detected Value (Max); 95% UCL (95% UCL); Arithmetic Mean (Mean)

(2) Isotopes/decay products calculated from total concentrations (see Appendix D-2 in Baseline HHRA)

(3) Not a chemical of concern (COC), however isotopes/decay product concentrations calculated from total concentrations (see Appendix D-2 in Baseline HHRA), so basis information presented.

(4) Minimum detected values and frequencies of detection were taken from Tables 3-4 and 3-5 in the Baseline HHRA and apply to the entire overburden and bedrock data sets, respectively.

Multiple results from each on-site monitoring well were treated as discrete samples.

The table represents the future chemicals of concern (COCs) and exposure point concentrations (EPCs) for each of the COCs detected in on- and off-property overburden and bedrock groundwater (i.e., the concentrations that will be used to estimate the exposure and risk for each COC in on- and off-property overburden and bedrock groundwater). The table includes the range of concentrations detected for each COC, as well as the frequency of detection (i.e., the number of times the chemical was detected in the samples collected at the site), the EPC, and how the EPC was derived. This table indicates that the inorganic chemicals, arsenic, barium, chromium, cobalt, copper, iron, manganese, molybdenum, nitrate, nitrite, uranium (and its isotopes/decay products), and thorium (and its isotopes/decay products), and the organic chemicals, 1,4-dioxane, bis(2-ethylhexyl)phthalate,1,1-dichloroethane,tetrachloroethene, trichloroethane, and vinyl chloride are the most frequently detected COCs in on- and off-property groundwater. The maximum detected concentration, identified assuming multiple results from each on- and off-property monitoring well were treated as discrete samples, was used as the EPC for each of the COCs detected in groundwater. Isotope/decay product EPCs were calculated from the total uranium and thorium maximum detection.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

Table G-5

Cancer Toxicity Data Summary

Pathway: Ingestion, Dermal

Chemical of Concern	Oral Cancer Slope Factor	Dermal Cancer Slope Factor	Slope Factor Units	Weight of Evidence/Cancer Guideline Description	Source	Date [1] (MM/DD/YYYY)
1,4-Dioxane	1.0E-01	1.0E-01	$(mg/kg\text{-}day)^{-1}$	Likely to be carcinogenic to humans	IRIS	03/03/15
Benzo(a)anthracene	7.3E-01	7.3E-01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	03/03/15
Benzo(a)pyrene	7.3E+00	7.3E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	03/03/15
Benzo(b)fluoranthene	7.3E-01	7.3E-01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	03/03/15
bis(2-Ethylhexyl)phthalate	1.4E-02	1.4E-02	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	03/03/15
Indeno(1,2,3-cd)pyrene	7.3E-01	7.3E-01	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	03/03/15
1,1-Dichloroethane	5.7E-03	5.7E-03	$(mg/kg\text{-}day)^{-1}$	C	CalEPA	03/03/15
Tetrachloroethene	2.1E-03	2.1E-03	$(mg/kg\text{-}day)^{-1}$	Likely to be carcinogenic to humans	IRIS	03/03/15
Trichloroethene	4.6E-02	4.6E-02	$(mg/kg\text{-}day)^{-1}$	Carcinogenic to humans	IRIS	03/03/15
Vinyl Chloride	7.2E-01	7.2E-01	$(mg/kg\text{-}day)^{-1}$	A	IRIS	03/03/15
Aroclor-1254	2.0E+00	2.0E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	03/03/15
Aroclor-1260	2.0E+00	2.0E+00	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	03/03/15
Arsenic	1.5E+00	1.5E+00	$(mg/kg\text{-}day)^{-1}$	A	IRIS	03/03/15
Barium	N/A	N/A	N/A	D	IRIS	03/03/15
Chromium	5.0E-01	1.3E-02	$(mg/kg\text{-}day)^{-1}$	Likely to be carcinogenic to humans	NJDEP	03/03/15
Cobalt	N/A	N/A	N/A	N/A	N/A	N/A
Copper	N/A	N/A	N/A	D	IRIS	03/03/15
Iron	N/A	N/A	N/A	N/A	N/A	N/A
Manganese	N/A	N/A	N/A	D	IRIS	03/03/15
Molybdenum	N/A	N/A	N/A	N/A	N/A	N/A
Uranium	N/A	N/A	N/A	N/A	N/A	N/A
Nitrate as N	N/A	N/A	N/A	N/A	N/A	N/A
Nitrite as N	N/A	N/A	N/A	N/A	N/A	N/A

Pathway: Inhalation

Chemical of Concern	Unit Risk	Units	Inhalation Cancer Slope Factor	Units	Weight of Evidence/Cancer Guideline Description	Source	Date [1] (MM/DD/YYYY)
1,4-Dioxane (used in BHHRA	7.7E-06	$(\mu g/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	NA	CalEPA	July 2009
1,4-Dioxane (updated) [2]	5.0E-06	$(\mu g/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	Likely to be carcinogenic to humans	IRIS	06/25/15
Benzo(a)anthracene	1.1E-04	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	B2	CalEPA	03/03/15
Benzo(a)pyrene	1.1E-03	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	B2	CalEPA	03/03/15
Benzo(b)fluoranthene	1.1E-04	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	B2	CalEPA	03/03/15
Indeno(1,2,3-cd)pyrene	1.1E-04	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	B2	CalEPA	03/03/15
1,1-Dichloroethane	1.6E-06	$(\mu g/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	C	CalEPA	03/03/15
Tetrachloroethene	2.6E-07	$(\mu g/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	Likely to be carcinogenic to humans	IRIS	03/03/15
Trichloroethene	4.1E-06	$(\mu g/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	Carcinogenic to humans	IRIS	03/03/15
Vinyl Chloride	4.4E-06	$(\mu g/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	A	IRIS	03/03/15
Aroclor-1254	5.7E-04	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	03/03/15
Aroclor-1260	5.7E-04	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	B2	IRIS	03/03/15
Arsenic	4.3E-03	$(ug/m^3)^{-1}$	N/A	$(mg/kg\text{-}day)^{-1}$	A	IRIS	03/03/15
Uranium	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Table G-5

Cancer Toxicity Data Summary

Pathway: External (Radiation)

Chemical of Concern	Cancer Slope or Conversion Factor	Exposure Route	Units	Weight of Evidence/Cancer Guideline Description	Source	Date (MM/DD/YYYY)
Ra-228+D	4.53E-06	External Exposure	Risk/year per pCi/g soil	A	HEAST	03/03/15
Th-228+D	7.76E-06	External Exposure	Risk/year per pCi/g soil	A	HEAST	03/03/15
Th-232	5.43E-07	External Exposure	Risk/year per pCi/g soil	A	HEAST	03/03/15
U-234	2.52E-10	External Exposure	Risk/year per pCi/g soil	A	HEAST	03/03/15
U-235+D	5.43E-07	External Exposure	Risk/year per pCi/g soil	A	HEAST	03/03/15
U-238+D	1.14E-07	External Exposure	Risk/year per pCi/g soil	A	HEAST	03/03/15
Ra-228+D	2.29E-09	Soil Ingestion	Risk/pCi soil	A	HEAST	03/03/15
Th-228+D	8.09E-10	Soil Ingestion	Risk/pCi soil	A	HEAST	03/03/15
Th-232	2.31E-10	Soil Ingestion	Risk/pCi soil	A	HEAST	03/03/15
U-234	1.58E-10	Soil Ingestion	Risk/pCi soil	A	HEAST	03/03/15
U-235+D	1.63E-10	Soil Ingestion	Risk/pCi soil	A	HEAST	03/03/15
U-238+D	2.10E-10	Soil Ingestion	Risk/pCi soil	A	HEAST	03/03/15
Ra-228+D	5.23E-09	Soil Inhalation	Risk/pCi soil	A	HEAST	03/03/15
Th-228+D	1.43E-07	Soil Inhalation	Risk/pCi soil	A	HEAST	03/03/15
Th-232	4.33E-08	Soil Inhalation	Risk/pCi soil	A	HEAST	03/03/15
U-234	1.14E-08	Soil Inhalation	Risk/pCi soil	A	HEAST	03/03/15
U-235+D	1.01E-08	Soil Inhalation	Risk/pCi soil	A	HEAST	03/03/15
U-238+D	9.35E-09	Soil Inhalation	Risk/pCi soil	A	HEAST	03/03/15
Ra-228+D	1.43E-09	Food Ingestion	Risk/pCi soil	A	HEAST	03/03/15
Th-228+D	4.22E-10	Food Ingestion	Risk/pCi soil	A	HEAST	03/03/15
Th-232	1.33E-10	Food Ingestion	Risk/pCi soil	A	HEAST	03/03/15
U-234	9.55E-11	Food Ingestion	Risk/pCi soil	A	HEAST	03/03/15
U-235+D	9.76E-11	Food Ingestion	Risk/pCi soil	A	HEAST	03/03/15
U-238+D	1.21E-10	Food Ingestion	Risk/pCi soil	A	HEAST	03/03/15
Ac-227+D	4.86E-10	Water Ingestion	Risk/pCi water	A	HEAST	03/03/15
Bi-210	8.92E-12	Water Ingestion	Risk/pCi water	A	HEAST	03/03/15
Pb-210	8.81E-10	Water Ingestion	Risk/pCi water	A	HEAST	03/03/15
Po-210	3.77E-10	Water Ingestion	Risk/pCi water	A	HEAST	03/03/15
Ra-226+D	3.86E-10	Water Ingestion	Risk/pCi water	A	HEAST	03/03/15
Ra-228+D	1.04E-09	Water Ingestion	Risk/pCi water	A	HEAST	03/03/15
Th-228+D	3.00E-10	Water Ingestion	Risk/pCi water	A	HEAST	03/03/15
Th-230	9.10E-11	Water Ingestion	Risk/pCi water	A	HEAST	03/03/15
Th-232	1.01E-10	Water Ingestion	Risk/pCi water	A	HEAST	03/03/15
U-234	7.07E-11	Water Ingestion	Risk/pCi water	A	HEAST	03/03/15
U-235+D	7.18E-11	Water Ingestion	Risk/pCi water	A	HEAST	03/03/15
U-238+D	8.71E-11	Water Ingestion	Risk/pCi water	A	HEAST	03/03/15

Table G-5

Cancer Toxicity Data Summary

Key

N/A: Not applicable

IRIS: Integrated Risk Information System, U.S. EPA

HEAST = Health Effects Assessment Summary Tables

NJDEP = New Jersey Department of Environmental Protection

CalEPA = California Environmental Protection Agency, Office of Environmental Health Hazard Assessment

EPA Group

A - Human carcinogen

B1 - Probable human carcinogen - Indicates that limited human data are available

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

E - Evidence of noncarcinogenicity

(1) Date indicates when source was last reviewed.

(2) 1,4-Dioxane was not classified as volatile at the time of the BHHRA, but has since been re-classified as volatile (USEPA, 2015). The Unit Risk has been utilized during development of cleanup levels.

For PCBs, the RME slope factor presented represents the upper-bound slope factor for high risk and persistence situations.

The slope factor for benzo(a)pyrene, along with the appropriate relative potency factor (USEPA, 1993), used for the other carcinogenic PAHs.

The slope factor presented for trichloroethene is the adult-based value. For early-life exposures, tumor-specific slope factor values of 9.3E-03 $(mg/kg\text{-}day)^{-1}$ for kidney tumors and 3.7E-02 $(mg/kg\text{-}day)^{-1}$ for combined liver tumors and non-Hodgkins lymphoma (NHL) are used in conjuction with age-dependent adjustment factors, as appropriate.

The unit risk presented for trichloroethene is the adult-based value. For early-life exposures, tumor-specific unit risk values of 1E-06 $(\mu g/m^3)^{-1}$ for kidney tumors and 3.1E-06 $(\mu g/m^3)^{-1}$ for combined liver tumors and non-Hodgkins lymphoma (NHL) are used in conjuction with age-dependent adjustment factors, as appropriate.

The slope factor for hexavalent chromium used for chromium, based on lack of speciation data.

Age-dependent adjustment factors are used in conjunction with toxicity values, as appropriate, for carcinogenic PAHs, chromium (evaluated as hexavalent chromium), trichloroethene, and vinyl chloride.

Soil ingestion cancer slope factors for the external (radiation) pathway are for whole population. Refer to the Table 10 in Appendix B of the FS for adult values.

This table provides the carcinogenic risk information which is relevant to the contaminants of concern in soil, sediment, indoor air, and groundwater. At this time, slope factors are not available for the dermal route of exposure. Thus, the dermal slope factors used in this assessment have been extrapolated from oral values. An adjustment factor is sometimes applied, and is dependent upon how well the chemical is absorbed via the oral route. Adjustments are particularly important for chemicals with less than 50% absorption via the ingestion route. However, adjustment is not necessary for the chemicals evaluated at this site, except for chromium (evaluated as hexavalent chromium) which has an adjustment factor of 0.025. For the remaining chemicals, the same oral slope factors as presented above were used as the dermal carcinogenic slope factors for these contaminants. Eleven of the COCs considered carcinogenic via the inhalation route were determined to be primary risk drivers for at least one exposure pathway evaluated at the site.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

Table G-6

Non-Cancer Toxicity Data Summary

Pathway: Ingestion, Dermal

Chemical of Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Dermal RfD	Dermal RfD Units	Primary Target Organ	Combined Uncertainty / Modifying Factors	Sources of RfD: Target Organ	Dates of RfD: Target Organ [1] (MM/DD/YYYY)
1,4-Dioxane	Chronic	3.0E-02	mg/kg-day	3.0E-02	mg/kg-day	Liver / Kidney	300	IRIS	03/03/15
Benzo(a)anthracene	Chronic	3.0E-02	mg/kg-day	3.0E-02	mg/kg-day	Kidney	3000	Surrogate	03/03/15
Benzo(a)pyrene	Chronic	3.0E-02	mg/kg-day	3.0E-02	mg/kg-day	Kidney	3000	Surrogate	03/03/15
Benzo(b)fluoranthene	Chronic	3.0E-02	mg/kg-day	3.0E-02	mg/kg-day	Kidney	3000	Surrogate	03/03/15
bis(2-Ethylhexyl)phthalate	Chronic	2.0E-02	mg/kg-day	2.0E-02	mg/kg-day	Liver	1000	IRIS	03/03/15
Indeno(1,2,3-cd)pyrene	Chronic	3.0E-02	mg/kg-day	3.0E-02	mg/kg-day	Kidney	3000	Surrogate	03/03/15
1,1-Dichloroethane	Chronic	2.0E-01	mg/kg-day	2.0E-01	mg/kg-day	Kidney	3000	PPRTV	03/03/15
Tetrachloroethene	Chronic	6.0E-03	mg/kg-day	6.0E-03	mg/kg-day	CNS	1000	IRIS	03/03/15
Trichloroethene	Chronic	5.0E-04	mg/kg-day	5.0E-04	mg/kg-day	Developmental / Immune System	10 to 1000	IRIS	03/03/15
Vinyl Chloride	Chronic	3.0E-03	mg/kg-day	3.0E-03	mg/kg-day	Liver	30	IRIS	03/03/15
Aroclor-1254	Chronic	2.0E-05	mg/kg-day	2.0E-05	mg/kg-day	Immune System	300	IRIS	03/03/15
Aroclor-1254	Subchronic	5.0E-05	mg/kg-day	5.0E-05	mg/kg-day	Immune System	300	IRIS	03/03/15
Aroclor-1260	Chronic	2.0E-05	mg/kg-day	2.0E-05	mg/kg-day	Immune System	300	IRIS	03/03/15
Aroclor-1260	Subchronic	5.0E-05	mg/kg-day	5.0E-05	mg/kg-day	Immune System	300	IRIS	03/03/15
Arsenic	Chronic	3.0E-04	mg/kg-day	3.0E-04	mg/kg-day	Skin	3	IRIS	03/03/15
Barium	Chronic	2.0E-01	mg/kg-day	1.4E-02	mg/kg-day	Kidney	300	IRIS	03/03/15
Chromium	Chronic	3.0E-03	mg/kg-day	7.5E-05	mg/kg-day	GI System	900	IRIS	03/03/15
Cobalt	Chronic	3.0E-04	mg/kg-day	3.0E-04	mg/kg-day	Thyroid	3000	PPRTV	03/03/15
Copper	Chronic	4.0E-02	mg/kg-day	4.0E-02	mg/kg-day	GI System	N/A	HEAST	FY 1997
Iron	Chronic	7.0E-01	mg/kg-day	7.0E-01	mg/kg-day	GI System	1.5	PPRTV	03/03/15
Manganese	Chronic	2.4E-02	mg/kg-day	9.6E-04	mg/kg-day	CNS	3	IRIS	03/03/15
Molybdenum	Chronic	5.0E-03	mg/kg-day	5.0E-03	mg/kg-day	Kidney	30	IRIS	03/03/15
Nitrate as N	Chronic	1.6E+00	mg/kg-day	1.6E+00	mg/kg-day	Hematological	1	IRIS	03/03/15
Nitrite as N	Chronic	1.0E-01	mg/kg-day	1.0E-01	mg/kg-day	Hematological	10	IRIS	03/03/15
Uranium	Chronic	6.0E-04	mg/kg-day	6.0E-04	mg/kg-day	Kidney	100	EPA Office of Water	03/03/15
Uranium (used in BHHRA)	Subchronic	2.0E-03	mg/kg-day	2.0E-03	mg/kg-day	Kidney	30	ATSDR	Feb 2012
Uranium (updated)	Subchronic	2.0E-04	mg/kg-day	2.0E-04	mg/kg-day	Kidney	300	ATSDR	03/03/15

Table G-6

Non-Cancer Toxicity Data Summary

Pathway: Inhalation

Chemical of Concern	Chronic/ Subchronic	Inhalation RfC	Inhalation RfC Units	Inhalation RfD	Inhalation RfD Units	Primary Target Organ	Combined Uncertainty / Modifying Factors	Sources of RfC: RfD: Target Organ	Dates (MM/DD/YYYY)
1,4-Dioxane (used in BHHRA	Chronic	30	µg/m^3	N/A	N/A	Liver	30	CalEPA	December 2008
1,4-Dioxane (updated) (3)	Chronic	30	µg/m^3	N/A	N/A	Respiratory System	1000	IRIS	06/25/15
Benzo(a)anthracene	Chronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Benzo(a)pyrene	Chronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Benzo(b)fluoranthene	Chronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Indeno(1,2,3-cd)pyrene	Chronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1,1-Dichloroethane (2)	Chronic	5000	µg/m^3	N/A	N/A	Kidney	100	HEAST	FY 1997
Tetrachloroethene	Chronic	40	µg/m^3	N/A	N/A	CNS	1000	IRIS	03/03/15
Trichloroethene	Chronic	2	µg/m^3	N/A	N/A	Developmental / Immune System	10 to 100	IRIS	03/03/15
Vinyl Chloride	Chronic	100	µg/m^3	N/A	N/A	Liver	30	IRIS	03/03/15
Aroclor-1254	Chronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Aroclor-1260	Chronic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic	Chronic	0.015	ug/m^3	N/A	N/A	Developmental	30	CalEPA	03/03/15
Uranium (used in BHHRA)	Chronic	0.3	ug/m^3	N/A	N/A	Kidney	90	ATSDR	Feb 2012
Uranium (updated)	Chronic	0.04	ug/m^3	N/A	N/A	Kidney	100	ATSDR	03/03/15
Uranium (used in BHHRA)	Subchronic	0.4	ug/m^3	N/A	N/A	Kidney	30	ATSDR	Feb 2012
Uranium (updated)	Subchronic	0.1	ug/m^3	N/A	N/A	Kidney	300	ATSDR	03/03/15

Key

N/A - No information available

IRIS: Integrated Risk Information System, U.S. EPA

PPRTV = Provisional Peer Reviewed Toxicity Value developed by STSC

HEAST = Health Effects Assessment Summary Tables

CalEPA = California Environmental Protection Agency, Office of Environmental Health Hazard Assessment

ATSDR = Agency for Toxic Substances and Disease Registry

(1) Date indicates when source was last reviewed.

(2) The RfC for 1,1-dichloroethane was used in the BHHRA, but has since been withdrawn from HEAST and therefore, has not been utilized for development of cleanup levels.

(3) 1,4-Dioxane was not classified as volatile at the time of the BHHRA, but has since been re-classified as volatile (USEPA, 2015). The RfC has been utilized during development of cleanup levels.

The RfD for Aroclor 1254 was used as a surrogate for Aroclor 1260 (High risk and persistence; upper-bound slope factor).

The RfD for pyrene was used as a surrogate for benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene.

The subchronic RfD and RfC for uranium and the chronic RfC for uranium have been updated since the baseline HHRA. Results presented on Risk Summary tables use the toxicity values and site-specific exposure parameters from the baseline HHRA. Refer to AECOM, 2015 technical memorandum for results adjusted based on updated toxicity values.

This table provides non-carcinogenic risk information which is relevant to the contaminants of concern in soil, sediment, indoor air, and groundwater. Twenty-three of the COCs have oral toxicity data (or surrogate toxicity data) indicating their potential for adverse non-carcinogenic health effects in humans. Chronic toxicity data available for the twenty-three COCs for oral exposures have been used to develop chronic oral reference doses (RfDs), provided in this table. The available chronic toxicty data indicate that trichloroethene and PCBs affect the immune system, 1,4-dioxane, bis(2-ethylhexyl)phthalate, and vinyl chloride affect the liver, 1,4-dioxane, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, indeno(1,2,3-cd)pyrene, 1,1-dichloroethane, barium, molybdenum, and uranium affect the kidney, tetrachloroethene and manganese affect the central nervous system, trichloroethene and arsenic are developmental toxicants, cobalt affects the thyroid, chromium, copper, and iron affect the gastrointestinal system, nitrate and nitrite affect the hematological system, and arsenic affects the skin. Dermal RfDs are not available for any of the COCs. As was the case for the carcinogenic data, dermal RfDs can be extrapolated from oral RfDs by applying an adjustment factor as appropriate. Oral RfDs were adjusted for COCs with less than 50% absorption via the ingestion route (barium, chromium, and manganese) to derive dermal RfDs for these COCs. Inhalation reference concentrations (RfCs) are available for six COCs evaluated for the inhalation pathway.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

Table G-7

Risk Characterization Summary - Non-Carcinogens

Scenario Timeframe: Current
Receptor Population: Trespasser
Receptor Age: Older Child/Adolescent

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Cooling Pond	Aroclor-1254	Immune System	1.7E+00	–	2.4E+00	4.1E+00
							Sediment Hazard Index Total =	4E+00
							Immune System Hazard Index =	4E+00

Key

N/A - Toxicity criteria are not available to quantitatively address this route of exposure.

-- Route of exposure is not applicable to this medium.

This table provides hazard quotients (HQs) for each route of exposure and the hazard index (sum of the hazard quotients) for all routes of exposure for a current older child/adolescent trespasser exposed to sediment in the Cooling Pond. The Risk Assessment Guidance for Superfund (RAGS) states that, generally, a hazard index (HI) of greater than 1 indicates the potential for adverse noncancer effects. The estimated target organ HI of 4 indicates that the potential for adverse effects could occur from exposure to contaminated sediment containing PCBs. Results presented use current toxicity values along with site-specific exposure parameters from the baseline HHRA.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

Table G-8

Risk Characterization Summary - Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk					
				Ingestion	Inhalation	Dermal	External (Radiation)	Produce Ingestion	Exposure Routes Total
Soil	Surface Soil	AOI 8 Sweepings Area							
			Benzo(a)pyrene	2.7E-06	1.7E-12	1.0E-06	--	--	3.7E-06
			Aroclor-1254	2.3E-05	4.1E-11	1.0E-05	--	--	3.4E-05
			Aroclor-1260	3.4E-06	6.0E-12	1.5E-06	--	--	4.9E-06
			Arsenic	9.4E-06	1.7E-10	8.9E-07	--	--	1.0E-05
			Uranium-238+D	3.3E-06	3.6E-09	--	2.6E-05	2.4E-06	3.2E-05
			Uranium-235+D	3.3E-08	5.3E-11	--	1.7E-06	2.6E-08	1.8E-06
			Uranium-234	4.2E-07	7.5E-10	--	9.9E-09	3.2E-07	7.5E-07
			Thorium-232	7.5E-08	3.4E-10	--	1.6E-09	2.2E-08	9.9E-08
			Radium-228+D	7.4E-07	4.2E-11	--	2.2E-05	9.4E-06	3.2E-05
			Thorium-228+D	2.6E-07	1.1E-09	--	3.7E-05	7.0E-08	3.7E-05
								Surface Soil Risk Total =	2E-04
								Total Risk =	2E-04
Soil	Surface Soil	AOI 7 & 11 Industrial Area East							
			Benzo(a)pyrene	8.2E-06	5.1E-12	3.2E-06	--	--	1.1E-05
			Benzo(b)fluoranthene	2.1E-06	1.3E-12	8.0E-07	--	--	2.9E-06
			Aroclor-1254	3.7E-06	6.6E-12	1.7E-06	--	--	5.4E-06
			Arsenic	7.7E-06	1.4E-10	7.3E-07	--	--	8.4E-06
			Uranium-238+D	3.2E-05	3.6E-08	--	2.6E-04	2.4E-05	3.1E-04
			Uranium-235+D	3.2E-07	4.9E-10	--	1.6E-05	2.4E-07	1.6E-05
			Uranium-234	4.1E-06	7.4E-09	--	9.7E-08	3.2E-06	7.4E-06
			Thorium-232	8.1E-08	3.8E-10	--	1.7E-09	2.4E-08	1.1E-07
			Radium-228+D	8.1E-07	4.6E-11	--	2.4E-05	1.0E-05	3.5E-05
			Thorium-228+D	2.9E-07	1.3E-09	--	4.0E-05	7.6E-08	4.1E-05
								Surface Soil Risk Total =	4E-04
								Total Risk =	4E-04

Table G-8

Risk Characterization Summary - Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk					
				Ingestion	Inhalation	Dermal	External (Radiation)	Produce Ingestion	Exposure Routes Total
Soil	Subsurface Soil	AOI 7 & 11 Industrial Area East							
			Benzo(a)pyrene	4.9E-06	3.1E-12	1.9E-06	--	--	6.8E-06
			Aroclor-1254	2.6E-05	4.6E-11	1.2E-05	--	--	3.8E-05
			Aroclor-1260	3.7E-06	6.6E-12	1.7E-06	--	--	5.4E-06
			Arsenic	5.6E-06	1.0E-10	5.3E-07	--	--	6.1E-06
			Uranium-238+D	1.4E-05	1.5E-08	--	1.1E-04	1.0E-05	1.3E-04
			Uranium-235+D	1.4E-07	2.2E-10	--	7.0E-06	1.1E-07	7.2E-06
			Uranium-234	1.7E-06	3.1E-09	--	3.2E-08	1.3E-06	3.1E-06
			Thorium-232	1.1E-07	5.0E-10	--	2.4E-09	3.1E-08	1.4E-07
			Radium-228+D	1.1E-06	6.0E-11	--	3.1E-05	1.3E-05	4.5E-05
			Thorium-228+D	3.8E-07	1.6E-09	--	5.3E-05	9.9E-08	5.3E-05
								Subsurface Soil Risk Total =	3E-04
								Total Risk =	3E-04
Soil	Surface Soil	AOI 2 & 4 Soils Area at Cooling Pond							
			Benzo(a)pyrene	5.8E-06	3.6E-12	2.6E-06	--	--	8.5E-06
			Aroclor-1254	9.9E-06	1.8E-11	4.4E-06	--	--	1.4E-05
			Aroclor-1260	4.0E-05	7.1E-11	1.8E-05	--	--	5.8E-05
			Arsenic	1.8E-05	3.1E-10	1.7E-06	--	--	1.9E-05
			Uranium-238+D	1.2E-06	1.3E-09	--	9.7E-06	8.9E-07	1.2E-05
			Uranium-235+D	1.3E-08	2.1E-11	--	6.5E-07	1.0E-08	6.7E-07
			Uranium-234	1.7E-07	2.9E-10	--	3.8E-09	1.2E-07	2.9E-07
			Thorium-232	7.8E-08	3.6E-10	--	1.7E-09	2.3E-08	1.0E-07
			Radium-228+D	7.7E-07	4.4E-11	--	2.2E-05	9.8E-06	3.3E-05
			Thorium-228+D	2.7E-07	1.2E-09	--	3.8E-05	7.2E-08	3.9E-05
								Surface Soil Risk Total =	2E-04
								Total Risk =	2E-04

Table G-8

Risk Characterization Summary - Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk					
				Ingestion	Inhalation	Dermal	External (Radiation)	Produce Ingestion	Exposure Routes Total
Soil	Subsurface Soil	AOI 2 & 4 Soils Area at Cooling Pond							
			Benzo(a)pyrene	2.0E-06	1.2E-12	7.5E-07	--	--	2.7E-06
			Aroclor-1254	5.3E-06	9.4E-12	2.4E-06	--	--	7.7E-06
			Aroclor-1260	2.3E-05	4.1E-11	1.0E-05	--	--	3.3E-05
			Arsenic	1.9E-05	3.5E-10	1.8E-06	--	--	2.1E-05
			Uranium-238+D	1.2E-06	1.3E-09	--	9.5E-06	8.7E-07	1.2E-05
			Uranium-235+D	1.2E-08	1.9E-11	--	6.1E-07	9.4E-09	6.3E-07
			Uranium-234	1.5E-07	2.6E-10	--	3.4E-09	1.1E-07	2.6E-07
			Thorium-232	3.5E-07	4.0E-10	--	1.9E-09	2.5E-08	3.8E-07
			Radium-228+D	8.6E-07	4.9E-11	--	2.5E-05	1.1E-05	3.7E-05
			Thorium-228+D	3.0E-07	1.3E-09	--	4.3E-05	8.1E-08	4.3E-05
								Subsurface Soil Risk Total =	2E-04
								Total Risk =	2E-04
Soil	Surface Soil	Rt 62 Outfall and Embayment Area							
			Benzo(a)anthracene	4.7E-06	4.0E-12	1.8E-06	--	--	6.5E-06
			Benzo(a)pyrene	4.9E-05	3.1E-11	1.9E-05	--	--	6.8E-05
			Benzo(b)fluoranthene	7.8E-06	5.4E-12	3.0E-06	--	--	1.1E-05
			Indeno(1,2,3-cd)pyrene	2.3E-06	1.4E-12	8.6E-07	--	--	3.1E-06
			Arsenic	8.1E-06	1.4E-12	7.7E-07	--	--	8.9E-06
			Thorium-232	7.8E-08	3.6E-10	--	1.7E-09	2.3E-08	1.0E-07
			Radium-228+D	7.7E-07	4.4E-11	--	2.2E-05	9.8E-06	3.3E-05
			Thorium-228+D	2.7E-07	1.2E-09	--	3.8E-05	7.2E-08	3.9E-05
								Surface Soil Risk Total =	2E-04
								Total Risk =	2E-04

Table G-8

Risk Characterization Summary - Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk					
				Ingestion	Inhalation	Dermal	External (Radiation)	Produce Ingestion	Exposure Routes Total
Soil	Surface Soil	AOI 1 Holding Basin							
			Arsenic	9.0E-06	1.6E-10	8.5E-07	--	--	9.8E-06
			Uranium-238+D	1.2E-05	1.4E-08	--	9.8E-05	9.0E-06	1.2E-04
			Uranium-235+D	1.2E-07	1.9E-10	--	6.0E-06	9.3E-08	6.2E-06
			Uranium-234	1.6E-06	2.8E-09	--	3.7E-08	1.2E-06	2.8E-06
			Thorium-232	1.1E-07	5.0E-10	--	2.4E-09	3.2E-08	1.4E-07
			Radium-228+D	1.1E-06	6.1E-11	--	3.1E-05	1.4E-05	4.6E-05
			Thorium-228+D	3.8E-07	1.7E-09	--	5.4E-05	1.0E-07	5.4E-05
								Surface Soil Risk Total =	2E-04
								Total Risk =	2E-04
Soil	Subsurface Soil	AOI 1 Holding Basin							
			Arsenic	6.8E-06	1.2E-10	6.4E-07	--	--	7.5E-06
			Uranium-238+D	1.5E-05	1.6E-08	--	1.2E-04	1.1E-05	1.4E-04
			Uranium-235+D	1.5E-07	2.3E-10	--	7.4E-06	1.1E-07	7.7E-06
			Uranium-234	1.8E-06	3.3E-09	--	4.3E-08	1.4E-06	3.3E-06
			Thorium-232	7.4E-08	3.4E-10	--	1.6E-09	2.2E-08	9.8E-08
			Radium-228+D	7.3E-07	4.1E-11	--	2.1E-05	9.3E-06	3.1E-05
			Thorium-228+D	2.6E-07	1.1E-09	--	3.6E-05	6.8E-08	3.7E-05
								Subsurface Soil Risk Total =	2E-04
								Total Risk =	2E-04

Key

N/A - Toxicity criteria are not available to quantitatively address this route of exposure.

-- Route of exposure is not applicable to this medium.

This table provides risk estimates for the significant routes of exposure for future young child and adult residents exposed to surface and subsurface soil at the following Areas of Interest: AOI 8 Sweepings Area, AOI 7 & 11 Industrial Area East, AOI 2 & 4 Soils Area at Cooling Pond, Rt 62 Outfall and Embayment Area, and AOI 1 Holding Basin. These risk estimates are based on a reasonable maximum exposure and were developed by taking into account various conservative assumptions about exposure to surface and subsurface soil by a young child and adult resident, as well as the toxicity of the COCs (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, indeno(1,2,3-cd)pyrene, PCBs, arsenic, uranium isotopes, and thorium isotopes). The total risk from exposure to soil for a future resident is estimated to be 2 x 10^{-4} (AOI 8 Sweepings Area surface soil), 4 x 10^{-4} (AOI 7 & 11 Industrial Area East surface soil), 3 x 10^{-4} (AOI 7 & 11 Industrial Area East subsurface soil), 2 x 10^{-4} (AOI 2 & 4 Soils Area at Cooling Pond surface soil), 2 x 10^{-4} (AOI 2 & 4 Soils Area at Cooling Pond subsurface soil), 2 x 10^{-4} (Rt 62 Outfall and Embayment Area surface soil), 2 x 10^{-4} (AOI 1 Holding Basin surface soil), and 2 x 10^{-4} (AOI 1 Holding Basin subsurface soil). The COCs contributing most to this risk level are PCBs, arsenic, uranium isotopes, and thorium isotopes. This risk level indicates that if no clean-up action is taken, a young child and adult resident would have an increased probability of 2 in 10,000 (AOI 8 Sweepings Area surface soil, AOI 2 & 4 Soils Area at Cooling Pond surface and subsurface soil, Rt 62 Outfall and Embayment Area surface soil, and AOI 1 Holding Basin surface and subsurface soil), 3 in 10,000 (AOI 7 & 11 Industrial Area East subsurface soil), or 4 in 10,000 (AOI 7 & 11 Industrial Area East surface soil) of developing cancer as a result of site-related exposure to the COCs in soil. Results presented use current toxicity values along with site-specific exposure parameters from the baseline HHRA.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

Table G-9

Risk Characterization Summary - Non-Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	AOI 14 North	Aroclor-1254	Immune System	1.0E+00	N/A	4.0E-01	1.4E+00
			Aroclor-1260	Immune System	2.5E-01	N/A	9.8E-02	3.5E-01
							Sediment Hazard Index Total =	2E+00
							Immune System Hazard Index =	2E+00
Soil	Surface Soil	AOI 8 Sweepings Area	Aroclor-1254	Immune System	4.8E+00	N/A	1.9E+00	6.7E+00
							Surface Soil Hazard Index Total =	7E+00
							Immune System Hazard Index =	7E+00
Soil	Subsurface Soil	AOI 8 Sweepings Area	Aroclor-1254	Immune System	2.8E+00	N/A	1.1E+00	4E+00
			Aroclor-1260	Immune System	3.8E-01	N/A	1.5E-01	5E-01
							Subsurface Soil Hazard Index Total =	4E+00
							Immune System Hazard Index =	4E+00
Soil	Surface Soil	AOI 7 & 11 Industrial Area East	Uranium	Kidney	7.8E+00	4.1E-05	N/A	7.8E+00
							Surface Soil Hazard Index Total =	8E+00
							Kidney Hazard Index =	8E+00
Soil	Subsurface Soil	AOI 7 & 11 Industrial Area East	Aroclor-1254	Immune System	5.4E+00	N/A	2.1E+00	7.4E+00
			Uranium	Kidney	3.3E+00	1.8E-05	N/A	3.3E+00
							Subsurface Soil Hazard Index Total =	1E+01
							Kidney Hazard Index =	3E+00
							Immune System Hazard Index =	7E+00
Soil	Surface Soil	AOI 2 & 4 Soils Area at Cooling Pond	Aroclor-1254	Immune System	2.0E+00	N/A	8.0E-01	2.8E+00
			Aroclor-1260	Immune System	8.2E+00	N/A	3.2E+00	1.1E+01
							Surface Soil Hazard Index Total =	1E+01
							Immune System Hazard Index =	1E+01

Table G-9

Risk Characterization Summary - Non-Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Subsurface Soil	AOI 2 & 4 Soils Area at Cooling Pond	Aroclor-1254	Immune System	1.1E+00	N/A	4.3E-01	1.5E+00
			Aroclor-1260	Immune System	4.7E+00	N/A	1.8E+00	6.5E+00
							Subsurface Soil Hazard Index Total =	8E+00
							Immune System Hazard Index =	8E+00
Soil	Surface Soil	AOI 1 Holding Basin	Uranium	Kidney	3.0E+00	1.6E-05	N/A	3.0E+00
							Surface Soil Hazard Index Total =	3E+00
							Kidney Hazard Index =	3E+00
Soil	Subsurface Soil	AOI 1 Holding Basin	Uranium	Kidney	3.5E+00	1.9E-05	N/A	3.5E+00
							Subsurface Soil Hazard Index Total =	4E+00
							Kidney Hazard Index =	4E+00

Key

N/A - Toxicity criteria are not available to quantitatively address this route of exposure.

-- Route of exposure is not applicable to this medium.

This table provides hazard quotients (HQs) for each route of exposure and the hazard index (sum of the hazard quotients) for all routes of exposure for future young child and adult residents exposed to surface and subsurface soil at the following Areas of Interest: AOI 14 North, AOI 8 Sweepings Area, AOI 7 & 11 Industrial Area East, AOI 2 & 4 Soils Area at Cooling Pond, and AOI 1 Holding Basin. The Risk Assessment Guidance for Superfund (RAGS) states that, generally, a hazard index (HI) of greater than 1 indicates the potential for adverse noncancer effects. The estimated target organ HIs between 2 and 10 indicate that the potential for adverse effects could occur from exposure to contaminated soil containing PCBs and uranium. Results presented use current toxicity values along with site-specific exposure parameters from the baseline HHRA.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

Table G-10

Risk Characterization Summary - Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Groundwater	Groundwater	On-Property Bedrock Groundwater Plume Used As Tap Water						
			1,1-Dichloroethane	1.6E-06	1.4E-07	1.0E-07	--	1.8E-06
			Trichloroethene	1.3E-05	3.5E-07	1.7E-06	--	1.5E-05
			1,4-Dioxane	6.2E-05	N/A	1.6E-06	--	6.4E-05
			Bis(2-Ethylhexyl)phthalate	3.3E-06	N/A	4.2E-06	--	7.5E-06
			Arsenic	1.6E-03	N/A	7.6E-06	--	1.6E-03
			Uranium-238+D	1.3E-04	--	--	--	1.3E-04
			Uranium-235+D	4.9E-06	--	--	--	4.9E-06
			Uranium-234	1.1E-04	--	--	--	1.1E-04
			Actinium-227+D	3.3E-05	--	--	--	3.3E-05
			Thorium-230	1.4E-04	--	--	--	1.4E-04
			Radium-226+D	7.9E-04	--	--	--	7.9E-04
			Lead-210	1.8E-03	--	--	--	1.8E-03
			Bismuth-210	2.0E-05	--	--	--	2.0E-05
			Polonium-210	3.5E-03	--	--	--	3.5E-03
			Thorium-232	1.5E-06	--	--	--	1.5E-06
			Radium-228+D	1.5E-05	--	--	--	1.5E-05
			Thorium-228+D	4.4E-06	--	--	--	4.4E-06
							Groundwater Risk Total =	8E-03
							Total Risk =	8E-03
Groundwater	Groundwater	On-Property Bedrock Groundwater Used As Tap Water						
			Trichloroethene	4.1E-06	1.1E-07	5.3E-07	--	4.8E-06
			Bis(2-Ethylhexyl)phthalate	1.1E-06	N/A	1.4E-06	--	2.5E-06
			Arsenic	1.9E-04	N/A	9.2E-07	--	1.9E-04
			Uranium-238+D	1.4E-05	--	--	--	1.4E-05
			Uranium-235+D	5.3E-07	--	--	--	5.3E-07
			Uranium-234	1.2E-05	--	--	--	1.2E-05
			Actinium-227+D	3.6E-06	--	--	--	3.6E-06
			Thorium-230	1.5E-05	--	--	--	1.5E-05
			Radium-226+D	8.7E-05	--	--	--	8.7E-05
			Lead-210	2.0E-04	--	--	--	2.0E-04
			Bismuth-210	2.2E-06	--	--	--	2.2E-06
			Polonium-210	3.8E-04	--	--	--	3.8E-04
			Thorium-232	2.2E-07	--	--	--	2.2E-07
			Radium-228+D	2.3E-06	--	--	--	2.3E-06
			Thorium-228+D	6.6E-07	--	--	--	6.6E-07
							Groundwater Risk Total =	9E-04
							Total Risk =	9E-04

Table G-10

Risk Characterization Summary - Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Groundwater	Groundwater	On-Property Overburden Groundwater Plume Used As Tap Water						
			Tetrachloroethene	2.1E-06	1.0E-07	1.1E-06	--	3.3E-06
			Trichloroethene	1.6E-05	3.0E-07	2.1E-06	--	1.9E-05
			1,4-Dioxane	2.3E-05	N/A	7.0E-08	--	2.3E-05
			Bis(2-Ethylhexyl)phthalate	2.3E-06	N/A	2.9E-06	--	5.2E-06
			Arsenic	3.4E-04	N/A	1.6E-06	--	3.4E-04
			Uranium-238+D	3.2E-03	--	--	--	3.2E-03
			Uranium-235+D	3.4E-05	--	--	--	3.4E-05
			Uranium-234	4.3E-04	--	--	--	4.3E-04
			Thorium-232	6.4E-07	--	--	--	6.4E-07
			Radium-228+D	6.6E-06	--	--	--	6.6E-06
			Thorium-228+D	1.9E-06	--	--	--	1.9E-06
							Groundwater Risk Total =	4E-03
							Total Risk =	4E-03
Groundwater	Groundwater	On-Property Overburden Groundwater Used As Tap Water						
			Vinyl chloride	3.7E-05	5.0E-08	1.3E-06	--	3.8E-05
			Bis(2-Ethylhexyl)phthalate	1.0E-06	N/A	1.3E-06	--	2.3E-06
			Arsenic	4.3E-04	N/A	2.1E-06	--	4.3E-04
			Uranium-238+D	2.6E-06	--	--	--	2.6E-06
			Uranium-234	2.3E-06	--	--	--	2.3E-06
			Thorium-230	2.9E-06	--	--	--	2.9E-06
			Radium-226+D	1.6E-05	--	--	--	1.6E-05
			Lead-210	3.8E-05	--	--	--	3.8E-05
			Polonium-210	7.2E-05	--	--	--	7.2E-05
			Thorium-232	5.0E-07	--	--	--	5.0E-07
			Radium-228+D	5.2E-06	--	--	--	5.2E-06
			Thorium-228+D	1.5E-06	--	--	--	1.5E-06
							Groundwater Risk Total =	6E-04
							Total Risk =	6E-04

Table G-10

Risk Characterization Summary - Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Groundwater	Groundwater	Off-Property Bedrock Groundwater Used As Tap Water						
			Trichloroethene	2.3E-05	6.6E-07	3.2E-06	--	2.7E-05
			Vinyl chloride	3.2E-05	4.5E-08	1.1E-06	--	3.4E-05
			1,4-Dioxane	1.4E-04	N/A	4.4E-07	--	1.4E-04
			Arsenic	1.6E-04	N/A	7.8E-07	--	1.6E-04
			Uranium-238+D	1.1E-05	--	--	--	1.1E-05
			Uranium-234	1.0E-05	--	--	--	1.0E-05
			Actinium-227+D	3.0E-06	--	--	--	3.0E-06
			Thorium-230	1.3E-05	--	--	--	1.3E-05
			Radium-226+D	7.3E-05	--	--	--	7.3E-05
			Lead-210	1.7E-04	--	--	--	1.7E-04
			Bismuth-210	1.8E-06	--	--	--	1.8E-06
			Polonium-210	3.2E-04	--	--	--	3.2E-04
			Thorium-232	3.6E-07	--	--	--	3.6E-07
			Radium-228+D	3.7E-06	--	--	--	3.7E-06
			Thorium-228+D	1.1E-06	--	--	--	1.1E-06
							Groundwater Risk Total =	1E-03
							Total Risk =	1E-03
Groundwater	Groundwater	Off-Property Overburden Groundwater Used As Tap Water						
			Trichloroethene	6.3E-05	2.1E-06	8.4E-06	--	7.3E-05
			1,4-Dioxane	7.4E-05	N/A	2.3E-07	--	7.5E-05
			Bis(2-Ethylhexyl)phthalate	5.9E-06	N/A	7.6E-06	--	1.3E-05
			Arsenic	8.7E-05	N/A	4.2E-07	--	8.8E-05
			Lead-210	3.8E-06	--	--	--	3.8E-06
			Polonium-210	7.2E-06	--	--	--	7.2E-06
			Thorium-232	3.6E-07	--	--	--	3.6E-07
			Radium-228+D	3.7E-06	--	--	--	3.7E-06
			Thorium-228+D	1.1E-06	--	--	--	1.1E-06
							Groundwater Risk Total =	3E-04
							Total Risk =	3E-04

Key

-- Route of exposure is not applicable to this medium.

N/A - Toxicity criteria are not available to quantitatively address this route of exposure.

This table provides risk estimates for the significant routes of exposure for the future young child and adult resident exposed to groundwater used as household water. These risk estimates are based on a reasonable maximum exposure and were developed by taking into account various conservative assumptions about the frequency and duration of a young child's and adult's exposure to groundwater, as well as the toxicity of the COCs (1,1-dichloroethane, tetrachloroethane, trichloroethane, vinyl chloride, 1,4-dioxane, bis(2-ethylhexyl)phthalate, indeno(1,2,3-cd)pyrene, naphthalene, arsenic, uranium isotopes, and thorium isotopes). The total risk from direct exposure to contaminated groundwater to a future resident, in the event that groundwater is used as a potable source, is estimated to be 8 x 10^{-3} (On-Property Bedrock Plume), 9 x 10^{-4} (On-Property Bedrock), 4 x 10^{-3} (On-Property Overburden Plume), 6 x 10^{-4} (On-Property Overburden), 1 x 10^{-3} (Off-Property Bedrock), and 3 x 10^{-4} (Off-Property Overburden). The COCs contributing most to these risk levels are 1,4-dioxane, trichloroethene, arsenic, and uranium isotopes in groundwater. This risk level indicates that if no clean-up action is taken, a future child/adult resident would have an increased probability of 8 in 1,000 (On-Property Bedrock Plume), 9 in 10,000 (On-Property Bedrock), 4 in 1,000 (On-Property Overburden Plume), 6 in 10,000 (On-Property Overburden), 1 in 1,000 (Off-Property Bedrock), and 3 in 10,000 (Off-Property Overburden) of developing cancer as a result of site-related exposure to the COCs in groundwater. Results presented use current toxicity values along with site-specific exposure parameters from the baseline HHRA.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

Table G-11

Risk Characterization Summary - Non-Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	On-Property Bedrock Groundwater Plume Used As Tap Water						
			Trichloroethene	Developmental / Immune System	2.1E+00	1.1E-01	1.3E-01	2.3E+00
			Arsenic	Skin	1.9E+01	N/A	8.4E-02	1.9E+01
			Barium	Kidney	2.2E+00	N/A	1.4E-01	2.4E+00
			Chromium	GI System	2.4E+00	N/A	8.6E-01	3.3E+00
			Cobalt	Thyroid	3.8E+00	N/A	1.7E-02	3.8E+00
			Iron	GI System	5.5E+00	N/A	N/A	5.5E+00
			Manganese	CNS	4.9E+00	N/A	5.4E-01	5.5E+00
			Molybdenum	Kidney	2.2E+00	N/A	9.8E-03	2.2E+00
			Uranium	Kidney	3.5E+01	N/A	1.5E-01	3.5E+01
			Nitrate as N	Hematological	6.8E+00	N/A	N/A	6.8E+00
			Nitrite as N	Hematological	1.0E+01	N/A	N/A	1.0E+01
							Groundwater Hazard Index Total =	1E+02
							Skin Hazard Index =	2E+01
							Immune System Hazard Index =	2E+00
							Developmental Hazard Index =	2E+00
							Kidney Hazard Index =	4E+01
							Thyroid Hazard Index =	4E+00
							GI System Hazard Index =	9E+00
							CNS Hazard Index =	6E+00
							Hematological Hazard Index =	2E+01
Groundwater	Groundwater	On-Property Bedrock Groundwater Used As Tap Water						
			Arsenic	Skin	2.3E+00	N/A	1.0E-02	2.3E+00
			Iron	GI System	1.8E+00	N/A	N/A	1.8E+00
			Manganese	CNS	1.4E+00	N/A	1.5E-01	1.6E+00
			Uranium	Kidney	3.8E+00	N/A	1.7E-02	3.8E+00
							Groundwater Hazard Index Total =	9E+00
							Skin Hazard Index =	2E+00
							Kidney Hazard Index =	4E+00
							GI System Hazard Index =	2E+00
							CNS Hazard Index =	2E+00

Table G-11

Risk Characterization Summary - Non-Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Groundwater	Groundwater	On-Property Overburden Groundwater Plume Used As Tap Water						
			Tetrachloroethene	CNS	9.6E-01	3.0E-02	3.7E-01	1.3E+00
			Trichloroethene	Developmental / Immune System	2.6E+00	1.3E-01	1.6E-01	2.7E+00
			Arsenic	Skin	4.1E+00	N/A	1.8E-02	4.1E+00
			Chromium	GI System	2.8E+00	N/A	1.0E+00	3.8E+00
			Cobalt	Thyroid	1.3E+01	N/A	5.6E-02	1.3E+01
			Copper	GI System	3.8E+00	N/A	1.7E-02	3.8E+00
			Iron	GI System	5.5E+00	N/A	N/A	5.5E+00
			Manganese	CNS	3.5E+00	N/A	3.9E-01	3.9E+00
			Molybdenum	Kidney	1.8E+01	N/A	7.8E-02	1.8E+01
			Uranium	Kidney	8.8E+02	N/A	3.9E+00	8.8E+02
			Nitrate as N	Hematological	6.8E+00	N/A	N/A	6.8E+00
			Nitrite as N	Hematological	2.0E+00	N/A	N/A	2.0E+00
							Groundwater Hazard Index Total =	9E+02
							Skin Hazard Index =	4E+00
							Immune System Hazard Index =	3E+00
							Kidney Hazard Index =	9E+02
							Developmental Hazard Index =	3E+00
							Thyroid Hazard Index =	1E+01
							GI System Hazard Index =	1E+01
							CNS Hazard Index =	5E+00
							Hematological Hazard Index =	9E+00
Groundwater	Groundwater	On-Property Overburden Groundwater Used As Tap Water						
			Arsenic	Skin	5.2E+00	N/A	2.3E-02	5.2E+00
			Cobalt	Thyroid	4.9E+00	N/A	2.1E-02	4.9E+00
			Iron	GI System	2.5E+00	N/A	N/A	2.5E+00
			Manganese	CNS	5.1E+00	N/A	5.6E-01	5.6E+00
							Groundwater Hazard Index Total =	2E+01
							Skin Hazard Index =	5E+00
							Thyroid Hazard Index =	5E+00
							GI System Hazard Index =	3E+00
							CNS Hazard Index =	6E+00
Groundwater	Groundwater	On-Property Bedrock Groundwater Used As Tap Water						

Table G-11

Risk Characterization Summary - Non-Carcinogens

Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Young Child/Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
			Trichloroethene	Developmental / Immune System	3.8E+00	2.0E-01	2.3E-01	4.0E+00
			Arsenic	Skin	1.9E+00	N/A	8.6E-03	2.0E+00
			Cobalt	Thyroid	9.1E+00	N/A	4.0E-02	9.1E+00
			Iron	GI System	4.3E+00	N/A	N/A	4.3E+00
			Manganese	CNS	1.7E+01	N/A	1.8E+00	1.8E+01
			Uranium	Kidney	3.2E+00	N/A	1.4E-02	3.2E+00
			Nitrate as N	Hematological	1.7E+01	N/A	N/A	1.7E+01
							Groundwater Hazard Index Total =	6E+01
							Skin Hazard Index =	2E+00
							Immune System Hazard Index =	4E+00
							Kidney Hazard Index =	3E+00
							Developmental Hazard Index =	4E+00
							Thyroid Hazard Index =	9E+00
							GI System Hazard Index =	4E+00
							CNS Hazard Index =	2E+01
							Hematological Hazard Index =	2E+01
Groundwater	Groundwater	On-Property Overburden Groundwater Used As Tap Water	Trichloroethene	Developmental / Immune System	1.0E+01	5.3E-01	6.1E-01	1.1E+01
			Iron	GI System	4.5E+00	N/A	N/A	4.5E+00
							Groundwater Hazard Index Total =	2E+01
							Immune System Hazard Index =	1E+01
							Developmental Hazard Index =	1E+01
							GI System Hazard Index =	5E+00

Key

N/A - Toxicity criteria are not available to quantitatively address this route of exposure.

-- Route of exposure is not applicable to this medium.

This table provides hazard quotients (HQs) for each route of exposure and the hazard index (sum of the hazard quotients) for all routes of exposure for the future young child and adult resident exposed to groundwater used as household water. The Risk Assessment Guidance for Superfund (RAGS) states that, generally, a hazard index (HI) of greater than 1 indicates the potential for adverse noncancer effects. The estimated target organ HIs between 2 and 900 indicate that the potential for adverse effects could occur from exposure to contaminated groundwater containing tetrachloroethene, trichloroethene, arsenic, barium, chromium, cobalt, copper, iron, manganese, molybdenum, uranium, nitrate, and nitrite. Results presented use current toxicity values along with site-specific exposure parameters from the baseline HHRA.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

Table G-12

Risk Characterization Summary - Non-Carcinogens

Scenario Timeframe: Future
Receptor Population: Abutting Resident/Recreational Visitor
Receptor Age: Young Child

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Sediment	Sediment	Cooling Pond	Aroclor-1254	Immune System	1.7E+01	–	5.7E+00	2.3E+01
							Sediment Hazard Index Total =	2E+01
							Immune System Hazard Index =	2E+01

Key

N/A - Toxicity criteria are not available to quantitatively address this route of exposure.

-- Route of exposure is not applicable to this medium.

This table provides hazard quotients (HQs) for each route of exposure and the hazard index (sum of the hazard quotients) for all routes of exposure for a future child abutting resident/recreational visitor exposed to sediment in the Cooling Pond. The Risk Assessment Guidance for Superfund (RAGS) states that, generally, a hazard index (HI) of greater than 1 indicates the potential for adverse noncancer effects. The estimated target organ HI of 20 indicates that the potential for adverse effects could occur from exposure to contaminated sediment containing PCBs. Results presented use current toxicity values along with site-specific exposure parameters from the baseline HHRA.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

Table G-13

Risk Characterization Summary - Non-Carcinogens

Scenario Timeframe: Future
Receptor Population: Child Recreational Visitor
Receptor Age: Young Child

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	Area	Aroclor-1254	Immune System	2.4E+00	N/A	9.3E-01	3.3E+00
							Surface Soil Hazard Index Total =	3E+00
							Immune System Hazard Index =	3E+00
Soil	Subsurface Soil	Area	Aroclor-1254	Immune System	1.4E+00	N/A	5.4E-01	1.9E+00
							Subsurface Soil Hazard Index Total =	2E+00
							Immune System Hazard Index =	2E+00
Soil	Surface Soil	AOI 7 & 11 Industrial Area East	Uranium	Kidney	3.9E+00	2.1E-05	N/A	3.9E+00
							Surface Soil Hazard Index Total =	4E+00
							Kidney Hazard Index =	4E+00
Soil	Subsurface Soil	AOI 7 & 11 Industrial Area East	Aroclor-1254	Immune System	2.7E+00	N/A	1.0E+00	3.7E+00
			Uranium	Kidney	1.6E+00	8.7E-06	N/A	1.6E+00
							Subsurface Soil Hazard Index Total =	5E+00
							Kidney Hazard Index =	2E+00
							Immune System Hazard Index =	4E+00
Soil	Surface Soil	AOI 2 & 4 Soils Area at Cooling Pond	Aroclor-1260	Immune System	4.1E+00	N/A	1.6E+00	5.7E+00
							Surface Soil Hazard Index Total =	6E+00
							Immune System Hazard Index =	6E+00

Table G-13

Risk Characterization Summary - Non-Carcinogens

Scenario Timeframe: Future
Receptor Population: Child Recreational Visitor
Receptor Age: Young Child

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Subsurface Soil	AOI 2 & 4 Soils Area at Cooling Pond	Aroclor-1260	Immune System	2.3E+00	N/A	9.2E-01	3.3E+00
							Subsurface Soil Hazard Index Total =	3E+00
							Immune System Hazard Index =	3E+00
Soil	Surface Soil	AOI 1 Holding Basin	Uranium	Kidney	1.5E+00	7.8E-06	N/A	1.5E+00
							Surface Soil Hazard Index Total =	2E+00
							Kidney Hazard Index =	2E+00
Soil	Subsurface Soil	AOI 1 Holding Basin	Uranium	Kidney	1.7E+00	9.3E-06	N/A	1.7E+00
							Subsurface Soil Hazard Index Total =	2E+00
							Kidney Hazard Index =	2E+00

Key

N/A - Toxicity criteria are not available to quantitatively address this route of exposure.

-- Route of exposure is not applicable to this medium.

This table provides hazard quotients (HQs) for each route of exposure and the hazard index (sum of the hazard quotients) for all routes of exposure for a future child recreational visitor exposed to surface and subsurface soil at the following Areas of Interest: AOI 8 Sweepings Area, AOI 7 & 11 Industrial Area East, AOI 2 & 4 Soils Area at Cooling Pond, and AOI 1 Holding Basin. The Risk Assessment Guidance for Superfund (RAGS) states that, generally, a hazard index (HI) of greater than 1 indicates the potential for adverse noncancer effects. The estimated target organ HIs between 2 and 6 indicates that the potential for adverse effects could occur from exposure to contaminated sediment containing PCBs and uranium. Results presented use current toxicity values along with site-specific exposure parameters from the baseline HHRA.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

Table G-14

Risk Characterization Summary - Carcinogens

Scenario Timeframe: Future
Receptor Population: Outdoor Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Carcinogenic Risk				
				Ingestion	Inhalation	Dermal	External (Radiation)	Exposure Routes Total
Soil	Surface Soil	AOI 7 & 11 Industrial Area East						
			Benzo(a)pyrene	6.0E-07	6.0E-12	5.2E-07	--	1.1E-06
			Aroclor-1254	1.2E-06	2.2E-11	1.1E-06	--	2.3E-06
			Arsenic	2.4E-06	4.6E-10	2.9E-06	--	5.3E-06
			Uranium-238+D	6.9E-06	3.6E-08	--	1.4E-04	1.5E-04
			Uranium-235+D	6.9E-08	5.0E-10	--	8.5E-06	8.6E-06
			Uranium-234	9.3E-07	7.5E-09	--	5.2E-08	9.9E-07
			Thorium-232	2.1E-08	3.9E-10	--	9.6E-10	2.2E-08
			Radium-228+D	1.6E-07	4.7E-11	--	1.3E-05	1.3E-05
			Thorium-228+D	4.0E-08	1.3E-09	--	2.2E-05	2.2E-05
							Surface Soil Risk Total =	2E-04
							Total Risk =	2E-04

Key

N/A - Toxicity criteria are not available to quantitatively address this route of exposure.

-- Route of exposure is not applicable to this medium.

This table provides risk estimates for the significant routes of exposure for a future adult outdoor worker exposed to surface soil at AOI 7 & 11 Industrial Area East. These risk estimates are based on a reasonable maximum exposure and were developed by taking into account various conservative assumptions about the exposure to soil by an adult outdoor worker, as well as the toxicity of the COCs (benzo(a)pyrene, PCBs, arsenic, uranium isotopes, and thorium isotopes). The total risk from surface soil exposure to a future adult outdoor worker is estimated to be 2×10^{-4}. The COCs contributing most to this risk level are uranium isotopes. This risk level indicates that if no clean-up action is taken, an individual would have an increased probability of 2 in 10,000 of developing cancer as a result of site-related exposure to the COCs in surface soil. Results presented use current toxicity values along with site-specific exposure parameters from the baseline HHRA.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

Table G-15

Risk Characterization Summary - Non-Carcinogens

Scenario Timeframe: Future
Receptor Population: Construction Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical of Concern	Primary Target Organ	Non-Carcinogenic Hazard Quotient			
					Ingestion	Inhalation	Dermal	Exposure Routes Total
Soil	Surface Soil	AOI 8 Sweepings Area	Aroclor-1254	Immune System	1.0E+00	N/A	4.4E-01	1.4E+00
			Aroclor-1260	Immune System	1.5E-01	N/A	6.4E-02	2.1E-01
							Surface Soil Hazard Index Total =	2E+00
							Immune System Hazard Index =	2E+00
Soil	Surface Soil	AOI 7 & 11 Industrial Area East	Uranium	Kidney	1.3E+00	5.7E-02	N/A	1.4E+00
							Surface Soil Hazard Index Total =	1E+00
							Kidney Hazard Index =	1E+00
Soil	Subsurface Soil	AOI 7 & 11 Industrial Area East	Aroclor-1254	Immune System	1.2E+00	N/A	4.9E-01	1.7E+00
							Subsurface Soil Hazard Index Total =	2E+00
							Immune System Hazard Index =	2E+00
Soil	Surface Soil	AOI 2 & 4 Soils Area at Cooling Pond	Aroclor-1260	Immune System	1.8E+00	N/A	7.6E-01	2.6E+00
							Surface Soil Hazard Index Total =	3E+00
							Immune System Hazard Index =	3E+00
Soil	Subsurface Soil	AOI 2 & 4 Soils Area at Cooling Pond	Aroclor-1254	Immune System	2.4E-01	N/A	1.0E-01	3.4E-01
			Aroclor-1260	Immune System	1.0E+00	N/A	4.3E-01	1.4E+00
							Subsurface Soil Hazard Index Total =	2E+00
							Immune System Hazard Index =	2E+00

Key

N/A - Toxicity criteria are not available to quantitatively address this route of exposure.

-- Route of exposure is not applicable to this medium.

This table provides hazard quotients (HQs) for each route of exposure and the hazard index (sum of the hazard quotients) for all routes of exposure for a future adult construction worker exposed to surface and subsurface soil at the following Areas of Interest: AOI 8 Sweepings Area, AOI 7 & 11 Industrial Area East, and AOI 2 & 4 Soils Area at Cooling Pond. The Risk Assessment Guidance for Superfund (RAGS) states that, generally, a hazard index (HI) of greater than 1 indicates the potential for adverse noncancer effects. The estimated target organ HIs between 1.4 and 3 indicate that the potential for adverse effects could occur from exposure to contaminated soil containing PCBs and uranium. Results presented use current toxicity values along with site-specific exposure parameters from the baseline HHRA.

Source: A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (U.S. EPA, 1999)

Table G-16

Occurrence, Distribution, and Selection of Chemicals of Potential Concern (COPCs)
Cooling Water Pond

Nuclear Metals Superfund Site, Concord, Massachusetts
Medium: Surface Water

Analyte	Frequency of Detection	Range of Detected Concentrations	Average (arithmetic mean) [a]	Final Selected Benchmark [b]	COPC? [c]	Rationale [c]	Maximum HQ [d]	Average HQ [e]
Semivolatile Organics (mg/L)								
Benzo(a)anthracene	1 / 7	0.000261 - 0.000261	0.000060	0.000027	Yes	ASL	9.7	2.2
Benzo(a)pyrene	1 / 7	0.000295 - 0.000295	0.000065	0.000014	Yes	ASL	21	4.6
Benzo(k)fluoranthene	1 / 7	0.000191 - 0.000191	0.000038	0.00014	Yes	ASL	1.4	0.3
Chrysene	1 / 7	0.000288 - 0.000288	0.000064	0.000070	Yes	ASL	4.1	0.9
Pyrene	2 / 7	0.000023 - 0.000521	0.000096	0.00040	Yes	ASL	1.3	0.2
Metals, Total (mg/L)								
Aluminum	7 / 7	0.0763 - 0.615	0.29	0.087	Yes	ASL	7.1	3.3
Barium	7 / 7	0.0087 - 0.011	0.010	0.0039	Yes	ASL	2.8	2.6
Copper	2 / 7	0.202 - 0.252	0.090	0.0049	Yes	ASL	51	18.5
Lead	3 / 7	0.0052 - 0.0099	0.0040	0.0012	Yes	ASL	8.3	3.3
Titanium	4 / 7	0.005300 - 0.0124	0.0078		Yes	NSL	NA	NA
Uranium	7 / 7	0.0049 - 0.0133	0.0080		Yes	NSL	NA	NA
Zinc	3 / 7	0.0555 - 0.0872	0.042	0.064	Yes	ASL	1.4	0.6
Metals, Dissolved (mg/L)								
Barium	7 / 7	0.0083 - 0.0099	0.0089	0.0040	Yes	ASL	2.5	2.2
Copper	7 / 7	0.0263 - 0.0338	0.029	0.0047	Yes	ASL	7.2	6.2
Manganese	5 / 7	0.0028 - 0.004	0.0028		Yes	NSL	NA	NA
Tungsten	4 / 7	0.00023 - 0.00032	0.00021		Yes	NSL	NA	NA
Uranium	7 / 7	0.0044 - 0.0055	0.0049	0.0026	Yes	ASL	2.1	1.9
Zirconium	1 / 7	0.0485 - 0.0485	0.0070	0.017	Yes	ASL	2.9	0.4
EPH (mg/L)								
C11-C22 Aromatics	1 / 7	0.137 - 0.137	0.081		Yes	NSL	NA	NA
C19-C36 Aliphatics	2 / 7	0.0876 - 0.132	0.059		Yes	NSL	NA	NA
C9-C18 Aliphatics	1 / 7	0.0232 - 0.0232	0.028		Yes	NSL	NA	NA

Notes:
[a] Average (arithmetic mean) was calculated using one-half the detection limit for non detects.
[b] Screening benchmarks were selected in BERA Table 3-9. Where applicable, benchmarks were adjusted based on measured hardness of 47.4 mg/L as $CaCO_3$.
[c] Chemical is selected as a chemical of potential concern (COPC) if the maximum detected concentration is greater than the screening benchmark or a screening benchmark is unavailable, unless the frequency of detection (FOD) is less than 5%.
ASL - Above Screening Level
NSL - No Screening Level
[d] Hazard quotient (HQ) is the maximum detected concentration divided by the screening benchmark. HQs are only calculated for COPCs.
[e] Average HQ is the average detected concentration divided by the screening benchmark.

NA - Hazard quotient not calculated because benchmark not available.
mg/L - milligrams per liter

Table G-17

Occurrence, Distribution, and Selection of Chemicals of Potential Concern (COPCs)
Cooling Water Pond

Nuclear Metals Superfund Site, Concord, Massachusetts
Medium: Sediment

Analyte	Frequency of Detection	Range of Detected Concentrations	Average (arithmetic mean) [a]	Final Selected Benchmark [b]	COPC? [c]	Rationale [c]	Maximum HQ [d]	Average HQ [e]
Volatile Organics (mg/Kg)								
Carbon disulfide	8 / 12	0.0011 - 0.0106	0.0042	0.00075	Yes	ASL	14	5.6
Semivolatile Organics (mg/Kg)								
2,4,6-Trichlorophenol	1 / 12	0.0972 - 0.0972	0.24		Yes	NSL	NA	NA
2-Methylnaphthalene	4 / 12	0.0163 - 0.0744	0.031	0.070	Yes	ASL	1.1	0.45
Acenaphthene	6 / 13	0.0227 - 0.101	0.039	0.016	Yes	ASL	6.3	2.4
Acenaphthylene	4 / 13	0.0212 - 0.148	0.034	0.044	Yes	ASL	3.4	0.78
Anthracene	10 / 13	0.014 - 0.317	0.072	0.057	Yes	ASL	5.6	1.3
Benzo(a)anthracene	13 / 13	0.0299 - 1.79	0.33	0.11	Yes	ASL	16	3.0
Benzo(a)pyrene	12 / 13	0.0165 - 1.71	0.33	0.15	Yes	ASL	11	2.2
Benzo(b)fluoranthene	13 / 13	0.0678 - 3.58	0.59	0.21	Yes	ASL	17	2.8
Benzo(ghi)perylene	10 / 13	0.0226 - 0.82	0.16	0.15	Yes	ASL	5.5	1.1
Benzo(k)fluoranthene	8 / 13	0.0306 - 0.439	0.085	0.21	Yes	ASL	2.1	0.41
Chrysene	13 / 13	0.0231 - 2.3	0.40	0.17	Yes	ASL	14	2.3
Dibenz(a,h)anthracene	1 / 13	0.195 - 0.195	0.038	0.033	Yes	ASL	5.9	1.1
Fluoranthene	13 / 13	0.047 - 4.09	0.78	0.42	Yes	ASL	9.7	1.9
Fluorene	7 / 13	0.0147 - 0.243	0.060	0.019	Yes	ASL	13	3.2
Indeno(1,2,3-cd)pyrene	13 / 13	0.0187 - 0.872	0.25	0.18	Yes	ASL	4.8	1.4
Phenanthrene	13 / 13	0.0265 - 2.44	0.47	0.20	Yes	ASL	12	2.3
Pyrene	13 / 13	0.0511 - 3.77	0.70	0.20	Yes	ASL	19	3.5
PCBs (mg/Kg)								
Aroclor-1254	6 / 6	0.436 - 366	67	0.053	Yes	ASL	6,906	1,261
Aroclor-1260	1 / 6	0.0697 - 0.0697	6.1	0.0044	Yes	ASL	16	1,387
Inorganics (mg/Kg)								
Aluminum	13 / 13	5080 - 11500	7,976		Yes	NSL	NA	NA
Antimony	1 / 13	2.7 - 2.7	0.49	2.0	Yes	ASL	1.4	0.24
Arsenic	13 / 13	6.6 - 19.5	12.5	6.0	Yes	ASL	3.3	2.1
Barium	13 / 13	19.5 - 158	43		Yes	NSL	NA	NA
Beryllium	13 / 13	0.71 - 2.9	1.6		Yes	NSL	NA	NA
Copper	13 / 13	256 - 1040	529	16	Yes	ASL	65	33
Lead	13 / 13	22.2 - 139	55	31	Yes	ASL	4.5	1.8
Mercury	13 / 13	0.023 - 0.22	0.085	0.15	Yes	ASL	1.5	0.57
Nickel	13 / 13	9.9 - 20	15	16	Yes	ASL	1.3	0.94
Thallium	12 / 13	0.07 - 0.15	0.10		Yes	NSL	NA	NA
Thorium	13 / 13	2.1 - 5.9	4.0		Yes	NSL	NA	NA
Titanium	13 / 13	131 - 532	398		Yes	NSL	NA	NA
Tungsten	10 / 13	0.45 - 1.3	0.61		Yes	NSL	NA	NA
Uranium	13 / 13	6.9 - 129	31	32	Yes	ASL	4.0	0.98
Vanadium	13 / 13	9 - 32.2	17.0	27	Yes	ASL	1.2	0.63
Zinc	13 / 13	51.9 - 153	82	120	Yes	ASL	1.3	0.68
Zirconium	13 / 13	1.3 - 4.6	3.0		Yes	NSL	NA	NA
EPH (mg/Kg)								
C11-C22 Aromatics	3 / 12	65.8 - 288	124		Yes	NSL	NA	NA
C19-C36 Aliphatics	12 / 12	14.7 - 610	119		Yes	NSL	NA	NA

Table G-17

Occurrence, Distribution, and Selection of Chemicals of Potential Concern (COPCs)
Cooling Water Pond

Nuclear Metals Superfund Site, Concord, Massachusetts
Medium: Sediment

Analyte	Frequency of Detection	Range of Detected Concentrations	Average (arithmetic mean) [a]	Final Selected Benchmark [b]	COPC? [c]	Rationale [c]	Maximum HQ [d]	Average HQ [e]
C9-C18 Aliphatics	3 / 12	3.92 - 13	30		Yes	NSL	NA	NA

Notes:
[a] Average (arithmetic mean) was calculated using one-half the detection limit for non-detects.
[b] Screening benchmarks were selected in BERA Table 3-11. Where applicable, benchmarks were adjusted based on site-wide average of 0.88% TOC.
[c] Chemical is selected as a chemical of potential concern (COPC) if the maximum detected concentration is greater than the screening benchmark or a screening benchmark is unavailable, unless the frequency of detection (FOD) is less than 5%.
ASL - Above Screening Level
NSL - No Screening Level
[d] Hazard quotient (HQ) is the maximum detected concentration divided by the screening benchmark. HQs are only calculated for COPCs.
[e] Average HQ is the average detected concentration divided by the screening benchmark.

NA - Hazard quotient not calculated because benchmark not available.
mg/Kg - milligram per kilogram
TOC - total organic carbon

Table G-18

Occurrence, Distribution, and Selection of Chemicals of Potential Concern (COPCs)
Sphagnum Bog

Nuclear Metals Superfund Site, Concord, Massachusetts
Medium: Surface Water

Analyte	Frequency of Detection	Range of Detected Concentrations	Average (arithmetic mean) [a]	Final Selected Benchmark [b]	COPC? [c]	Rationale [c]	Maximum HQ [d]	Average HQ [e]
Semivolatile Organics (mg/L)								
4-Methylphenol	1 / 3	0.0028 - 0.0028	0.0043	0.000027	Yes	ASL	103.7	158.0
Chrysene	2 / 20	0.000143 - 0.000203	0.0000	0.00007	Yes	ASL	2.9	0.6
Pyrene	5 / 20	0.0000558 - 0.000511	0.0001	0.0004	Yes	ASL	1.3	0.2
Metals, Total (mg/L)								
Aluminum	25 / 25	0.0799 - 2.29	0.3215	0.087	Yes	ASL	26.3	3.7
Barium	25 / 25	0.0025 - 0.142	0.0209	0.0039	Yes	ASL	36.4	5.4
Beryllium	21 / 25	0.00008 - 0.0173	0.0023	0.0051	Yes	ASL	3.4	0.4
Cadmium	8 / 25	0.000046 - 0.0011	0.0001	0.00025	Yes	ASL	4.4	0.5
Copper	8 / 25	0.0182 - 0.738	0.0506	0.0018	Yes	ASL	410.0	28.1
Iron	25 / 25	0.119 - 2.22	0.6380	1	Yes	ASL	2.2	0.6
Lead	14 / 25	0.0013 - 0.0948	0.0079	0.00028	Yes	ASL	338.6	28.2
Manganese	25 / 25	0.0189 - 0.488	0.0946	0.08	Yes	ASL	6.1	1.2
Mercury	12 / 25	0.000025 - 0.0021	0.0002	0.00091	Yes	ASL	2.3	0.2
Nickel	25 / 25	0.00057 - 0.0351	0.0058	0.01	Yes	ASL	3.5	0.6
Silver	9 / 25	0.00013 - 0.0055	0.0005	0.000012	Yes	ASL	458.3	39.5
Titanium	20 / 25	0.0054 - 0.0857	0.0119		Yes	NSL	NA	NA
Tungsten	9 / 25	0.00011 - 0.0092	0.0015		Yes	NSL	NA	NA
Uranium	25 / 25	0.00067 - 0.078	0.0112		Yes	NSL	NA	NA
Uranium-235 as Mass	25 / 25	0.000001 - 0.0003	0.0000		Yes	NSL	NA	NA
Uranium-238 as Mass	25 / 25	0.00067 - 0.0777	0.0112		Yes	NSL	NA	NA
Zinc	12 / 25	0.0113 - 0.233	0.0393	0.024	Yes	ASL	9.7	1.6
Zirconium	5 / 25	0.0007 - 0.0037	0.0007		Yes	NSL	NA	NA
Metals, Dissolved (mg/L)								
Aluminum	25 / 25	0.0431 - 2.51	0.1967	0.087	Yes	ASL	28.9	2.3
Barium	25 / 25	0.0018 - 0.0887	0.0111	0.004	Yes	ASL	22.2	2.8
Beryllium	20 / 25	0.00002 - 0.0255	0.0021	0.00066	Yes	ASL	38.6	3.2
Cadmium	6 / 25	0.000033 - 0.0179	0.0007	0.00025	Yes	ASL	71.6	3.0
Chromium	2 / 25	0.0061 - 0.0222	0.0015	0.016	Yes	ASL	1.4	0.1
Copper	25 / 25	0.0024 - 0.567	0.0359	0.0018	Yes	ASL	315.0	19.9
Iron	24 / 25	0.0437 - 2.32	0.4491	1	Yes	ASL	2.3	0.4
Lead	8 / 25	0.00082 - 0.153	0.0075	0.0003	Yes	ASL	510.0	24.9
Manganese	25 / 25	0.0115 - 0.199	0.0592		Yes	NSL	NA	NA
Mercury	3 / 25	0.000043 - 0.0015	0.0001	0.00077	Yes	ASL	1.9	0.1
Nickel	25 / 25	0.0008 - 0.0407	0.0053	0.01	Yes	ASL	4.1	0.5
Selenium	2 / 25	0.0025 - 0.0089	0.0012	0.005	Yes	ASL	1.8	0.2
Silver	13 / 25	0.000046 - 0.0066	0.0003	0.00036	Yes	ASL	18.3	0.9
Titanium	23 / 25	0.001 - 0.0635	0.0065		Yes	NSL	NA	NA
Tungsten	8 / 25	0.0016 - 0.0074	0.0013		Yes	NSL	NA	NA
Uranium	25 / 25	0.00035 - 0.147	0.0104	0.0026	Yes	ASL	56.5	4.0
Vanadium	7 / 25	0.0011 - 0.0271	0.0020	0.02	Yes	ASL	1.4	0.1
Zinc	25 / 25	0.0076 - 0.226	0.0436	0.023	Yes	ASL	9.8	1.9
EPH (mg/L)								
C11-C22 Aromatics	14 / 20	0.0573 - 1.01	0.2556		Yes	NSL	NA	NA

Table G-18

Occurrence, Distribution, and Selection of Chemicals of Potential Concern (COPCs)
Sphagnum Bog

Nuclear Metals Superfund Site, Concord, Massachusetts
Medium: Surface Water

Analyte	Frequency of Detection	Range of Detected Concentrations	Average (arithmetic mean) [a]	Final Selected Benchmark [b]	COPC? [c]	Rationale [c]	Maximum HQ [d]	Average HQ [e]
C19-C36 Aliphatics	12 / 20	0.025 - 0.224	0.0566		Yes	NSL	NA	NA
C9-C18 Aliphatics	5 / 20	0.0155 - 0.0591	0.0276		Yes	NSL	NA	NA

Notes:
[a] Average (arithmetic mean) was calculated using one-half the detection limit for non detects.
[b] Screening benchmarks were selected in BERA Table 3-9. Where applicable, benchmarks were adjusted based on measured hardness of 14.9 mg/L as $CaCO_3$.
[c] Chemical is selected as a chemical of potential concern (COPC) if the maximum detected concentration is greater than the screening benchmark or a screening benchmark is unavailable, unless the frequency of detection (FOD) is less than 5%.
ASL - Above Screening Level
NSL - No Screening Level
[d] Hazard quotient (HQ) is the maximum detected concentration divided by the screening benchmark. HQs are only calculated for COPCs.
[e] Average HQ is the average detected concentration divided by the screening benchmark.

NA - Hazard quotient not calculated because benchmark not available.
mg/L - milligrams per liter

Table G-19

Occurrence, Distribution, and Selection of Chemicals of Potential Concern (COPCs)
Sphagnum Bog

Nuclear Metals Superfund Site, Concord, Massachusetts
Medium: Sediment

Analyte	Frequency of Detection	Range of Detected Concentrations	Average (arithmetic mean) [a]	Final Selected Benchmark [b]	COPC? [c]	Rationale [c]	Maximum HQ [d]	Average HQ [e]
Volatile Organics (mg/Kg)								
Acetone	5 / 10	0.0889 - 0.79	0.24	0.13	Yes	ASL	6.1	1.9
Semivolatile Organics (mg/Kg)								
2,4-Dinitrophenol	1 / 19	0.436 - 0.436	1.4	0.0027	Yes	ASL	161	510
4-Methylphenol	1 / 3	0.163 - 0.163	0.50	0.11	Yes	ASL	1.5	4.5
Acenaphthylene	2 / 28	0.0212 - 0.0732	0.057	0.044	Yes	ASL	1.7	1.29
Anthracene	6 / 28	0.00598 - 0.176	0.059	0.057	Yes	ASL	3.1	1.0
Benzo(a)anthracene	4 / 28	0.0238 - 0.111	0.050	0.11	Yes	ASL	1.0	0.5
Fluorene	2 / 28	0.0198 - 0.0232	0.055	0.019	Yes	ASL	1.2	2.9
m+p-Methylphenol	3 / 16	0.494 - 1.1	0.77		Yes	NSL	NA	NA
Phenol	3 / 19	0.093 - 0.116	0.67	0.048	Yes	ASL	2.4	14
Pyrene	21 / 28	0.0329 - 0.301	0.10	0.20	Yes	ASL	1.5	0.5
PCBs (mg/Kg)								
Aroclor-1254	26 / 28	0.0125 - 27.8	2.1	0.88	Yes	ASL	32	2.4
Aroclor-1260	9 / 29	0.0037 - 0.271	0.15	0.073	Yes	ASL	3.7	2.1
Inorganics (mg/Kg)								
Aluminum	29 / 29	1210 - 11,600	3,882		Yes	NSL	NA	NA
Antimony	11 / 28	0.55 - 2.5	0.43	2.0	Yes	ASL	1.3	0.2
Arsenic	23 / 28	0.49 - 9.2	2.8	6.0	Yes	ASL	1.5	0.5
Barium	28 / 28	10.1 - 98.1	34		Yes	NSL	NA	NA
Beryllium	28 / 28	1.3 - 140	17		Yes	NSL	NA	NA
Cadmium	28 / 28	0.036 - 2	0.52	0.60	Yes	ASL	4.0	0.9
Chromium	28 / 28	3.1 - 96.8	15	26	Yes	ASL	3.7	0.6
Copper	28 / 28	14.4 - 1,590	208	16	Yes	ASL	99	13
Lead	28 / 28	6.8 - 200	41	31	Yes	ASL	6.5	1.3
Mercury	26 / 26	0.0094 - 5.8	0.42	0.15	Yes	ASL	39	2.8
Molybdenum	23 / 23	6.5 - 183	49	8.3	Yes	ASL	22	5.9
Nickel	28 / 28	6.9 - 66	20	16	Yes	ASL	4.1	1.2
Silver	20 / 28	0.28 - 32.4	2.7	1.0	Yes	ASL	32	2.7
Thallium	9 / 28	0.13 - 1.3	0.16		Yes	NSL	NA	NA
Thorium	23 / 23	0.12 - 10.7	2.1		Yes	NSL	NA	NA
Titanium	23 / 23	38.2 - 532	209		Yes	NSL	NA	NA
Tungsten	21 / 23	0.58 - 35	5.5		Yes	NSL	NA	NA
Uranium	30 / 30	2.8 - 327	51	32	Yes	ASL	10	1.6
Zinc	28 / 28	7.8 - 466	82	120	Yes	ASL	3.9	0.7
Zirconium	22 / 22	0.3 - 69	8.28		Yes	NSL	NA	NA
EPH (mg/Kg)								
C11-C22 Aromatics	16 / 19	59 - 801	250		Yes	NSL	NA	NA
C19-C36 Aliphatics	14 / 19	39.6 - 752	147		Yes	NSL	NA	NA
C9-C18 Aliphatics	13 / 19	1.8 - 12.2	4.6		Yes	NSL	NA	NA

Table G-19

Occurrence, Distribution, and Selection of Chemicals of Potential Concern (COPCs)
Sphagnum Bog

Nuclear Metals Superfund Site, Concord, Massachusetts
Medium: Sediment

Analyte	Frequency of Detection	Range of Detected Concentrations	Average (arithmetic mean) [a]	Final Selected Benchmark [b]	COPC? [c]	Rationale [c]	Maximum HQ [d]	Average HQ [e]

Notes:
[a] Average (arithmetic mean) was calculated using one-half the detection limit for non-detects.
[b] Screening benchmarks were selected in BERA Table 3-11. Where applicable, benchmarks were adjusted based AOI 6 average of 14.6% TOC.
[c] Chemical is selected as a chemical of potential concern (COPC) if the maximum detected concentration is greater than the screening benchmark or a screening benchmark is unavailable, unless the frequency of detection (FOD) is less than 5%.
ASL - Above Screening Level
NSL - No Screening Level
[d] Hazard quotient (HQ) is the maximum detected concentration divided by the screening benchmark. HQs are only calculated for COPCs.
[e] Average HQ is the average detected concentration divided by the screening benchmark.

NA - Hazard quotient not calculated because benchmark not available.
mg/Kg - milligram per kilogram
TOC - total organic carbon

Table G-20

Occurrence, Distribution, and Selection of Chemicals of Potential Concern (COPCs)
Sphagnum Bog

Nuclear Metals Superfund Site, Concord, Massachusetts
Medium: Peat

Analyte	Frequency of Detection	Range of Detected Concentrations	Average (arithmetic mean) [a]	Final Selected Benchmark [b]	COPC? [c]	Rationale [c]	Maximum HQ [d]	Average HQ [e]
Semivolatile Organics (mg/Kg)								
2-Methylnaphthalene	1 / 17	0.092 - 0.092	0.082	0.070	Yes	ASL	1.3	1.2
Acenaphthylene	2 / 18	0.09 - 0.738	0.12	0.044	Yes	ASL	16.8	2.7
Anthracene	2 / 18	0.0469 - 0.097	0.092	0.057	Yes	ASL	1.7	1.6
Benzo(a)pyrene	5 / 18	0.0363 - 0.234	0.091	0.15	Yes	ASL	1.6	0.61
Benzoic Acid	13 / 17	0.49 - 9.2	3.1	8.9	Yes	ASL	1.0	0.35
Chrysene	12 / 18	0.0448 - 0.256	0.12	0.17	Yes	ASL	1.5	0.69
Fluoranthene	16 / 18	0.0266 - 0.597	0.17	0.42	Yes	ASL	1.4	0.41
Fluorene	2 / 18	0.036 - 0.105	0.092	0.019	Yes	ASL	5.5	4.8
Phenanthrene	15 / 18	0.0343 - 0.259	0.12	0.20	Yes	ASL	1.3	0.59
Phenol	3 / 17	0.28 - 0.554	0.78	0.048	Yes	ASL	11.5	16.2
Pyrene	16 / 18	0.0737 - 0.391	0.19	0.20	Yes	ASL	2.0	0.95
PCBs (mg/Kg)								
Aroclor-1254	8 / 15	0.0058 - 4.82	0.36	2.1	Yes	ASL	2.3	0.17
Aroclor-1260	4 / 15	0.006 - 0.636	0.065	0.18	Yes	ASL	3.5	0.36
Inorganics (mg/Kg)								
Aluminum	18 / 18	900 - 5,450	1,745		Yes	NSL	NA	NA
Antimony	16 / 18	0.39 - 2.5	0.97	2.0	Yes	ASL	1.3	0.49
Arsenic	10 / 18	2.2 - 14	3.1	6.0	Yes	ASL	2.3	0.51
Barium	18 / 18	6.4 - 105	35		Yes	NSL	NA	NA
Beryllium	18 / 18	0.14 - 143	15.4		Yes	NSL	NA	NA
Cadmium	18 / 18	0.24 - 2	0.87	0.60	Yes	ASL	3.5	1.4
Chromium	17 / 18	3 - 104	12.2	26	Yes	ASL	4.0	0.47
Copper	14 / 18	19.3 - 837	135	16	Yes	ASL	52	8.4
Iron	18 / 18	1070 - 27200	5,025	20,000	Yes	ASL	1.4	0.3
Lead	18 / 18	20.4 - 211	62	31	Yes	ASL	6.8	2.0
Mercury	17 / 18	0.021 - 1.4	0.23	0.15	Yes	ASL	9.3	1.5
Molybdenum	18 / 18	0.7 - 213	43	8.3	Yes	ASL	26	5.2
Nickel	18 / 18	4.3 - 33	11.3	16	Yes	ASL	2.0	0.71
Silver	7 / 18	0.75 - 36	3.1	1.0	Yes	ASL	36	3.1
Thallium	8 / 18	0.11 - 0.67	0.15		Yes	NSL	NA	NA
Thorium	14 / 18	0.069 - 3.2	0.54		Yes	NSL	NA	NA
Titanium	18 / 18	33.2 - 180	65		Yes	NSL	NA	NA
Tungsten	18 / 18	0.59 - 34	5.7		Yes	NSL	NA	NA
Uranium	18 / 18	3.5 - 268	34	32	Yes	ASL	8.4	1.1
Vanadium	18 / 18	7.5 - 30.7	14.0	27	Yes	ASL	1.1	0.52
Zinc	18 / 18	24.6 - 648	156	120	Yes	ASL	5.4	1.3
Zirconium	13 / 13	0.22 - 24.2	3.2		Yes	NSL	NA	NA
EPH (mg/Kg)								
C11-C22 Aromatics	14 / 14	102 - 778	297		Yes	NSL	NA	NA
C19-C36 Aliphatics	14 / 14	25.4 - 1140	144		Yes	NSL	NA	NA
C9-C18 Aliphatics	9 / 14	2.15 - 20.9	5.1		Yes	NSL	NA	NA

Table G-20

Occurrence, Distribution, and Selection of Chemicals of Potential Concern (COPCs)
Sphagnum Bog

Nuclear Metals Superfund Site, Concord, Massachusetts
Medium: Peat

Analyte	Frequency of Detection	Range of Detected Concentrations	Average (arithmetic mean) [a]	Final Selected Benchmark [b]	COPC? [c]	Rationale [c]	Maximum HQ [d]	Average HQ [e]

Notes:
[a] Average (arithmetic mean) was calculated using one-half the detection limit for non-detects.
[b] Screening benchmarks were selected in BERA Table 3-11. Where applicable, benchmarks were adjusted based on AOI 6 peat average of 35.6% TOC.
[c] Chemical is selected as a chemical of potential concern (COPC) if the maximum detected concentration is greater than the screening benchmark or a screening benchmark is unavailable, unless the frequency of detection (FOD) is less than 5%.
ASL - Above Screening Level
NSL - No Screening Level
[d] Hazard quotient (HQ) is the maximum detected concentration divided by the screening benchmark. HQs are only calculated for COPCs.
[e] Average HQ is the average detected concentration divided by the screening benchmark.

NA - Hazard quotient not calculated because benchmark not available.
mg/Kg - milligram per kilogram
TOC - total organic carbon

Table G-21

Ecological Exposure Pathways of Concern - Aquatic Habitats

Exposure Media	Sensitive Environment Flag Y or N	Receptor	Endangered/ Threatened Species Flag Y or N	Exposure Routes	Assessment Endpoints	Measurement Endpoints
AOI 6 - SPHAGNUM BOG						
Surface water	Y	Aquatic Invertebrates	N	Ingestion and direct contact with chemicals in surface water	Aquatic benthic invertebrate community structure.	1A. Compare COPC levels in surface water samples to published surface water benchmarks and to background.
Sediment	Y	Aquatic Invertebrates	N	Ingestion and direct contact with chemicals in sediment	Aquatic benthic invertebrate community structure.	1B1. Compare COPC levels in mineral sediment samples to published sediment benchmarks and to background.
Moss	Y	Aquatic Invertebrates	N	Ingestion and direct contact with chemicals in moss	Aquatic benthic invertebrate community structure.	1B2. Compare COPC levels in moss samples to published mineral sediment benchmarks and to background.
Peat	Y	Aquatic Invertebrates	N	Ingestion and direct contact with chemicals in peat	Aquatic benthic invertebrate community structure.	1B3. Compare COPC levels in peat samples to published mineral sediment benchmarks and to background.
Sediment	Y	Aquatic Invertebrates	N	Ingestion and direct contact with chemicals in sediment	Aquatic benthic invertebrate community structure.	1C. Perform lab toxicity tests to measure survival and growth of a freshwater benthic invertebrate (*Chironomus dilutus*) exposed to mineral sediment and compare results to those measured in background samples.
Sediment	Y	Aquatic Invertebrates	N	Ingestion and direct contact with chemicals in sediment	Aquatic benthic invertebrate community structure.	1D. Assess the health of the benthic community in mineral sediment samples and compare the results to background conditions.
Surface water	Y	Amphibians	N	Ingestion and direct contact with chemicals in surface water	Growth, survival, and reproduction of amphibian populations	2A. Compare surface water concentrations to published surface water benchmarks and to background.
Sediment	Y	Amphibians	N	Ingestion and direct contact with chemicals in sediment	Growth, survival, and reproduction of amphibian populations	2B. Compare site sediment concentrations to published sediment benchmarks and to background
Surface water	Y	Amphibians	N	Ingestion and direct contact with chemicals in surface water	Growth, survival, and reproduction of amphibian populations	2C. Perform laboratory FETAX tests to measure survival, malformation, and growth of amphibians exposed to surface water collected from the site and compare to background.
Sediment, prey	Y	Wetland Birds	N	Dietary exposures of soil COPCs	Growth, survival, and reproduction of semi-aquatic bird populations	3A. Compare the EDDs for omnivorous waterfowl (mallard) based on ingesting prey from the Sphagnum Bog to published avian TRVs and to background conditions.
Sediment, prey	Y	Wetland Birds	N	Dietary exposures of soil COPCs	Growth, survival, and reproduction of semi-aquatic bird populations	3B. Compare the EDDs for predatory wading birds (great blue heron) based on ingesting prey fromthe SphagnumBog to published mammal TRVs and to background conditions.
Sediment, prey	Y	Wetland Mammals	N	Dietary exposures of soil COPCs	Growth, survival, and reproduction of semi-aquatic mammal populations	4A. Compare the EDDs for omnivorous small mammals (shrew) based on ingesting prey from the Sphagnum Bog to published mammal TRVs and to background conditions.
Sediment, prey	Y	Wetland Mammals	N	Dietary exposures of soil COPCs	Growth, survival, and reproduction of semi-aquatic mammal populations	4B. Compare the EDDs for predatory large mammals (raccoon) based on ingesting prey from the *Sphagnum* Bog to published mammal TRVs and to background conditions.

Notes:

COPC - Chemical of Potential Concern
EDD - Estimated Daily Dose
FETAX - Frog Embryo teratogenesis assay - Xenopus
TRV - Toxicity Reference Value

TABLE G-22

SUMMARY OF RISK BY ASSESSMENT ENDPOINT

Receptor Group	Assessment Endpoint	Measurement Endpoint	Weight	Risk summary
Aquatic Invertebrates	Aquatic benthic invertebrate community structure.	1A. Compare COPC levels in surface water samples to published surface water benchmarks and to background.	low-medium	Adverse impacts are possible based on CTE IRs > 1.0 derived from chronic toxicity surface water benchmarks. The three major risk drivers for metals are Cu, Pb, and Ag .
		1B1. Compare COPC levels in mineral sediment samples to published sediment benchmarks and to background.	low-medium	Adverse impacts in mineral sediment are possible based on CTE IRs > 1.0 derived from no-effect sediment benchmarks. The three main risk drivers are 2,4-dinitrophenol, Cu, and Mo.
		1B2. Compare COPC levels in moss samples to published mineral sediment benchmarks and to background.	low-medium	Adverse impacts in moss are possible based on CTE IRs > 1.0 derived from no-effect sediment benchmarks. The three main risk drivers are Cu, Mo, and U.
		1B3. Compare COPC levels in peat samples to published mineral sediment benchmarks and to background.	low-medium	Adverse impacts in peat are possible based on CTE IRs derived from no-effect sediment benchmarks. The three main risk drivers are phenol, Cu and Mo.
		1C. Perform lab toxicity tests to measure survival and growth of a freshwater benthic invertebrate (*Chironomus dilutus*) exposed to mineral sediment and compare results to those measured in background samples.	medium-high	Adverse impacts are possible at several locations in the bog. *C. dilutus* showed statistically significant effects in six of the 11 mineral sediment samples tested for toxicity. Highest impacts were measured only at two locations which corresponded with the highest and second highest PCB and metal levels in mineral sediments.
		1D. Assess the health of the benthic community in mineral sediment samples and compare the results to background conditions.	medium	Five of 13 benthic community samples were characterized as either slightly or moderately impaired. No relationship was found between the responses measured in the laboratory toxicity test and benthic community impairment.
Amphibians		2A. Compare surface water concentrations to published surface water benchmarks and to background.	low-medium	Adverse impacts are possible based on CTE IRs > 1.0 derived from chronic toxicity surface water benchmarks. The three major risk drivers for metals are Cu, Pb, and Ag .
		2B. Compare site sediment concentrations to published sediment benchmarks and to background.	low-medium	Adverse impacts in moss are possible based on CTE IRs > 1.0 derived from no-effect sediment benchmarks. The three main risk drivers are Cu, Mo, and U.
Wetland Birds	Growth, survival, and reproduction of semi-aquatic bird populations	3B. Compare the EDDs for predatory wading birds (great blue heron) based on ingesting prey from the *Sphagnum* Bog to published avian TRVs and to background conditions.	medium	Adverse population effects to great blue heron are possible from Be in the mineral fraction, peat fraction, and moss fraction
Wetland Mammals	Growth, survival, and reproduction of semi-aquatic mammal populations	4A. Compare the EDDs for omnivorous small mammals (shrew) based on ingesting prey from the Sphagnum Bog to published mammal TRVs and to background conditions.	medium	Adverse population effects to the shrew are possible from Mo in the peat fraction but not in the mineral or moss fractions

Notes:

COPC = contaminant of potential concern

CTE = central tendency exposure

IR = incremental risk

EDD = estimated daily dose

TRV = toxicity reference value

Table G-23

COC Concentrations Expected to Provide Adequate Protection of Ecological Receptors

Habitat Type/Name	Exposure Medium	COC	Protective Level	Units	Basis	Assessment Endpoint
BENTHIC INVERTEBRATE COMMUNITY						
Sphagnum Bog	Sediment	mean PEC-Q[1]	0.64		Site-specific MATC [2]	Survival and growth of benthic invertebrates communities
		Total PCBs	1.08	mg/kg	Site-specific MATC	
		Copper	176	mg/kg	Site-specific MATC	
		Lead	97.3	mg/kg	Site-specific MATC	
		Mercury	1.3	mg/kg	Site-specific MATC	

Notes:

[1] See Appendix A of the Feasibility Study (*de maximus*, 2014b) for discussion of development of PEC-Q values based on the results of the sediment toxicity tests.

[2] The site-specific MATC (set as the geometric mean between the NOEC and LOEC values) has been selected as the protective level for each COC.

COC - Chemical of Concern

NOEC - No observed effect concentration. The NOEC was set as the higher of the concentrations observed at locations with no observed effects.

LOEC - Lowest observed effect concentration. The LOEC was set as the lower of the concentrations observed at locations with observed toxicity to benthic invertebrates.

MATC - Maximum Acceptable Toxic Concentration

PEC-Q - Probable Effect Concentration - Quotients for mixtures consisting of metals, PAHs, and PCBs (unitless)

Table J1 - SOIL REMEDIAL ALTERNATIVE MATRIX

		General Response Action/Technology Type							
								In-Situ Stabilization of Holding Basin	
Alternative	Description	No Action	Excavation and **On-Site Consolidation** of Soils and Sediments	Excavation and **Off-Site Consolidation** of Soils and Sediments	Cap and Liner System at Grade	Vertical Barrier Jet Grouted	Horizontal Barrier (Sub-Grade Cover)	Apatite Injection (Note 2)	Cement Stabilization
SS-1	**N**o Action	•							
SS-2	**E**xcavation and On-Site Consolidation of Soils (including Unsaturated Holding Basin Soils) and Sediments. **C**ap and Liner System, **I**n-Situ Stabilization of Holding Basin Saturated Soils Using Apatite Injection[2]		95,000 cy (Note 1)		•			•	
SS-3	**E**xcavation and Off-Site Disposal Of Sediments And Non-Holding Basin Soils, **C**ontainment with Partial In-Situ Solidification/Stabilization of Holding Basin Soils Using Cement Grouting, and **L**ow-Permeability Sub-Grade Cover			82,500 cy of soils/ sediment, plus another 18,500 cy of spoils from solidification/ stabilization		Deep Soil Mixing Cement Ring	•		Cement Ring
SS-4	**E**xcavation and Off-Site Disposal Of Sediments and Non-Holding Basin Soils, **C**ontainment with Vertical Containment Wall **L**ow-Permeability Sub-Grade Cover **I**n-Situ Stabilization of Holding Basin Soils Using Apatite Injection[2]			82,500 cy		Jet Grouted Bentonite	•	•	
SS-5	**E**xcavation and Off-Site Disposal of Sediments and Soils (including Unsaturated Holding Basin Soils), and **C**ontainment with Full In-Situ Solidification/Stabilization of Holding Basin Saturated Soils Using Deep Soil Mixing **L**ow-Permeability Sub-Grade Cover			95,000 cy, plus another 12,750 cy of spoils from solidification/ stabilization (Note 1)		Cement Monolith	•		Cement Monolith

Notes:
Note 1 - The volumes for alternatives SS-2 and SS-5 are inclusive of 12,500 cubic yards of unsaturated holding basin soils that will be excavated and either consolidated on-site (SS-2) or disposed off-site (SS-5)
Note 2 - Apatite used for costing purposes; other comparable stabilization agents may be used.

Key:
bgs - below ground surface
cy - cubic yard
ft - feet

Table J2 - GROUNDWATER REMEDIAL ALTERNATIVE MATRIX

Alternative	Description	Long Term Monitoring			Pump and Treat (*Ex-Situ*)			*In-Situ* Treatment
		DU/ Natural U	VOCs	1,4-dioxane	DU/ Natural U	VOCs	1,4-dioxane	DU/ Natural U
GW-1	No-Action							
GW-2	Long-Term Monitoring	X	X	X				
GW-3	Ex-situ Treatment; Long-Term Monitoring	X			X	X	X	
GW-4	Ex-situ and In-situ Treatment; Long-Term Monitoring	X				X	X	X

Table K-1: Soil/Sediment Comparative Analysis of Alternatives

Evaluation Criteria	SS-1	SS-2	SS-3	SS-4	SS-5
	No Action	Excavation and On-Site Consolidation of Soils (including Unsaturated Holding Basin Soils) and Sediments, Cap and Liner System, In-Situ Stabilization of Holding Basin Saturated Soils Using Apatite Injection	Excavation and Off-Site Disposal Of Sediments And Non-Holding Basin Soils, Containment with Partial In-Situ Solidification/Stabilization of Holding Basin Soils Using Cement Grouting, and Low-Permeability Sub-Grade Cover	Excavation and Off-Site Disposal Of Sediments and Non-Holding Basin Soils, Containment with Vertical Containment Wall Low-Permeability Sub-Grade Cover In-Situ Stabilization of Holding Basin Soils Using Apatite (or equivalent) Injection	Excavation and Off-Site Disposal of Sediments and Soils (including Unsaturated Holding Basin Soils), and Containment with Full In-Situ Solidification/Stabilization of Holding Basin Saturated Soils Using Deep Soil Mixing Low-Permeability Sub-Grade Cover
Overall Protection of Human Health and the Environment	**No Protection**	**Significant Protection** á á á - Effective when combined with groundwater remedy - Southwest corner of bog will be adversely affected but extent of impact will be minimized to remove highest concentrations of COCs	**Significant Protection** á á á - Effective when combined with groundwater remedy - Southwest corner of bog will be adversely affected but extent of impact will be minimized to remove highest concentrations of COCs	**Significant Protection** á á á - Effective when combined with groundwater remedy - Southwest corner of bog will be adversely affected but extent of impact will be minimized to remove highest concentrations of COCs	**Significant Protection** á á á - Effective when combined with groundwater remedy - Southwest corner of bog will be adversely affected but extent of impact will be minimized to remove highest concentrations of COCs
Compliance with ARARs	**Will Not Meet ARARs**	**Will Meet Soil and Sediment ARARs** á á á - PRGs in soil and sediment can be achieved - Cap can be designed to meet requirements of 105CMR120.245	**Will Meet Soil and Sediment ARARs** á á á - PRGs in soil and sediment can be achieved - Cap can be designed to meet requirements of 105CMR120.245	**Will Meet Soil and Sediment ARARs** á á á - PRGs in soil and sediment can be achieved - Cap can be designed to meet requirements of 105CMR120.245	**Will Meet Soil and Sediment ARARs** á á á - PRGs in soil and sediment can be achieved - Cap can be designed to meet requirements of 105CMR120.245
Long-Term Effectiveness and Permanence	**Not Effective** - Concentrations of Uranium and PCBs in soils and sediments will not be addressed	**Effective for Excavated Soils** á á A larger amount of soil will be left on site untreated, which reduces the long-term effectiveness and permanence of this alternative - Containment is an approved Presumptive Remedy for metals in soils - Groundwater is a stable environment for stabilization technology Sequestration using apatite will treat principal threats that may exist in saturated soils in the Holding Basin footprint. Other principal threat soil within the Holding Basin will be excavated and placed in the consolidation area without treatment.	**Very Effective for Excavated Soils** á á á - Containment is an approved Presumptive Remedy for metals in soils - All soils are contained or disposed off site Principal threats will either be excavated for off-site disposal or treated with in-situ solidification / stabilization.	**Very Effective for Excavated Soils** á á á - Containment is an approved Presumptive Remedy for metals in soils - All soils are contained or disposed off-site Principal threats will either be excavated for off-site disposal or treated with in-situ sequestration using apatite.	**Very Effective for Excavated Soils** á á á - Containment is an approved Presumptive Remedy for metals in soils - All soils are contained or disposed off-site. This alternative is the most permanant as the most soils are disposed off site. Principal threats will either be excavated for off-site disposal or treated with in-situ solidification / stabilization.

Table K-1: Soil/Sediment Comparative Analysis of Alternatives

Evaluation Criteria	SS-1	SS-2	SS-3	SS-4	SS-5
	No Action	**Excavation and On-Site Consolidation of Soils (including Unsaturated Holding Basin Soils) and Sediments, Cap and Liner System, In-Situ Stabilization of Holding Basin Saturated Soils Using Apatite Injection**	**Excavation and Off-Site Disposal Of Sediments And Non-Holding Basin Soils, Containment with Partial In-Situ** Solidification/Stabilization of Holding Basin Soils Using Cement Grouting, and **Low-Permeability Sub-Grade Cover**	**Excavation and Off-Site Disposal Of Sediments and Non-Holding Basin Soils, Containment with Vertical Containment Wall Low-Permeability Sub-Grade Cover In-Situ Stabilization of Holding Basin Soils Using Apatite (or equivalent) Injection**	**Excavation and Off-Site Disposal of Sediments and Soils (including Unsaturated Holding Basin Soils), and Containment with Full In-Situ Solidification/Stabilization of Holding Basin Saturated Soils Using Deep Soil Mixing Low-Permeability Sub-Grade Cover**
Reduction of Toxicity, Mobility and Volume through Treatment	**No Treatment**	**No Treatment for Excavated Soils Reduction of Toxicity and Mobility for Saturated Soils á á** - Excavated soils will experience reduction in mobility through consolidation facility - Long-term stability of stabilization is promising; least amount of material treated, including principal threat waste	**No Treatment for Excavated Soils Reduction of Toxicity and Mobility for Contained Soils á á** - Excavated soils will experience reduction in mobility through containment- -Long-term stability of cement stabilization is proven, however increases volume or material requiring disposal	**No Treatment for Excavated Soils Reduction of Toxicity and Mobility for Contained Soils á á á** - Excavated soils will experience reduction in mobility through containment and stabilization, least volume generated; DU in saturated soils will be sequestered using apatite.	**No Treatment for Excavated Soils Reduction of Toxicity and Mobility for Contained Soils á á** - Excavated soils will experience reduction in mobility through containment - Long-term stability of cement stabilization is proven, however increases volume of material requiring disposal
Short-Term Effectiveness	**RAOs are not met Workers and Community are not affected á á á**	**RAOs are met á á á** - GW impact from removing existing cover over Holding Basin is minimized by downgradient groundwater hydraulic containment. **Community is Protected á á á** - No contaminated soils transferred off-site	**RAOs are met á á á** - GW impact from removing existing cover over Holding Basin is minimized by downgradient groundwater hydraulic containment. **Community is Protected á** - Approximately 101,000 cy of contaminated soils and spoils from stabilization process will be transported off-site - Transport and disposal of soils will require working with community to minimize impact	**RAOs are met á á á** - GW impact from removing existing cover over Holding Basin is minimized by downgradient groundwater hydraulic containment. **Community is Protected á á** - Approximately 82,500 cy of contaminated soils will be transported off-site - Transport and disposal of soils will require working with community to minimize impact	**RAOs are met á á** - GW impact from removing existing cover over Holding Basin is minimized by downgradient groundwater hydraulic containment. **Community is Protected á á** - Approximately 107,750 cy of contaminated soils and spoils from stabilization process will be transported off-site. - Transport and disposal of soils will require working with community to minimize impact
Short-Term Effectiveness (Continued)		**Worker Protections will be Critical á** - Dangers exist in excavating to 35 feet and bringing drill rig into excavation to stabilize saturated soils - Some exposure to drilling muds and displaced soils in stabilization processes	**Workers are Protected á** - This Alternative has the most exposure to approximately 40,000 cy drilling muds and displaced soils in stabilization processes	**Workers are Protected á á á** - Most protective of workers	**Worker Protections will be Critical á** - Dangers exist in excavating to 35 feet and bringing drill rig into excavation to stabilize saturated soils - Some exposure to drilling muds and displaced soils in stabilization processes.

Table K-1: Soil/Sediment Comparative Analysis of Alternatives

Evaluation Criteria	SS-1	SS-2	SS-3	SS-4	SS-5
	No Action	**Excavation and On-Site Consolidation of Soils (including Unsaturated Holding Basin Soils) and Sediments, Cap and Liner System, In-Situ Stabilization of Holding Basin Saturated Soils Using Apatite Injection**	**Excavation and Off-Site Disposal Of Sediments And Non-Holding Basin Soils, Containment with Partial In-Situ** Solidification/Stabilization of Holding Basin Soils Using Cement Grouting, and **Low-Permeability Sub-Grade Cover**	**Excavation and Off-Site Disposal Of Sediments and Non-Holding Basin Soils, Containment with Vertical Containment Wall Low-Permeability Sub-Grade Cover In-Situ Stabilization of Holding Basin Soils Using Apatite (or equivalent) Injection**	**Excavation and Off-Site Disposal of Sediments and Soils (including Unsaturated Holding Basin Soils), and Containment with Full In-Situ Solidification/Stabilization of Holding Basin Saturated Soils Using Deep Soil Mixing Low-Permeability Sub-Grade Cover**
Implementability	**Not Applicable**	**Difficult to Implement** á á - Stabilization of saturated soils from 35 to 90 feet will be difficult - Additional future actions will be difficult with consolidation facility built above stabilized soils - Stabilization contractors are not readily available - Pilot testing and extensive construction QA/QC will be required - Shoring of excavation will be necessary to excavate the unsaturated soils	**Difficult to Implement** á á - Most difficult task to stabilize from 20 to 90 feet - Additional future actions will be difficult if cement is used - Stabilization contractors are not readily available - Pilot testing and extensive construction QA/QC will be required	**Implementable** á á á - Construction of vertical barrier wall and stabilization to 90 feet will be difficult - Stabilization contractors are not readily available - Pilot testing and extensive construction QA/QC will be required	**Very Difficult to Implement** á - Stabilization of saturated soils from 35 to 90 feet will be difficult - Additional future actions will be difficult if cement is used - Stabilization contractors are not readily available - Pilot testing and extensive construction QA/QC will be required - Shoring of excavation will be necessary to excavate the unsaturated soils
Costs	**$0** á á á	**$ 37,953 K Capital Cost** **$ 7,305 K O&M (NPV at 7% for 200 years)** **$ 44,891 K Total Cost** á á á	**$127,682 K Capital Cost** **$ 1,566 K O&M (NPV at 7% for 200 years)** **$ 129,248 K Total Cost** á	**$ 103,188 K Capital Cost** **$ 1,566 K O&M (NPV at 7% for 200 years)** **$ 104,754 K Total Cost** á á	**$ 146,358 K Capital Cost** **$ 1,566 K O&M (NPV at 7% for 200 years)** **$ 147,924 K Total Cost** á
Diamonds represent how the evaluation criteria for each alternative compares to other alternatives, with more meaning "better"					

Table K-2: Comparative Analysis of Groundwater Alternatives

Evaluation Criteria		GW-1 No Action	GW-2 Limited Action/Institutional Controls and Long- Term Monitoring	GW-3 Ex-Situ Treatment (DU, UROCK, 1,4-dioxane), Institutional Controls,and Long-Term Monitoring	GW-4 Ex-Situ Treatment (VOCs and 1,4-Dioxane), In-situ Treatment (DU/Natural Uranium), Institutional Controls, and Long-Term Monitoring
Overall Protection of Human Health and the Environment	**Human Health Protection**	**No Additional Protection** á -There is no current exposure that poses risk to human health. -This alternative does not reduce the potential for on- or off-property human exposure to impacted groundwater.	**Moderate Protection** á á -There is no current exposure that poses risk to human health. -Deed restrictions prevent potential human exposure to on- and off-property overburden or bedrock groundwater (used as a hypothetical future domestic water supply) with uranium, VOCs, or 1,4-dioxane that exceed ARARs or target risk limits. -The plume of isotopically natural uranium in bedrock is at steady-state, and no off-property migration is expected in the future. -Although Holding Basin Source Control is included, this alternative does not specifically address potential human exposure to DU-impacted overburden groundwater which may migrate off-property in the future.	**Significant Protection** á á á -There is no current exposure that poses risk to human health. -Deed restrictions prevent potential human exposure to on and off-property overburden or bedrock groundwater (used as a hypothetical future domestic water supply) with uranium, VOCs, or 1,4-dioxane that exceeds ARARs or target risk limits. -The plume of isotopically natural uranium in bedrock is at steady-state, and no off-property migration is expected in the future. -Holding Basin source isolation and hydraulic containment would limit off-property migration of DU- impacted overburden groundwater. -Active pumping for the 1,4-dioxane hydraulic containment system will limit migration to and beyond the Assabet River and flush 1,4-dioxane from the aquifer over time.	**Significant Protection** á á á -There is no current exposure that poses risk to human health. -Deed restrictions prevent potential human exposure to on and off- property overburden or bedrock groundwater (used as a hypothetical future domestic water supply) with uranium, VOCs, or 1,4-dioxane that exceeds ARARs or target risk limits. -The plume of isotopically natural uranium in bedrock is at steady- state, and no off-property migration is expected in the future. -Active pumping for the 1,4-dioxane hydraulic containment system will limit migration to and beyond the Assabet River and flush 1,4- dioxane from the aquifer over time. --Holding Basin source isolation and the In-situ reactive zones would limit off-property migration of DU-impacted overburden groundwater and would likely occur in a shorter timeframe than hydraulic containment alone.
	Ecological Protection	**Not needed to satisfy RAOs**	**Not needed to satisfy RAOs**	**Not needed to satisfy RAOs**	**Not needed to satisfy RAOs**
Compliance with ARARs	**Chemical-Specific**	**May Partially Meet ARARs** á á -May meet ARARs for VOCs in groundwater off-property within a reasonable timeframe (i.e., î 30 years) due to natural attenuation. -May not meet ARARs for VOCs on- property due to slow natural attenuation rates. -ARARs are currently met off-property for isotopically natural uranium in bedrock but not on-property, although the plume is at steady-state. ARARs are not likely to be met on-property. -Not likely to meet ARARs for isotopically natural uranium in bedrock or DU in overburden groundwater on- property.	**May Partially Meet ARARs** á á -May meet ARARs for VOCs in groundwater off- property within a reasonable timeframe (i.e., î 30 years) due to natural attenuation. -May not meet ARARs for VOCs on-property due to slow natural attenuation rates. -ARARs are currently met off-property for isotopically natural uranium in bedrock but not on-property, although the plume is at steady-state. ARARs are not likely to be met on-property. -Not likely to meet ARARs for DU in overburden groundwater on-property or off-property.	**May Partially Meet ARARs** á á -May meet ARARs for VOCs in groundwater within a reasonable timeframe(i.e., î 30 years) due to natural attenuation. Active pumping of the VOC hydraulic containment system will flush VOCs from the aquifer over time; therefore, this alternative is more likely to achieve ARARs for VOCs than GW-1 or GW-2. -ARARs are currently met off-property for isotopically natural uranium in bedrock but not on-property, although the plume is at steady-state. ARARs are not likely to be met on-property. -May meet ARARs for DU in overburden groundwater off-property due to Holding Basin source control and hydraulic containment, but not likely to meet ARARs for DU on-property.	**Will Meet ARARs** á á á -May meet ARARs for VOCs in groundwater within a reasonable timeframe (i.e., î 30 years) due to natural attenuation. Active pumping of the VOC hydraulic containment system VOCs from the aquifer over time; therefore, this alternative is more likely to achieve ARARs for VOCs than GW-1 or GW-2. -ARARs are currently met off-property for isotopically natural uranium in bedrock but not on-property, although the plume is at steady-state. ARARs are expected to be met in a reasonable timeframe with in-situ treatment. -Will meet ARARs for DU in overburden groundwater on- and off- property due to Holding Basin Source control and the In-Situ Reactive Zone remedy.
	Location-Specific	**Not Applicable**	**Not Applicable**	**Not Applicable**	**Not Applicable**
	Action-Specific	**Not Applicable**	**Will Comply with ARARs**	**Will Comply with ARARs**	**Will Comply with ARARs**

Table K-2: Comparative Analysis of Groundwater Alternatives

Evaluation Criteria		GW-1 No Action	GW-2 Limited Action/Institutional Controls and Long- Term Monitoring	GW-3 Ex-Situ Treatment (DU, UROCK, 1,4-dioxane), Institutional Controls,and Long-Term Monitoring	GW-4 Ex-Situ Treatment (VOCs and 1,4-Dioxane), In-situ Treatment (DU/Natural Uranium), Institutional Controls, and Long-Term Monitoring
Long-Term Effectiveness and Performance	**Magnitude of Residual Risk**	**Higher Relative Risk** á -Potential future human exposure to uranium, VOCs, and 1,4-dioxane in groundwater from a hypothetical supply well would pose a higher level of risk compared to other alternatives.	**Moderate Residual Risk** á á -Risks related to human exposure to uranium, VOCs, and 1,4-dioxane in groundwater on-property are mitigated through institutional controls to limit groundwater use. -Potential future human exposure to uranium, VOCs, and 1,4-dioxane in groundwater from a hypothetical supply well off-property pose a higher level of risk compared to GW-3 and GW-4, if institutional controls are not feasible off-property.	**Residual Risk** á á -Risks related to human exposure to uranium, VOCs, and 1,4-dioxane in groundwater are mitigated through institutional controls to limit groundwater use. -Risks related to potential future human exposure to uranium, VOCs, and 1,4-dioxane in groundwater are mitigated through hydraulic containment, alhtough this alternative will take longer to achieve acceptable risk for uranium than GW-4.	**Lower Residual Risk** á á á -Risks related to human exposure to uranium, VOCs, and 1,4- dioxane in groundwater are mitigated through institutional controls to limit groundwater use. -Risks related to potential future human exposure to depleted uranium, VOCs, and 1,4-dioxane in groundwater are mitigated through in-situ treatmentof uranium and and hydraulic containment of 1,4 dioxane and VOCs.
Long-Term Effectiveness and Performance (Continued)	**Adequacy and Reliability of Controls**	**Not Applicable**	**Adequate & Reliable** á á -Institutional controls are reliable for limiting groundwater use. -Long-term monitoring provides a reliable means of evaluating concentrations over time.	**Highly Adequate & Reliable** á á á -Institutional controls are reliable for limiting groundwater use. -Hydraulic containment is a reliable and well-proven technology. -Long-term monitoring provides a reliable means of evaluating concentrations over time.	**Adequate & Reliable** á á -Institutional controls are reliable for limiting groundwater use. -Hydraulic containment is a reliable and well-proven technology. -The reliability of ISRZs to sequester uranium will need to be evaluated during the remedial design phase. -Long-term monitoring provides a reliable means of evaluating concentrations over time.
Reduction of Toxicity, Mobility and Volume through Treatment	**Treatment Process Used and Materials Treated**	**Not Applicable**	**Not Applicable**	**Well Proven Treatment** á á á -Groundwater extraction and ex-situ treatment of extracted groundwater by advanced oxidation for 1,4- dioxane and uranium-specific ion exchange resin for uranium removal are well-proven treatment technologies.	**Combination of Well Proven and Experimental Treatment** á á -Groundwater extraction and ex-situ treatment of extracted groundwater by advanced oxidation for 1,4-dioxane are well- proven treatment technologies. -In-situ immobilization of DU using ISRZs downgradient of the Holding Basin is an experimental technology, but site-specific testing results to date have been favorable.
	Amount Destroyed or Treated	**Some Destroyed, None Treated** á **-Mass reduction of VOCs due to natural attenuation will occur although no active remediation will be implemented.** -No treatment or destruction of uranium in bedrock or overburden groundwater will occur.	**Some Destroyed, None Treated** á -Mass reduction of VOCs due to natural attenuation will occur although no active remediation will be implemented. -Due to Holding Basin source control, some reduction in the total mass of DU in overburden groundwater will occur. -No treatment or destruction of uranium in bedrock or overburden groundwater will occur.	**Some Destroyed, Moderate Treatment** á á -Mass reduction of VOCs due to natural attenuation will occur and there will be some destruction of 1,4-dioxane through advanced oxidation of extracted groundwater. -Due to Holding Basin source control, some reduction in the total mass of DU in overburden groundwater will occur. -There will be treatment of DU and isotopically natural uranium using uranium-specific ion exchange resins to remove uranium from extracted groundwater. The amount of uranium treated will depend on design extraction rates and influent concentrations.	**Some Destroyed, Moderate to Good Treatment** á á á -Mass reduction of VOCs due to natural attenuation will occur and there will be some destruction of 1,4-dioxane through advanced oxidation of extracted groundwater. -Due to Holding Basin source control, some reduction in the total mass of DU in overburden groundwater will occur. Significant treatment of DU in groundwater via sequestration will occur in the ISRZs. -No treatment or destruction of uranium in bedrock groundwater will occur.

Table K-2: Comparative Analysis of Groundwater Alternatives

Evaluation Criteria		GW-1 No Action	GW-2 Limited Action/Institutional Controls and Long- Term Monitoring	GW-3 Ex-Situ Treatment (DU, UROCK, 1,4-dioxane), Institutional Controls,and Long-Term Monitoring	GW-4 Ex-Situ Treatment (VOCs and 1,4-Dioxane), In-situ Treatment (DU/Natural Uranium), Institutional Controls, and Long-Term Monitoring
	Degree of Expected Reductions in Toxicity, Mobility, or Volume through Treatment	**Not Applicable**	**Little to Moderate Reduction** á -There will be some reduction in the volume of aquifer impacted by VOCs and 1,4-dioxane over time through natural attenuation. -There will be moderate reduction in DU mobility due to Holding Basin source control.	**Moderate to Significant Reductions** á á -There will be some reduction in the volume of aquifer impacted by VOCs over time through natural attenuation. - There will be a significant reduction in the mobility of 1,4-dioxane and VOCs through hydraulic containment. -There will be a significant reduction in the mobility of DU via Holding Basin source control and hydraulic containment, and slight to moderate reductions in the uranium mass in bedrock groundwater via groundwater extraction and treatment.	**Significant Reductions** á á á --There will be some reduction in the volume of aquifer impacted by VOCs over time through natural attenuation. - There will be a significant reduction in the mobility of 1,4-dioxane and VOCs through hydraulic containment. -There will be a significant reduction in the mobility of DU and natural uranium via Holding Basin source control and in-situ treatment.
Reduction of Toxicity, Mobility and Volume through Treatment (Continued)	**Degree to which Treatment is Irreversible**	**Not Applicable**	**No Active Treatment** á -Natural attenuation of VOCs is irreversible.	**Not Reversible** á á á -Natural attenuation of VOCs is irreversible. -Ex-situ treatment of DU, uranium and 1,4-dioxane in extracted groundwater is irreversible.	**Possibly Reversible** á á -Natural attenuation of VOCs is irreversible. -Ex-situ treatment of 1,4-dioxane in extracted groundwater is irreversible. -DU sequestration via adsorption on apatite and incorporation into low solubility mineral forms is expected to be very stable. The degree of irreversibility would be evaluated during pilot testing in the remedial design phase.
	Type and Quantity of Residuals Remaining after Treatment	**Not Applicable**	**Not Applicable**	**Low to Mobile Residuals Remain** á á -There will be low residual concentrations of 1,4-dioxane and VOCs in overburden and bedrock groundwater, DU in overburden groundwater, and uranium in bedrock groundwater after treatment. -Residuals from groundwater treatment would include spent ion exchange resins containing uranium.	**Low to Moderate Residuals Remain** á á -There will be low residual concentrations of 1,4-dioxane and VOCs in overburden and bedrock groundwater, and uranium in bedrock groundwater after treatment. -Residual DU within the plume sequestered to the in-situ reactive media will remain after treatment.
	Degree to which Treatment Reduces Principal Threats	There are no principal threats associated with subsurface conditions at the site.	There are no principal threats associated with subsurface conditions at the site.	There are no principal threats associated with subsurface conditions at the site.	There are no principal threats associated with subsurface conditions at the site.

Table K-2: Comparative Analysis of Groundwater Alternatives

Evaluation Criteria		GW-1 No Action	GW-2 Limited Action/Institutional Controls and Long- Term Monitoring	GW-3 Ex-Situ Treatment (DU, UROCK, 1,4-dioxane), Institutional Controls,and Long-Term Monitoring	GW-4 Ex-Situ Treatment (VOCs and 1,4-Dioxane), In-situ Treatment (DU/Natural Uranium), Institutional Controls, and Long-Term Monitoring
Short-Term Effectiveness	**Protection of Community During Remedial Action**	**Not Applicable**	**Significant Protection** á á á -There is no increased incremental risk to the community as a result of remedial action.	**Significant Protection** á á á -There is no increased incremental risk to the community as a result of remedial action. -Extracted groundwater will be treated prior to discharge to surface water.	**Significant Protection** á á á -There is no increased incremental risk to community as a result of remedial action. -Extracted groundwater treated prior to discharge to surface water. -In-situ treatment reduces potential future exposure to DU in off- site groundwater.
	Environmental Impacts	**Not Applicable**	**Minimal** á á á -There are no short-term changes in environmental impact for this alternative relative to existing condition.	**Limited** á á -Compliance with a NPDES permit would limit the potential for adverse environmental impacts from discharge of treated groundwater. -Compliance with appropriate location and action specific ARARs would limit potential environmental impacts.	**Limited** á á -Compliance with a NPDES permit would limit the potential for adverse environmental impacts from discharge of treated groundwater. -Compliance with appropriate location and action specific ARARs would limit potential environmental impacts.
Short-Term Effectiveness (Continued)	**Time Until Remedial Action Objectives are Achieved**	**Very Long** á Chemical Specific ARARS: VOCs,1,4-dioxane (on-prop):> 50 Yrs VOCs,1,4-dioxane (off-prop):< 30 Yrs DU: Likely > 100 years Uranium: Likely > 100 years -No prevention of human exposure to uranium, VOCs, and 1,4-dioxane in groundwater on-property or off-property -No limiting of off-property migration of COCs in groundwater	**Very Long** á Chemical Specific ARARS: VOCs,1,4-dioxane (on-prop):> 50 Yrs VOCs,1,4-dioxane (off-prop): < 30 Yrs DU: Likely > 100 years Uranium: Likely > 100 years -Immediate prevention of human exposure to DU, uranium, VOCs, and 1,4-dioxane in groundwater on and off-property through institutional controls -No limiting of off-property migration of COCs in groundwater -No restoration of groundwater to chemical-specific ARARs for uranium within 100 years	**Long to Very Long** á Chemical Specific ARARS: VOCs,1,4-dioxane (on-prop):> 50 Yrs VOCs,1,4-dioxane (off-prop): < 30 Yrs DU: Likely > 100 years Uranium: Likely > 100 years -Immediate prevention of human exposure to DU, uranium, VOCs, and 1,4-dioxane in groundwater on-and off-property through institutional controls -Rapid limiting of off-property migration of COCs in groundwater through hydraulic containment -No restoration of groundwater to chemical-specific ARARs for uranium within 100 years	**Long to Very Long** á á Chemical Specific ARARS VOCs,1,4-dioxane (on-prop):> 50 Yrs VOCs,1,4-dioxane (off-prop):< 30 Yrs DU: Likely <15 years Uranium in Bedrock: Likely < 15 years -Immediate prevention of human exposure to DU, uranium, VOCs, and 1,4-dioxane in groundwater on and off-property through institutional controls -Rapid limiting of off-property migration of COCs in groundwater through hydraulic containment and in-situ treatment -Possible restoration of overburden groundwater to meet chemical- specific ARARs for DU and natural uranium within 15 years through source controls and in-situ treatment
	Protection of Workers During Remedial Action	**Not Applicable**	**Good Protection** á á á -Site-specific health and safety plans would be used to ensure worker safety. -Work would be conducted in accordance with OSHA standards.	**Good Protection** á á á -Site-specific health and safety plans would be used to ensure worker safety. -Work would be conducted in accordance with OSHA standards.	**Good Protection** á á á -Site-specific health and safety plans would be used to ensure worker safety. -Work would be conducted in accordance with OSHA standards.

Table K-2: Comparative Analysis of Groundwater Alternatives

Evaluation Criteria		GW-1 No Action	GW-2 Limited Action/Institutional Controls and Long- Term Monitoring	GW-3 Ex-Situ Treatment (DU, UROCK, 1,4-dioxane), Institutional Controls,and Long-Term Monitoring	GW-4 Ex-Situ Treatment (VOCs and 1,4-Dioxane), In-situ Treatment (DU/Natural Uranium), Institutional Controls, and Long-Term Monitoring
Implementability	**Ability to Construct and Operate the Technology**	**Not Applicable**	**Readily Implementable** á á á -Installation of monitoring wells and periodic groundwater monitoring are routine activities.	**Implementable** á á -Installation of extraction wells, supplemental monitoring wells, construction of treatment systems, and associated O&M tasks are readily implementable. -Negotiation of access rights for installation of extraction wells at off-property locations and obtaining surface water discharge permits pose potential difficulties.	**Implementable** á -Installation of extraction wells, supplemental monitoring wells, construction of treatment systems, and associated O&M tasks are readily implementable. -Negotiation of access rights for installation of extraction wells at off-property locations and obtaining surface water discharge permits pose potential difficulties. -Installation of in-situ reactive zones by injection from approximately 40-80 ft bgs is implementable but would need pilot testing and detailed design of injection procedures.
	Reliability of the Technology	**Not Applicable**	**Very Reliable** á á á -Deed restrictions are reliable if properly enforced. -Long-term monitoring is reliable for assessing groundwater concentrations relative to applicable RAOs.	**Very Reliable** á á á -Deed restrictions are reliable if properly enforced. -Long-term monitoring is reliable for assessing groundwater concentrations relative to applicable RAOs. -Hydraulic containment with ex-situ treatment is a reliable and well-proven technology.	**Reliable** á á -Deed restrictions are reliable if properly enforced. -Long-term monitoring is reliable for assessing groundwater concentrations relative to applicable RAOs. -Hydraulic containment with ex-situ treatment is a reliable and well- proven technology. -The reliability of the in-situ reactive zone technology for the DU plume has been proven at the field scale level but not over a long period. However, the unique combination of allowing for a passive remedy that does not require manipulation of geochemical conditions, combined with favorable testing to date at other sites, indicates that an apatite/ZVI ISRZ remedy is likely to be reliable.
Implementability (Continued)	**Ease of Undertaking Additional Remedial Actions, if Necessary**	**No Significant Interference** á á	**No Significant Interference** á á á	**No Significant Interference** á á á	**No Significant Interference** á á á
	Ability to Monitor Effectiveness of Remedy	**Not Applicable**	**Easily Monitored** á á á -Monitoring through groundwater sampling and analysis can readily be used to assess the progress of natural attenuation and changes in the DU and uranium plumes.	**Somewhat Easily Monitored** á á -Capture zones of hydraulic containment systems can be monitored using monitoring wells and water level measurements. -Monitoring capture associated with extraction wells for the 1,4-dioxane plume in bedrock may be challenging due to low hydraulic conductivity and the likely need to batch pump these wells.	**Somewhat Easily Monitored** á á -Capture zones of hydraulic containment systems can be monitored using monitoring wells and water level measurements. -Monitoring capture associated with extraction wells for the 1,4- dioxane plume in bedrock may be challenging due to low hydraulic conductivity and the likely need to batch pump these wells. -Monitoring of ISRZs using monitoring wells and water level measurements up and downgradient is routine, but solid phase sampling in ISRZs is less routine.

Table K-2: Comparative Analysis of Groundwater Alternatives

Evaluation Criteria		GW-1 No Action	GW-2 Limited Action/Institutional Controls and Long- Term Monitoring	GW-3 Ex-Situ Treatment (DU, UROCK, 1,4-dioxane), Institutional Controls,and Long-Term Monitoring	GW-4 Ex-Situ Treatment (VOCs and 1,4-Dioxane), In-situ Treatment (DU/Natural Uranium), Institutional Controls, and Long-Term Monitoring
	Availability of Off-site Treatment, Storage and Disposal Services and Capacity	**Not Applicable**	**Readily Available** á á á -Disposal facilities for investigation-derived waste generated during sampling are readily available.	**Readily Available** á á á -Disposal facilities for soils generated during construction and for spent groundwater treatment media (i.e., ion exchange resins used for uranium removal) are available. -Discharge of treated groundwater would be conducted in comply with ARARs (e.g., a NPDES permit).	**Readily Available** á á á -Disposal facilities for soils generated during construction are available. -Discharge of treated groundwater would be conducted in comply with ARARs (e.g., a NPDES permit).
	Availability of Necessary Equipment and Specialists	**Not Applicable**	**Readily Available** á á á	**Readily Available** á á á	**Readily Available** á á á
	Ability to Obtain Approvals and Coordinate with Other Agencies	**Not Applicable**	**Possible to Obtain** á á á -Monitoring under this alternative would be conducted in coordination with the USEPA, MassDEP and other appropriate agencies.	**Possible to Obtain** á á á -Remedial actions under this alternative would be designed, constructed and operated under coordination with the USEPA, MassDEP and other appropriate agencies.	**Possible to Obtain** á á á -Remedial actions under this alternative would be designed, constructed and operated under coordination with the USEPA, MassDEP and other appropriate agencies.
Capital Costs		None	$1,185,000	$6,510,000	$9,669,000
Annual Operation, Maintenance and Monitoring - net present value (7%) 30 - 200 years (monitoring is 200 years, active treatment 30 years)		None	$1,724,000	$22,755,000	$10,573,000
TOTAL		None	$2,909,000	$29,265,000	$20,242,000

Key:
1,1-DCE = 1,1 -Dichloroethene
ARARs = Applicable or Relevant and Appropriate Requirements ISRZ = In-Situ Reactive Zone
MCL = Maximum Contaminant Level MNA = Monitored Natural Attenuation PCE = Tetrachloroethene
PRG = Preliminary Remediation Goal RAO = Remedial Action Objective
RI/FS = Remedial Investigation and Feasibility Study TBC = To Be Considered
TCE = Trichloroethene VI = Vapor Intrusion
VOC = Volatile Organic Compound

Table L-1: Groundwater Cleanup Levels

Carcinogenic Chemical of Concern	Cancer Classification	Overburden Cleanup Level		Bedrock Cleanup Level	
		µg/L	Basis	µg/L	Basis
1,1-Dichloroethane	C	NA	NA	2.7	ILCR = 10^{-6} (Residential)
Tetrachloroethene	Likely to be carcinogenic to humans	5	MCL	5	MCL
Trichloroethene	Carcinogenic to humans	5	MCL	5	MCL
Vinyl chloride	A	2	MCL	2	MCL
1,4-Dioxane	Likely to be carcinogenic to humans	0.46	ILCR = 10^{-6} (Residential)	0.46	ILCR = 10^{-6} (Residential)
bis(2-Ethylhexyl)phthalate	B2	6	MCL	6	MCL
Arsenic	A	10	MCL	10	MCL
Chromium	Likely to be carcinogenic to humans	100	MCL	100	MCL
Thorium	A	0.33	ILCR = 10^{-6} (Residential)	0.33	ILCR = 10^{-6} (Residential)
Non-Carcinogenic Chemical of Concern	**Target Endpoint**	**Overburden Cleanup Level**		**Bedrock Cleanup Level**	
		µg/L	Basis	µg/L	Basis
1,1-Dichloroethane	Kidney	NA	NA	2.7	ILCR = 10^{-6} (Residential)
Tetrachloroethene	CNS	5	MCL	5	MCL
Trichloroethene	Developmental / Immune System	5	MCL	5	MCL
Vinyl chloride	Liver	2	MCL	2	MCL
1,4-Dioxane	Liver / Kidney / Respiratory	0.46	ILCR = 10^{-6} (Residential)	0.46	ILCR = 10^{-6} (Residential)
bis(2-Ethylhexyl)phthalate	Liver	6	MCL	6	MCL
Arsenic	Skin	10	MCL	10	MCL
Barium	Kidney	NA	NA	2,000	MCL
Chromium	GI System	100	MCL	100	MCL
Cobalt	Thyroid	6.0	HI = 1 (Residential)	6.0	HI = 1 (Residential)
Copper	GI System	1,300	Action Level	NA	NA
Iron	GI System	14,000	HI = 1 (Residential)	14,000	HI = 1 (Residential)
Manganese	CNS	300	Health Advisory	300	Health Advisory
Molybdenum	Kidney	100	HI = 1 (Residential)	100	HI = 1 (Residential)
Depleted Uranium	Kidney	30	MCL	30	MCL
Natural Uranium	Kidney	30	MCL	30	MCL
Nitrate-N	Hematological	10,000	MCL	10,000	MCL
Nitrite-N	Hematological	1,000	MCL	1,000	MCL

Key

1. See Appendix E of this ROD for cleanup level development and basis:

Health Advisory - Health Advisory on Manganese (EPA-822-R-04-003; January 2004)

HI - Hazard Index

MCL - Maximum Contaminant Level

ILCR - Incremental Lifetime Cancer Risk; 10^{-6} = 1 in 1,000,000

NA - Not applicable

Cancer Classification

A - Human carcinogen

B1 - Probable human carcinogen - Indicates that limited human data are available

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

E - Evidence of noncarcinogenicity

Table L-2: Soil Cleanup Levels for the Protection of Human Health

Carcinogenic Chemical of Concern	Cancer Classification	Cleanup Level[1]		Basis[1]
		mg/kg	pCi/g	
Benzo(a)anthracene	B2	0.34	NA	ILCR = 10^{-6} (Residential)
Benzo(a)pyrene	B2	0.22	NA	ILCR = 10^{-6} (Residential)
Benzo(b)fluoranthene	B2	0.34	NA	ILCR = 10^{-6} (Residential)
Indeno(1,2,3-cd)pyrene	B2	0.34	NA	ILCR = 10^{-6} (Residential)
PCBs	B2	1	NA	Policy
Arsenic	A	13.7	NA	Background
Uranium	A	2.7	1.1	ILCR = 10^{-6} (Residential)
U-238	A	NA	0.90	ILCR = 10^{-6} (Residential)
U-235	A	NA	0.01	ILCR = 10^{-6} (Residential)
U-234	A	NA	0.15	ILCR = 10^{-6} (Residential)
Thorium	A	7.4	0.81	Background
Th-232	A	NA	0.81	Background

Non-Carcinogenic Chemical of Concern	Target Endpoint	Cleanup Level[1]		Basis[1]
		mg/kg	pCi/g	
PCBs	Immune System	1	NA	Policy
Arsenic	Skin	13.7	NA	ILCR = 10^{-6} (Residential)
Uranium	Kidney	2.7	1.1	ILCR = 10^{-6} (Residential)

Key

NA - Not applicable

1. See Appendix E of this ROD for cleanup level development and basis:

Policy - Cleanup level for PCBs based on CERCLA Policy (Guidance on Remedial Actions for Superfund Sites with PCB Contamination, OSWER Directive #9355.4-01, EPA/540/G-90/007, August 1990

Background - If risk-based cleanup levels were below background concentrations for the site, the background concentration was selected.

ILCR - Incremental Lifetime Cancer Risk; 10^{-6} = 1 in 1,000,000

Cancer Classification

A - Human carcinogen

B1 - Probable human carcinogen - Indicates that limited human data are available

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

E - Evidence of noncarcinogenicity

Table L-3: Sediment Cleanup Levels for the Protection of Human Health

Carcinogenic Chemical of Concern	Cancer Classification	Cleanup Level[1] mg/kg	Basis[1]
PCBs	B2	2.7	ILCR = 10^{-6} (Abutting Resident/Recreational Visitor)

Non-Carcinogenic Chemical of Concern	Target Endpoint	Cleanup Level[1] mg/kg	Basis[1]
PCBs	Immune System	1	Policy

Key

NA - Not applicable

1. See Appendix B of FS for cleanup level development and basis:

Policy - Cleanup level for PCBs based on CERCLA Policy (Guidance on Remedial Actions for Superfund Sites with PCB Contamination, OSWER Directive #9355.4-01, EPA/540/G-90/007, August 1990

Cancer Classification

A - Human carcinogen

B1 - Probable human carcinogen - Indicates that limited human data are available

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

E - Evidence of noncarcinogenicity

Table L-4: Sediment Cleanup Levels for the Protection of Ecological Receptors

Habitat Type/Name	Exposure Medium	COC	Protective Level	Units	Basis	Assessment Endpoint
BENTHIC INVERTEBRATE COMMUNITY						
Sphagnum Bog	Sediment	mean PEC-Q[1]	0.64		Site-specific MATC [2]	Survival and growth of benthic invertebrate community
		Total PCBs	1.08	mg/kg	Site-specific MATC	
		Copper	176	mg/kg	Site-specific MATC	
		Lead	97.3	mg/kg	Site-specific MATC	
		Mercury	1.3	mg/kg	Site-specific MATC	

Notes:

[1] See Appendix A of the Feasibility Study (*de maximus*, 2014b) for discussion of development of PEC-Q values based on the results of the sediment toxicity tests.

[2] The site-specific MATC (set as the geometric mean between the NOEC and LOEC values) has been selected as the protective level for each COC.

COC - Chemical of Concern

NOEC - No observed effect concentration. The NOEC was set as the higher of the concentrations observed at locations with no observed effects.

LOEC - Lowest observed effect concentration. The LOEC was set as the lower of the concentrations observed at locations with observed toxicity to benthic invertebrates.

MATC - Maximum Acceptable Toxic Concentration

PEC-Q - Probable Effect Concentration - Quotients for mixtures consisting of metals, PAHs, and PCBs (unitless)

Table L-5: Cost Estimate Summary for Remedial Alternative GW-4

REMEDIAL ALTERNATIVE GW-4

Ex-Situ Treatment (VOCs and 1,4-Dioxane), In-situ Treatment (DU/Natural Uranium), Institutional Controls, and Long-Term Monitoring

COST ESTIMATE SUMMARY

Feasibility Study
Nuclear Metals, Inc. Superfund Site

Discount Rate: 7.00%

Item	Year	Unit Cost	Total Cost
CAPITAL EXPENDITURES			
Pre-Design Investigation			
Pilot Test for DU In-Situ Injection Design	1	$ 340,000	$ 340,000
Pump Test for 1,4-dioxane Containment System	1	$ 350,000	$ 350,000
Investigation for In-Situ UROCK Treatment	1	$ 460,700	$ 460,700
Pre-design Investigation Subtotal			$ 1,150,700
Remedial Design			
Remedial Design	1	$ 646,700	$ 646,700
Remedial Action			
Institutional Controls	1	$ 975,000	$ 975,000
Hydraulic Containment	2	$ 299,700	$ 281,900
Ex-Situ Treatment	2	$ 1,701,800	$ 1,486,400
In-Situ Treatment - DU	2	$ 1,760,000	$ 1,537,300
In-Situ Treatment - U in Rock	2	$ 313,600	$ 273,900
Groundwater Monitoring Wells	2	$ 207,900	$ 181,600
Professional Labor and Management	2	$ 1,058,300	$ 924,400
Remedial Action Subtotal			***$ 5,640,400***
Capital Expenditures - Subtotal			***$ 7,437,800***
Contingency (Capital Expenditures)	30%		$ 2,231,300
CAPITAL EXPENDITURES - TOTAL COST			**$ 9,669,000**
OPERATION, MAINTENANCE, MONITORING & REPORTING (OMM&R) COSTS			
Operation and Maintenance (O&M)			
General Operations	2-30	$ 250,000	$ 2,868,600
Advanced Oxidation System	2-30	$ 129,900	$ 1,490,500
Electricity Usage	2-30	$ 33,000	$ 378,700
O&M Subtotal			***$ 4,737,800***
Solid Phase Sampling (Proof of Attenuation)			
Semi-Annual Solid Phase Sampling	3	$ 250,000	$ 204,100
Annual Solid Phase Sampling	4-5	$ 125,000	$ 184,500
Solid Phase Sampling Subtotal			***$ 388,600***
Long-Term Monitoring			
Quarterly Monitoring Program (Years 2-3)	2-3	$ 299,400	$ 505,900
Semi-Annual Monitoring Program (Years 4-8)	4-8	$ 143,100	$ 479,000
Annual Monitoring Program (Years 9-30)	9-30	$ 86,400	$ 556,200
Five-Year Monitoring Program (Years 1-30)	1-30, Every 5 yrs	$ 25,400	$ 54,800
Five-Year Monitoring Program (Years 31-200)	31-200, Every 5 yrs	$ 52,900	$ 17,300
Long-Term Monitoring Subtotal			***$ 1,613,200***
Five-Year Review (CERCLA)			
Document Review, Interviews, Inspection, Report	1-200, Every 5 yrs	$ 81,300	$ 202,000
Project Management			
Project Management	2-30	$ 100,000	$ 1,147,446
Project Management	31-200	$ 25,000	$ 43,847
Site Closeout			
Closeout Report, Public Meetings, Notice of Completion	200	$ 116,100	$ 0.15
Well Decomissioning	1-30, Every 5 yrs	$ 11,200	$ 24,200
OMM&R Subtotal			***$ 8,132,893***
Contingency (OMM&R)	30%		$ 2,439,900
OMM&R - TOTAL COST			**$ 10,573,000**
TOTAL PROJECT COST - NET PRESENT VALUE	7.0%		**$ 20,242,000**

Table L-5: Cost Estimate Summary for Remedial Alternative GW-4

REMEDIAL ALTERNATIVE GW-4

Ex-Situ Treatment (VOCs and 1,4-Dioxane), In-situ Treatment (DU/Natural Uranium), Institutional Controls, and Long-Term Monitoring

COST ESTIMATE SUMMARY

Feasibility Study
Nuclear Metals, Inc. Superfund Site

Discount Rate: 7.00%

Notes:

A. Total costs are rounded to the nearest $100.

B. Future capital costs beyond Year 1 are subject to NPV calculation.

Assumptions:

1. Costs assume deed restrictions prohibiting groundwater use will be executed for the Site.
2. Hydraulic containment for the 1,4-dioxane plumes will consist of one (1) overburden extraction well with a depth of 100 ft and pumping rate of 2 gpm and two (2) bedrock wells with depths of 120 ft and pumping rates of approximately 1 gpm each.
3. Ex-situ treatment will include advanced oxidation using ultra-violet light and hyrdogen peroxide or equivalent. Treated water will discharge to surface water.
4. Nine (9) monitoring wells will be installed in the vicinity of the extraction wells to demonstrate capture of the 1,4-dioxane plumes, three (3) in the overburden and six (6) in the bedrock. Thirteen (13) monitoring wells will be installed in the vicinity of
5. The in-situ remedy for depleted uranium in overburden will include a pilot test to evaluate injection design, injection of apatite in two separate areas and nZVI in a downgradient location. Additional monitoring wells will be installed to monitor effectiveness, and borings will be drilled to collect aquifer materials for remedy evaluation.
6. Costs for DU in-situ treatment assume two (2) apatite and one (1) zero-valent iron (ZVI) in-situ reactive zones (ISRZs) installed by direct push injection. These ISRs installations will be repeated once.
7. The in-situ remedy for uranium in bedrock will include five (5) monitoring well locations with two (2) screened intervals in bedrock to delineate the depth of uranium >MCL. The remedy will include injection and recirculation of nZVI, apatite or bioremediation amendments via six (6) open bedrock boreholes.
8. Drill cuttings will be disposed on-site.
9. Well development water will be stored on-site and the treatment is represented and costed under the soils section of the Feasibility Study Report.
10. Long-term monitoring is assumed for costing purposes to consist of quarterly sampling for Years 2-3, semi-annual sampling for Years 4-8, annual sampling for Years 9-30 with an augmented program every fifth year, and five-year sampling for Years 31-200. The five-year monitoring for Years 1-30 is an incremental cost associated with the annual monitoring every fifth year. Solid phase sampling will be performed for Years 3-5. Five year monitoring for DU and UROCK will continue from year 31 to 200.
11. Well decommissioning will occur evey fifth year for Years 1-30, each for five (5) wells.

Table L-6: Cost Estimate Summary for Remedial Alternative SS-4

REMEDIAL ALTERNATIVE SS-4

Excavation and Off-Site Disposal Of Sediments and Non-Holding Basin Soils,
Containment with Vertical Containment Wall
Low-Permeability Sub-Grade Cover
In-Situ Stabilization of Holding Basin Soils Using Apatite Injection

COST ESTIMATE SUMMARY
Feasibility Study
Nuclear Metals Inc. Superfund Site

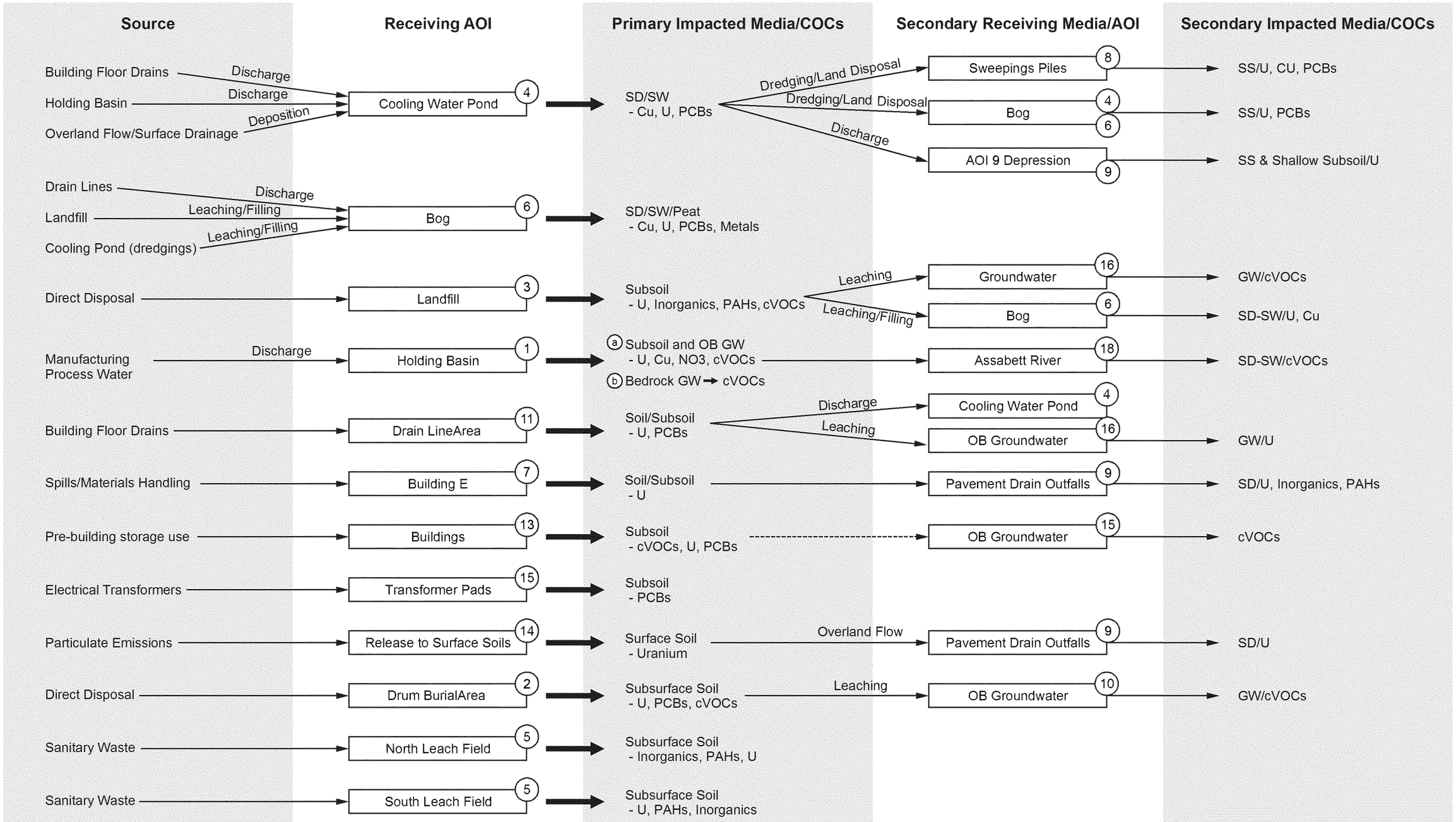
Item	Year	Unit Cost	Total Cost
CAPITAL EXPENDITURES			
Remedial Design			
Pilot Test Work Plan and Implementation	1	$ 440,000	$ 440,000
Remedial Design Work Plan and Project Planning	1	$ 120,000	$ 120,000
Remedial Design, including Design Specifications	1	$ 390,000	$ 390,000
Bid Document Preparation and Subcontractor Selection	1	$ 120,000	$ 120,000
Remedial Design Subtotal			$ 1,070,000
Remedial Action			
Project and Construction Management and Support	1 & 2	$ 10,513,040	$ 10,513,040
Mobilization	1	$ 1,545,800	$ 1,545,800
Monitoring, Surveying and Sampling	1 & 2	$ 788,042	$ 788,042
Excavation	1 & 2	$ 4,218,917	$ 4,218,917
Disposal	1 & 2	$ 57,296,250	$ 57,296,250
Stabilization of Soils beneath Holding Basin	1 & 2	$ 5,300,000	$ 5,300,000
Construction of Containment Wall and Cap	1 & 2	$ 2,753,607	$ 2,753,607
Site Restoration & Demobilization	2	$ 2,114,316	$ 2,114,316
Construction Completion Report	3	$ 300,000	$ 300,000
O&M Work Plans	3	$ 90,000	$ 90,000
Remedial Action Subtotal			$ 84,919,972
Capital Expenditures - Subtotal			***$ 85,989,972***
Contingency (Capital Expenditures)	20%		$ 17,197,994
CAPITAL EXPENDITURES - TOTAL COST			**$ 103,188,000**
OPERATION, MAINTENANCE, MONITORING & REPORTING (OMM&R) COSTS			
Operation and Maintenance (O&M)			
Project Management	2-200	$ 24,488	$ 326,935
Site Management and Inspections	2-200	$ 73,250	$ 977,969
O&M Subtotal			$ 1,304,905
Site Closeout Documentation			
Closeout Report, Public Meeting, Notice of Completion	200	$ 50,000	$ 0.07
OMM&R Subtotal			***$ 1,304,905***
Contingency (OMM&R)	20%		$ 260,981
OMM&R - TOTAL COST			**$ 1,566,000**
TOTAL COST - NET PRESENT VALUE (NPV)	7%		**$ 104,754,000**

Notes:

1. Total Capital Expenditures and Total OMM&R Costs are rounded to the nearest $1,000.
2. Future Capital Cost, beyond Year 1; subject to NPV calculation
3. Long-term groundwater monitoring, institutional controls, and 5-Year Review Reports are accounted for within the groundwater alternative evaluation and cost estimates.

APPENDIX C

FIGURES



Prepared/Date: JPH 7/10/13
Checked/Date: JDP 7/10/13

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amec

Figure E-1
Feasibility Study
Nuclear Metals Superfund Site
Concord, Massachusetts

PORT2013028a.cdr

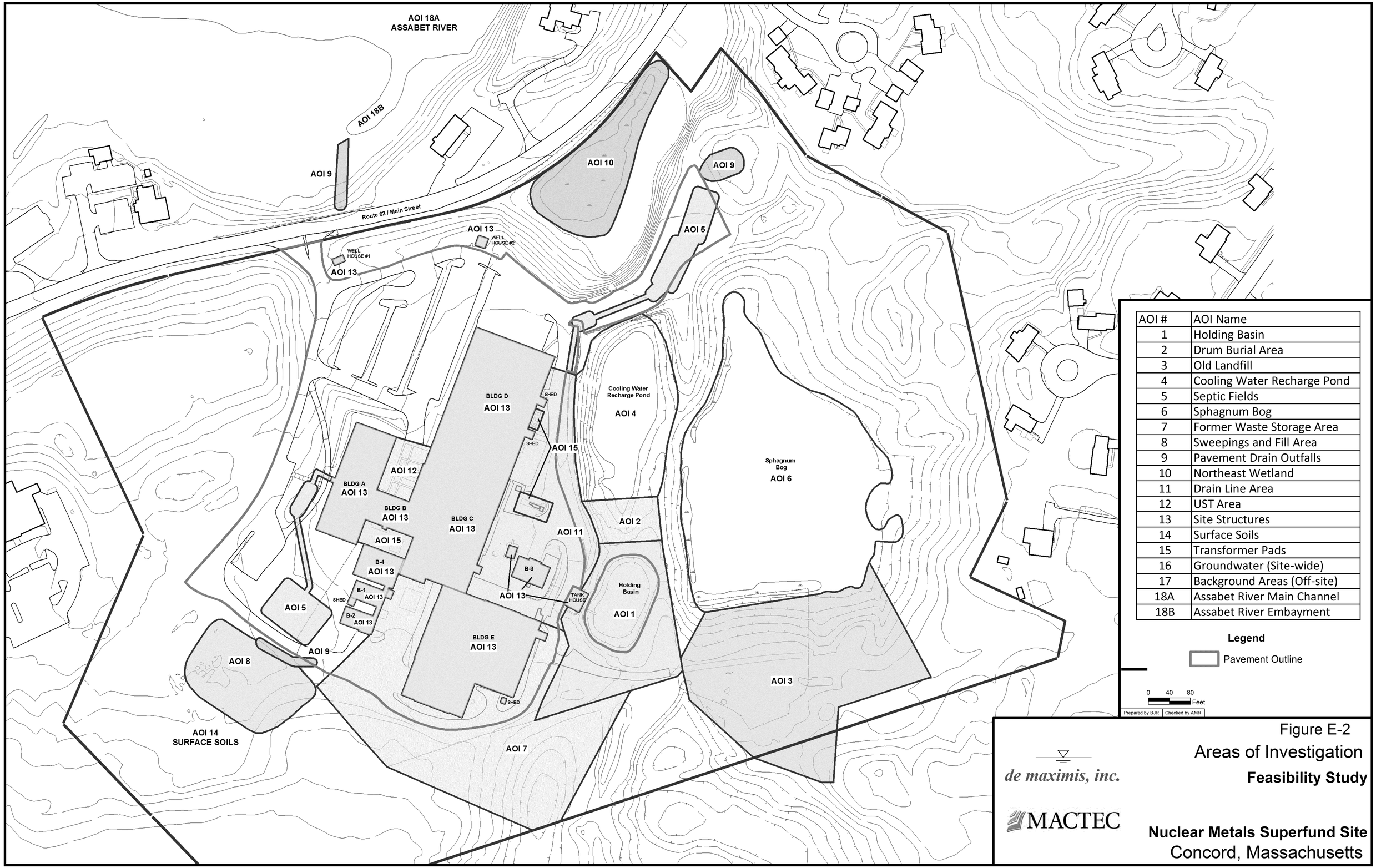


Figure E-2

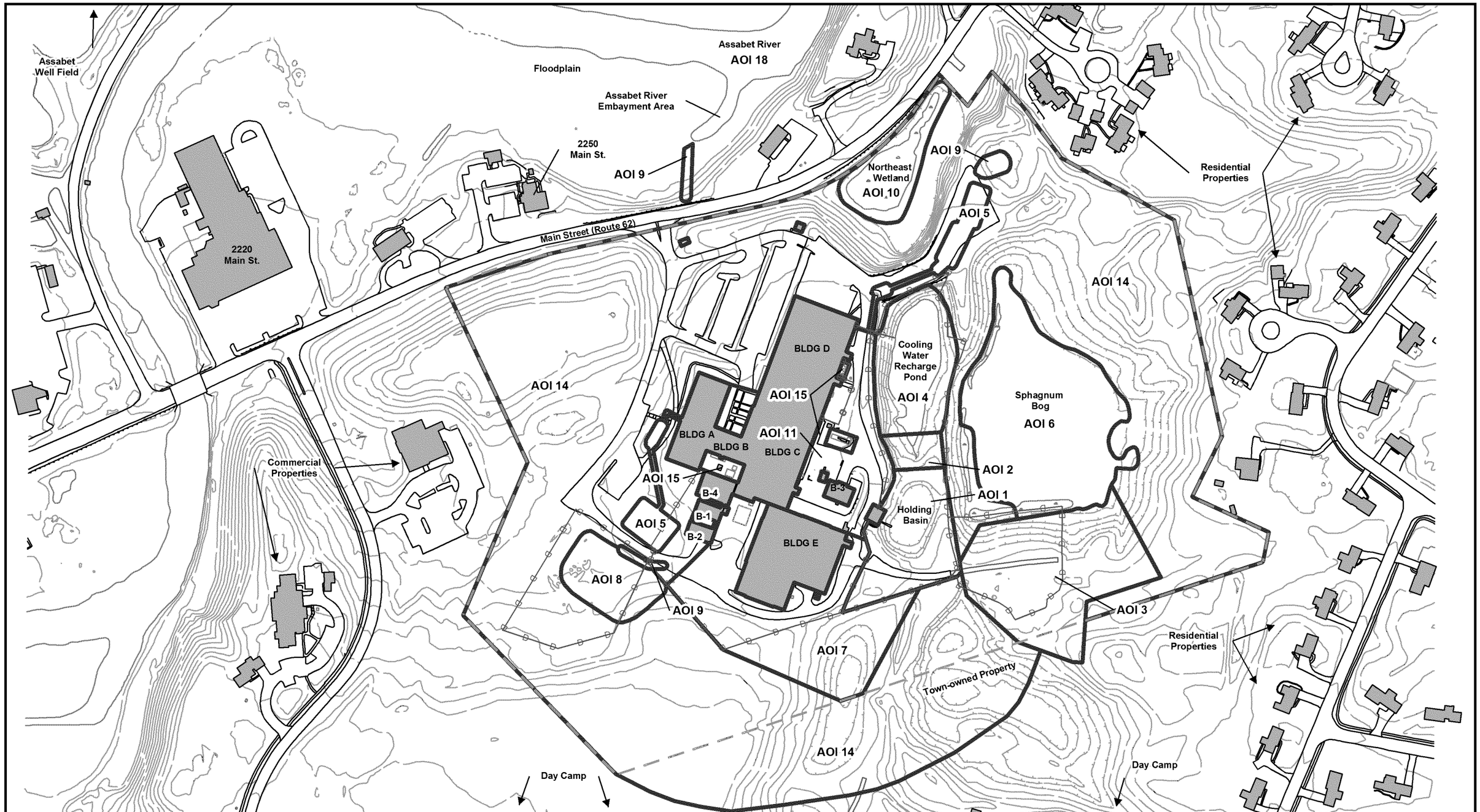
Areas of Investigation

Feasibility Study

Nuclear Metals Superfund Site

Concord, Massachusetts

Document: P:\Nuclear Metals\GIS\Mapdocuments\nmi_22x34.mxd PDF: P:\Nuclear Metals\Nuclear Metals RI FS EECA\Ecological Risk Assessment\BERA\Figures\Figure 1-2 - Areas of Investigation.pdf 12/17/2009 2:35 PM bjroden



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MACTEC

0 110 220 Feet

Prepared by BJR | Checked by JHP

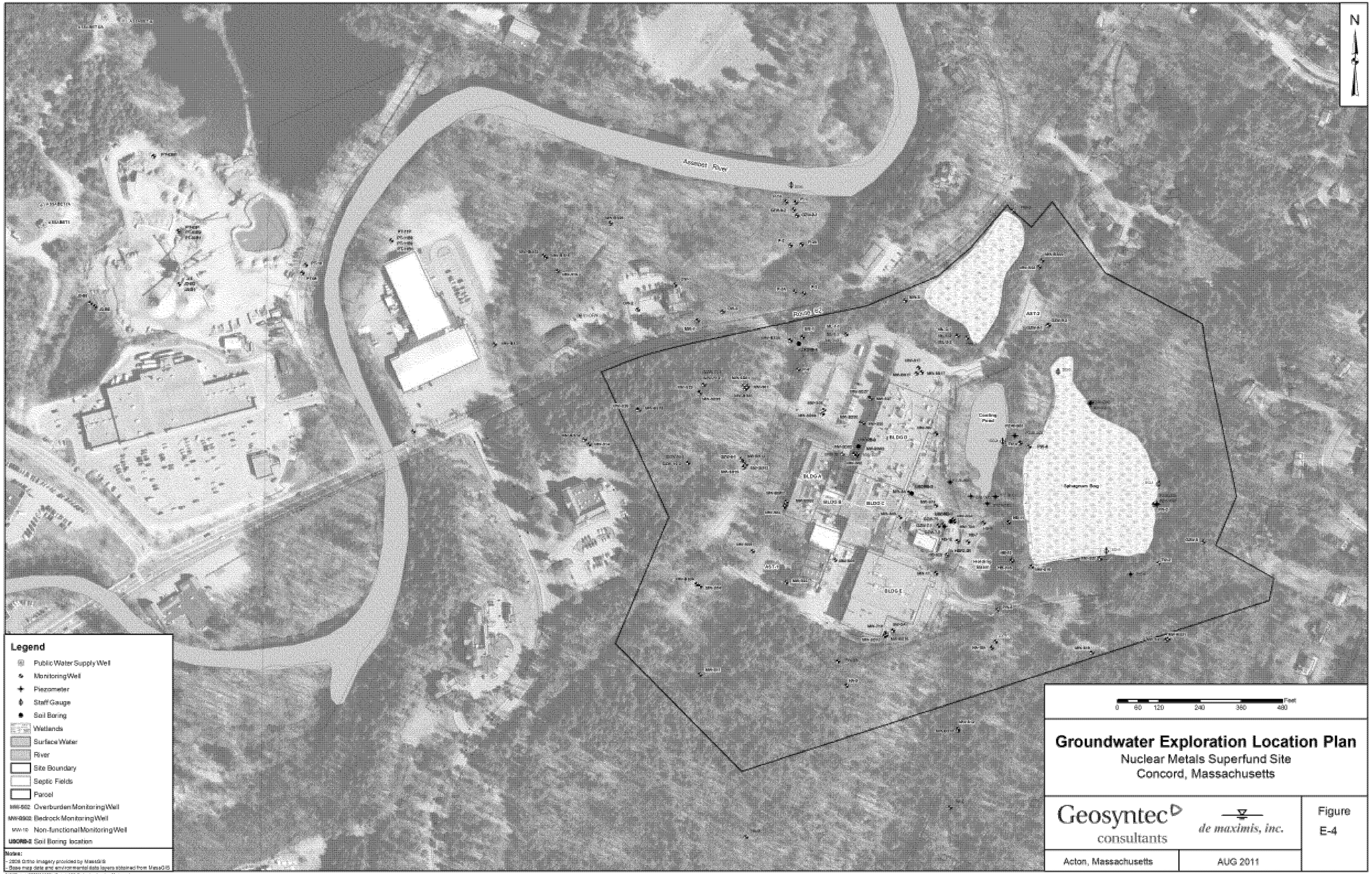
Legend

- Fence
- Approximate Site Boundary
- AOI Boundary
- Structure
- Road
- Paved Area
- Sidewalks/Steps
- Unpaved Area
- Guard Rail

Figure E-3
Site and Surrounding Properties

Feasibility Study
Nuclear Metals Superfund Site
Concord, Massachusetts

Document: P:\Nuclear Metals\GIS\Mapdocuments\HHRA_11x17L.mxd PDF: P:\Nuclear Metals\GIS\Figures\HHRA 2010\Figure 1-1 - Site and Surrounding Properties.pdf 10/29/2010 12:01 PM bjroden


N
Assabet River
Road C
BLDG A
BLDG B
BLDG C
BLDG D
BLDG E
Cooling Pond
Sphagnum Bog
Legend
Public Water Supply Well
Monitoring Well
Piezometer
Staff Gauge
Soil Boring
Wetlands
Surface Water
River
Site Boundary
Septic Fields
Parcel
Overburden Monitoring Well
Bedrock Monitoring Well
Non-functional Monitoring Well
Soil Boring location
Notes:
- 2008 Ortho imagery provided by MassGIS
- Base map data and environmental data layers obtained from MassGIS
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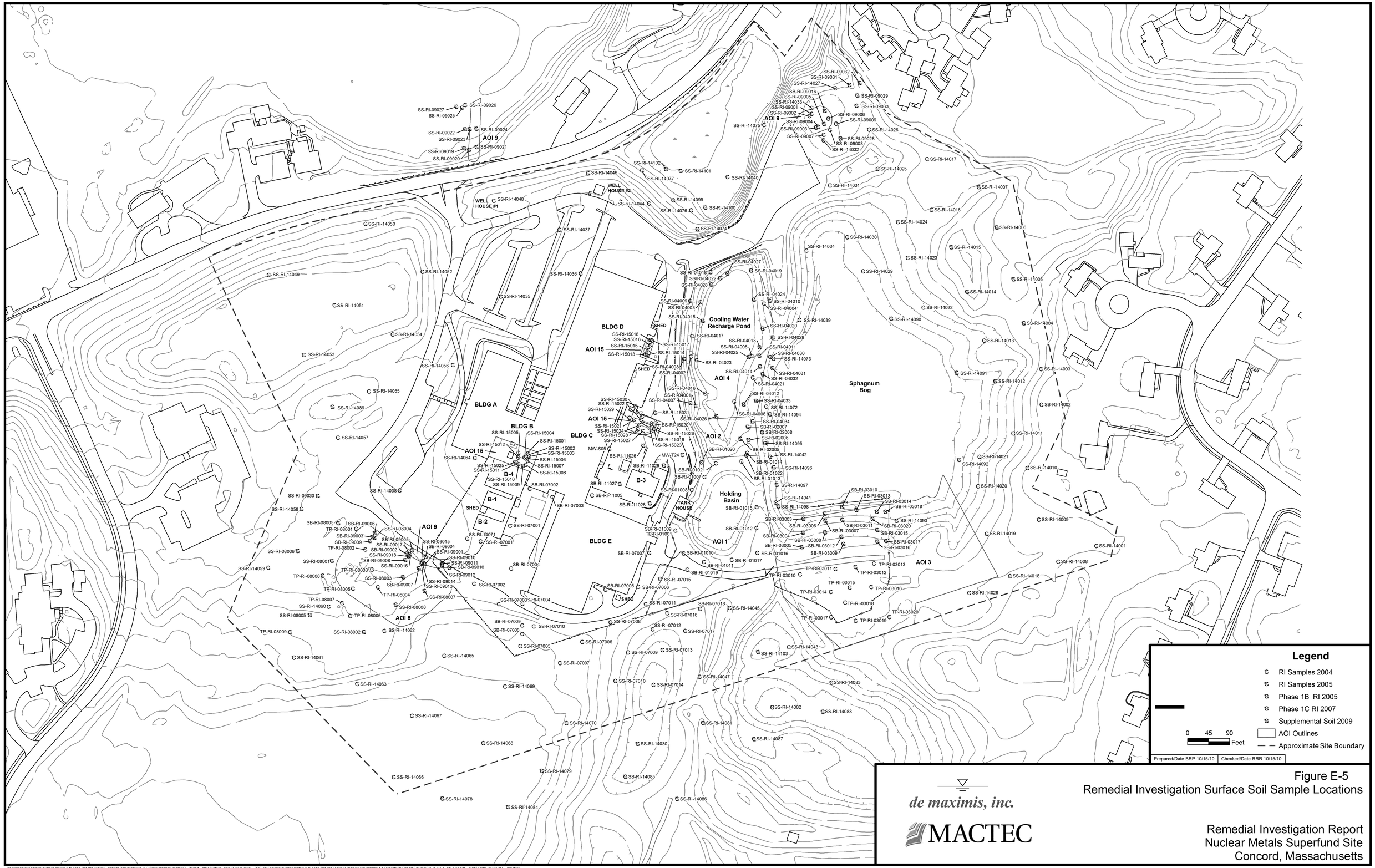
0 60 120 240 360 480
Feet
Groundwater Exploration Location Plan
Nuclear Metals Superfund Site
Concord, Massachusetts
Geosyntec consultants
de maximis, inc.
Figure
E-4
Acton, Massachusetts
AUG 2011



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MACTEC

Figure E-5
Remedial Investigation Surface Soil Sample Locations

Remedial Investigation Report
Nuclear Metals Superfund Site
Concord, Massachusetts

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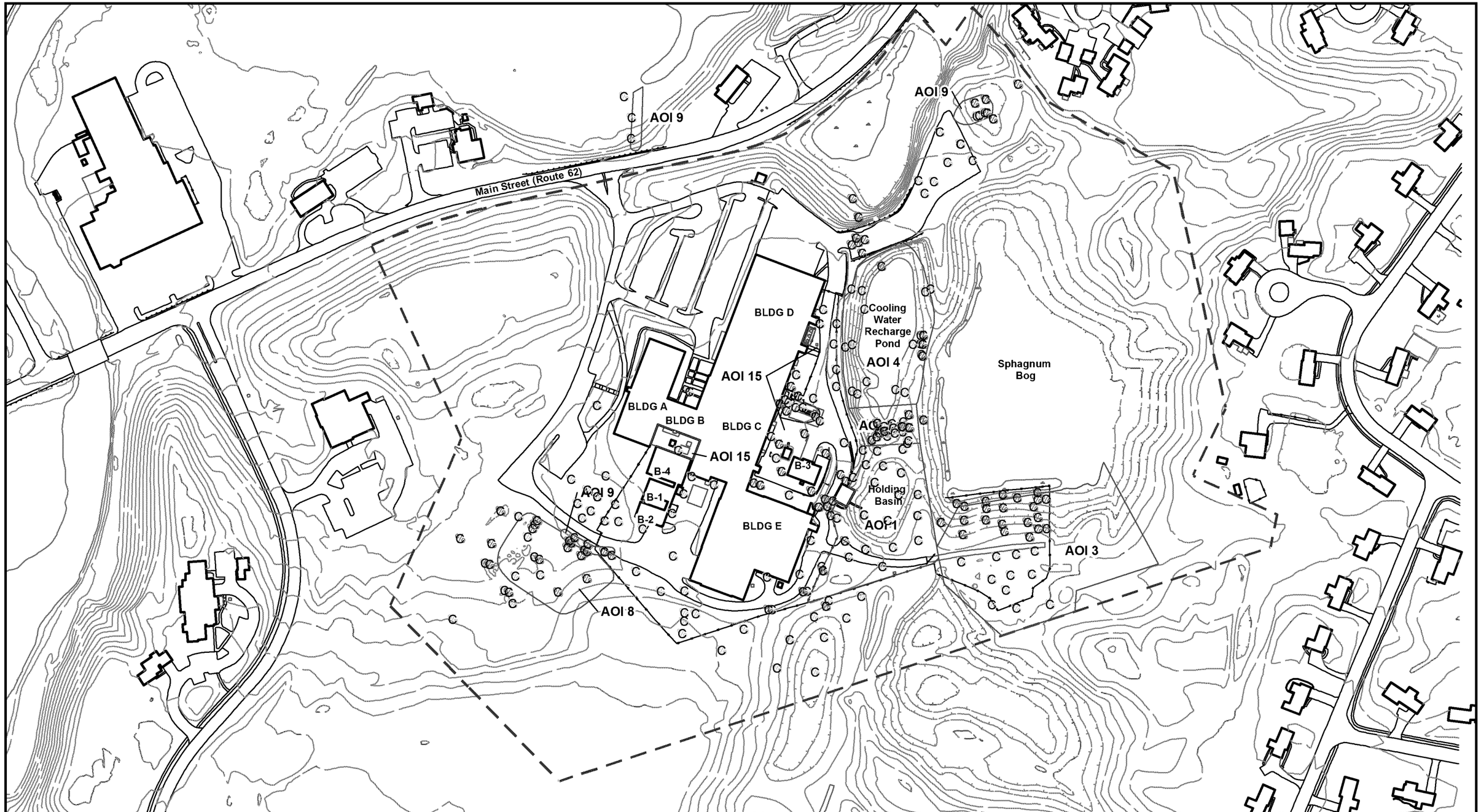

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MACTEC

0 100 200 Feet

Prepared/Date BJS 10/15/10 | Checked/Date SCF 10/15/10

Legend

- RI Samples 2004
- RI Samples 2005
- Phase 1B 2005 RI
- Phase 1C 2007 RI
- AOI Outlines
- Approximate Site Boundary
- Water Body

Figure E-6
Remedial Investigation Subsurface Soil Sample Locations

Remedial Investigation Report
Nuclear Metals Superfund Site
Concord, Massachusetts

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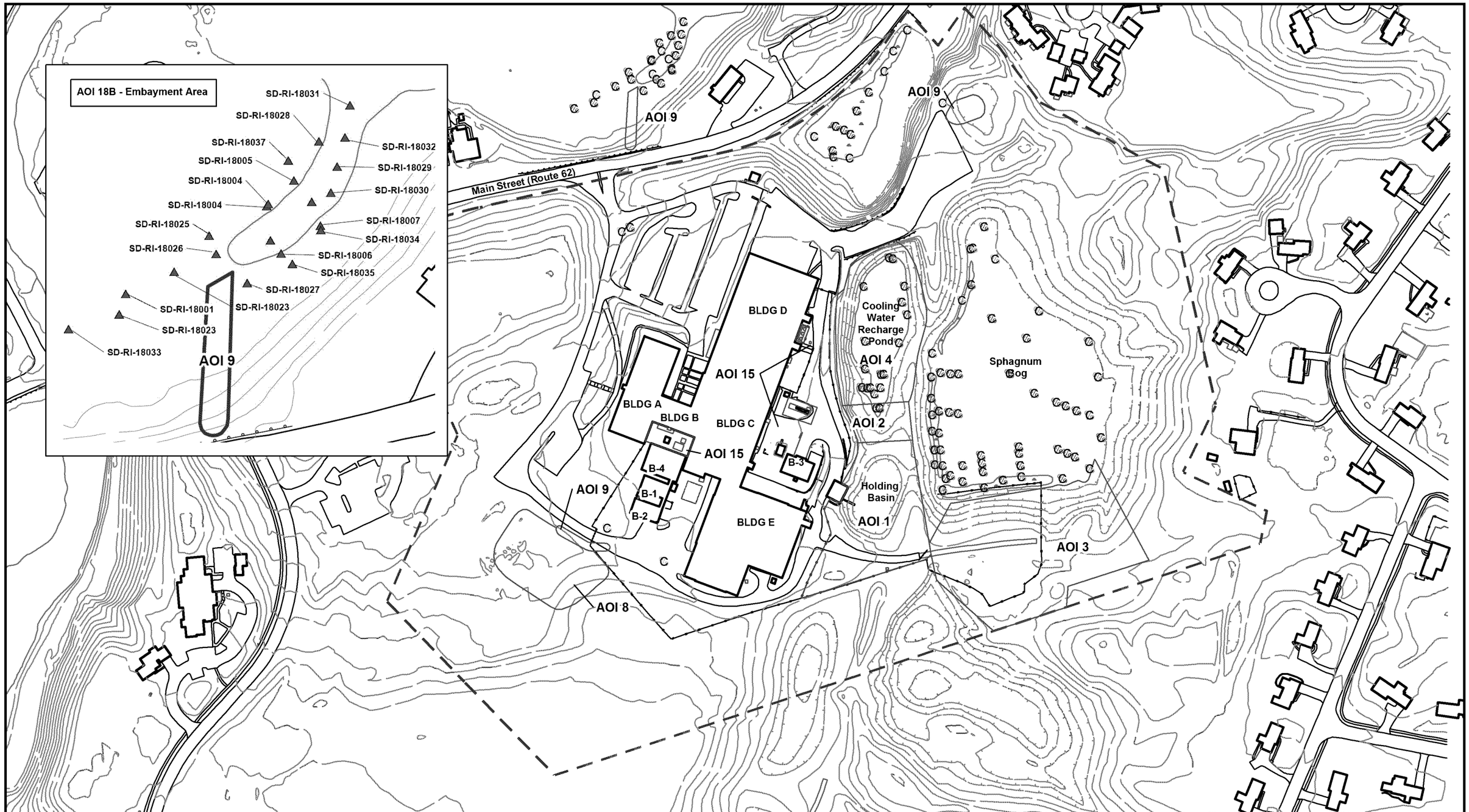

de maximis, inc.

MACTEC

0 100 200 Feet

Prepared/Date BJS 08/26/11 | Checked/Date DRP 08/26/11

Legend

- RI Samples 2004
- RI Samples 2005
- Phase 1B 2005 RI
- Phase 1C 2007 RI
- Ecological 2007
- AOI Outlines
- Approximate Site Boundary
- Water Body

Figure E-7
Remedial Investigation Sediment Sample Locations

Remedial Investigation Report
Nuclear Metals Superfund Site
Concord, Massachusetts

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de maximis, inc.

MACTEC

0 125 250 Feet

Legend

- RI Samples 2004
- Phase 1C 2007 RI
- AOI Outlines

Prepared/Date BJS 10/15/10 | Checked/Date SCF 10/15/10

Figure E-8
Remedial Investigation Sediment Sample Locations - Off Site

Remedial Investigation Report
Nuclear Metals Superfund Site
Concord, Massachusetts

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de maximis, inc.

MACTEC

0 100 200 Feet

Prepared/Date BJS 10/15/10 | Checked/Date SCF 10/15/10

Legend

- RI Samples 2004
- RI Samples 2005
- Phase 1C 2007 RI
- Ecological 2007
- AOI Outlines
- Approximate Site Boundary
- Water Body

Figure E-9
Remedial Investigation Surface Water Sample Locations

Remedial Investigation Report
Nuclear Metals Superfund Site
Concord, Massachusetts

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de maximis, inc.

MACTEC

0 125 250 Feet

Legend

RI Samples 2004

AOI Outlines

Prepared/Date BJS 10/15/10 | Checked/Date SCF 10/15/10

Figure E-10
Remedial Investigation Surface Water Sample Locations - Off Site

Remedial Investigation Report
Nuclear Metals Superfund Site
Concord, Massachusetts

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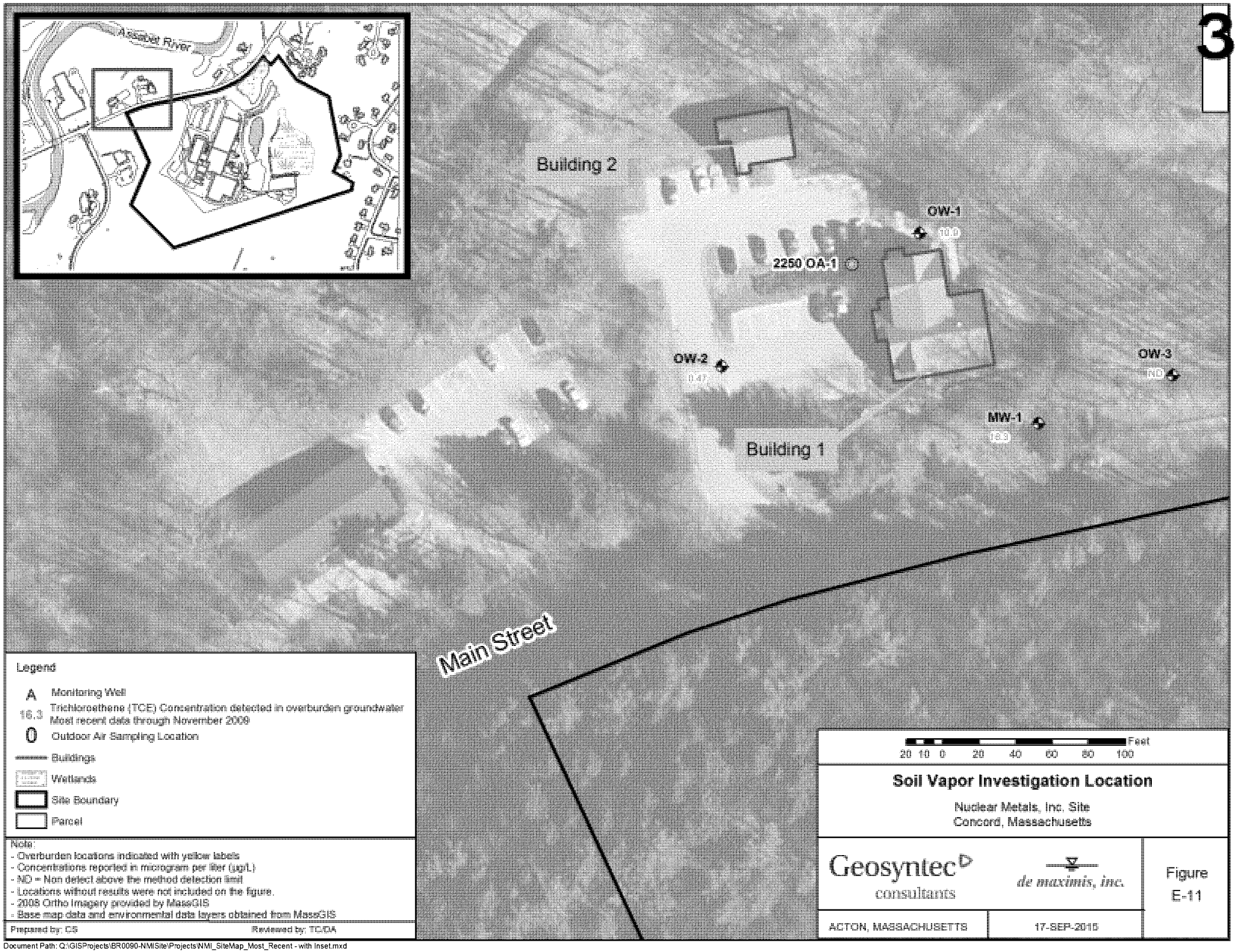

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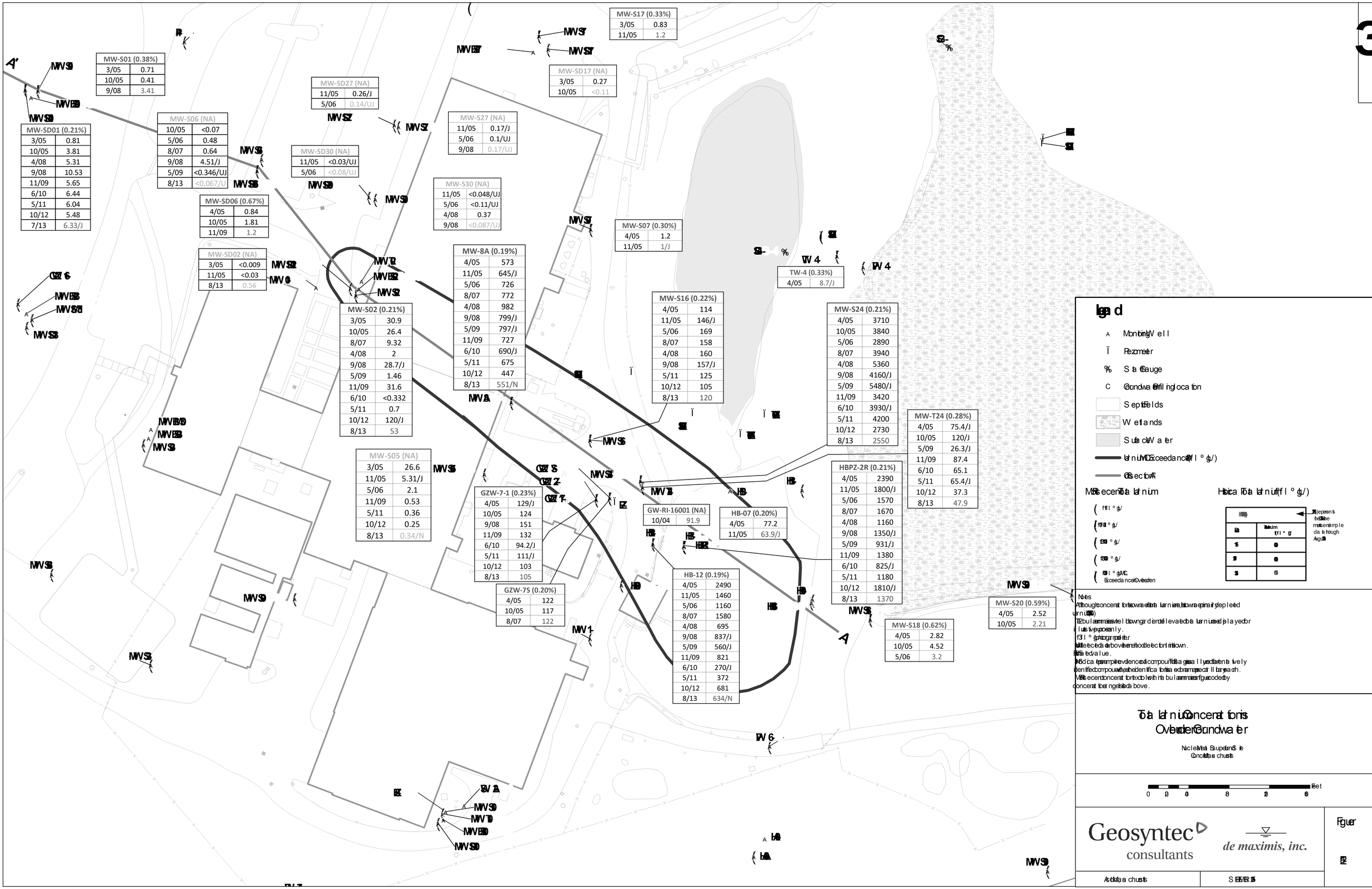
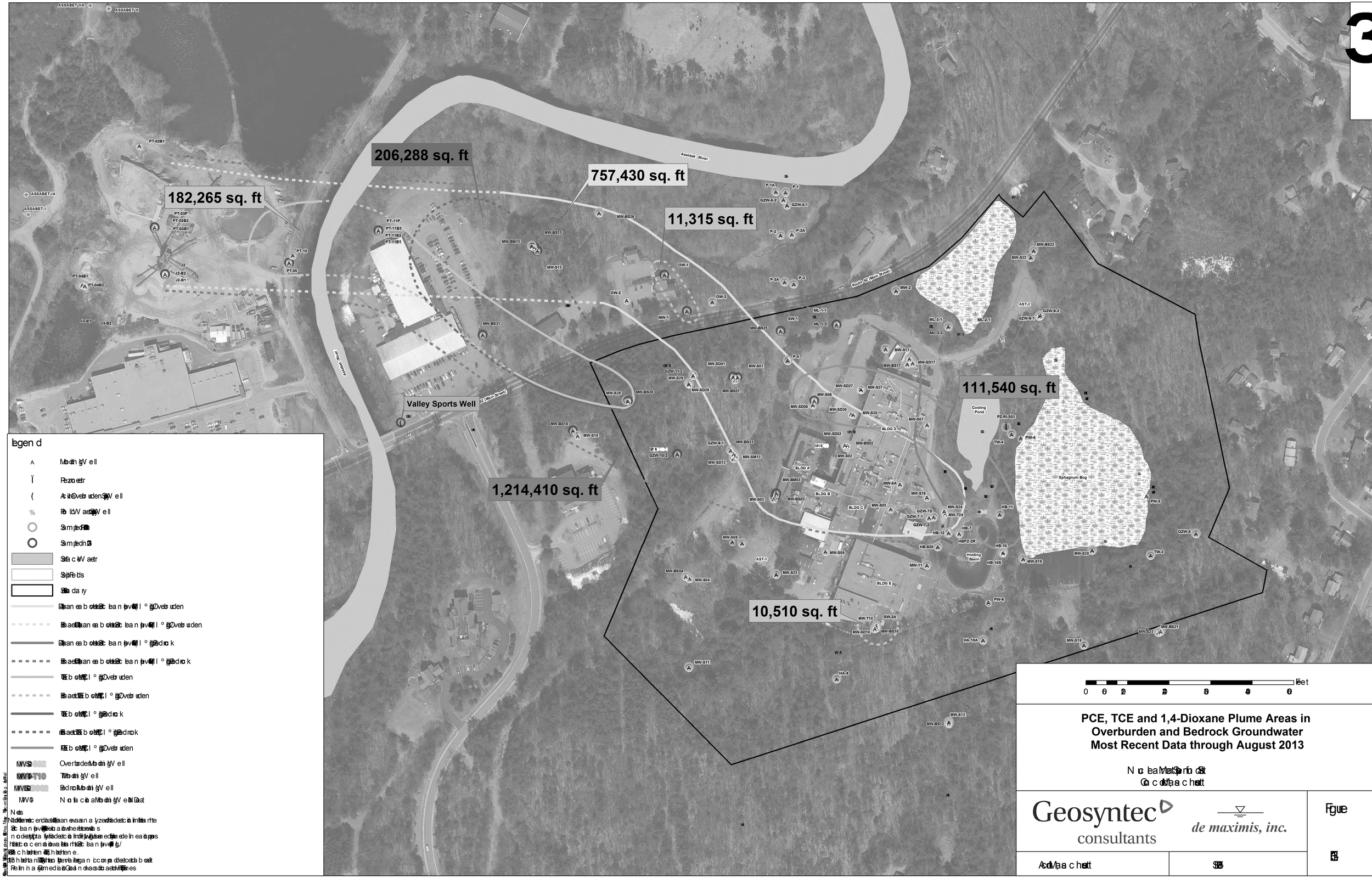
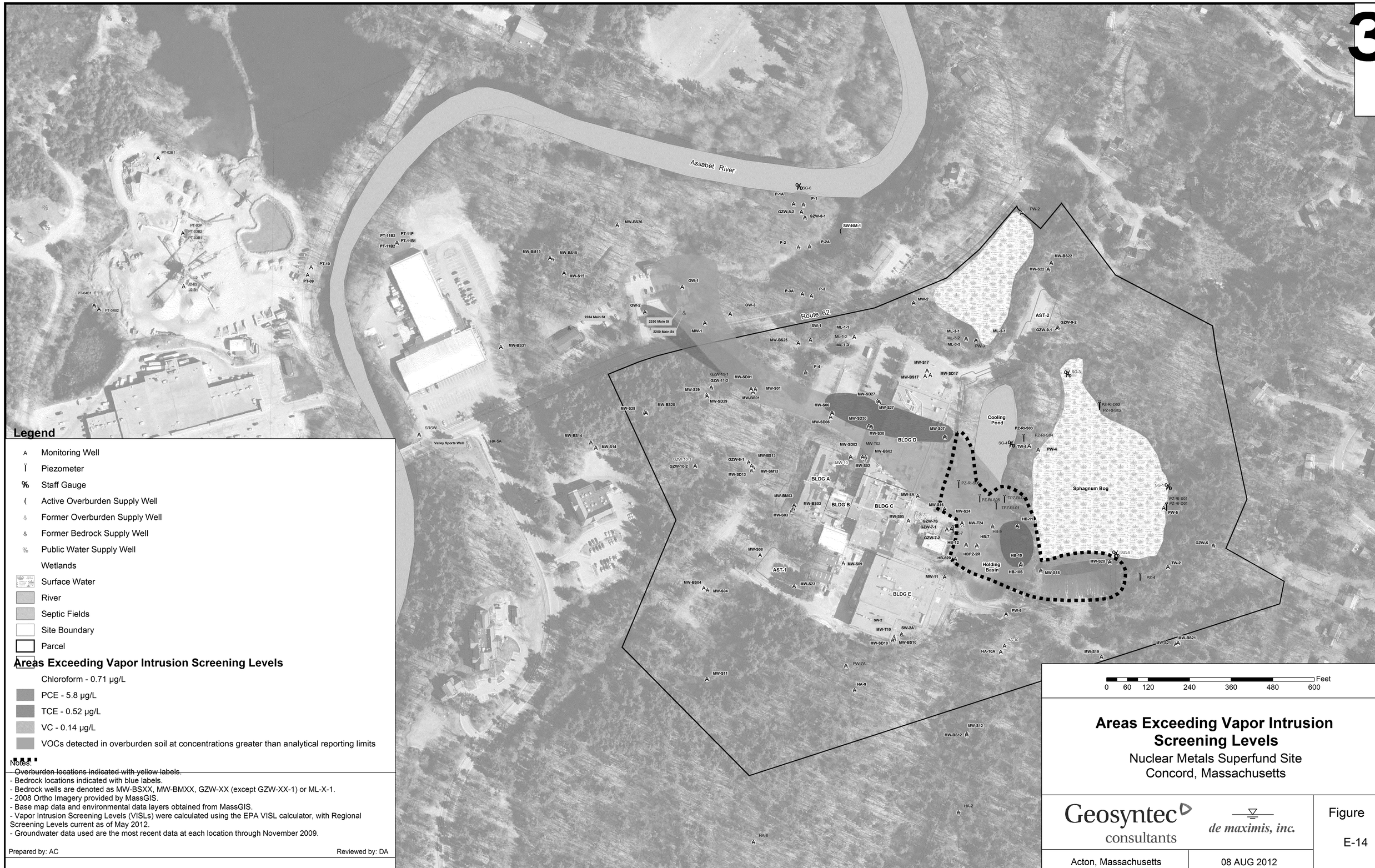
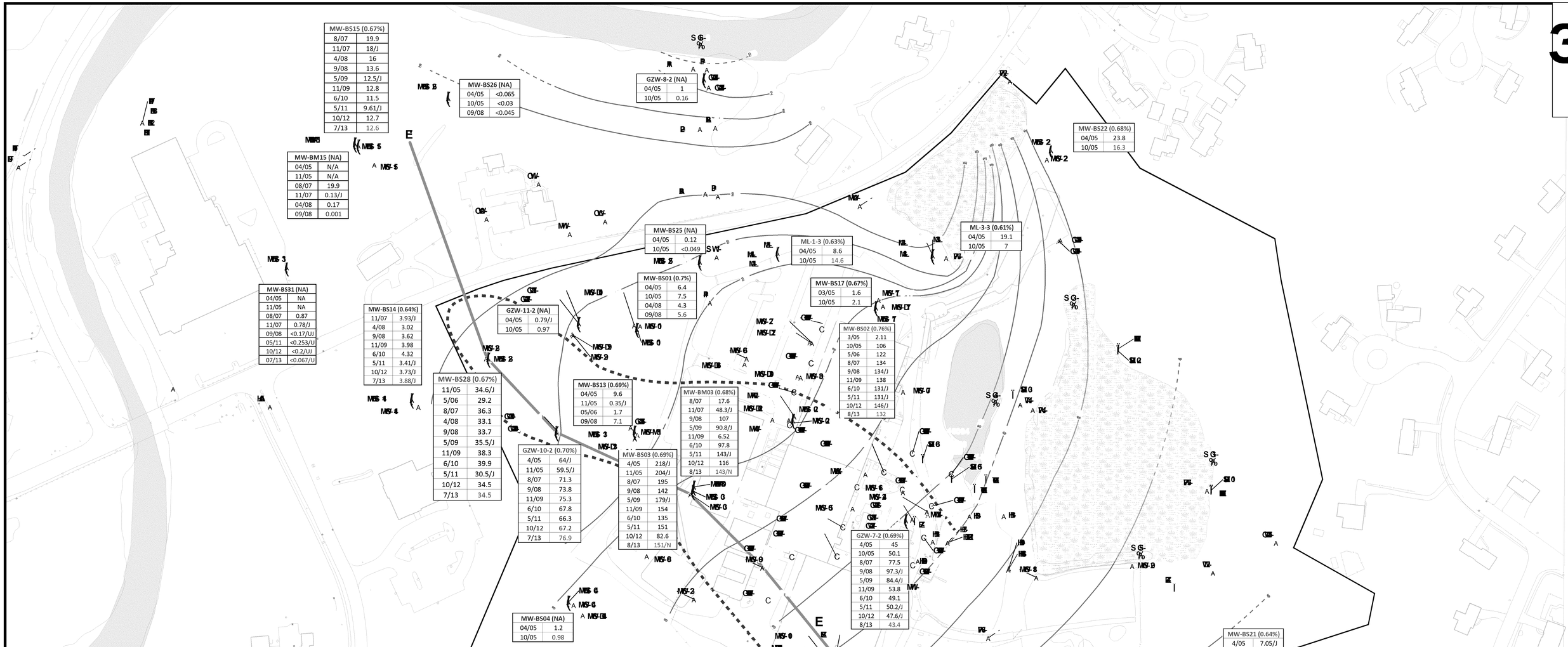


3
MW-S01 (0.38%)
3/05 0.71
10/05 0.41
9/08 3.41
MW-SD01 (0.21%)
3/05 0.81
10/05 3.81
4/08 5.31
9/08 10.53
11/09 5.65
6/10 6.44
5/11 6.04
10/12 5.48
7/13 6.33/J
MW-S06 (NA)
10/05 <0.07
5/06 0.48
8/07 0.64
9/08 4.51/J
5/09 <0.346/UJ
8/13 <0.067/U
MW-SD06 (0.67%)
4/05 0.84
10/05 1.81
11/09 1.2
MW-SD02 (NA)
3/05 <0.009
11/05 <0.03
8/13 0.56
MW-SD27 (NA)
11/05 0.26/J
5/06 0.14/UJ
MW-SD30 (NA)
11/05 <0.03/UJ
5/06 <0.08/UJ
MW-S27 (NA)
11/05 0.17/J
5/06 0.1/UJ
9/08 0.17/UJ
MW-S30 (NA)
11/05 <0.048/UJ
5/06 <0.11/UJ
4/08 0.37
9/08 <0.087/UJ
MW-S17 (0.33%)
3/05 0.83
11/05 1.2
MW-SD17 (NA)
3/05 0.27
10/05 <0.11
MW-S07 (0.30%)
4/05 1.2
11/05 1/J
TW-4 (0.33%)
4/05 8.7/J
MW-8A (0.19%)
4/05 573
11/05 645/J
5/06 726
8/07 772
4/08 982
9/08 799/J
5/09 797/J
11/09 727
6/10 690/J
5/11 675
10/12 447
8/13 551/N
MW-S02 (0.21%)
3/05 30.9
10/05 26.4
8/07 9.32
4/08 2
9/08 28.7/J
5/09 1.46
11/09 31.6
6/10 <0.332
5/11 0.7
10/12 120/J
8/13 53
MW-S16 (0.22%)
4/05 114
11/05 146/J
5/06 169
8/07 158
4/08 160
9/08 157/J
5/11 125
10/12 105
8/13 120
MW-S24 (0.21%)
4/05 3710
10/05 3840
5/06 2890
8/07 3940
4/08 5360
9/08 4160/J
5/09 5480/J
11/09 3420
6/10 3930/J
5/11 4200
10/12 2730
8/13 2550
MW-T24 (0.28%)
4/05 75.4/J
10/05 120/J
5/09 26.3/J
11/09 87.4
6/10 65.1
5/11 65.4/J
10/12 37.3
8/13 47.9
MW-S05 (NA)
3/05 26.6
11/05 5.31/J
5/06 2.1
11/09 0.53
5/11 0.36
10/12 0.25
8/13 0.34/N
GZW-7-1 (0.23%)
4/05 129/J
10/05 124
9/08 151
11/09 132
6/10 94.2/J
5/11 111/J
10/12 103
8/13 105
GZW-7S (0.20%)
4/05 122
10/05 117
8/07 122
GW-RI-16001 (NA)
10/04 91.9
HB-07 (0.20%)
4/05 77.2
11/05 63.9/J
HBPZ-2R (0.21%)
4/05 2390
11/05 1800/J
5/06 1570
8/07 1670
4/08 1160
9/08 1350/J
5/09 931/J
11/09 1380
6/10 825/J
5/11 1180
10/12 1810/J
8/13 1370
HB-12 (0.19%)
4/05 2490
11/05 1460
5/06 1160
8/07 1580
4/08 695
9/08 837/J
5/09 560/J
11/09 821
6/10 270/J
5/11 372
10/12 681
8/13 634/N
MW-S20 (0.59%)
4/05 2.52
10/05 2.21
MW-S18 (0.62%)
4/05 2.82
10/05 4.52
5/06 3.2
A'
A
Legend
Monitoring Well
Piezometer
Staff Gauge
Groundwater Drilling Location
Septic Fields
Wetlands
Surface Water
Maximum Exceedance (ft³/g)
Cross Section A'
Most Recent Total Uranium
Historical Total Uranium (ft³/g)
Exceedance Overburden
Notes
Total Uranium Concentrations Overburden Groundwater
Nuclear Metals Superfund Site
Concord, Massachusetts
Feet
0 2 4 8 12 16
Geosyntec consultants
de maximis, inc.
Figure
Acid Mass Chusetts
SEMS


3
206,288 sq. ft
757,430 sq. ft
182,265 sq. ft
11,315 sq. ft
111,540 sq. ft
1,214,410 sq. ft
10,510 sq. ft
Valley Sports Well
Assabet River
Cooling Pond
Sphagnum Bog
Holding Basin
Legend
Feet
PCE, TCE and 1,4-Dioxane Plume Areas in Overburden and Bedrock Groundwater
Most Recent Data through August 2013
Geosyntec consultants
de maximis, inc.


3
Assabet River
Route 62
Cooling Pond
Sphagnum Bog
Holding Basin
BLDG A
BLDG B
BLDG C
BLDG D
BLDG E
AST-1
AST-2
Valley Sports Well
Legend
Monitoring Well
Piezometer
Staff Gauge
Active Overburden Supply Well
Former Overburden Supply Well
Former Bedrock Supply Well
Public Water Supply Well
Wetlands
Surface Water
River
Septic Fields
Site Boundary
Parcel
Areas Exceeding Vapor Intrusion Screening Levels
Chloroform - 0.71 µg/L
PCE - 5.8 µg/L
TCE - 0.52 µg/L
VC - 0.14 µg/L
VOCs detected in overburden soil at concentrations greater than analytical reporting limits
Notes:
- Overburden locations indicated with yellow labels.
- Bedrock locations indicated with blue labels.
- Bedrock wells are denoted as MW-BSXX, MW-BMXX, GZW-XX (except GZW-XX-1) or ML-X-1.
- 2008 Ortho Imagery provided by MassGIS.
- Base map data and environmental data layers obtained from MassGIS.
- Vapor Intrusion Screening Levels (VISLs) were calculated using the EPA VISL calculator, with Regional Screening Levels current as of May 2012.
- Groundwater data used are the most recent data at each location through November 2009.
Prepared by: AC
Reviewed by: DA
0 60 120 240 360 480 600 Feet
Areas Exceeding Vapor Intrusion Screening Levels
Nuclear Metals Superfund Site
Concord, Massachusetts
Geosyntec consultants
de maximis, inc.
Figure
E-14
Acton, Massachusetts
08 AUG 2012



Legend

- Monitoring Well
- Piezometer
- Staff Gauge
- Wetlands
- Surface Water
- Site Boundary
- Septic Fields
- Uranium Exceedance (>30 µg/l)
- Cross Section
- Approximate Groundwater Elevation Contour (NAVD)
- Approximate Groundwater Elevation Contour (NAVD)

Total Uranium

- (0 - 30 µg/l)
- (30 - 200 µg/l)
- (200 - 500 µg/l)
- (500 - 1000 µg/l) Exceedance of Bedrock

Historical Total Uranium (µg/l)

Date	Total Uranium (µg/l)
1	0
2	0
3	5

Most recent concentration text color coded by concentration range as listed above.
Superimposed on most recent sampled data through 2013

Notes
Results Validated in accordance with project QAPP.
µg/l = micrograms per liter
Unfiltered data by EPA method 6020 unless otherwise noted
J = estimated value
Note: Geodetic Datum NAD 83
Contours represent approximate elevations and may not be accurate in areas of limited data or where data are sparse or absent.
Where feasible, data are shown as projected to the year 2020.

Feet
0 5 10 20 30 40

Total Uranium Concentrations in Bedrock Groundwater
Historical Data through 2013
Nuclear Metals Superfund Site
Concord, Massachusetts

Geosyntec consultants

de maximis, inc.

Figure E-15

Approved: [illegible]

Date: [illegible]

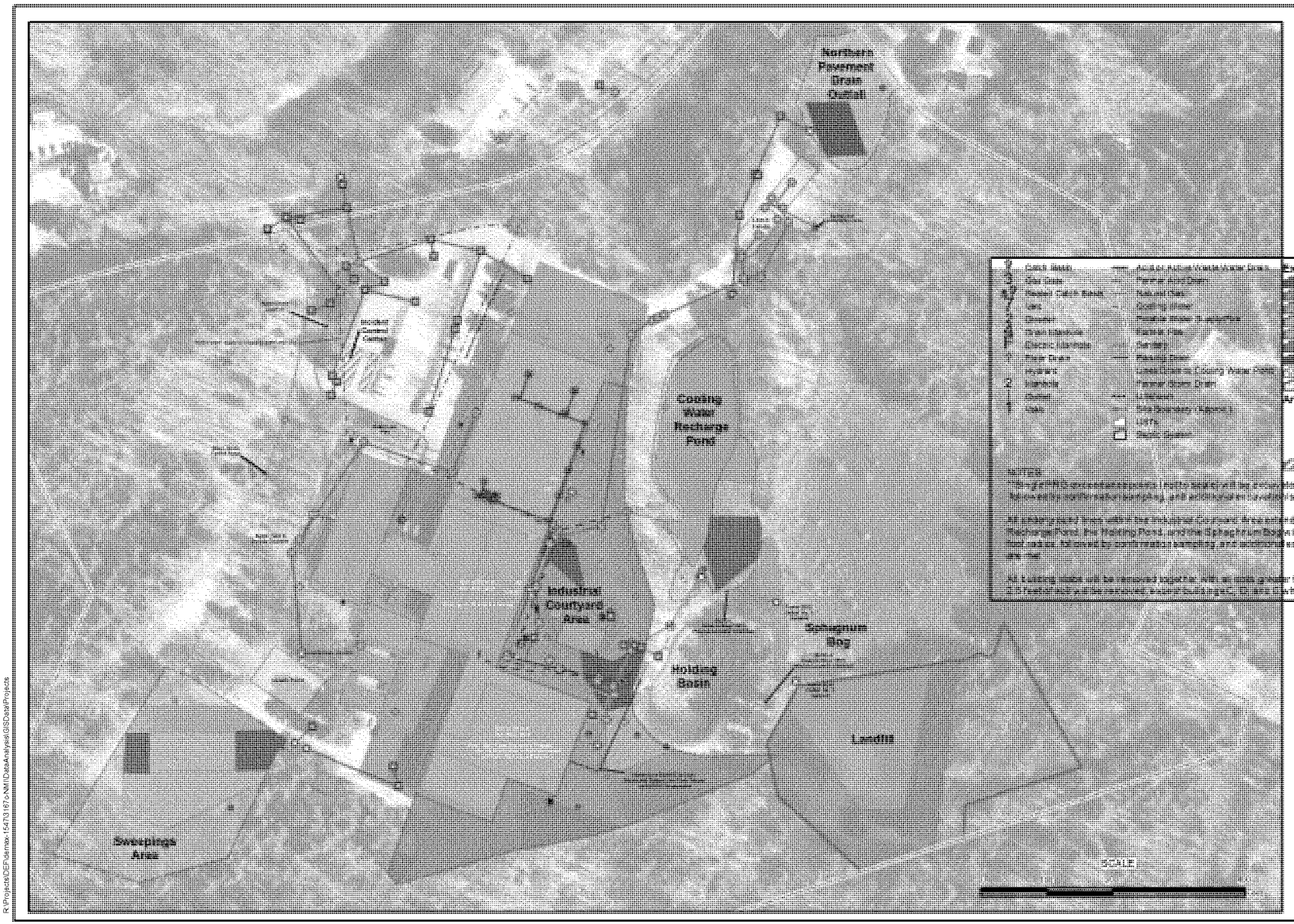


Figure L-1

Soil/Sediment Excavation Areas including Building Foundations and Utilities

in Surface and Sub Surface Soil

Nuclear Metals Inc. (NMI CRA)
Concord, Massachusetts

Source:
RMPS database and
the MACTEC Utility layers
from Site Engineering Drawings

Map Legend:

Check Basin	Approx. Active Waste Water Drain
Dry Basin	Fence Area Drain
Flume Catch Basin	Gas Line
Gate	Guard Rail
Hydrant	Overhead Wires
Light Standard	Pipeline Under Ground
Electric Manhole	Sewer Line
Floor Drain	Water Line
Culvert	Electric Line
Catch Basin	Electric Line
Valve	Underground Cooling Water Pipe
	Flume Drain Outlet
	Culvert
	Fence (Approx. Legend)
	Curb
	Back Drain

Excavation Depth (ft) **
- 0-.08
- 0.01 - 1.00
- 1.01 - 2.00
- 2.01 - 3.00
- 3.01 - 4.00
- 4.01 - 5.00
- 5.01 - 10.00
- T.B.D. by ready selection
- Remove all metal & soil to PRGs

Features
- Cooling Water Recharge Pond
- Industrial Courtyard Area
- Seepage Area
- Northern Pavement Drain Outfall
- Tower

Notes:
1. Soil/Sediment excavation depths noted will be excavated to an initial 2.5 foot radius. Excavation depths noted in parenthesis are estimated. Excavation depths noted in plangurid PRGs are met.
2. All building debris from within the Industrial Courtyard Area extending to the Cooling Water Recharge Pond, the Holding Basin and the Sphagnum Bog will be excavated to an initial 2.5 foot radius. Followed by confirmatory sampling and additional excavation/removal as required per plangurid PRGs are met.
3. All building debris will be removed regardless of depth, and all soils greater than PRGs. For cost estimating, the building debris and soil removal extends to a depth of 5 feet. Within 5 feet will be removed.

Spatial Projection:

Coordinate System:
NAD State Plane Massachusetts
FIPS Zone 2001
Units: US Survey Foot
Datum: NAD83

Plot Info:
File: Fig2.5.2_ExcAssessUtils
Project No. 31870
Plot Date: 05 August, 2014
Arc Operator: HM
Reviewed by: MMBT

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de maximis, inc.

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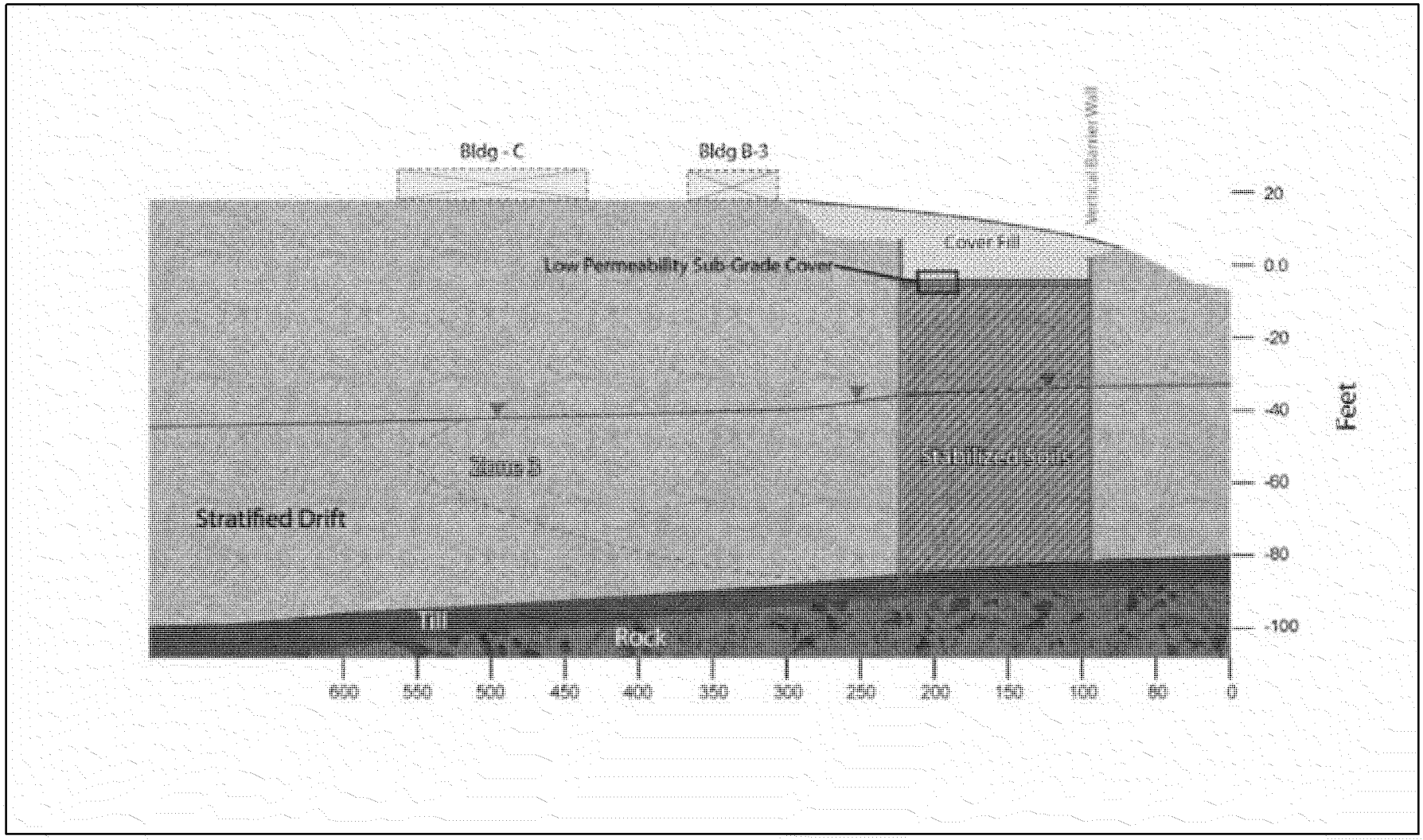

LEGEND

- Zone 1 - Uranium > 30 mg/kg in Vadose Zone Soils
- Zone 2 - Uranium > 30 mg/kg in Saturated Zone Soils
- Zone 3 - Uranium > 30 ug/l in Groundwater
- Building to be demolished
- Groundwater

Units depicted are feet (ft)

Holding Basin Soil Stabilization and Containment

Nuclear Metals Inc., Concord, MA

Name: Fig4.3.5_VBW_profile
Date: 8/7/2014
Author: RKoehnen
Project No.: 3215
Reviewed by: VR

L- 2

ddms
1217 Bandana Blvd N
St. Paul, MN 55108

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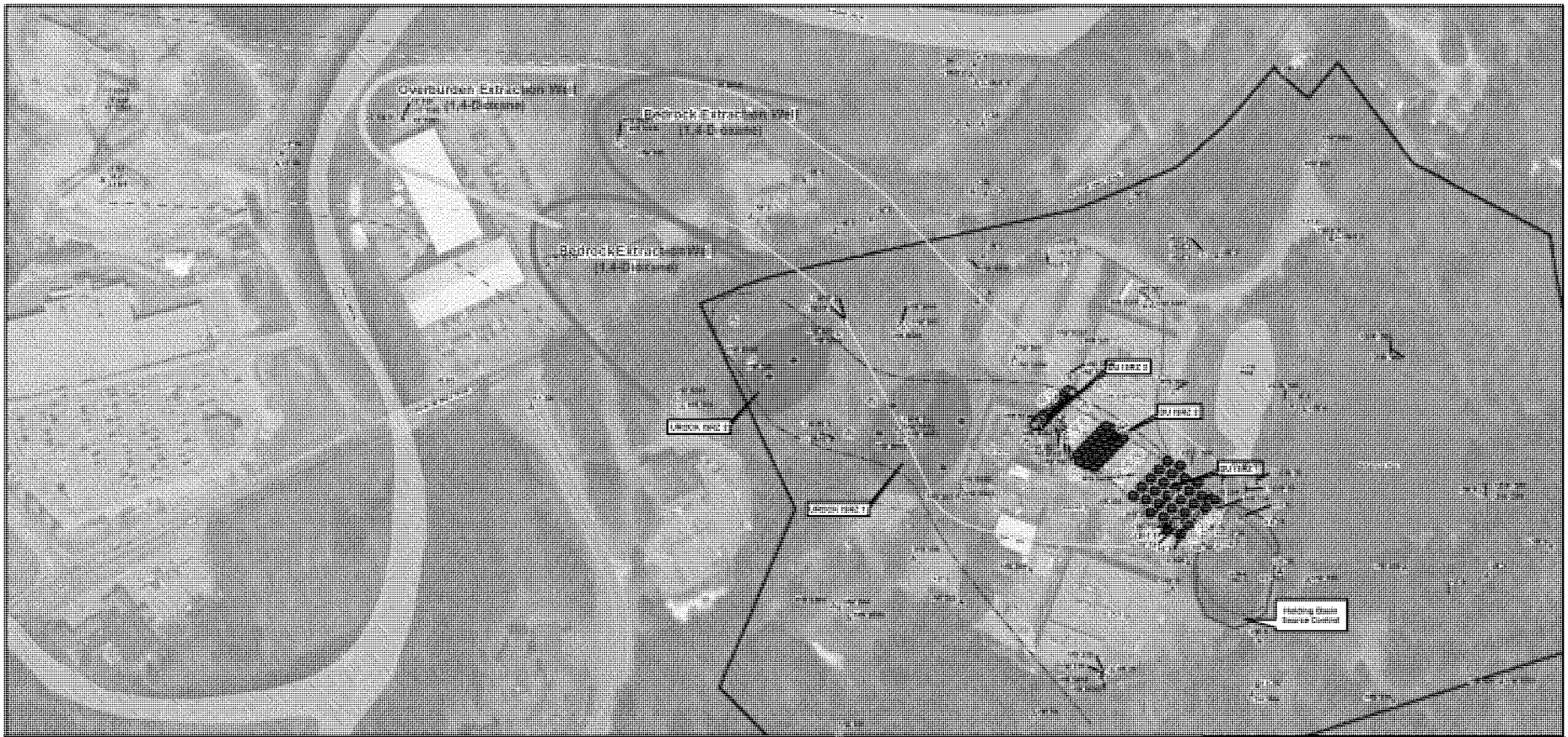

Legend

- Proposed Extraction Well in Bedrock
- Proposed Extraction Well in Overburden
- Monitoring Well
- Piezometer
- Wetlands
- Surface Water
- Site Boundary
- Proposed ISRZ Reactive Zone Monitoring Well
- Proposed Media Injection Point (Apatite)
- Proposed Media Injection Point (Zero Valent Iron (ZVI))
- Proposed Media Injection Point in Bedrock (Apatite or ZVI)
- Proposed Monitoring Well
- Estimated Hydraulic Capture Zone in Overburden (1,4-Dioxane)
- Estimated Hydraulic Capture Zone in Bedrock (1,4-Dioxane)
- 1,4-Dioxane above the Site PRG (0.67 µg/L) in Overburden
- Estimated 1,4-Dioxane above the Site PRG (0.67 µg/L) in Overburden
- 1,4-Dioxane above the Site PRG (0.67 µg/L) in Bedrock
- Estimated 1,4-Dioxane above the Site PRG (0.67 µg/L) in Bedrock
- Uranium above the MCL (>30 µg/L)
- Depleted Uranium above the MCL (>30 µg/L)
- Holding Basin Source Control Area
- ISRZ in Bedrock

Notes:
1. The illustrated capture zone for the 1,4-Dioxane overburden well assumes an extraction rate of approximately 6.0 gpm, based on a hydraulic gradient of 0.011, a hydraulic conductivity of 4.3 ft/day, a plume width of 200 ft and a plume thickness of 50 ft.
2. The illustrated capture zone for the two 1,4-Dioxane bedrock wells assumes an extraction rate of approximately -0.5 gpm, based on a hydraulic gradient of 0.004, hydraulic conductivity of 0.22 ft/day, a plume width of 400 ft and a plume thickness of 25 ft.
3. The locations of conveyance lines, treatment building, and discharge line would be selected during remedial design.
4. The upgradient portions of the 1,4-Dioxane plumes have been cut off for figure clarity.
5. ISRZ = In-situ Reactive Zone, DU = depleted uranium, UROCK = isotopically natural Uranium in Bedrock.

Nuclear Metals Superfund Site
Concord, Massachusetts

Feet
200 100 0 200

Geosyntec consultants

de maximis, inc.

Figure L-3

APPENDIX D

ARARs TABLES

Action-Specific ARARs for SS-4 and GW-4
Record of Decision
Nuclear Metals Superfund Site
Concord, Massachusetts

Regulatory Authority	Action/Trigger	Requirement	Status	Requirement Synopsis	Action To Be Taken To Attain ARAR
Soil and Sediment (Alternative SS-4)					
Federal	Management of PCB-contaminated soil	TSCA PCB Remediation Waste (40 CFR 761.61(c))	Applicable	This section of the TSCA regulations provides risk-based cleanup and disposal options for PCB remediation waste based on the risks posed by the concentrations at which the PCBs are found. Written approval for the proposed risk-based cleanup must be obtained from the Director, Office of Site Remediation and Restoration, USEPA Region 1.	The cleanup and disposal of PCB contaminated soil and sediment will be performed in a manner to comply with TSCA. EPA has determined that the method of excavation and disposal of the ≥ 5 0 ppm PCB-contaminated sediment and soil as described in the TSCA determination will not pose an unreasonable risk of injury to health and the environment. . (See TSCA Determination in Appendix G)
Federal	Management of waste radioactive material	Nuclear Regulatory Commission, Licensing of Radioactive Material (10 CFR Part 40, Appendix A, Criterion 6)	Relevant and Appropriate	10 CFR Part 40 Appendix A, Criterion 6(1) requires the disposal of waste byproduct radioactive material to be closed with a design which provides reasonable assurance of control of radiological hazards to be effective for 1,000 years, to the extent reasonably achievable, and in any case, for at least 200 years.	These requirements will be incorporated in the design of the vertical containment wall and horizontal cover for the solidified/stabilized soils remaining on-site in the Holding Basin.
State	Radiation containment design requirements	Massachusetts Regulations for the Control of Radiation, Standards for Protection Against Radiation, Vacating Premises (105 CMR 120.245)	Relevant and Appropriate	These regulations specify that the annual total effective dose equivalent (TEDE) from any specific environmental source during decommissioning activities should not exceed ten millirem above background and that the annual TEDE to any individual after the Site is released for unrestricted use should not exceed ten millirem above background.	The 10 mRem above background criteria was used during the development of cleanup goals and will be used in the design of the containment wall and cover.
Soil, Sediment, and Groundwater (Alternatives SS-4 and GW-4)					
Federal	Radiation protection program	Nuclear Regulatory Commission, Radiation Protection Programs (10 CFR Part 20 - Appendix B)	Relevant and Appropriate	Annual Limits on Intake (ALIs) and Derived Air Concentrations (DACs) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sewerage.	ALIs and DACs will be determined for protection of workers during remedial activities.
Federal	Control of surface water runoff, Direct discharge to surface water	Clean Water Act NPDES Permit Program (40 CFR Part 122,125)	Applicable	The NPDES permit program specifies the permissible concentration or level of contaminants in the discharge from any point source, including surface runoff, to waters of the United States.	Any discharges to surface waters will meet the substantive discharge standards.

Action-Specific ARARs for SS-4 and GW-4
Record of Decision
Nuclear Metals Superfund Site
Concord, Massachusetts

Regulatory Authority	Action/Trigger	Requirement	Status	Requirement Synopsis	Action To Be Taken To Attain ARAR
Federal	Discharge to publicly owned treatment works	CWA, General Pretreatment Program (40 CFR Part 403)	Applicable	Discharge of nondomestic wastewater to POTW must comply with the general prohibitions of this regulation, as well as categorical standards, and local pretreatment standards.	Discharge to POTW will be sampled to evaluate compliance with pre-treatment standards.
Federal	Storage and treatment of low-level mixed waste (hazardous waste containing low-level radioactive waste)	RCRA Conditional Exemption for Low-Level Mixed Waste Storage, Treatment, Transportation, and Disposal (40 CFR Part 266 Subpart N)	Applicable	Low-level mixed waste (LLMW) (hazardous waste containing low-level radioactive waste) is exempted from RCRA storage, treatment, transportation and disposal requirements.. LLMW must still be managed as radioactive waste according to Nuclear Regulatory Commission (NRC) regulations(Title 10, Chapter I, of the Code of Federal Regulations).	LLMW will be managed as radioactive waste according to NRC regulations.
Federal	Use of a treatment, storage or disposal facilityfor hazardous waste	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities (40 CFR Part 264)	Applicable	Establishes minimum national standards for the management of hazardous waste, including closure and post-closure requirements. Applies to owners and operators of all facilities which treat, store, or dispose of hazardous waste. Such facilities include landfills, containers, tank systems, waste piles, and miscellaneous units.	The use of treatment, storage or disposal facilities for hazardous waste that does not contain low-level radioactive waste will be done in accordance with these requirements.
Federal	Identification of hazardous waste	RCRA Identification and Listing of Hazardous Waste (40 CFR 261.3 and 40 CFR 264.13)	Applicable	These regulations include rules to identify hazardous waste. If waste exhibits the characteristics of a hazardous waste and does not contain low-level radioactive waste, RCRA waste regulations are applicable.	Any waste generated as part of the remedial activities will be tested for hazardous waste characteristics as well as low-level radioactive waste to determine whether it should be managed as hazardous waste.
Federal	Storage and disposal of hazardous wastes	RCRA Standards Applicable to Generators of Hazardous Waste (40 CFR Part 262)	Applicable	These standards govern storage, labeling, accumulation times, and disposal of hazardous waste. These regulations establish standards for generators of hazardous waste. RCRA Subtitle C established standards applicable to treatment, storage, and disposal of hazardous waste and closure of hazardous waste facilities.	Any hazardous waste generated during remedial action activities that does not contain low-level radioactive waste will be managed in accordance with these standards.
State	Receipt, ownership, possession, use, transfer, or disposal of any radiation source	Massachusetts Regulations for the Control of Radiation (105 CMR 120)	Applicable	Massachusetts regulates all sources of radiation including naturally occurring radioactive material, byproduct material and special nuclear material. These regulations pertain to source material, byproduct material, and special nuclear materials in quantities not sufficient to form a critical mass and apply to the protection of workers and individuals against radiation, termination of licenses, decommissioning of facilities, and transportation of radioactive material.	The substantive requirements of this regulation will be followed during the cleanup of the Site.

Action-Specific ARARs for SS-4 and GW-4
Record of Decision
Nuclear Metals Superfund Site
Concord, Massachusetts

Regulatory Authority	Action/Trigger	Requirement	Status	Requirement Synopsis	Action To Be Taken To Attain ARAR
State	Identification and management of hazardous waste	Massachusetts Hazardous Waste Management Rules (310 CMR 30.000)	Applicable	These regulations outline requirements and procedures for handling, storage, treatment, disposal, and record keeping at hazardous waste facilities.	Any waste generated as part of the remedial activities will be tested for hazardous waste characteristics as well as low-level radioactive waste to determine whether it should be managed as hazardous waste in accordance with these standards.
State	Discharges to surface water	Massachusetts Surface Water Discharge Permit Program (314 CMR 3.00)	Applicable	These regulations establish a permit program to regulate pollutant discharges to surface waters of the Commonwealth and to confer sufficient authority to the Massachusetts Department of Environmental Protection to assume the delegated administration of the NPDES permit program within the Commonwealth.	Any discharge to surface water of extracted groundwater, monitor well purge water, and investigation derived waste water will be treated and controlled to meet the requirements of these regulations. Construction activities will be controlled to meet surface water discharge requirements.
State	Discharges to surface water	Massachusetts Surface Water Quality Standards (314 CMR 4.00)	Applicable	Through these regulations MassDEP will limit or prohibit discharges of pollutants to surface waters to assure that surface water quality standards of the receiving waters are protected and maintained or attained. The level of treatment for an individual discharger will be established by the discharge permit in accordance with 314 CMR 3.00 (Massachusetts Surface Water Discharge Permit Program).	Any discharge to surface water of extracted groundwater, monitor well purge water, and investigation derived waste water will be treated and controlled to meet the requirements of these regulations. Construction activities will be controlled to meet surface water quality standards.
State	Activities that affect ambient air quality	Massachusetts Air Pollution Control Regulations (310 CMR 7.00)	Applicable	These regulations set emission limits necessary to attain ambient air quality standards, including standards for Visible Emissions (310 CMR 7.06); Dust, Odor, Construction and Demolition (310 CMR 7.09); Noise (310 CMR 7.10); and Volatile Organic Compounds (310 CMR 7.18).	Remedial activities will be conducted to meet these air quality standards, including standards for Visible Emissions (310 CMR 7.06); Dust, Odor, Construction and Demolition (310 CMR 7.09); Noise (310 CMR 7.10); and Volatile Organic Compounds (310 CMR 7.18).
Groundwater (Alternative GW-4)					
Federal	Use of air stripping	Clean Air Act National Emissions Standards for Hazardous Air Pollutants (NESHAPs), (40 CFR Part 61)	Applicable	These regulations set standards for emissions of 189 Hazardous Air Pollutants that are listed in Section 112(b)(1) of the Clean Air Act.	If air stripping is selected during remedial design as a component of the groundwater remedy and any of the 189 hazardous air pollutants will be emitted, engineering and other controls will be implemented to comply with these standards.
Federal	Underground injections	SDWA Underground Injection Control Program (40 CFR Part 144, 146, and 147 Subpart W)	Relevant and Appropriate	These regulations outline the minimum program and performance standards for underground injection programs. Technical criteria and standards for siting, operation and maintenance, closure, and reporting and recordkeeping as required for permitting are set forth in Part 146.	If treated groundwater is re-injected into the aquifer, these standards would be met since the treated groundwater would meet MCLs and would not be considered hazardous waste.

Action-Specific ARARs for SS-4 and GW-4
Record of Decision
Nuclear Metals Superfund Site
Concord, Massachusetts

Regulatory Authority	Action/Trigger	Requirement	Status	Requirement Synopsis	Action To Be Taken To Attain ARAR
State	Activities that affect ambient air quality	Massachusetts Ambient Air Quality Standards (310 CMR 6.00)	Applicable	These regulations set primary and secondary standards for emissions of sulfur dioxide, particulate matter, carbon monoxide, ozone, nitrogen dioxide, and lead.	If air stripping is selected during remedial design as a component of the groundwater remedy, it will be designed, constructed, and operated in accordance with these requirements.
State	Discharge of treated groundwater to groundwater	Massachusetts Groundwater Discharge Permit Program [3.14 CMR 5.10 (Permit Conditions) and 5.11 (Groundwater Standards)]	Relevant and Appropriate	These regulations require MassDEP to control the discharge of pollutants to the ground waters of the Commonwealth through the issuance of permits to assure that groundwaters are protected for their actual and potential use as a source of potable water and surface waters are protected for their existing and designated uses.	If treated groundwater is re-injected into the aquifer, the discharge of any pollutant to groundwater will controlled so that groundwaters are protected for their actual and potential use as a source of potable water and surface waters are protected for their existing and designated uses.

Key:

ARAR = Applicable or Relevant and Appropriate Requirement
BACT = best available control technology
CAA = Clean Air Act
CERCLA = Comprehensive Environmental Response, Compensation and Liability Act
CFR = Code of Federal Regulations
CMR = Code of Massachusetts Regulations
CWA = Clean Water Act
DCLG = Derived Concentration Guideline Level
LDRs = Land Disposal Restrictions
NCP = National Contingency Plan
NESHAP = National Emission Standards for Hazardous Air Pollutants
NPDES = National Pollutant Discharge Elimination System
PCBs = polychlorinated biphenyls
POTW = publicly owned treatment works
ppm = parts per million
RCRA = Resource Conservation and Recovery Act
SDWA = Safe Drinking Water Act
TSCA = Toxic Substances Control Act
UIC = Underground Injection Control
USEPA = U.S. Environmental Protection Agency
USC = United States Code

Chemical-SpecificARARs for Groundwater(AlternativeGW-4)
Record of Decision
Nuclear Metals Superfund Site
Concord, Massachusetts

Regulatory Authority	REQUIREMENT	STATUS	REQUIREMENTSYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
Federal	Safe Drinking Water Act, National Primary Drinking Water Regulations, MCLs and MCLGs [40 CFR Parts 141.60 - 141.63 and 141.50 - 141.52]	Relevant and Appropriate	The National Primary Drinking Water Regulations establish Maximum Contaminant Levels (MCLs) and Maximum Contaminant Level Goals (MCLGs) for several common organic and inorganic contaminants. MCLs specify the maximum permissible concentrations of contaminants in public drinking water supplies. MCLs are federally enforceable standards based in part on the availability and cost of treatment techniques. MCLGs specify the maximum concentration at which no known or anticipated adverse effect on humans will occur. MCLGs are non-enforceable health based goals set equal to or lower than MCLs.	MCLs and nonzero MCLGs were used during the development of cleanup goals. Cleanup actions will be designed and implemented to attain the concentration limits of these regulations.
Federal	USEPA Risk Reference Doses	To Be Considered	Risk reference doses (RfDs) are estimates of daily exposure levels that are unlikely to cause significant adverse non-carcinogenic health effects over a lifetime.	RfDs were considered during the development of cleanup goals.
Federal	USEPA Carcinogen Assessment Group, Cancer Slope Factors (CSFs)	To Be Considered	CSFs are used to compute the incremental cancer risk from exposure to site contaminants and represent the most up-to-date information on cancer risk from USEPA's Carcinogen Assessment Group.	CSFs were considered during the development of cleanup goals.
Federal	Guidelines for Carcinogen Risk Assessment (EPA/630/P-03/001F, March 2005)	To Be Considered	Guidance values are to be used to evaluate the potential carcinogenic hazard caused by exposure to contaminants.	These guidelines were considered during the development of cleanup goals.
Federal	Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (EPA/630/R-03/003F, March 2005)	To Be Considered	Guidance values are to be used to evaluate the potential carcinogenic hazard to children caused by exposure to contaminants.	This guidance was considered during the development of cleanup goals.
Federal	EPA Office of Water, Drinking Water Health Advisories (EPA 822-R-06-013)	To Be Considered	Health Advisories (HAs) are estimates of acceptable drinking water levels for chemical substances based on health effects information; an HA is not a legally enforceable federal standard, but serves as technical guidance to assist federal, state and local officials.	HAs were considered during the development of cleanup goals. In particular, HAs were used if a constituent does not have a promulgated MCL or MCP GW-1 [or MA MCL] standard.
State	Massachusetts Regulations for the Control of Radiation, Standards for Protection Against Radiation, Vacating Premises (105 CMR 120.245)	Relevant and Appropriate	These regulations specify that the annual TEDE dose from any specific environmental source during decommissioning activities should not exceed ten millirem above background and that the annual TEDE to any individual after the Site is released for unrestricted use should not exceed ten millirem above background.	The 10 mRem above background criterion was used during the development of cleanup goals.

Chemical-Specific ARARs for Groundwater (Alternative GW-4)
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Nuclear Metals Superfund Site
Concord, Massachusetts

Regulatory Authority	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
State	Massachusetts Contingency Plan (MCP) [310 CMR 40.0000], Method 1 GW-1 Standards	To Be Considered	The MCP Method 1 groundwater standards assume exposure to concentrations of hazardous material in groundwater under current or foreseeable future conditions. These standards contain a list of numerical, risk-based limitations on particular contaminants in groundwater based on the groundwater classification.	These standards were considered during development of cleanup goals.
State	Massachusetts Drinking Water Regulations [310 CMR 22.00]	Relevant and Appropriate	These standards establish Massachusetts Maximum Contaminant Levels (MA MCLs) for organic and inorganic contaminants that have been determined to adversely affect human health in public drinking water supply systems.	MA MCLs were used during development of cleanup goals.

Key:

ARAR = Applicable or Relevant and Appropriate Requirement
CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act
CFR = Code of Federal Regulations
CMR = Code of Massachusetts Regulations
CSF = cancer slope factor
DCGL = Derived Concentration Guideline Level
MCLs = Maximum Contaminant Levels
MCLGs = Maximum Contaminant Level Goals
MA MCLs = Massachusetts Maximum Contaminant Levels
RfD = reference dose
TEDE = total effective dose equivalent
TSCA = Toxic Substances Control Act
USEPA = United States Environmental Protection Agency

Chemical-Specific ARARs for Soil and Sediment (Alternative SS-4)
Record of Decision
Nuclear Metals Superfund Site
Concord, Massachusetts

Regulatory Authority	Requirement	Status	Requirement Synopsis	Action To Be Taken To Attain ARAR
Federal	USEPA Risk Reference Doses	To Be Considered	Risk reference doses (RfDs) are estimates of daily exposure levels that are unlikely to cause significant adverse non-carcinogenic health effects over a lifetime.	RfDs were considered during the development of cleanup goals.
Federal	USEPA Carcinogen Assessment Group, Cancer Slope Factors (CSFs)	To Be Considered	CSFs are used to compute the incremental cancer risk from exposure to site contaminants and represent the most up-to-date information on cancer risk from USEPA's Carcinogen Assessment Group.	CSFs were considered during the development of cleanup goals.
Federal	Guidelines for Carcinogen Risk Assessment (EPA/630/P-03/001F, March 2005)	To Be Considered	Guidance values are to be used to evaluate the potential carcinogenic hazard caused by exposure to contaminants.	These guidelines were considered during the development of cleanup goals.
Federal	Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens (EPA/630/R-03/003F, March 2005)	To Be Considered	Guidance values are to be used to evaluate the potential carcinogenic hazard to children caused by exposure to contaminants.	This guidance were considered during the development of cleanup goals.
Federal	A Guide on Remedial Actions at Superfund Sites with PCB Contamination, OSWER Directive #9355.4-01FS, August 1990	To Be Considered	Establishes a policy that a cleanup level of 1 mg/kg PCBs in residential area soil reflects a protective quantifiable concentration.	This policy was considered during the development of cleanup levels for soils and sediments.
Federal	Prediction of sediment toxicity using consensus-based freshwater sediment quality guidelines. EPA 905/R-00/007. June 2000	To Be Considered	The methodology presented in this document represent USEPA's best recommendation as to the concentration of a substance that may be present in sediment while still protecting benthic organisms from the effects of that substance.	These guidelines were considered during the development of cleanup goals for sediments.
State	Massachusetts Regulations for the Control of Radiation, Standards for Protection Against Radiation, Vacating Premises; 105 CMR 120.245; Standards for Protection Against Radiation	Relevant and Appropriate	These regulations specify that the annual total effective dose equivalent (TEDE) from any specific environmental source during decommissioning activities should not exceed ten millirem above background and that the annual TEDE to any individual after the Site is released for unrestricted use should not exceed ten millirem above background.	The 10 mRem above background criterion was used during the development of cleanup goals

Key:

ARAR = Applicable or Relevant and Appropriate Requirement
CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act
CFR = Code of Federal Regulations
CMR = Code of Massachusetts Regulations
CSF = cancer slope factor
mRem = millirem
RfD = reference dose
TEDE = total effective dose equivalent
TSCA = Toxic Substances Control Act
NUREG = NRC Regulation
USEPA = United States Environmental Protection Agency

Location-Specific ARARs for SS-4 and GW-4
Record of Decision
Nuclear Metals Superfund Site
Concord, Massachusetts

Regulatory Authority	Location Characteristic	Requirement	Status	Requirement Synopsis	Action To Be Taken To Attain Requirement
Soil and Sediment (Alternative SS-4)					
Federal	Surface Waters, Endangered Species, Migratory Species	Fish and Wildlife Coordination Act [16 USC 661 et seq.] 40 CFR Part 6	Applicable	Actions that affect species/habitat require consultation with USDOI, USFWS, NMFS, and/or state agencies, as appropriate, to ensure that proposed actions do not jeopardize the continued existence of the species or adversely modify or destroy critical habitat. The effects of water-related projects on fish and wildlife resources must be considered. Action must be taken to prevent, mitigate, or compensate for project-related damages or losses to fish and wildlife resources.	To the extent necessary, actions will be taken to develop measures to prevent, mitigate, or compensate for project related impacts to habitat and wildlife. The USFWS, acting as a review agency for the USEPA, will be kept informed of proposed remedial activities.
Federal	Wetlands, Aquatic Ecosystem	Clean Water Act, Dredge or Fill Requirements Section 404 [40 CFR Part 230, 33 CFR 320-323]	Applicable	Section 404 of the CWA regulates the discharge of dredged or fill materials to U.S. waters, including wetlands. Filling wetlands would be considered a discharge of fill materials. Guidelines for Specification of Disposal Sites for Dredged or Fill material at 40 CFR Part 230, promulgated under CWA Section 404(b)(1), maintain that no discharge of dredged or fill material will be permitted if there is a practical alternative that would have less effect on the aquatic ecosystem. If adverse impacts are unavoidable, action must be taken to restore, or create alternative wetlands.	SS-4's effects on surface waters and wetlands will be evaluated and avoided and/or minimized. Compensatory wetlands mitigation will need to be performed as necessary to comply with this ARAR. The selected remedy is the least environmentally damaging practicable alternative that meets the remedial action objectives. Any wetland or surface water areas that require removal of soil/sediment will be designated for eventual restoration.
Federal	Endangered Species	Endangered Species Act [50 CFR Parts 17.11-17.12; 50 CFR 402]	Applicable, if such species are encountered	This act requires action to avoid jeopardizing the continued existence of listed endangered or threatened species or modification of their habitat.	Protection of endangered species and their habitat will be considered as part of the design and excavation activities.
State	Floodplains, Wetlands, Surface Waters	Massachusetts Wetland Protection Regulations [310 CMR 10.00]	Applicable	These regulations include standards on dredging, filling, altering, or polluting inland wetlands and protected areas (defined as areas within the 100-year floodplain). Under this requirement, available alternatives must be considered that minimize the extent of adverse impacts, and mitigation including restoration and/or replication is required.	All work to be performed within wetlands and the 100 foot buffer zone will be in accordance with the substantive requirements of these regulations. The Sphagnum Bog is within 100 feet of the Holding Basin and Cooling Water Recharge Pond.

Location-Specific ARARs for SS-4 and GW-4
Record of Decision
Nuclear Metals Superfund Site
Concord, Massachusetts

Regulatory Authority	Location Characteristic	Requirement	Status	Requirement Synopsis	Action To Be Taken To Attain Requirement
State	Aquatic Ecosystem	Massachusetts Clean Waters Act, 21 M.G.L. §§ 26-53 Massachusetts Water Quality Certification for Discharge of Dredged or Fill Material, Dredging, and Dredging Material Disposal in Waters of the U.S. within the Commonwealth [314 CMR 9.00]	Applicable	For discharges of dredged or fill material, there must be no practicable alternative with less adverse impact on the aquatic ecosystem; appropriate and practicable steps must be taken to avoid and minimize potential adverse impacts to wetlands and land under water; stormwater discharges must be controlled with BMPs; and there must not be substantial adverse impacts to the physical, chemical or biological integrity of surface waters. For dredging and dredged material management, there must be no practicable alternative with less adverse impact on the aquatic ecosystem; and if avoidance is not possible, then minimize, or if neither avoidance nor minimization are possible, then mitigate potential adverse impacts.	Excavation and filling activities to be performed impacting the aquatic ecosystem will be in accordance with the substantive requirements of these regulations. The selected remedy is the least environmentally damaging practicable alternative that meets the remedial action objectives. Any wetland or surface water areas that require removal of soil/sediment will be designated for eventual restoration.
State	Endangered Species	Massachusetts Endangered Species Regulations [321 CMR 10.00]	Applicable, if such species are encountered	Actions must be conducted in a manner that minimizes the impact to Massachusetts-listed rare, threatened, or endangered species, and species listed by the Massachusetts Natural Heritage Program.	The protection of state listed endangered species will be considered during the design and implementation of remedial activities.
Groundwater (Alternative GW-4)					
Federal	Wetlands and Floodplains	Floodplain Management [44 CFR Part 9]	Relevant and Appropriate	These FEMA regulations set forth the policy, procedure and responsibilities to implement and enforce Executive Order 11988, Floodplain Management	There is no practicable alternative to monitoring groundwater wells and installing new groundwater wells that may be within the floodplain. EPA will avoid or minimize potential harmful impacts on floodplain resources to the extent practicable.

Key:

ARAR = Applicable or Relevant and Appropriate Requirement
CFR = Code of Federal Regulations
CMR = Code of Massachusetts Regulations
CWA = Clean Water Act
NCP = National Contingency Plan
NMFS = National Marine Fisheries Service
USDOI = U.S. Department of the Interior
USEPA = U.S. Environmental Protection Agency
USFWS = U.S. Fish and Wildlife Service
USC = United States Code

Location-Specific ARARs for SS-4 and GW-4
Record of Decision
Nuclear Metals Superfund Site
Concord, Massachusetts

APPENDIX E

HUMAN HEALTH RISK-RELATED UPDATES AND REVISED CLEANUP LEVEL DEVELOPMENT

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Technical Memorandum

April 20, 2015

UPDATES ON TOXICITY VALUES AND THEIR IMPLICATION ON THE BASELINE HUMAN HEALTH RISK ASSESSMENT

Nuclear Metals Inc. Superfund Site
Concord, Massachusetts

Since the production of the 2013 Baseline Human Health Risk Assessment (BHHRA; *de maximus*, 2013) for the Nuclear Metals Inc. Superfund Site (the Site), the chronic and subchronic reference concentrations (RfCs) for uranium, as well as the subchronic reference dose (RfD) for uranium have changed. Therefore, the purpose of this memorandum is to identify the changes in toxicity values used and present resulting risks/hazards and impacts to the Nuclear Metals project based on these changes.

In 2003, the EPA Office of Solid Waste and Emergency Response (OSWER) developed a recommended hierarchy (EPA, 2003) for the selection of toxicity values to be used in risk assessments. As discussed in the 2003 memorandum, the preferred tier of toxicological information is as follows:

- x Tier 1 – EPA's Integrated Risk Information System (IRIS), developed by EPA's Office of Research and Development National Center for Environmental Assessment (ORD NCEA);
- x Tier 2 – EPA's Provisional Peer Reviewed Toxicity Values (PPRTVs), developed by NCEA; and
- x Tier 3 – Other toxicity values, including additional EPA and non-EPA sources of toxicity information.

Toxicity values were selected for the 2013 BHHRA following the EPA recommended hierarchy. The uranium RfD and RfCs used in the BHHRA which have since changed were Tier 3 values (Minimal Risk Levels; MRLs) from the Agency for Toxic Substances and Disease Registry (ATSDR), current as of February 2012. In February 2013, ATSDR updated the MRLs for uranium. For non-cancer effects, currently there are neither Tier 1 nor Tier 2 toxicity values for uranium. Upon reviewing the available non-cancer toxicity values, the subchronic oral RfD MRL value of 2.0E-04 mg/kg-day developed by ATSDR (ATSDR, 2013) has been determined to be the most appropriate Tier 3 value for risk assessment of uranium exposure. This value is well documented and peer reviewed. The chronic and subchronic inhalation RfC MRL values of 4E-05 mg/m^3 and 1E-04 mg/m^3, respectively, developed by ATSDR (ATSDR, 2013) have been determined to be the most appropriate Tier 3 values for risk assessment of uranium inhalation exposure.

Table 1 shows different uranium toxicity values used in the 2013 BHHRA and the toxicity values in the current approach on evaluating uranium. Applying the recommended toxicity values to the same Reasonable Maximum Exposure (RME) scenarios and exposure parameters as used in the 2013 BHHRA and using the toxicity values for the current approach from Table 1, non-cancer hazards would be approximately revised as shown in Table 2. Note that the only exposure scenarios presented are those that involved the changed toxicity values.

As shown in Table 2, the changes due to lower RfCs are minimal and do not change the overall hazards. However, the changes due to the lower uranium subchronic RfD would result in the inclusion of uranium as a chemical of concern (COC) for the construction worker at AOI 7 & 11 Industrial Area East (subsurface soil scenario). While uranium is already a COC for the subsurface soil scenario at this area for other receptors, a cleanup level should also be developed for the construction worker using the updated subchronic RfD. In addition, the lower subchronic RfD results in an exceedance of the

acceptable hazard index level of 1 for the construction worker at AOI 1 Holding Basin (both surface and subsurface soil scenarios). Similar to AOI 7 & 11 Industrial Area East, uranium is already a COC for the surface and subsurface soil scenarios at the AOI 1 Holding Basin, but for other receptors. A cleanup level should also be developed for the construction worker using the updated RfD.

Table 1

Non-cancer toxicity data for uranium – oral/dermal and inhalation

Source	Oral/Dermal RfD(1)	Unit	Source	Inhalation RfC	Unit	Source
2013 BHHRA						
Chronic	6.0E-04	mg/kg-day	EPA Office of Water	0.3	µg/m^3	ATSDR
Subchronic	2.0E-03	mg/kg-day	ATSDR	0.4	µg/m^3	ATSDR
Current approach						
chronic	6.0E-04	mg/kg-day	EPA Office of Water	0.04	µg/m^3	ATSDR
subchronic	2.0E-04	mg/kg-day	ATSDR	0.1	µg/m^3	ATSDR

Note:
(1) There are no dermal toxicity values for uranium. Since the oral absorption efficiency to dermal for uranium exceeds 50%, no adjustment of the oral toxicity values is necessary.

Table 2

Summary of uranium non-cancer hazards (for RME scenario)

Exposure Point	Exposure Media	Scenario/ Receptor	Exposure Route	Non-cancer Hazards	
				2013 BHHRA	Revised Hazards
Current 1 – Open Space Area	Surface soil	Child Abutting Resident	Inhalation (U)	1E-07	8E-07
			Total	*3E-01*	*3E-01*
		Adult Abutting Resident	Inhalation (U)	1E-07	8E-07
			Total	*3E-02*	*3E-02*
Current 2 – Open Space Area North	Surface soil	Child Abutting Resident	Inhalation (U)	3E-07	2E-06
			Total	*1E+00*	*1E+00*
		Adult Abutting Resident	Inhalation (U)	3E-07	2E-06
			Total	*1E-01*	*1E-01*
Current 6 – Fenced Area (Sphagnum Bog)	Surface soil	Adolescent Trespasser	Inhalation (U)	2E-07	2E-06
			Total	*3E-01*	*3E-01*
Current 6 – Fenced Area (Cooling Pond)	Surface soil	Adolescent Trespasser	Inhalation (U)	2E-07	2E-06
			Total	*3E-01*	*3E-01*
Current 4/Future B4 – Rt. 62 Outfall and Embayment Area (Surface)	Surface soil	Child Abutting Resident/Rec. Visitor	Inhalation (U)	8E-08	6E-07
			Total	*3E-01*	*3E-01*
		Adult Abutting Resident/Rec. Visitor	Inhalation (U)	8E-08	6E-07
			Total	*3E-02*	*3E-02*

Exposure Point	Exposure Media	Scenario/ Receptor	Exposure Route	Non-cancer Hazards	
				2013 BHHRA	Revised Hazards
Current 4/Future B4 – Rt. 62 Outfall and Embayment Area (Subsurface)	Subsurface soil	Child Abutting Resident/Rec. Visitor	Inhalation (U)	5E-07	4E-06
			Total	*4E-01*	*4E-01*
		Adult Abutting Resident/Rec. Visitor	Inhalation (U)	5E-07	4E-06
			Total	*4E-02*	*4E-02*
Future A1 – AOI 14 West	Surface soil	Child Resident	Inhalation (U)	1E-07	8E-07
			Total	*5E-01*	*5E-01*
		Adult Resident	Inhalation (U)	6E-08	5E-07
			Total	*5E-02*	*5E-02*
Future A2 – AOI 14 South	Surface soil	Child Resident	Inhalation (U)	6E-07	5E-06
			Total	*7E-01*	*7E-01*
		Adult Resident	Inhalation (U)	4E-07	3E-06
			Total	*8E-02*	*8E-02*
Future A3 – AOI 14 East	Surface soil	Child Resident	Inhalation (U)	1E-07	8E-07
			Total	*7E-01*	*7E-01*
		Adult Resident	Inhalation (U)	8E-08	6E-07
			Total	*7E-02*	*7E-02*
Future A4 – AOI 14 North	Surface soil	Child Resident	Inhalation (U)	9E-07	7E-06
			Total	*3E+00*	*3E+00*
		Adult Resident	Inhalation (U)	5E-07	4E-06
			Total	*3E-01*	*3E-01*
	Subsurface soil	Child Resident	Inhalation (U)	3E-07	2E-06
			Total	*6E-01*	*6E-01*
		Adult Resident	Inhalation (U)	2E-07	2E-06
			Total	*6E-02*	*6E-02*
Future A5 – AOI 8 Sweepings Area	Surface soil	Child Resident	Inhalation (U)	4E-06	3E-05
			Total	*9E+00*	*9E+00*
		Adult Resident	Inhalation (U)	2E-06	2E-05
			Total	*1E+00*	*1E+00*
	Subsurface soil	Child Resident	Inhalation (U)	1E-06	8E-06
			Total	*5E+00*	*5E+00*
		Adult Resident	Inhalation (U)	8E-07	6E-06
			Total	*6E-01*	*6E-01*
Future A6 – AOI 7 & 11 Industrial Area East	Surface soil	Child Resident	Inhalation (U)	4E-05	3E-04
			Total	*1E+01*	*1E+01*
		Adult Resident	Inhalation (U)	2E-05	2E-04
			Total	*1E+00*	*1E+00*
	Subsurface soil	Child Resident	Inhalation (U)	2E-05	2E-04
			Total	*1E+01*	*1E+01*
		Adult Resident	Inhalation (U)	1E-05	8E-05
			Total	*1E+00*	*1E+00*
Future A7 – AOI 5 Industrial Area West	Surface soil	Child Resident	Inhalation (U)	1E-06	8E-05
			Total	*9E-01*	*9E-01*
		Adult Resident	Inhalation (U)	7E-07	5E-06
			Total	*1E-01*	*1E-01*
	Subsurface soil	Child Resident	Inhalation (U)	1E-06	8E-05
			Total	*7E-01*	*7E-01*
		Adult Resident	Inhalation (U)	6E-07	5E-06
			Total	*7E-02*	*7E-02*

Exposure Point	Exposure Media	Scenario/ Receptor	Exposure Route	Non-cancer Hazards	
				2013 BHHRA	Revised Hazards
Future A8 – AOI 14 Off-Property	Surface soil	Child Resident	Inhalation (U)	1E-07	8E-07
			Total	*6E-01*	*6E-01*
		Adult Resident	Inhalation (U)	7E-08	5E-07
			Total	*6E-02*	*6E-02*
Future B1 – Area Around Cooling Pond	Surface soil	Child Resident	Inhalation (U)	2E-06	2E-05
			Total	*2E+00*	*2E+00*
		Adult Resident	Inhalation (U)	1E-06	8E-06
			Total	*2E-01*	*2E-01*
	Subsurface soil	Child Resident	Inhalation (U)	5E-07	4E-06
			Total	*1E+00*	*1E+00*
		Adult Resident	Inhalation (U)	3E-07	2E-06
			Total	*1E-01*	*1E-01*
Future B2 – AOI 2 & 4 Soils Area At Cooling Pond	Surface soil	Child Resident	Inhalation (U)	2E-06	2E-05
			Total	*2E+01*	*2E+01*
		Adult Resident	Inhalation (U)	9E-07	7E-06
			Total	*2E+00*	*2E+00*
	Subsurface soil	Child Resident	Inhalation (U)	2E-06	2E-05
			Total	*9E+00*	*9E+00*
		Adult Resident	Inhalation (U)	9E-07	7E-06
			Total	*1E+00*	*1E+00*
Future B3 – AOI 10 NE Wetland Soils Area	Surface soil	Child Resident	Inhalation (U)	1E-06	8E-06
			Total	*7E-01*	*7E-01*
		Adult Resident	Inhalation (U)	6E-07	5E-06
			Total	*7E-02*	*7E-02*
	Subsurface soil	Child Resident	Inhalation (U)	2E-06	2E-05
			Total	*1E+00*	*1E+00*
		Adult Resident	Inhalation (U)	1E-06	8E-06
			Total	*1E-01*	*1E-01*
Future B4 – Rt. 62 Outfall and Embayment Area	Surface soil	Child Resident	Inhalation (U)	2E-07	2E-06
			Total	*6E-01*	*6E-01*
		Adult Resident	Inhalation (U)	9E-08	7E-07
			Total	*6E-02*	*6E-02*
	Subsurface soil	Child Resident	Inhalation (U)	1E-06	8E-06
			Total	*8E-01*	*8E-01*
		Adult Resident	Inhalation (U)	6E-07	5E-06
			Total	*8E-02*	*8E-02*
Future B1 – Area Around Cooling Pond	Surface soil	Child Abutting Resident	Inhalation (U)	1E-06	8E-06
			Total	*2E+00*	*2E+00*
		Adult Abutting Resident	Inhalation (U)	1E-06	8E-06
			Total	*2E-01*	*2E-01*
	Subsurface soil	Child Abutting Resident	Inhalation (U)	3E-07	2E-06
			Total	*1E+00*	*1E+00*
		Adult Abutting Resident	Inhalation (U)	3E-07	2E-06
			Total	*1E-01*	*1E-01*

Exposure Point	Exposure Media	Scenario/ Receptor	Exposure Route	Non-cancer Hazards	
				2013 BHHRA	Revised Hazards
Future B2 – AOI 2 & 4 Soils Area At Cooling Pond	Surface soil	Child Abutting Resident	Inhalation (U)	9E-07	7E-06
			Total	*2E+01*	*2E+01*
		Adult Abutting Resident	Inhalation (U)	9E-07	7E-06
			Total	*2E+00*	*2E+00*
	Subsurface soil	Child Abutting Resident	Inhalation (U)	9E-07	7E-06
			Total	*9E+00*	*9E+00*
		Adult Abutting Resident	Inhalation (U)	9E-07	7E-06
			Total	*1E+00*	*1E+00*
Future B3 – AOI 10 NE Wetland Soils Area	Surface soil	Child Abutting Resident	Inhalation (U)	6E-07	5E-06
			Total	*7E-01*	*7E-01*
		Adult Abutting Resident	Inhalation (U)	6E-07	5E-06
			Total	*7E-02*	*7E-02*
	Subsurface soil	Child Abutting Resident	Inhalation (U)	1E-06	8E-06
			Total	*1E+00*	*1E+00*
		Adult Abutting Resident	Inhalation (U)	1E-06	8E-06
			Total	*1E-01*	*1E-01*
Future A1 – AOI 14 West	Surface soil	Child Recreational Visitor	Inhalation (U)	5E-08	4E-07
			Total	*2E-01*	*2E-01*
		Adult Recreational Visitor	Inhalation (U)	5E-08	4E-07
			Total	*3E-02*	*3E-02*
Future A2 – AOI 14 South	Surface soil	Child Recreational Visitor	Inhalation (U)	3E-07	2E-06
			Total	*4E-01*	*4E-01*
		Adult Recreational Visitor	Inhalation (U)	3E-07	2E-06
			Total	*4E-02*	*4E-02*
Future A3 – AOI 14 East	Surface soil	Child Recreational Visitor	Inhalation (U)	7E-08	5E-07
			Total	*3E-01*	*3E-01*
		Adult Recreational Visitor	Inhalation (U)	7E-08	5E-07
			Total	*4E-02*	*4E-02*
Future A4 – AOI 14 North	Surface soil	Child Recreational Visitor	Inhalation (U)	5E-07	4E-06
			Total	*1E+00*	*1E+00*
		Adult Recreational Visitor	Inhalation (U)	5E-07	4E-06
			Total	*1E-01*	*1E-01*
	Subsurface soil	Child Recreational Visitor	Inhalation (U)	2E-07	2E-06
			Total	*3E-01*	*3E-01*
		Adult Recreational Visitor	Inhalation (U)	2E-07	2E-06
			Total	*3E-02*	*3E-02*
Future A5 – AOI 8 Sweepings Area	Surface soil	Child Recreational Visitor	Inhalation (U)	2E-06	2E-05
			Total	*4E+00*	*4E+00*
		Adult Recreational Visitor	Inhalation (U)	2E-06	2E-05
			Total	*5E-01*	*5E-01*
	Subsurface soil	Child Recreational Visitor	Inhalation (U)	7E-07	5E-06
			Total	*3E+00*	*3E+00*
		Adult Recreational Visitor	Inhalation (U)	7E-07	5E-06
			Total	*3E-01*	*3E-01*

Exposure Point	Exposure Media	Scenario/ Receptor	Exposure Route	Non-cancer Hazards	
				2013 BHHRA	Revised Hazards
Future A6 – AOI 7 & 11 Industrial Area East	Surface soil	Child Recreational Visitor	Inhalation (U)	2E-05	2E-04
			Total	*5E+00*	*5E+00*
		Adult Recreational Visitor	Inhalation (U)	2E-05	2E-04
			Total	*5E-01*	*5E-01*
	Subsurface soil	Child Recreational Visitor	Inhalation (U)	9E-06	7E-05
			Total	*6E+00*	*6E+00*
		Adult Recreational Visitor	Inhalation (U)	9E-06	7E-05
			Total	*7E-01*	*7E-01*
Future A7 – AOI 5 Industrial Area West	Surface soil	Child Recreational Visitor	Inhalation (U)	6E-07	5E-06
			Total	*5E-01*	*5E-01*
		Adult Recreational Visitor	Inhalation (U)	6E-07	5E-06
			Total	*5E-02*	*5E-02*
	Subsurface soil	Child Recreational Visitor	Inhalation (U)	5E-07	4E-06
			Total	*3E-01*	*3E-01*
		Adult Recreational Visitor	Inhalation (U)	5E-07	4E-06
			Total	*4E-02*	*4E-02*
Future A8 – AOI 14 Off-Property	Surface soil	Child Recreational Visitor	Inhalation (U)	6E-08	5E-07
			Total	*3E-01*	*3E-01*
		Adult Recreational Visitor	Inhalation (U)	6E-08	5E-07
			Total	*3E-02*	*3E-02*
Future B1 – Area Around Cooling Pond	Surface soil	Child Recreational Visitor	Inhalation (U)	9E-07	7E-06
			Total	*8E-01*	*8E-01*
		Adult Recreational Visitor	Inhalation (U)	9E-07	7E-06
			Total	*9E-02*	*9E-02*
	Subsurface soil	Child Recreational Visitor	Inhalation (U)	3E-07	2E-06
			Total	*6E-01*	*6E-01*
		Adult Recreational Visitor	Inhalation (U)	3E-07	2E-06
			Total	*7E-02*	*7E-02*
Future B2 – AOI 2 & 4 Soils Area At Cooling Pond	Surface soil	Child Recreational Visitor	Inhalation (U)	8E-07	6E-06
			Total	*8E+00*	*8E+00*
		Adult Recreational Visitor	Inhalation (U)	8E-07	6E-06
			Total	*9E-01*	*9E-01*
	Subsurface soil	Child Recreational Visitor	Inhalation (U)	8E-07	6E-06
			Total	*5E+00*	*5E+00*
		Adult Recreational Visitor	Inhalation (U)	8E-07	6E-06
			Total	*5E-01*	*5E-01*
Future B3 – AOI 10 NE Wetland Soils Area	Surface soil	Child Recreational Visitor	Inhalation (U)	5E-07	4E-06
			Total	*3E-01*	*3E-01*
		Adult Recreational Visitor	Inhalation (U)	5E-07	4E-06
			Total	*4E-02*	*4E-02*
	Subsurface soil	Child Recreational Visitor	Inhalation (U)	1E-06	8E-06
			Total	*5E-01*	*5E-01*
		Adult Recreational Visitor	Inhalation (U)	1E-06	8E-06
			Total	*5E-02*	*5E-02*
Future A1 – AOI 14 West	Surface soil	Indoor Commercial/ Industrial Worker	Inhalation (U)	3E-08	2E-07
			Total	*3E-02*	*3E-02*
Future A2 – AOI 14 South	Surface soil	Indoor Commercial/ Industrial Worker	Inhalation (U)	2E-07	2E-06
			Total	*4E-02*	*4E-02*
Future A3 – AOI 14 East	Surface soil	Indoor Commercial/ Industrial Worker	Inhalation (U)	5E-08	4E-07
			Total	*3E-02*	*3E-02*

Exposure Point	Exposure Media	Scenario/ Receptor	Exposure Route	Non-cancer Hazards	
				2013 BHHRA	Revised Hazards
Future A4 – AOI 14 North	Surface soil	Indoor Commercial/ Industrial Worker	Inhalation (U)	3E-07	2E-06
			Total	*1E-01*	*1E-01*
	Subsurface soil	Indoor Commercial/ Industrial Worker	Inhalation (U)	1E-07	8E-07
			Total	*3E-02*	*3E-02*
Future A5 – AOI 8 Sweepings Area	Surface soil	Indoor Commercial/ Industrial Worker	Inhalation (U)	1E-06	8E-06
			Total	*4E-01*	*4E-01*
	Subsurface soil	Indoor Commercial/ Industrial Worker	Inhalation (U)	5E-07	4E-06
			Total	*2E-01*	*2E-01*
Future A6 – AOI 7 & 11 Industrial Area East	Surface soil	Indoor Commercial/ Industrial Worker	Inhalation (U)	1E-05	8E-05
			Total	*5E-01*	*5E-01*
	Subsurface soil	Indoor Commercial/ Industrial Worker	Inhalation (U)	6E-06	5E-05
			Total	*6E-01*	*6E-01*
Future A7 – AOI 5 Industrial Area West	Surface soil	Indoor Commercial/ Industrial Worker	Inhalation (U)	4E-07	3E-06
			Total	*5E-02*	*5E-02*
	Subsurface soil	Indoor Commercial/ Industrial Worker	Inhalation (U)	3E-07	2E-06
			Total	*4E-02*	*4E-02*
Future A8 – AOI 14 Off-Property	Surface soil	Indoor Commercial/ Industrial Worker	Inhalation (U)	4E-08	3E-07
			Total	*3E-02*	*3E-02*
Future B1 – Area Around Cooling Pond	Surface soil	Indoor/Outdoor Commercial/ Industrial Worker	Inhalation (U)	6E-07	5E-06
			Total	*8E-02*	*8E-02*
	Subsurface soil	Indoor/Outdoor Commercial/ Industrial Worker	Inhalation (U)	2E-07	2E-06
			Total	*6E-02*	*6E-02*
Future B2 – AOI 2 & 4 Soils Area At Cooling Pond	Surface soil	Indoor/Outdoor Commercial/ Industrial Worker	Inhalation (U)	5E-07	4E-06
			Total	*7E-01*	*7E-01*
	Subsurface soil	Indoor/Outdoor Commercial/ Industrial Worker	Inhalation (U)	5E-07	4E-06
			Total	*4E-01*	*4E-01*
Future A1 – AOI 14 West	Surface soil	Outdoor Commercial/ Industrial Worker	Inhalation (U)	3E-07	2E-06
			Total	*5E-02*	*5E-02*
Future A2 – AOI 14 South	Surface soil	Outdoor Commercial/ Industrial Worker	Inhalation (U)	2E-06	2E-05
			Total	*8E-02*	*8E-02*
Future A3 – AOI 14 East	Surface soil	Outdoor Commercial/ Industrial Worker	Inhalation (U)	4E-07	3E-06
			Total	*7E-02*	*7E-02*
Future A4 – AOI 14 North	Surface soil	Outdoor Commercial/ Industrial Worker	Inhalation (U)	2E-06	2E-05
			Total	*4E-01*	*4E-01*
	Subsurface soil	Outdoor Commercial/ Industrial Worker	Inhalation (U)	9E-07	7E-06
			Total	*7E-02*	*7E-02*
Future A5 – AOI 8 Sweepings Area	Surface soil	Outdoor Commercial/ Industrial Worker	Inhalation (U)	1E-05	8E-05
			Total	*1E+00*	*1E+00*
	Subsurface soil	Outdoor Commercial/ Industrial Worker	Inhalation (U)	4E-06	3E-05
			Total	*7E-01*	*7E-01*
Future A6 – AOI 7 & 11 Industrial Area East	Surface soil	Outdoor Commercial/ Industrial Worker	Inhalation (U)	1E-04	8E-04
			Total	*1E+00*	*1E+00*
	Subsurface soil	Outdoor Commercial/ Industrial Worker	Inhalation (U)	5E-05	4E-04
			Total	*2E+00*	*2E+00*

Exposure Point	Exposure Media	Scenario/ Receptor	Exposure Route	Non-cancer Hazards	
				2013 BHHRA	Revised Hazards
Future A7 – AOI 5 Industrial Area West	Surface soil	Outdoor Commercial/ Industrial Worker	Inhalation (U)	3E-06	2E-05
			Total	*1E-01*	*1E-01*
	Subsurface soil	Outdoor Commercial/ Industrial Worker	Inhalation (U)	3E-06	2E-05
			Total	*7E-02*	*7E-02*
Future A8 – AOI 14 Off-Property	Surface soil	Outdoor Commercial/ Industrial Worker	Inhalation (U)	3E-07	2E-06
			Total	*6E-02*	*6E-02*
Future B4 – Rt. 62 Outfall and Embayment Area	Surface soil	Construction Worker	Ingestion (U)	5E-03	5E-02
			Inhalation (U)	2E-04	8E-04
			Total	*4E-01*	*4E-01*
	Subsurface soil	Construction Worker	Ingestion (U)	3E-02	3E-01
			Inhalation (U)	1E-03	4E-03
			Total	*5E-01*	*8E-01*
Future A1 – AOI 14 West	Surface soil	Construction Worker	Ingestion (U)	3E-03	3E-02
			Inhalation (U)	1E-04	4E-04
			Total	*4E-01*	*4E-01*
Future A2 – AOI 14 South	Surface soil	Construction Worker	Ingestion (U)	2E-02	2E-01
			Inhalation (U)	9E-04	4E-03
			Total	*5E-01*	*7E-01*
Future A3 – AOI 14 East	Surface soil	Construction Worker	Ingestion (U)	4E-03	4E-02
			Inhalation (U)	2E-04	8E-04
			Total	*5E-01*	*5E-01*
Future A4 – AOI 14 North	Surface soil	Construction Worker	Ingestion (U)	3E-02	3E-01
			Inhalation (U)	1E-03	4E-03
			Total	*9E-01*	*1E+00*
	Subsurface soil	Construction Worker	Ingestion (U)	1E-02	1E-01
			Inhalation (U)	5E-04	2E-03
			Total	*4E-01*	*5E-01*
Future A5 – AOI 8 Sweepings Area	Surface soil	Construction Worker	Ingestion (U)	1E-01	1E+00
			Inhalation (U)	6E-03	2E-02
			Total	*2E+00*	*3E+00*
	Subsurface soil	Construction Worker	Ingestion (U)	4E-02	4E-01
			Inhalation (U)	2E-03	8E-03
			Total	*1E+00*	*2E+00*
Future A6 – AOI 7 & 11 Industrial Area East	Surface soil	Construction Worker	Ingestion (U)	1E+00	1E+01
			Inhalation (U)	6E-02	2.4E-01
			Total	*2E+00*	*1E+01*
	Subsurface soil	Construction Worker	Ingestion (U)	5E-01	5E+00
			Inhalation (U)	2E-02	8E-01
			Total	*3E+00*	*8E+00*
Future A7 – AOI 5 Industrial Area West	Surface soil	Construction Worker	Ingestion (U)	4E-02	4E-01
			Inhalation (U)	2E-03	8E-03
			Total	*5E-01*	*9E-01*
	Subsurface soil	Construction Worker	Ingestion (U)	3E-02	3E-01
			Inhalation (U)	1E-03	4E-03
			Total	*4E-01*	*7E-01*
Future A8 – AOI 14 Off-Property	Surface soil	Construction Worker	Ingestion (U)	4E-03	4E-02
			Inhalation (U)	2E-04	8E-04
			Total	*1E+00*	*1E+00*

Exposure Point	Exposure Media	Scenario/ Receptor	Exposure Route	Non-cancer Hazards	
				2013 BHHRA	Revised Hazards
Future B1 – Area Around Cooling Pond	Surface soil	Construction Worker	Ingestion (U)	6E-02	6E-01
			Inhalation (U)	3E-03	1E-02
			Total	*6E-01*	*1E+00*
	Subsurface soil	Construction Worker	Ingestion (U)	2E-02	2E-01
			Inhalation (U)	8E-04	3E-03
			Total	*5E-01*	*7E-01*
Future B2 – AOI 2 & 4 Soils Area At Cooling Pond	Surface soil	Construction Worker	Ingestion (U)	5E-02	5E-01
			Inhalation (U)	2E-03	8E-03
			Total	*4E+00*	*5E+00*
	Subsurface soil	Construction Worker	Ingestion (U)	5E-02	5E-01
			Inhalation (U)	2E-03	8E-03
			Total	*2E+00*	*3E+00*
Future B3 – AOI 10 NE Wetland Soils Area	Surface soil	Construction Worker	Ingestion (U)	3E-02	3E-01
			Inhalation (U)	1E-03	4E-03
			Total	*4E-01*	*7E-01*
	Subsurface soil	Construction Worker	Ingestion (U)	7E-02	7E-01
			Inhalation (U)	3E-03	1E-02
			Total	*6E-01*	*1E+00*
Future B5 – AOI 1 Holding Basin	Surface soil	Child Resident	Inhalation (U)	2E-05	2E-04
			Total	*4E+00*	*4E+00*
		Adult Resident	Inhalation (U)	9E-06	7E-05
			Total	*4E-01*	*4E-01*
	Subsurface soil	Child Resident	Inhalation (U)	2E-05	2E-04
			Total	*4E+00*	*4E+00*
		Adult Resident	Inhalation (U)	1E-05	8E-05
			Total	*4E-01*	*4E-01*
Future B5 – AOI 1 Holding Basin	Surface soil	Child Recreational Visitor	Inhalation (U)	8E-06	6E-05
			Total	*2E+00*	*2E+00*
		Adult Recreational Visitor	Inhalation (U)	8E-06	6E-05
			Total	*2E-01*	*2E-01*
	Subsurface soil	Child Recreational Visitor	Inhalation (U)	9E-06	7E-05
			Total	*2E+00*	*2E+00*
		Adult Recreational Visitor	Inhalation (U)	9E-06	7E-05
			Total	*2E-01*	*2E-01*
Future B5 – AOI 1 Holding Basin	Surface soil	Construction Worker	Ingestion (U)	5E-01	5E+00
			Inhalation (U)	2E-02	8E-02
			Total	*1E+00*	*6E+00*
	Subsurface soil	Construction Worker	Ingestion (U)	6E-01	6E+00
			Inhalation (U)	3E-02	1E-01
			Total	*1E+00*	*7E+00*

(U) - Uranium

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Technical Memorandum

September 18, 2015

IMPACTS TO THE PREVIOUSLY PROPOSED CLEANUP LEVELS BASED ON CHANGES TO DEFAULT EXPOSURE PARAMETERS AND TOXICITY VALUES SINCE THE RELEASE OF THE 2013 BASELINE HUMAN HEALTH RISK ASSESSMENT

Nuclear Metals Inc. Superfund Site
Concord, Massachusetts

Since the production of the 2013 Baseline Human Health Risk Assessment (BHHRA; *de maximus*, 2013) for the Nuclear Metals Inc. Superfund Site (the Site), the chronic and subchronic reference concentrations (RfCs) for uranium, as well as the subchronic reference dose (RfD) for uranium have changed. In addition, in February 2014, EPA finalized a Directive to update standard default exposure factors and frequently asked questions associated with these updates (USEPA, 2014; located online at http://www.epa.gov/oswer/riskassessment/superfund_hh_exposure.htm;items # 22 and #23 [as updated in February 2015] of this web link). Furthermore, as part of the June 2015 periodic updates to EPA's Regional Screening Levels (http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm), changes were made regarding the definition of volatile compounds. Risk-based Preliminary Remediation Goals (PRGs) were initially calculated in the Feasibility Study (FS; *de maximus*, 2014). EPA has requested this technical memorandum to identify the changes in toxicity values and exposure parameters used during the initial PRG development and present resulting cleanup levels when applying the changes.

Toxicity Value Changes

Refer to AECOM's April 20, 2015 technical memorandum entitled "Updates on Toxicity Values and Their Implication on the Baseline Human Health Risk Assessment" for the basis of the changes presented below. The April 20, 2015 memorandum presents impacts of toxicity value changes to risk assessment conclusions, while this memorandum provides resulting changes to proposed cleanup levels previously generated in the FS (*de maximus*, 2014).

Table 1 below shows different uranium toxicity values used in the 2013 BHHRA/2014 FS and the toxicity values in the current approach on evaluating uranium:

Table 1

Non-cancer toxicity data for uranium – oral/dermal and inhalation

Source	Oral/Dermal RfD(1)	Unit	Source	Inhalation RfC	Unit	Source
2013 BHHRA/2014 FS						
Chronic	6.0E-04	mg/kg-day	EPA Office of Water	0.3	$\mu g/m^3$	ATSDR
Subchronic	2.0E-03	mg/kg-day	ATSDR	0.4	$\mu g/m^3$	ATSDR
Current approach						
chronic	6.0E-04	mg/kg-day	EPA Office of Water	0.04	$\mu g/m^3$	ATSDR
subchronic	2.0E-04	mg/kg-day	ATSDR	0.1	$\mu g/m^3$	ATSDR

Note:
(1) There are no dermal toxicity values for uranium. Since the oral absorption efficiency for uranium exceeds 50%, no adjustment of the oral toxicity values is necessary.

Exposure Parameter Changes

As noted above, the 2014 EPA directive, as updated in 2015 (included in Attachment A), resulted in a change to default exposure parameters utilized in human health risk evaluation. Table 2 below shows the changes which impact cleanup levels initially developed in the 2014 FS (*de maximus*, 2014).

Table 2
Summary of Exposure Parameter Changes

Definition (units)	Value previously used in 2014 FS	Current value[1]
Resident Drinking Water Ingestion Rate – Child (L/day)	1	0.78
Resident Drinking Water Ingestion Rate – Adult (L/day)	2	2.5
Resident Skin Surface Area – Child (cm^2)	2,800	2,373
Resident Skin Surface Area – Adult (cm^2)	5,700	6,032
Resident Water Surface Area – Child (cm^2)	6,600	6,378
Resident Water Surface Area – Adult (cm^2)	18,000	20,900
Adult Body Weight (kg)	70	80
Resident/Rec. User Exposure Duration (yr)	30	26
Resident/Rec. User Exposure Duration - Adult (yr)	24	20
Resident Water Exposure Time – Child (hrs/event)	1	0.54
Resident Water Exposure Time – Adult (hrs/event)	0.58	0.71
Worker Skin Surface Area (cm^2)	3,300	3,527
Worker Soil Adherence Factor (mg/cm^2)	0.2	0.12
Rec. Visitor Sediment Surface Area – Child (cm^2)	1,560	1,364
Rec. Visitor Sediment Surface Area – Adult (cm^2)	2,970	2,275
Rec. Visitor Sediment Adherence Factor – Child (mg/cm^2)	0.3	0.4
Rec. Visitor Sediment Adherence Factor – Child (mg/cm^2)	0.3	0.6

Notes:

1 – Refer to 2014 EPA Directive for all current values except related to sediment. Sediment values were developed in Attachment A (Table 1 for age-weighted mean surface areas; Table 2 for adherence factors) based on the Directive guidance.

Revised Cleanup Levels

Utilizing the changes to toxicity values and exposure parameters presented above, the PRG calculations presented in Appendix C of the FS were revised by AECOM for all receptors to assist with future evaluations which may be performed during future five-year reviews. Attachment B includes the revised calculations, with highlighting showing the parameters that were updated. The FS tables which summarized the PRGs for soil, sediment, and groundwater (Tables 2.3.2, 2.3.3, and 2.3.4, respectively) have been included as Attachment B.8. It should be noted that, even though radiological exposure parameters did not change for the worker scenarios, the uranium cancer PRG for the indoor and outdoor commercial/industrial workers (soil) changed due to rounding differences. Similarly, the arsenic non-cancer PRG for the recreational visitor (soil) and the thorium and depleted uranium cancer PRGs for the resident (groundwater) did not appear to change due to rounding. Finally, as noted in the introductory paragraph, as part of the June 2015 periodic updates to EPA's Regional Screening Levels (http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm), changes were made regarding the definition of volatile compounds. This change resulted in the addition/inclusion of inhalation calculations related to 1,4-dioxane in groundwater.

Applying these toxicity value and exposure parameter changes to the most conservative potential exposure scenarios results in the following proposed human health cleanup levels for soil (Table 3) and groundwater (Table 4). The resulting proposed human health proposed cleanup level for PCBs in sediment (2.7 mg/kg), based on an Incremental Lifetime Cancer Risk (ILCR) of 10^{-6} (Recreational Visitor), did not change.

Table 3
Human Health Proposed Cleanup Levels (PCLs) for Soil

Contaminant	Previously Proposed PCL		Selected PCL		Basis
	mg/kg	pCi/g	mg/kg	pCi/g	
Benzo(a)anthracene	0.32	NA	0.34	NA	ILCR = 10^{-6} (Residential)
Benzo(a)pyrene	0.22	NA	0.22	NA	Background
Benzo(b)fluoranthene	0.32	NA	0.34	NA	ILCR = 10^{-6} (Residential)
Indeno(1,2,3-cd)pyrene	0.32	NA	0.34	NA	ILCR = 10^{-6} (Residential)
PCBs	1	NA	1	NA	Policy
Arsenic	13.7	NA	13.7	NA	Background
Uranium	2.3	0.92	2.7	1.1	ILCR = 10^{-6} (Residential)
U-238	NA	0.78	NA	0.90	ILCR = 10^{-6} (Residential)
U-235	NA	0.01	NA	0.01	ILCR = 10^{-6} (Residential)
U-234	NA	0.13	NA	0.15	ILCR = 10^{-6} (Residential)
Thorium	7.4	0.81	7.4	0.81	Background
Th-232	NA	0.81	NA	0.81	Background

Notes:

mg/kg - milligram per kilogram

pCi/g - picocuries per gram

ILCR - Incremental Lifetime Cancer Risk; 10^{-6} = 1 in 1,000,000

NA - Not Applicable

Table 4
Human Health Proposed Cleanup Levels (PCLs) for Groundwater

Contaminant	Overburden		Bedrock	
	Selected PCL (µg/L)	Basis	Selected PCL (µg/L)	Basis
1,1-Dichloroethane	NA	NA	2.7 (prev. 2.4)	ILCR = 10^{-6} (Residential)
Tetrachloroethene	5	MCL	5	MCL
Trichloroethene	5	MCL	5	MCL
Vinyl chloride	2	MCL	2	MCL
1,4-Dioxane	0.46 (prev. 0.67)	ILCR = 10^{-6} (Residential)	0.46 (prev. 0.67)	ILCR = 10^{-6} (Residential)
bis(2-Ethylhexyl)phthalate	6	MCL	6	MCL
Arsenic	10	MCL	10	MCL
Barium	NA	NA	2000	MCL
Chromium	100	MCL	100	MCL
Cobalt	6.0 (prev. 4.7)	HI = 1 (Residential)	6.0 (prev. 4.7)	HI = 1 (Residential)
Copper	1,300	Action Level	NA	
Iron	14,000 (prev. 11,000)	HI = 1 (Residential)	14,000 (prev. 11,000)	HI = 1 (Residential)
Manganese	300	Health Advisory	300	Health Advisory
Molybdenum	100 (prev. 78)	HI = 1 (Residential)	100 (prev. 78)	HI = 1 (Residential)
Thorium	0.33 (prev. 0.32)	ILCR = 10^{-6} (Residential)	0.33 (prev. 0.32)	ILCR = 10^{-6} (Residential)
Depleted Uranium	30	MCL	30	MCL
Natural Uranium	30	MCL	30	MCL
Nitrate-N	10,000	MCL	10,000	MCL
Nitrite-N	1,000	MCL	1,000	MCL

Notes:

µg/L - micrograms per liter

MCL - Maximum Contaminant Level

ILCR - Incremental Lifetime Cancer Risk; 10^{-6} = 1 in 1,000,000

HI - Hazard Index

NA - Not Applicable – not a primary risk driver in this flow zone and/or maximum detection does not exceed MCL

prev. – previously proposed value

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ATTACHMENT A – EXPOSURE PARAMETERS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

FEB - 6 2014

OFFICE OF
SOLID WASTE AND
EMERGENCY RESPONSE

OSWER Directive 9200.1-120

MEMORANDUM

SUBJECT: Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors

FROM: Dana Stalcup, Acting Director
Assessment and Remediation Division
Office of Superfund Remediation and Technology Innovation

TO: Superfund National Policy Managers, Regions 1 - 10

Purpose

The mission of the Superfund program is to protect human health and the environment consistent with the Comprehensive Environmental Response, Compensation and Liability Act, as amended, (CERCLA) and as implemented by the National Oil and Hazardous Substances Pollution Contingency Plan. The purpose of this directive is to update the Interim Final Standard Exposure Factors Guidance (1991), which is reflected in the attached table and is to be used:

- in the CERCLA remedial investigation and feasibility study process (e.g., assessing baseline health risks, developing preliminary remediation goals, evaluating risks of remedial alternatives),
- to evaluate health risks in the CERCLA removal program, and
- in the process of five-year reviews of selected remedies.

This guidance update supplements the *Risk Assessment Guidance for Superfund: Human Health Evaluation Manual, Part A* (RAGS, Part A) that was issued October 13, 1989. This guidance supersedes and replaces certain portions of OSWER Directive 9285.6-03, issued March 25, 1991 and updates the *Risk Assessment Guidance for Superfund, Part E,* issued July 2004 (RAGS, Part E). Other cleanup programs in the Office of Solid Waste and Emergency Response (OSWER) are welcome and encouraged to adopt the recommended exposure factors, much as they have historically adopted other aspects of the *Risk Assessment Guidance for Superfund* (RAGS).

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Background

In September 2011, EPA's National Center for Environmental Assessment, Office of Research and Development (ORD/NCEA) issued a substantive update to its exposure assessment recommendations. *Exposure Factors Handbook – 2011 Edition*, referred to as EFH 2011 herein, provides information and recommendations on various physiological and behavioral factors commonly used in assessing exposure of adults and children to environmental chemicals. ORD/NCEA's recommended values for exposure factors are based on the results of studies deemed to be the most up-to-date and scientifically sound, based upon data available up to July 2011, and incorporates revisions made to the *Child-Specific Exposure Factors Handbook*, which was last updated and published in 2008. EFH 2011 is not a Superfund-specific document; rather, it provides a summary of the latest developments in exposure science and provides recommendations for a broad range of EPA programs.

Following the publication of EFH 2011, regional risk assessors received inquiries from other EPA program offices, states, the regulated community, and other interested parties regarding the applicability of the ORD/NCEA's recommendations for use in human health risk assessments. During the October 2011 to August 2012 period, the OSWER Human Health Regional Risk Assessors Forum (OHHRRAF) reviewed the recommendations in EFH 2011 in the context of the default exposure factors used in the Superfund program and to derive Regional screening levels. As a result of a consensus-driven process, the OHHRRAF identified several Superfund-specific default exposure factors that warranted updating, based upon recommendations from ORD/NCEA in EFH 2011. This guidance incorporates and adopts the updates recommended by the OHHRRAF.

Objective

This guidance has been developed to reduce variability and uncertainty in the exposure assumptions used by Regional Superfund staff to characterize exposures to human populations for human health risk assessments.

Implementation

This guidance supplements the *Risk Assessment Guidance for Superfund: Human Health Evaluation Manual* (RAGS), Part A through E. Where numerical values differ from those presented in Part A or E, the factors presented in this guidance should be considered updates to the older values. As new data become available, this Directive may be modified accordingly.

This report can be found at www.epa.gov/oswer/riskassessment/superfund_hh_exposure.htm
Please contact Richard Kapuscinski at (703) 305-7411 if you have questions or concerns.

Attachment

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OSWER/OSRTI Human Health Regional Risk Assessors Forum

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Attachment 1. Recommended Default Exposure Factors (2014)

Symbol	Definition (units)	Previous Default Value	Currently Recommended Value	Source of current recommendation	Source of previous recommendation
Ingestion and Dermal Contact Rates					
IRW_c	Resident Drinking Water Ingestion Rate - Child (L/day)	1	0.78	U.S. EPA 2011a, Tables 3-15 and 3-33; weighted average of 90th percentile consumer-only ingestion of drinking water (birth to <6 years)	U.S. EPA 1989 (Exhibit 6-11)
IRW_a	Resident Drinking Water Ingestion Rate - Adult (L/day)	2	2.5	U.S. EPA 2011a, Table 3-33; 90th percentile of consumer-only ingestion of drinking water (≥ 21 years)	U.S. EPA 1989 (Exhibit 6-11)
IRS_c	Resident Soil Ingestion Rate - Child (mg/day)	200	200	U.S. EPA 2011a (Table 5-1); "upper-bound values" accounting for both soil and dust ingestion	U.S. EPA 1991a (pg. 15)
IRS_a	Resident Soil Ingestion Rate - Adult (mg/day)	100	100	U.S. EPA 1991a (pp. 6 and 15); EFH 2011 only provides a central tendency value	U.S. EPA 1991a (pg. 15)
IR_{in}	Indoor Worker Soil Ingestion Rate (mg/day)	50	50	U.S. EPA 1991a (pp. 9-10, 15); EFH 2011 values not provided	U.S. EPA 1991a (pg. 15)
IR_{on}	Outdoor Worker Soil Ingestion Rate (mg/day)	100	100	U.S. EPA 1991a (pg. 15), same as adult resident; EFH 2011 value not provided	U.S. EPA 1991a (pg. 15)
SA_c	Resident skin surface area - child (cm^2)	2,800	2,373	U.S. EPA 2011a, Tables 7-2 and 7-8; weighted average of mean values for head, hands, forearms, lower legs, and feet (male and female, birth to < 6 years)(forearm and lower leg-specific data used when available, ratios for nearest available age group used elsewhere (per EPA 2011b))	U.S. EPA 2002 (Exhibit 1-2)
SA_a	Resident skin surface area - adult (cm^2)	5,700	6,032	U.S. EPA 2011a, Tables 7-2 and 7-12; weighted average of mean values for head, hands, forearms, and lower legs (male and female, 21+ years)(forearm and lower leg-specific data used for males and female lower leg, ratio of male forearm to arm applied to female arm data)	U.S. EPA 2002 (Exhibit 1-2)
SA_{on}	Worker skin surface area - adult (cm^2)	3,300	3,527	US EPA 2011a, Table 7-2; weighted average of mean values for head, hands, and forearms (male and female, 21+years) (similar assumptions for forearms as used in EPA 2011b)	U.S. EPA 2002 (Exhibit 1-2)
SA_c	Resident Water Surface area - child (cm^2)	6,600	6,378	U.S. EPA 2011a, Table 7.10; weighted average of mean values for children <6 years.	U.S. EPA 2004 (Exhibit 3-2)
SA_a	Resident Water Surface area - adult (cm^2)	18,000	20,900	U.S. EPA 2011a, Table 7.10; weighted average of mean values for adults, male and female 21+.	U.S. EPA 2004 (Exhibit 3-2)
AF_c	Resident soil adherence factor - child (mg/cm^2)	0.2	0.2	U.S. EPA 2004 (Exhibit 3-5), RAGS Part E	U.S. EPA 2002 (Exhibit 1-2)
AF_a	Resident soil adherence factor - adult (mg/cm^2)	0.07	0.07	U.S. EPA 2004 (Exhibit 3-5), RAGS Part E	U.S. EPA 2002 (Exhibit 1-2)
AF_{on}	Worker soil adherence factor - adult (mg/cm^2)	0.2	0.12	U.S. EPA 2011a, Table 7-20 and Section 7.2.2; arithmetic mean of weighted average of body part-specific (hands, forearms, and face) mean adherence factors for adult commercial/industrial activities	U.S. EPA 2002 (Exhibit 1-2)
BW_c	Resident Body Weight - child (kg)	15	15	U.S. EPA 2011a, Table 8-1; weighted average of mean body weights (birth to <6 years)	U.S. EPA 1991a (pg. 15)

Attachment 1. Recommended Default Exposure Factors (2014)

Symbol	Definition (units)	Previous Default Value	Currently Recommended Value	Source of current recommendation	Source of previous recommendation
BW_a	Resident Body Weight - adult (kg)	70	80	U.S. EPA 2011a, Table 8-3; weighted mean values for adults 21 – 78	U.S. EPA 1991a (pg. 15)
Bw_w	Worker Body Weight (kg)	70	80	U.S. EPA 2011a, Table 8-3; weighted mean values for adults 21 – 78	U.S. EPA 1991a (pg. 15)
Exposure Frequency, Exposure Duration, and Exposure Time Variables					
EF_r	Resident Exposure Frequency (days/yr)	350	350	U.S. EPA 1991a (pg. 15); value not provided in EFH 2011	U.S. EPA 1991a (pg. 15)
EF_w	Worker Exposure Frequency (days/yr)	250	250	U.S. EPA 1991a (pg. 15); value not provided in EFH 2011	U.S. EPA 1991a (pg. 15)
EF_{iw}	Indoor Worker Exposure Frequency (days/yr)	250	250	U.S. EPA 1991a (pg. 15); value not provided in EFH 2011	U.S. EPA 1991a (pg. 15)
EF_{ow}	Outdoor Worker Exposure Frequency (days/yr)	225	225	U.S. EPA 2002; value not provided in EFH 2011	U.S. EPA 1991a (pg. 15)
ED_r	Resident Exposure Duration (yr)	30	26	EPA 2011a, Table 16-108; 90th percentile for current residence time.	U.S. EPA 1991a (pg. 15)
ED_c	Resident Exposure Duration - child (yr)	6	6	U.S. EPA 1991a, Pages 6 and 15	U.S. EPA 1991a (pg. 15)
ED_a	Resident Exposure Duration - adult (yr)	24	20	EDr (26 years) - EDc (6 years)	U.S. EPA 1991a (pg. 15)
ED_w	Worker Exposure Duration - (yr)	25	25	U.S. EPA 1991a (pg. 15); EFH 2011 only provides a central tendency value	U.S. EPA 1991a (pg. 15)
ED_{iw}	Indoor Worker Exposure Duration - (yr)	25	25	U.S. EPA 1991a (pg. 15); EFH 2011 only provides a central tendency value	U.S. EPA 1991a (pg. 15)
ED_{ow}	Outdoor Worker Exposure Duration (yr)	25	25	U.S. EPA 1991a (pg. 15); EFH 2011 only provides a central tendency value	U.S. EPA 1991a (pg. 15)
ET_{ra}	Resident Air Exposure Time (hours/day)	24	24	The whole day	The whole day
ET_{rs}	Resident Soil Exposure Time (hours/day)	24	24	The whole day	The whole day
ET_w	Worker Air Exposure Time (hr/hr)	8	8	The work day	The work day
ET_{ws}	Worker Soil Exposure Time (hours/day)	8	8	The work day	The work day
ET_{rw}	Resident Water Exposure Time (hours/day)	24	24	The whole day	The whole day
ET_{rwc}	Resident Water Exposure Time - child (hours/event)	1	0.54	U.S. EPA 2011a, Table 16-28; weighted average of 90th percentile time spent bathing (birth to <6 years)	U.S. EPA 2004
ET_{rwa}	Resident Water Exposure Time - adult (hours/event)	0.58	0.71	U.S. EPA 2011a, Tables 16-30 and 16-31; weighted average of adult (21 to 78) 90th percentile of time spent bathing/ showering in a day, divided by mean number of baths/showers taken in a day.	U.S. EPA 2004
Miscellaneous Variables; values not provided in EFH 2011					

Attachment 1. Recommended Default Exposure Factors (2014)

Symbol	Definition (units)	Previous Default Value	Currently Recommended Value	Source of current recommendation	Source of previous recommendation
AT_r	Averaging time - resident (days/year)	365	365	U.S. EPA 1989 (pg. 6-23)	U.S. EPA 1989 (pg. 6-23)
AT_c	Averaging time - composite worker (days/year)	365	365	U.S. EPA 1989 (pg. 6-23)	U.S. EPA 1989 (pg. 6-23)
AT_{in}	Averaging time - indoor worker (days/year)	365	365	U.S. EPA 1989 (pg. 6-23)	U.S. EPA 1989 (pg. 6-23)
AT_{on}	Averaging time - outdoor worker (days/year)	365	365	U.S. EPA 1989 (pg. 6-23)	U.S. EPA 1989 (pg. 6-23)
LT	Lifetime (years)	70	70	U.S. EPA 1989 (pg. 6-22), pending additional input from NCEA	U.S. EPA 1989 (pg. 6-22)
IR_{fish}	Fish Ingestion Rate (mg/day)	5.4×10^4	**	Recommend using site-specific values	U.S. EPA 1991a (pg. 15)
$IR_{produce}$	Consumption of homegrown produce (g/day)	42 (fruit); 80 (veg)	**	Recommend using site-specific values	U.S. EPA 1990

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EPA. 2011b. "Regional Screening Levels (Formerly PRGs), User's Guide." November. On-Line Address: http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/usersguide.htm

Footnote: Users are directed to the *Exposure Factors Handbook* (2011) as a source for specific age-group exposure factors as described in EPA, 2005.

ATTACHMENT A TABLE 1
CALCULTION OF AGE-WEIGHTED MEAN SURFACE AREAS FOR SEDIMENT

	Mean Surface Area by Body Part (m^2)										Number of months within age-range
				hands	legs	feet		lower leg			
Age				(a)	(a)	(a)					
children (boy/girl)											
Birth to <1 month				0.015	0.06	0.019		0.0252	(c)		1
1 to <3 months				0.017	0.068	0.021		0.02856			2
3 to <6 months				0.02	0.078	0.025		0.03276			3
6 to <12 months				0.024	0.093	0.029		0.03906			6
1 to <2 years				0.03	0.122	0.033		0.05124			12
2 to <3 years				0.028	0.154	0.038		0.06468			12
3 to <6 years				0.037	0.195	0.049		0.078	(d)		36
adult male 21+ years				0.107	0.682	0.137		0.268	(b)		NA
adult female 21+ years				0.089	0.598	0.122		0.233	(e)		NA
adult 21+ years (average of male and female)				0.098	0.64	0.1295		0.2505			NA

	Calculated Age-Weighted Mean Surface Areas by Body Part (cm^2) (f)									Number of months within receptor's age-range
Receptor				hands	legs	feet		lower leg		
child - 0 to <6 years				317	1572	406		641		72
adult 21+ years				980	6400	1295		2505		684

ATTACHMENT A TABLE 1
CALCULTION OF AGE-WEIGHTED MEAN SURFACE AREAS FOR SEDIMENT

Receptor	Calculated Age-Weighted Mean Surface Areas (cm^2)	Note
Child (0 to <6 years)		
Sediment - hands, lower legs, feet	1364	USEPA, 2011. Table 7-2. Represents weighted mean surface area for males and females, including hands, lower legs and feet. These body parts were selected based on best professional judgment assuming contact with sediment may occur as part of a wading scenario.
Adult (21+ years)		
Sediment - hands, feet	2275	USEPA, 2011. Table 7-2. Represents weighted mean surface area for males and females, including hands and feet. These body parts were selected based on best professional judgment assuming contact with sediment may occur as part of a wading scenario.

Notes:
cm^2 - square centimeter.
EFH, 2011; USEPA, 2011 - USEPA Exposure Factors Handbook: 2011 Edition. September 2011.
m^2 - square meter.
NA - Not applicable.
USEPA - United States Environmental Protection Agency.
USEPA, 2014 - USEPA Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. February 6, 2014 (as updated in February 2015).
(a) EFH, 2011. Table 7-2. Recommended Values for Surface Area of Body Parts; Mean Surface Area by Body Part.
(b) Table 7-12.
(c) Surface area for the leg x ratio of the lower leg to the leg for the 2-year old, average of male and female (0.42) (Table 7-8).
(d) Surface area for the leg x ratio of the lower leg to the leg for the 4-year old, average of male and female (0.4) (Table 7-8).
(e) Table 7-13.
(f) The surface areas assocated with each receptor listed in this table are age-weighted as follows:
[(Mean surface area x number of months within age-range (from above table))$_{age\ range\ 1}$ + (Mean surface area x number of months within age-range (from above table))$_{age\ range\ 2}$ ….] / number of months within receptor's age-range. A factor of 1000 is applied to convert m^2 to cm^2.

ATTACHMENT A TABLE 2
SEDIMENT ADHERENCE FACTORS

Body Part	Adult Recreational Visitor - Sediment RME		
	Surface Area Weighted Mean (a) (cm^2)	Sediment Loading Reed Gatherer (mg/cm^2) (b)	Total Sediment Mass (mg)
Hands	980	0.658	645
Feet	1,295	0.633	820
Total	2,275	--	1465
Area-Weighted Sediment Adherence factor (mg/cm^2) = Sediment mass/Surface area =			0.6

Notes:
RME - Reasonable Maximum Exposure.
USEPA, 2011. Exposure Factors Handbook. September 2011.
USEPA, 2004. Risk Assessment Guidance for Superfund, Supplemental Guidance for Dermal Risk Assessment. July 2004.
(a) Data from USEPA (2011). Table 7-2. Weighted mean values (average of men and women).

(b) Data from USEPA (2004) Exhibit C-2. Geometric mean of reed gatherers. Since a high-end activity (i.e., reasonable but higher exposure) is being used to represent contact with sediment, the geometric mean adherence factor is selected for use to represent the RME exposure scenario, in accordance with USEPA guidance (page 3-14). USEPA (2004) states that it is not recommended that a high-end soil contact activity be used with a high-end weighted adherence factor for that activity, as this use would not be consistent with the use of a RME scenario.

Body Part	Child Recreational Visitor - Sediment RME		
	Surface Area Weighted Mean (a) (cm^2)	Sediment Loading Children Playing in Wet Soil (mg/cm^2) (b)	Total Sediment Mass (mg)
Hands	317	0.656	208
Lower legs	641	0.026	17
Feet (c)	406	0.656	266
Total	1,364	--	491
Area-Weighted Sediment Adherence factor (mg/cm^2) = Sediment mass/Surface area =			0.4

Notes:
RME - Reasonable Maximum Exposure.
USEPA, 2011. Exposure Factors Handbook. September 2011.
USEPA, 2004. Risk Assessment Guidance for Superfund, Supplemental Guidance for Dermal Risk Assessment. July 2004.
(a) Data from USEPA (2011). Table 7-2. Represents weighted mean surface area for males and females. Surface area of the lower legs is assumed to be 40% of the legs.
(b) Data from USEPA (2004) Exhibit C-2. Geometric mean of children playing in wet soil. Since a high-end activity (i.e., reasonable but higher exposure) is being used to represent contact with sediment, the geometric mean adherence factor is selected for use to represent both the RME and CTE exposure scenario, in accordance with USEPA guidance (page 3-14). USEPA (2004) states that it is not recommended that a high-end soil contact activity be used with a high-end weighted adherence factor for that activity, as this use would not be consistent with the use of a RME scenario.
(c) Soil loading data not available for feet. Data for hands used as a proxy.

ATTACHMENT B – REVISED PRG CALCULATIONS

B.1 – SEDIMENT – RECREATIONAL VISITOR

TABLE 1

VALUES USED FOR DAILY INTAKE CALCULATIONS - RECREATIONAL VISITOR

REASONABLE MAXIMUM EXPOSURE

NUCLEAR METALS SUPERFUND SITE

Scenario Timeframe: Future
Medium: Sediment
Exposure Medium: Sediment

Exposure Route	Receptor Population	Receptor Age	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion/Dermal	Recreational Visitor	Young Child/Adult					See FS Appendix C	
							Except where noted	See attached
			THQ	Target Hazard Quotient	1	- -		
			$AT\text{-}N_C$	Averaging Time (Non-Cancer) - child	2,190	days		
			ED_C	Exposure Duration - child	6	years		
			BW_C	Body Weight - child	15	kg		
			EF_C	Exposure Frequency - child	26	days/year		
			IR_C	Ingestion Rate of Sediment - child	200	mg/day		
			CF	Conversion Factor	0.000001	kg/mg		
			SA_C	Surface Area - child	1,364	cm^2	See Attachment A	
			AF_C	Adherence Factor - child	0.40	mg/cm^2-day	See Attachment A	
			ABS	Dermal Absorption Fraction	see FS Appendix C	- -		
			$AT\text{-}N_A$	Averaging Time (Non-Cancer) - adult	7,300	days	See Attachment A	
			ED_A	Exposure Duration - adult	20	years	See Attachment A	
			BW_A	Body Weight - adult	80	kg	See Attachment A	
			EF_A	Exposure Frequency - adult	26	days/year		
			IR_A	Ingestion Rate of Sediment - adult	100	mg/day		
			SA_A	Surface Area - adult	2,275	cm^2	See Attachment A	
			AF_A	Adherence Factor - adult	0.60	mg/cm^2-day	See Attachment A	
			RBA	Relative Bioavailability	0.6 for Arsenic/1 for all other analytes	- -		
			TR	Target ILCR	10^{-6} to 10^{-4}	- -		
			AT-C	Averaging Time (Cancer)	25,550	days		
			RfD_O	Oral Reference Dose	see ROD Table G-6	mg/kg-day		
			RfD_D	Dermal Reference Dose	see ROD Table G-6	mg/kg-day		
			SF_O	Oral Slope Factor	see ROD Table G-5	$(mg/kg\text{-}day)^{-1}$		
			SF_D	Dermal Slope Factor	see ROD Table G-5	$(mg/kg\text{-}day)^{-1}$		
			$ED_{0\text{-}2}$	Exposure Duration - 0-2 yrs	2	years		
			$ED_{2\text{-}6}$	Exposure Duration - 2-6 yrs	4	years		
			$ED_{6\text{-}16}$	Exposure Duration - 6-16 yrs	10	years		
			$ED_{16\text{-}26}$	Exposure Duration - 16-26 yrs+	10	years	See Attachment A	

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Intake Equation/
Model Name

Preliminary Remediation Goal (PRG) non-cancer:

Ingestion - child

$$PRG_{nc\text{-}ing}\ (mg/kg) = \frac{THQ \times AT\text{-}N_C \times RfD_o \times BW_C}{EF_C \times ED_C \times IR_C \times CF \times RBA}$$

Dermal - child

$$PRG_{nc\text{-}derm}\ (mg/kg) = \frac{THQ \times AT\text{-}N_C \times RfD_D \times BW_C}{EF_C \times ED_C \times SA_C \times AF_C \times ABS \times CF}$$

Total - child

$$PRG_{nc\text{-}tot}\ (mg/kg) = \frac{1}{1/PRG_{nc\text{-}ing} + 1/PRG_{nc\text{-}derm}}$$

Ingestion - adult

$$PRG_{nc\text{-}ing}\ (mg/kg) = \frac{THQ \times AT\text{-}N_A \times RfD_o \times BW_A}{EF_A \times ED_A \times IR_A \times CF \times RBA}$$

Dermal - adult

$$PRG_{nc\text{-}derm}\ (mg/kg) = \frac{THQ \times AT\text{-}N_A \times RfD_D \times BW_A}{EF_A \times ED_A \times SA_A \times AF_A \times ABS \times CF}$$

Total - adult

$$PRG_{nc\text{-}tot}\ (mg/kg) = \frac{1}{1/PRG_{nc\text{-}ing} + 1/PRG_{nc\text{-}derm}}$$

Preliminary Remediation Goal (PRG) cancer:

Ingestion

$$PRG_{ca\text{-}ing}\ (mg/kg) = \frac{TR \times AT\text{-}C}{SF_o \times IFS_{adj} \times CF \times RBA}$$

$$IFS_{adj}\ (mg/kg) = \frac{ED_C \times EF_C \times IR_C}{BW_C} + \frac{ED_A \times EF_A \times IR_A}{BW_A}$$

Dermal

$$PRG_{ca\text{-}derm}\ (mg/kg) = \frac{TR \times AT\text{-}C}{SF_D \times DFS_{adj} \times ABS \times CF}$$

$$DFS_{adj}\ (mg/kg) = \frac{ED_C \times EF_C \times SA_C \times AF_C}{BW_C} + \frac{ED_A \times EF_A \times SA_A \times AF_A}{BW_A}$$

Total

$$PRG_{ca\text{-}tot}\ (mg/kg) = \frac{1}{1/PRG_{ca\text{-}ing} + 1/PRG_{ca\text{-}derm}}$$

Notes

IFS_{adj} - age-adjusted soil ingestion factor

DFS_{adj} - age-adjusted soil dermal factor

TABLE 2. INTERMEDIATE RECREATIONAL VISITOR SEDIMENT PRG CALCULATIONS - INGESTION

Chemical	Mutagenic?	THQ	$AT\text{-}N_C$ days	$AT\text{-}N_A$ days	RfD_o mg/kg-day	BW_C kg	BW_A kg	EF_C days/yr	EF_A days/yr	ED_C yrs	ED_A yrs	IR_C mg/day	IR_A mg/day	CF kg/mg	RBA	TR	AT-C days	SF_o $(mg/kg\text{-}day)^{-1}$	IFS_{adj} mg/kg	$PRG_{ca\text{-}ing}$ mg/kg	$PRG_{nc\text{-}ing\text{-}child}$ mg/kg	$PRG_{nc\text{-}ing\text{-}adult}$ mg/kg
Aroclor-1254		1	2190	7300	2E-05	15	80	26	26	6	20	200	100	0.000001	1	1E-06	25550	2.0E+00	2730	**4.7E+00**	**2.1E+01**	**2.2E+02**

Notes

See Table 1 for input parameters and equations

TABLE 3. INTERMEDIATE RECREATIONAL VISITOR SEDIMENT PRG CALCULATIONS - DERMAL

Chemical	Mutagenic?	THQ	$AT\text{-}N_C$ days	$AT\text{-}N_A$ days	RfD_D mg/kg-day	BW_C kg	BW_A kg	EF_C days/yr	EF_A days/yr	ED_C yrs	ED_A yrs	SA_C cm^2	SA_A cm^2	AF_C mg/cm^2-day	AF_A mg/cm^2-day	ABS	CF kg/mg	TR	AT-C days	SF_D $(mg/kg\text{-}day)^{-1}$	DFS_{adj} mg/kg	$PRG_{ca\text{-}derm}$ mg/kg	$PRG_{nc\text{-}derm\text{-}child}$ mg/kg	$PRG_{nc\text{-}derm\text{-}adult}$ mg/kg
Aroclor-1254		1	2190	7300	2E-05	15	80	26	26	6	20	1364	2275	0.4	0.6	0.14	0.000001	1E-06	25550	2.0E+00	14547	**6.3E+00**	**5.5E+01**	**1.2E+02**

Notes

See Table 1 for input parameters and equations

TABLE 4. INTERMEDIATE RECREATIONAL VISITOR SEDIMENT PRG CALCULATIONS - RESULTS

	Carcinogenic Risk Level = 1E-06			Non-Cancer HQ = 1 - Child			Non-Cancer HQ = 1 - Adult		
Chemical	$PRG_{ca\text{-}ing}$ mg/kg	$PRG_{ca\text{-}derm}$ mg/kg	Result mg/kg	$PRG_{nc\text{-}ing}$ mg/kg	$PRG_{nc\text{-}derm}$ mg/kg	Result mg/kg	$PRG_{nc\text{-}ing}$ mg/kg	$PRG_{nc\text{-}derm}$ mg/kg	Result mg/kg
Aroclor-1254	4.7E+00	6.3E+00	**2.7E+00**	2.1E+01	5.5E+01	**1.5E+01**	2.2E+02	1.2E+02	**7.7E+01**

Notes
See Table 1 for equations
HQ = Hazard Quotient
The lowest non-cancer PRG between the child and adult is used as the non-cancer PRG.

B.2 – GROUNDWATER – RESIDENT

TABLE 1
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
NUCLEAR METALS SUPERFUND SITE

Scenario Timeframe: Future
Medium: Groundwater
Exposure Medium: Groundwater

Exposure Route	Receptor Population	Receptor Age	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion/Dermal/ Inhalation	Resident	Adult/Young Child					See FS Appendix C except where noted	
			IR_A	Ingestion Rate of Water - adult	2.5	liters/day	See Attachment A	See attached
			EF	Exposure Frequency	350	days/year		
			ED_A	Exposure Duration - adult	20	years	See Attachment A	
			BW_A	Body Weight - adult	80	kg	See Attachment A	
			AT-C	Averaging Time (Cancer)	25550	days		
			AT-N	Averaging Time (Non-Cancer)	2190	days		
			CF1	Conversion Factor 1	0.001	mg/ug		
			BW_C	Body Weight - child	15	kg		
			IR_C	Ingestion Rate of Water - child	0.78	liters/day	See Attachment A	
			RfD_o	Oral Reference Dose	see ROD Table G-6	mg/kg-day		
			RfD_d	Dermal Reference Dose	see ROD Table G-6	mg/kg-day		
			RfC	Inhalation Reference Concentration	see ROD Table G-6	ug/m^3		
			CF2	Conversion Factor 2	0.001	cm^3/mg		
			CF3	Conversion Factor 3	0.001	$liters/cm^3$		
			K	Volatilization Factor	0.5	L/m^3		
			EV	Event Frequency	1	events/day		
			THQ	Target Hazard Quotient	1	- -		
			ED_C	Exposure Duration - child	6	years		
			SF_o	Oral Slope Factor	see ROD Table G-5	$(mg/kg\text{-}day)^{-1}$		
			TR	Target ILCR	10^{-6} to 10^{-4}	- -		
			SF_d	Dermal Slope Factor	see ROD Table G-5	$(mg/kg\text{-}day)^{-1}$		
			UR	Unit Risk	see ROD Table G-5	$(ug/m^3)^{-1}$		
			DA_{event}	Dose Absorbed per Unit Area per Event	see Table 3	mg/cm^2-event		
			ET_C	Exposure Time - child	0.54	hr/event	See Attachment A	
			ET_A	Exposure Time - adult	0.71	hr/event	See Attachment A	
			GIABS	Gastrointestinal absorption	see Table 3	- -		
			FA	Fraction Absorbed Water	see Table 3	- -		
			MW	Molecular Weight	see Table 3	g/mol		
			SA_A	Skin Surface Area Available for Contact - adult	20900	cm^2	See Attachment A	
			SA_C	Skin Surface Area Available for Contact - child	6378	cm^2	See Attachment A	

Intake Equation/
Model Name

Preliminary Remediation Goal (PRG) non-cancer:

Ingestion

$$PRG_{nc\text{-}ing}\ (ug/L) = \frac{THQ \times AT\text{-}N \times RfD_o \times BW_C}{EF \times CF1 \times ED_C \times IR_C}$$

Dermal - inorganics

$$PRG_{nc\text{-}derm}\ (ug/L) = \frac{DA_{event}}{Kp \times ET_C \times CF3}$$

where

$$DA_{event}\ (ug/cm2\text{-}event) = \frac{THQ \times AT\text{-}N \times RfD_o \times GIABS \times BW_C}{EV \times CF1 \times ED_C \times EF \times SA_C}$$

Dermal - organics

if ET_C <= t*

$$PRG_{nc\text{-}derm}\ (ug/L) = \frac{DA_{event}}{2 \times FA \times Kp \times [6 \times tau \times ET_C / \pi]^{0.5} \times CF3}$$

if ET_C > t*

$$PRG_{nc\text{-}derm}\ (ug/L) = \frac{DA_{event}}{FA \times Kp \times [ET_C / (1 + B) + 2 \times tau \times (1 + 3B + 3B^2)/(1 + B)^2] \times CF3}$$

where

$$DA_{event}\ (ug/cm2\text{-}event) = \frac{THQ \times AT\text{-}N \times RfD_o \times GIABS \times BW_C}{EV \times CF1 \times ED_C \times EF \times SA_C}$$

$$B = \frac{Kp \times MW^{0.5}}{2.6}$$

$$tau = \frac{l_{SC}^2}{6 \times D_{SC}}$$

l_{SC} = Skin Thickness (cm; assumed)
1.00E-03

D_{SC} = l_{SC} x 10^(-2.8 - 0.0056 x MW)

t* = If B <= 0.6
2.4 x tau

If B > 0.6
$6 \times tau \times (b - (b^2 - c^2)^{0.5})$

$$b = \frac{2 \times (1 + B)^2}{\pi} - c$$

$$c = \frac{1 + 3 \times B + 3 \times B^2}{3 \times (1 + B)}$$

Inhalation

$$PRG_{nc\text{-}inh}\ (ug/L) = \frac{THQ \times AT\text{-}N \times RfC}{EF \times ED_C \times K}$$

Total

$$PRG_{nc\text{-}tot}\ (ug/L) = \frac{1}{1/PRG_{nc\text{-}ing} + 1/PRG_{nc\text{-}derm} + 1/PRG_{nc\text{-}inh}}$$

Preliminary Remediation Goal (PRG) cancer:

Ingestion

$$PRG_{ca\text{-}ing}\ (ug/L) = \frac{TR \times AT\text{-}C}{EF \times CF1 \times SF_o \times IFW_{adj}}$$

$$IFW_{adj} = \frac{ED_C \times IR_C}{BW_C} + \frac{ED_A \times IR_A}{BW_A}$$

Dermal - inorganics

$$PRG_{ca\text{-}derm}\ (ug/L) = \frac{DA_{event}}{Kp \times ET_{adj} \times CF3}$$

where

$$ET_{adj} = ET_C \times ED_C/30 + ET_A \times ED_A/30$$

$$DA_{event}\ (ug/cm2\text{-}event) = \frac{TR \times AT\text{-}C \times GIABS}{SF_o \times CF1 \times EF \times DFW_{adj}}$$

$$DFW_{adj} = \frac{EV \times ED_C \times SA_C}{BW_C} + \frac{EV \times ED_A \times SA_A}{BW_A}$$

Dermal - organics

if ET_{adj} <= t*

$$PRG_{ca\text{-}derm}\ (ug/L) = \frac{DA_{event}}{2 \times FA \times Kp \times [6 \times tau \times ET_{adj} / \pi]^{0.5} \times CF3}$$

if ET_{adj} > t*

$$PRG_{ca\text{-}derm}\ (ug/L) = \frac{DA_{event}}{FA \times Kp \times [ET_{adj} / (1 + B) + 2 \times tau \times (1 + 3B + 3B^2)/(1 + B)^2] \times CF3}$$

where

$$DA_{event}\ (ug/cm2\text{-}event) = \frac{TR \times AT\text{-}C \times GIABS}{SF_o \times CF1 \times EF \times DFW_{adj}}$$

$$B = \frac{Kp \times MW^{0.5}}{2.6}$$

$$tau = \frac{I_{SC}^2}{6 \times D_{SC}}$$

I_{SC} = Skin Thickness (cm; assumed)

1.00E-03

$$D_{SC} = I_{SC} \times 10^{(-2.8 - 0.0056 \times MW)}$$

t* = If B <= 0.6

$$2.4 \times tau$$

If B > 0.6

$$6 \times tau \times (b - (b^2 - c^2)^{0.5})$$

$$b = \frac{2 \times (1 + B)^2}{\pi \times a} - c$$

$$c = \frac{1 + 3 \times B + 3 \times B^2}{3 \times (1 + B)}$$

Inhalation

$$PRG_{ca\text{-}inh}\ (ug/L) = \frac{TR \times AT\text{-}C}{EF \times (ED_C + ED_A) \times UR \times K}$$

Total

$$PRG_{ca\text{-}tot}\ (ug/L) = \frac{1}{1/PRG_{ca\text{-}ing} + 1/PRG_{ca\text{-}derm} + 1/PRG_{ca\text{-}inh}}$$

Preliminary Remediation Goal (PRG) mutagenic:

Ingestion

$$PRG_{mu\text{-}ing}\ (ug/L) = \frac{TR \times AT\text{-}C}{EF \times CF1 \times SF_o \times IFWM_{adj}}$$

$$IFWM_{adj} = \frac{ED_{0\text{-}2} \times IR_C \times 10}{BW_C} + \frac{ED_{2\text{-}6} \times IR_C \times 3}{BW_C} + \frac{ED_{6\text{-}16} \times IR_A \times 3}{BW_A} + \frac{ED_{16\text{-}30} \times IR_A}{BW_A}$$

Dermal - inorganics

$$PRG_{mu\text{-}derm}\ (ug/L) = \frac{DA_{event}}{Kp \times ET_{madj} \times CF3}$$

where

$$ET_{madj} = \frac{ET_C \times ED_{0\text{-}2} + ET_C \times ED_{2\text{-}6} + ET_A \times ED_{6\text{-}16} + ET_A \times ED_{16\text{-}30}}{ED_{0\text{-}2} + ED_{2\text{-}6} + ED_{6\text{-}16} + ED_{16\text{-}30}}$$

$$DA_{event}\ (ug/cm2\text{-}event) = \frac{TR \times AT\text{-}C \times GIABS}{SF_o \times CF1 \times EF \times DFWM_{adj}}$$

$$DFWM_{adj} = \frac{ED_{0\text{-}2} \times SA_C \times 10}{BW_C} + \frac{ED_{2\text{-}6} \times SA_C \times 3}{BW_C} + \frac{ED_{6\text{-}16} \times SA_A \times 3}{BW_A} + \frac{ED_{16\text{-}30} \times SA_A}{BW_A}$$

Dermal - organics

if ET_{madj} <= t*

$$PRG_{mu\text{-}derm}\ (ug/L) = \frac{DA_{event}}{2 \times FA \times Kp \times [6 \times tau \times ET_{madj} / \pi]^{0.5} \times CF3}$$

if ET_{madj} > t*

$$PRG_{mu\text{-}derm}\ (ug/L) = \frac{DA_{event}}{FA \times Kp \times [ET_{madj} / (1 + B) + 2 \times tau \times (1 + 3B + 3B^2)/(1 + B)^2] \times CF3}$$

where

$$DA_{event}\ (ug/cm2\text{-}event) = \frac{TR \times AT\text{-}C \times GIABS}{SF_o \times CF1 \times EF \times DFWM_{adj}}$$

$$B = \frac{Kp \times MW^{0.5}}{2.6}$$

$$tau = \frac{l_{SC}^2}{6 \times D_{SC}}$$

l_{SC} = Skin Thickness (cm; assumed)

1.00E-03

D_{SC} = l_{SC} x 10^(-2.8 - 0.0056 x MW)

t* = If B <= 0.6

2.4 x tau

If B > 0.6

$$6 \times tau \times (b - (b^2 - c^2)^{0.5})$$

$$b = \frac{2 \times (1 + B)^2}{\pi} - c$$

$$c = \frac{1 + 3 \times B + 3 \times B^2}{3 \times (1 + B)}$$

Inhalation

$$PRG_{mu\text{-}inh}\ (ug/L) = \frac{TR \times AT\text{-}C}{EF \times K \times INFM_{adj}}$$

$$INFM_{adj} = ED_{0\text{-}2} \times UR \times 10 + ED_{2\text{-}6} \times UR \times 3 + ED_{6\text{-}16} \times UR \times 3 + ED_{16\text{-}30} \times UR$$

Total

$$PRG_{mu\text{-}tot}\ (ug/L) = \frac{1}{1/PRG_{mu\text{-}ing} + 1/PRG_{mu\text{-}derm} + 1/PRG_{mu\text{-}inh}}$$

Preliminary Remediation Goal (PRG) vinyl chloride:

Ingestion

$$PRG_{vc\text{-}ing}\ (ug/L) = \frac{TR}{CF1 \times SF_o \times ((EF \times IFW_{adj}) / AT\text{-}C + (IR_C / BW_C))}$$

$$IFW_{adj} = \frac{ED_C \times IR_C}{BW_C} + \frac{ED_A \times IR_A}{BW_A}$$

Dermal - organics

$$ET_{adj} = ET_C \times ED_C/30 + ET_A \times ED_A/30$$

$$DFW_{adj} = \frac{EV \times ED_C \times SA_C}{BW_C} + \frac{EV \times ED_A \times SA_A}{BW_A}$$

if ET_{adj} <= t*

$$PRG_{vc\text{-}derm}\ (ug/L) = \frac{DA_{event}}{2 \times FA \times Kp \times [6 \times tau \times ET_{madj} / \pi]^{0.5} \times CF3}$$

if ET_{adj} > t*

$$PRG_{vc\text{-}derm}\ (ug/L) = \frac{DA_{event}}{FA \times Kp \times [ET_{adj} / (1 + B) + 2 \times tau \times (1 + 3B + 3B^2)/(1 + B)^2] \times CF3}$$

where

$$DA_{event}\ (ug/cm2\text{-}event) = \frac{TR \times GIABS}{SF_o \times CF1 \times ((EF \times DFW_{adj}) / AT\text{-}C + SA_C / BW_C)}$$

$$B = \frac{Kp \times MW^{0.5}}{2.6}$$

$$tau = \frac{l_{SC}^2}{6 \times D_{SC}}$$

l_{SC} = Skin Thickness (cm; assumed)
1.00E-03

D_{SC} = l_{SC} x 10^(-2.8 - 0.0056 x MW)

t* = If B <= 0.6
2.4 x tau

If B > 0.6
$6 \times tau \times (b - (b^2 - c^2)^{0.5})$

$$b = \frac{2 \times (1 + B)^2}{\pi \times \tau} - c$$

$$c = \frac{1 + 3 \times B + 3 \times B^2}{3 \times (1 + B)}$$

Inhalation

$$PRG_{vc\text{-}inh}\ (ug/L) = \frac{TR}{UR \times K \times (EF \times (ED_C + ED_A))/AT\text{-}C + 1)}$$

Total

$$PRG_{vc\text{-}tot}\ (ug/L) = \frac{1}{1/PRG_{vc\text{-}ing} + 1/PRG_{vc\text{-}derm} + 1/PRG_{vc\text{-}inh}}$$

Notes

IFW_{adj} - age-adjusted water ingestion factor

DFW_{adj} - age-adjusted water dermal factor

$IFWM_{adj}$ - mutagenic age-adjusted water ingestion factor

$DFWM_{adj}$ - mutagenic age-adjusted water dermal factor

$INFM_{adj}$ - mutagenic age-adjusted inhalation factor

TABLE 2. INTERMEDIATE GROUNDWATER PRG CALCULATIONS - INGESTION

Chemical	Mutagenic?	EF days	ED_C yrs	ED_A yrs	BW_C kg	BW_A kg	IR_C L/day	IR_A L/day	AT-N days	AT-C days	CF1 mg/ug	SF_o $(mg/kg\text{-}day)^{-1}$	RfD_o mg/kg-day	THQ	TR	IFW_{adj} (L-yr/kg-day)	$IFWM_{adj}$ (L-yr/kg-day)	$PRG_{ca\text{-}ing}$ ug/L	$PRG_{nc\text{-}ing}$ ug/L
1,4-Dioxane		350	6	20	15	80	0.78	2.5	2190	25550	0.001	1.0E-01	3E-02	1	1E-06	0.937	2.914	**7.8E-01**	**6.0E+02**
bis(2-Ethylhexyl)phthalate		350	6	20	15	80	0.78	2.5	2190	25550	0.001	1.4E-02	2E-02	1	1E-06	0.937	2.914	**5.6E+00**	**4.0E+02**
1,1-dichloroethane		350	6	20	15	80	0.78	2.5	2190	25550	0.001	5.7E-03	2E-01	1	1E-06	0.937	2.914	**1.4E+01**	**4.0E+03**
tetrachloroethene		350	6	20	15	80	0.78	2.5	2190	25550	0.001	2.1E-03	6E-03	1	1E-06	0.937	2.914	**3.7E+01**	**1.2E+02**
Trichloroethene	Y	350	6	20	15	80	0.78	2.5	2190	25550	0.001	4.6E-02	5E-04	1	1E-06	0.937	2.914	**1.2E+00**	**1.0E+01**
kidney	Y	350	6	20	15	80	0.78	2.5	2190	25550	0.001	9.3E-03	N/A	1	1E-06	0.937	2.914	**2.7E+00**	
non-kidney		350	6	20	15	80	0.78	2.5	2190	25550	0.001	3.7E-02	N/A	1	1E-06	0.937	2.914	**2.1E+00**	
Vinyl Chloride	Y	350	6	20	15	80	0.78	2.5	2190	25550	0.001	7.2E-01	3E-03	1	1E-06	0.937	2.914	**2.1E-02**	**6.0E+01**
Nitrate		350	6	20	15	80	0.78	2.5	2190	25550	0.001	N/A	2E+00	1	1E-06	0.937	2.914	**N/A**	**3.2E+04**
Nitrite		350	6	20	15	80	0.78	2.5	2190	25550	0.001	N/A	1E-01	1	1E-06	0.937	2.914	**N/A**	**2.0E+03**
Uranium		350	6	20	15	80	0.78	2.5	2190	25550	0.001	N/A	6E-04	1	1E-06	0.937	2.914	**N/A**	**1.2E+01**
Barium		350	6	20	15	80	0.78	2.5	2190	25550	0.001	N/A	2E-01	1	1E-06	0.937	2.914	**N/A**	**4.0E+03**
Arsenic		350	6	20	15	80	0.78	2.5	2190	25550	0.001	1.5E+00	3E-04	1	1E-06	0.937	2.914	**5.2E-02**	**6.0E+00**
Chromium	Y	350	6	20	15	80	0.78	2.5	2190	25550	0.001	5.0E-01	3E-03	1	1E-06	0.937	2.914	**5.0E-02**	**6.0E+01**
Cobalt		350	6	20	15	80	0.78	2.5	2190	25550	0.001	N/A	3E-04	1	1E-06	0.937	2.914	**N/A**	**6.0E+00**
Iron		350	6	20	15	80	0.78	2.5	2190	25550	0.001	N/A	7E-01	1	1E-06	0.937	2.914	**N/A**	**1.4E+04**
Manganese (drinking water)		350	6	20	15	80	0.78	2.5	2190	25550	0.001	N/A	2.4E-02	1	1E-06	0.937	2.914	**N/A**	**4.8E+02**
Molybdenum		350	6	20	15	80	0.78	2.5	2190	25550	0.001	N/A	5.0E-03	1	1E-06	0.937	2.914	**N/A**	**1.0E+02**
Copper		350	6	20	15	80	0.78	2.5	2190	25550	0.001	N/A	4E-02	1	1E-06	0.937	2.914	**N/A**	**8.0E+02**

Notes

See Table 1 for input parameters and equations N/A - Not applicable or not available.

Trichloroethene calculated to account for mutagenic contributions during early life. Slope factors for kidney and non-kidney (liver and non-Hodgkin lymphoma) presented above.

(source - http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/faq.htm#FAQ19)

Final TCE cancer PRG shown calculated by 1/(1/kidney conc + 1/non-kidney conc)

Chromium evaluated as hexavalent chromium

TABLE 3. INTERMEDIATE GROUNDWATER PRG CALCULATIONS - DERMAL

Chemical	MWT g/mol	logKow	Kp (cm/hr) predicted	B	Isc cm	Dsc cm^2/hr	tau (hr)	c	b	t_star1 B>0.6	t_star3 B<=0.6	t_star (hr)	GIABS	Mutagenic?	FA for tau>3	ET_C hr/event	ET_A hr/event	ET_{adj} hr/event	ET_{madj} hr/event	EV event/day	EF days	ED_C yrs	ED_A yrs	BW_C kg	BW_A kg	SA_C cm^2	SA_A cm^2	AT-N days	AT-C days	CF1 mg/ug	CF3 L/cm^3	SF_o $(mg/kg\text{-}day)^{-1}$	RfD_o mg/kg-day	THQ	TR	DFW_{adj} cm^2-evt-day/kg	$DFWM_{adj}$ evt-cm^2/kg	DA_{event} - ca ug/cm^2-evt	DA_{event} - nc ug/cm^2-evt	$PRG_{ca\text{-}derm}$ ug/L	$PRG_{nc\text{-}derm}$ ug/L
1,4-Dioxane	88.1	-0.27	3.3E-04	0.001	1.0E-03	5.09E-07	0.33	3.3E-01	3.0E-01	N/A	0.79	0.79	1		1	1	0.71	0.671	0.671	1	350	6	20	15	80	6378	20900	2190	25550	0.001	0.001	1.0E-01	3E-02	1	1E-06	7776	24056	9.4E-05	7.4E-02	**2.2E+02**	**1.9E+05**
bis(2-Ethylhexyl)phthalate	391.0	7.60	NA	N/A	1.0E-03	1.02E-08	16.27	N/A	N/A	N/A	39.05	N/A	1		0.8	1	0.71	0.671	0.671	1	350	6	20	15	80	6378	20900	2190	25550	0.001	0.001	1.4E-02	2E-02	1	1E-06	7776	24056	N/A	N/A	**N/A**	**N/A**
1,1-dichloroethane	99.0	1.79	6.7E-03	0.026	1.0E-03	4.42E-07	0.38	3.5E-01	3.2E-01	N/A	0.90	0.90	1		1	1	0.71	0.671	0.671	1	350	6	20	15	80	6378	20900	2190	25550	0.001	0.001	5.7E-03	2E-01	1	1E-06	7776	24056	1.6E-03	4.9E-01	**1.8E+02**	**5.8E+04**
tetrachloroethene	165.8	3.40	3.3E-02	0.166	1.0E-03	1.87E-07	0.89	4.5E-01	4.1E-01	N/A	2.14	2.14	1		1	1	0.71	0.671	0.671	1	350	6	20	15	80	6378	20900	2190	25550	0.001	0.001	2.1E-03	6E-03	1	1E-06	7776	24056	4.5E-03	1.5E-02	**6.3E+01**	**2.3E+02**
Trichloroethene	131.4	2.42	1.2E-02	0.051	1.0E-03	2.91E-07	0.57	3.7E-01	3.4E-01	N/A	1.37	1.37	1	Y	1	1	0.71	0.671	0.671	1	350	6	20	15	80	6378	20900	2190	25550	0.001	0.001	4.6E-02	5E-04	1	1E-06	7776	24056	6.6E-05	1.2E-03	**7.2E+00**	**6.9E+01**
kidney	131.4	2.42	1.2E-02	0.051	1.0E-03	2.91E-07	0.57	3.7E-01	3.4E-01	N/A	1.37	1.37	1	Y	1	1	0.71	0.671	0.671	1	350	6	20	15	80	6378	20900	2190	25550	0.001	0.001	9.3E-03	N/A	1	1E-06	7776	24056	3.3E-04	N/A	**1.6E+01**	**N/A**
non-kidney	131.4	2.42	1.2E-02	0.051	1.0E-03	2.91E-07	0.57	3.7E-01	3.4E-01	N/A	1.37	1.37	1		1	1	0.71	0.671	0.671	1	350	6	20	15	80	6378	20900	2190	25550	0.001	0.001	3.7E-02	N/A	1	1E-06	7776	24056	2.5E-04	N/A	**1.3E+01**	**N/A**
Vinyl Chloride	62.5	1.62	8.4E-03	0.025	1.0E-03	7.08E-07	0.24	3.5E-01	3.2E-01	N/A	0.57	0.57	1	Y	1	1	0.71	0.671	0.671	1	350	6	20	15	80	6378	20900	2190	25550	0.001	0.001	7.2E-01	3E-03	1	1E-06	7776	24056	2.6E-06	7.4E-03	**2.7E-01**	**8.9E+02**
Nitrate	--	--	1.0E-03	--	1.0E-03	--	--	--	--	--	--	--	1	--	1	1	0.71	0.671	0.671	1	350	6	20	15	80	6378	20900	2190	25550	0.001	0.001	N/A	2E+00	1	1E-06	7776	24056	N/A	3.9E+00	**N/A**	**7.3E+06**
Nitrite	--	--	1.0E-03	--	1.0E-03	--	--	--	--	--	--	--	1	--	1	1	0.71	0.671	0.671	1	350	6	20	15	80	6378	20900	2190	25550	0.001	0.001	N/A	1E-01	1	1E-06	7776	24056	N/A	2.5E-01	**N/A**	**4.5E+05**
Uranium	--	--	1.0E-03	--	1.0E-03	--	--	--	--	--	--	--	1	--	1	1	0.71	0.671	0.671	1	350	6	20	15	80	6378	20900	2190	25550	0.001	0.001	N/A	6E-04	1	1E-06	7776	24056	N/A	1.5E-03	**N/A**	**2.7E+03**
Barium	--	--	1.0E-03	--	1.0E-03	--	--	--	--	--	--	--	0.07	--	1	1	0.71	0.671	0.671	1	350	6	20	15	80	6378	20900	2190	25550	0.001	0.001	N/A	2E-01	1	1E-06	7776	24056	N/A	3.4E-02	**N/A**	**6.4E+04**
Arsenic	--	--	1.0E-03	--	1.0E-03	--	--	--	--	--	--	--	1	--	1	1	0.71	0.671	0.671	1	350	6	20	15	80	6378	20900	2190	25550	0.001	0.001	1.5E+00	3E-04	1	1E-06	7776	24056	6.3E-06	7.4E-04	**9.3E+00**	**1.4E+03**
Chromium	--	--	2.0E-03	--	1.0E-03	--	--	--	--	--	--	--	0.025	Y	1	1	0.71	0.671	0.671	1	350	6	20	15	80	6378	20900	2190	25550	0.001	0.001	5.0E-01	3E-03	1	1E-06	7776	24056	1.5E-07	1.8E-04	**1.1E-01**	**1.7E+02**
Cobalt	--	--	4.0E-04	--	1.0E-03	--	--	--	--	--	--	--	1	--	1	1	0.71	0.671	0.671	1	350	6	20	15	80	6378	20900	2190	25550	0.001	0.001	N/A	3E-04	1	1E-06	7776	24056	N/A	7.4E-04	**N/A**	**3.4E+03**
Iron	--	--	1.0E-03	--	1.0E-03	--	--	--	--	--	--	--	1	--	1	1	0.71	0.671	0.671	1	350	6	20	15	80	6378	20900	2190	25550	0.001	0.001	N/A	7E-01	1	1E-06	7776	24056	N/A	1.7E+00	**N/A**	**3.2E+06**
Manganese (drinking water)	--	--	1.0E-03	--	1.0E-03	--	--	--	--	--	--	--	0.04	--	1	1	0.71	0.671	0.671	1	350	6	20	15	80	6378	20900	2190	25550	0.001	0.001	N/A	2.4E-02	1	1E-06	7776	24056	N/A	2.4E-03	**N/A**	**4.4E+03**
Molybdenum	--	--	1.0E-03	--	1.0E-03	--	--	--	--	--	--	--	1	--	1	1	0.71	0.671	0.671	1	350	6	20	15	80	6378	20900	2190	25550	0.001	0.001	N/A	5.0E-03	1	1E-06	7776	24056	N/A	1.2E-02	**N/A**	**2.3E+04**
Copper	--	--	1.0E-03	--	1.0E-03	--	--	--	--	--	--	--	1	--	1	1	0.71	0.671	0.671	1	350	6	20	15	80	6378	20900	2190	25550	0.001	0.001	N/A	4E-02	1	1E-06	7776	24056	N/A	9.8E-02	**N/A**	**1.8E+05**

Notes

See Table 1 for input parameters and equations N/A - Not applicable or not available.

log Kow, GIABS, and FA - From Regional Screening Level (January 2015) tables

Kp - predicted values utilize formula from RAGs part E Eq. 3.8: log Kp = -2.805603 + 0.6645865 log Kow - 0.0056118 MW (Equation more accurate in spreadsheet than in report) (Final - EPA/540/R/99/005, July 2004)

NA: Outside of Effective Predictive Domain (EPD). Calculated based on RAGS Part E criteria for MW and log Kow.

Inorganics: Rags Part E, Exhibit 3-1; Final - EPA/540/R/99/005, July 2004

Trichloroethene calculated to account for mutagenic contributions during early life. Slope factors for kidney and non-kidney (liver and non-Hodgkin lymphoma) presented above.

(source - http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/faq.htm#FAQ19)

Final TCE cancer PRG shown calculated by 1/(1/kidney conc + 1/non-kidney conc)

Chromium evaluated as hexavalent chromium

TABLE 4. INTERMEDIATE GROUNDWATER PRG CALCULATIONS - INHALATION

Chemical	Mutagenic?	EF days	ED_C yrs	ED_A yrs	K L/m^3	AT-N days	AT-C days	UR $(ug/m^3)^{-1}$	RfC ug/m^3	THQ	TR	$INFM_{adj}$ yr-ug/m^3	PRG_{ca-inh} ug/L	PRG_{nc-inh} ug/L
1,4-Dioxane		350	6	20	0.5	2190	25550	5.0E-06	3E+01	1	1E-06	3.6E-04	**1.1E+00**	**6.3E+01**
bis(2-Ethylhexyl)phthalate		350	6	20	0.5	2190	25550	N/A	N/A	1	1E-06	N/A	**N/A**	**N/A**
1,1-dichloroethane		350	6	20	0.5	2190	25550	1.6E-06	N/A	1	1E-06	1.2E-04	**3.5E+00**	**N/A**
tetrachloroethene		350	6	20	0.5	2190	25550	2.6E-07	4E+01	1	1E-06	1.9E-05	**2.2E+01**	**8.3E+01**
Trichloroethene	Y	350	6	20	0.5	2190	25550	4.1E-06	2E+00	1	1E-06	3.0E-04	**9.6E-01**	**4.2E+00**
kidney	Y	350	6	20	0.5	2190	25550	1.0E-06	N/A	1	1E-06	7.2E-05	**2.0E+00**	
non-kidney		350	6	20	0.5	2190	25550	3.1E-06	N/A	1	1E-06	2.2E-04	**1.8E+00**	
Vinyl Chloride	Y	350	6	20	0.5	2190	25550	4.4E-06	1E+02	1	1E-06	3.2E-04	**3.4E-01**	**2.1E+02**
Nitrate		350	6	20	0.5	2190	25550	N/A	N/A	1	1E-06	N/A	**N/A**	**N/A**
Nitrite		350	6	20	0.5	2190	25550	N/A	N/A	1	1E-06	N/A	**N/A**	**N/A**
Uranium		350	6	20	0.5	2190	25550	N/A	N/A	1	1E-06	N/A	**N/A**	**N/A**
Barium		350	6	20	0.5	2190	25550	N/A	N/A	1	1E-06	N/A	**N/A**	**N/A**
Arsenic		350	6	20	0.5	2190	25550	4.3E-03	1.5E-03	1	1E-06	3.1E-01	**N/A**	**N/A**
Chromium	Y	350	6	20	0.5	2190	25550	N/A	N/A	1	1E-06	N/A	**N/A**	**N/A**
Cobalt		350	6	20	0.5	2190	25550	9.0E-03	6E-03	1	1E-06	6.5E-01	**N/A**	**N/A**
Iron		350	6	20	0.5	2190	25550	N/A	N/A	1	1E-06	N/A	**N/A**	**N/A**
Manganese (drinking water)		350	6	20	0.5	2190	25550	N/A	5E-02	1	1E-06	N/A	**N/A**	**N/A**
Molybdenum		350	6	20	0.5	2190	25550	N/A	N/A	1	1E-06	N/A	**N/A**	**N/A**
Copper		350	6	20	0.5	2190	25550	N/A	N/A	1	1E-06	N/A	**N/A**	**N/A**

Notes

See Table 1 for input parameters and equations N/A - Not applicable or not available.

PRGs shown as "N/A" are due to either lack of inhalation toxicity values or because the analyte is non-volatile.

Trichloroethene calculated to account for mutagenic contributions during early life. Slope factors for kidney and non-kidney (liver and non-Hodgkin lymphoma) presented in spreadsheet.

(source - http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/faq.htm#FAQ19)

Final TCE cancer PRG shown calculated by 1/(1/kidney conc + 1/non-kidney conc)

Chromium evaluated as hexavalent chromium

TABLE 5. INTERMEDIATE GROUNDWATER PRG CALCULATIONS - RESULTS

	Carcinogenic Risk Level = 1E-06				Non-Cancer Hazard Quotient = 1			
Chemical	$PRG_{ca\text{-}ing}$ ug/L	$PRG_{ca\text{-}derm}$ ug/L	$PRG_{ca\text{-}inh}$ ug/L	Result ug/L	$PRG_{nc\text{-}ing}$ ug/L	$PRG_{nc\text{-}derm}$ ug/L	$PRG_{nc\text{-}inh}$ ug/L	Result ug/L
1,4-Dioxane	7.8E-01	2.2E+02	1.1E+00	**4.6E-01**	6.0E+02	1.9E+05	6.3E+01	**5.7E+01**
bis(2-Ethylhexyl)phthalate	5.6E+00	N/A	N/A	**5.6E+00**	4.0E+02	N/A	N/A	**4.0E+02**
1,1-Dichloroethane	1.4E+01	1.8E+02	3.5E+00	**2.7E+00**	4.0E+03	5.8E+04	N/A	**3.8E+03**
Tetrachloroethene	3.7E+01	6.3E+01	2.2E+01	**1.1E+01**	1.2E+02	2.3E+02	8.3E+01	**4.1E+01**
Trichloroethene	1.2E+00	7.2E+00	9.6E-01	**4.9E-01**	1.0E+01	6.9E+01	4.2E+00	**2.8E+00**
Vinyl Chloride	2.1E-02	2.7E-01	3.4E-01	**1.9E-02**	6.0E+01	8.9E+02	2.1E+02	**4.4E+01**
Nitrate	N/A	N/A	N/A	**N/A**	3.2E+04	7.3E+06	N/A	**3.2E+04**
Nitrite	N/A	N/A	N/A	**N/A**	2.0E+03	4.5E+05	N/A	**2.0E+03**
Uranium	N/A	N/A	N/A	**N/A**	1.2E+01	2.7E+03	N/A	**1.2E+01**
Barium	N/A	N/A	N/A	**N/A**	4.0E+03	6.4E+04	N/A	**3.8E+03**
Arsenic	5.2E-02	9.3E+00	N/A	**5.2E-02**	6.0E+00	1.4E+03	N/A	**6.0E+00**
Chromium	5.0E-02	1.1E-01	N/A	**3.5E-02**	6.0E+01	1.7E+02	N/A	**4.4E+01**
Cobalt	N/A	N/A	N/A	**N/A**	6.0E+00	3.4E+03	N/A	**6.0E+00**
Iron	N/A	N/A	N/A	**N/A**	1.4E+04	3.2E+06	N/A	**1.4E+04**
Manganese (drinking water)	N/A	N/A	N/A	**N/A**	4.8E+02	4.4E+03	N/A	**4.3E+02**
Molybdenum	N/A	N/A	N/A	**N/A**	1.0E+02	2.3E+04	N/A	**1.0E+02**
Copper	N/A	N/A	N/A	**N/A**	8.0E+02	1.8E+05	N/A	**8.0E+02**

Notes

See Table 1 for equations

Chromium evaluated as hexavalent chromium

N/A - Not applicable or not available.

TABLE 6. RADIOLOGICAL PRG DEVELOPMENT - INTERMEDIATE CALCULATIONS - RESIDENT - GROUNDWATER

$$\text{PRG (cancer) - Radionuclide COC (pCi/L)} = \frac{TR}{IR\text{-}W \times FI \times EF \times ED \times CSFw}$$

Exposure Parameters[1]

TR	Target Risk	1.00E-06	Risk
IR-Wa	Ingestion Rate of Water-adult	2.5	L/day
IR-Wc	Ingestion Rate of Water-child	0.78	L/day
FI	Fraction Ingested	1	unitless
EF	Exposure Frequency	350	day/yr
EDa	Exposure Duration-adult	20	yr
EDc	Exposure Duration-child	6	yr
CSFw	Cancer Slope Factor - Water	See ROD Table G-5	Risk/pCi

Notes

1 - See FS Appendix C except for highlighted values (see Attachment A)

		Ra-228+D	Th-228+D	Th-232	U-234	U-235+D	U-238+D	Ac-227+D	Th-230	Ra-226+D	Pb-210	Bi-210	Po-210
Cancer Slope Factor - Water Ingestion	CSFw:	1.04E-09	3.00E-10	1.01E-10	7.07E-11	7.18E-11	8.71E-11	4.86E-10	9.10E-11	3.86E-10	8.81E-10	8.92E-12	3.77E-10
	adult - IR-Wa x FI x EF x EDa x CSFw	1.82E-05	5.25E-06	1.77E-06	1.24E-06	1.26E-06	1.52E-06	8.51E-06	1.59E-06	6.76E-06	1.54E-05	1.56E-07	6.60E-06
	child - IR-Wc x FI x EF x EDc x CSFw	1.70E-06	4.91E-07	1.65E-07	1.16E-07	1.18E-07	1.43E-07	7.96E-07	1.49E-07	6.32E-07	1.44E-06	1.46E-08	6.18E-07
Activity-Based PRG (pCi/L) = TR / (adult+child):		5.02E-02	1.74E-01	5.17E-01	7.39E-01	7.28E-01	6.00E-01	1.08E-01	5.74E-01	1.35E-01	5.93E-02	5.86E+00	1.39E-01

Table 7 - Derivation of Site-Specific Human Health Preliminary Remediation Goals for Radionucildes - Groundwater
Nuclear Metals Superfund Site

Depleted Uranium				
Isotope	Specific Activity (pCi/ml)	Receptor Scenario:	Resident	
			PRG - Activity (pCi/L)	PRG - Mass (ug/L)
		Total Depleted Uranium PRG - Mass:		1.6E+00
		Mass Abundance		
U-238+D	3.35E+05	99.7982%	6.00E-01	1.8E+00
U-235+D	2.16E+06	0.2009%	7.28E-01	1.7E+02
U-234	6.24E+09	0.0009%	7.39E-01	1.3E+01

Natural Uranium				
Isotope	Specific Activity (pCi/ml)	Receptor Scenario:	Resident	
			PRG - Activity (pCi/L)	PRG - Mass (ug/L)
		Total Natural Uranium PRG - Mass:		7.6E-02
		Mass Abundance		
U-238+D	3.35E+05	99.2739%	6.00E-01	1.80E+00
U-235+D	2.16E+06	0.7204%	7.28E-01	4.67E+01
U-234	6.24E+09	0.0057%	7.39E-01	2.08E+00
Ac-227+D	activity equals U-235 activity		1.08E-01	6.90E+00
Th-230	activity equals U-234 activity		5.74E-01	1.61E+00
Ra-226+D	activity equals U-234 activity		1.35E-01	3.80E-01
Pb-210	activity equals U-234 activity		5.93E-02	1.67E-01
Bi-210	activity equals U-234 activity		5.86E+00	1.65E+01
Po-210	activity equals U-234 activity		1.39E-01	3.89E-01

Total Thorium (as Th-232)				
Isotope	Specific Activity (pCi/ml)	Receptor Scenario:	Resident	
			PRG - Activity (pCi/L)	PRG - Mass (ug/L)
		Total Thorium PRG - Mass:		3.3E-01
		Mass Abundance		
Th-232	1.10E+05	100%	5.17E-01	4.70E+00
Ra-228+D	activity equals Th-232 activity		5.02E-02	4.57E-01
Th-228+D	activity equals Th-232 activity		1.74E-01	1.58E+00

PRG - Activity calculated using equations provided in Table 6.
PRG - Mass calculated for each isotope as PRG-Activity x 1E+06 /specific activity / mass abundance
PRG - Mass for total uranium and total throium calculated as: 1 / [(1/PRG-Mass for isotope) + (1/PRG-Mass for isotope) + (1/PRG-Mass for isotope) … *n*]
ug/L = microgram per liter
pCi/L = picoCurie per liter

B.3 – SOIL – RESIDENT

TABLE 1

VALUES USED FOR DAILY INTAKE CALCULATIONS - RESIDENT

REASONABLE MAXIMUM EXPOSURE

NUCLEAR METALS SUPERFUND SITE

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion/Dermal	Resident	Young Child/Adult					See FS Appendix C, except where noted	
								See attached
			THQ	Target Hazard Quotient	1	- -		
			$AT\text{-}N_C$	Averaging Time (Non-Cancer) - child	2,190	days		
			ED_C	Exposure Duration - child	6	years		
			BW_C	Body Weight - child	15	kg		
			EF_C	Exposure Frequency - child	161	days/year		
			IR_C	Ingestion Rate of Soil - child	200	mg/day		
			CF	Conversion Factor	0.000001	kg/mg		
			SA_C	Surface Area - child	2,373	cm^2	See Attachment A	
			AF_C	Adherence Factor - child	0.20	mg/cm^2-day		
			ABS	Dermal Absorption Fraction	see FS Appendix C	- -		
			$AT\text{-}N_A$	Averaging Time (Non-Cancer) - adult	7,300	days	See Attachment A	
			ED_A	Exposure Duration - adult	20	years	See Attachment A	
			BW_A	Body Weight - adult	80	kg	See Attachment A	
			EF_A	Exposure Frequency - adult	161	days/year		
			IR_A	Ingestion Rate of Soil - adult	100	mg/day		
			SA_A	Surface Area - adult	6,032	cm^2	See Attachment A	
			AF_A	Adherence Factor - adult	0.07	mg/cm^2-day		
			RBA	Relative Bioavailability	0.6 for Arsenic/1 for all other analytes	- -		
			TR	Target ILCR	10^{-6} to 10^{-4}	- -		
			AT-C	Averaging Time (Cancer)	25,550	days		
			RfD_O	Oral Reference Dose	see ROD Table G-6	mg/kg-day		
			RfD_D	Dermal Reference Dose	see ROD Table G-6	mg/kg-day		
			SF_O	Oral Slope Factor	see ROD Table G-5	$(mg/kg\text{-}day)^{-1}$		
			SF_D	Dermal Slope Factor	see ROD Table G-5	$(mg/kg\text{-}day)^{-1}$		
			$ED_{0\text{-}2}$	Exposure Duration - 0-2 yrs	2	years		
			$ED_{2\text{-}6}$	Exposure Duration - 2-6 yrs	4	years		
			$ED_{6\text{-}16}$	Exposure Duration - 6-16 yrs	10	years		
			$ED_{16\text{-}26}$	Exposure Duration - 16-26 yrs+	10	years	See Attachment A	

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Intake Equation/
Model Name

Preliminary Remediation Goal (PRG) non-cancer:

Ingestion - child

$$PRG_{nc\text{-}ing}\ (mg/kg) = \frac{THQ \times AT\text{-}N_C \times RfD_O \times BW_C}{EF_C \times ED_C \times IR_C \times CF \times RBA}$$

Dermal - child

$$PRG_{nc\text{-}derm}\ (mg/kg) = \frac{THQ \times AT\text{-}N_C \times RfD_D \times BW_C}{EF_C \times ED_C \times SA_C \times AF_C \times ABS \times CF}$$

Total - child

$$PRG_{nc\text{-}tot}\ (mg/kg) = \frac{1}{1/PRG_{nc\text{-}ing} + 1/PRG_{nc\text{-}derm}}$$

Ingestion - adult

$$PRG_{nc\text{-}ing}\ (mg/kg) = \frac{THQ \times AT\text{-}N_A \times RfD_O \times BW_A}{EF_A \times ED_A \times IR_A \times CF \times RBA}$$

Dermal - adult

$$PRG_{nc\text{-}derm}\ (mg/kg) = \frac{THQ \times AT\text{-}N_A \times RfD_D \times BW_A}{EF_A \times ED_A \times SA_A \times AF_A \times ABS \times CF}$$

Total - adult

$$PRG_{nc\text{-}tot}\ (mg/kg) = \frac{1}{1/PRG_{nc\text{-}ing} + 1/PRG_{nc\text{-}derm}}$$

Preliminary Remediation Goal (PRG) cancer:

Ingestion

$$PRG_{ca\text{-}ing}\ (mg/kg) = \frac{TR \times AT\text{-}C}{SF_O \times IFS_{adj} \times CF \times RBA}$$

$$IFS_{adj}\ (mg/kg) = \frac{ED_C \times EF_C \times IR_C}{BW_C} + \frac{ED_A \times EF_A \times IR_A}{BW_A}$$

Dermal

$$PRG_{ca\text{-}derm}\ (mg/kg) = \frac{TR \times AT\text{-}C}{SF_D \times DFS_{adj} \times ABS \times CF}$$

$$DFS_{adj}\ (mg/kg) = \frac{ED_C \times EF_C \times SA_C \times AF_C}{BW_C} + \frac{ED_A \times EF_A \times SA_A \times AF_A}{BW_A}$$

Total

$$PRG_{ca\text{-}tot}\ (mg/kg) = \frac{1}{1/PRG_{ca\text{-}ing} + 1/PRG_{ca\text{-}derm}}$$

Preliminary Remediation Goal (PRG) mutagenic:

Ingestion

$$PRG_{mu\text{-}ing}\ (mg/kg) = \frac{TR \times AT\text{-}C}{SF_O \times IFSM_{adj} \times CF \times RBA}$$

$$IFSM_{adj}\ (mg/kg) = \frac{ED_{0\text{-}2} \times EF_C \times IR_C \times 10}{BW_C} + \frac{ED_{2\text{-}6} \times EF_C \times IR_C \times 3}{BW_C} + \frac{ED_{6\text{-}16} \times EF_A \times IR_A \times 3}{BW_A} + \frac{ED_{16\text{-}26} \times EF_A \times IR_A}{BW_A}$$

Dermal

$$PRG_{mu\text{-}derm}\ (mg/kg) = \frac{TR \times AT\text{-}C}{SF_D \times DFSM_{adj} \times ABS \times CF}$$

$$DFSM_{adj}\ (mg/kg) = \frac{ED_{0\text{-}2} \times EF_C \times AF_C \times SA_C \times 10}{BW_C} + \frac{ED_{2\text{-}6} \times EF_C \times AF_C \times SA_C \times 3}{BW_C} + \frac{ED_{6\text{-}16} \times EF_A \times AF_A \times SA_A \times 3}{BW_A} + \frac{ED_{16\text{-}26} \times EF_A \times AF_A \times SA_A}{BW_A}$$

Total

$$PRG_{mu\text{-}tot}\ (mg/kg) = \frac{1}{1/PRG_{mu\text{-}ing} + 1/PRG_{mu\text{-}derm}}$$

Notes

IFS_{adj} - age-adjusted soil ingestion factor

DFS_{adj} - age-adjusted soil dermal factor

$IFSM_{adj}$ - mutagenic age-adjusted soil ingestion factor

$DFSM_{adj}$ - mutagenic age-adjusted soil dermal factor

TABLE 2. INTERMEDIATE RESIDENT SOIL PRG CALCULATIONS - INGESTION

Chemical	Mutagenic?	THQ	$AT\text{-}N_C$ days	$AT\text{-}N_A$ days	RfD_o mg/kg-day	BW_C kg	BW_A kg	EF_C days/yr	EF_A days/yr	ED_C yrs	ED_A yrs	IR_C mg/day	IR_A mg/day	CF kg/mg	RBA	TR	AT-C days	SF_o $(mg/kg\text{-}day)^{-1}$	IFS_{adj} mg/kg	$IFSM_{adj}$ mg/kg	$PRG_{ca\text{-}ing}$ mg/kg	$PRG_{nc\text{-}ing\text{-}child}$ mg/kg	$PRG_{nc\text{-}ing\text{-}adult}$ mg/kg
Benzo(a)anthracene	Y	1	2190	7300	3E-02	15	80	161	161	6	20	200	100	0.000001	1	1E-06	25550	7.3E-01	16905	76743.3333	**4.6E-01**	**5.1E+03**	**5.4E+04**
Benzo(a)pyrene	Y	1	2190	7300	3E-02	15	80	161	161	6	20	200	100	0.000001	1	1E-06	25550	7.3E+00	16905	76743.3333	**4.6E-02**	**5.1E+03**	**5.4E+04**
Benzo(b)fluoranthene	Y	1	2190	7300	3E-02	15	80	161	161	6	20	200	100	0.000001	1	1E-06	25550	7.3E-01	16905	76743.3333	**4.6E-01**	**5.1E+03**	**5.4E+04**
Indeno(1,2,3-cd)pyrene	Y	1	2190	7300	3E-02	15	80	161	161	6	20	200	100	0.000001	1	1E-06	25550	7.3E-01	16905	76743.3333	**4.6E-01**	**5.1E+03**	**5.4E+04**
Aroclor-1254		1	2190	7300	2E-05	15	80	161	161	6	20	200	100	0.000001	1	1E-06	25550	2.0E+00	16905	76743.3333	**7.6E-01**	**3.4E+00**	**3.6E+01**
Arsenic		1	2190	7300	3E-04	15	80	161	161	6	20	200	100	0.000001	0.6	1E-06	25550	1.5E+00	16905	76743.3333	**1.7E+00**	**8.5E+01**	**9.1E+02**
Thorium		1	2190	7300	N/A	15	80	161	161	6	20	200	100	0.000001	1	1E-06	25550	NA	16905	76743.3333	**N/A**	**N/A**	**N/A**
Uranium		1	2190	7300	6E-04	15	80	161	161	6	20	200	100	0.000001	1	1E-06	25550	NA	16905	76743.3333	**N/A**	**1.0E+02**	**1.1E+03**

Notes

See Table 1 for input parameters and equations

N/A - Not applicable or not available.

TABLE 3. INTERMEDIATE RESIDENT SOIL PRG CALCULATIONS - DERMAL

Chemical	Mutagenic?	THQ	$AT\text{-}N_C$ days	$AT\text{-}N_A$ days	RfD_D mg/kg-day	BW_C kg	BW_A kg	EF_C days/yr	EF_A days/yr	ED_C yrs	ED_A yrs	SA_C cm^2	SA_A cm^2	AF_C mg/cm^2-day	AF_A mg/cm^2-day	ABS	CF kg/mg	TR	AT-C days	SF_D $(mg/kg\text{-}day)^{-1}$	DFS_{adj} mg/kg	$DFSM_{adj}$ mg/kg	$PRG_{ca\text{-}derm}$ mg/kg	$PRG_{nc\text{-}derm\text{-}child}$ mg/kg	$PRG_{nc\text{-}derm\text{-}adult}$ mg/kg
Benzo(a)anthracene	Y	1	2190	7300	3E-02	15	80	161	161	6	20	2373	6032	0.2	0.07	0.13	0.000001	1E-06	25550	7.3E-01	47559	197000	**1.4E+00**	**1.7E+04**	**9.9E+04**
Benzo(a)pyrene	Y	1	2190	7300	3E-02	15	80	161	161	6	20	2373	6032	0.2	0.07	0.13	0.000001	1E-06	25550	7.3E+00	47559	197000	**1.4E-01**	**1.7E+04**	**9.9E+04**
Benzo(b)fluoranthene	Y	1	2190	7300	3E-02	15	80	161	161	6	20	2373	6032	0.2	0.07	0.13	0.000001	1E-06	25550	7.3E-01	47559	197000	**1.4E+00**	**1.7E+04**	**9.9E+04**
Indeno(1,2,3-cd)pyrene	Y	1	2190	7300	3E-02	15	80	161	161	6	20	2373	6032	0.2	0.07	0.13	0.000001	1E-06	25550	7.3E-01	47559	197000	**1.4E+00**	**1.7E+04**	**9.9E+04**
Aroclor-1254		1	2190	7300	2E-05	15	80	161	161	6	20	2373	6032	0.2	0.07	0.14	0.000001	1E-06	25550	2.0E+00	47559	197000	**1.9E+00**	**1.0E+01**	**6.1E+01**
Arsenic		1	2190	7300	3E-04	15	80	161	161	6	20	2373	6032	0.2	0.07	0.03	0.000001	1E-06	25550	1.5E+00	47559	197000	**1.2E+01**	**7.2E+02**	**4.3E+03**
Thorium		1	2190	7300	N/A	15	80	161	161	6	20	2373	6032	0.2	0.07	NA	0.000001	1E-06	25550	NA	47559	197000	**N/A**	**N/A**	**N/A**
Uranium		1	2190	7300	6E-04	15	80	161	161	6	20	2373	6032	0.2	0.07	NA	0.000001	1E-06	25550	NA	47559	197000	**N/A**	**N/A**	**N/A**

Notes

See Table 1 for input parameters and equations

N/A - Not applicable or not available.

TABLE 4. INTERMEDIATE RESIDENT SOIL PRG CALCULATIONS - RESULTS

	Carcinogenic Risk Level = 1E-06			Non-Cancer HQ = 1 - Child			Non-Cancer HQ = 1 - Adult		
Chemical	$PRG_{ca\text{-}ing}$ mg/kg	$PRG_{ca\text{-}derm}$ mg/kg	Result mg/kg	$PRG_{nc\text{-}ing}$ mg/kg	$PRG_{nc\text{-}derm}$ mg/kg	Result mg/kg	$PRG_{nc\text{-}ing}$ mg/kg	$PRG_{nc\text{-}derm}$ mg/kg	Result mg/kg
Benzo(a)anthracene	4.6E-01	1.4E+00	**3.4E-01**	5.1E+03	1.7E+04	**3.9E+03**	5.4E+04	9.9E+04	**3.5E+04**
Benzo(a)pyrene	4.6E-02	1.4E-01	**3.4E-02**	5.1E+03	1.7E+04	**3.9E+03**	5.4E+04	9.9E+04	**3.5E+04**
Benzo(b)fluoranthene	4.6E-01	1.4E+00	**3.4E-01**	5.1E+03	1.7E+04	**3.9E+03**	5.4E+04	9.9E+04	**3.5E+04**
Indeno(1,2,3-cd)pyrene	4.6E-01	1.4E+00	**3.4E-01**	5.1E+03	1.7E+04	**3.9E+03**	5.4E+04	9.9E+04	**3.5E+04**
Aroclor-1254	7.6E-01	1.9E+00	**5.4E-01**	3.4E+00	1.0E+01	**2.6E+00**	3.6E+01	6.1E+01	**2.3E+01**
Arsenic	1.7E+00	1.2E+01	**1.5E+00**	8.5E+01	7.2E+02	**7.6E+01**	9.1E+02	4.3E+03	**7.5E+02**
Thorium	N/A	N/A	**N/A**	N/A	N/A	**N/A**	N/A	N/A	**N/A**
Uranium	N/A	N/A	**N/A**	1.0E+02	N/A	**1.0E+02**	1.1E+03	N/A	**1.1E+03**

Notes
See Table 1 for equations
HQ = Hazard Quotient
The lowest non-cancer PRG between the child and adult is used as the non-cancer PRG.
N/A - Not applicable or not available.

TABLE 5. RADIOLOGICAL PRG DEVELOPMENT - INTERMEDIATE CALCULATIONS - RESIDENT - SOIL

PRG (cancer) - Radionuclide COC (pCi/g) =

$$\frac{TR}{\{ED \times IR\text{-}S \times FI \times EF \times 1E\text{-}03\ g/mg \times CSFo\} + \{ED \times ACF \times CSFe \times [(ETi \times (EFi / 365\ d/y) \times SHFi) + (ETo \times (EFo / 365\ d/y) \times SHFo)]\} + \{[(IR\text{-}V \times FI\text{-}V) + (IR\text{-}F \times FI\text{-}F)] \times UPF \times EF \times ED \times CSFf\}}$$

PRG (cancer) -
Combined adult and child populations =

$$\frac{1}{(1 / \text{Adult PRG}) + (1 / \text{Child PRG})}$$

Exposure Parameters[1]

						Ra-228+D	Th-228+D	Th-232	U-234	U-235+D	U-238+D
TR	Target Risk	1.00E-06	Risk		Plant Uptake Factor (UPF) basis:	Radium	Thorium	Thorium	Uranium	Uranium	Uranium
IR-Sa	Ingestion Rate of Soil-adult	100	mg/day		UPF (see FS Appendix C):	0.04	0.001	0.001	0.0025	0.0025	0.0025
FI	Fraction Ingested	1	unitless	Cancer Slope Factor - Soil Ingestion-Whole Pop.	CSFo (Risk/pCi) - see ROD Table G-5:	2.29E-09	8.09E-10	2.31E-10	1.58E-10	1.63E-10	2.10E-10
EF	Exposure Frequency	161	day/yr	Cancer Slope Factor - External Exposure	CSFe (Risk/pCi) - see ROD Table G-5:	4.S3E-06	7.76E-06	3.42E-10	2.52E-10	S.43E-07	1.14E-07
EDa	Exposure Duration-adult	20	yr	Cancer Slope Factor - Food Ingestion	CSFf (Risk/pCi) - see ROD Table G-S:	1.43E-09	4.22E-10	1.33E-10	9.SSE-11	9.76E-11	1.21E-10
ACF	Area Correction Factor	0.9	unitless								
ETia	Exposure Time - Indoors-adult	0.683	hr/hr		$adult_{ing}$ - EDa x IR-Sa x FI x EF x 1E-03 g/mg x CSFo:	7.37E-07	2.60E-07	7.44E-08	S.09E-08	5.25E-08	6.76E-08
EFia	Exposure Frequency - Indoor-adult	350	day/yr		$adult_{ext}$ - EDa x ACF x CSFe x [(ETia x (EFia / 365 d/y) x SHFi) + (EToa x (EFoa / 36S d/y) x SHFo)]:	2.44E-0S	4.18E-0S	1.84E-09	1.36E-09	2.92E-06	6.14E-07
Conv. Fact		365	day/yr		$adult_{food}$ - [(IR-Va x FI-Va) + (IR-Fa x FI-Fa)] x UPF x EFf x EDa x CSFf:	1.41E-0S	1.04E-07	3.28E-08	S.88E-08	6.01E-08	7.4SE-08
SHFi	Shielding Factor - Indoor	0.4	unitless		Adult Sum:	3.92E-0S	4.22E-0S	1.09E-07	1.11E-07	3.04E-06	7.S6E-07
EToa	Exposure Time - Outdoors-adult	0.073	hr/hr								
EFoa	Exposure Frequency - Outdoor-adult	186	day/yr								
SHFo	Shielding Factor - Outdoor	1	unitless								
IR-Va	Ingestion Rate of Vegetables-adult	800	g/day	10 g/kg BW/day x 80 kg BW							
FI-Va	Fraction Vegetables Homegrown-adult	0.038	unitless								
IR-Fa	Ingestion Rate of Fruit-adult	960	g/day	12 g/kg BW/day x 80 kg BW							
FI-Fa	Fraction Fruits Homegrown-adult	0.005	unitless								
EFf	Exposure Frequency fruits/vegetables	3S0	day/yr								
TR	Target Risk	1.00E-06	Risk								
IR-Sc	Ingestion Rate of Soil-child	200	mg/day								
FI	Fraction Ingested	1	unitless								
EF	Exposure Frequency	161	day/yr								
EDc	Exposure Duration-child	6	yr								
ACF	Area Correction Factor	0.9	unitless								
ETic	Exposure Time - Indoors-child	0.833	hr/hr		$child_{ing}$ - EDc x IR-Sc x FI x EF x 1E-03 g/mg x CSFo:	4.42E-07	1.56E-07	4.46E-08	3.0SE-08	3.15E-08	4.06E-08
EFic	Exposure Frequency - Indoor-child	350	day/yr		$child_{ext}$ - EDc x ACF x CSFe x [(ETic x (EFic / 365 d/y) x SHFi) + (EToc x (EFoc / 36S d/y) x SHFo)]:	9.37E-06	1.61E-0S	7.08E-10	5.21E-10	1.12E-06	2.36E-07
Conv. Fact		36S	day/yr		$child_{food}$ - [(IR-Vc x FI-Vc) + (IR-Fc x FI-Fc)] x UPF x EFf x EDc x CSFf:	7.93E-07	S.85E-09	1.84E-09	3.31E-09	3.38E-09	4.19E-09
SHFi	Shielding Factor - Indoor	0.4	unitless		Child Sum:	1.06E-0S	1.62E-0S	4.72E-08	3.44E-08	1.16E-06	2.81E-07
EToc	Exposure Time - Outdoors-child	0.125	hr/hr								
EFoc	Exposure Frequency - Outdoor-child	186	day/yr								
SHFo	Shielding Factor - Outdoor	1	unitless								
IR-Vc	Ingestion Rate of Vegetables-child	150	g/day	10 g/kg BW/day x 1S kg BW							
FI-Vc	Fraction Vegetables Homegrown-child	0.038	unitless								
IR-Fc	Ingestion Rate of Fruit-child	180	g/day	12 g/kg BW/day x 1S kg BW							
FI-Fc	Fraction Fruits Homegrown-child	0.005	unitless								
EFf	Exposure Frequency fruits/vegetables	3S0	day/yr								
					Activity-Based PRG (pCi/g) = TR/(Adult Sum+Child Sum):	2.0E-02	1.7E-02	6.4E+00	6.9E+00	2.4E-01	9.6E-01

Notes

1 - See FS Appendix C except for highlighted values (see Attachment A)

Table 6 - Derivation of Site-Specific Human Health Preliminary Remediation Goals for Radionucildes - Soil - Resident
Nuclear Metals Superfund Site

Depleted Uranium					
Isotope	Specific Activity (pCi/g)	Receptor Scenario:	Resident		
			PRG - Activity (pCi/g)	PRG - Mass (mg/kg)	Activity-Based PRG based on PRG - Mass and Mass Abundance (pCi/g)
		Total Uranium PRG:		**2.7E+00**	
		Mass Abundance			
U-238+D	3.35E+05	99.7982%	9.6E-01	2.9E+00	9.0E-01
U-235+D	2.16E+06	0.2009%	2.4E-01	5.5E+01	1.2E-02
U-234	6.24E+09	0.0009%	6.9E+00	1.2E+02	1.5E-01
				U-Total:	1.1E+00

Thorium (as Th-232)				
Isotope	Specific Activity (pCi/g)	Receptor Scenario:	Resident	
			PRG - Activity (pCi/g)	PRG - Mass (mg/kg)
		Total Thorium PRG:	**9.2E-03**	**8.4E-02**
		Mass Abundance		
Th-232	1.10E+05	100%	6.4E+00	5.8E+01
Ra-228+D	PRG is for Th-232 mass		2.0E-02	1.8E-01
Th-228+D	PRG is for Th-232 mass		1.7E-02	1.6E-01

PRG - Activity: PRGs for each isotope, expressed as actibivity, are calculated using equations provided in Table 5.

PRG - Mass: Calculated for each isotope as PRG-Activity x 1E+06 /specific activity / mass abundance

PRG - Mass (total): For total uranium and total throium calculated as: 1 / [(1/PRG-Mass for isotope) + (1/PRG-Mass for isotope) + (1/PRG-Mass for isotope)]

PRG - Activity (total): For thorium is calculated as: Activity PRG for Th-232 x Th mass PRG / Th-232 mass PRG. This results in a mass to activity conversion factor of 9.1 mg/kg per pCi/g

mg/Kg = milligram per kilogram

pCi/g = picoCurie per gram

B.4 – SOIL – RECREATIONAL VISITOR

TABLE 1

VALUES USED FOR DAILY INTAKE CALCULATIONS - RECREATIONAL VISITOR

REASONABLE MAXIMUM EXPOSURE

NUCLEAR METALS SUPERFUND SITE

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion/Dermal	Recreational Visitor	Young Child/Adult					See FS Appendix C, except where noted	See attached
			THQ	Target Hazard Quotient	1	- -		
			$AT\text{-}N_C$	Averaging Time (Non-Cancer) - child	2,190	days		
			ED_C	Exposure Duration - child	6	years		
			BW_C	Body Weight - child	15	kg		
			EF_C	Exposure Frequency - child	80	days/year		
			IR_C	Ingestion Rate of Soil - child	200	mg/day		
			CF	Conversion Factor	0.000001	kg/mg		
			SA_C	Surface Area - child	2,373	cm^2	See Attachment A	
			AF_C	Adherence Factor - child	0.20	mg/cm^2-day		
			ABS	Dermal Absorption Fraction	see FS Appendix C	- -		
			$AT\text{-}N_A$	Averaging Time (Non-Cancer) - adult	7,300	days	See Attachment A	
			ED_A	Exposure Duration - adult	20	years	See Attachment A	
			BW_A	Body Weight - adult	80	kg	See Attachment A	
			EF_A	Exposure Frequency - adult	80	days/year		
			IR_A	Ingestion Rate of Soil - adult	100	mg/day		
			SA_A	Surface Area - adult	6,032	cm^2	See Attachment A	
			AF_A	Adherence Factor - adult	0.07	mg/cm^2-day		
			RBA	Relative Bioavailability	0.6 for Arsenic/1 for all other analytes	- -		
			TR	Target ILCR	10^{-6} to 10^{-4}	- -		
			AT-C	Averaging Time (Cancer)	25,550	days		
			RfD_O	Oral Reference Dose	see ROD Table G-6	mg/kg-day		
			RfD_D	Dermal Reference Dose	see ROD Table G-6	mg/kg-day		
			SF_O	Oral Slope Factor	see ROD Table G-5	$(mg/kg\text{-}day)^{-1}$		
			SF_D	Dermal Slope Factor	see ROD Table G-5	$(mg/kg\text{-}day)^{-1}$		
			$ED_{0\text{-}2}$	Exposure Duration - 0-2 yrs	2	years		
			$ED_{2\text{-}6}$	Exposure Duration - 2-6 yrs	4	years		
			$ED_{6\text{-}16}$	Exposure Duration - 6-16 yrs	10	years		
			$ED_{16\text{-}26}$	Exposure Duration - 16-26 yrs+	10	years	See Attachment A	

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Intake Equation/
Model Name

Preliminary Remediation Goal (PRG) non-cancer:

Ingestion - child

$$PRG_{nc\text{-}ing}\ (mg/kg) = \frac{THQ \times AT\text{-}N_C \times RfD_O \times BW_C}{EF_C \times ED_C \times IR_C \times CF \times RBA}$$

Dermal - child

$$PRG_{nc\text{-}derm}\ (mg/kg) = \frac{THQ \times AT\text{-}N_C \times RfD_D \times BW_C}{EF_C \times ED_C \times SA_C \times AF_C \times ABS \times CF}$$

Total - child

$$PRG_{nc\text{-}tot}\ (mg/kg) = \frac{1}{1/PRG_{nc\text{-}ing} + 1/PRG_{nc\text{-}derm}}$$

Ingestion - adult

$$PRG_{nc\text{-}ing}\ (mg/kg) = \frac{THQ \times AT\text{-}N_A \times RfD_O \times BW_A}{EF_A \times ED_A \times IR_A \times CF \times RBA}$$

Dermal - adult

$$PRG_{nc\text{-}derm}\ (mg/kg) = \frac{THQ \times AT\text{-}N_A \times RfD_D \times BW_A}{EF_A \times ED_A \times SA_A \times AF_A \times ABS \times CF}$$

Total - adult

$$PRG_{nc\text{-}tot}\ (mg/kg) = \frac{1}{1/PRG_{nc\text{-}ing} + 1/PRG_{nc\text{-}derm}}$$

Preliminary Remediation Goal (PRG) cancer:

Ingestion

$$PRG_{ca\text{-}ing}\ (mg/kg) = \frac{TR \times AT\text{-}C}{SF_o \times IFS_{adj} \times CF \times RBA}$$

$$IFS_{adj}\ (mg/kg) = \frac{ED_C \times EF_C \times IR_C}{BW_C} + \frac{ED_A \times EF_A \times IR_A}{BW_A}$$

Dermal

$$PRG_{ca\text{-}derm}\ (mg/kg) = \frac{TR \times AT\text{-}C}{SF_D \times DFS_{adj} \times ABS \times CF}$$

$$DFS_{adj}\ (mg/kg) = \frac{ED_C \times EF_C \times SA_C \times AF_C}{BW_C} + \frac{ED_A \times EF_A \times SA_A \times AF_A}{BW_A}$$

Total

$$PRG_{ca\text{-}tot}\ (mg/kg) = \frac{1}{1/PRG_{ca\text{-}ing} + 1/PRG_{ca\text{-}derm}}$$

Preliminary Remediation Goal (PRG) mutagenic:

Ingestion

$$PRG_{mu\text{-}ing}\ (mg/kg) = \frac{TR \times AT\text{-}C}{SF_o \times IFSM_{adj} \times CF \times RBA}$$

$$IFSM_{adj}\ (mg/kg) = \frac{ED_{0\text{-}2} \times EF_C \times IR_C \times 10}{BW_C} + \frac{ED_{2\text{-}6} \times EF_C \times IR_C \times 3}{BW_C} + \frac{ED_{6\text{-}16} \times EF_A \times IR_A \times 3}{BW_A} + \frac{ED_{16\text{-}26} \times EF_A \times IR_A}{BW_A}$$

Dermal

$$PRG_{mu\text{-}derm}\ (mg/kg) = \frac{TR \times AT\text{-}C}{SF_D \times DFSM_{adj} \times ABS \times CF}$$

$$DFSM_{adj}\ (mg/kg) = \frac{ED_{0\text{-}2} \times EF_C \times AF_C \times SA_C \times 10}{BW_C} + \frac{ED_{2\text{-}6} \times EF_C \times AF_C \times SA_C \times 3}{BW_C} + \frac{ED_{6\text{-}16} \times EF_A \times AF_A \times SA_A \times 3}{BW_A} + \frac{ED_{16\text{-}26} \times EF_A \times AF_A \times SA_A}{BW_A}$$

Total

$$PRG_{mu\text{-}tot}\ (mg/kg) = \frac{1}{1/PRG_{mu\text{-}ing} + 1/PRG_{mu\text{-}derm}}$$

Notes

IFS_{adj} - age-adjusted soil ingestion factor

DFS_{adj} - age-adjusted soil dermal factor

$IFSM_{adj}$ - mutagenic age-adjusted soil ingestion factor

$DFSM_{adj}$ - mutagenic age-adjusted soil dermal factor

TABLE 2. INTERMEDIATE RECREATIONAL VISITOR SOIL PRG CALCULATIONS - INGESTION

Chemical	Mutagenic?	THQ	$AT\text{-}N_C$ days	$AT\text{-}N_A$ days	RfD_o mg/kg-day	BW_C kg	BW_A kg	EF_C days/yr	EF_A days/yr	ED_C yrs	ED_A yrs	IR_C mg/day	IR_A mg/day	CF kg/mg	RBA	TR	AT-C days	SF_o $(mg/kg\text{-}day)^{-1}$	IFS_{adj} mg/kg	$IFSM_{adj}$ mg/kg	$PRG_{ca\text{-}ing}$ mg/kg	$PRG_{nc\text{-}ing\text{-}child}$ mg/kg	$PRG_{nc\text{-}ing\text{-}adult}$ mg/kg
Benzo(a)anthracene	Y	1	2190	7300	3E-02	15	80	80	80	6	20	200	100	0.000001	1	1E-06	25550	7.3E-01	8400	38133.3333	**9.2E-01**	**1.0E+04**	**1.1E+05**
Benzo(a)pyrene	Y	1	2190	7300	3E-02	15	80	80	80	6	20	200	100	0.000001	1	1E-06	25550	7.3E+00	8400	38133.3333	**9.2E-02**	**1.0E+04**	**1.1E+05**
Benzo(b)fluoranthene	Y	1	2190	7300	3E-02	15	80	80	80	6	20	200	100	0.000001	1	1E-06	25550	7.3E-01	8400	38133.3333	**9.2E-01**	**1.0E+04**	**1.1E+05**
Indeno(1,2,3-cd)pyrene	Y	1	2190	7300	3E-02	15	80	80	80	6	20	200	100	0.000001	1	1E-06	25550	7.3E-01	8400	38133.3333	**9.2E-01**	**1.0E+04**	**1.1E+05**
Aroclor-1254		1	2190	7300	2E-05	15	80	80	80	6	20	200	100	0.000001	1	1E-06	25550	2.0E+00	8400	38133.3333	**1.5E+00**	**6.8E+00**	**7.3E+01**
Arsenic		1	2190	7300	3E-04	15	80	80	80	6	20	200	100	0.000001	0.6	1E-06	25550	1.5E+00	8400	38133.3333	**3.4E+00**	**1.7E+02**	**1.8E+03**
Thorium		1	2190	7300	N/A	15	80	80	80	6	20	200	100	0.000001	1	1E-06	25550	NA	8400	38133.3333	**N/A**	**N/A**	**N/A**
Uranium		1	2190	7300	6E-04	15	80	80	80	6	20	200	100	0.000001	1	1E-06	25550	NA	8400	38133.3333	**N/A**	**2.1E+02**	**2.2E+03**

Notes

See Table 1 for input parameters and equations

N/A - Not applicable or not available.

TABLE 3. INTERMEDIATE RECREATIONAL VISITOR SOIL PRG CALCULATIONS - DERMAL

Chemical	Mutagenic?	THQ	$AT\text{-}N_C$ days	$AT\text{-}N_A$ days	RfD_D mg/kg-day	BW_C kg	BW_A kg	EF_C days/yr	EF_A days/yr	ED_C yrs	ED_A yrs	SA_C cm^2	SA_A cm^2	AF_C mg/cm^2-day	AF_A mg/cm^2-day	ABS	CF kg/mg	TR	AT-C days	SF_D $(mg/kg\text{-}day)^{-1}$	DFS_{adj} mg/kg	$DFSM_{adj}$ mg/kg	$PRG_{ca\text{-}derm}$ mg/kg	$PRG_{nc\text{-}derm\text{-}child}$ mg/kg	$PRG_{nc\text{-}derm\text{-}adult}$ mg/kg
Benzo(a)anthracene	Y	1	2190	7300	3E-02	15	80	80	80	6	20	2373	6032	0.2	0.07	0.13	0.000001	1E-06	25550	7.3E-01	23632	97888	**2.8E+00**	**3.3E+04**	**2.0E+05**
Benzo(a)pyrene	Y	1	2190	7300	3E-02	15	80	80	80	6	20	2373	6032	0.2	0.07	0.13	0.000001	1E-06	25550	7.3E+00	23632	97888	**2.8E-01**	**3.3E+04**	**2.0E+05**
Benzo(b)fluoranthene	Y	1	2190	7300	3E-02	15	80	80	80	6	20	2373	6032	0.2	0.07	0.13	0.000001	1E-06	25550	7.3E-01	23632	97888	**2.8E+00**	**3.3E+04**	**2.0E+05**
Indeno(1,2,3-cd)pyrene	Y	1	2190	7300	3E-02	15	80	80	80	6	20	2373	6032	0.2	0.07	0.13	0.000001	1E-06	25550	7.3E-01	23632	97888	**2.8E+00**	**3.3E+04**	**2.0E+05**
Aroclor-1254		1	2190	7300	2E-05	15	80	80	80	6	20	2373	6032	0.2	0.07	0.14	0.000001	1E-06	25550	2.0E+00	23632	97888	**3.9E+00**	**2.1E+01**	**1.2E+02**
Arsenic		1	2190	7300	3E-04	15	80	80	80	6	20	2373	6032	0.2	0.07	0.03	0.000001	1E-06	25550	1.5E+00	23632	97888	**2.4E+01**	**1.4E+03**	**8.6E+03**
Thorium		1	2190	7300	N/A	15	80	80	80	6	20	2373	6032	0.2	0.07	NA	0.000001	1E-06	25550	NA	23632	97888	**N/A**	**N/A**	**N/A**
Uranium		1	2190	7300	6E-04	15	80	80	80	6	20	2373	6032	0.2	0.07	NA	0.000001	1E-06	25550	NA	23632	97888	**N/A**	**N/A**	**N/A**

Notes

See Table 1 for input parameters and equations

N/A - Not applicable or not available.

TABLE 4. INTERMEDIATE RECREATIONAL VISITOR SOIL PRG CALCULATIONS - RESULTS

	Carcinogenic Risk Level = 1E-06			Non-Cancer HQ = 1 - Child			Non-Cancer HQ = 1 - Adult		
Chemical	$PRG_{ca\text{-}ing}$ mg/kg	$PRG_{ca\text{-}derm}$ mg/kg	Result mg/kg	$PRG_{nc\text{-}ing}$ mg/kg	$PRG_{nc\text{-}derm}$ mg/kg	Result mg/kg	$PRG_{nc\text{-}ing}$ mg/kg	$PRG_{nc\text{-}derm}$ mg/kg	Result mg/kg
Benzo(a)anthracene	9.2E-01	2.8E+00	**6.9E-01**	1.0E+04	3.3E+04	**7.8E+03**	1.1E+05	2.0E+05	**7.1E+04**
Benzo(a)pyrene	9.2E-02	2.8E-01	**6.9E-02**	1.0E+04	3.3E+04	**7.8E+03**	1.1E+05	2.0E+05	**7.1E+04**
Benzo(b)fluoranthene	9.2E-01	2.8E+00	**6.9E-01**	1.0E+04	3.3E+04	**7.8E+03**	1.1E+05	2.0E+05	**7.1E+04**
Indeno(1,2,3-cd)pyrene	9.2E-01	2.8E+00	**6.9E-01**	1.0E+04	3.3E+04	**7.8E+03**	1.1E+05	2.0E+05	**7.1E+04**
Aroclor-1254	1.5E+00	3.9E+00	**1.1E+00**	6.8E+00	2.1E+01	**5.1E+00**	7.3E+01	1.2E+02	**4.6E+01**
Arsenic	3.4E+00	2.4E+01	**3.0E+00**	1.7E+02	1.4E+03	**1.5E+02**	1.8E+03	8.6E+03	**1.5E+03**
Thorium	N/A	N/A	**N/A**	N/A	N/A	**N/A**	N/A	N/A	**N/A**
Uranium	N/A	N/A	**N/A**	2.1E+02	N/A	**2.1E+02**	2.2E+03	N/A	**2.2E+03**

Notes
See Table 1 for equations
HQ = Hazard Quotient
The lowest non-cancer PRG between the child and adult is used as the non-cancer PRG.
N/A - Not applicable or not available.

TABLE 5. RADIOLOGICAL PRG DEVELOPMENT - INTERMEDIATE CALCULATIONS - RECREATIONAL VISITOR - SOIL

PRG (cancer) - Radionuclide COC (pCi/g) =	$\frac{TR}{\{ED \times IR\text{-}S \times FI \times EF \times 1E\text{-}03\ g/mg \times CSFo\} + \{ED \times ACF \times CSFe \times [(ETi \times (EFi / 365\ d/y) \times SHFi) + (ETo \times (EFo / 365\ d/y) \times SHFo)]\} + \{[(IR\text{-}V \times FI\text{-}V) + (IR\text{-}F \times FI\text{-}F)] \times UPF \times EF \times ED \times CSFi\}}$
PRG (cancer) - Combined adult and child populations =	$\frac{1}{(1 / \text{Adult PRG}) + (1 / \text{Child PRG})}$

Exposure Parameters[1]

					Ra-228+D	Th-228+D	Th-232	U-234	U-235+D	U-238+D
TR	Target Risk	1.00E-06	Risk							
IR-Sa	Ingestion Rate of Soil-adult	100	mg/day							
FI	Fraction Ingested	1	unitless	Cancer Slope Factor - Soil Ingestion-Whole Pop. CSFo (Risk/pCi) - see ROD Table G-5:	2.29E-09	8.09E-10	2.31E-10	1.58E-10	1.63E-10	2.10E-10
EF	Exposure Frequency	80	day/yr	Cancer Slope Factor - External Exposure CSFe (Risk/pCi) - see ROD Table G-5:	4.53E-06	7.76E-06	3.42E-10	2.52E-10	5.43E-07	1.14E-07
EDa	Exposure Duration-adult	20	yr							
ACF	Area Correction Factor	0.9	unitless							
ETia	Exposure Time - Indoors-adult	0	hr/hr	$adult_{ing}$ - EDa x IR-Sa x FI x EF x 1E-03 g/mg x CSFo:	3.66E-07	1.29E-07	3.70E-08	2.53E-08	2.61E-08	3.36E-08
EFia	Exposure Frequency - Indoor-adult	0	day/yr	$adult_{ext}$ - EDa x ACF x CSFe x [(ETia x (EFia / 365 d/y) x SHFi) + (EToa x (EFoa / 365 d/y) x SHFo)]:	2.23E-06	3.83E-06	1.69E-10	1.24E-10	2.68E-07	5.62E-08
Conv. Fact		365	day/yr							
SHFi	Shielding Factor - Indoor	0	unitless	Adult Sum:	2.60E-06	3.96E-06	3.71E-08	2.54E-08	2.94E-07	8.98E-08
EToa	Exposure Time - Outdoors-adult	0.125	hr/hr							
EFoa	Exposure Frequency - Outdoor-adult	80	day/yr							
SHFo	Shielding Factor - Outdoor	1	unitless							

TR	Target Risk	1.00E-06	Risk							
IR-Sc	Ingestion Rate of Soil-child	200	mg/day							
FI	Fraction Ingested	1	unitless							
EF	Exposure Frequency	80	day/yr							
EDc	Exposure Duration-child	6	yr							
ACF	Area Correction Factor	0.9	unitless							
ETic	Exposure Time - Indoors-child	0	hr/hr	$child_{ing}$ - EDc x IR-Sc x FI x EF x 1E-03 g/mg x CSFo:	2.20E-07	7.77E-08	2.22E-08	1.52E-08	1.56E-08	2.02E-08
EFic	Exposure Frequency - Indoor-child	0	day/yr	$child_{ext}$ - EDc x ACF x CSFe x [(ETic x (EFic / 365 d/y) x SHFi) + (EToc x (EFoc / 365 d/y) x SHFo)]:	6.70E-07	1.15E-06	5.06E-11	3.73E-11	8.03E-08	1.69E-08
Conv. Fact		365	day/yr							
SHFi	Shielding Factor - Indoor	0	unitless	Child Sum:	8.90E-07	1.23E-06	2.22E-08	1.52E-08	9.60E-08	3.70E-08
EToc	Exposure Time - Outdoors-child	0.125	hr/hr							
EFoc	Exposure Frequency - Outdoor-child	80	day/yr							
SHFo	Shielding Factor - Outdoor	1	unitless							

Activity-Based PRG (pCi/g) = TR/(Adult Sum+Child Sum):	2.9E-01	1.9E-01	1.7E+01	2.5E+01	2.6E+00	7.9E+00

Notes

1 - See FS Appendix C except for highlighted values (see Attachment A)

Table 6 - Derivation of Site-Specific Human Health Preliminary Remediation Goals for Radionucildes - Soil - Recreational Visitor
Nuclear Metals Superfund Site

			Depleted Uranium		
Isotope	Specific Activity (pCi/g)	Receptor Scenario:	Recreational Visitor		Activity-Based PRG based on PRG - Mass and Mass Abundance (pCi/g)
			PRG - Activity (pCi/g)	PRG - Mass (mg/kg)	
		Total Uranium PRG:		**2.2E+01**	
		Mass Abundance			
U-238+D	3.35E+05	99.7982%	7.9E+00	2.4E+01	7.2E+00
U-235+D	2.16E+06	0.2009%	2.6E+00	5.9E+02	9.4E-02
U-234	6.24E+09	0.0009%	2.5E+01	4.4E+02	1.2E+00
				U-Total:	8.5E+00

			Thorium (as Th-232)	
Isotope	Specific Activity (pCi/g)	Receptor Scenario:	Recreational Visitor	
			PRG - Activity (pCi/g)	PRG - Mass (mg/kg)
		Total Thorium PRG:	**1.1E-01**	**1.0E+00**
		Mass Abundance		
Th-232	1.10E+05	100%	1.7E+01	1.5E+02
Ra-228+D	PRG is for Th-232 mass		2.9E-01	2.6E+00
Th-228+D	PRG is for Th-232 mass		1.9E-01	1.8E+00

PRG - Activity: PRGs for each isotope, expressed as actibivity, are calculated using equations provided in Table 5.

PRG - Mass: Calculated for each isotope as PRG-Activity x 1E+06 /specific activity / mass abundance

PRG - Mass (total): For total uranium and total throium calculated as: 1 / [(1/PRG-Mass for isotope) + (1/PRG-Mass for isotope) + (1/PRG-Mass for isotope)]

PRG - Activity (total): For thorium is calculated as: Activity PRG for Th-232 x Th mass PRG / Th-232 mass PRG. This results in a mass to activity conversion factor of 9.1 mg/kg per pCi/g

mg/Kg = milligram per kilogram

pCi/g = picoCurie per gram

B.5 – SOIL – INDOOR COMMERCIAL/INDUSTRIAL WORKER

TABLE 1

VALUES USED FOR DAILY INTAKE CALCULATIONS - COMMERCIAL/INDUSTRIAL WORKER - INDOOR

REASONABLE MAXIMUM EXPOSURE

NUCLEAR METALS SUPERFUND SITE

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion/Dermal	Comm. Worker	Adult					See FS Appendix C, except where noted	See attached
			THQ	Target Hazard Quotient	1	- -		
			CF	Conversion Factor	0.000001	kg/mg		
			ABS	Dermal Absorption Fraction	see FS Appendix C	- -		
			$AT\text{-}N_A$	Averaging Time (Non-Cancer) - adult	9,125	days		
			ED_A	Exposure Duration - adult	25	years		
			BW_A	Body Weight - adult	80	kg	See Attachment A	
			EF_A	Exposure Frequency - adult	161	days/year		
			IR_A	Ingestion Rate of Soil - adult	50	mg/day		
			SA_A	Surface Area - adult	3,527	cm^2	See Attachment A	
			AF_A	Adherence Factor - adult	0.02	mg/cm^2-day	(site specific)	
			RBA	Relative Bioavailability	0.6 for Arsenic/1 for all other analytes	- -		
			TR	Target ILCR	10^{-6} to 10^{-4}	- -		
			AT-C	Averaging Time (Cancer)	25,550	days		
			RfD_O	Oral Reference Dose	see ROD Table G-6	mg/kg-day		
			RfD_D	Dermal Reference Dose	see ROD Table G-6	mg/kg-day		
			SF_O	Oral Slope Factor	see ROD Table G-5	$(mg/kg\text{-}day)^{-1}$		
			SF_D	Dermal Slope Factor	see ROD Table G-5	$(mg/kg\text{-}day)^{-1}$		

Intake Equation/
Model Name

Preliminary Remediation Goal (PRG) non-cancer:

Ingestion - adult

$$PRG_{nc\text{-}ing}\ (mg/kg) = \frac{THQ \times AT\text{-}N_A \times RfD_o \times BW_A}{EF_A \times ED_A \times IR_A \times CF \times RBA}$$

Dermal - adult

$$PRG_{nc\text{-}derm}\ (mg/kg) = \frac{THQ \times AT\text{-}N_A \times RfD_D \times BW_A}{EF_A \times ED_A \times SA_A \times AF_A \times ABS \times CF}$$

Total - adult

$$PRG_{nc\text{-}tot}\ (mg/kg) = \frac{1}{1/PRG_{nc\text{-}ing} + 1/PRG_{nc\text{-}derm}}$$

Preliminary Remediation Goal (PRG) cancer:

Ingestion

$$PRG_{ca\text{-}ing}\ (mg/kg) = \frac{TR \times AT\text{-}C}{SF_o \times IFS_{adj} \times CF \times RBA}$$

$$IFS_{adj}\ (mg/kg) = \frac{ED_A \times EF_A \times IR_A}{BW_A}$$

Dermal

$$PRG_{ca\text{-}derm}\ (mg/kg) = \frac{TR \times AT\text{-}C}{SF_D \times DFS_{adj} \times ABS \times CF}$$

$$DFS_{adj}\ (mg/kg) = \frac{ED_A \times EF_A \times SA_A \times AF_A}{BW_A}$$

Total

$$PRG_{ca\text{-}tot}\ (mg/kg) = \frac{1}{1/PRG_{ca\text{-}ing} + 1/PRG_{ca\text{-}derm}}$$

Notes

IFS_{adj} - age-adjusted soil ingestion factor

DFS_{adj} - age-adjusted soil dermal factor

TABLE 2. INTERMEDIATE COMMERCIAL/INDUSTRIAL WORKER (INDOOR) SOIL PRG CALCULATIONS - INGESTION

Chemical	Mutagenic?	THQ	$AT\text{-}N_A$ days	RfD_o mg/kg-day	BW_A kg	EF_A days/yr	ED_A yrs	IR_A mg/day	CF kg/mg	RBA	TR	AT-C days	SF_o $(mg/kg\text{-}day)^{-1}$	IFS_{adj} mg/kg	$PRG_{ca\text{-}ing}$ mg/kg	$PRG_{nc\text{-}ing\text{-}adult}$ mg/kg
Benzo(a)anthracene	Y	1	9125	3E-02	80	161	25	50	0.000001	1	1E-06	25550	7.3E-01	2515.625	**1.4E+01**	**1.1E+05**
Benzo(a)pyrene	Y	1	9125	3E-02	80	161	25	50	0.000001	1	1E-06	25550	7.3E+00	2515.625	**1.4E+00**	**1.1E+05**
Benzo(b)fluoranthene	Y	1	9125	3E-02	80	161	25	50	0.000001	1	1E-06	25550	7.3E-01	2515.625	**1.4E+01**	**1.1E+05**
Indeno(1,2,3-cd)pyrene	Y	1	9125	3E-02	80	161	25	50	0.000001	1	1E-06	25550	7.3E-01	2515.625	**1.4E+01**	**1.1E+05**
Aroclor-1254		1	9125	2E-05	80	161	25	50	0.000001	1	1E-06	25550	2.0E+00	2515.625	**5.1E+00**	**7.3E+01**
Arsenic		1	9125	3E-04	80	161	25	50	0.000001	0.6	1E-06	25550	1.5E+00	2515.625	**1.1E+01**	**1.8E+03**
Thorium		1	9125	N/A	80	161	25	50	0.000001	1	1E-06	25550	NA	2515.625	**N/A**	**N/A**
Uranium		1	9125	6E-04	80	161	25	50	0.000001	1	1E-06	25550	NA	2515.625	**N/A**	**2.2E+03**

Notes

See Table 1 for input parameters and equations

N/A - Not applicable or not available.

TABLE 3. INTERMEDIATE COMMERCIAL/INDUSTRIAL WORKER (INDOOR) SOIL PRG CALCULATIONS - DERMAL

Chemical	Mutagenic?	THQ	$AT\text{-}N_A$ days	RfD_D mg/kg-day	BW_A kg	EF_A days/yr	ED_A yrs	SA_A cm^2	AF_A mg/cm^2-day	ABS	CF kg/mg	TR	AT-C days	SF_D $(mg/kg\text{-}day)^{-1}$	DFS_{adj} mg/kg	$PRG_{ca\text{-}derm}$ mg/kg	$PRG_{nc\text{-}derm\text{-}adult}$ mg/kg
Benzo(a)anthracene	Y	1	9125	3E-02	80	161	25	3527	0.02	0.13	0.000001	1E-06	25550	7.3E-01	3549	**7.6E+01**	**5.9E+05**
Benzo(a)pyrene	Y	1	9125	3E-02	80	161	25	3527	0.02	0.13	0.000001	1E-06	25550	7.3E+00	3549	**7.6E+00**	**5.9E+05**
Benzo(b)fluoranthene	Y	1	9125	3E-02	80	161	25	3527	0.02	0.13	0.000001	1E-06	25550	7.3E-01	3549	**7.6E+01**	**5.9E+05**
Indeno(1,2,3-cd)pyrene	Y	1	9125	3E-02	80	161	25	3527	0.02	0.13	0.000001	1E-06	25550	7.3E-01	3549	**7.6E+01**	**5.9E+05**
Aroclor-1254		1	9125	2E-05	80	161	25	3527	0.02	0.14	0.000001	1E-06	25550	2.0E+00	3549	**2.6E+01**	**3.7E+02**
Arsenic		1	9125	3E-04	80	161	25	3527	0.02	0.03	0.000001	1E-06	25550	1.5E+00	3549	**1.6E+02**	**2.6E+04**
Thorium		1	9125	N/A	80	161	25	3527	0.02	NA	0.000001	1E-06	25550	NA	3549	**N/A**	**N/A**
Uranium		1	9125	6E-04	80	161	25	3527	0.02	NA	0.000001	1E-06	25550	NA	3549	**N/A**	**N/A**

Notes

See Table 1 for input parameters and equations

N/A - Not applicable or not available.

TABLE 4. INTERMEDIATE COMMERCIAL/INDUSTRIAL WORKER (INDOOR) SOIL PRG CALCULATIONS - RESULTS

	Carcinogenic Risk Level = 1E-06			Non-Cancer HQ = 1 - Adult		
Chemical	$PRG_{ca\text{-}ing}$ mg/kg	$PRG_{ca\text{-}derm}$ mg/kg	Result mg/kg	$PRG_{nc\text{-}ing}$ mg/kg	$PRG_{nc\text{-}derm}$ mg/kg	Result mg/kg
Benzo(a)anthracene	1.4E+01	7.6E+01	**1.2E+01**	1.1E+05	5.9E+05	**9.2E+04**
Benzo(a)pyrene	1.4E+00	7.6E+00	**1.2E+00**	1.1E+05	5.9E+05	**9.2E+04**
Benzo(b)fluoranthene	1.4E+01	7.6E+01	**1.2E+01**	1.1E+05	5.9E+05	**9.2E+04**
Indeno(1,2,3-cd)pyrene	1.4E+01	7.6E+01	**1.2E+01**	1.1E+05	5.9E+05	**9.2E+04**
Aroclor-1254	5.1E+00	2.6E+01	**4.2E+00**	7.3E+01	3.7E+02	**6.1E+01**
Arsenic	1.1E+01	1.6E+02	**1.1E+01**	1.8E+03	2.6E+04	**1.7E+03**
Thorium	N/A	N/A	**N/A**	N/A	N/A	**N/A**
Uranium	N/A	N/A	**N/A**	2.2E+03	N/A	**2.2E+03**

Notes

See Table 1 for equations

HQ = Hazard Quotient

N/A - Not applicable or not available.

TABLE 5. RADIOLOGICAL PRG DEVELOPMENT - INTERMEDIATE CALCULATIONS - INDOOR COMMERCIAL/INDUSTRIAL WORKER - SOIL

$$\text{PRG (cancer) - Radionuclide COC (pCi/g)} = \frac{TR}{\{ED \times IR\text{-}S \times FI \times EF \times 1E\text{-}03\ g/mg \times CSFo\} + \{ED \times ACF \times CSFe \times [(ETi \times (EFi / 365\ d/y) \times SHFi) + (ETo \times (EFo / 365\ d/y) \times SHFo)]\} + \{[(IR\text{-}V \times FI\text{-}V) + (IR\text{-}F \times FI\text{-}F)] \times UPF \times EF \times ED \times CSFi\}}$$

Exposure Parameters[1]

TR	Target Risk	1.00E-06	Risk
IR-Sa	Ingestion Rate of Soil-adult	50	mg/day
FI	Fraction Ingested	1	unitless
EF	Exposure Frequency	161	day/yr
EDa	Exposure Duration-adult	25	yr
ACF	Area Correction Factor	0.9	unitless
ETia	Exposure Time - Indoors-adult	0.33	hr/hr
EFia	Exposure Frequency - Indoor-adult	250	day/yr
Conv. Fact		365	day/yr
SHFi	Shielding Factor - Indoor	0.4	unitless
EToa	Exposure Time - Outdoors-adult	0.042	hr/hr
EFoa	Exposure Frequency - Outdoor-adult	186	day/yr
SHFo	Shielding Factor - Outdoor	1	unitless

		Ra-228+D	Th-228+D	Th-232	U-234	U-235+D	U-238+D
Cancer Slope Factor - Soil Ingestion-Whole Pop.	CSFo (Risk/pCi) - see ROD Table G-5:	6.70E-10	1.62E-10	8.47E-11	5.11E-11	5.03E-11	5.62E-11
Cancer Slope Factor - External Exposure	CSFe (Risk/pCi) - see ROD Table G-5:	4.53E-06	7.76E-06	3.42E-10	2.52E-10	5.43E-07	1.14E-07
	$adult_{ing}$ - EDa x IR-Sa x FI x EF x 1E-03 g/mg x CSFo:	1.35E-07	3.26E-08	1.70E-08	1.03E-08	1.01E-08	1.13E-08
	$adult_{ext}$ - EDa x ACF x CSFe x [(ETia x (EFia / 365 d/y) x SHFi) + (EToa x (EFoa / 365 d/y) x SHFo)]:	1.14E-05	1.95E-05	8.60E-10	6.34E-10	1.37E-06	2.87E-07
	Adult Sum:	1.15E-05	1.96E-05	1.79E-08	1.09E-08	1.38E-06	2.98E-07
	Activity-Based PRG (pCi/g) = TR/Sum:	8.7E-02	5.1E-02	5.6E+01	9.2E+01	7.3E-01	3.4E+00

Notes

1 - See FS Appendix C except for highlighted values (see Attachment A)

Table 6 - Derivation of Site-Specific Human Health Preliminary Remediation Goals for Radionucildes - Soil - Commercial/Industrial Worker - Indoor
Nuclear Metals Superfund Site

			Depleted Uranium		
Isotope	Specific Activity (pCi/g)	Receptor Scenario:	C/I Worker - Indoor		Activity-Based PRG based on PRG - Mass and Mass Abundance (pCi/g)
			PRG - Activity (pCi/g)	PRG - Mass (mg/kg)	
		Total Uranium PRG:		**9.4E+00**	
		Mass Abundance			
U-238+D	3.35E+05	99.7982%	3.4E+00	1.0E+01	3.1E+00
U-235+D	2.16E+06	0.2009%	7.3E-01	1.7E+02	4.1E-02
U-234	6.24E+09	0.0009%	9.2E+01	1.6E+03	5.3E-01
				U-Total:	3.7E+00

			Thorium (as Th-232)	
Isotope	Specific Activity (pCi/g)	Receptor Scenario:	C/I Worker - Indoor	
			PRG - Activity (pCi/g)	PRG - Mass (mg/kg)
		Total Thorium PRG:	**3.2E-02**	**2.9E-01**
		Mass Abundance		
Th-232	1.10E+05	100%	5.6E+01	5.1E+02
Ra-228+D	PRG is for Th-232 mass		8.7E-02	7.9E-01
Th-228+D	PRG is for Th-232 mass		5.1E-02	4.6E-01

PRG - Activity: PRGs for each isotope, expressed as actibivity, are calculated using equations provided in Table 5.

PRG - Mass: Calculated for each isotope as PRG-Activity x 1E+06 /specific activity / mass abundance

PRG - Mass (total): For total uranium and total throium calculated as: 1 / [(1/PRG-Mass for isotope) + (1/PRG-Mass for isotope) + (1/PRG-Mass for isotope)]

PRG - Activity (total): For thorium is calculated as: Activity PRG for Th-232 x Th mass PRG / Th-232 mass PRG. This results in a mass to activity conversion factor of 9.1 mg/kg per pCi/g

mg/Kg = milligram per kilogram

pCi/g = picoCurie per gram

B.6 – SOIL – OUTDOOR COMMERCIAL/INDUSTRIAL WORKER

TABLE 1

VALUES USED FOR DAILY INTAKE CALCULATIONS - COMMERCIAL/INDUSTRIAL WORKER - OUTDOOR

REASONABLE MAXIMUM EXPOSURE

NUCLEAR METALS SUPERFUND SITE

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion/Dermal	Comm. Worker	Adult					See FS Appendix C, except where noted	See attached
			THQ	Target Hazard Quotient	1	- -		
			CF	Conversion Factor	0.000001	kg/mg		
			ABS	Dermal Absorption Fraction	see FS Appendix C	- -		
			$AT\text{-}N_A$	Averaging Time (Non-Cancer) - adult	9,125	days		
			ED_A	Exposure Duration - adult	25	years		
			BW_A	Body Weight - adult	80	kg	See Attachment A	
			EF_A	Exposure Frequency - adult	161	days/year		
			IR_A	Ingestion Rate of Soil - adult	100	mg/day		
			SA_A	Surface Area - adult	3,527	cm^2	See Attachment A	
			AF_A	Adherence Factor - adult	0.12	mg/cm^2-day	See Attachment A	
			RBA	Relative Bioavailability	0.6 for Arsenic/1 for all other analytes	- -		
			TR	Target ILCR	10^{-6} to 10^{-4}	- -		
			AT-C	Averaging Time (Cancer)	25,550	days		
			RfD_O	Oral Reference Dose	see ROD Table G-6	mg/kg-day		
			RfD_D	Dermal Reference Dose	see ROD Table G-6	mg/kg-day		
			SF_O	Oral Slope Factor	see ROD Table G-5	$(mg/kg\text{-}day)^{-1}$		
			SF_D	Dermal Slope Factor	see ROD Table G-5	$(mg/kg\text{-}day)^{-1}$		

Intake Equation/
Model Name

Preliminary Remediation Goal (PRG) non-cancer:

Ingestion - adult

$$PRG_{nc\text{-}ing}\ (mg/kg) = \frac{THQ \times AT\text{-}N_A \times RfD_o \times BW_A}{EF_A \times ED_A \times IR_A \times CF \times RBA}$$

Dermal - adult

$$PRG_{nc\text{-}derm}\ (mg/kg) = \frac{THQ \times AT\text{-}N_A \times RfD_D \times BW_A}{EF_A \times ED_A \times SA_A \times AF_A \times ABS \times CF}$$

Total - adult

$$PRG_{nc\text{-}tot}\ (mg/kg) = \frac{1}{1/PRG_{nc\text{-}ing} + 1/PRG_{nc\text{-}derm}}$$

Preliminary Remediation Goal (PRG) cancer:

Ingestion

$$PRG_{ca\text{-}ing}\ (mg/kg) = \frac{TR \times AT\text{-}C}{SF_o \times IFS_{adj} \times CF \times RBA}$$

$$IFS_{adj}\ (mg/kg) = \frac{ED_A \times EF_A \times IR_A}{BW_A}$$

Dermal

$$PRG_{ca\text{-}derm}\ (mg/kg) = \frac{TR \times AT\text{-}C}{SF_D \times DFS_{adj} \times ABS \times CF}$$

$$DFS_{adj}\ (mg/kg) = \frac{ED_A \times EF_A \times SA_A \times AF_A}{BW_A}$$

Total

$$PRG_{ca\text{-}tot}\ (mg/kg) = \frac{1}{1/PRG_{ca\text{-}ing} + 1/PRG_{ca\text{-}derm}}$$

Notes

IFS_{adj} - age-adjusted soil ingestion factor

DFS_{adj} - age-adjusted soil dermal factor

TABLE 2. INTERMEDIATE COMMERCIAL/INDUSTRIAL WORKER (OUTDOOR) SOIL PRG CALCULATIONS - INGESTION

Chemical	Mutagenic?	THQ	$AT\text{-}N_A$ days	RfD_o mg/kg-day	BW_A kg	EF_A days/yr	ED_A yrs	IR_A mg/day	CF kg/mg	RBA	TR	AT-C days	SF_o $(mg/kg\text{-}day)^{-1}$	IFS_{adj} mg/kg	$PRG_{ca\text{-}ing}$ mg/kg	$PRG_{nc\text{-}ing\text{-}adult}$ mg/kg
Benzo(a)anthracene	Y	1	9125	3E-02	80	161	25	100	0.000001	1	1E-06	25550	7.3E-01	5031.25	**7.0E+00**	**5.4E+04**
Benzo(a)pyrene	Y	1	9125	3E-02	80	161	25	100	0.000001	1	1E-06	25550	7.3E+00	5031.25	**7.0E-01**	**5.4E+04**
Benzo(b)fluoranthene	Y	1	9125	3E-02	80	161	25	100	0.000001	1	1E-06	25550	7.3E-01	5031.25	**7.0E+00**	**5.4E+04**
Indeno(1,2,3-cd)pyrene	Y	1	9125	3E-02	80	161	25	100	0.000001	1	1E-06	25550	7.3E-01	5031.25	**7.0E+00**	**5.4E+04**
Aroclor-1254		1	9125	2E-05	80	161	25	100	0.000001	1	1E-06	25550	2.0E+00	5031.25	**2.5E+00**	**3.6E+01**
Arsenic		1	9125	3E-04	80	161	25	100	0.000001	0.6	1E-06	25550	1.5E+00	5031.25	**5.6E+00**	**9.1E+02**
Thorium		1	9125	N/A	80	161	25	100	0.000001	1	1E-06	25550	NA	5031.25	**N/A**	**N/A**
Uranium		1	9125	6E-04	80	161	25	100	0.000001	1	1E-06	25550	NA	5031.25	**N/A**	**1.1E+03**

Notes

See Table 1 for input parameters and equations

N/A - Not applicable or not available.

TABLE 3. INTERMEDIATE COMMERCIAL/INDUSTRIAL WORKER (OUTDOOR) SOIL PRG CALCULATIONS - DERMAL

Chemical	Mutagenic?	THQ	$AT\text{-}N_A$ days	RfD_D mg/kg-day	BW_A kg	EF_A days/yr	ED_A yrs	SA_A cm^2	AF_A mg/cm^2-day	ABS	CF kg/mg	TR	AT-C days	SF_D $(mg/kg\text{-}day)^{-1}$	DFS_{adj} mg/kg	$PRG_{ca\text{-}derm}$ mg/kg	$PRG_{nc\text{-}derm\text{-}adult}$ mg/kg
Benzo(a)anthracene	Y	1	9125	3E-02	80	161	25	3527	0.12	0.13	0.000001	1E-06	25550	7.3E-01	21294	**1.3E+01**	**9.9E+04**
Benzo(a)pyrene	Y	1	9125	3E-02	80	161	25	3527	0.12	0.13	0.000001	1E-06	25550	7.3E+00	21294	**1.3E+00**	**9.9E+04**
Benzo(b)fluoranthene	Y	1	9125	3E-02	80	161	25	3527	0.12	0.13	0.000001	1E-06	25550	7.3E-01	21294	**1.3E+01**	**9.9E+04**
Indeno(1,2,3-cd)pyrene	Y	1	9125	3E-02	80	161	25	3527	0.12	0.13	0.000001	1E-06	25550	7.3E-01	21294	**1.3E+01**	**9.9E+04**
Aroclor-1254		1	9125	2E-05	80	161	25	3527	0.12	0.14	0.000001	1E-06	25550	2.0E+00	21294	**4.3E+00**	**6.1E+01**
Arsenic		1	9125	3E-04	80	161	25	3527	0.12	0.03	0.000001	1E-06	25550	1.5E+00	21294	**2.7E+01**	**4.3E+03**
Thorium		1	9125	N/A	80	161	25	3527	0.12	NA	0.000001	1E-06	25550	NA	21294	**N/A**	**N/A**
Uranium		1	9125	6E-04	80	161	25	3527	0.12	NA	0.000001	1E-06	25550	NA	21294	**N/A**	**N/A**

Notes

See Table 1 for input parameters and equations

N/A - Not applicable or not available.

TABLE 4. INTERMEDIATE COMMERCIAL/INDUSTRIAL WORKER (OUTDOOR) SOIL PRG CALCULATIONS - RESULTS

	Carcinogenic Risk Level = 1E-06			Non-Cancer HQ = 1 - Adult		
Chemical	$PRG_{ca\text{-}ing}$ mg/kg	$PRG_{ca\text{-}derm}$ mg/kg	Result mg/kg	$PRG_{nc\text{-}ing}$ mg/kg	$PRG_{nc\text{-}derm}$ mg/kg	Result mg/kg
Benzo(a)anthracene	7.0E+00	1.3E+01	**4.5E+00**	5.4E+04	9.9E+04	**3.5E+04**
Benzo(a)pyrene	7.0E-01	1.3E+00	**4.5E-01**	5.4E+04	9.9E+04	**3.5E+04**
Benzo(b)fluoranthene	7.0E+00	1.3E+01	**4.5E+00**	5.4E+04	9.9E+04	**3.5E+04**
Indeno(1,2,3-cd)pyrene	7.0E+00	1.3E+01	**4.5E+00**	5.4E+04	9.9E+04	**3.5E+04**
Aroclor-1254	2.5E+00	4.3E+00	**1.6E+00**	3.6E+01	6.1E+01	**2.3E+01**
Arsenic	5.6E+00	2.7E+01	**4.7E+00**	9.1E+02	4.3E+03	**7.5E+02**
Thorium	N/A	N/A	**N/A**	N/A	N/A	**N/A**
Uranium	N/A	N/A	**N/A**	1.1E+03	N/A	**1.1E+03**

Notes

See Table 1 for equations

HQ = Hazard Quotient

N/A - Not applicable or not available.

TABLE 5. RADIOLOGICAL PRG DEVELOPMENT - INTERMEDIATE CALCULATIONS - OUTDOOR COMMERCIAL/INDUSTRIAL WORKER - SOIL

$$\text{PRG (cancer) - Radionuclide COC (pCi/g)} = \frac{TR}{\{ED \times IR\text{-}S \times FI \times EF \times 1E\text{-}03\ g/mg \times CSFo\} + \{ED \times ACF \times CSFe \times [(ETi \times (EFi / 365\ d/y) \times SHFi) + (ETo \times (EFo / 365\ d/y) \times SHFo)]\} + \{[(IR\text{-}V \times FI\text{-}V) + (IR\text{-}F \times FI\text{-}F)] \times UPF \times EF \times ED \times CSFi\}}$$

Exposure Parameters[1]

TR	Target Risk	1.00E-06	Risk
IR-Sa	Ingestion Rate of Soil-adult	100	mg/day
FI	Fraction Ingested	1	unitless
EF	Exposure Frequency	161	day/yr
EDa	Exposure Duration-adult	25	yr
ACF	Area Correction Factor	0.9	unitless
ETia	Exposure Time - Indoors-adult	0	hr/hr
EFia	Exposure Frequency - Indoor-adult	0	day/yr
Conv. Fact		365	day/yr
SHFi	Shielding Factor - Indoor	0	unitless
EToa	Exposure Time - Outdoors-adult	0.33	hr/hr
EFoa	Exposure Frequency - Outdoor-adult	225	day/yr
SHFo	Shielding Factor - Outdoor	1	unitless

		Ra-228+D	Th-228+D	Th-232	U-234	U-235+D	U-238+D
Cancer Slope Factor - Soil Ingestion-Whole Pop.	CSFo (Risk/pCi) - see ROD Table G-5:	6.70E-10	1.62E-10	8.47E-11	5.11E-11	5.03E-11	5.62E-11
Cancer Slope Factor - External Exposure	CSFe (Risk/pCi) - see ROD Table G-5:	4.53E-06	7.76E-06	3.42E-10	2.52E-10	5.43E-07	1.14E-07
	$adult_{ing}$ - EDa x IR-Sa x FI x EF x 1E-03 g/mg x CSFo:	2.70E-07	6.52E-08	3.41E-08	2.06E-08	2.02E-08	2.26E-08
	$adult_{ext}$ - EDa x ACF x CSFe x [(ETia x (EFia / 365 d/y) x SHFi) + (EToa x (EFoa / 365 d/y) x SHFo)]:	2.07E-05	3.5SE-05	1.57E-09	1.15E-09	2.49E-06	5.22E-07
	Adult Sum:	2.10E-05	3.56E-05	3.57E-08	2.17E-08	2.51E-06	5.44E-07
	Activity-Based PRG (pCi/g) = TR/Sum:	4.8E-02	2.8E-02	2.8E+01	4.6E+01	4.0E-01	1.8E+00

Notes

1 - See FS Appendix C except for highlighted values (see Attachment A)

Table 6 - Derivation of Site-Specific Human Health Preliminary Remediation Goals for Radionucildes - Soil - Commercial/Industrial Worker - Outdoor
Nuclear Metals Superfund Site

			Depleted Uranium		
Isotope	Specific Activity (pCi/g)	Receptor Scenario:	C/I Worker - Outdoor		Activity-Based PRG based on PRG - Mass and Mass Abundance (pCi/g)
			PRG - Activity (pCi/g)	PRG - Mass (mg/kg)	
		Total Uranium PRG:		**5.1E+00**	
		Mass Abundance			
U-238+D	3.35E+05	99.7982%	1.8E+00	5.5E+00	1.7E+00
U-235+D	2.16E+06	0.2009%	4.0E-01	9.2E+01	2.2E-02
U-234	6.24E+09	0.0009%	4.6E+01	8.2E+02	2.9E-01
				U-Total:	2.0E+00

			Thorium (as Th-232)	
Isotope	Specific Activity (pCi/g)	Receptor Scenario:	C/I Worker - Outdoor	
			PRG - Activity (pCi/g)	PRG - Mass (mg/kg)
		Total Thorium PRG:	**1.8E-02**	**1.6E-01**
		Mass Abundance		
Th-232	1.10E+05	100%	2.8E+01	2.5E+02
Ra-228+D	PRG is for Th-232 mass		4.8E-02	4.3E-01
Th-228+D	PRG is for Th-232 mass		2.8E-02	2.6E-01

PRG - Activity: PRGs for each isotope, expressed as actibivity, are calculated using equations provided in Table 5.

PRG - Mass: Calculated for each isotope as PRG-Activity x 1E+06 /specific activity / mass abundance

PRG - Mass (total): For total uranium and total throium calculated as: 1 / [(1/PRG-Mass for isotope) + (1/PRG-Mass for isotope) + (1/PRG-Mass for isotope)]

PRG - Activity (total): For thorium is calculated as: Activity PRG for Th-232 x Th mass PRG / Th-232 mass PRG. This results in a mass to activity conversion factor of 9.1 mg/kg per pCi/g

mg/Kg = milligram per kilogram

pCi/g = picoCurie per gram

B.7 – SOIL – CONSTRUCTION WORKER

TABLE 1

VALUES USED FOR DAILY INTAKE CALCULATIONS - CONSTRUCTION WORKER

REASONABLE MAXIMUM EXPOSURE

NUCLEAR METALS SUPERFUND SITE

Scenario Timeframe: Future
Medium: Soil
Exposure Medium: Surface/Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation/ Model Name
Ingestion/Dermal	Const. Worker	Adult					See FS Appendix C, except where noted	See attached
			THQ	Target Hazard Quotient	1	- -		
			CF	Conversion Factor	0.000001	kg/mg		
			ABS	Dermal Absorption Fraction	see FS Appendix C	- -		
			$AT\text{-}N_A$	Averaging Time (Non-Cancer) - adult	365	days		
			ED_A	Exposure Duration - adult	1	years		
			BW_A	Body Weight - adult	80	kg	See Attachment A	
			EF_A	Exposure Frequency - adult	250	days/year		
			IR_A	Ingestion Rate of Soil - adult	330	mg/day		
			SA_A	Surface Area - adult	3,527	cm^2	See Attachment A	
			AF_A	Adherence Factor - adult	0.30	mg/cm^2-day	(site specific)	
			RBA	Relative Bioavailability	0.6 for Arsenic/1 for all other analytes	- -		
			TR	Target ILCR	10^{-6} to 10^{-4}	- -		
			AT-C	Averaging Time (Cancer)	25,550	days		
			RfD_O	Oral Reference Dose	see ROD Table G-6	mg/kg-day		
			RfD_D	Dermal Reference Dose	see ROD Table G-6	mg/kg-day		
			SF_O	Oral Slope Factor	see ROD Table G-5	$(mg/kg\text{-}day)^{-1}$		
			SF_D	Dermal Slope Factor	see ROD Table G-5	$(mg/kg\text{-}day)^{-1}$		

Intake Equation/
Model Name

Preliminary Remediation Goal (PRG) non-cancer:

Ingestion - adult

$$PRG_{nc\text{-}ing}\ (mg/kg) = \frac{THQ \times AT\text{-}N_A \times RfD_o \times BW_A}{EF_A \times ED_A \times IR_A \times CF \times RBA}$$

Dermal - adult

$$PRG_{nc\text{-}derm}\ (mg/kg) = \frac{THQ \times AT\text{-}N_A \times RfD_D \times BW_A}{EF_A \times ED_A \times SA_A \times AF_A \times ABS \times CF}$$

Total - adult

$$PRG_{nc\text{-}tot}\ (mg/kg) = \frac{1}{1/PRG_{nc\text{-}ing} + 1/PRG_{nc\text{-}derm}}$$

Preliminary Remediation Goal (PRG) cancer:

Ingestion

$$PRG_{ca\text{-}ing}\ (mg/kg) = \frac{TR \times AT\text{-}C}{SF_o \times IFS_{adj} \times CF \times RBA}$$

$$IFS_{adj}\ (mg/kg) = \frac{ED_A \times EF_A \times IR_A}{BW_A}$$

Dermal

$$PRG_{ca\text{-}derm}\ (mg/kg) = \frac{TR \times AT\text{-}C}{SF_D \times DFS_{adj} \times ABS \times CF}$$

$$DFS_{adj}\ (mg/kg) = \frac{ED_A \times EF_A \times SA_A \times AF_A}{BW_A}$$

Total

$$PRG_{ca\text{-}tot}\ (mg/kg) = \frac{1}{1/PRG_{ca\text{-}ing} + 1/PRG_{ca\text{-}derm}}$$

Notes

IFS_{adj} - age-adjusted soil ingestion factor

DFS_{adj} - age-adjusted soil dermal factor

TABLE 2. INTERMEDIATE CONSTRUCTION WORKER SOIL PRG CALCULATIONS - INGESTION

Chemical	Mutagenic?	THQ	$AT\text{-}N_A$ days	RfD_o mg/kg-day	BW_A kg	EF_A days/yr	ED_A yrs	IR_A mg/day	CF kg/mg	RBA	TR	AT-C days	SF_o $(mg/kg\text{-}day)^{-1}$	IFS_{adj} mg/kg	$PRG_{ca\text{-}ing}$ mg/kg	$PRG_{nc\text{-}ing\text{-}adult}$ mg/kg
Benzo(a)anthracene	Y	1	365	3E-01	80	250	1	330	0.000001	1	1E-06	25550	7.3E-01	1031.25	**3.4E+01**	**1.1E+05**
Benzo(a)pyrene	Y	1	365	3E-01	80	250	1	330	0.000001	1	1E-06	25550	7.3E+00	1031.25	**3.4E+00**	**1.1E+05**
Benzo(b)fluoranthene	Y	1	365	3E-01	80	250	1	330	0.000001	1	1E-06	25550	7.3E-01	1031.25	**3.4E+01**	**1.1E+05**
Indeno(1,2,3-cd)pyrene	Y	1	365	3E-01	80	250	1	330	0.000001	1	1E-06	25550	7.3E-01	1031.25	**3.4E+01**	**1.1E+05**
Aroclor-1254		1	365	5E-05	80	250	1	330	0.000001	1	1E-06	25550	2.0E+00	1031.25	**1.2E+01**	**1.8E+01**
Arsenic		1	365	3E-04	80	250	1	330	0.000001	0.6	1E-06	25550	1.5E+00	1031.25	**2.8E+01**	**1.8E+02**
Thorium		1	365	N/A	80	250	1	330	0.000001	1	1E-06	25550	NA	1031.25	**N/A**	**N/A**
Uranium		1	365	2E-04	80	250	1	330	0.000001	1	1E-06	25550	NA	1031.25	**N/A**	**7.1E+01**

Notes

See Table 1 for input parameters and equations

N/A - Not applicable or not available.

TABLE 3. INTERMEDIATE CONSTRUCTION WORKER SOIL PRG CALCULATIONS - DERMAL

Chemical	Mutagenic?	THQ	$AT\text{-}N_A$ days	RfD_D mg/kg-day	BW_A kg	EF_A days/yr	ED_A yrs	SA_A cm^2	AF_A mg/cm^2-day	ABS	CF kg/mg	TR	AT-C days	SF_D $(mg/kg\text{-}day)^{-1}$	DFS_{adj} mg/kg	$PRG_{ca\text{-}derm}$ mg/kg	$PRG_{nc\text{-}derm\text{-}adult}$ mg/kg
Benzo(a)anthracene	Y	1	365	3E-01	80	250	1	3527	0.3	0.13	0.000001	1E-06	25550	7.3E-01	3307	**8.1E+01**	**2.6E+05**
Benzo(a)pyrene	Y	1	365	3E-01	80	250	1	3527	0.3	0.13	0.000001	1E-06	25550	7.3E+00	3307	**8.1E+00**	**2.6E+05**
Benzo(b)fluoranthene	Y	1	365	3E-01	80	250	1	3527	0.3	0.13	0.000001	1E-06	25550	7.3E-01	3307	**8.1E+01**	**2.6E+05**
Indeno(1,2,3-cd)pyrene	Y	1	365	3E-01	80	250	1	3527	0.3	0.13	0.000001	1E-06	25550	7.3E-01	3307	**8.1E+01**	**2.6E+05**
Aroclor-1254		1	365	5E-05	80	250	1	3527	0.3	0.14	0.000001	1E-06	25550	2.0E+00	3307	**2.8E+01**	**3.9E+01**
Arsenic		1	365	3E-04	80	250	1	3527	0.3	0.03	0.000001	1E-06	25550	1.5E+00	3307	**1.7E+02**	**1.1E+03**
Thorium		1	365	N/A	80	250	1	3527	0.3	NA	0.000001	1E-06	25550	NA	3307	**N/A**	**N/A**
Uranium		1	365	2E-04	80	250	1	3527	0.3	NA	0.000001	1E-06	25550	NA	3307	**N/A**	**N/A**

Notes

See Table 1 for input parameters and equations

N/A - Not applicable or not available.

TABLE 4. INTERMEDIATE CONSTRUCTION WORKER SOIL PRG CALCULATIONS - RESULTS

Chemical	Carcinogenic Risk Level = 1E-06			Non-Cancer HQ = 1 - Adult		
	$PRG_{ca\text{-}ing}$ mg/kg	$PRG_{ca\text{-}derm}$ mg/kg	Result mg/kg	$PRG_{nc\text{-}ing}$ mg/kg	$PRG_{nc\text{-}derm}$ mg/kg	Result mg/kg
Benzo(a)anthracene	3.4E+01	8.1E+01	**2.4E+01**	1.1E+05	2.6E+05	**7.7E+04**
Benzo(a)pyrene	3.4E+00	8.1E+00	**2.4E+00**	1.1E+05	2.6E+05	**7.7E+04**
Benzo(b)fluoranthene	3.4E+01	8.1E+01	**2.4E+01**	1.1E+05	2.6E+05	**7.7E+04**
Indeno(1,2,3-cd)pyrene	3.4E+01	8.1E+01	**2.4E+01**	1.1E+05	2.6E+05	**7.7E+04**
Aroclor-1254	1.2E+01	2.8E+01	**8.5E+00**	1.8E+01	3.9E+01	**1.2E+01**
Arsenic	2.8E+01	1.7E+02	**2.4E+01**	1.8E+02	1.1E+03	**1.5E+02**
Thorium	N/A	N/A	**N/A**	N/A	N/A	**N/A**
Uranium	N/A	N/A	**N/A**	7.1E+01	N/A	**7.1E+01**

Notes

See Table 1 for equations

HQ = Hazard Quotient

N/A - Not applicable or not available.

TABLE 5. RADIOLOGICAL PRG DEVELOPMENT - INTERMEDIATE CALCULATIONS - CONSTRUCTION WORKER - SOIL

$$\text{PRG (cancer) - Radionuclide COC (pCi/g)} = \frac{TR}{\{ED \times IR\text{-}S \times FI \times EF \times 1E\text{-}03\ g/mg \times CSFo\} + \{ED \times ACF \times CSFe \times [(ETi \times (EFi / 365\ d/y) \times SHFi) + (ETo \times (EFo / 365\ d/y) \times SHFo)]\} + \{[(IR\text{-}V \times FI\text{-}V) + (IR\text{-}F \times FI\text{-}F)] \times UPF \times EF \times ED \times CSFi\}}$$

Exposure Parameters[1]

						Ra-228+D	Th-228+D	Th-232	U-234	U-235+D	U-238+D
TR	Target Risk	1.00E-06	Risk								
IR-Sa	Ingestion Rate of Soil-adult	300	mg/day								
FI	Fraction Ingested	1	unitless	Cancer Slope Factor - Soil Ingestion-Whole Pop.	CSFo (Risk/pCi) - see ROD Table G-5:	6.70E-10	1.62E-10	8.47E-11	5.11E-11	5.03E-11	5.62E-11
EF	Exposure Frequency	250	day/yr	Cancer Slope Factor - External Exposure	CSFe (Risk/pCi) - see ROD Table G-5:	4.53E-06	7.76E-06	3.42E-10	2.52E-10	5.43E-07	1.14E-07
EDa	Exposure Duration-adult	1	yr								
ACF	Area Correction Factor	0.9	unitless								
ETia	Exposure Time - Indoors-adult	0	hr/hr		$adult_{ing}$ - EDa x IR-Sa x FI x EF x 1E-03 g/mg x CSFo:	5.03E-08	1.22E-08	6.35E-09	3.83E-09	3.77E-09	4.22E-09
EFia	Exposure Frequency - Indoor-adult	0	day/yr		$adult_{ext}$ - EDa x ACF x CSFe x [(ETia x (EFia / 365 d/y) x SHFi) + (EToa x (EFoa / 365 d/y) x SHFo)]:	9.22E-07	1.58E-06	6.96E-11	5.13E-11	1.10E-07	2.32E-08
Conv. Fact		365	day/yr								
SHFi	Shielding Factor - Indoor	0	unitless		Adult Sum:	9.72E-07	1.59E-06	6.42E-09	3.88E-09	1.14E-07	2.74E-08
EToa	Exposure Time - Outdoors-adult	0.33	hr/hr		Activity-Based PRG (pCi/g) = TR/Sum:	1.0E+00	6.3E-01	1.6E+02	2.6E+02	8.8E+00	3.6E+01
EFoa	Exposure Frequency - Outdoor-adult	250	day/yr								
SHFo	Shielding Factor - Outdoor	1	unitless								

Notes

1 - See FS Appendix C except for highlighted values (see Attachment A)

Table 6 - Derivation of Site-Specific Human Health Preliminary Remediation Goals for Radionucildes - Soil - Construction Worker
Nuclear Metals Superfund Site

Depleted Uranium					
Isotope	Specific Activity (pCi/g)	Receptor Scenario:	Construction Worker		Activity-Based PRG based on PRG - Mass and Mass Abundance (pCi/g)[1]
			PRG - Activity (pCi/g)	PRG - Mass (mg/kg)	
		Total Uranium PRG:		**1.0E+02**	
		Mass Abundance			
U-238+D	3.35E+05	99.7982%	3.6E+01	1.1E+02	2.4E+01
U-235+D	2.16E+06	0.2009%	8.8E+00	2.0E+03	3.1E-01
U-234	6.24E+09	0.0009%	2.6E+02	4.6E+03	4.0E+00
				U-Total:	2.8E+01

Thorium (as Th-232)				
Isotope	Specific Activity (pCi/g)	Receptor Scenario:	Construction Worker	
			PRG - Activity (pCi/g)	PRG - Mass (mg/kg)
		Total Thorium PRG:	**3.9E-01**	**3.5E+00**
		Mass Abundance		
Th-232	1.10E+05	100%	1.6E+02	1.4E+03
Ra-228+D	PRG is for Th-232 mass		1.0E+00	9.4E+00
Th-228+D	PRG is for Th-232 mass		6.3E-01	5.7E+00

PRG - Activity: PRGs for each isotope, expressed as actibivity, are calculated using equations provided in Table 5.

PRG - Mass: Calculated for each isotope as PRG-Activity x 1E+06 /specific activity / mass abundance

PRG - Mass (total): For total uranium and total throium calculated as: 1 / [(1/PRG-Mass for isotope) + (1/PRG-Mass for isotope) + (1/PRG-Mass for isotope)]

PRG - Activity (total): For thorium is calculated as: Activity PRG for Th-232 x Th mass PRG / Th-232 mass PRG. This results in a mass to activity conversion factor of 9.1 mg/kg per pCi/g

mg/Kg = milligram per kilogram

pCi/g = picoCurie per gram

1 - The non-cancer risk-based PRG (71 mg/kg) is lower than the cancer PRG (100 mg/kg) presented here (see Attachment B.8). The calculations developing the activity-based PRGs based on the mass-based PRG and mass abundance are for the non-cancer PRG of 71 mg/kg.

B.8 – FS PRG SUMMARY TABLES

Table 2.3.2 - Summary of Site-Specific Preliminary Remediation Goals and Residual Risks - Soil
Nuclear Metals Superfund Site

Chemical of Concern	Receptor Scenario	Preliminary Remedition Goals (mg/kg)						Detection Limits [1] (mg/kg)	Background [2] (mg/kg)	ARAR/Policy (mg/kg)	Selected PRG (mg/kg)		Selected PRG (pCi/g)	Residual Risk at PRG [4]	
		Based on Excess Liftime Cancer Risk			Based on Hazard Index									Excess Lifetime Cancer Risk	Hazard Index
		$1x10^{-6}$	$1x10^{-5}$	$1x10^{-4}$	0.1	1	10								
Benzo(a)anthracene	Resident	0.34	3.4	34	390	3,900	39,000	0.034 - 0.52	0.033	Not Applicable	0.34	c	--	1E-06	0.00009
	Recreational Visitor	0.69	6.9	69	780	7,800	78,000				0.69	c	--	1E-06	0.00009
	C/I Worker - Indoor	12	120	1,200	9,200	92,000	920,000				12	c	--	1E-06	0.0001
	C/I Worker - Outdoor	4.5	45	450	3,500	35,000	350,000				4.5	c	--	1E-06	0.0001
	Construction Worker	24	240	2,400	7,700	77,000	770,000				24	c	--	1E-06	0.0003
Benzo(a)pyrene	Resident	0.034	0.34	3.4	390	3,900	39,000	0.034 - 0.52	0.22	Not Applicable	0.22	b	--	6E-06	0.00006
	Recreational Visitor	0.069	0.69	6.9	780	7,800	78,000				0.22	b	--	3E-06	0.00003
	C/I Worker - Indoor	1.2	12	120	9,200	92,000	920,000				1.2	c	--	1E-06	0.00001
	C/I Worker - Outdoor	0.45	4.5	45	3,500	35,000	350,000				0.45	c	--	1E-06	0.00001
	Construction Worker	2.4	24	240	7,700	77,000	770,000				2.4	c	--	1E-06	0.00003
Benzo(b)fluoranthene	Resident	0.34	3.4	34	390	3,900	39,000	0.034 - 0.52	0.066	Not Applicable	0.34	c	--	1E-06	0.00009
	Recreational Visitor	0.69	6.9	69	780	7,800	78,000				0.69	c	--	1E-06	0.00009
	C/I Worker - Indoor	12	120	1,200	9,200	92,000	920,000				12	c	--	1E-06	0.0001
	C/I Worker - Outdoor	4.5	45	450	3,500	35,000	350,000				4.5	c	--	1E-06	0.0001
	Construction Worker	24	240	2,400	7,700	77,000	770,000				24	c	--	1E-06	0.0003
Indeno(1,2,3-cd)pyrene	Resident	0.34	3.4	34	390	3,900	39,000	0.034 - 0.52	Not Detected	Not Applicable	0.34	c	--	1E-06	0.00009
	Recreational Visitor	0.69	6.9	69	780	7,800	78,000				0.69	c	--	1E-06	0.00009
	C/I Worker - Indoor	12	120	1,200	9,200	92,000	920,000				12	c	--	1E-06	0.0001
	C/I Worker - Outdoor	4.5	45	450	3,500	35,000	350,000				4.5	c	--	1E-06	0.0001
	Construction Worker	24	240	2,400	7,700	77,000	770,000				24	c	--	1E-06	0.0003
PCBs	Resident	0.54	5.4	54	0.26	2.6	26	0.0034 - 0.7	Not Applicable	1 [3]	1	a	--	2E-06	0.4
	Recreational Visitor	1.1	11	110	0.51	5.1	51				1.1	c	--	1E-06	0.2
	C/I Worker - Indoor	4.2	42	420	6.1	61	610			10 - 25 [3]	4.2	c	--	1E-06	0.07
	C/I Worker - Outdoor	1.6	16	160	2.3	23	230			10 - 25 [3]	1.6	c	--	1E-06	0.07
	Construction Worker	8.5	85	850	1.2	12	120			10 - 25 [3]	8.5	c	--	1E-06	0.7
Arsenic	Resident	1.5	15	150	7.6	76	760	0.21 - 6.2	13.7	Not Applicable	13.7	b	--	9E-06	0.2
	Recreational Visitor	3.0	30	300	15	150	1,500				13.7	b	--	5E-06	0.1
	C/I Worker - Indoor	11	110	1100	170	1,700	17,000				13.7	b	--	1E-06	0.01
	C/I Worker - Outdoor	4.7	47	470	75	750	7,500				13.7	b	--	3E-06	0.02
	Construction Worker	24	240	2400	15.0	150	1,500				24.0	c	--	1E-06	0.2

Table 2.3.2 - Summary of Site-Specific Preliminary Remediation Goals and Residual Risks - Soil
Nuclear Metals Superfund Site

Chemical of Concern	Receptor Scenario	Preliminary Remedition Goals (mg/kg)						Detection Limits [1] (mg/kg)	Background [2] (mg/kg)	ARAR/Policy (mg/kg)	Selected PRG (mg/kg)		Selected PRG (pCi/g)		Residual Risk at PRG [4]	
		Based on Excess Liftime Cancer Risk			Based on Hazard Index										Excess Lifetime Cancer Risk	Hazard Index
		$1x10^{-6}$	$1x10^{-5}$	$1x10^{-4}$	0.1	1	10									
Uranium	Resident	2.7	27	270	10	100	1,000				2.7	c	U-238: 0.90	d	1E-06	0.03
													U-235: 0.01	d		
													U-234: 0.15	d		
													U-total: 1.1	d		
	Recreational Visitor	22	220	2,200	21	210	2,100				22	c	U-238: 7.2	d	1E-06	0.10
													U-235: 0.094	d		
													U-234: 1.2	d		
													U-total: 8.5	d		
	C/I Worker - Indoor	9.4	94	940	220	2,200	22,000	0.0064 - 0.0064	1.3	Not Applicable	9.4	c	U-238: 3.1	d	1E-06	0.004
													U-235: 0.041	d		
													U-234: 0.53	d		
													U-total: 3.7	d		
	C/I Worker - Outdoor	5.1	51	510	110	1,100	11,000				5.1	c	U-238: 1.7	d	1E-06	0.005
													U-235: 0.022	d		
													U-234: 0.29	d		
													U-total: 2.0	d		
	Construction Worker	100	1,000	10,000	7	71	710				71	nc	U-238: 24	d	7E-07	1.0
													U-235: 0.31	d		
													U-234: 4.0	d		
													U-total: 28	d		
Thorium	Resident	0.084	0.84	8.4	Not Applicable			0.021 - 0.026	7.35	Not Applicable	7.35	b	0.81	e	9E-05	Not Applicable
	Recreational Visitor	1.0	10.0	100							7.35	b	0.81	e	7E-06	
	C/I Worker - Indoor	0.29	2.9	29							7.35	b	0.81	e	3E-05	
	C/I Worker - Outdoor	0.16	1.6	16							7.35	b	0.81	e	5E-05	
	Construction Worker	3.5	35	348							7.35	b	0.81	e	2E-06	

Highlighted values are those generated in Attachments B.3 through B.7 which are different than what was presented in the FS.
1 - Range of reporting limits for non-detects in surface soil, as reported in data set for the Remedial Investigation.
2 - Background values for soils, where applicable, were established using upper limit concentrations for the Stowe Town Forest dataset (Baseline Human Health Risk Assessment, Appendices C and N) .
3 - PRG for Total PCBs based on CERCLA Policy (A Guide on Remedial Actions at Superfund Sites with PCB Contamination, OSWER Directive #9355.4-01FS, August 1990).
4 - Residual risk represents the excess lifetime cancer risk and hazard index associated with exposure to COC concentrations equal to the PRG. Calculated as:
Cancer risk = Final PRG x 1E-06 / PRG derived for 1E-06 target risk
Hazard Index = Final PRG / PRG derived for a target hazard index of 1
ARAR - Applicable, Relevant, or Appropriate Requirement
mg/kg - milligram per kilogram
a - Final PRG is based on an ARAR
b - Final PRG is based on the background value
c - Final PRG is based on an excess lifetime cancer risk of $1x10^{-6}$
d - PRG as activity (pCi/g) is calculated from PRG as mass (mg/kg) based the isotopic profile for depleted uranium (0.2% U-235) as determined through analysis of soil samples collected in the Remedial Investigation.
e - PRG as activity (pCi/g) calculated as PRG (mg/kg) divided by a mass to activity conversion factor of 9.1 (mg/kg per pCi/g). The conversion factor is based on thorium measured as Th-232 as determined through analysis of soil samples collected in the Remedial Investigation and accounting for in-growth of Ra-228+D and Th-228+D.
nc - Final PRG is based on a non-cancer hazard index of 1
-- - Not Applicable

Table 2.3.3 - Summary of Site-Specific Preliminary Remediation Goals and Residual Risks - Sediment
Nuclear Metals Superfund Site

Chemical of Concern	Receptor Scenario	Preliminary Remedition Goals (mg/kg)							Detection Limits (1) (mg/kg)	Background (2) (mg/kg)	ARAR/Policy (mg/kg)	Selected PRG (mg/kg)		Residual Risk at PRG (4)	
		Human Health - Based on Excess Liftime Cancer Risk			Human Health - Based on Hazard Index			Ecological						Excess Lifetime Cancer Risk	Hazard Index
		$1x10^{-6}$	$1x10^{-5}$	$1x10^{-4}$	0.1	1	10	Based on Benthic Community							
PCBs	Recreational Visitor	2.7	27	269	1.5	15	150	1.08	0.45	Not Detected	1 (3)	1	a	4E-07	0.07
Copper		Not a COC			Not a COC			176	0.21 - 1.1	9.1	Not Applicable	176	e		
Lead		Not a COC			Not a COC			97.3	0.21 - 1.1	33.7	Not Applicable	97	e		
Mercury		Not a COC			Not a COC			1.3	0.21 - 1.1	0.041	Not Applicable	1.3	e		

Highlighted values are those generated in Attachment B.1 which are different than what was presented in the FS.
1 - Range of reporting limits for non-detects in sediment, as reported in data set for the Remedial Investigation.
2 - Background values for sediments, where applicable, were established using upper limit concentrations for the Maynard Pond dataset (Baseline Human Health Risk Assessment, Appendices C and N).
3 - PRG for Total PCBs based on CERCLA Policy (A Guide on Remedial Actions at Superfund Sites with PCB Contamination, OSWER Directive #9355.4-01FS, August 1990).
4 - Residual risk represents the excess lifetime cancer risk and hazard index associated with exposure to COC concentrations equal to the PRG. Calculated as:
Cancer risk = Final PRG x 1E-06 / PRG derived for 1E-06 target risk
Hazard Index = Final PRG / PRG derived for a target hazard index of 1
ARAR - Applicable, Relevant, or Appropriate Requirement
mg/kg - milligram per kilogram
a - Final PRG is based on an ARAR
b - Final PRG is based on the background value
c - Final PRG is based on an excess lifetime cancer risk of $1x10^{-6}$
nc - Final PRG is based on a non-cancer hazard index of 1
e - Final PRG is based on ecological risk (protection of benthic community)

Table 2.3.4 - Summary of Site-Specific Preliminary Remediation Goals - Groundwater
Nuclear Metals Superfund Site

Chemical of Concern	Receptor Scenario	Preliminary Remedition Goals (ug/l)						Detection Limits [1] (ug/L)	Background (ug/L)		ARARs and TBC (ug/L)			Selected PRG (ug/L)	
		Based on Excess Liftime Cancer Risk			Based on Hazard Index				Overuburden [7]	Bedrock [7]	Federal MCL [2]	MA MCL [3]	TBC		
		$1x10^{-6}$	$1x10^{-5}$	$1x10^{-4}$	0.1	1	10							Overburden	Bedrock
1,1-Dichloroethane	Resident	2.7	27	270	380	3,800	38,000	0.5	Not Applicable	Not Applicable	Not Available	Not Available		Not a COC	2.7 c
Tetrachloroethene	Resident	11	110	1100	4.1	41	410	0.5	Not Applicable	Not Applicable	5	5		5 a	5 a
Trichloroethene	Resident	0.49	4.9	49	0.28	2.8	28	0.5	Not Applicable	Not Applicable	5	5		5 a	5 a
Vinyl chloride	Resident	0.019	0.19	1.9	4.4	44	440	0.5	Not Applicable	Not Applicable	2	2		2 a	2 a
1,4-Dioxane	Resident	0.46	4.6	46	5.7	57	570	0.15 [5] - 4.0 [6]	Not Applicable	Not Applicable	Not Available	Not Available	0.3 (G)	0.46 c	0.46 c
bis(2-Ethylhexyl)phthalate	Resident	5.6	56	560	40	400	4,000	4.3 - 11	3.2	4.6	6	6		6 a	6 a
Arsenic	Resident	0.052	0.52	5.2	0.60	6.0	60	0.8 - 16	1.2	26.8	10	10		10 a	10 a
Barium	Resident	Not Applicable			380	3,800	38,000	NA	19.5	44	2000	2000		Not a COC	2000 a
Chromium	Resident	0.035	0.35	3.5	4.4	44	440	0.27 - 13	1.7	9.6	100	100		100 a	100 a
Cobalt	Resident	Not Applicable			0.60	6.0	60	0.045 - 0.47	0.64	1.1	Not Available	Not Available		6.0 nc	6.0 nc
Copper	Resident	Not Applicable			80	800	8,000	0.29 - 24	0.78	6.8	1,300	1,300		1300 a	Not a COC
Iron	Resident	Not Applicable			1,400	14,000	140,000	32 - 280	596	4000	Not Available	Not Available	300 (S)	14,000 nc	14,000 nc
Manganese	Resident	Not Applicable			43	430	4,300	0.2 - 4.8	25.6	200	Not Available	Not Available	300 (HA)	300 a	300 a
Molybdenum	Resident	Not Applicable			10	100	1000	0.022 - 1.4	Not Detected	8.7	Not Available	Not Available		100 nc	100 nc
Thorium	Resident	0.33	3.3	33	Not Applicable			0.05 - 0.38	0.15	Not Detected	Not Available	Not Available		0.33 c	0.33 c
Depleted Uranium	Resident	1.6	16	160	1.2	12	120	0.038 - 0.048	0.47 [4]	14.1 [4]	30	30		30 a	30 a
Natural Uranium	Resident	0.076	0.76	7.6	1.2	12	120	0.03 - 0.17	0.47	14.1	30	30		30 a	30 a
Nitrate-N	Resident	Not Applicable			3,200	32,000	320,000	20 - 310	522	253	10,000	10,000		10000 a	10000 a
Nitrite-N	Resident	Not Applicable			200	2,000	20,000	30 - 100	Not Detected	70	1,000	1,000		1000 a	1000 a

Highlighted values are those generated in Attachment B.2 which are different than what was presented in the FS.
1 - Range of reporting limits for non-detects in groundwater, as reported in data set for the Remedial Investigation.
2 - National Primary Drinking Water Regulations (EPA 816-F-09-0004, May 2009) (http://water.epa.gov/drink/contaminants/index.cfm#List)
3 - 2012 Standards and Guidelines for Contaminants in Massachusetts Drinking Water (http://www.mass.gov/dep/water/drinking/standards/dwstand.htm)
4 - Values are for natural uranium
5 - Reporting limit for 8270 SIM
6 - Reporting limit for 8260 SIM
7 - Background values for groundwater, where applicable, were established using upper limit concentrations for background wells at the Site (Baseline Human Health Risk Assessment, Appendix C) .
(G) - Value is a Massachusetts Drinking Water Guideline
(S) - Value is a Federal and Massachusetts Secondary MCL
(HA) - Value is a USEPA Health Advisory
MCL - Maximum Contaminant Level
ARAR - Applicable, Relevant, or Appropriate Requirement
TBC - To Be Considered
ug/L - microgram per liter
a - Final PRG is based on an ARAR
b - Final PRG is based on the background value
c - Final PRG is based on an excess lifetime cancer risk of $1x10^{-6}$
nc - Final PRG is based on a non-cancer hazard index of 1
Not a COC - Not a primary risk driver in this flow zone and/or maximum detection does not exceed MCL

APPENDIX F

ACTION MEMORANDUM FOR A

NON-TIME CRITICAL REMOVAL ACTION

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I
5 POST OFFICE SQUARE, BOSTON, MA 02109

Enforcement Confidential Materials Attached

MEMORANDUM

DATE:

SUBJ: Request for a Non-Time Critical Removal Action at the Nuclear Metals, Inc. Superfund Site, Concord, Massachusetts -- **ACTION MEMORANDUM**

FROM: Melissa Taylor, Remedial Project Manager
MA Superfund Section

THRU: Bob Cianciarulo, Chief
MA Superfund Section

Bryan Olson, Chief
Remediation and Restoration Branch

TO: Nancy Barmakian, Acting Director
Office of Site Remediation & Restoration

I. PURPOSE

The purpose of this Action Memorandum is to request and document approval of a non-time critical removal action (NTCRA) for the Nuclear Metals, Inc. Superfund Site (the "Site"), located at 2229 Main Street, Concord, Massachusetts. This NTCRA is expected to be completed within one to five years of mobilization at a cost of approximately $5.2 million (up to one year of construction and up to four years of monitoring, operation, and maintenance). This NTCRA is necessary to prevent, minimize, stabilize, and mitigate potential threats to human health and the environment posed by a release of hazardous substances to the environment.

In particular, this NTCRA will address migration of contaminated groundwater. The location and layout of the Site is shown in Figure E-3 of the Record of Decision (ROD). The Site includes a 46-acre Nuclear Metals, Inc. property (the "NMI Property") and surrounding areas where contamination has come to be located. In the fall of 2014, EPA completed a Remedial Investigation and Feasibility Study for the Site, which determined that groundwater contaminated with 1,4–dioxane was migrating away from the NMI Property under the Assabet River. The Assabet wellfield, one of the public water supply wellfields for the town of Acton, Massachusetts, could be impacted if the groundwater plume continues to migrate. This NTCRA is consistent with the long-term remedial strategy for this Site to minimize exposure to and migration of contaminants.

This NTCRA will ensure that EPA can provide a timely response to effectively minimize threats to public health or welfare or the environment which may result from the continuing release and/or threat of release of hazardous substances from the site.

While this NTCRA will accelerate the overall Site cleanup by reducing site contamination, it does not constitute the complete cleanup plan for the Site. EPA has issued a Record of Decision (ROD) concurrent with this Action Memorandum. The ROD selects a remedy to address the full nature and extent of contamination at the Site not addressed by this NTCRA or the on-going building NTCRA, prior time-critical removal actions, or the prior removal action by the Massachusetts Department of Environmental Protection (MassDEP).

II. SITE CONDITIONS AND BACKGROUND

CERCLIS Identifier: MAD062166335
Site Identifier: 017D
Removal Category: Non-Time Critical
NPL status: Listed on NPL on June 14, 2001

A. Site Description

1. Removal site evaluation

The portion of the Site addressed by this action is groundwater contaminated with 1,4-dioxane and VOCs that has migrated off the NMI property and is headed towards a public water supply. Other areas of the Site not addressed by this removal action are the 46-acre NMI property, which includes: a five-section interconnected building and several other storage buildings (which altogether have a current footprint of approximately 185,000 square feet); a holding basin and a small landfill (which have both been covered with a temporary cap by EPA as part of a 2002 time-critical removal action); site soils; a sphagnum bog; a cooling water recharge pond; a "sweepings" pile, and DU and uranium groundwater contamination. These areas are being addressed under the ROD that is being issued concurrently with this Action Memorandum.

Currently, a NTCRA is on-going which requires the removal of all contents of the facility buildings and demolition of the buildings themselves. Most of the facility contents have been removed and the buildings are scheduled for demolition in fall 2015/spring 2016.

Anecdotal information indicates that volatile organic compounds (VOCs) used as solvents and degreasers were discharged through floor drains of the facility buildings to an on-site cooling water pond, resulting in contamination of an on-site supply well. The VOCs likely contained 1,4-dioxane as a stabilizer. The Remedial Investigation and Feasibility Study that was completed in the fall of 2014 determined that a groundwater plume of 1,4-dioxane was migrating away from the NMI Property towards the one of the public water supply wellfields for the town of Acton. Due to the rate at which the 1,4-dioxane plume is moving, EPA is requesting Non-Time Critical

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Removal Authority to address the contaminated groundwater migrating off the Starmet property. EPA signed an approval memorandum for performance of an Engineering Evaluation and Cost Analysis (EE/CA) equivalent in September 2015. The completed Feasibility Study is serving as the EE/CA equivalent as it evaluates the necessary groundwater remedial alternatives. The RI/FS was performed by potentially responsible parties (PRPs) pursuant to an Administrative Order by Consent for RI/FS (RI/FS AOC), signed on June 13, 2003.[1] The RI/FS reports can be found in the administrative record for the ROD and on the Nuclear Metals EPA website: http://www.epa.gov/region1/superfund/sites/nmi. EPA anticipates that performance of this NTCRA would be performed on a PRP-lead basis. A more detailed description of the Site history can be found in Section B of the ROD and Section 1 of the Feasibility Study.

As this NTCRA is not anticipated to cost more than $6 million, consultation with the Office of Superfund Remediation and Technology Innovation (OSRTI) and the Office of Emergency Management (OEM) in accordance with the national guidance document "Use of Non-Time Critical Removal Authority in Superfund Response Actions", dated February 14, 2000, is not required.

In October 2014, EPA issued a Proposed Plan outlining the cleanup plan at the Site to local communities. In addition to seeking comments on the proposed overall cleanup plan, the Proposed Plan also asked for comments on the proposal to accelerate a portion of the groundwater cleanup of 1,4-dioxane and VOCs as a NTCRA. On December 10, 2014, EPA held a public hearing to discuss the cleanup alternatives in the Proposed Plan and Feasibility Study, and EPA's preferred alternative for the cleanup plan and accelerated groundwater cleanup for 1,4-dioxane and VOCs. From November 13, 2014 to January 14, 2015, EPA held a public comment period. Responses to significant comments related to this NTCRA proposal are provided in Part 3 of the ROD along with responses to other comments received on EPA's proposed cleanup plan. Additional supporting documentation can be found in the Administrative Record.

2. Physical location

The Site is located at 2229 Main Street, in Concord, Massachusetts. The NMI Property consists of approximately 46 acres, including five interconnected buildings, a tank house, a hydrogen peroxide tank house, four "Butler" buildings, and two gas cylinder storage huts. The property is bordered by residential properties to the east and northeast, a commercial property to the west, Main Street (Route 62) to the north and to the south and southwest by conservation land/woodlands and the Thoreau Hills Summer Camp (a children's day camp).

The closest residence is located within 200-300 feet of the Site. The Assabet River is approximately 300 feet north from the northern perimeter of the property. Both the town of Concord and the adjacent town of Acton are on public water supplies that have not been impacted by site-contaminated groundwater; however, 1,4-dioxane has been found in monitoring wells approximately 300 feet from the town of Acton's Assabet wellfield.

[1] The RI/FS AOC was amended on February 13, 2008 and again on October 2, 2012.

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3. Site characteristics

From 1958 to the present, the Site was used by various operators as a specialized research and metal manufacturing facility, which was licensed to possess radioactive substances. At various times, Site operators used depleted uranium, beryllium, titanium, zirconium, copper, acids, solvents, and other substances. Although the source of the DU is known, sources of other contaminants at the Site can only be hypothesized. It is thought that the PCBs were used at the Site within the machinery, and VOCs were used as solvents at the Site and those VOCs likely contained 1,4-dioxane as a stabilizer. Other areas of the Site investigated as part of the RI/FS include: site soils, site groundwater, a cooling water recharge pond, a sphagnum bog, the northeast wetland, the former waste holding basin, a small landfill, and a waste pile referred to as the "sweepings" pile that contains dredged material from the cooling water recharge pond.

Since 1972, Starmet Corp. (Starmet), formerly known as Nuclear Metals, Inc., or one of its wholly-owned subsidiaries, owned and/or operated the Site. Starmet previously manufactured penetrator bullets from depleted uranium as a defense contractor for the U.S. Army under a license to possess radioactive materials by the MADPH-RCP[2]. Starmet vacated the Site in early November 2011 (in accordance with the terms of a Consent Decree with the MADPH-RCP), Starmet's radioactive materials licenses were terminated by MAD PH-RCP on November 8, 2011, and the company is now defunct.

The Site lies within the Assabet River basin. No natural streams are present on-site. The only apparent surface water body that pre-dates development of the Site is a Sphagnum Bog located in the eastern-central portion of the Site. The Assabet River flows in an easterly direction and merges with the Sudbury River to form the Concord River approximately 3.5 miles downstream of the Site. A surface water divide is located in the upland to the south of the Site. Surface water runoff from areas north of this divide flow north to the Assabet River. Surface water runoff from areas south of this divide flow south to Second Division Brook, which flows in an easterly direction, and then north to join with the Assabet River. Groundwater is found both in the unconsolidated and bedrock formations and migrates north/northwest, towards the Assabet River.

Groundwater data suggest that DU migrated to the overburden groundwater, natural uranium migrated to the bedrock groundwater, and chlorinated VOCs, and 1,4-dioxane migrated to the overburden and bedrock groundwater. The groundwater flow is toward the north and northwest, resulting in overburden and bedrock plumes of VOCs and 1,4-dioxane that extend off the facility property toward and beneath the Assabet River. The 1,4-dioxane plume associated with the Site extends to deeper overburden as evidenced by monitoring results from wells located just south and northwest of the Assabet River.

[2] The Commonwealth of Massachusetts became a Nuclear Regulatory Commission (NRC) "agreement state" licensee in 1997.

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4. Release or threatened release into the environment of a hazardous substance or pollutant or contaminant

The last round of groundwater sampling results shows that the 1,4-dioxane plume is migrating away from the NMI property under the Assabet River. Previous sampling results had shown that the 1,4-dioxane plume was contained with no signs of migration. Addressing 1,4-dioxane (which will address VOCs simultaneously) in groundwater as a non-time critical removal action (NTCRA) in advance of implementing the full remedy for the Site could contain this plume from expanding further, thereby protecting human health and avoiding the increase in time and cost for this component of the cleanup action. There is a release or threatened release of hazardous substances into the environment posed by the contamination of groundwater with 1,4-dioxane in the near vicinity of public supply wells. Recent sampling of monitoring wells in the vicinity of the public supply wells has shown concentrations of 1,4-dioxane between 2 and 14 ug/l, which is in exceedance of the ROD groundwater cleanup level of 0.46 ug/l for 1,4-dioxane.

5. NPL status

This Site is listed on the National Priorities List (NPL). The Site was proposed for listing on the NPL on July 27, 2000, and was listed on the NPL on June 14, 2001 with the concurrence of the Governor of Massachusetts.

B. Other Actions to Date

1. EPA Region 1 Emergency Planning and Response Branch (EPRB) Actions

EPA's EPRB has been involved at the Site since mid-2000. Through investigations of past activities and EPRB's subsequent Preliminary Assessment/Site Investigations (PA/SIs), two discrete buried drum areas were identified: one was located between the holding basin and the water cooling recharge pond, and one is located within the old landfill area immediately south of the sphagnum bog. (See Figure E-3 in the ROD showing the locations of the cooling water recharge pond, holding basin, and sphagnum bog.)

From April 23, 2002 to April 30, 2003, the EPRB conducted a time-critical removal action that included the installation of a cap over the old landfill area, and the installation of a liner over the holding basin. In addition, a fence was erected around the old landfill area. A small buried drum area located within a fenced area near the holding basin was not addressed as part of this removal action because trespasser access to the buried materials was limited and the materials were not at or near the surface. As explained below, the buried materials were removed from the Site in December 2004. The 2002 removal action prevented the direct contact threat with the contaminated surface soils located in the landfill area, eliminated contaminated dust migration from the holding basin, and prevented precipitation from infiltrating the soils within the holding basin.

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Due to a fire that occurred at the Site in June 2007, EPA's EPRB conducted a second time-critical removal action in early 2008 to remove hazardous and flammable materials from within the facility buildings at the request of the Concord Fire Department.

2. Remedial Branch Actions

In 2003, EPA entered into an Administrative Order by Consent to perform a Remedial Investigation/Feasibility Study (RI/FS AOC) with several potentially responsible parties (PRPs) for the Site. In 2014, the Respondents under the RI/FS AOC completed the RI/FS at the Site. The drums discovered during the 2002 time-critical removal action were removed in December 2004 as part of the activities performed under the RI/FS AOC. In addition, as another activity performed under the RI/FS AOC, the Respondents completed an EE/CA which evaluated alternatives for addressing contamination related to buildings on the Site. An Action Memorandum for a NTCRA to remove of all contents of the facility buildings and demolish the buildings themselves (the "Building NTCRA") was signed on September 23, 2008. Subsequently, an Administrative Settlement Agreement and Order on Consent for NTCRA was signed in August 2011 which requires several PRPs to perform the Building NTCRA. Most of the facility contents have been removed and the buildings are scheduled for demolition beginning in fall 2015/spring 2016. A comprehensive remedy for the Site is being selected concurrent with this Action Memorandum, as outlined in the ROD.

C. State and Local Authorities' Roles

1. State and local actions to date

From about the late 1980s to 2000, Starmet, performed certain Site investigations and a partial cleanup under the oversight of MADEP. In 1997, Starmet, with the financial support of the U.S. Army, and oversight by MADEP and MADPH-RCP, excavated approximately 8,000 cubic yards of soil contaminated with depleted uranium and copper from the on-site holding basin and disposed of these soils at an off-site, low-level radioactive waste disposal facility. The cleanup halted in late 1998 when Starmet determined that the cleanup level required by MADEP could not be met without excavating significantly more material.

In the spring of 2006, MADEP conducted a removal action, with proceeds obtained by the State through a settlement with the U.S. Army, which consisted of the removal of more than 3,800 drums and containers containing depleted uranium from within the facility.

On May 22, 2007, MADPH-RCP and Starmet entered into a Consent Decree in which Starmet agreed to vacate the Site by October 31, 2007. Starmet's related companies (i.e., the Starmet Parties), also operating at the Site, were required to vacate the Site on the same date.

On June 26, 2007, the Concord Fire Department, MADPH-RCP, MADEP, and EPA responded to a fire at the Starmet facility. Subsequently, the Concord Fire Department issued two orders to Starmet to correct various violations of the state fire code at the Site. In November 2007, after Starmet failed to comply with the orders, the Concord Fire Department sent a letter to EPA requesting assistance with removing these materials from the Starmet facility, concluding that the continued existence of these materials within the facility constitutes an imminent threat to public health and safety. EPA completed a time-critical removal action in early 2008 which removed hazardous and flammable materials from within the facility buildings.

Starmet and its related companies vacated the Site on November 1, 2011 and Starmet's radioactive materials licenses were terminated by MADPH-RCP on November 8, 2011. Starmet is now defunct but remains the current owner of the NMI Property.

2. Potential for continued State/local response

MassDEP is the lead agency for the Commonwealth of Massachusetts. MassDEP has limited funds available to address the Site. There is no state response mechanism available with sufficient funds to perform this NTCRA.

III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

Based on Site conditions and information available on the hazardous substances present, the Site poses the following threats to public health, welfare, or the environment:

A. Threats to Public Health or Welfare or the Environment

"Actual or potential exposure to nearby human populations, animals or the food chain from hazardous substances or pollutants or contaminants" [40 CFR 300.415(b)(2)(i)];

The NMI Property is bordered by residential properties to the east, a commercial property to the west, Main Street (Route 62) to the north and to the south and southwest by conservation land/woodlands and the Thoreau Hills Summer Camp. The 1,4-dioxane plume extends off the NMI Property, across Main Street to the northern side of the Assabet River. This groundwater plume has elevated concentrations of 1,4-dioxane in exceedance of EPA's risk-based cleanup level of 0.46 ug/l.

"Actual or potential contamination of drinking water supplies or sensitive ecosystems" [40 CFR 300.415(b)(2)(ii)];

As stated above, Site groundwater is contaminated at levels exceeding risk-based cleanup levels, as well as MCLs. Concentrations approaching EPA's risk based cleanup level of 0.46 ug/l for 1,4-dioxane have been detected in the vicinity of the Acton Water District supply wells.

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"The availability of other appropriate federal or state response mechanisms to respond to the release" [40 CFR 300.415(b)(2)(vii)];

EPA is the lead agency at the Site. The Site was listed on the NPL on June 14, 2001. MassDEP has limited funds available to address the Site and there are no state response mechanisms available with sufficient funding to respond to the release.

IV. ENDANGERMENT DETERMINATION

Actual or threatened releases of hazardous substances at or from the Site, if not addressed by implementing the response action selected in this Action Memorandum, may present an imminent and substantial endangerment to public health and welfare.

V. EXEMPTION FROM STATUTORY LIMITS

It is expected that this removal action will be performed with PRP funds. However, if it were to be performed as a Fund-lead response, it would require funding above $2 million and more than one year to implement, thereby exceeding the statutory money and time limits on Fund-financed removal actions established under Section 104(c) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended (CERCLA), and Section 300.415(b)(5) of the National Oil and Hazardous Substances Pollution Contingency Plan, as amended (NCP). The proposed NTCRA is projected to cost approximately $5.2 million and take one to five years to complete. In the event that the removal action were to be performed as a Fund-lead response, a "consistency" exemption is invoked through this Action Memorandum to allow for the proposed removal action to exceed the $2 million ceiling and 12-month time limit for Fund-financed removal actions.

Section 104(c) of CERCLA, 42 U.S.C. § 9604(c), states that removal actions can exceed the $2 million and 12 month statutory limits if conditions meet either the "emergency exemption" criteria or the "consistency exemption" criteria. The consistency exemption requires that the proposed removal be appropriate and consistent with the remedial action to be taken. As described below conditions and proposed actions at the Site meet the criteria for a consistency exemption.

A. Appropriateness

EPA OSWER Directive 9360.0-12A, "Final Guidance on Implementation of the 'Consistency' Exemption to the Statutory Limits on Removal Actions," June 12, 1989, states that an action is appropriate if the activity is necessary for any *one* of the following reasons:

1. To avoid a foreseeable threat;
2. To prevent further migration of contaminants;
3. To use alternatives to land disposal, or,

4. To comply with the off-site policy.

The NTCRA described in Section VI below meets criteria one and two identified above. The proposed removal action abates the foreseeable threat posed by the migrating 1,4-dioxane groundwater plume. In addition, by addressing the off-property contaminated groundwater in advance of the full Remedial Design/Remedial Action, the removal action will minimize the scope and cost of the final remedial action and the potential for migration of contaminants to a public water supply.

The proposed removal action is therefore appropriate and necessary.

B. Consistent With the Remedial Action

The proposed NTCRA is also consistent with anticipated remedial actions to minimize exposure to and migration of contaminants. As indicated in EPA's 1989 guidance (p. 3), "the 'remedial action to be taken' is the remedial action that, prior to the start of the removal action, was planned or could reasonably have been expected to be taken."

The proposed NTCRA is one part of a phased approach to address concerns at the Nuclear Metals, Inc. Superfund Site. The other past and future components are (1) a time-critical removal action conducted in 2002 including: installation of a permanent fence around an area containing buried drums where local residents and a summer camp had direct access; capping of beryllium-contaminated soils overlying the same buried drum area; and lining of the holding basin with a temporary cover; (2) a MassDEP removal action that has addressed the 3,800 stored drums and containers of depleted uranium in the facility through an agreement reached with the U.S. Army; (3) a time-critical removal action conducted in 2008 to remove containers of flammable and other hazardous substances from the Site that constitute a threat of fire and/or explosion; (4) an on-going NTCRA to address contaminated buildings on the NMI Property; (5) the RI/FS completed in 2014 which characterized the Site contaminants; and (6) the ROD for the Site, issued concurrently with this Action Memorandum, which will address site-wide contamination not addressed in prior actions.

Because the proposed NTCRA is both appropriate and consistent with the remedial action to be taken, EPA finds that the requirements of the consistency exemption under Section 104(c) of CERCLA have been met.

VI. PROPOSED ACTIONS AND ESTIMATED COSTS

A. Proposed Action

EPA issued a Feasibility Study Report in November 2014 which found that groundwater at the Site is contaminated with 1,4-dioxane and VOCs most likely from the use of VOCs as solvents at the Site. The VOCs used likely contained 1,4-dioxane as a stabilizer. The Feasibility Study Report, also functioning as the Engineering Evaluation and Cost Analysis ("EE/CA") equivalent

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for this NTCRA, evaluated several alternatives for addressing VOCs and 1,4-dioxane in groundwater. EPA issued a proposed cleanup plan ("Proposed Plan") for public comment on October 31, 2014 which outlined EPA's proposed cleanup approach for the Site and summarized the alternative cleanup approaches considered. The proposed plan recommended hydraulic containment (by pumping from overburden and bedrock extraction wells) and ex-situ treatment to address 1,4-dioxane and VOCs in groundwater. An estimate of the total pumping rate needed to hydraulically contain and cut off further migration of 1,4-dioxane is ~12 gallon per minute (gpm). Treatment at this relatively low flow rate, while not inexpensive, is feasible and this alternative is readily implemented. The Proposed Plan was based on findings from the Remedial Investigation (April 2014) and Feasibility Study Reports issued by EPA.

The Proposed Plan also sought comment on accelerating the 1,4-dioxane and VOC groundwater extraction and *ex-situ* treatment portion of the proposed remedy as a NTCRA. This accelerated action was proposed because recent sampling has shown that the 1,4-dioxane plume at the Site may be migrating away from the NMI Property under the Assabet River, and taking early action to contain the plume could prevent the further migration. Previous sampling results had shown that the 1,4-dioxane plume was contained with no signs of migration.

The ROD selected the remedy proposed in the Proposed Plan and EPA has elected to issue this Action Memorandum to accelerate a portion of the groundwater remedy. This NTCRA includes extraction of overburden and bedrock groundwater with *ex-situ* treatment for VOCs and 1,4-dioxane and discharge to surface water or underground injection. The estimated cost of this portion of the groundwater remedy is $5.2 million. This includes design, construction and up to four years of monitoring, operation, and maintenance. Long-term operation and maintenance and long-term monitoring of this portion of the groundwater remedy is included as part of the remedial action for the Site.

1. Removal Action Objectives

Prevent Release to the Environment

Prevent the further migration of contaminated groundwater.

Prevent Direct Exposure to Contaminants

Prevent direct contact with, ingestion of, contaminated groundwater that present an unacceptable risk to human health and the environment. This NTCRA is designed to address the cleanup of contaminated groundwater in exceedance of the ROD cleanup levels for 1,4-dioxane (0.46ug/l), 1,1-dichloroethane (2.7ug/l), Tetrachloroethene (5ug/l), Tricholorethene (5ug/l), and Vinyl Chloride (2ug/l).

Contribute to the Efficient Performance of Remedial Activities

To the extent practicable, contribute to the efficient performance of the anticipated long-term remedial action with respect to the release concerned, as outlined in the ROD.

2. Proposed action description

The alternatives that were subject to detailed analysis in the FS as the EE/CA equivalent are summarized below. As noted below, only certain portions of these alternatives are the subject of this NTCRA.

Removal Action Alternatives:

GW-1: No Action

Alternative GW-1 is the no action alternative. This alternative provides no active groundwater treatment. Concentrations of VOCs and 1,4-dioxane in groundwater would be reduced somewhat through natural attenuation via dispersion, dilution, and volatilization. There is no cost estimated as part of this alternative.

GW-2: Limited Actions / Institutional Controls

Alternative GW-2 includes: (1) implementation of institutional controls to and (2) long-term groundwater monitoring for DU, VOCs/1,4-dioxane and natural uranium to monitor the plumes and evaluate concentration decreases due to natural attenuation. The total estimated present value cost of this alternative is approximately $2.9 million. Since there is no provision for active treatment in this alternative, there would be no cost for this NTCRA action under this alternative.

GW-3: *Ex-Situ* Treatment

Alternative GW-3 includes: (1) extraction of overburden groundwater downgradient of the Holding Basin (DU source area) with *ex-situ* treatment and discharge to surface water; (2) extraction of overburden and bedrock groundwater in the off-property area between Main Street and the Assabet River with *ex-situ* treatment for 1,4-dioxane and VOCs and discharge to surface water; (3) extraction of groundwater from shallow bedrock at the downgradient end of the natural uranium plume with *ex-situ* treatment for uranium removal and discharge to surface water; (4) implementation of institutional controls; and (5) long-term groundwater monitoring for DU, VOCs/1,4-dioxane and natural uranium to monitor the effectiveness of *in-situ* and *ex-situ* treatment and to evaluate concentration decreases due to natural attenuation. The total estimated present value cost of this alternative is approximately $29.3 million. The portion of this alternative that would be completed as a NTCRA is similar in scope and cost ($5.2 million) to alternative GW-4 below.

GW-4: Ex-Situ Treatment of VOCs/1,4-Dioxane, and *In-Situ* Treatment of DU And Natural Uranium (EPA's Preferred Alternative)

Alternative GW-4 includes: (1) extraction of overburden and bedrock groundwater with *ex-situ* treatment for VOCs and 1,4-dioxane and discharge to surface water or recharge/reinjection into the aquifer; (2) injection of apatite and/or Zero Valent Iron (ZVI) based media in the overburden DU and natural uranium bedrock plumes to remove uranium from groundwater in sorbed and

mineral precipitate forms; (3) long-term groundwater monitoring to monitor effectiveness of *in-* and *ex-situ* treatment and to evaluate concentration decreases due to natural attenuation; (4) implementation of institutional controls. The total estimated present value cost of this alternative is approximately $20.2 million. The portion of this alternative to be completed as a NTCRA, the initial construction and up to 4 years of operation, maintenance and monitoring of the system to capture the 1,4-dioxane and VOC plume, is estimated to cost $5.2 million.

As required under CERCLA and the NCP, during the FS process, all of the alternatives were evaluated independently based upon cost, effectiveness, and implementability. Cost was used to assess options of similar effectiveness and implementability. Effectiveness was based upon the ability of the alternative to meet the removal action objectives. The effectiveness evaluation also involved the assessment of federal and state applicable or relevant and appropriate requirements (ARARs). Implementability involved the assessment of technical feasibility, availability, and administrative feasibility. After comparing these alternatives and weighing the strengths and weaknesses, EPA has selected Alternative GW-4 as presented below as the best balance of human health and environmental protection considering cost, effectiveness, and implementability of each of the alternatives. Immediately below is a comparison of the five alternatives based on effectiveness, implementability, and cost. See the FS Section 6.5 (as the EE/CA equivalent) for a more detailed presentation of the cost and components of each alternative.

Effectiveness
GW-2, GW-3 and GW-4 will prevent human exposure to contaminants in groundwater through institutional controls. GW-1 does not prevent human exposure to contaminants in groundwater at the Site. GW-3 and GW-4 limit migration of contaminants (through *ex-situ* or *in-situ* treatment). GW-1 and GW-2 will not limit migration of contaminants. GW-3 includes hydraulic containment and *ex-situ* treatment of the distal end of the DU plume rather than treatment throughout the plume; therefore, plume flushing times are expected to be longer for GW-3 than for GW-4. GW-4 is likely to achieve the MCLs for DU and natural uranium more quickly (15 years) than the other alternatives (greater than 200 years) because it includes *in-situ* treatment throughout the plumes. The estimated time to reach cleanup levels for VOCs/1,4-dioxane for GW-1 and 2 is greater than 50 years. GW-3 and GW-4 will likely meet cleanup levels for VOCs/1,4-dioxane within 30 years. ARARs for DU and natural uranium will not be achieved within a reasonable timeframe for alternatives GW-1 and GW-2 because they provide no treatment. It is relatively easy to monitor the effectiveness of GW-1, GW-2, GW-3 and GW-4 with long-term monitoring and 5-year reviews.

Implementability
Alternative GW-1 (No Action) is the easiest to implement because it does not involve the construction, operation or maintenance of remedial systems or enforcement of institutional controls. GW-2 is easier to implement than GW-3 or GW-4 because it does not require the construction, operation or maintenance of active remedial systems. However, GW-2 may be less reliable for limiting potential human exposure to contaminants in groundwater than GW-3 or GW-4 because it relies only on institutional controls. Of the active remedial alternatives

considered for groundwater, GW-3 is easier to implement in the short term than GW-4 as the ability to construct the *in-situ* treatment portion of GW-4 depends on subsurface conditions that affect direct-push injection equipment (which would be evaluated during pilot testing in the remedial design phase). The reliability of GW-3 is high because groundwater extraction and *ex-situ* treatment via ion exchange or advanced oxidation and discharge to surface water are relatively routine tasks. The reliability of *in-situ* treatment in alternative GW-4 has been proven at the bench scale for apatite, and ZVI is a proven media. *In-situ* treatment technology allows for a passive remedy that does not depend on long-term manipulation of groundwater geochemistry; and if successful, implementation of GW-4 will not have the long-term operating requirements of the active groundwater extraction and *ex-situ* treatment system included in GW-3.

Cost

The range in estimated cost for all four alternatives is from $0 for GW-1 (No Action) to $29.3 million for GW-3. A summary of costs for each alternative is provided below:

ALTERNATIVE	TOTAL COST (IN MILLIONS)	NTCRA COST (IN MILLIONS)
Alternative GW-1 – No Action	$0	$0
Alternative GW-2 – Limited Action – Monitoring and Access Controls	$2.9	$0
Alternative GW-3 – Ex-Situ Treatment	$29.3	$5.2
Alternative GW-4 – Ex-Situ Treatment of VOCs/1,4 Dioxane, and *In-Situ* Treatment of DU And Natural Uranium	$20.2	$5.2

Alternative GW-4 is EPA's selected groundwater remedy in the ROD: Ex-Situ Treatment of VOCs/1,4-Dioxane, and *In-Situ* Treatment of DU And Natural Uranium

Technical Description

The work to be conducted under Alternative GW-4 is discussed in detail in Section 6.4 of the FS. This NTCRA includes extraction of overburden and bedrock groundwater with *ex-situ* treatment for VOCs and 1,4-dioxane and discharge to surface water or underground injection. Extraction and *ex-situ* treatment are proven technologies for reducing 1,4-dioxane and VOCs in groundwater. There are no technical difficulties associated with this technology, and it can be implemented without major obstacles. Groundwater monitoring can easily be undertaken to determine the effectiveness of the treatment. The cost of this portion of the groundwater remedy

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is $5.2 million. This includes design, construction and up to four years of operation and maintenance. Long-term operation and maintenance and long-term monitoring of this portion of the groundwater remedy is included as part of the remedial action for the Site.

Since this NCTRA includes only a portion of the GW-4 remedy, the following components of the GW-4 remedy do not apply to this NTCRA but will be completed pursuant to the ROD:

- injection of apatite and/or ZVI based media in the overburden DU and natural uranium bedrock plumes to remove uranium from groundwater in sorbed and mineral precipitate forms;
- long-term groundwater monitoring to monitor effectiveness of *in-* and *ex-situ* treatment and to evaluate concentration decreases due to natural attenuation; and
- implementation of institutional controls.

3. Community relations

In advance of and during performance of this NTCRA, EPA's Community Involvement Office will disseminate information regarding the project to the impacted residents and local citizen groups. There are two very active community groups that EPA meets with bi-monthly to discuss technical issues at the Site, the town-appointed 2229 Main Street Advisory Committee and the Technical Assistance Grant recipient group CREW (Citizens Research and Environmental Watch). EPA will continue to work closely with the town of Concord, CREW, and state officials as the NTCRA progresses.

The town of Concord, CREW, and the Commonwealth of Massachusetts fully support EPA's decision to accelerate the cleanup of 1,4-dioxane in groundwater under this NTCRA. MassDEP concurred with the selected remedy outlined in the ROD, including this NTCRA (attached as Appendix F to the ROD).

4. Contribution to remedial performance

Contribution to the Efficient Performance of Remedial Activities

Under Section 104(a)(2) of CERCLA and Section 300.415(d) of the NCP, removal activities shall, to the extent practicable, contribute to the efficient performance of any anticipated long-term remedial action with respect to the release concerned. See EPA's OSWER Directive 9360.0-13, "Guidance on Implementation of the 'Contribute to Remedial Performance' Provision." This provision was meant to avoid repetitive removal actions that do not take into account their impact on the performance of subsequent remedial actions and to allow for more permanent tasks to be completed under removal authorities. (See NCP Preamble, 53 Federal Register 51409-51410, December 21, 1988). Together, CERCLA Sections 104(a)(2) and 104(c) ("consistency" exemption) are intended to promote and enhance efficiency and continuity.

Section 104(a)(2) of CERCLA and Section 300.415(d) of the NCP require that any removal action should, to the extent deemed practicable, contribute to the efficient performance of any long term remedial action with respect to the release or threatened release concerned. This removal action will contribute to the efficient performance of the long term remedial action by eliminating the potential for further migration of hazardous substances in off-property groundwater near the Acton drinking water public supply wells. Because the performance of this NTCRA portion of groundwater cleanup is part of the selected remedial action, this NTCRA contributes to the efficient performance of the long term remedial action.

5. Description of alternative technologies considered

A detailed description of alternative groundwater treatment technologies is located in Section 3.2.1.3 of the FS (as the EE/CA equivalent). The FS stated that although there are numerous technologies available for treatment of VOCs/1,4-dioxane, groundwater extraction and ex-situ treatment with advanced oxidation or synthetic media adsorption (or similar treatment technologies) are the most effective for removal of 1,4-dioxane from groundwater. Although other technologies are effective for VOC removal (such as air stripping and carbon adsorption), they were less effective for 1,4-dioxane removal, and therefore, were not chosen. A summary of the effectiveness, technical implementability, and cost screening of the technologies for VOCs and 1,4-dioxane in overburden and bedrock groundwater are presented in Table 3.2.2 of the FS.

6. Applicable or relevant and appropriate regulations (ARARs)

The ARARs tables can be found in Appendix D of the ROD.

7. Project schedule

Duration of the removal action shall be one to five years from the day of its commencement.

B. Estimated Costs

The estimated costs associated with this alternative are $5.2 million. A more detailed breakdown of costs associated with this alternative can be found in the attached Table 1.

VII. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

In the absence of the removal action described herein, conditions at the Site can be expected to remain unaddressed until implementation of the remedial action, and threats associated with the presence of contaminated groundwater migrating to public supply wells will continue to pose a threat of release.

VIII. OUTSTANDING POLICY ISSUES

There have been no outstanding policy issues identified to date.

IX. ENFORCEMENT

See attached Enforcement Strategy (for internal distribution only).

X. RECOMMENDATION

This decision document represents the selected removal action for the Nuclear Metals, Inc. Superfund Site in Concord, MA, developed in accordance with CERCLA, as amended, and is not inconsistent with the NCP. The decision is based on documents contained in the Administrative Record for the Site.

Conditions at the Site meet the criteria set out in the NCP Section 300.415(b)(2) due to:

"Actual or potential exposure to nearby human populations, animals or the food chain from hazardous substances or pollutants or contaminants" [§ 300.415(b)(2)(i)];

"Actual or potential contamination of drinking water supplies or sensitive ecosystems" [§ 300.415(b)(2)(ii)]; and

"The availability of other appropriate federal or state response mechanisms to respond to the release" [§ 300.415(b)(2)(vii)].

I recommend that you approve the proposed removal action. Your signature will also reflect that an exemption pursuant to Section 104(c) of CERCLA and Section 300.415(b)(5)(ii) of the NCP has been granted.

APPROVAL: Nancy Barmakian DATE: 09/28/15

DISAPPROVAL: _____ DATE: _____

Table 1: GROUNDWATER NTCRA
COST ESTIMATE SUMMARY

Feasibility Study
Nuclear Metals, Inc. Superfund Site

:Discount Rate 7.00%

Item	Year	Unit Cost	Total Cost
CAPITAL EXPENDITURES			
Pre-Design Investigation			
Pump Test for 1,4-dioxane Containment System	1	$ 500,000	$ 500,000
Pre-design Investigation Subtotal			$ 500,000
Remedial Design			
Remedial Design	1	$ 165,200	$ 165,200
Remedial Action			
Hydraulic Containment	2	$ 299,700	$ 261,800
Ex-Situ Treatment	2	$ 1,701,800	$ 1,486,400
Groundwater Monitoring Wells	2	$ 81,600	$ 71,300
Professional Labor and Management	2	$ 412,200	$ 360,000
Remedial Action Subtotal			***$ 2,179,500***
Capital Expenditures - Subtotal			***$ 2,844,700***
Contingency (Capital Expenditures)	30%		$ 853,400
CAPITAL EXPENDITURES - TOTAL COST			**$ 3,698,000**
OPERATION, MAINTENANCE, MONITORING & REPORTING (OMM&R) COSTS			
Operation and Maintenance (O&M)			
General Operations	2-5	$ 250,000	$ 573,000
Advanced Oxidation System	2-5	$ 129,900	$ 297,800
Electricity Usage	2-5	$ 33,000	$ 75,600
O&M Subtotal			***$ 946,400***
Project Management			
Project Management	2-5	$ 100,000	$ 229,218
OMM&R Subtotal			***$ 1,175,618***
Contingency (OMM&R)	30%		$ 352,700
OMM&R - TOTAL COST			**$ 1,528,000**
TOTAL PROJECT COST - NET PRESENT VALUE	**7.0%**		**$ 5,226,000**

Notes:

A. Total costs are rounded to the nearest $100.

B. Future capital costs beyond Year 1 are subject to NPV calculation. Future discount rate is subject to change.

Assumptions:

1. Costs assume deed restrictions prohibiting groundwater use will be executed for the Site.
2. Hydraulic containment for the 1,4-dioxane plumes will consist of one (1) overburden extraction well with a depth of 100 ft and pumping rate of 2 gpm and two (2) bedrock wells with depths of 120 ft and pumping rates of approximately 1 gpm each.
3. Nine (9) monitoring wells will be installed in the vicinity of the extraction wells to demonstrate capture of the 1,4-dioxane plumes, three (3) in the overburden and six (6) in the bedrock.
4. Drill cuttings will be disposed on-site.
5. Well development water will be stored on-site and treated in the final system
12. This alternative is illustrated on Figure 3

APPENDIX G

TSCA 40 CFR SECTION 761.61(c) DETERMINATION

APPENDIX G

TSCA 40 CFR SECTION 761.61(c) DETERMINATION

This Determination is included in EPA's Record of Decision to address cleanup of soil, sediment, and groundwater contamination at the Nuclear Metals, Inc. Superfund Site located in Concord, Massachusetts. In general, PCB-contaminated soils and sediments with greater than (">") 1 part per million ("ppm") will be excavated and disposed off-site.

EPA's Superfund program has determined that PCB-contaminated sediments and soils with PCB concentrations greater than or equal to ("≥") 50 ppm located at the Nuclear Metals, Inc. Superfund Site meet the definition of a *PCB remediation waste* as defined under 40 CFR § 761.3. Therefore, these PCB-contaminated sediments and soils are regulated for cleanup and disposal under 40 CFR Part 761. PCB-contaminated sediments and soils with less than ("<") 50 ppm will be excavated and disposed of in accordance with state requirements.

EPA's Administrative Record, available for public review, includes extensive information on the nature of the contamination, location and extent of the contamination, the procedures used relative to sampling, Human Health and Ecological Risk Assessments, and the Proposed Plan for the Nuclear Metals, Inc. Superfund Site.

Consistent with 40 CFR 761.61(c) of the Toxic Substances Control Act ("TSCA"), I have determined that the method of excavation and disposal of the ≥ 50 ppm PCB-contaminated sediments and soils as described will not pose an unreasonable risk of injury to health or the environment as long as the following conditions are met:

1. The selected contractor for the PCB remediation work shall submit a contractor work plan describing the containment and air monitoring that will be employed during PCB remedial activities, including but not limited to site control, excavation, handling, storage, and disposal activities. This work plan should also include information on how and where all PCB-contaminated wastes (both less than ("<") 50 ppm and ≥ 50 ppm) will be stored and disposed of, how stormwater controls and runoff will be managed, how dust levels will be controlled and monitored, and on how field equipment will be decontaminated.

2. Two PCB-contaminated sediment and soil samples with ≥ 50 ppm PCBs are located in Areas of Investigation (AOIs) 4 and 8, as shown in **Attachment 1.** Identified PCB-contaminated soils and sediments with ≥ 50 ppm shall be excavated and disposed off-site at a TSCA-approved disposal facility or a RCRA hazardous waste landfill in accordance with 40 CFR § 761.61(a)(5)(i)(B)(*2*)(*iii*). Confirmatory sampling shall be conducted in accordance with 40 CFR Part 761, Subpart O to document that all PCBs with ≥ 50 ppm have been removed. The locations of these PCB-contaminated soil and sediment areas are identified in **Attachment 1.**

3. Compliance with the PCB regulations at 40 CFR Part 761 is maintained during all phases of work involving ≥ 50 ppm PCB-contaminated soils and/or sediments, including but not limited to:

   a. 40 CFR Part 761 Subpart C – Marking of PCBs and PCB Items
   b. 40 CFR § 761.50(b)(7) – PCB/Radioactive waste
   c. 40 CFR § 761.65 – Storage for Disposal
   d. 40 CFR § 761.79 – Decontamination Standards and Procedures
   e. 40 CFR Part 761 Subpart K – PCB Waste Disposal Records and Reports

This Determination is based on the information contained in the Administrative Record. In the event that PCBs are identified in other areas located on the Nuclear Metals Superfund Site that meet the definition of a *PCB remediation waste* and that are not addressed under this TSCA Determination, compliance with 40 CFR § 761.61 for cleanup and disposal of these PCBs shall be required.

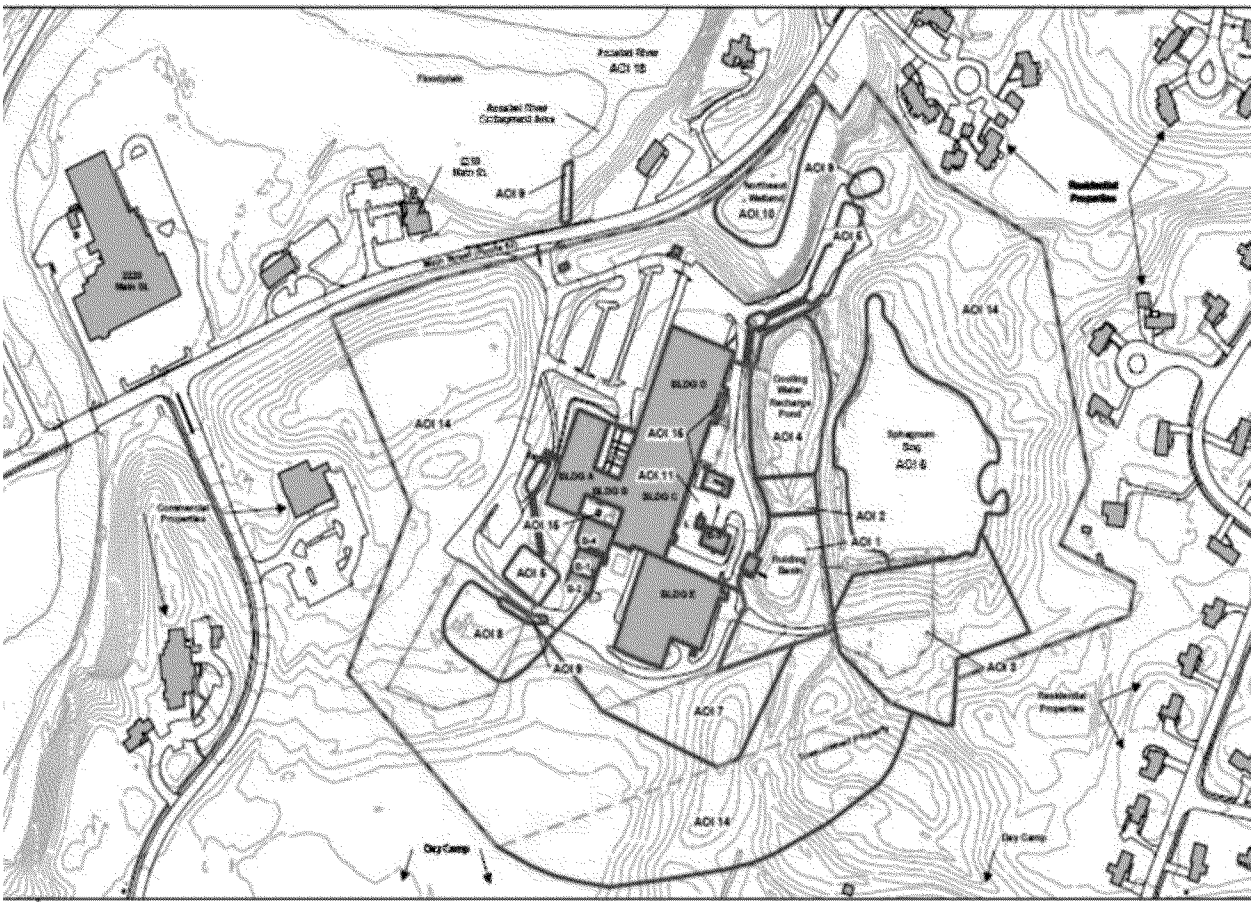
Nancy Barmakian 09/28/15

Nancy Barmakian, Acting Director — Date

Office of Site Remediation & Restoration

Attachment 1: ≥ 50 ppm PCB-contaminated soils and sediments AOIs 4 and 8

Attachment 1



APPENDIX H

LIST OF ACRONYMS AND ABBREVIATIONS

LIST OF ACRONYMS AND ABBREVATIONS

AOC	Administrative Order on Consent
AOI	Areas of Investigation
ARAR	Applicable or Relevant and Appropriate Requirement
BERA	Baseline Ecological Risk Assessment
bgs	below ground surface
BHHRA	Baseline Human Health Risk Assessment
BSAF	Biota-Soil Accumulation Factor
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CFR	Code of Federal Regulations
cm	centimeter
CMR	Code of Massachusetts Regulations
COC	Contaminant of Concern
COPC	Contaminant of Potential Concern
CREW	Citizens Research and Environmental Watch
CSGWPP	Comprehensive State Ground Water Protection Program
CSM	Conceptual Site Model
CTEs	Central Tendency Exposures
CWA	Clean Water Act
cy	cubic yard
DCA	Dichloroethane
DCE	Dichloroethene
DU	Depleted Uranium
EA	Exposure Area
EDI	Estimated Daily Intake
EE/CA	Engineering Evaluation/Cost Analysis
EPA	United States Environmental Protection Agency
EPC	Exposure Point Concentration
ESD	Explanation of Significant Differences
FETAX	Frog Embryo teratogenesis assay - using *Xenopus*
FS	Feasibility Study
GERE	Grant of Environmental Restriction and Easement
GWTP	Ground Water Treatment Plant
HHRA	Human Health Risk Assessment
HI	Hazard Index
HQ	Hazard Quotient
ICs	Institutional Controls
Id	*Idem* ("the same")
ILCR	Incremental Lifetime Cancer Risk
IR	Incremental Risk
ISRZ	*In-Situ* Reactive Zones

kg	kilogram
L	liter
LLC	Limited Liability Company
m	meter
MADPH	Massachusetts Department of Public Health
MADPH-RCP	Massachusetts Department of Public Health-Radiation Control Program
MANHESP	Massachusetts Natural Heritage and Endangered Species Program
MassDEP	Massachusetts Department of Environmental Protection
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MCP	Massachusetts Contingency Plan
mg	milligram
M.G.L.	Massachusetts General Law
MM	Management of Migration
NAUL	Notice of Activity and Use Limitation
NCP	National Contingency Plan
NMI	Nuclear Metals, Incorporated
NPL	National Priorities List
NTCRA	Non-Time Critical Removal Action
O&M	Operation and Maintenance
OSRR	Office of Site Remediation and Restoration
OSWER	Office of Solid Waste and Emergency Response
PAH	Polynuclear Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCE	Tetrachloroethene
ppb	parts per billion
ppm	parts per million
PRG	Preliminary Remediation Goal
PRP	Potentially Responsible Party
RAGS	Risk Assessment Guidance for Superfund
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
RfC	reference concentration
RfD	reference dose
RME	Reasonable Maximum Exposure
ROD	Record of Decision
SC	Source Control
SLERA	Screening Level Ecological Risk Assessment
SQT	Sediment Quality Triad
SRI	Superfund Redevelopment Initiative
SSL	Soil Screening Level
SVOC	Semivolatile Organic Compound
TAG	Technical Assistance Grant
TBC	To Be Considered
TCA	1,1,1-Trichloroethane

TCE	Trichloroethene
TRV	Toxicity Reference Value
TSCA	Toxic Substances Control Act
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
ug	microgram
USC	United States Code
VISL	Vapor Intrusion Screening Guidance
VOC	Volatile Organic Compound
ZVI	Zero-Valent Iron

APPENDIX I

ADMINISTRATIVE RECORD INDEX

Nuclear Metals

NPL Site Administrative Record

Record of Decision (ROD)
And Non-Time Critical Removal Action
(NTCRA)

Index

ROD Signed: September 2015
Admin. Record Released: September 2015

Prepared by
EPA New England
Office of Site Remediation & Restoration

Introduction to the Collection

This is the Administrative Record Index for the Administrative Record (AR), for the Nuclear Metals Superfund Site (Site), located in Concord, Massachusetts. This Record of Decision (ROD) and Non-Time Critical Removal Action (NTCRA) Memorandum was released in September, 2015. The file contains site-specific documents and a list of guidance documents used by EPA staff in selecting a proposed response action at the Site.

This Administrative Record replaces the Administrative Record File for the ROD Proposed Plan released in November 2014. This Administrative Record index includes, by reference, the following Administrative Records issued on dates indicated: Removal Action in August 2002, Supplemental Removal Action in April 2003, Removal Action in February 2008, and Non-Time Critical Removal Action (NTCRA) in September 2008. This Administrative Record index includes, by reference, the following Administrative Records issued on dates indicated: Removal Action in August 2002, Supplemental Removal Action in April 2003, Removal Action in February 2008, and Non-Time Critical Removal Action (NTCRA) in September 2008. Documents listed in a bibliography to a document included in the administrative record (e.g., listed in the bibliography to the RI/FS) are included in this administrative record by reference and might not be listed separately in this index.

The administrative record file is available for review at:

Concord Public Library, Concord, MA
129 Main St, Concord, MA 01742
Phone: (978) 318-3300
Email: concord@minlib.net
Concord Free Public Library Homepage: http://www.concordlibrary.org/

U.S. Environmental Protection Agency
Office of Site Remediation and Restoration Records Center
5 Post Office Square, Suite 100
Boston, MA 02109-3912
Tel. (617)918-1440
Hours: Monday - Friday 9:00 a.m. to 5:00 p.m.
Website: http://www.epa.gov/region1/cleanup/resource/records/

An administrative record file is required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA).

Please note that the compact disc(s) (CD) containing this Administrative Record may include index data and other metadata (hereinafter collectively referred to as metadata) to allow the user to conduct index searches and key word searches across all the files contained on the CD. All the information that appears in the metadata, including any dates associated with creation of the indexing data, is not part of the Administrative Record for the Site under CERCLA and shall not

be construed as relevant to the documents that comprise the Administrative Record. This metadata is provided as a convenience for the user and is not part of the Administrative Record.

Questions about this administrative record file should be directed to the EPA New England project manager.

NUCLEAR METALS, INC.
AR Collection: 63554
Record of Decision (ROD) and Non-Time Critical Removal Action (NTCRA)
AR Collection Index Report
For External Use

Phase 02: REMOVAL RESPONSE

582987 **ENGINEERING EVALUATION/ COST ANALYSIS (EE/CA) EQUIVALENT APPROVAL MEMORANDUM FOR NON-TIME CRITICAL REMOVAL ACTION (NTCRA)**

Author: MELISSA TAYLOR,US EPA REGIO
Addressee: NANCY BARMAKIAN, US EPA REGION 1
Doc Type: CORRESPONDENCE
EE/CA START APPROVAL
MEMO

Doc Date: 09/18/2015 **# of Pages:** 8
File Break: 02.02

Phase 03: REMEDIAL INVESTIGATION (RI)

519891 **LETTER COMMENTING ON DRAFT REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS) WORK PLAN**

Author: DANIEL KEEFE, MA DEPT OF ENV
Addressee: MELISSA TAYLOR,US EPA REGION 1
Doc Type: CORRESPONDENCE
LETTER
PUBLIC (AND OTHER) COMMENTS

Doc Date: 03/24/2004 **# of Pages:** 7
File Break: 03.07

567928 **LETTER PROVIDING COMMENTS ON DRAFT REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS) WORK PLAN**

Author: MICHAEL J WEBSTER, GEOINSIG
Addressee: , CITIZENS RESEARCH AND ENV
MELISSA TAYLOR,US EPA REGION 1
Doc Type: CORRESPONDENCE
LETTER
PUBLIC (AND OTHER) COMMENTS

Doc Date: 04/23/2004 **# of Pages:** 42
File Break: 03.07

Phase 03: REMEDIAL INVESTIGATION (RI)

567930 **LETTER PROVIDING RESPONSE TO COMMENTS ON DRAFT REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS) WORK PLAN**

Author: MELISSA TAYLOR,US EPA REGIO
Addressee: , CONCORD (MA) TOWN OF
Doc Type: CORRESPONDENCE
LETTER
PUBLIC (AND OTHER) COMMENTS
Doc Date: 05/19/2004
File Break: 03.07
# of Pages: 7

568462 **MEMO REGARDING RESPONSE TO COMMENTS ON DRAFT REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS) WORK PLAN**

Author: MELISSA TAYLOR,US EPA REGIO
Addressee: DANIEL KEEFE, MA DEPT OF ENVIRONMENTAL PR
Doc Type: CORRESPONDENCE
MEMO
PUBLIC (AND OTHER) COMMENTS
Doc Date: 05/19/2004
File Break: 03.07
# of Pages: 10

457308 **FIELD SAMPLING PLAN (FSP)**

Author: , DE MAXIMIS INC
Addressee: , GEOSYNTEC CONSULTANTS IN
, MACTEC ENGINEERING AND C
Doc Type: WORK PLAN
Doc Date: 09/29/2004
File Break: 03.07
# of Pages: 540

457309 **QUALITY ASSURANCE PROJECT PLAN (QAPP)**

Author: , DE MAXIMIS INC
Addressee: , GEOSYNTEC CONSULTANTS IN
, MACTEC ENGINEERING AND C
Doc Type: WORK PLAN
Doc Date: 09/29/2004
File Break: 03.07
# of Pages: 657

Phase 03: REMEDIAL INVESTIGATION (RI)

457310 **HEALTH AND SAFETY PLAN**

Author: , DE MAXIMIS INC
Addressee: , GEOSYNTEC CONSULTANTS IN
, MACTEC ENGINEERING AND C
Doc Type: WORK PLAN
Doc Date: 09/29/2004
# of Pages: 558
File Break: 03.07

457311 **SITE MANAGEMENT PLAN**

Author: , DE MAXIMIS INC
Addressee: , GEOSYNTEC CONSULTANTS IN
, MACTEC ENGINEERING AND C
Doc Type: WORK PLAN
Doc Date: 09/29/2004
# of Pages: 118
File Break: 03.07

557003 **LETTER REGARDING REMEDIAL INVESTIGATION / FEASIBILITY STUDY (RI/FS) WORK PLAN MODIFICATION REQUEST NO. 1**

Author: BRUCE R THOMPSON, DE MAXIM
Addressee: MELISSA TAYLOR,US EPA REGION 1
Doc Type: CORRESPONDENCE
LETTER
Doc Date: 10/19/2004
# of Pages: 56
File Break: 03.07

457304 **PROJECT SUMMARY AND OPERATIONS PLAN**

Author: , DE MAXIMIS INC
Addressee: , GEOSYNTEC CONSULTANTS IN
, MACTEC ENGINEERING AND C
Doc Type: WORK PLAN
Doc Date: 04/15/2005
# of Pages: 629
File Break: 03.07

Phase 03: REMEDIAL INVESTIGATION (RI)

457305 **GROUNDWATERMODELING PLAN**

Author: , DE MAXIMIS INC
Addressee: , GEOSYNTEC CONSULTANTS IN
, MACTEC ENGINEERING AND C
Doc Type: WORK PLAN
Doc Date: 04/15/2005
# of Pages: 79
File Break: 03.07

457306 **RISK ASSESSMENT PLAN**

Author: , DE MAXIMIS INC
Addressee: , GEOSYNTEC CONSULTANTS IN
, MACTEC ENGINEERING AND C
Doc Type: WORK PLAN
Doc Date: 04/15/2005
# of Pages: 195
File Break: 03.07

567936 **REVISED PHASE 1B SCOPE OF WORK (SOW)**

Author: BRUCE R THOMPSON, DE MAXIM
Addressee: MELISSA TAYLOR,US EPA REGION 1
Doc Type: CORRESPONDENCE
LETTER
Doc Date: 09/27/2005
# of Pages: 854
File Break: 03.03

568430 **MEMO REGARDING REVIEW OF CITIZENS RESEARCH AND ENVIRONMENTAL WATCH(CREW) TECHNICAL NOTE 2006-01: COMMENTS ON RADIOLOGICAL REVIEW OF FALL 2004 REMEDIAL INVESTIGATION (RI) ANALYTICALDATA**

Author: ANDREW SCHKUTA, METCALF &
Addressee: EDWARD A CONROY, METCALF & EDDY INC
Doc Type: CORRESPONDENCE
MEMO
Doc Date: 01/13/2006
# of Pages: 6
File Break: 03.02

Phase 03: REMEDIAL INVESTIGATION (RI)

568449 **DRAFT FOR AGENCY REVIEW AND COMMENT LETTER REGARDING RESPONSE TO COMMENTS IN CITIZENS RESEARCH AND ENVIRONMENTAL WATCH(CREW) TECHNICAL NOTE NO. 2006-1 - RADIOLOGICAL REVIEW OF FALL 2004 ANALYTICAL DATA [REDLINE, HIGHLIGHTING, MARGINALIA]**

Author: , DE MAXIMIS INC
Addressee: , US EPA REGION 1
Doc Type: CORRESPONDENCE
LETTER
Doc Date: 03/09/2006
# of Pages: 12
File Break: 03.02

568448 **LETTER REGARDING RESPONSE TO COMMENTS IN CITIZENS RESEARCH AND ENVIRONMENTAL WATCH(CREW) TECHNICAL NOTE NO. 2006-1**

Author: BRUCE R THOMPSON, DE MAXIM
Addressee: MELISSA TAYLOR,US EPA REGION 1
Doc Type: CORRESPONDENCE
LETTER
Doc Date: 04/03/2006
# of Pages: 66
File Break: 03.02

568433 **MEMO REGARDING RESPONSE TO COMMENTS ON RADIOLOGICAL REVIEW OF FALL 2004 ANALYTICAL DATA, CITIZENS RESEARCH AND ENVIRONMENTAL WATCH(CREW) TECHNICAL NOTE NO. 2006-1 (12/15/2005 URANIUM ANALYSIS MEMO ATTACHED)**

Author: MELISSA TAYLOR,US EPA REGIO
Addressee: JAMES L WEST, CREW (NUCLEAR METALS)
Doc Type: CORRESPONDENCE
MEMO
Doc Date: 04/25/2006
# of Pages: 7
File Break: 03.02

567935 **REVISED PHASE 1C WORK PLAN**

Author: BRUCE R THOMPSON, DE MAXIM
Addressee: MELISSA TAYLOR,US EPA REGION 1
Doc Type: CORRESPONDENCE
LETTER
WORK PLAN
Doc Date: 05/07/2007
# of Pages: 718
File Break: 03.07

Phase 03: REMEDIAL INVESTIGATION (RI)

568437 **MEMO REGARDING THOREAU HILLS SURFICIAL SOIL SAMPLING RESULTS**

Author: MICHAEL J WEBSTER, GEOINSIG]
Addressee: , DE MAXIMIS INC
, US EPA
Doc Type: CORRESPONDENCE
MEMO
SAMPLING DATA

Doc Date: 03/17/2008 **# of Pages:** 36
File Break: 03.02

567934 **LETTER REGARDING ADDITIONAL PHASE 1C SAMPLING (05/2008 GROUNDWATER SAMPLING TABLE, 2008 GROUNDWATER MONITORING SCHEDULE AND FIGURE ATTACHED)**

Author: JOHN M HUNT, DE MAXIMIS INC
Addressee: MELISSA TAYLOR, US EPA REGION 1
Doc Type: CORRESPONDENCE
LETTER

Doc Date: 04/14/2008 **# of Pages:** 6
File Break: 03.01

70002852 **DRAFT ASSABET RIVER SEDIMENT STATISTICAL REPORT: AN EXAMINATION OF SITE AND BACKGROUND SEDIMENT SAMPLE DATA WITH STATISTICAL COMPARISONS**

Author: , MACTEC ENGINEERING AND C(
Addressee: , DE MAXIMIS INC
Doc Type: REPORT
SAMPLING DATA

Doc Date: 07/30/2008 **# of Pages:** 71
File Break: 03.10

Phase 03: REMEDIAL INVESTIGATION (RI)

555798 **TECHNICAL MEMO REGARDING DELINEATION OF GROUNDWATER CONTAMINANTS**

Author: DAVID ADILMAN, GEOSYNTEC C
Addressee: PETER ZEEB, GEOSYNTEC CONSI
JOHN M HUNT, DE MAXIMIS INC
BRUCE R THOMPSON, DE MAXIMIS INC
Doc Type: CORRESPONDENCE
MEMO

Doc Date: 01/12/2009 **# of Pages:** 132
File Break: 03.02

557000 **TECHNICAL MEMO REGARDING DELINEATION OF SOIL, SEDIMENT AND SURFACE WATER CONTAMINATION**

Author: NADIA GLUCKSBERG, MACTEC E
Addressee: ROD PENDLETON, MACTEC ENGI
JAY PETERS, MACTEC ENGINEER
BRUCE R THOMPSON, DE MAXIMIS INC
Doc Type: CORRESPONDENCE
MEMO

Doc Date: 01/16/2009 **# of Pages:** 1,310
File Break: 03.02

567929 **LETTER PROVIDING COMMENTS ON DELINEATION OF SOIL, SEDIMENT, SURFACE WATER AND GROUNDWATER CONTAMINATION TECHNICAL MEMORANDUM**

Author: MELISSA TAYLOR, US EPA REGIO
Addressee: , METCALF & EDDY INC
Doc Type: CORRESPONDENCE
MEMO
PUBLIC (AND OTHER) COMMENTS

Doc Date: 04/28/2009 **# of Pages:** 4
File Break: 03.07

Phase 03: REMEDIAL INVESTIGATION (RI)

555799 LETTER REGARDING RESPONSE TO COMMENTS ON DELINEATION MEMORANDA

Author: BRUCE R THOMPSON, DE MAXIM
Addressee: MELISSA TAYLOR,US EPA REGION 1
Doc Type: CORRESPONDENCE
LETTER
Doc Date: 09/08/2009
# of Pages: 31
File Break: 03.02

75000293 CITIZENS RESEARCH AND ENVIRONMENTAL WATCH(CREW) COMMENTS ON THE BASELINE ECOLOGICAL RISK ASSESSMENT (BERA)

Author: , CITIZENS RESEARCH AND ENV
Addressee:
Doc Type: PUBLIC (AND OTHER) COMMENTS
REPORT
Doc Date: 08/19/2011
# of Pages: 5
File Break: 03.10

567932 DEPLETED URANIUM FATE AND TRANSPORT MODEL

Author: , GEOSYNTEC CONSULTANTS
Addressee: , DE MAXIMIS INC
Doc Type: REPORT
Doc Date: 01/01/2012
# of Pages: 80
File Break: 03.01

567933 REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS) STATUS REPORT, GROUND WATER SAMPLES - METALS/RAD - 07/30/2013 - 08/05/2013

Author:
Addressee:
Doc Type: REPORT
SAMPLING DATA
Doc Date: 08/05/2013
# of Pages: 10
File Break: 03.02

Phase 03: REMEDIAL INVESTIGATION (RI)

555797 **FINAL HUMAN HEALTH RISK ASSESSMENT (HHRA)**

Author: , HALEY & ALDRICH INC
Addressee: , DE MAXIMIS INC
Doc Type: REPORT
RISK/HEALTH ASSESSMENT
Doc Date: 09/04/2013
# of Pages: 4,609
File Break: 03.09

555795 **REMEDIAL INVESTIGATION (RI) REPORT**

Author: , AMEC ENVIRONMENT AND INF.
Addressee: , DE MAXIMIS INC
, GEOSYNTEC CONSULTANTS IN
, HALEY & ALDRICH INC
Doc Type: REMEDIAL INVESTIGATION (RI)
REPORT
Doc Date: 04/01/2014
# of Pages: 5,888
File Break: 03.06

555796 **MEMO REGARDING APPROVALOF DRAFT HUMAN HEALTH RISK ASSESSMENT (HHRA) AND CONDITIONAL APPROVALOF DRAFT REMEDIAL INVESTIGATION (RI) REPORT**

Author: MELISSA TAYLOR, US EPA REGIO
Addressee: BRUCE R THOMPSON, DE MAXIMIS INC
Doc Type: CORRESPONDENCE
MEMO
Doc Date: 04/02/2014
# of Pages: 2
File Break: 03.06

561873 **BASELINE ECOLOGICAL RISK ASSESSMENT (ERA)**

Author: , HALEY & ALDRICH INC
Addressee: , DE MAXIMIS INC
Doc Type: REPORT
RISK/HEALTH ASSESSMENT
Doc Date: 06/03/2014
# of Pages: 1,549
File Break: 03.10

Phase 04: FEASIBILITY STUDY (FS)

568426 **LETTER REGARDING COMMENTS ON REVISED PHASE 1B SCOPE OF WORK (SOW), SUBMITTED ON BEHALF OF CITIZENS RESEARCH AND ENVIRONMENTAL WATCH(CREW)**

Author: MICHAEL J WEBSTER, GEOINSIGI
Addressee: MELISSA TAYLOR,US EPA REGION 1
Doc Type: CORRESPONDENCE
LETTER

Doc Date: 12/01/2005 **# of Pages:** 9
File Break: 04.03

567938 **LETTER REGARDING US EPA NATIONAL REMEDY REVIEW BOARD (NRRB) MEETING TO REVIEW CLEANUP ALTERNATIVESFOR SITE**

Author: ROBERT G CIANCIARULO, US EP/
Addressee:
Doc Type: CORRESPONDENCE
LETTER

Doc Date: 08/22/2013 **# of Pages:** 2
File Break: 04.09

568453 **LETTER REGARDING RESPONSE TO COMMENTS ON DEPLETED URANIUM (DU) METAL EXTERIOR SITE CHARACTERIZATION SURVEY PLAN**

Author: BRUCE R THOMPSON, DE MAXIM
Addressee: MELISSA TAYLOR,US EPA REGION 1
Doc Type: CORRESPONDENCE
LETTER

Doc Date: 09/24/2013 **# of Pages:** 33
File Break: 04.07

568451 **EMAIL REGARDING APPROVALOF REVISED DEPLETED URANIUM (DU) SCANNING PLAN (EMAIL HISTORY ATTACHED)**

Author: MELISSA TAYLOR,US EPA REGIO
Addressee: ANDREW SCHKUTA, AECOM ENVIRONMENT
BRUCE R THOMPSON, DE MAXIMIS INC
Doc Type: CORRESPONDENCE
EMAIL

Doc Date: 09/25/2013 **# of Pages:** 1
File Break: 04.07

Phase 04: FEASIBILITY STUDY (FS)

568450 **GROUNDWATER USE AND VALUE DETERMINATION (10/29/2013 TRANSMITTAL LETTER ATTACHED)**

Author: , MA DEPT OF ENVIRONMENTAL
Addressee:
Doc Type: REPORT
Doc Date: 10/28/2013
# of Pages: 6
File Break: 04.04

567937 **NATIONAL REMEDY REVIEW BOARD (NRRB) INFORMATION PACKAGE**

Author: , US EPA REGION 1
Addressee:
Doc Type: REPORT
Doc Date: 11/01/2013
# of Pages: 182
File Break: 04.09

568447 **EMAIL REGARDING ZONING - 2229 MAIN STREET (EMAIL HISTORY ATTACHED)**

Author: PAMELA ROCKWELL, CONCORD
Addressee: MELISSA TAYLOR,US EPA REGION 1
Doc Type: CORRESPONDENCE
EMAIL
Doc Date: 11/19/2013
# of Pages: 3
File Break: 04.01

567931 **MEMO CONCERNING HEADQUARTERS CONSULTATIONFOR SITE**

Author: MELISSA TAYLOR,US EPA REGIO
Addressee: STUART WALKER,US EPA
Doc Type: CORRESPONDENCE
MEMO
Doc Date: 02/05/2014
# of Pages: 10
File Break: 04.01

Phase 04: FEASIBILITY STUDY (FS)

568452 **FINAL REPORT, FIELD AND LABORATORY MEDIA TESTING FOR DEPLETED URANIUM (DU) SEQUESTRATION IN OVERBURDEN GROUNDWATER**

Author: , GEOSYNTEC CONSULTANTS IN
Addressee: , DE MAXIMIS INC
Doc Type: REPORT
SAMPLING DATA
Doc Date: 09/01/2014
# of Pages: 79
File Break: 04.02

564689 **MEMO REGARDING NATIONAL REMEDY REVIEW BOARD (NRRB) RECOMMENDATIONS**

Author: AMY LEGARE, US EPA - HEADQU
Addressee: JAMES T OWENS III, US EPA REGION 1
Doc Type: CORRESPONDENCE
MEMO
Doc Date: 09/04/2014
# of Pages: 6
File Break: 04.09

564690 **MEMO REGARDING RESPONSES TO NATIONAL REMEDY REVIEW BOARD (NRRB) RECOMMENDATIONS (07/11/2014 EMAIL ON RADIATION CONSULTATION ATTACHED)**

Author: NANCY BARMAKIAN, US EPA RE
Addressee: JAMES T OWENS III, US EPA REGI
AMY LEGARE, US EPA - HEADQUARTERS
Doc Type: CORRESPONDENCE
MEMO
Doc Date: 09/10/2014
# of Pages: 13
File Break: 04.09

568091 **PROPOSED PLAN**

Author: , US EPA REGION 1
Addressee:
Doc Type: PROPOSED PLAN
PUBLIC INFORMATION
REPORT
Doc Date: 10/01/2014
# of Pages: 29
File Break: 04.09

Phase 04: FEASIBILITY STUDY (FS)

568423 **FEASIBILITY STUDY (FS) REPORT**

Author: , DE MAXIMIS INC
Addressee: , GEOSYNTEC CONSULTANTS IN
, HALEY & ALDRICH INC
Doc Type: FEASIBILITY STUDY (FS)
REPORT

Doc Date: 11/01/2014 **# of Pages:** 884
File Break: 04.06

Phase 05: RECORD OF DECISION (ROD)

581153 **EMAIL REGARDING PUBLIC COMMENTS ON PUBLIC MEETING**

Author: PAUL LOVECCHIO, CONCORD (M
Addressee: MELISSA TAYLOR,US EPA REGION 1
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

Doc Date: 11/13/2014 **# of Pages:** 1
File Break: 05.03

581154 **EMAIL REGARDING PUBLIC COMMENTS ON PROPOSED REMEDIATION PLAN**

Author: PAMELA ROCKWELL, CONCORD
Addressee: MELISSA TAYLOR,US EPA REGION 1
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

Doc Date: 11/19/2014 **# of Pages:** 2
File Break: 05.03

Phase 05: RECORD OF DECISION (ROD)

581155 **EMAIL REGARDING REQUEST FOR EXTENSION OF PUBLIC COMMENT PERIOD**

Author: MICHAEL J WEBSTER, GEOINSIG
Addressee: , CREW (NUCLEAR METALS)
MELISSA TAYLOR,US EPA REGION 1
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS
Doc Date: 11/24/2014
# of Pages: 1
File Break: 05.03

581156 **LETTER REGARDING PUBLIC COMMENT ON PROPOSED PLAN (EMAIL TRANSMITTAL ATTACHED)**

Author: CATHERINE PERRY,CONCORD (M
Addressee: MELISSA TAYLOR,US EPA REGION 1
Doc Type: CORRESPONDENCE
LETTER
PUBLIC (AND OTHER) COMMENTS
Doc Date: 11/29/2014
# of Pages: 2
File Break: 05.03

581152 **MEMO REGARDING PUBLIC COMMENTS ON PUBLIC MEETING AND REPORT**

Author: DOUGLAS GIFFORD, CONCORD (
Addressee: MELISSA TAYLOR,US EPA REGION 1
Doc Type: CORRESPONDENCE
MEMO
PUBLIC (AND OTHER) COMMENTS
Doc Date: 12/07/2014
# of Pages: 18
File Break: 05.03

Phase 05: RECORD OF DECISION (ROD)

581157 **EMAIL REGARDING PUBLIC COMMENT ON PROPOSED CLEANUP PLAN**

Author: SUE FELSHIN, CONCORD (MA) RI
Addressee: MELISSA TAYLOR,US EPA REGION 1
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

Doc Date: 12/09/2014 **# of Pages:** 1
File Break: 05.03

581158 **EMAIL REGARDING PUBLIC COMMENT ON PROPOSED CLEANUP PLAN**

Author: C ROSE CORTESE, CONCORD (MA
Addressee: MELISSA TAYLOR,US EPA REGION 1
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

Doc Date: 12/10/2014 **# of Pages:** 1
File Break: 05.03

581159 **LETTER REGARDING PUBLIC COMMENT ON PUBLIC HEARING AND PROPOSED REMEDIAL ACTION PLAN (EMAIL TRANSMITTAL ATTACHED)**

Author: JANE CERASO, ACTON CITIZENS,
Addressee: MELISSA TAYLOR,US EPA REGION 1
Doc Type: CORRESPONDENCE
LETTER
PUBLIC (AND OTHER) COMMENTS

Doc Date: 12/10/2014 **# of Pages:** 2
File Break: 05.03

581161 **PUBLIC HEARING COMMENTS ON PROPOSED PLAN**

Author: , CREW (NUCLEAR METALS)
Addressee: , US EPA REGION 1
Doc Type: PUBLIC (AND OTHER) COMMENTS
REPORT

Doc Date: 12/10/2014 **# of Pages:** 3
File Break: 05.03

Phase 05: RECORD OF DECISION (ROD)

581160 **EMAIL REGARDING PUBLIC COMMENT PROPOSED REMEDIATION PLAN**

Author: MARGARET M WARGELIN, CONC
Addressee: MELISSA TAYLOR, US EPA REGION 1
Doc Type: CORRESPONDENCE
EMAIL
PUBLIC (AND OTHER) COMMENTS

Doc Date: 12/14/2014 **# of Pages:** 1
File Break: 05.03

581162 **LETTER REGARDING COMMENTS ON PROPOSED PLAN**

Author: JEFFREY ADAMS, CONCORD (MA
Addressee: ELISSA BROWN, CONCORD (MA)
GREGORY HIGGINS, CONCORD (M
LYNN HUGGINS, CONCORD (MA)
STEPHEN VERRILL, CONCORD (M
MELISSA TAYLOR, US EPA REGION 1
Doc Type: CORRESPONDENCE
LETTER
PUBLIC (AND OTHER) COMMENTS

Doc Date: 12/17/2014 **# of Pages:** 2
File Break: 05.03

581163 **LETTER REGARDING COMMENTS ON PROPOSED REMEDIAL ACTION PLAN**

Author: SUZANNE K CONDON, MA DEPT (
Addressee: MELISSA TAYLOR, US EPA REGION 1
Doc Type: CORRESPONDENCE
LETTER
PUBLIC (AND OTHER) COMMENTS

Doc Date: 01/07/2015 **# of Pages:** 4
File Break: 05.03

Phase 05: RECORD OF DECISION (ROD)

581164 **LETTER REGARDING COMMENTS ON PROPOSED PLAN (EMAIL TRANSMITTAL ATTACHED)**

Author: PAUL BOEHM, CONCORD (MA) T(
Addressee: RAY BRUTTOMESSO, CONCORD (
LEN RAPPOLLI, CONCORD (MA) T
PAMELA ROCKWELL, CONCORD
FRED SEWARD, CONCORD (MA) T
STEVE VERRILL, CONCORD (MA)
MELISSA TAYLOR, US EPA REGION 1
Doc Type: CORRESPONDENCE
LETTER
PUBLIC (AND OTHER) COMMENTS

Doc Date: 01/09/2015 **# of Pages:** 9
File Break: 05.03

581165 **MEMO REGARDING PUBLIC COMMENTS ON PUBLIC MEETING AND REPORT (EMAIL TRANSMITTAL ATTACHED)**

Author: DOUGLAS GIFFORD, CONCORD (
Addressee: MELISSA TAYLOR, US EPA REGION 1
Doc Type: CORRESPONDENCE
MEMO
PUBLIC (AND OTHER) COMMENTS

Doc Date: 01/12/2015 **# of Pages:** 5
File Break: 05.03

581166 **LETTER REGARDING COMMENTS ON PROPOSED REMEDIAL ACTION PLAN (EMAIL TRANSMITTAL ATTACHED)**

Author: KERRY DISKIN, CONCORD (MA) E
Addressee: MELISSA TAYLOR, US EPA REGION 1
Doc Type: CORRESPONDENCE
LETTER
PUBLIC (AND OTHER) COMMENTS

Doc Date: 01/13/2015 **# of Pages:** 2
File Break: 05.03

Phase 05: RECORD OF DECISION (ROD)

581167 **LETTER REGARDING COMMENTS ON PROPOSED PLAN (01/14/2015 EMAIL TRANSMITTAL ATTACHED)**

Author: GARRY WALDECK, MA DEPT OF E
Addressee: MELISSA TAYLOR, US EPA REGION 1
Doc Type: CORRESPONDENCE
LETTER
PUBLIC (AND OTHER) COMMENTS

Doc Date: 01/13/2015 **# of Pages:** 3
File Break: 05.03

581168 **LETTER REGARDING COMMENTS ON PROPOSED PLAN**

Author: STEVEN NG, CONCORD (MA) BOA
Addressee: MELISSA TAYLOR, US EPA REGION 1
Doc Type: CORRESPONDENCE
LETTER
PUBLIC (AND OTHER) COMMENTS

Doc Date: 01/13/2015 **# of Pages:** 3
File Break: 05.03

581169 **LETTER REGARDING COMMENTS ON PROPOSED CLEANUP PLAN AND FEASIBILITY STUDY (FS) (EMAIL TRANSMITTAL ATTACHED)**

Author: CHRIS ALLEN, ACTON (MA) WATE
Addressee: MATTHEW MOSTOLLER, ACTON
MELISSA TAYLOR, US EPA REGION 1
Doc Type: CORRESPONDENCE
LETTER
PUBLIC (AND OTHER) COMMENTS

Doc Date: 01/14/2015 **# of Pages:** 5
File Break: 05.03

Phase 05: RECORD OF DECISION (ROD)

581170 **MEMO REGARDING COMMENTS ON PROPOSED PLAN (EMAIL TRANSMITTAL ATTACHED)**

Author: DOUGLAS GIFFORD, CREW (NUC
Addressee: VIRGINIE LANDRE, CREW (NUCL
RICK OLESON, CREW (NUCLEAR
LEN RAPPOLI, CREW (NUCLEAR
TIM ROSE, CREW (NUCLEAR ME
BOB VANDYKE, CREW (NUCLEA
MELISSA TAYLOR, US EPA REGION 1
Doc Type: CORRESPONDENCE
MEMO
PUBLIC (AND OTHER) COMMENTS

Doc Date: 01/14/2015 **# of Pages:** 4
File Break: 05.03

Phase 09: STATE COORDINATION

48359 **THESIS: PRE-CONSTRUCTION RADIOLOGICAL ASSESSMENT AND DECONTAMINATION OF A DEPLETED URANIUM WASTE HANDLING SITE**

Author: ADAM S WEAVER, UNIVERSITY C
Addressee:
Doc Type: REPORT

Doc Date: 09/25/1985 **# of Pages:** 60
File Break: 09.10

48391 **APPLICATION FOR RENEWAL OF SOURCE MATERIAL LICENSES SMB-179 AND SUB-1452**

Author: TONY CARPENTINO, NUCLEAR M
Addressee: , NUCLEAR REGULATORY COMMISSION
Doc Type: REPORT

Doc Date: 09/06/1996 **# of Pages:** 110
File Break: 09.10

Phase 09: STATE COORDINATION

20515 **DECOMMISSIONING PLAN FOR HOLDING BASIN, REVISION 1**

Author: , GZA GEOENVIRONMENTAL INC
Addressee: , STARMET CORPORATION
Doc Type: WORK PLAN
Doc Date: 01/01/1997
# of Pages: 146
File Break: 09.10

Phase 10: ENFORCEMENT/NEGOTIATION

567942 **DRAFT TSCA 40 CFR SECTION 761.61(C) DETERMINATION (MAP ATTACHED)**

Author: JAMES T OWENS, US EPA REGION
Addressee:
Doc Type: REPORT
Doc Date: 01/01/1111
# of Pages: 3
File Break: 10.01

273482 **ADMINISTRATIVE ORDER BY CONSENT (AOC) FOR REMEDIAL INVESTIGATION / FEASIBILITY STUDY (RI/FS)**

Author: RICHARD CAVAGNERO,US EPA R
Addressee:
Doc Type: ADMIN ORDER ON CONSENT
ENFORCEMENT & SETTLEMENT
Doc Date: 06/13/2003
# of Pages: 140
File Break: 10.07

282734 **AMENDMENT TO ADMINISTRATIVE ORDER BY CONSENT (AOC) FOR REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS)**

Author: , US EPA REGION 1
Addressee: , DEPARTMENT OF ENERGY
, MONY LIFE INSURANCE CO
, TEXTRON INC
, US ARMY
, WHITTAKER CORP
Doc Type: ADMIN ORDER ON CONSENT
ENFORCEMENT & SETTLEMENT
Doc Date: 02/13/2008
# of Pages: 24
File Break: 10.07

Phase 10: ENFORCEMENT/NEGOTIATION

75000256 **ADMINISTRATIVE SETTLEMENT AGREEMENT AND ORDER ON CONSENT (AOC) FOR NON-TIME CRITICAL REMOVAL ACTION (NTCRA), CERCLA DOCKET NO. CERCLA-01-2011-004**

Author: , TEXTRON INC
Addressee: , US ARMY
, US DEPT OF ENERGY
, US EPA REGION 1
, WHITTAKER CORP
Doc Type: ADMIN ORDER ON CONSENT
ENFORCEMENT & SETTLEMENT

Doc Date: 06/22/2011 **# of Pages:** 47
File Break: 10.07

524097 **SECOND AMENDMENT TO ADMINISTRATIVE SETTLEMENT AGREEMENT AND ORDER ON CONSENT (AOC) FOR REMEDIAL INVESTIGATION/FEASIBILITY STUDY (RI/FS). US EPA DOCKET #CERCLA-01-2012-0096**

Author: , US EPA REGION 1
Addressee:
Doc Type: ADMIN ORDER ON CONSENT
ENFORCEMENT & SETTLEMENT

Doc Date: 10/02/2012 **# of Pages:** 11
File Break: 10.07

Phase 11: POTENTIALLY RESPONSIBLE PARTY

16911 **104 INFORMATION REQUEST - US ARMY LEGAL SERVICES AGENCY (CERTIFIED MAIL RECEIPT IS ATTACHED)**

Author: BRUCE MARSHALL, US EPA REGI
Addressee: LT COLONEL DAVID HOWLETT, US ARMY LEGAL S
Doc Type: 104 INFO REQUEST
CORRESPONDENCE
LETTER

Doc Date: 11/07/2000 **# of Pages:** 18
File Break: 11.09

Phase 11: POTENTIALLY RESPONSIBLE PARTY

16913 **104 INFORMATION REQUEST - STARMET CORP (CERTIFIED MAIL RECEIPT IS ATTACHED)**

Author: BRUCE MARSHALL, US EPA REGI
Addressee: ROBERT E QUINN, STARMET CORPORATION
Doc Type: 104 INFO REQUEST
CORRESPONDENCE
LETTER
Doc Date: 11/07/2000
File Break: 11.09
# of Pages: 31

16914 **104 INFORMATION REQUEST - WHITTAKER CORP (CERTIFIED MAIL RECEIPT IS ATTACHED)**

Author: BRUCE MARSHALL, US EPA REGI
Addressee: JOSEPH F ALIBRANDI, WHITTAKER CORP
Doc Type: 104 INFO REQUEST
CORRESPONDENCE
LETTER
Doc Date: 11/07/2000
File Break: 11.09
# of Pages: 28

16915 **104 INFORMATION REQUEST - TEXTRON INC (CERTIFIED MAIL RECEIPT IS ATTACHED)**

Author: BRUCE MARSHALL, US EPA REGI
Addressee: LEWIS B CAMPBELL, TEXTRON INC
Doc Type: 104 INFO REQUEST
CORRESPONDENCE
LETTER
Doc Date: 11/07/2000
File Break: 11.09
# of Pages: 28

16871 **104 INFORMATION REQUEST RESPONSE - TEXTRON INC (ANNUAL REPORT IS ATTACHED)**

Author: JAMIESON M SCHIFF, TEXTRON I
Addressee: MELISSA TAYLOR,US EPA REGION 1
Doc Type: 104 INFO REQUEST RESPONSE
CORRESPONDENCE
LETTER
Doc Date: 12/11/2000
File Break: 11.09
# of Pages: 235

Phase 11: POTENTIALLY RESPONSIBLE PARTY

16845 **[REDACTED] 104 INFORMATION REQUEST RESPONSE - WHITTAKER CORPORATION**

Author: ERIC G LARDIERE, WHITTAKER C
Addressee: MELISSA TAYLOR,US EPA REGION 1
AUDREY ZUCKER, US EPA REGION 1
Doc Type: 104 INFO REQUEST RESPONSE
CORRESPONDENCE
LETTER
Doc Date: 12/15/2000
# of Pages: 457
File Break: 11.09

568461 **104 INFORMATION REQUEST RESPONSE - UNITED STATES ARMY LEGAL SERVICES AGENCY [LETTER ONLY WITHOUT ATTACHMENTS]**

Author: LT COLONEL DAVID HOWLETT, U
Addressee: MELISSA TAYLOR,US EPA REGION 1
Doc Type: 104 INFO REQUEST RESPONSE
CORRESPONDENCE
LETTER
Doc Date: 01/30/2001
# of Pages: 8
File Break: 11.09

16755 **[REDACTED] 104 INFORMATION REQUEST RESPONSE - STARMET CORP (PART 1 OF 5) (02/07/01 COVER LETTER IS ATTACHED)**

Author: ROBERT E QUINN, STARMET COR
Addressee: , US EPA REGION 1
Doc Type: 104 INFO REQUEST RESPONSE
CORRESPONDENCE
LETTER
Doc Date: 02/06/2001
# of Pages: 90
File Break: 11.09

Phase 11: POTENTIALLY RESPONSIBLE PARTY

16760 **104 INFORMATION REQUEST RESPONSE - STARMET CORP (PART 2 OF 5) (EXHIBITS A-Q)**

Author: ROBERT E QUINN, STARMET COR
Addressee: , US EPA REGION 1
Doc Type: 104 INFO REQUEST RESPONSE
CORRESPONDENCE
LETTER
Doc Date: 02/06/2001
File Break: 11.09
# of Pages: 478

16762 **[REDACTED] 104 INFORMATION REQUEST RESPONSE - STARMET CORP (PART 3 OF 5) (EXHIBITS R-DD)**

Author: ROBERT E QUINN, STARMET COR
Addressee: , US EPA REGION 1
Doc Type: 104 INFO REQUEST RESPONSE
CORRESPONDENCE
LETTER
Doc Date: 02/06/2001
File Break: 11.09
# of Pages: 360

16763 **[REDACTED] 104 INFORMATION REQUEST RESPONSE - STARMET CORP (PART 4 OF 5) (EXHIBITS EE-QQ)**

Author: ROBERT E QUINN, STARMET COR
Addressee: , US EPA REGION 1
Doc Type: 104 INFO REQUEST RESPONSE
CORRESPONDENCE
LETTER
Doc Date: 02/06/2001
File Break: 11.09
# of Pages: 454

16764 **[REDACTED] 104 INFORMATION REQUEST RESPONSE - STARMET CORP (PART 5 OF 5) (EXHIBITS RR-RRR)**

Author: ROBERT E QUINN, STARMET COR
Addressee: , US EPA REGION 1
Doc Type: 104 INFO REQUEST RESPONSE
CORRESPONDENCE
LETTER
Doc Date: 02/06/2001
File Break: 11.09
# of Pages: 677

Phase 13: COMMUNITY RELATIONS

568432 **LETTER REGARDING COMMUNITY INVOLVEMENT PLAN (CIP)**

Author: ROBERT G CIANCIARULO, US EP/
Addressee: JAMES L WEST, CREW (NUCLEAR METALS)
Doc Type: CORRESPONDENCE
LETTER
Doc Date: 06/15/2004
# of Pages: 2
File Break: 13.01

457307 **COMMUNITY INVOLVEMENT SUPPORT PLAN**

Author: , DE MAXIMIS INC
Addressee: , GEOSYNTEC CONSULTANTS IN
, MACTEC ENGINEERING AND C
Doc Type: COMMUNITY INVOLVEMENT PLAN
WORK PLAN
Doc Date: 04/15/2005
# of Pages: 84
File Break: 13.02

568436 **DRAFT PRESENTATION - REVIEW OF HUMAN HEALTH RISK ASSESSMENT (HHRA)**

Author: , US EPA REGION 1
Addressee: , CREW (NUCLEAR METALS)
Doc Type: MEETING RECORD
Doc Date: 11/29/2006
# of Pages: 42
File Break: 13.04

568439 **DRAFT PRESENTATION - ECOLOGICAL RISK ASSESSMENT (ERA) UPDATE**

Author: , US EPA REGION 1
Addressee: , CREW (NUCLEAR METALS)
Doc Type: MEETING RECORD
Doc Date: 11/29/2006
# of Pages: 13
File Break: 13.04

Phase 13: COMMUNITY RELATIONS

568438 **FEASIBILITY STUDY (FS) PRESENTATION**

Author: , GEOSYNTEC CONSULTANTS
Addressee:
Doc Type: MEETING RECORD
Doc Date: 02/12/2013
# of Pages: 45
File Break: 13.04

568445 **EMAIL REGARDING PRIVATESIDE OF WEB SITE (10/01/2007, 09/01/2000, AND 06/01/2009 GUIDANCES, PAPER ON APATITE2, AND EMAIL HISTORY ATTACHED)**

Author: BRUCE R THOMPSON, DE MAXIM
Addressee: MICHAEL J WEBSTER, GEOINSIGHT INC
Doc Type: CORRESPONDENCE
EMAIL
Doc Date: 03/01/2013
# of Pages: 470
File Break: 13.01

568429 **MEMO REGARDING PRELIMINARY COMMENTS / OBSERVATIONSREGARDING THE FEASIBILITY STUDY (FS) OVERVIEW PRESENTATION**

Author: , CREW (NUCLEAR METALS)
Addressee: , GEOINSIGHT INC
MELISSA TAYLOR,US EPAREGION 1
BRUCE R THOMPSON, DE MAXIMIS INC
Doc Type: CORRESPONDENCE
MEMO
Doc Date: 03/07/2013
# of Pages: 4
File Break: 13.04

Phase 13: COMMUNITY RELATIONS

568442 **EMAIL REGARDING CITIZENS RESEARCH AND ENVIRONMENTAL WATCH(CREW) / 229 MAIN STREET COMMITTEE MEETING ON 04/10/2013 (03/13/2013 SOIL AND GROUNDWATERALTERNATIVELIST ATTACHED)**

Author: BRUCE R THOMPSON, DE MAXIM

Doc Date: 04/05/2013 **# of Pages:** 2

Addressee: PAUL BOEHM, CONCORD (MA) TOWN OF

File Break: 13.01

RAY BRUTTOMESSO, CONCORD (MA) TOWN OF

KAREN BYRNE, NONE

KERRY DISKIN, NONE

VIRGINIE LANDRE, NONE

RICK OLESON, CREW (NUCLEAR METALS)

LEN RAPPOLI, NONE

SUSAN RASK, CONCORD (MA) TOWN OF

PAMELA ROCKWELL, CREW (NUCLEAR METALS)

TIM ROSE, NONE

FRED SEWARD, CONCORD (MA) TOWN OF

ANN SHAPIRO, NONE

PHIL STARK, NONE

BOB VANDYCK, NONE

STEVE VERRILL, CONCORD (MA) TOWN OF

MIKE WEBSTER, GEOINSIGHT INC

JAMES L WEST, CREW (NUCLEAR METALS)

CANDACE WIGHT, NONE

Doc Type: CORRESPONDENCE
EMAIL

Phase 13: COMMUNITY RELATIONS

568441 **SITE PRESENTATION**

Author: , DE MAXIMIS INC
Addressee:
Doc Type: MEETING RECORD

Doc Date: 09/04/2013
# of Pages: 48
File Break: 13.04

Phase 13: COMMUNITY RELATIONS

568443 **EMAIL REGARDING DEPLETED URANIUM (DU) SEQUESTRATION TESTING (11/01/2013 SCOPE OF WORK (SOW), FIELD AND LABORATORY MEDIA TESTING FOR URANIUM SEQUESTRATION IN GROUNDWATER ATTACHED)**

Author: BRUCE R THOMPSON, DE MAXIM

Doc Date: 11/25/2013 **# of Pages:** 64

File Break: 13.01

Addressee: PAUL BOEHM, CONCORD (MA) TOWN OF
RAY BRUTTOMESSO, CONCORD (MA) TOWN OF
KAREN BYRNE, NONE
KERRY DISKIN, NONE
VIRGINIE LANDRE, NONE
RICK OLESON, CREW (NUCLEAR METALS)
LEN RAPPOLI, NONE
SUSAN RASK, CONCORD (MA) TOWN OF
PAMELA ROCKWELL, CREW (NUCLEAR METALS)
TIM ROSE, NONE
FRED SEWARD, CONCORD (MA) TOWN OF
ANN SHAPIRO, NONE
PHIL STARK, NONE
BOB VANDYCK, NONE
STEVE VERRILL, CONCORD (MA) TOWN OF
MIKE WEBSTER, GEOINSIGHT INC
JAMES L WEST, CREW (NUCLEAR METALS)
CANDACE WIGHT, NONE

Doc Type: CORRESPONDENCE
EMAIL

Phase 13: COMMUNITY RELATIONS

568428 **EMAIL REGARDING PURCHASE OF GRACE SUPERFUND LAND BY TOWN OF CONCORD FOR SOLAR ARRAYS AND BUS STORAGE**

Author: PAMELA ROCKWELL, CREW (NU(
Addressee: MELISSA TAYLOR, US EPA REGION 1
Doc Type: CORRESPONDENCE
EMAIL
Doc Date: 12/10/2013
# of Pages: 1
File Break: 13.01

568446 **EMAIL CONFIRMING 02/06/2014 2229 COMMITTEE / CITIZENS RESEARCH AND ENVIRONMENTAL WATCH(CREW) MEETING (EMAIL HISTORY ATTACHED)**

Author: BRUCE R THOMPSON, DE MAXIM
Addressee: JOHN M HUNT, DE MAXIMIS INC
TIM ROSE, NONE
Doc Type: CORRESPONDENCE
EMAIL
Doc Date: 02/03/2014
# of Pages: 2
File Break: 13.01

568424 **EMAIL TRANSMITTING NAMES OF 229 MAIN STREET OVERSIGHT COMMITTEE CONTACTS**

Author: PAMELA ROCKWELL, CREW (NU(
Addressee: MELISSA TAYLOR, US EPA REGION 1
Doc Type: CORRESPONDENCE
EMAIL
Doc Date: 02/26/2014
# of Pages: 1
File Break: 13.06

Phase 13: COMMUNITY RELATIONS

568444 **EMAIL TRANSMITTING PRESENTATION REGARDING APATITE / DEPLETED URANIUM (DU) SEQUESTRATION PILOT STUDY**

Author: BRUCE R THOMPSON, DE MAXIM

Doc Date: 04/08/2014 **# of Pages:** 1

File Break: 13.01

Addressee: PAUL BOEHM, CONCORD (MA) TOWN OF
RAY BRUTTOMESSO, CONCORD (MA) TOWN OF
KAREN BYRNE, NONE
KERRY DISKIN, NONE
DEBORAH FARNSWORTH, PINE & SWALLOW ASSO
VIRGINIE LANDRE, NONE
RICK OLESON, CREW (NUCLEAR METALS)
LEN RAPPOLI, NONE
SUSAN RASK, CONCORD (MA) TOWN OF
PAMELA ROCKWELL, CREW (NUCLEAR METALS)
TIM ROSE, NONE
FRED SEWARD, CONCORD (MA) TOWN OF
ANN SHAPIRO, NONE
PHIL STARK, NONE
BOB VANDYCK, NONE
STEVE VERRILL, CONCORD (MA) TOWN OF
MIKE WEBSTER, GEOINSIGHT INC
JAMES L WEST, CREW (NUCLEAR METALS)
CANDACE WIGHT, NONE

Doc Type: CORRESPONDENCE
EMAIL

Phase 13: COMMUNITY RELATIONS

568431 **MEETING NOTES ON 04/09/2014 MEETING WITH COMMUNITY RESEARCH AND ENVIRONMENTAL WATCH(CREW)**

Author: , US EPA REGION 1
Addressee:
Doc Type: MEETING RECORD
Doc Date: 04/09/2014
# of Pages: 1
File Break: 13.04

568440 **PRESENTATION ON APATITE2(TM) PILOT TEST PRELIMINARY RESULTS: IN-SITU DEPLETED URANIUM (DU) IMMOBILIZATION**

Author: , GEOSYNTEC CONSULTANTS
Addressee:
Doc Type: MEETING RECORD
Doc Date: 04/09/2014
# of Pages: 20
File Break: 13.04

568434 **EMAIL REGARDING 04/29/2014 INTERNET SEMINAR ON RENEWABLE ENERGY AT SUPERFUND SITES (EMAIL HISTORY ATTACHED)**

Author: MELISSA TAYLOR,US EPA REGIO
Addressee: PAMELA ROCKWELL, CREW (NUCLEAR METALS)
Doc Type: CORRESPONDENCE
EMAIL
Doc Date: 05/07/2014
# of Pages: 1
File Break: 13.01

568435 **EMAIL REGARDING TRANSMITTAL OF RENEWABLE ENERGY AND LIABILITY FACT SHEETS AND STATUS OF FEASIBILITY STUDY (FS) (EMAIL HISTORY ATTACHED)**

Author: MELISSA TAYLOR,US EPA REGIO
Addressee: PAMELA ROCKWELL, CREW (NUCLEAR METALS)
Doc Type: CORRESPONDENCE
EMAIL
Doc Date: 07/22/2014
# of Pages: 2
File Break: 13.01

568425 **HANDWRITTEN SIGN-IN SHEET FOR SITE MEETING**

Author: , US EPA REGION 1
Addressee:
Doc Type: MEETING RECORD
Doc Date: 09/17/2014
# of Pages: 1
File Break: 13.04

Phase 13: COMMUNITY RELATIONS

568427 **NEWS ARTICLE: MEETINGS ON 2229 MAIN STREET REMEDIATION PLANNED**

Author: , CONCORD JOURNAL
Addressee:
Doc Type: ARTICLE - PERIODICAL
NEWS ARTICLE
PUBLIC INFORMATION
Doc Date: 10/27/2014
File Break: 13.03
# of Pages: 1

568422 **NEWS RELEASE: CLEANUP PLAN PROPOSED FOR THE NUCLEAR METALS SITE IN CONCORD, MA**

Author: , US EPA REGION 1
Addressee:
Doc Type: PRESS RELEASE
PUBLIC INFORMATION
Doc Date: 11/03/2014
File Break: 13.03
# of Pages: 2

582973 **PUBLIC NOTICE: US EPA ANNOUNCES A PROPOSED PLAN FOR CLEANUP OF THE NUCLEAR METALS SITE IN CONCORD, MA**

Author: , US EPA REGION 1
Addressee:
Doc Type: PRESS RELEASE
PUBLIC INFORMATION
Doc Date: 11/06/2014
File Break: 13.03
# of Pages: 3

568484 **PRESENTATION: PUBLIC MEETING ON PROPOSED REMEDIAL ACTION (RA) PLAN**

Author: MELISSA TAYLOR,US EPA REGIO
Addressee: BRUCE R THOMPSON, DE MAXIM
Doc Type: MEETING RECORD
Doc Date: 11/12/2014
File Break: 13.04
# of Pages: 62

582403 **SIGN-IN SHEET FOR PUBLIC HEARING**

Author: , US EPA REGION 1
Addressee:
Doc Type: MEETING RECORD
Doc Date: 11/12/2014
File Break: 13.04
# of Pages: 4

Phase 13: COMMUNITY RELATIONS

581150 **PUBLIC HEARING TRANSCRIPT ON PROPOSED REMEDIAL ACTION PLAN**

Author: JOAN M CASSIDY, EPPLEY COUR
Addressee:
Doc Type: MEETING RECORD
Doc Date: 12/10/2014 **# of Pages:** 46
File Break: 13.04

581151 **SIGN-IN SHEET FOR PUBLIC HEARING**

Author: , US EPA REGION 1
Addressee:
Doc Type: MEETING RECORD
Doc Date: 12/10/2014 **# of Pages:** 4
File Break: 13.04

582972 **PRESENTATION AT PUBLIC HEARING ON PROPOSED REMEDIAL ACTION PLAN**

Author: , US EPA REGION 1
Addressee:
Doc Type: MEETING RECORD
Doc Date: 12/10/2014 **# of Pages:** 10
File Break: 13.04

Phase 17: SITE MANAGEMENT RECORDS

567900 **SITE CHARACTERIZATION REPORT FOR HOLDING BASIN**

Author: , NUCLEAR METALS INC
Addressee: , US NUCLEAR REGULATORY COMMISSION (NRC)
Doc Type: REPORT
Doc Date: 02/12/1993 **# of Pages:** 96
File Break: 17.08

568458 **APATITE 2 TO REMEDIATE SOIL OR GROUNDWATER CONTAINING URANIUM OR PLUTONIUM**

Author: JAMES CONCA, LOS ALAMOS NA
Addressee: JUDITH WRIGHT, PIMS NW INC
Doc Type: REPORT
Doc Date: 01/01/2000 **# of Pages:** 17
File Break: 17.07

Phase 17: SITE MANAGEMENT RECORDS

568457 **ARTICLE IN GROUND WATERCURRENTS: MONTICELLO PERMEABLE REACTIVE BARRIER PROJECT**

Author: CLAY CARPENTER, MACTEC
Addressee: DON METZLER, US DEPT OF ENE
STAN MORRISON, ROY F WESTO
Doc Type: ARTICLE - PERIODICAL
Doc Date: 06/01/2000 **# of Pages:** 4
File Break: 17.07

22170 **HISTORICAL AERIAL PHOTO SITE ANALYSIS, EPIC BOOK**

Author: , US EPA - ENVIRONMENTAL PHC
Addressee:
Doc Type: PHOTOGRAPH
Doc Date: 06/01/2001 **# of Pages:** 40
File Break: 17.04

568455 **USE OF APATITE FOR CHEMICAL STABILIZATION OF SUBSURFACE CONTAMINANTS, FINAL REPORT**

Author: WILLIAM D BOSTICK, MATERIAL
Addressee: L A HARRIS, MATERIALS AND CH
R J JARABEK, MATERIALS AND C
E B MUNDAY, MATERIALS AND C
D PEERY, MATERIALS AND CHEM
J L SHOEMAKER, MATERIALS AN
R J STEVENSON, MATERIALS AN
, US DEPT OF ENERGY
Doc Type: REPORT
Doc Date: 05/01/2003 **# of Pages:** 195
File Break: 17.07

567444 **SEDIMENT STUDIES IN THE ASSABET RIVER, CENTRAL MASSACHUSETTS, 2003**

Author: JASON R SORENSON, US GEOLO
Addressee: MARC J ZIMMERMAN, US GEOL
Doc Type: REPORT
Doc Date: 01/01/2005 **# of Pages:** 94
File Break: 17.07

Phase 17: SITE MANAGEMENT RECORDS

568456 **PERFORMANCE ASSESSMENT AND RECOMMENDATIONS FOR REJUVENATION OF A PERMEABLE REACTIVE BARRIER: COTTER CORPORATION'S CANON CITY, COLORADO, URANIUM MILL**

Author: , US DEPT OF ENERGY
Addressee: , US EPA REGION 8
Doc Type: REPORT
Doc Date: 04/01/2005
# of Pages: 130
File Break: 17.07

568460 **300 AREA URANIUM STABILIZATION THROUGH POLYPHOSPHATE INJECTION: FINAL REPORT**

Author: B N BJORNSTAD, BATTELLE
Addressee: B G FRITZ, BATTELLE
J S FRUCHTER, BATTELLE
R D MACKLEY, BATTELLE
D P MENDOZA, BATTELLE
D R NEWCOMER, BATTELLE
M L ROCKHOLD, BATTELLE
V R VERMEUL, BATTELLE
D M WELLMAN, BATTELLE
M D WILLIAMS, BATTELLE
, US DEPT OF ENERGY
Doc Type: REPORT
Doc Date: 06/01/2009
# of Pages: 188
File Break: 17.07

Phase 17: SITE MANAGEMENT RECORDS

568454 **A RISK / BENEFIT APPROACH TO THE APPLICATION OF IRON NANOPARTICLES FOR THE REMEDIATION OF CONTAMINATED SITES IN THE ENVIRONMENT**

Author: PAUL BARDOS, UK DEPT FOR EN
Addressee: BRIAN BONE, UK DEPT FOR ENV
DANIEL ELLIOTT, UK DEPT FOR I
NIELS HARTOG, UK DEPT FOR EN
JOHN HENSTOCK, UK DEPT FOR I
PAUL NATHANAIL, UK DEPT FOR
Doc Type: REPORT

Doc Date: 10/01/2011 **# of Pages:** 111
File Break: 17.07

70002993 **MATERIAL LICENSE SUPPLEMENTARY SHEET TERMINATING STARMET CORPORATION LICENSE NUMBER SU-1453**

Author:
Addressee:
Doc Type: CONTRACT DOCUMENTATION

Doc Date: 11/08/2011 **# of Pages:** 2
File Break: 17.01

567445 **RECORD OF DECISION (ROD) FOR 300-FF-2 AND 300-FF-5, AND RECORD OF DECISION (ROD) AMENDMENT FOR 300-FF-1, HANFORD SITE**

Author: , US DEPT OF ENERGY
Addressee: , US EPA REGION 10
Doc Type: DECISION DOCUMENT
RECORD OF DECISION (ROD)
REPORT

Doc Date: 11/26/2013 **# of Pages:** 129
File Break: 17.07

568459 **LIST OF EPA DOCUMENTS TO BE INCLUDED BY REFERENCE, FEASIBILITY STUDY (FS) REPORT**

Author: , US EPA
Addressee:
Doc Type: LIST

Doc Date: 11/01/2014 **# of Pages:** 3
File Break: 17.07

NUCLEAR METALS, INC.
AR Collection: 63554
Record of Decision (ROD) and Non-Time Critical Removal Action (NTCRA)
AR Collection Index Report
For External Use

Phase 20: RECORDS MANAGEMENT

567943 **NUCLEAR METALS, OPERABLE UNIT (OU) 1 PROPOSED PLAN ADMINISTRATIVE RECORD (AR) INDEX**

Author: , US EPA REGION 1
Addressee:
Doc Type: ADMIN RECORD (AR) INDEX
INDEX

Doc Date: 10/01/2014
# of Pages: 45
File Break: 20.01

Number of Documents in Administrative Record: 125

Selected Key Guidance Documents

EPA Guidance Documents may be reviewed at the OSRR Records and Information Center in Boston, MA

DOCNUMBER	DOCDATE	TITLE	OSWEREPAID
2013	01-Nov-89	GETTING READY - SCOPING THE RI/FS [QUICK REFERENCE FACT SHEET]	OSWER #9355.3-01FS1
2014	01-Aug-90	GUIDANCE ON REMEDIAL ACTIONS FOR SUPERFUND SITES WITH PCB CONTAMINATION	OSWER #9355.4-01
2016	02-Jun-89	MODEL STATEMENT OF WORK FOR A REMEDIAL INVESTIGATION AND FEASIBILITY STUDY CONDUCTED BY POTENTIALLY RESPONSIBLE PARTIES	OSWER #9835.8
2328	01-Aug-88	TECHNOLOGICAL APPROACHES TO THE CLEANUP OF RADIOLOGICALLY CONTAMINATED SUPERFUND SITES	EPA/540/2-88/002
C018	17-Oct-86	COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT OF 1980. AMENDED BY PL 99-499, 10/17/86.	
C254	01-Aug-90	GUIDE ON REMEDIAL ACTIONS AT SUPERFUND SITES WITH PCB CONTAMINATION. QUICK REFERENCE FACT SHEET.	OSWER 9355.4-01FS
C278	04-Apr-96	FINAL GROUND WATER USE AND VALUE DETERMINATION GUIDANCE	
C317	01-Jan-95	LAND USE IN THE CERCLA REMEDY SELECTION PROCESS	OSWER 9355.7-04
C363	01-May-93	REVIEW OF ECOLOGICAL ASSESSMENT CASE STUDIES FROM A RISK ASSESSMENT PERSPECTIVE	EPA 630/R-92-005
C478	01-Sep-94	INNOVATIVE SITE REMEDIATION TECHNOLOGY: CHEMICAL TREATMENT, VOL. 2	EPA 542-B-94-004
C479	01-Nov-93	INNOVATIVE SITE REMEDIATION TECHNOLOGY, SOIL WASHING/SOIL FLUSHING, VOL. 3	EPA 542-B-93-012
C502	01-Aug-97	EXPOSURE FACTORS HANDBOOK; ACTIVITY FACTORS, VOLUME III	EPA/600/P-95/002FC
C510	01-Aug-91	NATIONAL STATUS AND TRENDS PROGRAM	GC57 N6
C622	01-Nov-91	A GUIDE TO PRINCIPLE THREAT AND LOW LEVEL THREAT WASTES	9380.3-06FS
C720	08-May-98	CONTAMINATED SEDIMENT MANAGEMENT STRATEGY	
C723	01-May-09	TECHNICAL GUIDE: MONITORED NATURAL RECOVERY AT CONTAMINATED SEDIMENT SITES	
C744	29-Apr-96	REQUIREMENTS FOR MANAGEMENT OF HAZARDOUS CONTAMINATED MEDIA (40 CFR PARTS 260, 261, 262, 264, 268, 269, 271)	
C851	02-Feb-12	USEPA CONTRACT LABORATORY PROGRAM STATEMENT OF WORK FOR ORGANIC ANALYSIS, SOM01.2	

Selected Key Guidance Documents

EPA Guidance Documents may be reviewed at the OSRR Records and Information Center in Boston, MA

DOCNUMBER	DOCDATE	TITLE	OSWEREPAID
C854	01-Apr-92	FINAL GUIDANCE DATA USABILITY IN RISK ASSESSMENT (PART A) (PUBLICATION 9285.7-09A	PB92-963356
C859	01-Mar-01	GUIDANCE FOR PREPARING STANDARD OPERATING PROCEDURES (SOPS), QA/G-6	EPA/240/B-01/004
C863	01-Jan-99	COMPENDIUM OF METHODS FOR THE DETERMINATION OF TOXIC ORGANIC COMPOUNDS IN AMBIENT AIR. SECOND EDITION, COMPENDIUM METHOD TO-15	EPA/625/R-96/010b
C864	01-Oct-04	USEPA CONTRACT LABORATORY PROGRAM NATIONAL FUNCTIONAL GUIDELINES FOR INORGANIC DATA REVIEW	OSWER 9240.1-45 /EPA 540-R-04-004
C875	20-Sep-10	REVISED GUIDANCE ON COMPILING ADMINISTRATIVE RECORDS FOR CERCLA RESPONSE	
C914	19-Jun-98	GUIDANCE FOR PREPARING SUPERFUND REMEDIAL DECISION DOCUMENTS, FINAL REVIEW DRAFT	EPA 540-R-98-031, OSWER 9200.1-23
C916	17-Mar-10	CONSIDERING REASONABLY ANTICIPATED FUTURE LAND USE AND REDUCING BARRIERS TO REUSE AT EPA-LEAD SUPERFUND REMEDIAL SITES	OSWER 9355.7-19
C942	01-Jan-11	ENVIRONMENTAL FACT SHEET: 1,4 DIOXANCE AND DRINKING WATER	WD-DWGB-3-24
C957	01-Oct-07	TECHNOLOGY REFERENCE GUIDE FOR RADIOACTIVELY CONTAMINATED MEDIA	EPA 402-R-07-004
C958	01-Sep-00	SOLIDIFICATION/STABILIZATION USE AT SUPERFUND SITES	EPA 542-R-00-010
C959	01-Apr-13	USE OF AMENDMENTS FOR IN SITU REMEDIATION AT SUPERFUND SEDIMENT SITES	OSWER 9200.2-128FS
C960	22-Aug-97	ESTABLISHMENT OF CLEANUP LEVELS FOR CERCLA SITES WITH RADIOACTIVE CONTAMINATION	OSWER 9200.4-18

To: Cora, Lori[Cora.Lori@epa.gov]; Openchowski, Charles[openchowski.charles@epa.gov]; Anderson, RobinM[Anderson.RobinM@epa.gov]; Bradfish, Larry[Bradfish.Larry@epa.gov]; Buxbaum, David[Buxbaum.David@epa.gov]; Engeman, Diana[Engeman.Diana@epa.gov]; Estrada, Thelma[Estrada.Thelma@epa.gov]; Fagiolo, John[fagiolo.john@epa.gov]; Finch, Rhelyn[Finch.Rhelyn@epa.gov]; Fishburn, Meredith[Fishburn.Meredith@epa.gov]; Flanagan, Sarah[Flanagan.Sarah@epa.gov]; Hiltner, Allison[Hiltner.Allison@epa.gov]; Johnson, MaryC[Johnson.MaryC@epa.gov]; Legare, Amy[Legare.Amy@epa.gov]; Lukens, Elizabeth[Lukens.Elizabeth@epa.gov]; MacDonald, Jennifer[Macdonald.Jennifer@epa.gov]; Poetzsch, Michael[Poetzsch.Michael@epa.gov]; Quinones, Edwin[quinones.edwin@epa.gov]; Salo, Earl[Salo.Earl@epa.gov]; Sisk, Richard[Sisk.Richard@epa.gov]; Stevens, Jim[Stevens.Jim@epa.gov]; Tanasijevich, Rudy[Tanasijevich.Rudy@epa.gov]; Tucker, Marlene[Tucker.Marlene@epa.gov]; Tyner, Lee[tyner.lee@epa.gov]; VanItallie, Michael[vanItallie.Michael@epa.gov]
From: Catri, Cindy
Sent: Wed 11/4/2015 7:04:54 PM
Subject: RE: the November remedy selection call is this Thursday at 1:00 eastern Personal Privacy / Ex. 6
Personal Privacy / Ex. 6
ESD 4.pdf

Lori,

Attorney Client / Ex. 5

From: Cora, Lori
Sent: Tuesday, November 03, 2015 3:09 PM
To: Openchowski, Charles <openchowski.charles@epa.gov>; Anderson, RobinM <Anderson.RobinM@epa.gov>; Bradfish, Larry <Bradfish.Larry@epa.gov>; Buxbaum, David <Buxbaum.David@epa.gov>; Catri, Cindy <Catri.Cynthia@epa.gov>; Engeman, Diana <Engeman.Diana@epa.gov>; Estrada, Thelma <Estrada.Thelma@epa.gov>; Fagiolo, John <fagiolo.john@epa.gov>; Finch, Rhelyn <Finch.Rhelyn@epa.gov>; Fishburn, Meredith <Fishburn.Meredith@epa.gov>; Flanagan, Sarah <Flanagan.Sarah@epa.gov>; Hiltner, Allison <Hiltner.Allison@epa.gov>; Johnson, MaryC <Johnson.MaryC@epa.gov>; Legare, Amy <Legare.Amy@epa.gov>; Lukens, Elizabeth <Lukens.Elizabeth@epa.gov>; MacDonald, Jennifer <Macdonald.Jennifer@epa.gov>; Poetzsch, Michael <Poetzsch.Michael@epa.gov>;

Quinones, Edwin <quinones.edwin@epa.gov>; Salo, Earl <Salo.Earl@epa.gov>; Sisk, Richard <Sisk.Richard@epa.gov>; Stevens, Jim <Stevens.Jim@epa.gov>; Tanasijevich, Rudy <Tanasijevich.Rudy@epa.gov>; Tucker, Marlene <Tucker.Marlene@epa.gov>; Tyner, Lee <tyner.lee@epa.gov>; VanItallie, Michael <vanItallie.Michael@epa.gov>
Subject: RE: the November remedy selection call is this Thursday at 1:00 eastern
Personal Privacy / Ex. 6

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Openchowski, Charles
Sent: Monday, November 02, 2015 8:35 AM
To: Anderson, RobinM <Anderson.RobinM@epa.gov>; Bradfish, Larry <Bradfish.Larry@epa.gov>; Buxbaum, David <Buxbaum.David@epa.gov>; Catri, Cindy <Catri.Cynthia@epa.gov>; Cora, Lori <Cora.Lori@epa.gov>; Engeman, Diana <Engeman.Diana@epa.gov>; Estrada, Thelma <Estrada.Thelma@epa.gov>; Fagiolo, John <fagiolo.john@epa.gov>; Finch, Rhelyn <Finch.Rhelyn@epa.gov>; Fishburn, Meredith <Fishburn.Meredith@epa.gov>; Flanagan, Sarah <Flanagan.Sarah@epa.gov>; Hiltner, Allison <Hiltner.Allison@epa.gov>; Johnson, MaryC <Johnson.MaryC@epa.gov>; Legare, Amy <Legare.Amy@epa.gov>; Lukens, Elizabeth <Lukens.Elizabeth@epa.gov>; MacDonald, Jennifer <Macdonald.Jennifer@epa.gov>; Poetzsch, Michael <Poetzsch.Michael@epa.gov>; Quinones, Edwin <quinones.edwin@epa.gov>; Salo, Earl <Salo.Earl@epa.gov>; Sisk, Richard <Sisk.Richard@epa.gov>; Stevens, Jim <Stevens.Jim@epa.gov>; Tanasijevich, Rudy <Tanasijevich.Rudy@epa.gov>; Tucker, Marlene <Tucker.Marlene@epa.gov>; Tyner, Lee <tyner.lee@epa.gov>; VanItallie, Michael <vanItallie.Michael@epa.gov>; Williams, Thomas <williams.tom@epa.gov>
Subject: the November remedy selection call is this Thursday at 1:00 eastern Personal Privacy / Ex. 6 Personal Privacy / Ex. 6

Please send around any agenda items you would like to discuss – thanks!

To: Cora, Lori[Cora.Lori@epa.gov]
From: Anderson, RobinM
Sent: Tue 11/3/2015 9:17:00 PM
Subject: RE: the November remedy selection call is this Thursday at 1:00 eastern Personal Privacy / Ex. 6
Personal Privacy / Ex. 6

I think the decision needs to be in the ROD. Like Dave but he's not CERCLA.

From: Cora, Lori
Sent: Tuesday, November 03, 2015 4:04 PM
To: Anderson, RobinM <Anderson.RobinM@epa.gov>
Subject: RE: the November remedy selection call is this Thursday at 1:00 eastern
1.866.299.3188 2025645519#

Attorney Client / Ex. 5

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From: Anderson, RobinM
Sent: Tuesday, November 03, 2015 12:51 PM
To: Cora, Lori <Cora.Lori@epa.gov>
Subject: RE: the November remedy selection call is this Thursday at 1:00 eastern
Personal Privacy / Ex. 6

Attorney Client / Ex. 5

Attorney Client / Ex. 5

From: Cora, Lori
Sent: Tuesday, November 03, 2015 3:09 PM
To: Openchowski, Charles <openchowski.charles@epa.gov>; Anderson, RobinM <Anderson.RobinM@epa.gov>; Bradfish, Larry <Bradfish.Larry@epa.gov>; Buxbaum, David <Buxbaum.David@epa.gov>; Catri, Cindy <Catri.Cynthia@epa.gov>; Engeman, Diana <Engeman.Diana@epa.gov>; Estrada, Thelma <Estrada.Thelma@epa.gov>; Fagiolo, John <fagiolo.john@epa.gov>; Finch, Rhelyn <Finch.Rhelyn@epa.gov>; Fishburn, Meredith <Fishburn.Meredith@epa.gov>; Flanagan, Sarah <Flanagan.Sarah@epa.gov>; Hiltner, Allison <Hiltner.Allison@epa.gov>; Johnson, MaryC <Johnson.MaryC@epa.gov>; Legare, Amy <Legare.Amy@epa.gov>; Lukens, Elizabeth <Lukens.Elizabeth@epa.gov>; MacDonald, Jennifer <Macdonald.Jennifer@epa.gov>; Poetzsch, Michael <Poetzsch.Michael@epa.gov>; Quinones, Edwin <quinones.edwin@epa.gov>; Salo, Earl <Salo.Earl@epa.gov>; Sisk, Richard <Sisk.Richard@epa.gov>; Stevens, Jim <Stevens.Jim@epa.gov>; Tanasijevich, Rudy <Tanasijevich.Rudy@epa.gov>; Tucker, Marlene <Tucker.Marlene@epa.gov>; Tyner, Lee <tyner.lee@epa.gov>; VanItallie, Michael <vanItallie.Michael@epa.gov>
Subject: RE: the November remedy selection call is this Thursday at 1:00 eastern

Personal Privacy / Ex. 6

Attorney Client / Ex. 5

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From: Openchowski, Charles
Sent: Monday, November 02, 2015 8:35 AM
To: Anderson, RobinM <Anderson.RobinM@epa.gov>; Bradfish, Larry <Bradfish.Larry@epa.gov>; Buxbaum, David <Buxbaum.David@epa.gov>; Catri, Cindy <Catri.Cynthia@epa.gov>; Cora, Lori <Cora.Lori@epa.gov>; Engeman, Diana <Engeman.Diana@epa.gov>; Estrada, Thelma <Estrada.Thelma@epa.gov>; Fagiolo, John <fagiolo.john@epa.gov>; Finch, Rhelyn <Finch.Rhelyn@epa.gov>; Fishburn, Meredith <Fishburn.Meredith@epa.gov>; Flanagan, Sarah <Flanagan.Sarah@epa.gov>; Hiltner, Allison <Hiltner.Allison@epa.gov>; Johnson, MaryC <Johnson.MaryC@epa.gov>; Legare, Amy <Legare.Amy@epa.gov>; Lukens, Elizabeth <Lukens.Elizabeth@epa.gov>; MacDonald, Jennifer <Macdonald.Jennifer@epa.gov>; Poetzsch, Michael <Poetzsch.Michael@epa.gov>; Quinones, Edwin <quinones.edwin@epa.gov>; Salo, Earl <Salo.Earl@epa.gov>; Sisk, Richard <Sisk.Richard@epa.gov>; Stevens, Jim <Stevens.Jim@epa.gov>; Tanasijevich, Rudy

<Tanasijevich.Rudy@epa.gov>; Tucker, Marlene <Tucker.Marlene@epa.gov>; Tyner, Lee <tyner.lee@epa.gov>; VanItallie, Michael <vanItallie.Michael@epa.gov>; Williams, Thomas <williams.tom@epa.gov>
Subject: the November remedy selection call is this Thursday at 1:00 eastern Personal Privacy / Ex. 6
Personal Privacy / Ex. 6

Please send around any agenda items you would like to discuss – thanks!

To: Cora, Lori[Cora.Lori@epa.gov]
From: Koch, Kristine
Sent: Mon 11/2/2015 4:17:40 PM
Subject: FW: Updated Disposal Decision Tree
Fig3-03-40_Sediment Management and Disposal Decision Tree_20151102.pdf

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
Region 10
1200 Sixth Avenue, Suite 900, M/S ECL-122
Seattle, Washington 98101-3140

(206)553-6705
(206)553-8581 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: Koch, Kristine
Sent: Monday, November 02, 2015 8:17 AM
To: Cora, Lori <cora.lori@epa.gov>; Anderson, RobinM <Anderson.RobinM@epa.gov>; Silvina Fonseca (Fonseca.Silvina@epa.gov) <Fonseca.Silvina@epa.gov>; Legare, Amy <Legare.Amy@epa.gov>; Steve Ells (Ells.Steve@epa.gov) <Ells.Steve@epa.gov>; Charters, David <Charters.DavidW@epa.gov>; Sheldrake, Sean (sheldrake.sean@epa.gov) <sheldrake.sean@epa.gov>
Subject: FW: Updated Disposal Decision Tree
Importance: High

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
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1200 Sixth Avenue, Suite 900, M/S ECL-122
Seattle, Washington 98101-3140

(206)553-6705
(206)553-8581 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: Coffey, Scott [mailto:CoffeySE@cdmsmith.com]
Sent: Monday, November 02, 2015 7:13 AM
To: Koch, Kristine <Koch.Kristine@epa.gov>; Allen, Elizabeth <allen.elizabeth@epa.gov>
Cc: Blischke, Eric <blischkee@cdmsmith.com>; Sayler, Cheryl Ann <saylerc@cdmsmith.com>; Foster, Malena L. <fosterml@cdmsmith.com>; Hazen, Gary <HazenGL@cdmsmith.com>
Subject: FW: Updated Disposal Decision Tree
Importance: High

Hi Kristine.

Attached is an updated Disposal Flow Chart that incorporates some late breaking edits from our technical team.

Sorry for the last minute change. See below the revision input from our RCRA expert Cheryl and Eric.

This version incorporates those revisions.

Scott

From: Blischke, Eric
Sent: Monday, November 02, 2015 7:03 AM
To: Sayler, Cheryl Ann <saylerc@cdmsmith.com>; Coffey, Scott <CoffeySE@cdmsmith.com>
Cc: Foster, Malena L. <fosterml@cdmsmith.com>; Hazen, Gary <HazenGL@cdmsmith.com>

Subject: RE: Updated Disposal Decision Tree

Deliberative Process / Ex. 5

Eric

From: Sayler, Cheryl Ann
Sent: Monday, November 02, 2015 6:29 AM
To: Coffey, Scott <CoffeySE@cdmsmith.com>
Cc: Blischke, Eric <blischkee@cdmsmith.com>; Foster, Malena L. <fosterml@cdmsmith.com>; Hazen, Gary <HazenGL@cdmsmith.com>; Sayler, Cheryl Ann <saylerc@cdmsmith.com>
Subject: RE: Updated Disposal Decision Tree

Scott,

I have two comments in the decision tree.

Let me know if you have questions.

Cheryl

865-576-5566 (o)

865-635-1693 (c)

From: Coffey, Scott
Sent: Friday, October 30, 2015 5:50 PM
To: Koch, Kristine (Koch.Kristine@epa.gov) <Koch.Kristine@epa.gov>
Cc: Blischke, Eric <blischkee@cdmsmith.com>; Foster, Malena L. <fosterml@cdmsmith.com>; Sayler, Cheryl Ann <saylerc@cdmsmith.com>; Hazen, Gary <HazenGL@cdmsmith.com>
Subject: Updated Disposal Decision Tree

Hi Kristine.

Attached is an updated DRAFT Disposal Decision Tree that incorporates the changes we discussed this morning.

Please let us know if you have any further revisions.

Scott

Scott Coffey, L.Hg.
Hydrogeologist
CDM Smith | consulting engineering construction operations
14432 SE Eastgate Way, Suite 100 | Bellevue, WA 98007

phone: (425) 519-8320| mobile (206) 457-9270
email: coffeyse@cdmsmith.com | www.cdmsmith.com

To: Cora, Lori[Cora.Lori@epa.gov]
From: Northridge, Michael
Sent: Fri 10/30/2015 10:27:34 PM
Subject: RE: Draft memo re: taking over the FS at Portland Harbor

Well, it's getting late on a Friday, and I didn't get around to this, and I'm headed to R8 Monday morning (Cami Grandinetti will be at the national prioritization panel meetings). Sorry!! I resolve (again) to try to get to this upon my return…

From: Northridge, Michael
Sent: Tuesday, October 27, 2015 7:02 PM
To: Cora, Lori <Cora.Lori@epa.gov>
Subject: RE: Draft memo re: taking over the FS at Portland Harbor

Confidential and privileged

Attorney Client / Ex. 5

Unfortunately, I've gotten sidetracked a bit on other things. Hope springs eternal (e.g., that I can spend more time on this tomorrow). Gotta head out now though… ;-)

From: Cora, Lori
Sent: Tuesday, October 27, 2015 6:53 PM
To: Northridge, Michael <Northridge.Michael@epa.gov>
Subject: RE: Draft memo re: taking over the FS at Portland Harbor

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
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P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Northridge, Michael
Sent: Monday, October 26, 2015 3:06 PM
To: Cora, Lori
Subject: RE: Draft memo re: taking over the FS at Portland Harbor

See attached. I didn't get too much farther with this today (just polishing a lot of the language (---feel free to reject) and not really anything substantive). Will try again tomorrow. Gotta head home now…

From: Cora, Lori
Sent: Wednesday, October 21, 2015 7:37 PM
To: Northridge, Michael <Northridge.Michael@epa.gov>
Cc: Ingemansen, Dean <Ingemansen.Dean@epa.gov>
Subject: Draft memo re: taking over the FS at Portland Harbor

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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To: Cora, Lori[Cora.Lori@epa.gov]
From: Koch, Kristine
Sent: Wed 10/28/2015 7:32:51 PM
Subject: FW: LWG Information Needs to Enable Review of EPA's Revised FS Sections 3 and 4
2015-09-08 LWG Letter to EPA re Information Requests.pdf
2015-09-08 Information Requests from EPA.pdf

Here is the original request.

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
Region 10
1200 Sixth Avenue, Suite 900, M/S ECL-122
Seattle, Washington 98101-3140

(206)553-6705
(206)553-8581 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: Jen Woronets [mailto:jworonets@anchorqea.com]
Sent: Tuesday, September 08, 2015 12:45 PM
To: Koch, Kristine
Cc: brandy.humphreys@grandronde.org; audiehuber@ctuir.com; Bob Wyatt; callie@ridolfi.com; Courtney Johnson (courtney@crag.org); cunninghame@gorge.net; Dave Livesay; Elmer Ward (elmer.ward@ctwsbnr.org); Personal Privacy / Ex. 6
Personal Privacy / Ex. 6 Gail Fricano (gfricano@indecon.com); Holly Partridge (Holly.Partridge@grandronde.org); Jennifer Kassakian (jkassakian@indecon.com); Jen Woronets; Jim McKenna (jim.mckenna@verdantllc.com); Julie Weis; Kim Cox (kim.cox@portlandoregon.gov); Kim D'Aquila (kim.daquila@grandronde.org); Madalinski, Kelly; MCCLINCY Matt; Michael.karnosh@grandronde.org; Rachel DelVecchio (rdelvecchio@indecon.com); Rita Cabral; Robert.Neely@noaa.gov; rose@yakamafish-nsn.gov; Sheldrake, Sean; tomd@ctsi.nsn.us; Patty Dost; Carl Stivers; Amanda Shellenberger
Subject: LWG Information Needs to Enable Review of EPA's Revised FS Sections 3 and 4

Kristine,

Please find attached information needs to enable review of EPA's revised FS Sections 3

and 4.

Let us know if you have any questions.

Thank you,

Jen Woronets ☺

Anchor QEA, LLC

jworonets@anchorqea.com

421 SW Sixth Avenue, Suite 750

Portland, OR 97204

503-972-5014

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To: Barbara Smith[barbara@harrisandsmith.com]
From: MacIntyre, Mark
Sent: Fri 10/23/2015 9:13:05 PM
Subject: RE: Comments to NRRB

Sorry, Barbara, I'm RAMMING to get something to my boss by COB.

We are NOT releasing our comments. They are remaining internal.

From: Barbara Smith [mailto:barbara@harrisandsmith.com]
Sent: Friday, October 23, 2015 1:56 PM
To: MacIntyre, Mark
Subject: Comments to NRRB

Mark

Kristine sent this out today and it had the DEQ, LWG, CAG, 5Tribes and Yakama comments to the NRRB attached but not Region 10's comments. Does that mean you are not releasing them? Not sure what you heard in your meeting with the RA this week……I'm still curious.

Thanks

B

Sent: Friday, October 23, 2015 10:31 AM

To: Michael.karnosh@grandronde.org; jim@jimrobison.org; ROICK Tom <ROICK.Tom@deq.state.or.us>; Rose Longoria <lonr@yakamafish-nsn.gov>; Bob Wyatt <rjw@nwnatural.com>
Cc: brandy.humphreys@grandronde.org; Holly Partridge (Holly.Partridge@grandronde.org) <Holly.Partridge@grandronde.org>; Courtney Johnson (courtney@crag.org) <courtney@crag.org>; Personal Privacy / Ex. 6 Personal Privacy / Ex. 6 ; Julie Weis (jweis@hk-law.com) <jweis@hk-law.com>; tomd@ctsi.nsn.us; Brian Cunninghame (cunninghame@gorge.net) <cunninghame@gorge.net>; Elmer Ward <elmer.ward@ctwsbnr.org>; Gail Fricano (gfricano@indecon.com) <gfricano@indecon.com>; Rita Cabral (rcabral@indecon.com) <rcabral@indecon.com>; Peter DeFur (pldefur@igc.org) <pldefur@igc.org>; PARRETT Kevin <Parrett.Kevin@deq.state.or.us>; Conley, Alanna <conley.alanna@epa.gov>; Travis Williams-WRK <travis@willametteriverkeeper.org>; callie@ridolfi.com; Jen Woronets <jworonets@anchorqea.com>; Grandinetti, Cami <Grandinetti.Cami@epa.gov>; Robinson, Deborah <Robinson.Deborah@epa.gov>; Cora, Lori <Cora.Lori@epa.gov>
Subject: Comments to NRRB/CSTAG

All – As stakeholders for the Portland Harbor Superfund site, we are sharing with you the comments from all the stakeholders that were sent to the board. We thank you all for taking the time and effort to craft these comments.

Regards,

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
Region 10
1200 Sixth Avenue, Suite 900, M/S ECL-122
Seattle, Washington 98101-3140

(206)553-6705
(206)553-8581 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

To: Cora, Lori[Cora.Lori@epa.gov]; DeMaria, Eva[DeMaria.Eva@epa.gov]
From: Yuan, Tonya
Sent: Tue 10/20/2015 10:28:35 PM
Subject: RE: Riverbank documentation
SFRecords -Riverbank documentation review_09142015.docx

Hi Eva,

I reviewed the list of documents starting on page 2. My results for the documents I was able to locate are in green. Let us know if you would documents added to the AR that I did locate, but are not currently in the AR.

Thanks,

Tonya Yuan
Region 10 Superfund Records Center
Staffed by ASRC Primus
206-553-2118

From: Cora, Lori
Sent: Tuesday, October 20, 2015 2:56 PM
To: DeMaria, Eva; Yuan, Tonya
Subject: RE: Riverbank documentation

See my responses to your questions to me below.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

From: DeMaria, Eva

Sent: Tuesday, October 20, 2015 10:58 AM
To: Yuan, Tonya; Cora, Lori
Subject: FW: Riverbank documentation

Hi Tonya-

Thanks for your help on the Superfund recordkeeping! Here's the list of reports/correspondence that we should have in the AR. Can you double check to make sure that they are in the AR and mark the ones that aren't.

Lori – There are a number of reports/correspondence that CDM cites that should be in DEQ's records (ECSI database/website) that document riverbank contamination (see attached word doc).

Attorney Client / Ex. 5

Attorney Client / Ex. 5

Eva

From: Allen, Michael [mailto:AllenMC@cdmsmith.com]
Sent: Monday, September 14, 2015 5:15 PM
To: DeMaria, Eva; Sheldrake, Sean
Subject: Riverbank documentation

Eva & Sean:
Attached for your review and future discussion, is our narrative summarizing review of

documentation for the properties with known riverbank contamination.

There are a few aspect of this that CDM Smith has yet to fully comprehend. We can discuss at your convenience. Perhaps Thursday?

Thanks,

mike

Michael C. Allen P.E.

Sr. Proj. Manager/Principal

14432 SE Eastgate Way, Suite 100 | Bellevue, WA 98007

T: 425.519.8311 |Cell: 206.790.9220

allenmc@cdmsmith.com

www.cdmsmith.com

To: Yuan, Tonya[Yuan.Tonya@epa.gov]; Cora, Lori[Cora.Lori@epa.gov]
From: DeMaria, Eva
Sent: Tue 10/20/2015 5:57:40 PM
Subject: FW: Riverbank documentation
Riverbank documentation review_09142015.docx
FW: Hampton and Glacier documentation of slag fill

Hi Tonya-

Thanks for your help on the Superfund recordkeeping! Here's the list of reports/correspondence that we should have in the AR. Can you double check to make sure that they are in the AR and mark the ones that aren't.

Lori – There are a number of reports/correspondence that CDM cites that should be in DEQ's records (ECSI database/website) that document riverbank contamination (see attached word doc).

Attorney Client / Ex. 5

Attorney Client / Ex. 5

Eva

From: Allen, Michael [mailto:AllenMC@cdmsmith.com]
Sent: Monday, September 14, 2015 5:15 PM
To: DeMaria, Eva; Sheldrake, Sean
Subject: Riverbank documentation

Eva & Sean:
Attached for your review and future discussion, is our narrative summarizing review of documentation for the properties with known riverbank contamination.

There are a few aspect of this that CDM Smith has yet to fully comprehend. We can discuss at your convenience. Perhaps Thursday?

Thanks,

mike

Michael C. Allen P.E.

Sr. Proj. Manager/Principal

14432 SE Eastgate Way, Suite 100 | Bellevue, WA 98007

T: 425.519.8311 |Cell: 206.790.9220

allenmc@cdmsmith.com

www.cdmsmith.com

To: Cora, Lori[Cora.Lori@epa.gov]
From: Anderson, RobinM
Sent: Mon 10/19/2015 8:06:13 PM
Subject: RE: ph decision tree ATTORNEY CLIENT PRIVILEGE

Attorney Client / Ex. 5

Attorney Client / Ex. 5

Bottom line – check to make sure that the language is used correctly in the chart – is seems wrong to me.

Robin

From: Cora, Lori
Sent: Monday, October 19, 2015 4:01 PM
To: Anderson, RobinM
Subject: RE: ph decision tree ATTORNEY CLIENT PRIVILEGE

Attorney Client / Ex. 5

This is a RCRA policy that I don't believe is set out in any regulation, federal or state.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Anderson, RobinM
Sent: Monday, October 19, 2015 12:51 PM
To: Cora, Lori
Subject: RE: ph decision tree ATTORNEY CLIENT PRIVILEGE

Attorney Client / Ex. 5

Sorry to be dense on this – but the langauge is not working for me.

Robin

From: Cora, Lori
Sent: Monday, October 19, 2015 3:43 PM
To: Anderson, RobinM; Koch, Kristine; Allen, Elizabeth; Legare, Amy; Fonseca, Silvina; Ells, Steve; Charters, David; Christopher, Anne
Subject: RE: ph decision tree ATTORNEY CLIENT PRIVILEGE

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

From: Anderson, RobinM
Sent: Monday, October 19, 2015 12:35 PM
To: Cora, Lori; Koch, Kristine; Allen, Elizabeth; Legare, Amy; Fonseca, Silvina; Ells, Steve; Charters, David; Christopher, Anne
Subject: RE: ph decision tree ATTORNEY CLIENT PRIVILEGE

Agree with Lori's comment on Note 1 – we need it clear in the ROD whatmakes something a PTW or not.

Deliberative Process / Ex. 5

Robin M Anderson

OSRTI/ARD/SARDB

703-603-8747

From: Cora, Lori
Sent: Monday, October 19, 2015 3:01 PM
To: Koch, Kristine; Allen, Elizabeth; Anderson, RobinM; Legare, Amy; Fonseca, Silvina; Ells, Steve; Charters, David; Christopher, Anne
Subject: RE: ph decision tree ATTORNEY CLIENT PRIVILEGE

Hello, Team. The diagram is looking pretty good to me.

Attorney Client / Ex. 5

Comment on Note 1:

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

From: Koch, Kristine
Sent: Monday, October 19, 2015 11:02 AM
To: Cora, Lori; Allen, Elizabeth; Anderson, RobinM; Legare, Amy; Fonseca, Silvina; Ells, Steve; Charters, David; Christopher, Anne
Subject: FW: ph decision tree ATTORNEY CLIENT PRIVILEGE

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
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1200 Sixth Avenue, Suite 900, M/S ECL-122
Seattle, Washington 98101-3140

(206)553-6705
(206)553-8581 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: Coffey, Scott [mailto:CoffeySE@cdmsmith.com]
Sent: Monday, October 19, 2015 10:35 AM
To: Koch, Kristine; Allen, Elizabeth
Cc: Chan, Arthur; Blischke, Eric; Foster, Malena L.; Jones, Jennifer M.
Subject: FW: ph decision tree ATTORNEY CLIENT PRIVILEGE

Here is the latest Disposal Decision Tree with Amy's comments incorporated.

From: Foster, Malena L.

Sent: Monday, October 19, 2015 10:15 AM
To: Blischke, Eric <blischkee@cdmsmith.com>; Coffey, Scott <CoffeySE@cdmsmith.com>
Cc: Sayler, Cheryl Ann <saylerc@cdmsmith.com>; Hazen, Gary <HazenGL@cdmsmith.com>; Jones, Jennifer M. <JonesJM@cdmsmith.com>
Subject: RE: ph decision tree ATTORNEY CLIENT PRIVILEGE

Here's the latest version with the edits.

Malena

From: Blischke, Eric
Sent: Monday, October 19, 2015 9:57 AM
To: Foster, Malena L. <fosterml@cdmsmith.com>
Subject: RE: ph decision tree ATTORNEY CLIENT PRIVILEGE

I made a few revisions to footnotes 1 and 4 as highlighted in purple. Please incorporate these into your version and then we should be good to go.

Thanks, Eric

From: Foster, Malena L.
Sent: Monday, October 19, 2015 10:40 AM
To: Blischke, Eric <blischkee@cdmsmith.com>
Cc: Coffey, Scott <CoffeySE@cdmsmith.com>
Subject: RE: ph decision tree ATTORNEY CLIENT PRIVILEGE

Hi Eric,

Attached are the changes we discussed. Let me know if everything works okay.

Scott, Eric will review and then send on to the group.

Thanks,

Malena

From: Blischke, Eric
Sent: Monday, October 19, 2015 6:06 AM
To: Foster, Malena L. <fosterml@cdmsmith.com>; Coffey, Scott <CoffeySE@cdmsmith.com>; Jones, Jennifer M. <JonesJM@cdmsmith.com>
Cc: Hazen, Gary <HazenGL@cdmsmith.com>; Sayler, Cheryl Ann <saylerc@cdmsmith.com>
Subject: RE: ph decision tree ATTORNEY CLIENT PRIVILEGE

Hi Malena. Let me know when you want to talk. I do not see the need for many changes in response to Amy's comments – perhaps the statement about treatment to the extent practicable in our new first bullet.

One thing that I would point out in response to Amy's comments, one of the situations that may limit the use of treatment as stated on page 3 of the PTW guidance is "The extraordinary volume of materials or complexity of the site make implementation of treatment technologies impracticable."

Eric

From: Foster, Malena L.
Sent: Monday, October 19, 2015 2:15 AM
To: Blischke, Eric <blischkee@cdmsmith.com>; Coffey, Scott <CoffeySE@cdmsmith.com>; Jones, Jennifer M. <JonesJM@cdmsmith.com>
Cc: Hazen, Gary <HazenGL@cdmsmith.com>; Sayler, Cheryl Ann <saylerc@cdmsmith.com>
Subject: RE: ph decision tree ATTORNEY CLIENT PRIVILEGE

I will have to talk to Eric on Monday about the latest changes.

Malena

From: Blischke, Eric
Sent: Sunday, October 18, 2015 9:16 AM
To: Coffey, Scott <CoffeySE@cdmsmith.com>; Foster, Malena L. <fosterml@cdmsmith.com>; Jones, Jennifer M. <JonesJM@cdmsmith.com>
Cc: Hazen, Gary <HazenGL@cdmsmith.com>; Sayler, Cheryl Ann <saylerc@cdmsmith.com>
Subject: RE: ph decision tree ATTORNEY CLIENT PRIVILEGE

Hi Scott. Here are my thoughts on Lori's comments in Red Text. Malena, can you make these revisions? I do not think that I can edit this effectively in Blue Beam. Proposed text revisions are garishly highlighted in blue.

Thanks, Eric

From: Coffey, Scott
Sent: Friday, October 16, 2015 7:50 PM
To: Blischke, Eric <blischkee@cdmsmith.com>; Foster, Malena L. <fosterml@cdmsmith.com>; Jones, Jennifer M. <JonesJM@cdmsmith.com>
Subject: Fwd: ph decision tree ATTORNEY CLIENT PRIVILEGE

Sorry. I just got through all of the email that came in while I was in my meeting. Kristine didn't Ccussations Jennifer on this email. Attached are Lori Cora's comments. Not sure if this changes much from what was sent. Her commments start with a lot of "agreed" statements.

Sent via the Samsung Galaxy S™ III, an AT&T 4G LTE smartphone

-------- Original message --------

From: "Koch, Kristine"

Date:10/16/2015 2:59 PM (GMT-08:00)

To: "Coffey, Scott"

Subject: FW: ph decision tree ATTORNEY CLIENT PRIVILEGE

Here are Lori's comments on Robins comments. I have not heard from CDM on this or water. I'm leaving shortly and will not be back on-line until Sunday. I was hoping to get these from you before I quit working today in case I have any questions. I guess that won't be happening. Please sent the information ASAP. I will be working on this tonight and tomorrow, but will not be connected.

Thanks,

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
Region 10
1200 Sixth Avenue, Suite 900, M/S ECL-122
Seattle, Washington 98101-3140

(206)553-6705
(206)553-8581 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: Cora, Lori
Sent: Friday, October 16, 2015 2:51 PM

To: Anderson, RobinM; Koch, Kristine; Allen, Elizabeth; Fonseca, Silvina; Legare, Amy; Sheldrake, Sean; Christopher, Anne; Ells, Steve; Charters, David
Subject: RE: ph decision tree ATTORNEY CLIENT PRIVILEGE

See my comments below.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Anderson, RobinM
Sent: Friday, October 16, 2015 9:09 AM
To: Koch, Kristine; Allen, Elizabeth; Fonseca, Silvina; Legare, Amy; Cora, Lori; Sheldrake, Sean; Christopher, Anne; Ells, Steve; Charters, David
Subject: FW: ph decision tree

Thank you for the opportunity to review the draft Sediment Soil Disposal Decision Tree. My comments are in pen on the chart itself. Since so much of this (at least half is regulatory) I am interested in hearing Lori's take as well.

Deliberative Process / Ex. 5

Deliberative Process / Ex. 5

Deliberative Process / Ex. 5

Deliberative Process / Ex. 5

As noted previously, I support Sean comment on the asbestos – might be best handled in a footnote.

Steve Ells – I think I also addressed your concern for need for clarity on basis for saying that it can be reliably contained - -otherwise this is just a big whole in the paper.

From: VA-PYS-5251-M@EPA.GOV [mailto:VA-PYS-5251-M@EPA.GOV]
Sent: Friday, October 16, 2015 11:26 AM
To: Anderson, RobinM
Subject: ph decision tree

To: Cora, Lori[Cora.Lori@epa.gov]
From: Koch, Kristine
Sent: Thur 10/1/2015 9:14:01 PM
Subject: FW: LWG List of Significant Issues with EPA's Revised FS Sections 3 and 4
2015-09-08 LWG Letter re Significant Issues on EPA FS Section 3 and 4.pdf
2015-09-08 FS Sec 3 and 4 List of Significant Issues.pdf

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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(206)553-8581 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: Jen Woronets [mailto:jworonets@anchorqea.com]
Sent: Tuesday, September 08, 2015 2:37 PM
To: Koch, Kristine
Cc: Woolford, James; Ells, Steve; Grandinetti, Cami; brandy.humphreys@grandronde.org; audiehuber@ctuir.com; Bob Wyatt; callie@ridolfi.com; Courtney Johnson (courtney@crag.org); cunninghame@gorge.net; Dave Livesay; Elmer Ward (elmer.ward@ctwsbnr.org); Personal Privacy / Ex. 6 Personal Privacy / Ex. 6; Gail Fricano (gfricano@indecon.com); Holly Partridge (Holly.Partridge@grandronde.org); Jennifer Kassakian (jkassakian@indecon.com); Jen Woronets; Jim McKenna (jim.mckenna@verdantllc.com); Julie Weis; Kim Cox (kim.cox@portlandoregon.gov); Kim D'Aquila (kim.daquila@grandronde.org); Madalinski, Kelly; MCCLINCY Matt; Michael.karnosh@grandronde.org; Rachel DelVecchio (rdelvecchio@indecon.com); Rita Cabral; Robert.Neely@noaa.gov; rose@yakamafish-nsn.gov; Sheldrake, Sean; tomd@ctsi.nsn.us; Carl Stivers; Amanda Shellenberger; Patty Dost
Subject: LWG List of Significant Issues with EPA's Revised FS Sections 3 and 4

Kristine,

Per Jim Woolford's request, attached please find the list of significant issues with EPA's

revised FS Sections 3 and 4.

Let us know if you have any questions.

Thank you,

Jen Woronets ☺

Anchor QEA, LLC

jworonets@anchorqea.com

421 SW Sixth Avenue, Suite 750

Portland, OR 97204

503-972-5014

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To: Cora, Lori[Cora.Lori@epa.gov]
From: Dowton, David
Sent: Thur 10/1/2015 4:45:38 PM
Subject: RE: Portland Harbor Superfund Site; Congressional inquiries/involvement ATTORNEY CLIENT PRIVILEGE

Lori, is there a call-in number? Thanks.

-----Original Appointment-----
From: Cora, Lori
Sent: Wednesday, September 30, 2015 3:08 PM
To: Cora, Lori; Dowton, David; Michaud, John; Salo, Earl; Openchowski, Charles; Ingemansen, Dean; Zhen, Davis; Grandinetti, Cami; McLerran, Dennis; Stalcup, Dana; Woolford, James; Northridge, Michael
Cc: Robinson, Deborah; Dunbar, Bill
Subject: FW: Portland Harbor Superfund Site; Congressional inquiries/involvement ATTORNEY CLIENT PRIVILEGE
When: Thursday, October 01, 2015 10:00 AM-11:00 AM (UTC-08:00) Pacific Time (US & Canada).
Where: R10Sea-Room-11Camas-ORC-VTC/R10-Rooms-Restricted

David,

Ken Patterson just directed that you should participate in this call, and he asked me to forward the call-invitation to you.

-----Original Appointment-----
From: Cora, Lori
Sent: Monday, September 28, 2015 12:34 PM
To: Cora, Lori; Michaud, John; Salo, Earl; Openchowski, Charles; Ingemansen, Dean; Zhen, Davis; Grandinetti, Cami; McLerran, Dennis; Stalcup, Dana; Woolford, James; Northridge, Michael
Cc: Robinson, Deborah; Dunbar, Bill
Subject: Portland Harbor Superfund Site; Congressional inquiries/involvement ATTORNEY CLIENT PRIVILEGE
When: Thursday, October 01, 2015 10:00 AM-11:00 AM (UTC-08:00) Pacific Time (US & Canada).
Where: R10Sea-Room-11Camas-ORC-VTC/R10-Rooms-Restricted

For Region 10 Folks: we have reserved the Camas Meeting Room on the 11th floor for the conversation.

Attorney Client / Ex. 5

This meeting time is open for all the legal counsel on the invite, but many if not most program folks and HQ/Regional management appear to be booked. I will look for other days later that may be better for more invitees, but believe it is better for the legal discussion to begin sooner than later.

To: Cora, Lori[Cora.Lori@epa.gov]; Michaud, John[Michaud.John@epa.gov]; Salo, Earl[Salo.Earl@epa.gov]; Openchowski, Charles[openchowski.charles@epa.gov]; Ingemansen, Dean[Ingemansen.Dean@epa.gov]; Zhen, Davis[Zhen.Davis@epa.gov]; Grandinetti, Cami[Grandinetti.Cami@epa.gov]; McLerran, Dennis[mclerran.dennis@epa.gov]; Stalcup, Dana[Stalcup.Dana@epa.gov]
From: Woolford, James
Sent: Fri 9/25/2015 9:37:05 PM
Subject: RE: Portland Harbor Superfund Site; Congressional inquiries/involvement ATTORNEY CLIENT PRIVILEGE

If we have a budget Personal Privacy / Ex. 6 Otherwise we're doing shutdown.

If the former I will call in from the road. If the latter, we'll be doing other things.

Jim Woolford, Director
Office of Superfund Remediation & Technology Innovation
US EPA

Sent from my Windows Phone
Please excuse typos

From: Cora, Lori
Sent: 9/25/2015 4:24 PM
To: Michaud, John; Salo, Earl; Openchowski, Charles; Ingemansen, Dean; Zhen, Davis; Grandinetti, Cami; McLerran, Dennis; Stalcup, Dana; Woolford, James
Subject: Portland Harbor Superfund Site; Congressional inquiries/involvement ATTORNEY CLIENT PRIVILEGE

Attorney Client / Ex. 5

This meeting time is open for all the legal counsel on the invite, but many if not most program folks and HQ/Regional management appear to be booked. I will look for other days later that may be better for more invitees, but believe it is better for the legal discussion to begin sooner than later.

To: White, Bruce[Bruce.White@btlaw.com]; Cora, Lori[Cora.Lori@epa.gov]
Cc: Klinger, Nanci[Nanci.Klinger@portlandoregon.gov]
From: Koch, Kristine
Sent: Thur 9/24/2015 8:59:08 PM
Subject: RE: PCI group presentation
2015-09-29 Presentation to PCI Group on FS Sections 3 & 4.pptx

Attached is the presentation.

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
Region 10
1200 Sixth Avenue, Suite 900, M/S ECL-122
Seattle, Washington 98101-3140

(206)553-6705
(206)553-8581 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: White, Bruce [mailto:Bruce.White@btlaw.com]
Sent: Thursday, September 24, 2015 9:11 AM
To: Koch, Kristine; Cora, Lori
Cc: Klinger, Nanci
Subject: RE: PCI group presentation

Thx

Regards,

Bruce White

312-214-4584 (DD)

Personal Privacy / Ex. 6 (Cell)

From: Koch, Kristine [mailto:Koch.Kristine@epa.gov]
Sent: Thursday, September 24, 2015 11:11 AM
To: White, Bruce; Cora, Lori
Cc: Klinger, Nanci
Subject: RE: PCI group presentation

Bruce, We will get you something later today.

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
Region 10
1200 Sixth Avenue, Suite 900, M/S ECL-122
Seattle, Washington 98101-3140

(206)553-6705
(206)553-8581 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: White, Bruce [mailto:Bruce.White@btlaw.com]
Sent: Thursday, September 24, 2015 9:03 AM
To: Cora, Lori
Cc: Koch, Kristine; Klinger, Nanci
Subject: RE: PCI group presentation

Lori

Just following up to find out when we might expect to receive EPA's slide deck that will be used for the presentation

Regards,

Bruce White

312-214-4584 (DD)

Personal Privacy / Ex. 6 (Cell)

From: White, Bruce
Sent: Friday, September 18, 2015 1:10 PM
To: 'Cora, Lori'
Cc: Koch, Kristine; Klinger, Nanci
Subject: RE: PCI group presentation

Lori

Just wanted to follow up and re-confirm the presentation September 29th from ~ 10 a.m. to 2 p.m. The meeting will be at the Hilton in downtown Portland. The group will provide an attendance list after the meeting as requested. We will have a phone hook-up as requested. It would be very helpful if you could provide the EPA's slide deck that will be used for the presentation in advance of the meeting.

We were also asked to get confirmation from EPA that attendees would have an opportunity to ask questions, time permitting.

Regards,

Bruce White

312-214-4584 (DD)

Personal Privacy / Ex. 6 (Cell)

From: Cora, Lori [mailto:Cora.Lori@epa.gov]

Sent: Wednesday, August 26, 2015 12:18 PM
To: White, Bruce
Cc: Koch, Kristine; Klinger, Nanci
Subject: RE: PCI group presentation

Hello, Bruce. The EPA team has confirmed that we can travel to Portland on September 29th to provide the FS Chapter 3 and 4 presentation to the PCI group. We cannot be in Portland until at least 10 a.m. Some of our contractors and other EPA folks will participate by telephone, so there needs to be a conference line set up. We expect that the meeting will be no longer than 4 hours total as was the case for the LWG on July 31. EPA will want a list of attendees after the meeting. Let me know if you have any questions. Thanks.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

From: White, Bruce [mailto:Bruce.White@btlaw.com]
Sent: Tuesday, August 25, 2015 1:28 PM
To: Cora, Lori
Cc: Koch, Kristine; Klinger, Nanci
Subject: Re: PCI group presentation

Once again, I apoliogize but I have to nudge for confirmation of 9/29, as we are required to put up a deposit to reserve or potentially lose the room.

Thx

Bruce White

312-214-4584 DD

Personal Privacy / Ex. 6 M

From: Bruce White
Date: Monday, August 24, 2015 at 12:43 PM
To: Lori Cora
Cc: Kristine Koch, Nanci Klinger
Subject: Re: PCI group presentation

Lori

Sorry for being a nudge, but can EPA confirm 9/29.

We need to lock in the room and give our participants notice.

Thanks,

Bruce White

312.214.4584 (W)

Personal Privacy / Ex. 6 (C)

On Aug 20, 2015, at 4:30 PM, White, Bruce <Bruce.White@btlaw.com> wrote:

> Lori
>
> Following up on our discussion yesterday, the Group would like to have an in person presentation from EPA on 9/29. Of the three dates you proposed, that is the one on which we can get a room. (Portland Hilton)
>
> As soon as you can confirm, we will send notice to PCI Group members.
>
> Thanks
>
> Bruce White
>
> 312.214.4584 (W)
>
> Personal Privacy / Ex. 6 (C)

On Aug 11, 2015, at 1:21 PM, Cora, Lori <Cora.Lori@epa.gov> wrote:

Hello, Bruce. I've checked in with Kristine. We would like to propose a webinair format for the presentation. A webinair eliminates the need to travel which should help maximize participation by the PCI members and reduces the resources and time for everyone. The dates Kristine and I are available are September 22, 24, and September 29. Let us know which of those dates work for the group. Thanks.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: White, Bruce [mailto:Bruce.White@btlaw.com]
Sent: Monday, August 10, 2015 12:20 PM
To: Cora, Lori
Cc: Koch, Kristine; Klinger, Nanci
Subject: RE: PCI group presentation

Lori

In an effort to do some PCI Group planning we would greatly appreciate your providing, before our 8/13 meeting, some dates in the near future when EPA would be available to make a presentation to the PCI Group.

We would like to lock in one of those dates when we have group together this week.

Thanks,

Bruce White

312-214-4584 (DD)

Personal Privacy / Ex. 6 (Cell)

From: White, Bruce
Sent: Wednesday, August 05, 2015 4:50 PM
To: Cora, Lori
Cc: Koch, Kristine; Klinger, Nanci
Subject: Re: PCI group presentation

Lori

Thanks for getting back so quickly.

If your schedules happen to change between now and then, please let us know - we can be flexible.

Bruce White

312.214.4584 (W)

Personal Privacy / Ex. 6 (C)

On Aug 5, 2015, at 4:45 PM, Cora, Lori <Cora.Lori@epa.gov> wrote:

> Hello, Bruce. Unfortunately, Kristine and I both are not available for meeting with the PCI group on the 13th. We will be in touch about a proposed time and process by which we can present the draft FS to the PCI group sometime in the future.

Lori Houck Cora | Assistant Regional Counsel
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From: White, Bruce [mailto:Bruce.White@btlaw.com]
Sent: Wednesday, August 05, 2015 2:00 PM
To: Cora, Lori
Cc: Koch, Kristine; Klinger, Nanci
Subject: Re: PCI group presentation

Lori

Just wanted to follow up to see if there was any way possible that you and Kristine might be able to open up your schedule to be available on the 13th; or, alternatively, if Kristine could make it, perhaps another of EPA's regional counsel might accompany here.

This in person meeting has been scheduled for some time, and is likely to be the only such meeting through year-end at which more than 100 party representatives will be together in the same room in Portland. We believe that the timing of this in person meeting, with chapters 2 and 3 of the FS having recently been distributed by EPA, offers a particularly good opportunity for the Agency to connect with the PCI Group.

We can include such a presentation most any time that day, though earlier would be preferable if that works for EPA.

We greatly appreciate EPA's further consideration of this request.

Thanks,

Bruce White

312.214.4584 (W)

Personal Privacy / Ex. 6 (C)

On Aug 3, 2015, at 7:36 PM, Klinger, Nanci <Nanci.Klinger@portlandoregon.gov> wrote:

Lori,

Thank you very much. I have included Bruce and he can work with you to coordinate with the Group.

Nanci

Nanci Klinger

Deputy City Attorney

Phone 503.823.3022

This email contains confidential and privileged information. If you receive this message in error, please notify me and delete all versions of the email.

From: Cora, Lori [mailto:Cora.Lori@epa.gov]
Sent: Monday, August 03, 2015 3:42 PM
To: Klinger, Nanci
Cc: Koch, Kristine
Subject: RE: PCI group presentation

Hello, Nancy. We can provide a presentation to the PCI group but neither Kristine nor I are available on August 13th. We are also going to think about how it could be done most efficiently. We will be back with you to schedule a day and time but it likely will not be until later in August or September.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

From: Klinger, Nanci [mailto:Nanci.Klinger@portlandoregon.gov]

Sent: Monday, August 03, 2015 10:35 AM
To: Cora, Lori
Subject: RE: PCI group presentation

Hi Lori,

Yes, I think there is value in the PCI Group understanding EPA's approach to the site as early as possible.

The allocation process is proceeding simultaneously with the EPA administrative process. The FS plays a critical role in helping the PCI Group determine how to apply its allocation process to specific areas (e.g. the new draft FS has changes to SMA, SDUs cost assumptions, etc). The FS draft described on Friday has implications for the Group's approach to advocacy. The Group needs to understand how the decision trees and scoring matrices developed by EPA may operate in the selection of a remedy so that the Group can get its process to match-up with the requirements of the ROD. There are many steps to developing an allocation process that all the participating parties can agree to and so the Group has been and is working on that process now. The draft FS structure influences our process and our process needs time to incorporate those changes. We understand that it is early and it is a draft, but I think this will keep the allocation process moving forward effectively.

I would be happy to talk and am around the office most of the day.

Nanci Klinger

Deputy City Attorney

Phone 503.823.3022

This email contains confidential and privileged information. If you receive this message in error, please notify me and delete all versions of the email.

From: Cora, Lori [mailto:Cora.Lori@epa.gov]
Sent: Monday, August 03, 2015 9:35 AM
To: Klinger, Nanci
Cc: Koch, Kristine
Subject: PCI group presentation

Hello, Nanci. Kristine informs me that you would like Kristine to present Chapters 3 and 4 to the PCI group. In thinking about what the appropriate time for outreach to the PCI might be, we would like to understand the allocation process better. Is the allocation process proceeding based on EPA's draft FS modifications that we are providing to the LWG for comment or will it be based on the final FS? Or might the allocation even wait for the ROD? Thanks for your attention to this request.

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U.S. Environmental Protection Agency | Region 10
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To: Grandinetti, Cami[Grandinetti.Cami@epa.gov]; Legare, Amy[Legare.Amy@epa.gov]; Cora, Lori[Cora.Lori@epa.gov]; Fonseca, Silvina[Fonseca.Silvina@epa.gov]
From: Koch, Kristine
Sent: Thur 8/13/2015 1:41:15 PM
Subject: RE: PCI group presentation

Yes.

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
Region 10
1200 Sixth Avenue, Suite 900, M/S ECL-122
Seattle, Washington 98101-3140

(206)553-6705
(206)553-8581 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: Grandinetti, Cami
Sent: Wednesday, August 12, 2015 2:29 PM
To: Legare, Amy; Cora, Lori; Fonseca, Silvina
Cc: Koch, Kristine
Subject: RE: PCI group presentation

Amy—We would like to say no to these other parties providing comments. They haven't been working with us on the RIFS and I can't think of how their input is critical to any remedy selection issue—Kristine, do you agree with that?

Cami Grandinetti

Program Manager, Remedial Cleanup Program

USEPA

1200 6th Ave, Suite 900

ECL-113

Seattle, Wa. 98101

206-553-8696 (desk)

206-390-8890 (cell)

206-553-0124 (fax)

From: Legare, Amy
Sent: Wednesday, August 12, 2015 2:12 PM
To: Grandinetti, Cami; Cora, Lori; Fonseca, Silvina
Cc: Koch, Kristine
Subject: RE: PCI group presentation

Or PRPs that may offer technical comments critical to understanding key remedy selection issues at the site.

There is a small amount of flexibility but the decision is yours.

From: Grandinetti, Cami
Sent: Wednesday, August 12, 2015 12:57 PM
To: Cora, Lori; Legare, Amy; Fonseca, Silvina
Cc: Koch, Kristine
Subject: RE: PCI group presentation

Lori—look on page 12. In answer to the role of the PRP—it is pretty clear that only PRPs that are doing the RI/FS or are very involved in the RI/FS get to write comments to the board.

Cami Grandinetti

Program Manager, Remedial Cleanup Program

USEPA

1200 6th Ave, Suite 900

ECL-113

Seattle, Wa. 98101

206-553-8696 (desk)

206-390-8890 (cell)

206-553-0124 (fax)

From: Cora, Lori
Sent: Wednesday, August 12, 2015 9:47 AM
To: Grandinetti, Cami; Legare, Amy; Fonseca, Silvina
Cc: Koch, Kristine
Subject: RE: PCI group presentation

Can someone send me any written NRRB guidance/process materials that says who can (thus who cannot) participate in the process that I can forward to the PCI group?

They are pretty intent on having an in-person meeting vs a webinar is that ok with us? Also, Kristine, is there any date sooner than September 22 you could go to Portland or do a webinair for this purpose? Again, I am unavailable September 8 through the 18th.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Grandinetti, Cami
Sent: Wednesday, August 12, 2015 9:27 AM
To: Cora, Lori; Legare, Amy; Fonseca, Silvina

Cc: Koch, Kristine
Subject: RE: PCI group presentation

No—they cannot submit comments—only LWG PRPs can submit and they as a group are limited to 40 pages.

Cami Grandinetti

Program Manager, Remedial Cleanup Program

USEPA

1200 6th Ave, Suite 900

ECL-113

Seattle, Wa. 98101

206-553-8696 (desk)

206-390-8890 (cell)

206-553-0124 (fax)

From: Cora, Lori
Sent: Wednesday, August 12, 2015 8:29 AM
To: Grandinetti, Cami; Legare, Amy; Fonseca, Silvina
Cc: Koch, Kristine
Subject: FW: PCI group presentation

Hello. Please see message from a representative for the Portland Harbor allocation group. He indicates that individual PRPs want to submit comments to the NRRB. Is that what NRRB process provides for?

Lori Houck Cora | **Assistant Regional Counsel**

U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: White, Bruce [mailto:Bruce.White@btlaw.com]
Sent: Wednesday, August 12, 2015 7:18 AM
To: Cora, Lori
Cc: Koch, Kristine; Klinger, Nanci
Subject: RE: PCI group presentation

Lori

Thanks for your response below.

The PCI Group would prefer an earlier in person presentation because either the group or members of the group, not affiliated with the LWG, intend to file comments with the Remedy Review Board. Group members have advised that they would very much appreciate such a presentation from EPA, as soon as possible after Ch 4 of the FS is issued, and preferably before the Labor Day weekend.

Additionally, from a larger perspective, as the site moves toward a proposed plan and a ROD, we believe that insofar as the US will be looking to the members of the PCI Group for an agreement, EPA needs to engage and keep the larger Group informed on a timely basis.

We look forward to receiving some earlier suggested dates.

Thanks,

Bruce White

312-214-4584 (DD)

Personal Privacy / Ex. 6 (Cell)

From: Cora, Lori [mailto:Cora.Lori@epa.gov]
Sent: Tuesday, August 11, 2015 1:22 PM
To: White, Bruce
Cc: Koch, Kristine; Klinger, Nanci
Subject: RE: PCI group presentation

Hello, Bruce. I've checked in with Kristine. We would like to propose a webinair format for the presentation. A webinair eliminates the need to travel which should help maximize participation by the PCI members and reduces the resources and time for everyone. The dates Kristine and I are available are September 22, 24, and September 29. Let us know which of those dates work for the group. Thanks.

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312.214.4584 (W)

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312.214.4584 (W)

Personal Privacy / Ex. 6 (C)

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Thank you very much. I have included Bruce and he can work with you to coordinate with the Group.

Nanci

Nanci Klinger

Deputy City Attorney

Phone 503.823.3022

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Sent: Monday, August 03, 2015 3:42 PM
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P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Klinger, Nanci [mailto:Nanci.Klinger@portlandoregon.gov]
Sent: Monday, August 03, 2015 10:35 AM
To: Cora, Lori
Subject: RE: PCI group presentation

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I would be happy to talk and am around the office most of the day.

Nanci Klinger

Deputy City Attorney

Phone 503.823.3022

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From: Cora, Lori [mailto:Cora.Lori@epa.gov]
Sent: Monday, August 03, 2015 9:35 AM
To: Klinger, Nanci
Cc: Koch, Kristine
Subject: PCI group presentation

Hello, Nanci. Kristine informs me that you would like Kristine to present Chapters 3 and 4 to the PCI group. In thinking about what the appropriate time for outreach to the PCI might be, we would like to understand the allocation process better. Is the allocation process proceeding based on EPA's draft FS modifications that we are providing to the LWG for comment or will it be based on the final FS? Or might the allocation even wait for the ROD? Thanks for your attention to this request.

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To: Cora, Lori[Cora.Lori@epa.gov]
From: Robinson, Deborah
Sent: Thur 8/6/2015 7:29:46 PM
Subject: Dennis will be here in a few minutes - RE: Agenda for 8/6/15 PH Executives Meeting

Thanks,

Debbie

==========
From the Desk of:
Debbie Robinson
Tel: 206-553-4961
robinson.deborah@epa.gov

US EPA Region 10, M/S ECL 122, 1200 Sixth Avenue, Suite 900, Seattle, WA 98101

From: Cora, Lori
Sent: Thursday, August 06, 2015 11:35 AM
To: Robinson, Deborah
Subject: RE: Agenda for 8/6/15 PH Executives Meeting

Yes, I would like to listen in to any debrief.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Robinson, Deborah
Sent: Thursday, August 06, 2015 11:30 AM
To: Cora, Lori
Subject: RE: Agenda for 8/6/15 PH Executives Meeting

No costs. Dennis will talk some about assumptions. It is possible he will come back and debrief at a little after 12. I can open up a phone line if it happens. Let me know.

Personal Privacy / Ex. 6

Thanks,

Debbie

==========

From the Desk of:
Debbie Robinson
Tel: 206-553-4961
robinson.deborah@epa.gov

US EPA Region 10, M/S ECL 122, 1200 Sixth Avenue, Suite 900, Seattle, WA 98101

From: Cora, Lori
Sent: Thursday, August 06, 2015 9:25 AM
To: Robinson, Deborah
Subject: RE: Agenda for 8/6/15 PH Executives Meeting

Interesting

Lori Houck Cora | **Assistant Regional Counsel**
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

From: Robinson, Deborah
Sent: Thursday, August 06, 2015 8:47 AM

To: Cora, Lori
Subject: RE: Agenda for 8/6/15 PH Executives Meeting

Yes, I did not have them as of the time I signed off last night. I am checking through emails now, hoping something is there, but Woolford has not received anything yet.

Thanks,

Debbie

==========
From the Desk of:
Debbie Robinson
Tel: 206-553-4961
robinson.deborah@epa.gov

US EPA Region 10, M/S ECL 122, 1200 Sixth Avenue, Suite 900, Seattle, WA 98101

From: Cora, Lori
Sent: Thursday, August 06, 2015 8:21 AM
To: Robinson, Deborah
Subject: RE: Agenda for 8/6/15 PH Executives Meeting

Hi, Debbie. I've not received the alternatives' cost estimates. I see Dennis is discussing today. Can you send them to me? Thanks.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Robinson, Deborah
Sent: Wednesday, August 05, 2015 5:23 PM
To: Tyler, Kendra; Magorrian, Matthew; Woolford, James; McLerran, Dennis; Kevin Parrett

(parrett.kevin@deq.state.or.us); Kirkpatrick, Margaret; Hamilton, Jessica; Cox, Kim (BES)
Cc: Grandinetti, Cami; Zhen, Davis; Koch, Kristine; Christopher, Anne; DeMaria, Eva; Sheldrake, Sean; Conley, Alanna; Cora, Lori; Allen, Elizabeth; MacIntyre, Mark; Fonseca, Silvina; Legare, Amy; Holsman, Marianne; Stalcup, Dana; Ammon, Doug; Matt McClincy - ODEQ (mcclincy.matt@deq.state.or.us); Tom Roick - ODEQ (ROICK.Tom@deq.state.or.us); gilles.bruce@deq.state.or.us; Keith Johnson - ODEQ (johnson.keith@deq.state.or.us); Kirkpatrick, Margaret; Hamilton, Jessica; Jen Woronets; Dunbar, Bill
Subject: Agenda for 8/6/15 PH Executives Meeting

Attached is the revised agenda for the 8/6/15 Portland Harbor Executive Meeting.

If there are further changes tomorrow, I will send out another revision.

Thanks,

Debbie

==========
From the Desk of:
Debbie Robinson
Tel: 206-553-4961
robinson.deborah@epa.gov

US EPA Region 10, M/S ECL 122, 1200 Sixth Avenue, Suite 900, Seattle, WA 98101

To: Cora, Lori[Cora.Lori@epa.gov]
Cc: Sheldrake, Sean[sheldrake.sean@epa.gov]
From: DeMaria, Eva
Sent: Thur 7/30/2015 7:36:11 PM
Subject: RE: Stormwater info you requested

Attorney Client / Ex. 5

From: Cora, Lori
Sent: Thursday, July 30, 2015 11:35 AM
To: DeMaria, Eva; Koch, Kristine
Cc: Sheldrake, Sean
Subject: RE: Stormwater info you requested

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

From: DeMaria, Eva
Sent: Thursday, July 30, 2015 11:18 AM
To: Cora, Lori; Koch, Kristine
Cc: Sheldrake, Sean
Subject: FW: Stormwater info you requested

Lori, Kristine-

Attorney Client / Ex. 5

Eva

From: LIVERMAN Alex [mailto:liverman.alex@deq.state.or.us]
Sent: Thursday, July 30, 2015 9:32 AM
To: DeMaria, Eva
Cc: MCCLINCY Matt
Subject: Stormwater info you requested

Hi Eva.

Thanks for the note and for all your focused efforts on getting PH under your belt. I look forward to our upcoming discussions and trading of info to land on a good path together. It will be good to reconnect with Lori Cora on these issues, as we have had positive interactions on stormwater

as things have developed and EPA counsel and past management came up to speed on our programs. I'll touch base with new staff and management in our WQ section, too, to keep the discussions in the right wheelhouses and make sure the collaboration pathways are open.

I'm attaching the requested ppt and email exchange with Rich. You will see in comparing DEQ SCD memos and EPA/CDM comments just before this email exchange with those after, that there were some refinements and more consistent content. That would be one goal in smoothly out our collaboration as we continue on into the last phases of source control work and most projects.

I also attached an email exchange I had with Deb Yamamota and Lori Cohen after briefing them on our source control work and stormwater programs. I'd like to work up a bit more on the exchanges DEQ had with Kristine Koch and others starting in 2006 or so as we jointly developed the stormwater program for Portland Harbor. I think it will be a good exercise for us all to walk back through some it that together and reaffirm the agreed to path and find agreement on how it has been followed toward meeting our source control objectives.

Look forward to our next discussions.

--Alex

From: DeMaria, Eva [mailto:DeMaria.Eva@epa.gov]
Sent: Wednesday, July 29, 2015 10:11 PM
To: LIVERMAN Alex
Cc: ORR Jim; MCCLINCY Matt; Sheldrake, Sean; Michael Allen (allenmc@cdmsmith.com)
Subject: Re: draft EPA comments on Wilhelm Trucking Work Plan

Hi Alex-

Before we proceed, I need to obtain further clarification from our own counsel and management about how we're dealing with stormwater and our/my communications with DEQ. In that vein, it would help me if you could forward Rich's 9/26/13 email that you provided to me in hard copy today. Also, if you could also send me an electronic copy of the Stormwater Pathway Evaluation (June 30, 2015) powerpoint that you provided me during our first meeting, I would greatly appreciate it. It'll be easier for me to put it into

our administrative records and also to forward to the appropriate folks.

BTW, Matt, I found your SC updated spreadsheet amongst all the other emails. I've forwarded to CDM to incorporate into their spreadsheet.

Thanks again for all the time, effort, and patience you, Matt, and the PMs have been giving me in getting me up to speed on PH.

Eva

From: LIVERMAN Alex <liverman.alex@deq.state.or.us>
Sent: Wednesday, July 29, 2015 4:06 PM
To: DeMaria, Eva
Cc: ORR Jim; MCCLINCY Matt; Sheldrake, Sean; Michael Allen (allenmc@cdmsmith.com)
Subject: draft EPA comments on Wilhelm Trucking Work Plan

Hi Eva (and all!)

Jim and I chatted about the latest work plan submittal from Wilhelm and EPA's draft comments on it. As we discussed in our meeting today, this is one where we would appreciate the comments being put on hold or rescinded. We agree with several of the comments, while we hope to keep dialoguing to work out some language again on how the PRGs are used and including the rank-order curves as a line of evidence. Importantly, though, we are going to reject the submittal because it is not what we asked for and does not lay out the additional work we were expecting. We will share a copy of the letter we send to Wilhelm reflecting that. Hopefully the new submittal will better address the comments (yours and ours) and then we can revisit commenting.

Meanwhile, the comments note that additional documents referred to in the plan would have been helpful for CDM/EPA in understanding the background, etc. Jim indicates that he has been diligent in providing the documents for the site and thinks you should have them in the record. As you/CDM are updating the review tracking table and looking into the record, perhaps you can pinpoint these documents and have them available/reviewed by the time the new submittal is ready for review? Or you can let us know what is missing and we will resend it.

Thanks again for the on-going coordination as you get up to speed in PH and we jointly focus on bringing the active source control projects to closure.

Talk to you soon.

--Alex

From: ORR Jim
Sent: Monday, July 27, 2015 11:38 AM
To: LIVERMAN Alex
Subject: FW: 69 Wilhelm Trucking Work Plan

Alex Here are EPA's Draft comments for the Wilhelm WP.

Thank You

Jim Orr
DEQ Northwest Region

700 NE Multnomah St. Suite 600

Portland, Oregon 97232

503-229-5039

From: DeMaria, Eva [mailto:DeMaria.Eva@epa.gov]
Sent: Monday, July 27, 2015 10:37 AM
To: ORR Jim; MCCLINCY Matt
Cc: Sheldrake, Sean; Michael Allen (allenmc@cdmsmith.com)
Subject: Re: 69 Wilhelm Trucking Work Plan

Hi Jim-

Please see EPA's draft comments on the workplan. Please call or email if you have questions. Thanks.

Eva

From: ORR Jim <orr.jim@deq.state.or.us>
Sent: Thursday, July 9, 2015 10:06 AM
To: Sheldrake, Sean; DeMaria, Eva; LIVERMAN Alex; 'Scheffler, Linda'
Subject: 69 Wilhelm Trucking Work Plan

Below is the DEQ FTP link to a work plan for Wilhelm Trucking.

Please let me know your schedule for comment, if needed.

Personal Privacy / Ex. 6

Thank You

Jim Orr
DEQ Northwest Region

700 NE Multnomah St. Suite 600

Portland, Oregon 97232

503-229-5039

To: Cora, Lori[Cora.Lori@epa.gov]
From: Koch, Kristine
Sent: Thur 7/2/2015 6:48:42 PM
Subject: FW: Oregon Hazardous Waste -- pesticide rule -- ARAR question

This one?

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
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From: Cora, Lori
Sent: Monday, May 11, 2015 1:52 PM
To: Anderson, RobinM; Openchowski, Charles
Cc: Koch, Kristine; Sheldrake, Sean
Subject: FW: Oregon Hazardous Waste -- pesticide rule -- ARAR question

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10

P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Vrooman Gary L [mailto:Gary.L.Vrooman@doj.state.or.us]
Sent: Monday, May 11, 2015 8:38 AM
To: Cora, Lori
Subject: RE: Oregon Hazardous Waste -- pesticide rule -- ARAR question

Lori,

Here are DEQ's answers to your questions below.

1) Yes, DEQ would view an in-water CDF complying with substantive ARAR requirements of 404 or MSPRA as meeting the substantive requirements of the HWIR.

2) Not in circumstances where the substantive requirements of the HWIR rule were met as in question 1.

3) DEQ does believe that substantive solid waste requirements are ARARs for CDFs if the CERCLA remedy requirements for the CDFs are not otherwise at least as protective as the solid waste requirements. The substantive requirements DEQ believes might be applicable to a CDF, depending on the other controls established by the CERCLA remedy, are located in OAR Chapter 340 division 093 and 095, including specifically the applicable portions of the following:

-OAR 340-093-0130, Site Characterization Report;

-OAR 340-093-0140, Detailed Plans and Specifications;

-OAR 340-093-0150, Construction Certification;

-OAR 340-093-0170, Cleanup Materials Contaminated with Hazardous Substances;

-OAR 340-093-0190, Wastes Requiring Special Management;

-OAR 340-095-0010, Location Restrictions;

-OAR 340-095-0020, Operating Criteria;

-OAR 340-095-0030, Design Criteria;

-OAR 340-095-0050(1) & (2), Groundwater Monitoring;

-OAR 340-095-0070(2), Closure Requirements.

Please let me know if you need any more information.

Gary Vrooman

Assistant Attorney General

Natural Resources Section

Oregon Department of Justice

971.673.1878.

From: Vrooman Gary L
Sent: Monday, April 13, 2015 4:45 PM
To: 'Cora, Lori'
Subject: RE: Oregon Hazardous Waste -- pesticide rule -- ARAR question

Hi Lori,

We will review this and get back to you.

Gary Vrooman

Assistant Attorney General

Natural Resources Section

Oregon Department of Justice

From: Cora, Lori [mailto:Cora.Lori@epa.gov]
Sent: Monday, April 13, 2015 4:41 PM
To: Vrooman Gary L
Cc: Koch, Kristine; Sheldrake, Sean
Subject: Oregon Hazardous Waste -- pesticide rule -- ARAR question

Hello, Gary. Hope all is well. As EPA continues to develop the Portland Harbor Feasibility Study and the cleanup alternatives, we would like some clarity on DEQ's view of its application of Oregon solid and hazardous waste regulations as they may relate to placement of dredged material in an in-water disposal facility. Attached is previous correspondence we have gotten from DEQ regarding the HWIR rule and its application to dredged material taken from the Arkema site. This correspondence is clear that its hazardous waste characterization and disposal requirements would apply to any upland disposal outside the jurisdiction of a 404 permit or permit under MSPA. But leaves in question whether a CDF authorized by a CERCLA ROD is "subject to a permit that has been issued under Clean Water Act

(CWA) section 404 or the Marine Protection, Research and Sanctuaries Act (MPRSA)". Also, in earlier discussions about the Port of Portland's design of the CDF, DEQ indicated it may see that its solid waste regulations may have some application to an in-water disposal site even though the material being placed in the CDF is contaminated media and would be meeting the substantive criteria of Section 404 of the Clean Water Act.

Our questions are:

1. Does DEQ view an in-water CDF or other type of in-water disposal facility authorized by a CERCLA ROD and designed and constructed to meet the substantive requirements of Section 404 of the Clean Water Act as meeting the substantive conditions of Oregon's HWIR exemption to hazardous waste characterization and disposal requirements? If not, can you explain why not and provide the hazardous waste regulations DEQ would apply to an in-water disposal facility?

2. Would DEQ apply its pesticide residue rule to Arkema dredged sediment if placed in an in-water disposal facility authorized by a CERCLA ROD?

3. What Oregon solid waste regulations, if any, does DEQ believe are applicable or relevant and appropriate to the design and management of an in-water disposal facility selected under a CERCLA ROD?

As EPA is currently considering the screening of technologies, including disposal options, and developing the remedial alternatives for further 7 criteria analysis, we would appreciate your responses as soon as possible, but at least by early May. Thanks. If you have questions or wish to discuss our request, please don't hesitate to call me.

Lori Houck Cora | **Assistant Regional Counsel**
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****

To: Koch, Kristine[Koch.Kristine@epa.gov]; MCCLINCY Matt[MCCLINCY.Matt@deq.state.or.us]
Cc: Cora, Lori[Cora.Lori@epa.gov]; PARRETT Kevin[Parrett.Kevin@deq.state.or.us]; ROICK Tom[ROICK.Tom@deq.state.or.us]; VROOMAN Gary L[Gary.L.VROOMAN@state.or.us]
From: Grandinetti, Cami
Sent: Thur 7/2/2015 3:18:05 PM
Subject: RE: ARARs related to Removal-Fill Program for PDX Harbor

Deliberative Process / Ex. 5

Cami Grandinetti

Program Manager, Remedial Cleanup Program

USEPA

1200 6th Ave, Suite 900

ECL-113

Seattle, Wa. 98101

206-553-8696 (desk)

206-390-8890 (cell)

206-553-0124 (fax)

From: Koch, Kristine
Sent: Wednesday, July 01, 2015 4:18 PM
To: MCCLINCY Matt
Cc: Cora, Lori; Grandinetti, Cami; PARRETT Kevin; ROICK Tom; VROOMAN Gary L
Subject: RE: ARARs related to Removal-Fill Program for PDX Harbor

Matt – That's the deal. If they are not an ARAR, then they are not considered in the remedy. Yes, Lori and Gary will have more discussions, and I'm sure EPA headquarters will weigh in on this, too.

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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From: MCCLINCY Matt [mailto:MCCLINCY.Matt@deq.state.or.us]
Sent: Wednesday, July 01, 2015 3:37 PM
To: Koch, Kristine
Cc: Cora, Lori; Grandinetti, Cami; PARRETT Kevin; ROICK Tom; VROOMAN Gary L
Subject: RE: ARARs related to Removal-Fill Program for PDX Harbor

Thanks Kristine,

I will pass this along. I understand that Lori and Gary will be discussing. The email I sent on the DSL Div. 145 regs was more of a heads up on the substantial costs associated with obtaining the easements and financial assurance required under Div. 145 independent of them being ARARs. It just seems like these costs have the potential to influence the FS remedy evaluation (e.g., dredging instead of capping) in a specific area.

Matt

From: Koch, Kristine [mailto:Koch.Kristine@epa.gov]
Sent: Wednesday, July 01, 2015 1:08 PM
To: MCCLINCY Matt
Cc: Cora, Lori; Grandinetti, Cami
Subject: FW: ARARs related to Removal-Fill Program for PDX Harbor

Matt - We received DSL's list of ARARs through DEQ months ago. We reviewed them and got back to them with what we considered to be ARARs. I'm resending you our specific responses to each of DSL's ARARs as you were provided these originally. I've also attached the ARAR chart from the FS that reflects our conclusions as to what is ARAR. I don't think DSL listed the specific rules DEQ is raising now. They don't sound like ARARs to our HQ and ORC as they are not environmental criteria or standards. If DSL/DEQ wants to submit specific citations to us with an explanation as to why they consider them ARAR, we can consider it but they have not done that to date.

Thanks,

Kristine Koch
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From: Koch, Kristine
Sent: Thursday, January 29, 2015 11:10 AM
To: MCCLINCY Matt; Bensel Lore
Cc: GAINER Tom; Cora, Lori
Subject: RE: ARARs related to Removal-Fill Program for PDX Harbor

Lore,

EPA has reviewed the information provided by the State and we are providing our responses. If you would like to discuss this further, please let us know. We plan to share a draft of Section 2 with the PRP group on Feb 6, so if you would like to discuss before then please let us know.

Thanks,

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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From: MCCLINCY Matt [mailto:MCCLINCY.Matt@deq.state.or.us]
Sent: Thursday, September 04, 2014 4:57 PM
To: Koch, Kristine
Cc: GAINER Tom
Subject: FW: ARARs related to Removal-Fill Program for PDX Harbor

Hi Kristine,

I am sure that this was routed to you, but just in case I am forwarding it.

Matt

From: Bensel Lore [mailto:lore.bensel@state.or.us]
Sent: Monday, August 04, 2014 1:41 PM
To: 'yamamoto.deb@epa.gov'
Cc: LLOYD Diane; BENSEL Lore; GAINER Tom
Subject: ARARs related to Removal-Fill Program for PDX Harbor

Hello Deb,

I was asked to review the Removal-Fill Program and consider whether any provisions of the program should be ARARs for the Portland Harbor Superfund Site.

EPA has already identified three provisions related to Compensatory Wetland or Tidal Waters Mitigation as potential ARARs. CWM applies to wetlands and tidal waters so it will apply to both removal and fill activities in wetlands along the river. Those provisions are OAR 141-085-0685 (Functions and Values), 141-085-0690(4) (CWM Ratios), and 141-085-0710 (Monitoring). See the spreadsheets attached to your email to Kevin Parrett dated July 7, 2014 at 1:29 pm. The authorizing statute and the supporting rules should be added to the list of ARARs, including ORS 196.825(5), OAR 141-085-0510, OAR 141-085-0680, all of OAR 141-085-0690 (not just (4)), OAR 141-085-0695 through 141-085-0705, and OAR 141-085-0715.

OAR 141-085-0765 establishes standards, requirements, criteria, or limitations for Compensatory Non-Wetland/Non-Tidal Waters Mitigation. This rule applies to both removal and fill activities within the Lower Willamette River. Like the rules for CWM, this rule is authorized by ORS 196.825(5). The statute and rule should be added to the list of ARARs.

It is DSL's understanding that there may be one or more mitigation banking opportunities associated with the clean-up. Therefore, the rules related to banking should be added to the list of ARARs. Those provisions are OAR 141-085-0720 through 141-085-0740. In addition, the rule related to in-lieu fee mitigation should be included. It is OAR 141-085-0745.

The river portions of the Portland Harbor Superfund Site are within the planning area of the Lower Willamette River Management Plan (LWRMP). The LWRMP is a rule that is codified at OAR 141-080-0105. It was adopted to set policy for the Removal-Fill Program and the state's proprietary interests. It may be downloaded from http://www.oregon.gov/dsl/DO/docs/lwrmp92.zip. The LWRMP establishes standards, requirements, criteria, or limitations for removal or fill activities within the Lower Willamette River. For example, the LWRMP sets forth general conditions that must be included in all removal or fill permits that authorize activities in the Lower Willamette River. See pages F-15 to 19. OAR 141-080-0105 should be added to the list of ARARs.

Perhaps the most important provisions of the Removal Fill Program are the statute that requires a permit and the statute that states the specific decision criteria. ORS 196.810 requires a permit for any amount of removal or fill in waters of this state when the water is an Essential Indigenous Salmonid Habitat such as the Lower Willamette River. ORS 196.825(1)(a) and (b) set the primary standards for when the Department of State Lands will issue a removal or fill permit in any waters of this state, including in the Lower Willamette River. These statutes should be added to the list of ARARs.

Lore Bensel

Senior Assistant Attorney General

(503) 947-4583

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****

To: Cora, Lori[Cora.Lori@epa.gov]
From: Robinson, Deborah
Sent: Thur 6/18/2015 9:08:27 PM
Subject: RE: PH Communications and Alanna's jury duty

Thank you Lori -

Thanks,

Debbie

==========
From the Desk of:
Debbie Robinson
Tel: 206-553-4961
robinson.deborah@epa.gov

US EPA Region 10, M/S ECL 122, 1200 Sixth Avenue, Suite 900, Seattle, WA 98101

From: Cora, Lori
Sent: Wednesday, June 17, 2015 8:38 AM
To: Robinson, Deborah; Koch, Kristine; Allen, Elizabeth; Conley, Alanna; MacIntyre, Mark; Christopher, Anne; Zhen, Davis; Grandinetti, Cami; Sheldrake, Sean; DeMaria, Eva; Fleming, Sheila
Subject: RE: PH Communications and Alanna's jury duty

Attached are my comments. I think an important points to make that will help explain why broad public comment is not sought during NRRB review are:

NRRB is reviewing the draft feasibility study and a conceptual remedy based on that draft.

The NRRB is a vehicle to get internal peer review in order for EPA to finalize the FS and develop the proposed plan.

The conceptual remedy to be discussed with the NRRB is not a complete proposed cleanup plan, only preliminary ideas about the major components of a cleanup.

Lori Houck Cora | Assistant Regional Counsel
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From: Robinson, Deborah
Sent: Tuesday, June 16, 2015 5:15 PM
To: Koch, Kristine; Allen, Elizabeth; Conley, Alanna; MacIntyre, Mark; Christopher, Anne; Zhen, Davis; Grandinetti, Cami; Sheldrake, Sean; DeMaria, Eva; Cora, Lori; Fleming, Sheila
Subject: PH Communications and Alanna's jury duty

Dear PH team,

Personal Privacy / Ex. 6

An article was published in the online St. John's Review, expressing some concerns about the public having the time and room for feedback to EPA. There are a couple of factual errors. I spoke with Alanna and am in touch with Mark about our response, which is likely to be that we comment on the article with some information about how the public has input. I am attaching my notes on the response – if you see errors or problems, please be sure Mark gets them.

Thanks,

Debbie

==========
From the Desk of:
Debbie Robinson
Tel: 206-553-4961
robinson.deborah@epa.gov

US EPA Region 10, M/S ECL 122, 1200 Sixth Avenue, Suite 900, Seattle, WA 98101

To: Cora, Lori[Cora.Lori@epa.gov]
From: Koch, Kristine
Sent: Sat 6/13/2015 2:33:24 AM
Subject: FW: Final LW 2015 Summer Handout (see updated handout from Barbara, Personal Privacy / Ex. 6
Personal Privacy / Ex. 6
LWG 2015 Summer handout final 6-12-15.pdf

FYI…

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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From: Conley, Alanna
Sent: Friday, June 12, 2015 6:15 PM
To: Grandinetti, Cami; Koch, Kristine
Cc: Allen, Elizabeth; Christopher, Anne; Sheldrake, Sean
Subject: FW: Final LW 2015 Summer Handout (see updated handout from Barbar Personal Privacy / Ex. 6
Personal Privacy / Ex. 6

Hello all, Barbara shared an updated handout, see her message below. I reiterated EPA's plans to discuss on June 17th during the Senior Exec meeting.

Please note: I have jury duty on Monday and Tuesday. Will catch up with everyone Wednesday.

From: Barbara Smith [mailto:barbara@harrisandsmith.com]
Sent: Friday, June 12, 2015 4:44 PM
To: Conley, Alanna

Cc: MacIntyre, Mark; Jennifer Woronets (jworonets@anchorqea.com); 'Jim McKenna '
Subject: Final LW 2015 Summer Handout

Alanna – attached is the final version of the LWG 2015 Summer Handout. We reviewed the EPA suggested comments and made a few adjustments but we added a footer which clearly identifies this handout as reflecting the opinions and positions of the LWG and not EPA. We understand EPA Senior Managers will bring this up with LWG Senior Managers at the June 17 meeting. However, the attached has been approved by LWG Exec so it is considered final by the LWG.

Best Regards,

Barbara

Barbara J. Smith

Harris & Smith Public Affairs

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www.harrisandsmith.com

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To: Cora, Lori[Cora.Lori@epa.gov]
From: Lori Cora
Sent: Tue 12/16/2014 11:23:15 PM
Subject: Infant breastmilk pathway
Shorebird Assessment.doc
20080423 FINAL Attachment 1 Breastfeeding Summary.xls
SourceCSMOutline.doc
20080423 Final Draft Breastmilk Issue Memo for Yamamoto.doc
20080515 Breast Milk Pathway Comments of Peer Reviewers for the Housatonic HHRA.doc
EPA Response to LWG Data Lockdown Proposal.doc
20080428 FINAL Attachment 2 Draft Proposed Approach for LWG Breastfeeding and Health Consultation .doc

Lori Houck Cora | Assistant Regional Counsel
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----- Forwarded by Lori Cora/R10/USEPA/US on 12/16/2014 03:22 PM -----

From: Michael Cox/R10/USEPA/US
To: Allison Hiltner/R10/USEPA/US@EPA, Chip Humphrey/R10/USEPA/US@EPA, Dana Davoli/R10/USEPA/US@EPA, Deb Yamamoto/R10/USEPA/US@EPA, Eric Blischke/R10/USEPA/US@EPA, Laura Castrilli/R10/USEPA/US@EPA, Lon Kissinger/R10/USEPA/US@EPA, Lori Cohen/R10/USEPA/US@EPA, Lori Cora/R10/USEPA/US@EPA, Marc Stifelman/R10/USEPA/US@EPA, Marcia Bailey/R10/USEPA/US@EPA, Sheila Eckman/R10/USEPA/US@EPA,
Date: 05/01/2008 10:00 AM
Subject: Breast Milk Pathway for Human Health RA

(See attached file: 20080428 FINAL Attachment 2 Draft Proposed Approach for LWG Breastfeeding and Health Consultation .doc)(See attached file: 20080423 FINAL Attachment 1 Breastfeeding Summary.xls)(See attached file: 20080423 Final Draft Breastmilk Issue Memo for Yamamoto.doc)

The purpose of this meeting is to discuss the breast milk pathway for Human Health Risk Assessment. The issue has come up in Portland Harbor but we need to discuss on wider scale its applicability to other sites. We will get an agenda out prior to the meeting. If you have any suggestions for agenda topics please forward.
----- Forwarded by Lori Cora/R10/USEPA/US on 12/16/2014 03:22 PM -----

From: Eric Blischke/R10/USEPA/US
To: Burt Shephard/R10/USEPA/US@EPA, Chip Humphrey/R10/USEPA/US@EPA, GAINER Tom <GAINER.Tom@deq.state.or.us>, Gina Grepo-Grove/R10/USEPA/US@EPA, Jennifer L Peterson <PETERSON.Jenn@deq.state.or.us>, jeremy_buck@fws.gov, anderson.jim@deq.state.or.us, Joe Goulet/R10/USEPA/US@EPA, Judy Smith/R10/USEPA/US@EPA, Kristine Koch/R10/USEPA/US@EPA, MCCLINCY Matt <MCCLINCY.Matt@deq.state.or.us>, POULSEN Mike <POULSEN.Mike@deq.state.or.us>, Rene Fuentes/R10/USEPA/US@EPA, Robert.Neely@noaa.gov, Sean Sheldrake/R10/USEPA/US@EPA, tomd@ctsi.nsn.us, rose@yakama.com, erin.madden@gmail.com, jay.field@noaa.gov, Lori Cora/R10/USEPA/US@EPA, Mark Ader/R10/USEPA/US@EPA, audiehuber@ctuir.com, Lisa.Bluelake@grandronde.org, Sheila Fleming/R10/USEPA/US@EPA, Benjamin Shorr <Benjamin.Shorr@noaa.gov>, LavelleJM@cdm.com, Mary.Baker@noaa.gov,

Michael.Karnosh@grandronde.org, David.G.Farrer@state.or.us, dallen@stratusconsulting.com, jpeers@stratusconsulting.com, Bob Dexter <bob@ridolfi.com>, cunninghame@gorge.net, JMalek@parametrix.com, nancy.munn@noaa.gov, jweis@hk-law.com, Brad Hermanson <bhermanson@parametrix.com>, frenchrd@cdm.com, ryan@davissudbury.com, Judy Smith/R10/USEPA/US@EPA, genevieve.angle@noaa.gov, TARNOW.Karen@deq.state.or.us, Jessica.Winter@noaa.gov, mspence@parametrix.com, Elizabeth Allen/R10/USEPA/US@EPA, colin@ridolfi.com, AEbbets@stratusconsulting.com,
Cc: Karl Gustavson/DC/USEPA/US@EPA, Deb Yamamoto/R10/USEPA/US@EPA
Date: 11/30/2010 01:15 PM
Subject: Project Update and TCT Agenda

We will be having a TCT meeting on Wednesday, December 1st beginning at 9:00 am. In Portland, we will be meeting at DEQ NWR, Conference Room C. The usual TCT number will be available - Personal Privacy / Ex. 6 Personal Privacy / Ex. 6 pass code Personal Privacy / Ex. 6 The project update outlined below will serve as an agenda for the meeting. Sean, Chip and Kristine are in training so I will be doing this solo and there will not be any early action updates unless Sean can break away. I expect that DEQ will do an upland update.

Project Update:

RI and BRA Comment Resolution:

On November, 18, 2010, the LWG sent EPA their responses to the non-directive comments. In general, the comments accurately reflect our agreements and the majority of the comments are considered resolved. However, there are a number of comments that remain outstanding. A summary of these comments and our proposed resolution is described below. At this time, I am unaware of any additional outstanding unresolved comments. However, if anyone has them, please feel free to raise them during the TCT.

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In order to resolve this comment, I developed a CSM outline that summarized the information that we would like to see in the revised CSM (attached). In the comment resolution document, the LWG states that "The LWG feels that additional effort only adds marginal value to the RI and it will add 4-6 weeks to the RI revisions schedule; we therefore do not intend to incorporate the request."

> **Proposed Resolution:** EPA is prepared to direct the LWG to make the requested revisions to the RI report. EPA believes that this comment has been made previously during our review of the Round 2 Report and that our expectations for the RI Report CSM were clear.

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Proposed Resolution: EPA will note that some revisions for clarity will be made.

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Proposed Resolution: EPA is prepared to direct the LWG to present the risks associated with PBDEs in bass and carp tissue. At this point, we have not developed BSAFs or BSARs for PBDEs nor have we considered PBDEs in the food web model. As a result, we do not currently anticipate developing PRGs for PBDEs. However, we would expect that long term monitoring efforts will consider PBDEs.

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Proposed Resolution: EPA will reiterate our expectation that a composite by composite comparison will be performed.

BERA Comment - SLERA/Refined Screen Process: The LWG agreed to revise the description of the SLERA and the Refined Screen and to clearly identify the chemicals that were screened out at each step. It is unclear whether the SLERA and/or the refined screen were performed incorrectly. Jennifer Peterson has stated in her comments on the status of the comment: "Currently, DEQ does not agree with the Refined Screen Process as it is applied to all media. Detection of chemicals in sediment and composites of carp, large scale sucker, northern pike minnow, peamouth, lamprey, mussels, etc can be removed from the screening process. For sediment, it is unclear if the additional consideration of three or more contiguous samples was applied to the screening process before removal. Also, for tissue an individual sample did not produce an HQ>5 it was dropped from further evaluation. This was not a component of the Problem Formulation. We would want to see all samples with HQ>1 carried through. Finally, the criteria of "log Kow>4" should not be applied to tissue. This is meant to be an indicator of bioaccumulation from sediment to tissue, but if a chemical is detected in tissue it needs to be evaluated. The best way to resolve this issue would be to submit the additional Revised Screen documentation for review prior to finalizing comment."

Proposed Resolution: EPA is prepared to agree with the LWG proposed resolution. it is highly unlikely that any chemicals that pose a potentially unacceptable risk to ecological receptors have been screened out during the screening step since maximum concentrations are used for the screening step. It should be noted that EPA performed the SLERA as part of its comments on the Round 2 Report. Although this did not include the incorporation of Round 3 data, it is clear from a review of Attachment 5 that the LWG included the Round 3 data in the screening step. Table 3-6 presents the highest PCB detection in Carp of 25,100 ug/kg which is a round 3 sample. EPA is prepared to agree with the LWG response to present the results more clearly. If there are any issues with the SLERA and/or refined screen, we will be able to identify them at that time.

BERA Comment - Use of BSAFs/BSARs in shorebird calculations: The LWG did not include BSARs to estimate dietary concentrations because they claim that the BSARs had an r squared value below 0.3. However, it is unclear whether BSARs were developed for chemicals that were also modeled using the mechanistic food web model. As a result, it is not possible to evaluate the r squared values for these chemicals. A summary of this issue is attached.

Proposed Resolution: EPA is prepared to direct the LWG to develop BSARs for the purpose of estimating the dietary contribution of invertebrates for shorebirds in areas where empirical invertebrate data is unavailable. This approach is consistent with the problem formulation.

BERA Comment - Include HQs in Summary Tables: EPA commented that HQs should be presented (rather than an "X") in the risk assessment summary tables. The LWG countered that this was a complex endeavor. In order to resolve the comment, EPA provided example tables to the LWG. In the LWG's proposed resolution, the LWG states that "EPA agreed that it is acceptable to present tables summarizing the chemicals with HQs greater than 1.0 using X's (e.g., Tables 7-39, 11-1), so long as subsequent tables summarizing the risks for a receptor group (e.g., Table 7-40) or multiple receptor groups (e.g., Table 11-2) provide sufficient information to characterize the magnitude, extent, and ecological significance of risks. EPA also agreed that HQs are not required for tables showing the results of screening calculations." It is unclear whether this approach is adequate.

Proposed Resolution: EPA will reiterate that HQ's must be presented where it makes sense consistent with the example tables provided to the LWG.

FS Alternative Screening Meetings:

EPA and the LWG scheduled a series of Remedial Action Alternative Screening Meetings for December 7th (FS Tools Meeting) and December 14th (Alternative Screening Meeting). A Fate and Transport Modeling Meeting was also schedule for December 1st. As late as our October 28th Management Team meeting, it appeared that the meetings were on track with advance materials to be delivered on November 18th and November 26th. On November 17th, we were informed by the LWG that they were not ready to have the meetings. We had a detailed discussion with the LWG management team on Friday November 19th. During this meeting, we reaffirmed our desire to have the meetings, that they were critical for keeping the FS on track and that the proposed cancellation was on very short notice. The LWG indicated that they would discuss with their Executive Team on November 24th and get back to us.

On November 29th, Chip and I spoke to Bob Wyatt to see where the LWG was. Bob proposed cancelling the December 7th meeting, and having a limited FS tools meeting on December 14th. This falls far short of our expectations. When pressed about when we would have the Alternative Screening Meeting, Bob was unwilling to commit to a date only saying that the meeting would occur sometime in the first quarter of next year. This approach would not allow us to meet the June 2011 FS delivery date. The LWG claims that they have not been able to complete their internal review of the meeting information that was presented to the LWG by their consultants on November 6th because they have been busy working to resolve the RI and RA comments we submitted back in July. In addition, the LWG is concerned about how unresolved comments on the RA may affect the draft FS. Specific comments include the following:

- Evaluation of PBDEs in fish tissue
- Combining the adult and child exposure scenarios
- Breast milk pathway
- Benthic Risk
- Consideration of all HQ's > 1 in the FS.

For the first three, we have indicated to the LWG that updated PRGs were not needed for the draft FS. For the last two, we have an agreed upon path forward that we are currently pursuing.

At this point, we are looking at ways of keeping the FS on schedule. One option is for the LWG to present an overview of the screening step and the MNR evaluation on December 14th with the goal of giving the government team enough information to provide the LWG with a set of directions for the screening step and have the LWG go ahead and produce the FS for delivery on June 15, 2010. Further discussion with the LWG is expected to take place following the LWG's December 1st executive team meeting. Once we have more information, we develop a updated meeting schedule.

Benthic Risk Evaluation:

On November 4, 2010, we held a meeting with the LWG to develop a path forward for resolving the benthic risk evaluation. Key elements of the discussion included reaching resolution on the hit/no-hit classifications and the application of the two predictive models. A follow-up meeting is scheduled for Wednesday afternoon following the TCT call. In general, I believe that this is on track.

FS Source Tables:

EPA sent out comments on the FS Source Tables last week. The comments on the source tables were primarily developed by DEQ.

Eric

(See attached file: SourceCSMOutline.doc)(See attached file: EPA Response to LWG Data Lockdown Proposal.doc)(See attached file: Shorebird Assessment.doc)

----- Forwarded by Lori Cora/R10/USEPA/US on 12/16/2014 03:22 PM -----

From: Dana Davoli/R10/USEPA/US
To: Deb Yamamoto/R10/USEPA/US@EPA,
Cc: Allison Hiltner/R10/USEPA/US@EPA, Eric Blischke/R10/USEPA/US@EPA, Humphrey.Chip@epamail.epa.gov, Laura Castrilli/R10/USEPA/US@EPA, Lon Kissinger/R10/USEPA/US@EPA, Lori Cohen/R10/USEPA/US@EPA, Lori Cora/R10/USEPA/US@EPA, Marcia Bailey/R10/USEPA/US@EPA, Michael Cox/R10/USEPA/US@EPA
Date: 05/15/2008 03:01 PM
Subject: Re: RESPONSE TO Region 5 Response to Request for Help on Breast Milk as an Exposure Pathway in Risk Assessments

---

Deliberative Process / Ex. 5

Deliberative Process / Ex. 5

----- Forwarded by Dana Davoli/R10/USEPA/US on 05/15/2008 02:23 PM -----

To Margaret McDonough/R1/USEPA/US@EPA

Dana Davoli/R10/USEPA/US

05/15/2008 12:44 PM

cc Eric Blischke/R10/USEPA/US@EPA, Chip Humphrey/R10/USEPA/US@EPA

Subject Breast Milk Pathway

Deliberative Process / Ex. 5

I was hoping to speak with you early next week about these question. Or you can just send me an e-mail.

Thanks for all of your help!

(See attached file: 20080515 Breast Milk Pathway Comments of Peer Reviewers for the Housatonic HHRA.doc)

Deb Yamamoto/R10/USEPA/US

To Eric Blischke, Humphrey.Chip@epamail.epa.gov

Deb Yamamoto/R10/USEPA/US

05/15/2008 01:23 PM

cc Dana Davoli/R10/USEPA/US@EPA, Michael Cox/R10/USEPA/US@EPA, Allison Hiltner/R10/USEPA/US@EPA, Lori Cohen/R10/USEPA/US@EPA, Lon Kissinger/R10/USEPA/US@EPA, Laura Castrilli/R10/USEPA/US@EPA, Marcia Bailey/R10/USEPA/US@EPA, Lori Cora/R10/USEPA/US@EPA

Subject Fw: Region 5 Response to Request for Help on Breast Milk as an Exposure Pathway in Risk Assessments

Eric and Chip,

Below is the first response I've received to a message I sent out to selected Superfund Branch Chiefs asking if they had considered breast milk as an exposure pathway in risk assessment.

Deb

----- Forwarded by Deb Yamamoto/R10/USEPA/US on 05/15/2008 01:18 PM -----

To Deb Yamamoto/R10/USEPA/US@EPA

THOMAS SHORT/R5/USEPA/US

05/15/2008 09:25 AM

cc Wendy Carney/R5/USEPA/US@EPA

Subject Fw: Request for Help on Breast Milk as an Exposure Pathway in Risk Assessments in your Region

Good morning Deb. Below is a response from Milt Clarke our senior scientist/toxicologist here in Region 5's SF program. He's been involved in sediment risk issues for a very long time.

Tom

----- Forwarded by THOMAS SHORT/R5/USEPA/US on 05/15/2008 11:23 AM -----

To THOMAS SHORT/R5/USEPA/US@EPA

Milt Clark/R5/USEPA/US

cc

05/15/2008 11:21 AM

Subject Re: Fw: Request for Help on Breast Milk as an Exposure Pathway in Risk Assessments in your Region

Tom,

Deliberative Process / Ex. 5

Milt

To: R10-ORA[R10-ORA@epa.gov]
Cc: R10 ECI ECL Editors[R10_ECI_ECL_Editors@epamail.epa.gov]; Barber, Anthony[Barber.Anthony@epa.gov]; Cora, Lori[Cora.Lori@epa.gov]; Kelly, Joyce[Kelly.Joyce@epa.gov]; Werntz, James[Werntz.James@epa.gov]; Fleming, Sheila[fleming.sheila@epa.gov]; Eaton, Thomas[Eaton.Thomas@epa.gov]; Philip, Jeff[Philip.Jeff@epa.gov]; Hastings, Janis[Hastings.Janis@epa.gov]; R10-ECL Mail Group[R10-ECL_Mail_Group@epamail.epa.gov]; Kelly, Kate[kelly.kate@epa.gov]; Murchie, Peter[Murchie.Peter@epa.gov]
From: Lori Cohen
Sent: Fri 11/14/2014 1:49:48 AM
Subject: ECL's Weekly for 11/13/2014

*** Internal Use Only ***

Subject: **Weekly Report for the week of 11/13/2014 for ECL**

To: R10-ORA@epa.gov

CC: R10 ECI ECL Editors; Anthony Barber/R10/USEPA/US; Lori Cora/R10/USEPA/US; Allyn Stern/R10/USEPA/USDianne Soderlund/R10/USEPA/US; Joyce Kelly/R10/USEPA/US; James Werntz/R10/USEPA/US; Sheila Fleming/R10/USEPA/US; Thomas Eaton/R10/USEPA/US; Jeff Philip/R10/USEPA/US; Janis Hastings/R10/USEPA/US; R10-ECL Mail Group; Kate Kelly/R10/USEPA/US; Peter Murchie/R10/USEPA/US@EPA

OD & AD TRAVEL/SIGNIFICANT LEAVE:

HOT TOPICS

This Week:

Nonresponsive

Nonresponsive

Nonresponsive

Portland Harbor (Portland, OR): Members from the Portland Harbor team and management at EPA provided a briefing to Win Porter, former AA at EPA who is now working as a consultant for the Port of Portland. The briefing went well and Win was appreciative of the information.

Upcoming:

Nonresponsive

Nonresponsive

To: Anderson, RobinM[Anderson.RobinM@epa.gov]
Cc: Cora, Lori[Cora.Lori@epa.gov]; Boyd, Andrew[Boyd.Andrew@epa.gov]; Yamamoto, Deb[Yamamoto.Deb@epa.gov]
From: Grandinetti, Cami
Sent: Tue 10/14/2014 11:00:46 PM
Subject: Prep for ASTSWMO meeting
Alaskan ARAR question.docx
HotSpot ARAR Memo.pdf

Robin, I've pulled together information that will hopefully help you with questions/presentations at the upcoming ASTSWMO meeting. I'm forwarding to you information in this email and two attachments. One of the attachments includes a memo prepared by Lori Cora (regional attorney working on the Portland Harbor project) with specific discussion of the Oregon "Hot Spot" regulations. In her memo, she outlines the regulations identified by the state and an analysis of why we think they are not ARARs. I'm still waiting for the attorney to get me something on Alaska, but in the other attachment, I've cut and pasted the Alaskan regulation we've been talking about and specifically highlighted the section we think makes their regs less stringent (or equivalently stringent to CERCLA).

Here are also specific answers to your emailed questions.

For the Oregon Regulations:

Name of Regulation and URL :

Hazardous Waste and Hazardous Materials Remedial Action statute – ORS 465.315(1)(e)

Hazardous Substances Remedial Action Rules – OAR 340-122-0085, 0090, 0115(32) (collectively, all of these rules relate to the identification and assessment of the feasibility to treat/remove "hot spots of contamination" as defined by rule (340-122-0115(32))

When was the regulation promulgated – **I believe 1997 or 1998**

What is the issue that is bringing the standard into question (excerpts of the problem language is useful)

Deliberative Process / Ex. 5

Deliberative Process / Ex. 5

It should be noted, that EPA sent a letter explaining its analysis of the hot spot regulations (not the attached memo) and ODEQ indicated that at least for the Portland Harbor cleanup they agreed it was not ARAR.

Deliberative Process / Ex. 5

For Alaska:

Nonresponsive

Nonresponsive

Cami Grandinetti

Program Manager, Remedial Cleanup Program

USEPA

1200 6th Ave, Suite 900

ECL-113

Seattle, Wa. 98101

206-553-8696 (desk)

206-390-8890 (cell)

206-553-0124 (fax)

To: Cora, Lori[Cora.Lori@epa.gov]
From: Lori Cora
Sent: Wed 9/24/2014 6:49:35 PM
Subject: Fw: Project Update and TCT Agenda
Shorebird Assessment.doc
SourceCSMOutline.doc
EPA Response to LWG Data Lockdown Proposal.doc

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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----- Forwarded by Lori Cora/R10/USEPA/US on 09/24/2014 11:49 AM -----

From: Eric Blischke/R10/USEPA/US
To: Burt Shephard/R10/USEPA/US@EPA, Chip Humphrey/R10/USEPA/US@EPA, GAINER Tom <GAINER.Tom@deq.state.or.us>, Gina Grepo-Grove/R10/USEPA/US@EPA, Jennifer L Peterson <PETERSON.Jenn@deq.state.or.us>, jeremy_buck@fws.gov, anderson.jim@deq.state.or.us, Joe Goulet/R10/USEPA/US@EPA, Judy Smith/R10/USEPA/US@EPA, Kristine Koch/R10/USEPA/US@EPA, MCCLINCY Matt <MCCLINCY.Matt@deq.state.or.us>, POULSEN Mike <POULSEN.Mike@deq.state.or.us>, Rene Fuentes/R10/USEPA/US@EPA, Robert.Neely@noaa.gov, Sean Sheldrake/R10/USEPA/US@EPA, tomd@ctsi.nsn.us, rose@yakama.com, erin.madden@gmail.com, jay.field@noaa.gov, Lori Cora/R10/USEPA/US@EPA, Mark Ader/R10/USEPA/US@EPA, audiehuber@ctuir.com, Lisa.Bluelake@grandronde.org, Sheila Fleming/R10/USEPA/US@EPA, Benjamin Shorr <Benjamin.Shorr@noaa.gov>, LavelleJM@cdm.com, Mary.Baker@noaa.gov, Michael.Karnosh@grandronde.org, David.G.Farrer@state.or.us, dallen@stratusconsulting.com, jpeers@stratusconsulting.com, Bob Dexter <bob@ridolfi.com>, cunninghame@gorge.net, JMalek@parametrix.com, nancy.munn@noaa.gov, jweis@hk-law.com, Brad Hermanson <bhermanson@parametrix.com>, frenchrd@cdm.com, ryan@davissudbury.com, Judy Smith/R10/USEPA/US@EPA, genevieve.angle@noaa.gov, TARNOW.Karen@deq.state.or.us, Jessica.Winter@noaa.gov, mspence@parametrix.com, Elizabeth Allen/R10/USEPA/US@EPA, colin@ridolfi.com, AEbbets@stratusconsulting.com,
Cc: Karl Gustavson/DC/USEPA/US@EPA, Deb Yamamoto/R10/USEPA/US@EPA
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BERA Comment - Assessing Risk at the Individual Sample Scale: EPA specific comment 122 states in part: "Present individual composite risk, not using a 95% UCL concentration." In the response to comments, the LWG agrees to present location specific TRV exceedances for individual samples but also states that the limited spatial extent and/or low magnitude of the HQ exceedance are not necessarily ecologically significant. However the resolution is not clear that a composite by composite evaluation of tissue TRV exceedances will be performed consistent with the Problem Formulation.

Proposed Resolution: EPA will reiterate our expectation that a composite by composite comparison will be performed.

BERA Comment - SLERA/Refined Screen Process: The LWG agreed to revise the description of the SLERA and the Refined Screen and to clearly identify the chemicals that were screened out at each step. It is unclear whether the SLERA and/or the refined screen were performed incorrectly. Jennifer Peterson has stated in her comments on the status of the comment: "Currently, DEQ does not agree with the Refined Screen Process as it is applied to all media. Detection of chemicals in sediment and composites of carp, large scale sucker, northern pike minnow, peamouth, lamprey, mussels, etc can be removed from the screening process. For sediment, it is unclear if the additional consideration of three or more contiguous samples was applied to the screening process before removal. Also, for tissue an individual sample did not produce an HQ>5 it was dropped from further evaluation. This was not a component of the Problem Formulation. We would want to see all samples with HQ>1 carried through. Finally, the criteria of "log Kow>4" should not be applied to tissue. This is meant to be an indicator of bioaccumulation from sediment to tissue, but if a chemical is detected in tissue it needs to be evaluated. The best way to resolve this issue would be to submit the additional Revised Screen documentation for review prior to finalizing comment."

Proposed Resolution: EPA is prepared to agree with the LWG proposed resolution. it is highly unlikely that any chemicals that pose a potentially unacceptable risk to ecological receptors have been screened out during the screening step since maximum concentrations are used for the screening step. It should be noted that EPA performed the SLERA as part of its comments on the Round 2 Report. Although this did not include the incorporation of Round 3 data, it is clear from a review of Attachment 5 that the LWG included the Round 3 data in the screening step. Table 3-6 presents the highest PCB detection in Carp of 25,100 ug/kg which is a round 3 sample. EPA is prepared to agree with the LWG response to present the results more clearly. If there are any issues with the SLERA and/or refined screen, we will be able to identify them at that time.

BERA Comment - Use of BSAFs/BSARs in shorebird calculations: The LWG did not include BSARs to estimate dietary concentrations because they claim that the BSARs had an r squared value below 0.3. However, it is unclear whether BSARs were developed for chemicals that were also modeled using the mechanistic food web model. As a result, it is not possible to evaluate the r squared values for these chemicals. A summary of this issue is attached.

Proposed Resolution: EPA is prepared to direct the LWG to develop BSARs for the purpose of estimating the dietary contribution of invertebrates for shorebirds in areas where empirical invertebrate data is unavailable. This approach is consistent with the problem formulation.

BERA Comment - Include HQs in Summary Tables: EPA commented that HQs should be presented (rather than an "X") in the risk assessment summary tables. The LWG countered that this was a complex endeavor. In order to resolve the comment, EPA provided example tables to the LWG. In the LWG's proposed resolution, the LWG states that "EPA agreed that it is acceptable to present tables summarizing

the chemicals with HQs greater than 1.0 using X's (e.g., Tables 7-39, 11-1), so long as subsequent tables summarizing the risks for a receptor group (e.g., Table 7-40) or multiple receptor groups (e.g., Table 11-2) provide sufficient information to characterize the magnitude, extent, and ecological significance of risks. EPA also agreed that HQs are not required for tables showing the results of screening calculations." It is unclear whether this approach is adequate.

Proposed Resolution: EPA will reiterate that HQ's must be presented where it makes sense consistent with the example tables provided to the LWG.

FS Alternative Screening Meetings:

EPA and the LWG scheduled a series of Remedial Action Alternative Screening Meetings for December 7th (FS Tools Meeting) and December 14th (Alternative Screening Meeting). A Fate and Transport Modeling Meeting was also schedule for December 1st. As late as our October 28th Management Team meeting, it appeared that the meetings were on track with advance materials to be delivered on November 18th and November 26th. On November 17th, we were informed by the LWG that they were not ready to have the meetings. We had a detailed discussion with the LWG management team on Friday November 19th. During this meeting, we reaffirmed our desire to have the meetings, that they were critical for keeping the FS on track and that the proposed cancellation was on very short notice. The LWG indicated that they would discuss with their Executive Team on November 24th and get back to us.

On November 29th, Chip and I spoke to Bob Wyatt to see where the LWG was. Bob proposed cancelling the December 7th meeting, and having a limited FS tools meeting on December 14th. This falls far short of our expectations. When pressed about when we would have the Alternative Screening Meeting, Bob was unwilling to commit to a date only saying that the meeting would occur sometime in the first quarter of next year. This approach would not allow us to meet the June 2011 FS delivery date. The LWG claims that they have not been able to complete their internal review of the meeting information that was presented to the LWG by their consultants on November 6th because they have been busy working to resolve the RI and RA comments we submitted back in July. In addition, the LWG is concerned about how unresolved comments on the RA may affect the draft FS. Specific comments include the following:

- Evaluation of PBDEs in fish tissue
- Combining the adult and child exposure scenarios
- Breast milk pathway
- Benthic Risk
- Consideration of all HQ's > 1 in the FS.

For the first three, we have indicated to the LWG that updated PRGs were not needed for the draft FS. For the last two, we have an agreed upon path forward that we are currently pursuing.

At this point, we are looking at ways of keeping the FS on schedule. One option is for the LWG to present an overview of the screening step and the MNR evaluation on December 14th with the goal of giving the government team enough information to provide the LWG with a set of directions for the screening step and have the LWG go ahead and produce the FS for delivery on June 15, 2010. Further discussion with the LWG is expected to take place following the LWG's December 1st executive team meeting. Once we have more information, we develop a updated meeting schedule.

Benthic Risk Evaluation:

On November 4, 2010, we held a meeting with the LWG to develop a path forward for resolving the benthic risk evaluation. Key elements of the discussion included reaching resolution on the hit/no-hit classifications and the application of the two predictive models. A follow-up meeting is scheduled for Wednesday afternoon following the TCT call. In general, I believe that this is on track.

FS Source Tables:

EPA sent out comments on the FS Source Tables last week. The comments on the source tables were primarily developed by DEQ.

Eric

(See attached file: SourceCSMOutline.doc)(See attached file: EPA Response to LWG Data Lockdown Proposal.doc)(See attached file: Shorebird Assessment.doc)

To: Peterson, Lance[PetersonLE@cdmsmith.com]; Cora, Lori[Cora.Lori@epa.gov]
From: Sheldrake, Sean
Sent: Fri 9/19/2014 9:24:26 PM
Subject: RE: Request for Determination - Arkema Dispute Dated July 3, 2014 for review

Lance, I see my requested delection of the "conclusions" section hasn't been done yet—I think it's redundant and doesn't add anything. If you could make that change along with Lori's further edits, that would be great. S

Sean Sheldrake, Unit Diving Officer, RPM

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http://www.epa.gov/region10/dive/

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From: Peterson, Lance [mailto:PetersonLE@cdmsmith.com]
Sent: Friday, September 19, 2014 2:18 PM
To: Sheldrake, Sean; Cora, Lori
Subject: FW: Request for Determination - Arkema Dispute Dated July 3, 2014 for review

Sean and Lori, attached is the Arkema revision. The cover letter needs review. Also please note the Exhibit 1 2005 AOC/SOW is not signed (taken from the EPA web site). Regarding Lori's comments on data sets not collected under an EPA approved work plan, I had Eric Blischke respond to this as he has quite a bit of history with the project (see below).

Lance

Here is Eric's summary:

There are a number of data sets that have been incorporated into the Portland Harbor RI/FS. These data sets are summarized in Table 2.0-1 of the 2011 Draft Final RI Report (attached). During the development of the Portland Harbor Programmatic Work Plan, it was agreed to use non-LWG data if it met certain QA/QC requirements. Data of adequate quality were classified as Category 1 while data of lessor quality were classified as Category 2. Within Category 1, data were designated as QA 1 or QA2 with QA2 data having a higher level of data validation. As stated in the RI Report: Only Category 1, QA2 data are used in the BHHRA, the BERA, and the determination of background chemical concentrations (Section 7). Both Category 1, QA1 and QA2 data are used to describe the nature and extent of contamination (Section 5) and to evaluate contaminant loading, fate, and transport (Section 6). Category 2 data were generally used for project scoping.

For the FS, other than a February 4, 2011 update, the draft FS dataset is identical to the RI dataset. It is my understanding that all Category 1, QA2 data have been utilized in the FS analyses.

Deliberative Process / Ex. 5

From: Sheldrake, Sean [mailto:sheldrake.sean@epa.gov]
Sent: Friday, September 19, 2014 8:56 AM
To: Cora, Lori; Peterson, Lance
Subject: RE: Request for Determination - Arkema Dispute Dated July 3, 2014 for review

Thanks Lori; sounds like early afternoon for your planning purposes. Lance, please send this one to both of us simultaneously as I'll be waterside at the NOAA campus at that time.

Thank you.

S

Sean Sheldrake, Unit Diving Officer, RPM

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From: Cora, Lori
Sent: Friday, September 19, 2014 8:45 AM
To: Sheldrake, Sean; Lance Peterson (PetersonLE@cdmsmith.com)
Subject: RE: Request for Determination - Arkema Dispute Dated July 3, 2014 for review

We should have a list of Exhibits at the end of the Response document. This all needs more work and massaging. I didn't even really look at your summary list at the end. I'll try to get to that this a.m. and provide any comments. So the faster you all can revise and insert stuff and fill gaps the better to allow me time to further edit.

Lori Houck Cora | **Acting Unit 2 Manager**
U.S. Environmental Protection Agency | Region 10

P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Sheldrake, Sean
Sent: Friday, September 19, 2014 6:59 AM
To: Lance Peterson (PetersonLE@cdmsmith.com); Cora, Lori
Subject: FW: Request for Determination - Arkema Dispute Dated July 3, 2014 for review

Attorney Client / Ex. 5

Lance, be sure to drop "porewater?" from the added language from Lori at the intro as I don't believe we've sampled that media as of yet. Can you let me know when you can get this into one word file to the extent possible with the cover letter, body, any added attachments.?

Thank you.

S

Sean Sheldrake, Unit Diving Officer, RPM

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From: Cora, Lori
Sent: Thursday, September 18, 2014 6:19 PM
To: Sheldrake, Sean
Cc: Lance Peterson (PetersonLE@cdmsmith.com)
Subject: RE: Request for Determination - Arkema Dispute Dated July 3, 2014 for review

Attorney Client / Ex. 5

Lori Houck Cora | Acting Unit 2 Manager
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Sheldrake, Sean
Sent: Thursday, September 18, 2014 3:10 PM
To: Cora, Lori
Cc: Lance Peterson (PetersonLE@cdmsmith.com); Conley, Alanna

Subject: FW: Request for Determination - Arkema Dispute Dated July 3, 2014 for review

Thanks Lance.

Lori, eta on your review of the enclosure? Here's the most recent version with the 11e response updated.

Requested link: **Personal Privacy / Ex. 6**

Alanna, does the embedded schedule match the last publicly advertised version?

I've also placed it on the share here

Thanks all.

S

Sean Sheldrake, Unit Diving Officer, RPM

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http://www.epa.gov/region10/dive/

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From: Peterson, Lance [mailto:PetersonLE@cdmsmith.com]
Sent: Thursday, September 18, 2014 3:02 PM
To: Sheldrake, Sean
Subject: RE: Request for Determination - Arkema Dispute Dated July 3, 2014 for review

Sean, per your direction, yesterday's submittal has be reformatted as a cover letter with enclosure. You should confirm the cc: list on the letter. Your request for an edit on the RM11E project is shown in track changes (in the enclosure).

Lance

From: Sheldrake, Sean [mailto:sheldrake.sean@epa.gov]
Sent: Thursday, September 18, 2014 1:08 PM
To: Peterson, Lance
Subject: FW: Request for Determination - Arkema Dispute Dated July 3, 2014 for review

Lance, So if you could reformat with cover letter and enclosure, that would be much appreciated. Thank you! S

Sean Sheldrake, Unit Diving Officer, RPM

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From: Cora, Lori
Sent: Thursday, September 18, 2014 1:03 PM
To: Sheldrake, Sean
Subject: RE: Request for Determination - Arkema Dispute Dated July 3, 2014 for review

Yes.

Lori Houck Cora | Acting Unit 2 Manager
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Sheldrake, Sean
Sent: Thursday, September 18, 2014 11:36 AM
To: Cora, Lori
Cc: Lance Peterson (PetersonLE@cdmsmith.com)
Subject: RE: Request for Determination - Arkema Dispute Dated July 3, 2014 for review

Understood, thanks for that clarification Lori. So the cover letter would be a letter from Shawn to Rick, correct? S

Sean Sheldrake, Unit Diving Officer, RPM

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From: Cora, Lori
Sent: Thursday, September 18, 2014 11:29 AM
To: Sheldrake, Sean
Cc: Lance Peterson (PetersonLE@cdmsmith.com)
Subject: RE: Request for Determination - Arkema Dispute Dated July 3, 2014 for review

Hi, Sean and Lance. I will start reviewing this now, but I don't think this response all should be in a letter. We typically respond in more of a quasi-brief format, with a cover letter that Shawn would sign. So Lance don't change the format yet, the memo my be fine.

Lori Houck Cora | Acting Unit 2 Manager
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Sheldrake, Sean
Sent: Wednesday, September 17, 2014 4:10 PM
To: Cora, Lori
Cc: Lance Peterson (PetersonLE@cdmsmith.com); Koch, Kristine; Conley, Alanna
Subject: FW: Request for Determination - Arkema Dispute Dated July 3, 2014 for review

Lori, to start your review.

Kristine, Alanna, is this the latest schedule that is referenceable?

Lance, the 11E response needs to be recast—point out the data is not being included in the FS, that we started talking about it much earlier, and that we are also offering them an opportunity to do sampling, just not right now. The 11E work was proposed over a year before LSS starting talking about this work, things have changed, etc.

Letter needs to be reformatted as a letter from Blocker to Rick not memo.

Delete conclusions regarding disputed items—our responses line by line are enough.

Thank you.

S

Sean Sheldrake, Unit Diving Officer, RPM

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http://www.epa.gov/region10/dive/

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From: Peterson, Lance [mailto:PetersonLE@cdmsmith.com]
Sent: Wednesday, September 17, 2014 3:55 PM
To: Sheldrake, Sean
Subject: FW: Request for Determination - Arkema Dispute Dated July 3, 2014

Sean, attached is a draft EPA position on the Arkema dispute. We were not sure about the format; the draft follows something put together for one of the previous Arkema disputes. The rebuttal text is italicized for clarity. We can modify/edit after EPA review. Also, we believe the embedded PH schedule is the most current "public" version but that should be checked.

Lance

From: Eron Dodak [mailto:edodak@integral-corp.com]
Sent: Friday, September 12, 2014 7:02 PM
To: 'albright.rick@epa.gov'
Cc: 'Sheldrake, Sean'; Cora, Lori; Alex Liverman (liverman.alex@deq.state.or.us); Allen, Elizabeth; audiehuber@ctuir.com; bayuk.dana@deq.state.or.us; schwarz.bob@deq.state.or.us; bob@ridolfi.com; callie@ridolfi.com; Coffey, Scott; Conley, Alanna; Cora, Lori; cunninghame@gorge.net; Dan Hafley (HAFLEY.Dan@deq.state.or.us); erin.madden@gmail.com; Fuentes, Rene; Gail Fricano (gfricano@indecon.com); Genevieve Angle - NOAA-NMFS (Genevieve.Angle@noaa.gov); Gustavson, Karl; Holly Partridge (Holly.Partridge@grandronde.org); jd@williamsjohnsonlaw.com; Jen Kassakian (jkassakian@indecon.com); Jeremy_Buck@fws.gov; johnson.keith@deq.state.or.us; jweis@hk-law.com; King, Todd W.; Kristin Callahan; Koch, Kristine; Peterson, Lance; mcclincy.matt@deq.state.or.us; tosm@yakamafish-nsn.gov; Michael.karnosh@grandronde.org; Muza, Richard; nancy.munn@noaa.gov; peterson.Jennifer@deq.state.or.us; poulsen.mike@deq.state.or.us; Rachel DelVecchio (rdelvecchio@indecon.com); Robert.Neely@noaa.gov; rose@yakamafish-nsn.gov; Penoyar, Susan; ted_buerger@fws.gov; tomd@ctsi.nsn.us; Tom Gainer (gainer.tom@deq.state.or.us); David Livermore; erik.ipsen@erm.com; Karen TRAEGER; Stephen T. Parkinson - Arkema (SParkinson@jzplaw.com); Todd SLATER; 'Fred WOLF'; Blocker, Shawn; Yamamoto, Deb; David Livermore; Bridgette DeShields
Subject: Request for Determination - Arkema Dispute Dated July 3, 2014

Mr. Albright -

On behalf of LSS, agent for Arkema Inc., please find attached the Request for Determination by EPA Region 10's Director of the Office of Environmental Cleanup re: Arkema Dispute dated July 3, 2014. The attachments and exhibits to this letter are too large to email. They can be downloaded by clicking on the following link: Personal Privacy / Ex. 6
Personal Privacy / Ex. 6

Please contact Todd Slater at 610-594-4430 or me at 503-943-3614 if you have any questions or difficulty accessing the letter and attachments/exhibits. Thank you for your consideration of this matter.

Eron

Eron J. Dodak, R.G., L.H.G. | Managing Hydrogeologist

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319 SW Washington Street, Suite 1150 | Portland, OR 97204

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HEALTH **ENVIRONMENT** TECHNOLOGY SUSTAINABILITY

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UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION 10

IN THE MATTER OF:	)	ADMINISTRATIVE ORDER ON
	)	CONSENT FOR REMOVAL ACTION
	)	
Portland Harbor Superfund Site	)	U.S. EPA Region 10
Arkema Inc. Facility	)	CERCLA Docket No.
Portland, Oregon	)	
	)	
	)	Proceeding Under Sections 104,
Arkema Inc.	)	106(a), 107 and 122 of the
a Pennsylvania Corporation	)	Comprehensive Environmental
	)	Response, Compensation, and
Respondent.	)	Liability Act, as amended, 42 U.S.C.
	)	§§ 9604, 9606(a), 9607 and 9622
	)	

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I. JURISDICTION AND GENERAL PROVISIONS

1. This Administrative Order on Consent (Order) is entered into voluntarily by the United States Environmental Protection Agency, Region 10 (EPA) and Arkema Inc. (Respondent). This Order provides for the performance of a non-time-critical removal action by Respondent and the reimbursement of response costs incurred by the United States and Tribal Governments at or in connection with the removal action at Arkema Inc.'s facility, located at 6400 NW Front Avenue, Portland, Oregon, which is partly within the currently known boundaries of the Portland Harbor Superfund Site Assessment Area in Portland, Oregon.

2. This Order is issued under the authority vested in the President of the United States by Sections 104, 106(a), 107 and 122 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 U.S.C. §§ 9604, 9606(a), 9607 and 9622, as amended (CERCLA).

3. EPA has notified the State of Oregon Department of Environmental Quality (DEQ) of this action pursuant to Section 106(a) of CERCLA, 42 U.S.C. § 9606(a).

4. EPA and Respondent recognize that this Order has been negotiated in good faith and that the actions undertaken by Respondent in accordance with this Order do not constitute an admission of any liability. Respondent does not admit, and retains the right to controvert in any subsequent proceedings, other than proceedings to implement or enforce this Order, the validity of the findings of fact, conclusions of law, and determinations in Sections IV and V of this Order. Respondent agrees: (1) to undertake all Work required by this Order and comply with and be bound by the terms of

this Order, subject to the dispute resolution process, and; (2) further agrees that it will not contest EPA's authority to issue or enforce this Order, or the basis or validity of this Order or its terms as an EPA jurisdictional matter.

5. EPA has entered into a Memorandum of Understanding for the Portland Harbor Site (the "MOU") with, among others, the Confederated Tribes and Bands of the Yakama Nation, the Confederated Tribes of the Grand Ronde Community of Oregon, the Confederated Tribes of Siletz Indians, the Confederated Tribes of the Umatilla Indian Reservation, the Confederated Tribes of the Warm Springs Reservation of Oregon, and the Nez Perce Tribe (collectively, "the Tribal Governments") to acknowledge the federal government's consultation requirements concerning the Portland Harbor Superfund Site, and to ensure the Tribal Governments' participation in the response actions at the Portland Harbor Superfund Site, including early actions.

6. The Tribal Governments have treaty-reserved rights and resources and other rights, interests, or resources in the Site. The National Oceanic and Atmospheric Administration, the United States Department of the Interior, the Oregon Department of Fish & Wildlife, and the Tribal Governments are designated Natural Resource Trustees overseeing the assessment of natural resource damages at the Site. To the extent practicable, and if consistent with the objectives of the removal action, the work under this Order will be conducted so as to be coordinated with any natural resource damage assessment and restoration of the Portland Harbor Superfund Site. The Tribal Governments and the federal and state Natural Resource Trustees will be provided an opportunity to review and comment on plans, reports, and other deliverables submitted by Respondent to EPA under this Order.

7. EPA and DEQ have agreed to share responsibility for investigation and cleanup of the Portland Harbor Superfund Site. DEQ is the lead agency for conducting upland work necessary for source control, and EPA is the support agency for that work. EPA is lead agency for conducting in-water work, including coordination of EPA's lead work with DEQ's source identification and source control activities. DEQ is the support agency for EPA's in-water work. DEQ will be provided an opportunity to review and comment on plans, reports, and other deliverables that Respondent submits to EPA under this Order. EPA will determine when sources have been controlled sufficiently for the selected removal action to be implemented under this Order. Upon entering into this Order, EPA will use best efforts to coordinate with DEQ to minimize duplication of work or inconsistencies between the removal action and the Upland Source Control Action.

8. To the extent practicable and consistent with the objectives of this removal action, the work under this Order will be coordinated with work implemented under the Administrative Order on Consent for Remedial Investigation and Feasibility Study of the Site, dated September 29, 2001, Docket No. CERCLA-10-2001-0240.

II. PARTIES BOUND

9. This Order applies to and is binding upon EPA and upon Respondent and its successors and assigns. Any change in ownership or status of Respondent including, but not limited to, any transfer of assets or real or personal property, shall not alter Respondent's responsibilities under this Order.

10. Respondent shall ensure that its contractors, subcontractors, and representatives receive a copy of this Order prior to performing any work on the project,

and that they comply with this Order. Respondent shall be responsible for any noncompliance with this Order.

III. DEFINITIONS

11. Unless otherwise expressly provided herein, terms used in this Order which are defined in CERCLA or in regulations promulgated under CERCLA shall have the meaning assigned to them in CERCLA or in such regulations. Whenever terms listed below are used in this Order or in the appendices attached hereto and incorporated hereunder, the following definitions shall apply:

a. "Arkema Site" shall mean that portion of the former chemical manufacturing facility, located at 6400 NW Front Avenue, Portland, Multnomah County, Oregon, and areas adjacent to it where hazardous substances or pollutants or contaminants from the facility have been released, disposed of, and/or otherwise come to be located. A map generally depicting the upland portion of the Arkema Site based on current information is attached as Appendix A to this Order.

b. "CERCLA" shall mean the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, 42 U.S.C. §§ 9601, *et seq.*

c. "Day" shall mean a calendar day. In computing any period of time under this Order, where the last day would fall on a Saturday, Sunday, or Federal holiday, the period shall run until the close of business of the next working day.

d. "DEQ" or "State" shall mean the State of Oregon Department of Environmental Quality and any successor departments or agencies thereof.

e. "Effective Date" shall be the effective date of this Order as provided in Section XXX.

f. "Engineering Evaluation/Cost Analysis" (EE/CA) shall have the definition and attributes described in the NCP, as may be modified by this Order.

g. "EPA" shall mean the United States Environmental Protection Agency and any successor departments or agencies of the United States.

h. "Future Response Costs" shall mean all costs of removal action related to this Order incurred by the United States not inconsistent with the National Contingency Plan. Future Response Costs, include, but are not limited to, direct and indirect costs incurred in: scoping, planning, developing and negotiating this Order prior to the Effective Date, and after the Effective Date, reviewing or developing plans, reports and other items pursuant to this Order; verifying the work; coordinating with DEQ, the Tribal Governments, and Natural Resource Trustees regarding the removal action; cooperative agreement or other interagency agreement costs related to the removal action; or otherwise implementing, overseeing, or enforcing this Order, including but not limited to, payroll costs, contractor costs, travel costs, laboratory costs, costs associated with EPA's preparation of any decision documents (including any Action Memoranda or EE/CA approval memo), the costs incurred pursuant to Paragraph 29 (costs and attorneys fees and any monies paid to secure access, including the amount of just compensation), Paragraph 39 (emergency response), and Paragraph 68 (work takeover), as well as any other enforcement activities undertaken by EPA or the U.S. Department of Justice related to this Order and removal action. Future Response Costs shall not include the costs of oversight or data gathered by EPA concerning any other response action or Order

associated with the Portland Harbor Superfund Site. Future Response Costs shall not include costs incurred by any department, instrumentality, or agency of the United States that are not related to overseeing the Work, providing technical or legal support to EPA, or assessing human health issues related to the Arkema Site or this Order.

i. "National Contingency Plan" or "NCP" shall mean the National Oil and Hazardous Substances Pollution Contingency Plan promulgated pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, codified at 40 C.F.R. Part 300, and any amendments thereto.

j. "Interest" shall mean interest at the rate specified for interest on investments of the EPA Hazardous Substance Superfund established by 26 U.S.C. § 9507, compounded annually on October 1 of each year, in accordance with 42 U.S.C. § 9607(a). The applicable rate of interest shall be the rate in effect at the time the interest accrues. The rate of interest is subject to change on October 1 of each year.

k. "Order" shall mean this Administrative Order on Consent and all appendices attached hereto (listed in Section XXIX). In the event of conflict between this Order and any appendix, this Order shall control.

l. "Paragraph" shall mean a portion of this Order identified by an Arabic numeral.

m. "Parties" shall mean EPA and Respondent.

n. "Portland Harbor Superfund Site" shall mean the site in Portland, Multnomah County, Oregon listed on the National Priorities List (NPL) on December 1, 2000. 65 Fed. Reg. 75179-01. The Portland Harbor Superfund Site consists of the areal extent of contamination, including all suitable areas in proximity to the contamination

necessary for implementation of response action, at, from and to the Portland Harbor Superfund Site Assessment Area from approximately River Mile 3.5 to River Mile 9.2 (Assessment Area), including uplands portions of the Site that contain sources of contamination to the sediments at, on, or within the Willamette River. The boundaries of the Site will be initially determined upon issuance of a Record of Decision for the Portland Harbor Superfund Site.

o. "Removal Action Area" or "RAA" shall mean the areal extent of the removal action to be performed under this Order. Areas where sampling and characterization activities, and studies or analysis are necessary are preliminarily within the RAA. The final boundaries of the RAA for implementation of the removal action will be established in the EE/CA. A map illustrating the preliminary boundaries of the RAA based on current information is attached as Appendix A to this Order.

p. "RCRA" shall mean the Solid Waste Disposal Act, as amended, 42 U.S.C. §§ 6901, *et seq.* (also known as the Resource Conservation and Recovery Act).

q. "Section" shall mean a portion of this Order identified by a Roman numeral.

r. "Statement of Work" or "SOW" shall mean the statement of work for implementation of the removal action, as set forth in Appendix B to this Order, and any modifications made thereto in accordance with this Order.

s. "Tribal Response Costs" shall mean all direct and indirect costs that the Tribal Governments and their employees, agents, contractors, consultants and other authorized representatives will incur in coordinating and consulting with EPA in conjunction with EPA's planning and implementation of this Order. Tribal Response costs

are only those costs incurred to fulfill the requirements of this Order, including review of plans, reports, assessments and notes prepared pursuant to this Consent Order; development of common positions and coordination among the Tribes; briefings to tribal leaders and tribal communities; and scoping, planning, and negotiating this Consent Order and budgets, which are not inconsistent with the NCP, 40 C.F.R. Part 300, are authorized as recoverable response costs pursuant to Sections 104 and 107 of CERCLA, 42 U.S.C. §§ 9604 and 9607 and are required to be paid by this Consent Order.

t. "Upland Source Control Action" shall mean the remedial investigation and feasibility study, pilot treatability studies, and remedial source control action(s), whether interim or final, on the Arkema Site, that Arkema Inc. is performing and may perform in the future under a Voluntary Cleanup Agreement with DEQ.

u. "Waste Material" shall mean 1) any "hazardous substance" under Section 101(14) of CERCLA, 42 U.S.C. § 9601(14); 2) any pollutant or contaminant under Section 101(33) of CERCLA, 42 U.S.C. § 9601(33); 3) any "solid waste" under Section 1004(27) of RCRA, 42 U.S.C. § 6903(27); and 4) any "hazardous substance" under ORS 465.200 *et seq.*

v. "Work" shall mean all activities Respondent is required to perform under this Order.

IV. FINDINGS OF FACT

12. EPA finds the following facts which Respondent neither admits nor denies:

a. Respondent, Arkema Inc., (previously known as ATOFINA Chemicals, Inc.), a Pennsylvania Corporation, owns the Arkema Site, located at 6400

NW Front Avenue, Portland, Multnomah County, Oregon. The Arkema Site is adjacent to the Willamette River, at approximately river mile 7.5. A portion of the Arkema Site is within the boundaries of the Portland Harbor Superfund Site Assessment Area. All manufacturing operations have ceased at the facility, and significant demolition of the facility's buildings has occurred.

b. Historical manufacturing operations began in 1941 by Pennsylvania Salt Manufacturing, later known as Pennwalt Corporation. Between 1941 and 2001, various chemicals were produced at the facility, including but not limited to, sodium chlorate, potassium chlorate, chlorine, sodium hydroxide, dichlorodiphenyltrichloroethane (DDT), sodium orthosilicate, magnesium chloride hexahydrate, ammonia, hydrogen, ammonium perchlorate, and hydrochloric acid.

c. In 1990, Pennwalt's operations were combined with those of two other subsidiaries of Elf Aquitaine, and the new combined company was named, Elf Atochem North America, Inc. In 2000, Elf Aquitaine merged with TOTALFINA and formed TOTALFINA ELF and Elf Atochem became ATOFINA Chemicals, Inc. In 2004, ATOFINA Chemicals, Inc. changed its name to Arkema Inc.

d. Waste from the manufacture of DDT that contained DDT, chlorobenzene, and spent sulfuric acid was discharged to a floor drain in the DDT process building from approximately 1947 to 1948. The floor drain is believed to have been connected to a pipe that discharged to the Willamette River. From 1948 until 1954, DDT manufacturing process waste was discharged directly to an unlined on-site settling pond, which was expanded to include a 285-foot overflow trench in 1950. A monochlorobenzene recovery plant was added in 1950. Sodium and ammonium

perchlorate were manufactured at the Arkema Site from 1958 until 1962. Releases of perchlorate occurred during the manufacturing process from the sodium chlorate process area and the ammonium perchlorate process area. Sodium chlorate was manufactured on site from 1941 until 2001. Sodium bichromate, which contains hexavalent chromium, was used in the chlorate manufacturing process. Releases of hexavalent chromium occurred during the manufacture of sodium chlorate in the sodium chlorate process area.

e. Historic operational practices have resulted in releases of hazardous substances in soils, stormwater, groundwater, and Willamette River sediments on and adjacent to portions of the Arkema Site. DDT concentrations exceed 1 part per million (ppm) in groundwater (unfiltered geoprobe sample), 20 ppm in surface sediments, and 1,000 ppm in subsurface sediment which exceed the following screening criteria: the published ecological probable effects level (PEL) of 4,450 parts per billion (ppb) (NOAA, 1999) in sediment and the acute aquatic water quality critieria (AWQC) of 0.55 ppb. DDT and its breakdown products have been found in resident fish species in the Willamette River. Chlorobenzene has been detected in upland monitoring wells at concentrations up to 292 ppm in groundwater and 64 ppm in shallow groundwater under the sediment off the facility, several orders of magnitude above the AWQC for chlorobenzene of 250 ppb. The presence of chlorobenzene (a solvent) in groundwater enables transport of the DDT to sediment and the water column in the Willamette River. Perchlorate in upland monitoring wells at the site has been found in groundwater at concentrations up to 290 ppm and in the shallow groundwater under the sediment at concentrations up to 370 ppm. Recent studies from Texas Tech University indicate adverse ecological effects occur at concentrations of 147 ppb perchlorate. Hexavalent

chromium concentrations exceeded 26 ppm in shallow groundwater (in an unfiltered Geoprobe sample), several orders of magnitude above the AWQC for hexavalent chromium of 16 ppb. The highest groundwater result for hexavalent chromium from an upland monitoring well was 9.79 ppm.

V. CONCLUSIONS OF LAW AND DETERMINATIONS

13. Based on the Findings of Fact set forth above EPA has determined that:

a. The Arkema Site is a "facility" as defined by Section 101(9) of CERCLA, 42 U.S.C. § 9601(9).

b. The contamination found on and adjacent to the Arkema Site, as identified in the Findings of Fact above, includes "hazardous substances" as defined by Section 101(14) of CERCLA, 42 U.S.C. § 9601(14), and/or pollutants or contaminants which may present an imminent and substantial danger to the public health or welfare.

c. Respondent is a "person" as defined by Section 101(21) of CERCLA, 42 U.S.C. § 9601(21).

d. Respondent is a responsible party under Section 107(a) of CERCLA, 42 U.S.C. § 9607(a), and is liable for performance of response action and for response costs incurred and to be incurred for the Arkema Site. Respondent is an "owner" and/or "operator" of the Arkema Site, as defined by Section 101(20) of CERCLA, 42 U.S.C. § 9601(20), and within the meaning of Section 107(a)(1) of CERCLA, 42 U.S.C. § 9607(a)(1); and/or arranged for disposal or treatment, or arranged with a transporter for transport for disposal or treatment of hazardous substances at the facility, within the meaning of Section 107(a)(3) of CERCLA, 42 U.S.C. § 9607(a)(3).

e. The conditions described in the Findings of Fact above constitute an actual or threatened "release" of a hazardous substance from the facility as defined by Section 101(22) of CERCLA, 42 U.S.C.§ 9601(22).

f. The removal action required by this Order is necessary to protect the public health, welfare, or the environment and, if carried out in compliance with the terms of this Order, will be considered consistent with the NCP, as provided in Section 300.700(c)(3)(ii) of the NCP.

g. A planning period of at least six months exists before field activities beyond sampling and related scoping activities required by this Order must be initiated.

VI. ORDER

14. Based upon the foregoing Findings of Fact, Conclusions of Law, Determinations, and the administrative record for the Arkema Site, it is hereby Ordered and Agreed that Respondent shall comply with all provisions of this Order, including, but not limited to, all attachments to this Order and all documents incorporated by reference into this Order.

VII. DESIGNATION OF CONTRACTOR, PROJECT COORDINATOR

15. Respondent shall retain one or more contractors to perform the work and shall notify EPA of the name(s) and qualifications of such contractor(s) within 10 days of the Effective Date. Respondent shall also notify EPA in writing of the name(s) and qualification(s) of any other contractor(s) or subcontractor(s) retained to perform the Work at least 7 days prior to that contractor's or subcontractor's commencement of such Work. EPA retains the right to disapprove any or all of the contractors and/or

subcontractors retained by Respondent. If EPA disapproves a selected contractor, Respondent shall retain a different contractor and shall notify EPA of that contractor's name and qualifications within 10 days of EPA's disapproval.

16. Within 7 days after the Effective Date, Respondent shall designate a Project Coordinator who shall be responsible for administration of all actions by Respondent required by this Order and shall submit to EPA the designated Project Coordinator's name, address, telephone number, and qualifications. To the greatest extent possible, the Project Coordinator shall be present or readily available during field work. EPA retains the right to disapprove the designated Project Coordinator. If EPA disapproves the designated Project Coordinator, Respondent shall retain a different Project Coordinator and shall notify EPA of that person's name, address, telephone number, and qualifications within 10 days following EPA's disapproval. Receipt by Respondent's Project Coordinator of any notice or communication from EPA relating to this Order shall constitute receipt by Respondent.

17. EPA has designated Sean Sheldrake of the Office of Environmental Cleanup (ECL), Region 10, as its Project Coordinator. Except as otherwise provided in this Order, Respondent shall direct all submissions required by this Order to the EPA Project Coordinator at 1200 Sixth Avenue, M/S ECL-111, Seattle, WA 98101 via hardcopy and electronic files to sheldrake.sean@epa.gov. Upon request by EPA, Respondent will also provide submissions on a compact disc.

18. EPA and Respondent shall have the right, subject to Paragraph 16, to change their respective designated Project Coordinator. Respondent shall notify EPA 7

days before such a change is made. The initial notification may be made orally, but shall be promptly followed by a written notice.

VIII. WORK TO BE PERFORMED

19. Respondent shall perform, at a minimum, all actions necessary to implement the Statement of Work (SOW), which is attached as Appendix B.

20. The EPA Guidance on Conducting Non-Time-Critical Removal Actions under Superfund (OSWER Directive 9360.0-32) and any additional relevant guidance shall be followed in implementing the SOW.

21. The removal action will address, at a minimum, the principal threat contamination extending from the top of the riverbank on the Arkema Site into the Willamette River, including unsubmerged and submerged lands. It is anticipated that upland source control action(s) will occur outside of the RAA, but if necessary to reduce the potential of recontamination to the in-water Work or achieve the Removal Action Objectives, the evaluation and implementation of hydraulic control measures will be required in accordance with the process and schedule for evaluation of the uplands source control program as set forth in the SOW. The Removal Action Objectives for this removal are listed in the SOW that is attached as Appendix B to this Order. Additional objectives may be identified for the action through the EE/CA process.

22. For all Work, EPA may approve, disapprove, require revisions to, or modify a deliverable in whole or in part. EPA approvals, requested revisions, or disapprovals will be in writing. If EPA requires revisions, Respondent shall submit a revised deliverable within 30 days of receipt of EPA's notification of the required revisions, unless otherwise noted in the SOW, and subject to Section XVI (Dispute Resolution) of this Order.

Respondent shall implement the work as approved in writing by EPA in accordance with the schedule approved by EPA. Once approved, or approved with modifications, the work and the schedule, and any subsequent modifications, shall be incorporated into and become fully enforceable under this Order.

23. Respondent shall not commence any work except in conformance with the terms of this Order. Respondent shall not commence implementation of the work developed hereunder until after receiving written EPA approval pursuant to Paragraph 22 of this Order.

24. Quality Assurance and Sampling.

a. All sampling and analyses performed pursuant to this Order shall conform to EPA direction, approval, and guidance regarding sampling, quality assurance/quality control ("QA/QC"), data validation, and chain-of-custody procedures. Respondent shall ensure that the laboratory used to perform the analyses participates in a QA/QC program that complies with the appropriate EPA guidance. Respondent shall follow, as appropriate, "Quality Assurance/Quality Control Guidance for Removal Activities: Sampling QA/QC Plan and Data Validation Procedures" (OSWER Directive No. 9360.4-01, April 1, 1990), as guidance for QA/QC and sampling. Respondent shall only use laboratories that have a documented Quality System that complies with ANSI/ASQC E-4 1994, "Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs" (American National Standard, January 5, 1995). A Quality Assurance Project Plan shall be prepared for each sample collection activity in accordance with: (1) "EPA Requirements for Quality Management Plans (QA/R5) (2001)" or the most current version; (2) for data

validation, "Guidance on Environmental Data Verification and Validation, EPA QA/G8 (2002)", or the most current version; and (3) the EPA Functional Guidelines for Data Review. EPA may consider laboratories accredited under the National Environmental Laboratory Accreditation Program ("NELAP") as meeting the Quality System requirements.

b. Upon written request by EPA, Respondent shall have such a laboratory analyze samples submitted by EPA for QA monitoring. Respondent shall provide to EPA the QA/QC procedures followed by all sampling teams and laboratories performing data collection and/or analysis.

c. Upon request by EPA, Respondent shall allow EPA or its authorized representatives to take split and/or duplicate samples. Respondent shall notify EPA not less than 14 days in advance of any sample collection activity, unless shorter notice is agreed to by EPA. EPA shall have the right to take any additional samples that EPA deems necessary. EPA shall use its best efforts to notify Respondent not less than 14 days in advance of any sample collection activity EPA conducts, and allow Respondent to take split or duplicate samples of any samples it takes as part of its oversight of Respondent's implementation of the Work.

25. Reporting.

a. After the Effective Date and until EPA issues a Notice of Completion of Work pursuant to Section XXVIII, Respondent shall submit a written progress report to EPA concerning actions undertaken pursuant to this Order on the fifteenth day of each month, unless otherwise directed in writing by the EPA Project Coordinator. These reports shall describe all significant developments during the

preceding period, including the actions performed and any problems encountered, analytical data received during the reporting period, and the developments anticipated during the next reporting period, including a schedule of actions to be performed, anticipated problems, and planned resolutions of past or anticipated problems.

b. Respondent shall, at least 30 days prior to the conveyance of any interest in the Arkema Site, give: (1) written notice to the transferee that the RAA is subject to this Order; and (2) written notice to EPA of the proposed conveyance, including the name and address of the transferee. Such notices shall be given even if the property transferred is not within the RAA. Respondent shall also, as a condition of the transfer, require that the transferee and its successors comply with Sections IX (Site Access) and X (Access to Information) of this Order unless, based on the specific circumstances of the transfer and/or transferee, EPA determines that conditioning the transfer in that manner is not necessary.

26. Final Removal Completion Report. Within 60 days after completion of all work required by this Order, Respondent shall submit for EPA review and approval a final report summarizing the actions taken to comply with this Order. The final report shall conform, at a minimum, with the requirements set forth in Section 300.165 of the NCP entitled "OSC Reports" and with "Superfund Removal Procedures: Removal Response Reporting - POLREPS and OSC Reports" (OSWER Directive No. 9360.3-03, June 1, 1994). The final report shall include a listing of quantities and types of Waste Materials removed off-site or handled on-site, a discussion of removal and disposal options considered for those materials, a listing of the ultimate destination(s) of those materials, a presentation of the analytical results of all sampling and analyses performed,

and accompanying appendices, containing all relevant documentation generated during the removal action (e.g., manifests and permits). The final report shall also include the following certification signed by a person who supervised or directed the preparation of that report:

> "Under penalty of law, I certify that to the best of my knowledge, after appropriate inquiries of all relevant persons involved in the preparation of the report, the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

27. Off-Site Shipments.

a. Respondent shall, prior to any off-site shipment of Waste Material from the RAA under this Order to an out-of-state waste management facility, provide written notification of such shipment of Waste Material to the appropriate state environmental official in the receiving facility's state and to the EPA Project Coordinator. However, this notification requirement shall not apply to any off-site shipments when the total volume of all such shipments will not exceed 10 cubic yards.

i. Respondent shall include in the written notification the following information: 1) the name and location of the facility to which the waste material is to be shipped; 2) the type and quantity of the waste material to be shipped; 3) the expected schedule for the shipment of the Waste Material; and 4) the method of transportation. Respondent shall notify the state in which the planned receiving facility is located of major changes in the shipment plan, such as a decision to ship the waste material to another facility within the same state, or to a facility in another state.

ii. The identity of the receiving facility and state will be determined by Respondent following the award of the contract for the removal action.

Respondent shall provide the information required by Paragraph 27(a) and 27(b) as soon as practicable after the award of the contract and before the Waste Material is actually shipped.

b. Before shipping any hazardous substances, pollutants, or contaminants from the RAA to an off-site location, Respondent shall obtain EPA's certification that the proposed receiving facility is operating in compliance with the requirements of CERCLA Section 121(d)(3), 42 U.S.C. § 9621(d)(3), and 40 C.F.R. § 300.440. Respondent shall only send hazardous substances, pollutants, or contaminants from the RAA to an off-site facility that complies with the requirements of the statutory provision and regulation cited in the preceding sentence.

IX. ACCESS/INSTITUTIONAL CONTROLS

28. If any portion of the RAA, or any other property where access is needed to implement this Order, is owned or controlled by Respondent, Respondent shall, commencing on the Effective Date, provide EPA and DEQ, their representatives, including contractors or agents, with access at all reasonable times to the RAA, or such other property, for the purpose of conducting any activity related to this Order. Respondent shall, commencing on the Effective Date and, after reasonable advance notice unless accompanied by EPA or DEQ, provide the designated representatives of the Tribal Governments, and Natural Resource Trustees, and their representatives, including contractors, with access at all reasonable times to the RAA, or such other property, for the purpose of consulting on the Work required under this Order or, in the case of cultural resource issues, overseeing the Work required under this Order. All government agencies or governments will use their best efforts to notify Respondent before they intend to

access the RAA or such other property, but advance notice is not a condition for Respondent's agreement to provide access. All government agency and Tribal Government representatives, will be responsible for adhering to their health and safety protocols, and any specific precautions Respondent provides. If, during or after the removal action is complete, restrictions on the use of Respondent's property, including beds or banks of the river, is necessary to protect public health, welfare, or the environment or maintain the removal action or avoid exposure to hazardous substances, pollutants or contaminants, Respondent shall take any and all actions to establish, implement, and maintain the necessary institutional controls. Respondent shall establish, implement, and maintain the necessary institutional controls on the schedule and for the duration determined necessary by EPA before or after the EE/CA and/or any subsequent work plans or reports developed under this Order.

29. Where any action under this Order is to be performed on property or in areas owned by or in possession of someone other than Respondent, Respondent shall use best efforts to obtain all necessary access agreements within 45 days after EPA notifies Respondent that such access is needed. The access agreements shall provide access to EPA, DEQ, the Tribal Governments, and Natural Resource Agencies to the same extent as provided in Paragraph 28 above. If, during or after the removal action is complete, restrictions on the use of property are necessary and such property is owned by or in the possession of someone other than Respondent, Respondent shall use best efforts to establish and implement controls it has the capability of implementing, or have such use restrictions established and implemented by the owner. Respondent shall notify EPA if, after using its best efforts, it is unable to obtain access agreements or use restrictions. In

such notice, Respondent shall describe in writing its efforts to obtain access or the use restrictions. For purposes of this Paragraph, "best efforts" includes the payment of reasonable sums of money in consideration of access or loss of use unless EPA has determined the off-site property owner is a potentially responsible party under Section 107(a) of CERCLA for the Portland Harbor Superfund Site. EPA may then assist Respondent in gaining access or establishing use restrictions, to the extent necessary to effectuate the response action or maintain it as described herein, using such means as EPA deems appropriate. Respondent shall reimburse EPA for all costs and attorney's fees incurred by the United States in obtaining such access or use restrictions, in accordance with the procedures in Section XV (Payment of EPA and Tribal Response Costs).

30. Notwithstanding any provision of this Order, EPA retains all of its access authorities and rights, as well as all of its rights to require land/water use restrictions, including enforcement authorities related thereto, under CERCLA, RCRA, and any other applicable statutes or regulations.

X. ACCESS TO INFORMATION

31. Respondent shall provide copies to EPA, upon request, of all documents and information within its possession or control or that of its contractors or agents relating to the Arkema Site or to the implementation of this Order, including, but not limited to, sampling, analysis, chain-of-custody records, manifests, trucking logs, receipts, reports, sample traffic routing, correspondence, or other documents or information related to the Work. Respondent shall also make available to EPA, upon request, for purposes of investigation, information gathering, or testimony, their

employees, agents, or representatives with knowledge of relevant facts concerning the performance of the Work.

32. Respondent may assert business confidentiality claims covering part or all of the documents or information submitted to EPA under this Order, to the extent permitted by and in accordance with Section 104(e)(7) of CERCLA, 42 U.S.C. § 9604(e)(7), and 40 C.F.R. § 2.203(b). Documents or information determined to be confidential by EPA will be afforded the protection specified in 40 C.F.R. Part 2, Subpart B. If no claim of confidentiality accompanies documents or information when they are submitted to EPA, or if EPA has notified Respondent that the documents or information are not confidential under the standards of Section 104(e)(7) of CERCLA or 40 C.F.R. Part 2, Subpart B, the public may be given access to such documents or information without further notice to Respondent.

33. Respondent may assert that certain documents, records and other information are privileged under the attorney-client privilege or any other privilege recognized by federal law. If Respondent asserts such a privilege in lieu of providing documents, it shall provide EPA with the following: 1) the title of the document, record, or information; 2) the date of the document, record, or information; 3) the name and title of the author of the document, record, or information; 4) the name and title of each addressee and recipient; 5) a description of the contents of the document, record, or information; and 6) the privilege asserted by Respondent. However, no documents, reports or other information required to be created or generated by this Order shall be withheld on the grounds that they are privileged.

34. No claim of confidentiality shall be made with respect to any data, including, but not limited to, all sampling, analytical, monitoring, hydrogeologic, scientific, chemical, or engineering data, or any other documents or information evidencing conditions at or around the Arkema Site.

XI. RECORD RETENTION

35. Until 10 years after Respondent's receipt of EPA's notification pursuant to Section XXVIII (Notice of Completion of Work), Respondent shall preserve and retain all non-identical copies of records and documents (including records or documents in electronic form) now in its possession or control or which come into its possession or control that relate in any manner to the performance of the work or the liability of any person under CERCLA with respect to the RAA, regardless of any internal retention policy to the contrary unless Respondent has received EPA's written permission to destroy such documents. Until 10 years after Respondent's receipt of EPA's notification pursuant to Section XXVIII (Notice of Completion of Work), Respondent shall also instruct its contractors and agents to preserve all documents, records, and information of whatever kind, nature or description relating to performance of the Work.

36. At the conclusion of this document retention period, Respondent shall notify EPA at least 90 days prior to the destruction of any such records or documents, and, upon request by EPA, Respondent shall deliver any such records or documents to EPA. Respondent may assert that certain documents, records and other information are privileged under the attorney-client privilege or any other privilege recognized by federal law. If Respondent asserts such a privilege, it shall provide EPA with the following: 1) the title of the document, record, or information; 2) the date of the document, record,

or information; 3) the name and title of the author of the document, record, or information; 4) the name and title of each addressee and recipient; 5) a description of the subject of the document, record, or information; and 6) the privilege asserted by Respondent. However, no documents, reports or other information required to be created or generated by this Order shall be withheld on the grounds that they are privileged.

37. Respondent hereby certifies that, to the best of its knowledge and belief, after reasonable inquiry, it has not altered, mutilated, discarded, destroyed or otherwise disposed of any records, documents or other information (other than identical copies) relating to its potential liability regarding the Portland Harbor Superfund Site since receipt of EPA's general notice letter dated December 8, 2000. Respondent hereby agrees that it will fully comply with any and all EPA requests for information pursuant to Sections 104(e) and 122(e) of CERCLA, 42 U.S.C. §§ 9604(e) and 9622(e), and Section 3007 of RCRA, 42 U.S.C. § 6927.

XII. COMPLIANCE WITH OTHER LAWS

38. Respondent shall perform all actions required pursuant to this Order in accordance with all applicable local, state, and federal laws and regulations except as provided in Section 121(e) of CERCLA, 42 U.S.C. § 9621(e), and 40 C.F.R. §§ 300.400(e) and 300.415(j). In accordance with 40 C.F.R. § 300.415(j), all actions required pursuant to this Order shall, to the extent practicable, as determined by EPA, considering the exigencies of the situation, attain applicable or relevant and appropriate requirements (ARARs) under federal environmental, tribal environmental, or state environmental or facility siting laws. No local, state, or federal permit shall be required

for any action conducted entirely on-site, including studies, where such action is selected and carried out in compliance with this Order.

XIII. EMERGENCY RESPONSE AND NOTIFICATION OF RELEASES

39. In the event of any action or occurrence during performance of the Work which causes or threatens to cause a release of Waste Material from the RAA that constitutes an emergency situation or may present an immediate threat to public health or welfare or the environment, as soon as Respondent knows of the emergency or immediate threat Respondent shall immediately take all appropriate action. Respondent shall take these actions in accordance with all applicable provisions of this Order, in order to prevent, abate or minimize such release or endangerment caused or threatened by the release. Respondent shall also immediately notify the EPA Project Coordinator or, in the event of his/her unavailability, the Regional Duty Officer, Environmental Cleanup Office, Emergency Response Unit, EPA Region 10, (206) 553-1263, of the incident or conditions. In the event that Respondent fails to take appropriate response action as required by this Paragraph, and EPA takes such action instead, Respondent shall reimburse EPA all costs of the response action not inconsistent with the NCP pursuant to Section XV (Payment of Response Costs).

40. In addition, in the event of any release of a hazardous substance from the RAA, as soon as Respondent has knowledge of the release, Respondent shall immediately notify the EPA Project Coordinator and the National Response Center at (800) 424-8802. Respondent shall submit a written report to EPA within 7 days after each release, setting forth the events that occurred and the measures taken or to be taken to mitigate any release or endangerment caused or threatened by the release and to

prevent the reoccurrence of such a release. This reporting requirement is in addition to, and not in lieu of, reporting under Section 103(c) of CERCLA, 42 U.S.C. § 9603(c), and Section 304 of the Emergency Planning and Community Right-To-Know Act of 1986, 42 U.S.C. § 11001, *et seq*.

XIV. AUTHORITY OF EPA PROJECT COORDINATOR

41. The EPA Project Coordinator shall be responsible for overseeing Respondent's implementation of this Order. The Project Coordinator shall have the authority vested in an On-Scene Coordinator (OSC) by the NCP, including the authority to halt, conduct, or direct any Work required by this Order, or to direct any other removal action undertaken at the Arkema Site, as well as the authority of a Remedial Project Manager (RPM) as set forth in the NCP. Absence of the EPA Project Coordinator from the Arkema Site shall not be cause for stoppage of work unless specifically directed by the EPA Project Coordinator.

XV. PAYMENT OF EPA AND TRIBAL RESPONSE COSTS

42. Payments for EPA Future Response Costs.

a. Respondent shall pay EPA all Future Response Costs not inconsistent with the NCP. On a periodic basis, EPA will send Respondent a bill requiring payment that includes a certified Agency Financial Management System summary (SCORPIOS) cost summary report or other regionally prepared cost summary. The bill will include Future Response Costs as defined in this Order. Respondent shall make all payments within 60 days of receipt of each bill requiring payment, except as otherwise provided in Paragraph 45 of this Order. Within the 60-day payment period, Respondent may request the following EPA oversight cost documentation: EPA personnel timesheets and/or payroll

reports; travel manager reports; EPA contractor monthly invoices; and all applicable contract laboratory program (CLP) invoices.

b. Respondent shall make all payments to EPA required by this Paragraph by a certified or cashier's check or checks made payable to "EPA Hazardous Substance Superfund-Portland Harbor Special Account," referencing the name and address of the Respondent, the Docket Number of this Order, and EPA Site/Spill ID number 10BX, and shall be clearly designated as Response Costs: Portland Harbor Superfund Site, Arkema Site. Respondent shall send the check(s) to:

Mellon Client Services Center
EPA Region 10
ATTN: Superfund Accounting
P.O. Box 360903M
500 Ross Street
Pittsburgh, Pennsylvania 15251

c. At the time of payment, Respondent shall send notice that payment has been made to the Financial Management Officer, Environmental Protection Agency, Region 10, 1200 Sixth Avenue, M/S OMP-146, Seattle, Washington 98101-1128.

43. The total amount to be paid to EPA by Respondent pursuant to Paragraph 42(a) of this Order shall be deposited in the Portland Harbor Special Account within the EPA Hazardous Substance Superfund to be retained and used to conduct or finance actions at or in connection with the Portland Harbor Superfund Site, or to be transferred by EPA to the Hazardous Substance Superfund.

44. If payments for Future Response Costs are not made within 60 days of Respondent's receipt of a bill, Respondent shall pay Interest on the unpaid balance. The Interest on Future Response Costs shall begin to accrue on the date of Respondent's receipt of the bill and shall continue to accrue until the date of payment. Payments of

Interest made under this Paragraph shall be in addition to such other remedies or sanctions available to the United States by virtue of Respondent's failure to make timely payments under this Section, including but not limited to, payment of stipulated penalties pursuant to Section XVIII.

45. Respondent may dispute all or part of a bill for Future Response Costs submitted under this Order, if Respondent alleges that EPA has made an accounting error, or if Respondent alleges that a cost item is inconsistent with the NCP or outside the scope of the Order. If any dispute over costs is resolved before payment is due, the amount due will be adjusted as necessary. If the dispute is not resolved before payment is due, Respondent shall pay the full amount of the uncontested costs to EPA as specified in Paragraph 42(b) of this Order on or before the due date. Within the same time period, Respondent shall pay the full amount of the contested costs into an interest-bearing escrow account. Respondent shall simultaneously transmit a copy of both checks to the persons listed in Paragraph 42(b) above, together with a copy of the correspondence that established and funds the escrow account, including, but not limited to, information containing the identity of the bank and bank account under which the escrow account is established as well as a bank statement showing the initial balance of the escrow account. Respondent shall ensure that the prevailing party or parties in the dispute shall receive the amount upon which they prevailed from the escrow funds plus interest within 10 days after the dispute is resolved.

46. Payment of Past Tribal Response Costs.

a. Respondent shall notify the Tribal Governments in writing within forty-five (45) days of receipt of invoices for the Tribal Governments' past Tribal

Response Costs whether Respondent approves them for payment. For all past Tribal Response Costs not approved by Respondent, this written notice must include a detailed justification for non-approved response costs. Past response costs for which Tribal Governments do not receive written notice within forty-five (45) days are deemed approved and uncontested. Respondent and the Tribal Governments may negotiate to reach agreement on past cost payments. Respondent shall pay approved response costs within thirty (30) days of the date of Respondent's notice of the approval. The invoices shall cover the Tribal Governments' costs incurred for the period between notification by EPA of the possible early action on May 13, 2004 and the effective date of this Consent Order. The Tribal Governments' supporting documentation shall consist of the documentation set forth in Attachment 1, which shall include Tribal personnel timesheets, travel expense reports, and documentation and contractor invoices.

b. Respondent and the Tribal Governments reserve all rights and claims they may have regarding any amounts in the past cost invoices not approved and paid by Respondent. Respondent reserves all rights, privileges, and defenses it may have to challenge and/or defend such claims. All claims arising from and related to unpaid Tribal Response Costs shall be brought in the United States District Court for the District of Oregon.

c. Respondent may, in its sole discretion, dispute all or part of an invoice for Past Tribal Response Costs submitted under this Consent Order, if Respondent alleges that the Tribal Government has made an accounting error, if Respondent alleges that a cost item is inconsistent with the NCP, if Respondent alleges that a cost item is not within the scope of work identified in Paragraph 46(a) of this

Order, or if Respondent alleges that it does not have enough documentation to determine whether the Past Tribal Response costs are in error, inconsistent with the NCP, not authorized under CERCLA, or not within the scope of work identified in Paragraph 46(a) of this Order. Respondent shall identify any disputed costs and the basis for its objection. Respondent shall bear the burden of establishing facts sufficient to support its allegation(s). Disputes of Past Tribal Response Costs shall be handled pursuant to Paragraph 47.e.

47. Payment of Future Tribal Response Costs.

a. After the effective date of this Consent Order, Respondent shall pay the Tribal Governments, in advance, for Tribal Response Costs incurred pursuant to this Consent Order.

b. Within thirty (30) days of the effective date of this Consent Order, and at the same time each year thereafter until EPA issues a Notice of Completion of Work, Respondent and the Tribal Governments shall meet to discuss the work to be performed under this Order for the current twelve-month period following the effective date and to negotiate an estimated annual budget for Tribal Response Costs. The Tribal Governments shall develop a reasonable estimated budget (with an appropriate contingency) for Tribal Response Costs for the twelve-month period, which shall separately identify anticipated costs for each Tribal Government and the shared technical consultant. The estimated annual budget shall separately identify the activities to be performed with an estimate of costs associated with such types of activities. Within thirty (30) days of the date of Respondent's written notification to the Tribal Governments of Respondent's approval of the estimated budget, Respondent shall remit a

check for the amount identified in the approved estimated budget made payable to the corresponding Tribal Government at the appropriate address. The amount identified for the shared technical consultant shall be sent to the Confederated Tribes of the Umatilla Indian Reservation. Respondent and the Tribal Governments reserve all rights and claims they may have regarding any amounts in the estimated budget not approved and paid by Respondent. Respondent reserves all rights, privileges and defenses it may have to challenge and/or defend such claims. All claims arising from and related to unpaid Tribal Response costs shall be brought in the United States District Court for the District of Oregon. The addresses of the Tribal Governments are as follows:

The Confederated Tribes of the Grand Ronde Community of Oregon

Attn: Accounting Department
The Confederated Tribes of the Grand Ronde Community of Oregon
9615 Grand Ronde Road
Grand Ronde, Oregon 97347

The Confederated Tribes of Siletz Indians of Oregon

Attn: Karen Bell
Accounting Department
The Confederated Tribes of Siletz Indians of Oregon
P.O. Box 549
Siletz, Oregon 97380

The Confederated Tribes of the Umatilla Indian Reservation

Attn: Accounts Receivable, Finance Department
The Confederated Tribes of the Umatilla Indian Reservation
P.O. Box 638
Pendleton, Oregon 97801

The Confederated Tribes of the Warm Springs Reservation of Oregon

Attn: Finance Department
The Confederated Tribes of the Warm Springs Reservation of Oregon
P.O. Box C
Warm Springs, Oregon 97761

The Nez Perce Tribe

Attn: Office of Legal Counsel
The Nez Perce Tribe
P.O. Box 305
Lapwai, Idaho 83540

The Confederated Tribes and Bands of the Yakama Nation

Central Accounting
The Confederated Tribes and Bands of the Yakama Nation
P.O. Box 151
Toppenish, WA 98948

c. Within thirty (30) days of the close of the twelve-month estimated budget period, the Tribal Governments shall provide supporting documentation to the Respondent for Response Costs reimbursed by the Respondent. The Tribal Governments' supporting documentation shall consist of the documentation set forth in Attachment 1, which shall include Tribal personnel timesheets; travel expense reports and documentation; and contractor invoices.

d. In the event that the Tribal Governments have overestimated the amount of funding required for a twelve-month period and the Respondent has paid more than the amount of Tribal Response Costs incurred for work during such twelve-month period, the Tribal Governments shall apply such overpayments to reimburse Tribal Response Costs in the following twelve-month period. To the extent that the Tribal Governments have incurred Tribal Response costs in addition to the estimated budget for the twelve-month period, the additional costs shall be included in the estimate for the subsequent twelve-month period. At the completion of the work under this Order, all unexpended funds advanced to the Tribal Governments for Tribal Response Costs shall be refunded to Respondents.

e. Following the receipt of support documentation provided in Subsection c. above, Respondent may dispute all or a portion of Tribal Response Costs reimbursed or not approved by Arkema during the previous twelve-month period under this Consent Order, if Respondent alleges that the Tribal Government has made an accounting error, if Respondent alleges that a cost item is inconsistent with the NCP, if Respondent alleges that a cost item is not within the scope of the budget identified in Paragraph 47(a) and (b) of this Order, or if Respondent alleges that the Tribal Governments failed to provide the documentation required in Paragraph 47(c) . Respondent shall identify any disputed costs and the basis for its objection. Respondent shall bear the burden of establishing facts in support of its allegations. Respondent, in its sole discretion, may choose to invoke the dispute resolution provisions of Section XVI, provided that Respondent's notice of its objections under Paragraph 48 shall be made to the appropriate Tribal Government, in addition to EPA, and the appropriate Tribal Government shall prepare a written response to Respondent's written objections. EPA shall make the final decision on the dispute subject to the rights reserved by Respondent and the Tribal Governments in this Order. Nothing in this Paragraph shall in any way be construed to limit the rights of the Tribal Governments to seek to recover response costs incurred by the Tribal Governments related to this Consent Order and not reimbursed by Respondent, and for natural resource liability. Nothing in this Paragraph shall in any way be construed to limit any rights, privileges and defenses Respondent may have to challenge and/or defend claims arising from or related to unpaid Tribal response costs or natural resource liability. All claims arising from and related to Tribal Response Costs

and natural resource liability shall be brought in the United States District Court for the District of Oregon.

XVI. DISPUTE RESOLUTION

48. Unless otherwise expressly provided for in this Order, the dispute resolution procedures of this Section shall be the exclusive mechanism for resolving disputes arising under this Order. The Parties shall attempt to resolve any disagreements concerning this Order expeditiously and informally. In accordance with Section XV., Paragraphs 46(c) and 47(e) of this Order, the Tribal Governments shall provide written responses to Respondent's disputes about Tribal Response Costs, and Respondent and the Tribal Governments will engage in negotiations to resolve disputes in accordance with Paragraph 49 below. EPA will be the final decision maker pursuant to Paragraph 50 below.

49. If Respondent objects to any EPA action taken pursuant to this Order, including billings for Future Response Costs, they shall notify EPA in writing of their objection(s) within 14 days of such action, unless the objection(s) has/have been resolved informally, or EPA has agreed in writing to extend the informal dispute resolution period. Respondent's notice shall provide all of the reasons for its objections and attach any supporting information or documentation that it is relying on to raise the dispute. EPA and Respondent shall then have 30 days from EPA's receipt of Respondent's written objection(s) to resolve the dispute through formal negotiations (the "Negotiation Period") with EPA's Remedial Action Unit Manager. EPA may, in its sole discretion, prepare a written response to Respondent's written objections. The Negotiation Period may be

extended at the sole discretion of EPA. At EPA's discretion and approval, the dispute record may be supplemented during the Negotiation Period.

50. Any agreement reached by the parties pursuant to this Section shall be in writing and shall, upon signature by both parties, be incorporated into and become an enforceable part of this Order. If the Parties are unable to reach an agreement within the Negotiation Period, EPA's position shall be the final decision and binding upon Respondent, unless within 5 days of the end of the Negotiation Period, Respondent requests the determination of EPA Region 10's Director of the Office of Environmental Cleanup (ECL), which he or she may delegate to the Associate Director of ECL. The Director or Associate Director will issue a written decision on the dispute to Respondent based on the record created pursuant to Paragraph 49 above. EPA's decision shall be incorporated into and become an enforceable part of this Order. Respondent's obligations under this Order that are not affected by the disputed issue(s) shall not be tolled by submission of any objection for dispute resolution under this Section. Following resolution of the dispute, as provided by this Section, Respondent shall fulfill the requirement that was the subject of the dispute in accordance with the agreement reached or with EPA's decision, whichever occurs first.

XVII. FORCE MAJEURE

51. Respondent agrees to perform all requirements of this Order within the time limits established under this Order, unless the performance is delayed by a *force majeure*. For purposes of this Order, a *force majeure* is defined as any event arising from causes beyond the control of Respondent, or of any entity controlled by Respondent, including but not limited to their contractors and subcontractors, which delays or prevents

performance of any obligation under this Order despite Respondent's best efforts to fulfill the obligation. *Force majeure* does not include financial inability to complete the Work, or increased cost of performance, or a failure to attain performance standards/action levels selected by EPA.

52. If any event occurs or has occurred that may delay the performance of any obligation under this Order, whether or not caused by a *force majeure* event, Respondent shall notify EPA orally within 48 hours of when Respondent first knew that the event might cause a delay. Within 10 days thereafter, Respondent shall provide to EPA in writing an explanation and description of the reasons for the delay; the anticipated duration of the delay; all actions taken or to be taken to prevent or minimize the delay; a schedule for implementation of any measures to be taken to prevent or mitigate the delay or the effect of the delay; Respondent's rationale for attributing such delay to a *force majeure* event if they intend to assert such a claim, including supporting documentation for such a claim; and a statement as to whether, in the opinion of Respondent, such event may cause or contribute to an endangerment to public health, welfare or the environment. Failure to comply with the above requirements shall preclude Respondent from asserting any claim of *force majeure* for that event for the period of time of such failure to comply and for any additional delay caused by such failure.

53. If EPA agrees that the delay or anticipated delay is attributable to a *force majeure* event, the time for performance of the obligations under this Order that are affected by the *force majeure* event will be extended by EPA for such time as is necessary to complete those obligations. An extension of the time for performance of the obligations affected by the *force majeure* event shall not, of itself, extend the time for

performance of any other obligation. If EPA does not agree that the delay or anticipated delay has been or will be caused by a *force majeure* event, EPA will notify Respondent in writing of its decision. In that event, Respondent may invoke the dispute resolution provisions of Section XVI. If EPA agrees that the delay is attributable to a *force majeure* event, EPA will notify Respondent in writing of the length of the extension, if any, for performance of the obligations affected by the *force majeure* event.

XVIII. STIPULATED PENALTIES

54. Respondent shall be liable to EPA for stipulated penalties in the amounts set forth in Paragraphs 55 and 56 for failure to comply with the requirements of this Order specified below, unless excused under Section XVII (*Force Majeure*). "Compliance" by Respondent shall include completion of the activities under this Order or any work plan or other plan approved under this Order identified below in accordance with all applicable requirements of law, this Order, all Appendices, and any plans or other documents approved by EPA pursuant to this Order and within the specified time schedules established by and approved under this Order.

55. Stipulated Penalty Amounts - Work.

a. The following stipulated penalties shall accrue per violation per day for any noncompliance identified in Paragraph 55(b):

Penalty Per Violation Per Day	Period of Noncompliance
$ 500	1st through 7th day
$ 1,000	8th through 14th day
$ 2,500	15th through 30th day
$ 5,000	31st day and beyond

b. The final and all submitted drafts of the following Compliance Milestones:

(1) Draft and Final EE/CA Work Plan.

(2) Draft and Final Removal Action Characterization Report

(3) First and Second Draft and Final EE/CA Report

(4) Draft and Final Biological Assessment and CWA Section 404 Memoranda

(5) Draft and Conceptual 30% removal action design

(6) Draft and Pre-Final 90% removal action design

(7) Draft and Final 100% removal action design

(8) Draft and Final Removal Action Work Plan

(9) Draft and Final Removal Action Completion Report

56. Stipulated Penalty Amounts - Reports, Other Non-Compliance, including late Payment of Future Response Costs. The following stipulated penalties shall accrue per violation per day for failure to submit timely or adequate final and all submitted draft reports or other written documents pursuant to this Order that are not listed in Paragraph 55(b). The following stipulated penalties shall accrue per violation per day for any non-compliance with the requirements of this Order, including late payments of Future Response Costs.

Penalty Per Violation Per Day	Period of Noncompliance
$ 250	1st through 7th day
$ 500	8th through 14th day
$ 1,500	15th through 30th day

$ 2,500	31st day and beyond

57. In the event that EPA assumes performance of a portion or all of the Work pursuant to Paragraph 67 of Section XX, Respondent shall be liable for a stipulated penalty in the amount of $200,000 or 25% of the cost of the Work EPA performs, whichever is less.

58. All penalties shall begin to accrue on the day after the complete performance is due or the day a violation occurs, and shall continue to accrue through the final day of the correction of the noncompliance or completion of the activity. However, stipulated penalties shall not accrue: 1) with respect to a deficient submission under Section VIII (Work to be Performed), during the period, if any, beginning on the 1st day after EPA's receipt of such submission until the date that EPA notifies Respondent of any deficiency; and 2) with respect to an issue that Respondent chooses to seek a decision by the ECL Director or Associate Director under Section XVI (Dispute Resolution), during the period, if any, beginning on the 5th day after the Negotiation Period ends until the date that the ECL Director or Associate Director issues a final decision regarding such dispute. Nothing herein shall prevent the simultaneous accrual of separate penalties for separate violations of this Order. If EPA seeks to enforce this Order in Court, Respondent may seek judicial review of EPA's final administrative decision.

59. Following EPA's determination that Respondent has failed to comply with a requirement of this Order, EPA may give Respondent written notification of the failure and describe the noncompliance. EPA may send Respondent a written demand for payment of the penalties. Except as provided in the preceding Paragraph 58, penalties shall accrue regardless of whether EPA has notified Respondent of a violation.

60. All penalties accruing under this Section shall be due and payable to EPA within 60 days of Respondent's receipt from EPA of a demand for payment of the penalties, unless Respondent invokes the dispute resolution procedures under Section XVI (Dispute Resolution). All payments to EPA under this Section shall be paid by certified or cashier's check(s) made payable to "EPA Hazardous Substances Superfund," shall be mailed to the Lockbox number and address set forth in Paragraph 42.b, above, shall indicate that the payment is for stipulated penalties, and shall reference the EPA Region and Site/Spill ID Number 10BX, the EPA Docket Number of this Order, and the name and address of the parties making payment. Copies of check(s) paid pursuant to this Section, and any accompanying transmittal letter(s), shall be sent to EPA as provided in Paragraph 17, and to other receiving officials at EPA identified in Paragraph 42.c, above.

61. The payment of penalties shall not alter in any way Respondent's obligation to complete performance of the Work required under this Order.

62. Penalties shall continue to accrue during any dispute resolution period, except as provided in Paragraph 58 above, but need not be paid until 30 days after the dispute is resolved by agreement or by receipt of EPA's decision. No penalties shall accrue or be payable if Respondent prevails in any dispute.

63. If Respondent fails to pay stipulated penalties when due, EPA may institute proceedings to collect the penalties, as well as Interest. Respondent shall pay Interest on the unpaid balance, which shall begin to accrue on the date of demand made pursuant to this Section. Nothing in this Order shall be construed as prohibiting, altering, or in any way limiting the ability of EPA to seek any other remedies or sanctions

available by virtue of Respondent's violation of this Order or of the statutes and regulations upon which it is based, including, but not limited to, penalties pursuant to Sections 106(b) and 122(l) of CERCLA, 42 U.S.C. §§ 9606(b) and 9622(l), and punitive damages pursuant to Section 107(c)(3) of CERCLA, 42 U.S.C. § 9607(c)(3). Provided, however, that EPA shall not seek civil penalties pursuant to Section 106(b) or 122(l) of CERCLA or punitive damages pursuant to Section 107(c)(3) of CERCLA for any violation for which a stipulated penalty is provided herein, except in the case of a willful violation of this Order or in the event that EPA assumes performance of a portion or all of the Work pursuant to Section XX, Paragraph 68.

64. Notwithstanding any other provision of this Section, EPA may, in its unreviewable discretion, waive any portion of stipulated penalties that have accrued pursuant to this Order.

XIX. COVENANT NOT TO SUE BY EPA

65. In consideration of the actions that will be performed and the payments that will be made by Respondent under the terms of this Order, and except as otherwise specifically provided in this Order, EPA covenants not to sue or to take administrative action against Respondent pursuant to Sections 106 and 107(a) of CERCLA, 42 U.S.C. §§ 9606 and 9607(a), for performance of the Work and for recovery of Future Response Costs. This covenant not to sue shall take effect upon the Effective Date and is conditioned upon the complete and satisfactory performance by Respondent of all obligations under this Order, including, but not limited to, payment of Future Response Costs pursuant to Section XV. This covenant not to sue extends only to Respondent and does not extend to any other person.

XX. RESERVATIONS OF RIGHTS BY EPA

66. Except as specifically provided in this Order, nothing herein shall limit the power and authority of EPA or the United States to take, direct, or order all actions necessary to protect public health, welfare, or the environment or to prevent, abate, or minimize an actual or threatened release of hazardous substances, pollutants or contaminants, or hazardous or solid waste on, at, or from the Arkema Site or Portland Harbor Superfund Site. Further, nothing herein shall prevent EPA from seeking legal or equitable relief to enforce the terms of this Order, from taking other legal or equitable action as it deems appropriate and necessary, or from requiring Respondent in the future to perform additional activities pursuant to CERCLA or any other applicable law.

67. The covenant not to sue set forth in Section XIX above does not pertain to any matters other than those expressly identified therein. EPA reserves, and this Order is without prejudice to, all rights against Respondent with respect to all other matters, including, but not limited to:

a. claims based on a failure by Respondent to meet a requirement of this Order;

b. liability for costs that are not inconsistent with the NCP and not included within the definition of Future Response Costs;

c. liability for performance of response action other than the Work performed under this Order;

d. criminal liability;

e. liability for damages for injury to, destruction of, or loss of natural resources, and for the costs of any natural resource damage assessments;

f. liability arising from the past, present, or future disposal, release or threat of release of Waste Materials outside of the Removal Action Area; and

g. liability for costs not inconsistent with the NCP incurred or to be incurred by the Agency for Toxic Substances and Disease Registry related to the Arkema Site or the Portland Harbor Superfund Site.

68. Work Takeover. In the event EPA determines that Respondent has ceased implementation of any portion of the Work, is seriously or repeatedly deficient or late in its performance of the Work, or is implementing the Work in a manner which may cause an endangerment to human health or the environment, EPA may assume the performance of all or any portion of the Work as EPA determines necessary. Respondent may invoke the procedures set forth in Section XVI (Dispute Resolution) to dispute EPA's determination that takeover of the Work is warranted under this Paragraph. Costs incurred by the United States in performing the Work pursuant to this Paragraph shall be considered Future Response Costs that Respondent shall pay pursuant to Section XV (Payment of Response Costs). Notwithstanding any other provision of this Order, EPA retains all authority and reserves all rights to take any and all response actions authorized by law.

XXI. COVENANT NOT TO SUE BY RESPONDENT

69. Except as specifically provided in this Order, including but not limited to, Section I., Paragraph 4 and this Section XXI., Respondent reserves all rights, claims, privileges, and defenses it may have. Respondent's failure to specifically reserve a

particular right, privilege or defense herein shall not be construed as a waiver of that right.

70. Respondent covenants not to sue and agrees not to assert any claims or causes of action against the EPA, or its contractors or employees, with respect to the Work, Future Response Costs, or this Order, including, but not limited to:

a. any direct or indirect claim for reimbursement from the Hazardous Substance Superfund established by 26 U.S.C. § 9507, based on Sections 106(b)(2), 107, 111, 112, or 113 of CERCLA, 42 U.S.C. §§ 9606(b)(2), 9607, 9611, 9612, or 9613, or any other provision of law;

b. any claim arising out of response actions at or in connection with the Work, including any claim under the United States Constitution, the Oregon State Constitution, the Tucker Act, 28 U.S.C. § 1491, the Equal Access to Justice Act, 28 U.S.C. § 2412, as amended, or at common law; or

c. any claim against the EPA pursuant to Sections 107 and 113 of CERCLA, 42 U.S.C. §§ 9607 and 9613, relating to the Work.

71. a. Except as provided in Paragraph 81 (Waiver of Claims), these covenants not to sue shall not apply in the event the United States brings a cause of action or issues an order pursuant to the reservations set forth in Paragraphs 67(b), (c) and (e) - (g), but only to the extent that Respondent's claims arise from the same response action, response costs, or damages that the United States is seeking pursuant to the applicable reservation.

b. The Respondent reserves, and this Order is without prejudice to, claims against the United States, subject to the provisions of Chapter 171 of Title 28 of

the United States Code, for money damages for injury or loss of property or personal injury or death caused by the negligent or wrongful act or omission of any employee of the United States while acting within the scope of his office or employment under circumstances where the United States, if a private person, would be liable to the claimant in accordance with the law of the place where the act or omission occurred. However, any such claim shall not include a claim for any damages caused, in whole or in part, by the act or omission of any person, including any contractor, who is not a federal employee as that term is defined in 28 U.S.C. §2671; nor shall any such claim include a claim based on EPA's selection of response actions, or the oversight or approval of the Settling Defendants' plans or activities. The foregoing applies only to claims which are brought pursuant to any statute other than CERCLA and for which the waiver of sovereign immunity is found in a statute other than CERCLA.

72. Nothing in this Agreement shall be deemed to constitute approval or preauthorization of a claim within the meaning of Section 111 of CERCLA, 42 U.S.C. § 9611, or 40 C.F.R. § 300.700(d).

XXII. OTHER CLAIMS

73. By issuance of this Order, the United States and EPA assume no liability for injuries or damages to persons or property resulting from any acts or omissions of Respondent. The United States or EPA shall not be deemed a party to any contract entered into by Respondent or its directors, officers, employees, agents, successors, representatives, assigns, contractors, or consultants in carrying out actions pursuant to this Order.

74. Except as expressly provided in Section XIX (Covenant Not to Sue by EPA), nothing in this Order constitutes a satisfaction of or release from any claim or cause of action against Respondent or any person not a party to this Order, for any liability such person may have under CERCLA, other statutes, or common law, including but not limited to any claims of the United States for costs, damages and interest under Sections 106 and 107 of CERCLA, 42 U.S.C. §§ 9606 and 9607.

75. No action or decision by EPA pursuant to this Order shall give rise to any right to judicial review, except as set forth in Section 113(h) of CERCLA, 42 U.S.C. § 9613(h).

XXIII. CONTRIBUTION PROTECTION

76. The Parties agree that Respondent is entitled, as of the Effective Date, to protection from contribution actions or claims as provided by Sections 113(f)(2) and 122(h)(4) of CERCLA, 42 U.S.C. §§ 9613(f)(2) and 9622(h)(4), for "matters addressed" in this Order. The "matters addressed" in this Order are the Work and Future Response Costs related to the Removal Action Area only. Nothing in this Order precludes the United States or Respondent from asserting any claims, causes of action, or demands against any persons not parties to this Order for indemnification, contribution, or cost recovery.

77. Respondent agrees that with respect to any suit or claim for contribution brought by it for matters related to this Order, it will notify EPA in writing no later than 60 days prior to the initiation of such suit or claim. Respondent further agrees that with respect to any suit or claim for contribution brought against it for matters related to this Order, it will notify EPA in writing within 10 days of service of the complaint on it. In

addition, Respondent shall notify EPA within 10 days of service or receipt of any Motion for Summary Judgment and within 10 days of receipt of any order from a court setting a case for trial.

78. In any subsequent administrative or judicial proceeding initiated by the United States for injunctive relief, recovery of response costs, or other appropriate relief relating to the Removal Action Area, Respondent shall not assert, and may not maintain, any defense or claim based upon the principles of waiver, res judicata, collateral estoppel, issue preclusion, claim-splitting, or other defenses based upon any contention that the claims raised by the United States in the subsequent proceeding were or should have been addressed in this Order; provided, however, that nothing in this Paragraph affects the enforceability of the covenants not to sue set forth in this Order.

XXIV. INDEMNIFICATION

79. Respondent shall indemnify, save and hold harmless the United States, its officials, agents, contractors, subcontractors, employees and representatives from any and all claims or causes of action arising from, or on account of, negligent or other wrongful acts or omissions of Respondent, its officers, directors, employees, agents, contractors, or subcontractors, in carrying out actions pursuant to this Order. In addition, Respondent agrees to pay the United States all costs incurred by the United States, including but not limited to attorneys fees and other expenses of litigation and settlement, arising from or on account of claims made against the United States based on negligent or other wrongful acts or omissions of Respondent, its officers, directors, employees, agents, contractors, subcontractors and any persons acting on their behalf or under their control, in carrying out activities pursuant to this Order. The United States shall not be held out as a party to

any contract entered into by or on behalf of Respondent in carrying out activities pursuant to this Order. Neither Respondent nor any such contractor shall be considered an agent of the United States.

80. The United States shall give Respondent notice of any claim for which the United States plans to seek indemnification pursuant to this Section and shall consult with Respondent prior to settling such claim.

81. Respondent waives all claims against the United States for damages or reimbursement or for set-off of any payments made or to be made to the United States, arising from or on account of any contract, agreement, or arrangement between Respondent and any person for performance of Work on or relating to the Removal Action Area, including, but not limited to, claims on account of construction delays. In addition, Respondent shall indemnify and hold harmless the United States with respect to any and all claims for damages or reimbursement arising from or on account of any contract, agreement, or arrangement between Respondent and any person for performance of Work on or relating to the Removal Action Area, including, but not limited to, claims on account of construction delays. The waiver in this Paragraph does not apply to any potential CERCLA cost recovery or contribution claims Respondent may have against the United States for response costs incurred in performing Work under this Order.

XXV. INSURANCE

82. At least 7 days prior to commencing any field work under this Order, Respondent shall secure, and shall maintain for the duration of this Order, comprehensive general liability insurance and automobile insurance with limits of 1 million dollars, per

occurrence, plusumbrella insurance in excess of the comprehensive general liability and automobile liability coverage in the amount of 4 million dollars per occurrence. Within the same time period, Respondent shall provide EPA with certificates of such insurance and a copy of each insurance policy. In addition, for the duration of the Order, Respondent shall satisfy, or shall ensure that its contractors or subcontractors satisfy, all applicable laws and regulations regarding the provision of worker's compensation insurance for all persons performing the work on behalf of Respondent in furtherance of this Order. If Respondent demonstrates by evidence satisfactory to EPA that any contractor or subcontractor maintains insurance equivalent to that described above, or insurance covering some or all of the same risks but in an equal or lesser amount, then Respondent need provide only that portion of the insurance described above which is not maintained by such contractor or subcontractor.

XXVI. FINANCIAL ASSURANCE

83. Within 30 days of the Effective Date and on the anniversary of the Effective Date every year thereafter until Notice of Completion of Work in accordance with Section XXVIII below is received from EPA, Respondent shall establish and maintain financial security for the Work under this Order. Within 30 days of the Effective Date, Respondent shall establish and maintain a surety bond in the amount of $.07 million until the EE/CA is finalized and the Action Memorandum is issued. Within 30 days of the issuance of the Action Memorandum, Respondent shall establish and maintain financial security in the amount of the estimated cost of the removal action selected in the Action Memorandum. Financial security for the cost of the removal action under this Order shall be established in one or more of the following forms:

a. A surety bond guaranteeing performance of the work;

b. One or more irrevocable letters of credit equaling the total estimated cost of the work;

c. A trust fund;

d. A demonstration that Respondent satisfies the requirements of 40 C.F.R. Part 264.143(f).

84. If Respondent seeks to demonstrate its ability to complete the work by means of the financial test pursuant to Paragraph 83.d of this Section, it shall resubmit sworn statements conveying the information required by 40 C.F.R. 264.143(f) annually, on the anniversary of the Effective Date. In the event that EPA determines at any time that the financial assurances provided pursuant to this Section are inadequate, Respondent shall, within 30 days of receipt of notice of EPA's determination, obtain and present to EPA for approval one of the other forms of financial assurance listed in Paragraph 83 of this Section. Respondent's inability to demonstrate financial ability to complete the work shall not excuse performance of any activities required under this Order.

85. If, after the Effective Date, Respondent can show that the estimated cost to complete the remaining work has diminished below the amount set forth in Paragraph 83 of this Section, Respondent may, on any anniversary date of the Effective Date, or at any other time agreed to by the Parties, reduce the amount of the financial security provided under this Section to the estimated cost of the remaining work to be performed. Respondent shall submit a proposal for such reduction to EPA, in accordance with the requirements of this Section, and may reduce the amount of the security upon approval

by EPA. In the event of a dispute, Respondent may reduce the amount of the security in accordance with the written decision resolving the dispute.

86. Respondent may change the form of financial assurance provided under this Section at any time, upon notice to and approval by EPA, provided that the new form of assurance meets the requirements of this Section. In the event of a dispute, Respondent may change the form of the financial assurance only in accordance with the written decision resolving the dispute.

XXVII. MODIFICATIONS

87. EPA may determine that in addition to tasks defined in the SOW, or initial approved work plans, other additional work may be necessary to accomplish the objectives of the removal action. EPA may request in writing Respondent to perform these response actions and Respondent shall confirm its willingness to perform the additional work, in writing, to EPA within 14 days of receipt of EPA's request, or Respondent may invoke dispute resolution in accordance with Section XVI. Subject to EPA resolution of any dispute, Respondent shall implement the additional tasks which EPA determines are necessary. Any other requirements of this Order may be modified in writing by mutual agreement of the parties.

88. If Respondent seeks permission to deviate from any approved work plan or schedule or the Statement of Work, Respondent's Project Coordinator shall submit a written request to EPA for approval outlining the proposed modification and its basis. Respondent may not proceed with the requested deviation until receiving written approval from the EPA Project Coordinator pursuant to Paragraph 22.

89. No informal advice, guidance, suggestion, or comment by the EPA Project Coordinator or other EPA representatives regarding reports, plans, specifications, schedules, or any other writing submitted by Respondent shall relieve Respondent of its obligation to obtain any formal approval required by this Order, or to comply with all requirements of this Order, unless it is formally modified.

XXVIII. NOTICE OF COMPLETION OF WORK

90. Upon the request of Respondent or on its own initiative, EPA may determine, after its review of the Final Removal Action Completion Report, that all Work has been fully performed in accordance with this Order, with the exception of any continuing obligations required by this Order, including post-removal site controls and monitoring, if any, payment of Future Response Costs, or record retention, and EPA will provide written notice to Respondent. EPA will use best efforts to respond to Respondent's request in a timely manner. If EPA determines that any such Work has not been completed in accordance with this Order, EPA will notify Respondent, provide a list of the deficiencies, and require that Respondent correct such deficiencies, or modify the Removal Action Work Plan, if necessary. Respondent shall correct the deficiencies or, if appropriate, implement the modified and approved Work Plan, and shall submit a modified Final Removal Action Completion Report in accordance with the EPA notice, subject to its right to invoke dispute under Section XVI of this Order. Failure by Respondent to implement the approved modified Work Plan shall be a violation of this Order. This Order shall be terminated if all long-term obligations and uncompleted Work required by this Order is included in a consent decree with Respondent and/or other persons and entered as a final judgment.

XXIX. SEVERABILITY/INTEGRATION/APPENDICES

91. If a court issues an order that invalidates any provision of this Order or finds that Respondent has sufficient cause not to comply with one or more provisions of this Order, Respondent shall remain bound to comply with all provisions of this Order not invalidated or determined to be subject to a sufficient cause defense by the court's order.

92. This Order and its appendices and attachment constitute the final, complete and exclusive agreement and understanding among the Parties with respect to the settlement embodied in this Order. The parties acknowledge that there are no representations, agreements or understandings relating to the settlement other than those expressly contained in this Order. The following appendices are attached to and incorporated into this Order:

a. Appendix A: Map generally depicting the upland portion of the Arkema Site and the preliminary boundaries of the Removal Action Area.

b. Appendix B: Statement of Work

c. Attachment 1. Tribal Cost Documentation Template

XXX. EFFECTIVE DATE

93. This Order shall be effective on the day it is issued by EPA. The undersigned representative of Respondent certifies that (s)he is fully authorized to enter into the terms and conditions of this Order and to bind Respondent.

XXXI. NOTICES AND SUBMISSIONS

94. Documents including work plans, reports, approvals, disapprovals, and other correspondence required to be submitted under this Order, shall be sent to the

individuals at the addresses specified below in the format indicated. All agencies and governments are responsible for giving written notice of a change to Respondent and the other parties. All notices and submissions shall be considered effective one business day after receipt by Respondent's Project Coordinator, unless otherwise provided.

a. One (1) copy of EPA correspondence or other communications to Respondent's Project Coordinator in electronic form and hardcopy:

b. Three (3) hardcopies of documents to be submitted to EPA shall be forwarded to:

Sean Sheldrake
U.S. Environmental Protection Agency
1200 Sixth Avenue, ECL-111
Seattle, Washington 98101

Respondent shall also submit such documents in electronic form to sheldrake.sean@epa.gov or via CD-ROM.

c. One (1) hardcopy of documents or electronic file shall be submitted to DEQ:

James M Anderson
DEQ Northwest Region
2020 SW Fourth Ave, Suite 400
Portland, Oregon 97201
anderson.jim@deq.state.or.us

Electronic file or CD-ROM transmissions to the following contacts:

d. Oregon Department of Fish & Wildlife:

Rick Kepler
Oregon Department of Fish & Wildlife
2501 SW First Avenue
Portland, Oregon 97207
rick.j.kepler@state.or.us

e. NOAA:

Rob Neely
Coastal Resources Coordination
c/o EPA Region 10
1200 Sixth Avenue (MS ECL-117)
Seattle, WA 98101
neely.rob@epg.gov

Dr. Nancy Munn
NOAA Fisheries
525 NE Oregon Street, Suite 500
Portland, Oregon 97232-2737
nancy.munn@noaa.gov

f. USFW:

Jeremy Buck
US Fish & Wildlife
2600 SE 98th Avenue, Suite 100
Portland, Oregon 97266
jeremy_buck@r1.fws.gov

Kemper McMaster, State Supervisor
U.S. Fish and Wildlife Service
Oregon Fish and Wildlife Office
2600 SE 98th Ave., Suite 100
Portland, Oregon 97266
Kemper_McMaster@fws.gov

g. U.S. Department of Interior:

Preston Sleeger
Regional Environmental Officer
Pacific Northwest Region
500 NE Multnomah St., Suite 356
Portland, Oregon 97232
Personal Privacy / Ex. 6

h. Confederated Tribes of the Warm Springs Reservation of Oregon:

Brian Cunninghame
5520 Skyline Drive
Hood River, Oregon 97031
cunninghame@gorge.net

i. Confederated Tribes and Bands of the Yakama Nation:

Paul Ward
Yakama Nation
Fisheries Management Program
P.O. Box 151
4690 SR 22
Toppenish, Washington 98948
pward@yakama.com

j. Confederated Tribes of the Grand Ronde Community of Oregon:

Pete Wakeland
Confederated Tribes of the
Grand Ronde Community of Oregon
47010 SW Hebo Road
Grand Ronde, Oregon 97347
pete.wakeland@grandronde.org

k. Confederated Tribes of the Siletz Indians:

Tom Downey
Environmental Specialist
Confederated Tribes of the Siletz Indians
P.O. Box 549
Siletz, Oregon 97380
tomd@ctsi.nsn.us

l. Confederated Tribes of the Umatilla Indian Reservation:

Audie Huber
Confederated Tribes of the Umatilla Indian Reservation
Department of Natural Resources
73239 Confederated Way
Pendleton, Oregon 97801
audiehuber@ctuir.com

m. Nez Perce Tribe:

Joe Oatman
Nez Perce Tribe
P.O. Box 365
Lapwai, Idaho 83540
joeo@nezperce.org

n. Environment International Ltd.:

Jean Lee, PE
Environment International Ltd.
5505 34th Avenue, N.E.
Seattle, Washington 98105
Jean.lee@envintl.com

XXXI. ADMINISTRATIVE RECORD AND PUBLIC COMMENT

95. EPA will determine the contents of the administrative record file for selection of the removal action. In accordance with this Order and the SOW, Respondent shall submit to EPA documents developed during the course of the EE/CA upon which selection of the response action may be based. Respondent shall assist EPA, as requested, before and during the comment period with its community relations activities concerning the EE/CA. At EPA's request, Respondent shall establish a community information repository to house one copy of the administrative record. In accordance with 40 CFR §§ 300.415(m)(4) and 300.820, EPA will provide a public comment period of not less than 30 days on the EE/CA and the proposed removal action. After considering public comments received, and reviewing additional data or analyses required to complete the EE/CA, if necessary, EPA will select a final removal action.

It is so ORDERED and Agreed this _____ day of _____, 2005.

By: _____
Sylvia Kawabata
ECL Unit Manager
U.S. EPA, Region 10

Agreed this _____ day of _____, 2005.

For Respondent Arkema Inc.

By: _____

_____
Printed Name

_____
Title

APPENDIX B

STATEMENT OF WORK

ARKEMA REMOVAL ACTION
PORTLAND HARBOR SUPERFUND SITE
PORTLAND, OREGON

I. PURPOSE

The primary purposes of this Statement of Work (SOW) are: (1) to implement the Administrative Order on Consent for Removal Action (AOC); (2) facilitate and expedite the feasibility study and implementation of controls on upland sources to the Willamette River; and (3) expedite the characterization, feasibility study, cleanup alternatives analysis, and performance of cleanup on the principal threat in the intertidal area and submerged lands on and adjacent to the Arkema Site.

The removal action will identify the areal extent of the project, which will become the Arkema Removal Action Area (RAA). Beyond the RAA, the removal action will not address all contamination and releases of hazardous substances from the Arkema Site that may be posing unacceptable risks to human health and the environment. The river-wide Portland Harbor Superfund Site cleanup will address releases of hazardous substances from the Arkema Site beyond the RAA.

Removal Action Objectives shall include, at a minimum:

1. Reduce human health risks to acceptable levels from direct contact with and incidental ingestion of chemicals of concern (COCs) in sediments and riverbank within the RAA.
2. Reduce COC concentrations in sediments and riverbank within the RAA to levels that will result in acceptable risks to humans that eat fish and shellfish from the Willamette River.
3. Reduce human health risks to acceptable levels from direct contact with and incidental ingestion of water with COCs within the RAA.
4. Reduce ecological risks from contact with and ingestion of COCs in sediments or riverbank material or prey within the RAA to acceptable levels.
5. Reduce ecological risks to acceptable levels from contact with and ingestion of water with COCs within the RAA.
6. Eliminate the potential for migration of contaminants at unacceptable levels from the RAA to the Willamette River.
7. Reduce contaminant flux from uplands, riverbank, and sediments so that recontamination of any sediment or riverbank caps put in place does not occur.

The Work to be completed under this SOW shall include preparation, delivery, and implementation of the following:

1. Engineering Evaluation/Cost Analysis (EE/CA) Work Plan (draft and final);

2. Removal Action Area Characterization Report(s) (draft and final);
3. Engineering Evaluation/Cost Analysis (EE/CA) Report (draft and final);
4. Biological Assessment (BA) and Clean Water Act (CWA) (Section 404) Analysis Memorandum;
5. Removal Action Design Documents (conceptual, pre-final and final);
6. Removal Action Work Plan (draft and final);
7. Implementation of Removal Action;
8. Removal Action Completion Report (draft and final);
9. Long-Term Monitoring and Reporting Plan (if appropriate); and
10. Community Involvement Activities

Removal activities shall be completed in accordance with Table 1 of this SOW.

The Respondent will coordinate meetings and/or teleconferences with EPA, DEQ, the Tribes, and the Natural Resource Trustees to discuss the status of work described in this SOW. After approval of the EE/CA Work Plan, such meetings shall be monthly, if needed. DEQ, the Tribes and the Trustees will submit their comments to EPA. EPA will provide the comments to Respondent that Respondent is to address. Respondent will coordinate quarterly meetings with EPA and DEQ and/or written updates will be provided in place of a meeting regarding upland source control actions on the Arkema Site.

II. WORK TO BE PERFORMED BY RESPONDENT

Deliverables specified in this SOW shall be consistent with "EPA's Guidance on Conducting Non-Time-Critical Removal Actions under CERCLA" (EPA/540/R-93/057, OSWER 9360.0-32). Work to be completed under this SOW shall also include activities necessary to achieve the objectives, criteria and performance standards contained in this SOW, or any work plan, report, or other deliverable approved under the AOC and this SOW. Work to be completed under this SOW shall, to the extent practicable, be consistent with the Portland Harbor Superfund Site RI/FS, and contribute to the efficient performance of the long-term remedial action.

Respondent shall complete the following tasks:

1. Engineering Evaluation/Cost Analysis (EE/CA) Work Plan

Respondent shall submit an EE/CA Work Plan that will include a summary of existing information, a project work plan, a Sampling and Analysis Plan (SAP) and a Health and Safety Plan (HASP).

The EE/CA Work Plan shall include, at a minimum, the following information:

- Introduction/Purpose;

- Brief description of the Arkema Removal Action Area characteristics, including ecological and physical characteristics;

- Identification of historic and ongoing sources of contamination to the Arkema Removal Action Area, including past and present operations, drainage, discharges, groundwater seeps, or other releases;

- Summary of existing information on upstream and upland contamination sources that have the potential to contaminate the Removal Action Area, including a description of environmental investigations, environmental cleanups and planned upland source control measures that are being conducted under agreements with DEQ as the lead agency. The summary of upland source control measures being conducted must contain a schedule for implementation to be completed prior to the EE/CA;

- Arkema historical information including dredging history and identification of past and present property owners, operators, and major tenants as well as owners and operators of all immediately adjacent upland properties;

- Summary of current facility operations and potential access or operational constraints on Work Plan implementation;

- Description of the nature and extent of contamination in the Arkema Removal Action Area, to the extent known, including a summary of existing sediment quality data with a comparison to:

  1) Existing ecological sediment quality guidelines that represent a range of levels including, but not limited to, low or no effects (e.g., Threshold Effects Concentrations [TECs], Threshold Effects Levels [TELs], Effects Range Low [ERLs]), as well as levels at which some effects are expected (e.g., Probable Effects Concentrations [PECs], Effects Range Medium [ERMs]). Existing chemistry data will be reviewed to establish Category 1 and Category 2 data categories in accordance with the Portland Harbor RI/FS protocols;
  2) Estimated risk-based sediment cleanup values for persistent bioaccumlative toxins (PBTs) that protective of humans and wildlife that consume aquatic biota from the Willamette River; and
  3) Sediment cleanup values that are protective of humans from direct contact with, and incidental ingestion of, chemicals of concern in sediments, riverbank and water. Existing sediment data should be plotted on site maps. Locations with sediment concentrations above the risk based levels in (1), (2), and (3) above should be indicated on these maps.

- Summary of results from sediment toxicity testing conducted to date;

- A process for developing a cultural resources survey, and a process for developing procedures to protect and address such cultural resources;

- Identification of Removal Action Objectives (RAOs), potential Applicable or Relevant and Appropriate Requirements (ARARs), and To Be Considered (TBCs) for the Arkema Removal Action Area;

- A description of the analysis to be conducted to determine disposal facility or containment options for contaminated sediment;

- A detailed conceptual site model that shows the relationship of the contaminant plumes including, but not limited to: pH variations, hexavalent chrome, perchlorate, monochlorobenzene, DDT, and salinity gradients, starting in the uplands and continuing through the riverbank, and into sediment in the river, to the full extent of the data available at the time of submittal; and

- Other information (including maps and figures) necessary to gain a general understanding of the Arkema Removal Action Area.

Respondent shall also identify data gaps that will be filled by the collection and analysis of field data. Investigation activities will focus on problem definition and will result in data of adequate quality and technical content to evaluate the following:

- Nature, extent, and volume of riverbank and sediment contamination including the degree to which riverbank and sediments will need to be removed that represent the principal threat of contamination, an ongoing source of contaminants to the river, and which may represent a recontamination risk to any cap put in place;

- Potential human health and ecological risks resulting from sediment and surface water contamination;

- Engineering characteristics of the Removal Action Area including sediment consistency, dredgeability, potential slope stability issues related to dredging, and potential sediment consolidation issues associated with capping;

- Potential water quality effects associated with dredging, piling removal, sheet pile installation, capping, or disposal technologies;

- Technologies for sediment remediation including capping, dredging, treatment, including any necessary treatability testing, and disposal (on-site and off-site);

- If necessary, assessment of hydraulic control measures, including a sheet pile wall keyed into bedrock across the site, should they be necessary to reduce the recontamination risk to the in-water work (riverbank and sediment cleanup); and

- Potential impacts to threatened or endangered species, other biological receptors, and the potential habitat benefits and impacts of the removal action.

The procedures Respondent plans to implement when conducting all field activities will be detailed in the SAP for the specific field activity. The initial SAP will be included in the EE/CA Work Plan. The SAP for any field activity will ensure that sample collection and analytical activities are conducted in accordance with technically acceptable protocols and that data meet data quality objectives. A SAP provides a mechanism for planning field activities and consists of a Field Sampling Plan (FSP) and a Quality Assurance Project Plan (QAPP). Details are provided in Section III of this SOW.

Respondent shall also prepare HASP that is designed to protect personnel from physical, chemical and other hazards posed by field sampling efforts. Details are set forth in Section III of this SOW.

Upon request by EPA, Respondent shall also submit copies of previous studies or sampling efforts conducted independently or under local, state or other federal authorities or agreements that are determined by EPA to relate to remedy selection under this Order.

Additionally, Respondent shall continue to work under DEQ supervision on upland source control actions related to the Arkema Site and that are threatening to be released to the Willamette River, which may include source identification, source prioritization, documentation and tracking of source control plans and completed source control actions, evaluating and documenting effectiveness of source control measures, and providing input to EPA's and DEQ's decision as to effectiveness of source control in order to implement the Removal Action. The goal is for significant upland sources to be controlled to the greatest extent practicable before or during Removal Action implementation such that significant post Removal Action recontamination is not predicted. The EE/CA work plan shall contain a process and schedule for evaluation of the upland source control program. As a result of the evaluation, should it be determined that sources are not being controlled sufficiently to achieve the RAOs, this SOW requires, upon notice by EPA, Arkema to conduct evaluation of hydraulic control measures in the EE/CA, including, but not limited to, installation of a sheet pile wall, such that this Removal Action may occur without the expectation of recontamination. A schedule for such evaluation will be included in the EE/CA work plan.

2. Removal Action Area Characterization Report

Respondent shall submit a Removal Action Area Characterization Report that includes information from field sampling events, including validated analytical results.

The Removal Action Area Characterization Report shall include, at a minimum, the following sections:

- Introduction/Purpose;

- Summary of the field sampling effort that, at a minimum, includes sampling vessel information, field effort dates, a summary of the sample collection effort (e.g., surface sediment, subsurface sediment, and surface water samples), field sample observations

(e.g., sediment descriptions), and a summary of sample and station locations – including station depths (corrected to mean lower low water), station locations (latitudes/longitudes and state plane coordinates), maps and figures;

- Deviations from the FSP;

- Summary of sample handling and shipment; and

- Summary of all data, including a data validation report. Data from this effort shall be provided electronically in a format consistent with other data already acquired under the harbor-wide study.

- Description of the nature and extent of contamination in the Arkema Removal Action Area including a summary of existing and newly collected surface and subsurface sediment quality data with a comparison to:

    a. Existing ecological sediment quality guidelines that represent a range of levels including, but not limited to, low or no effects (e.g., Threshold Effects Concentrations [TECs], Threshold Effects Levels [TELs], Effects Range Low [ERLs]), as well as levels at which some effects are expected (e.g., Probable Effects Concentrations [PECs], Effects Range Medium [ERMs]). Existing chemistry data will be reviewed to establish Category 1 and Category 2 data categories in accordance with the Portland Harbor RI/FS protocols;
    b. Estimated risk-based sediment cleanup values for persistent bioaccumlative toxins (PBTs) that protective of humans and wildlife that consume aquatic biota from the Willamette and
    c. Sediment cleanup values that are protective of humans from direct contact with, and incidental ingestion of, chemicals of concern in sediments, riverbank and water.

Existing sediment data should be plotted on site maps. Locations with sediment concentrations above the risk based levels in (1), (2), and (3) above should be indicated on these maps.

Respondent shall submit the data validation report to EPA within 5 days of Respondent's receipt of the data validation report from their contractor or in-house source. Information necessary for EPA to perform an independent review of the validated data shall also be provided.

3. Engineering Evaluation/Cost Analysis (EE/CA) Report

Based on data obtained in the previous sampling efforts and work to be performed under this SOW, and in consideration of EPA's guidance for this removal actions[1], Respondent

[1] Including, but not limited to: "Institutional Controls: A Site Manager's Guide to Identifying, Evaluating and Selecting Institutional Controls at Superfund and RCRA Corrective Action Cleanups," (EPA 540-F-00-

will prepare a technical briefing for EPA, DEQ, the Tribes and the Trustees on the proposed removal alternatives that will be presented by Respondent in the EE/CA.

After the technical briefing, Respondent, in consideration of comments received at the technical briefing, will submit a first draft of the EE/CA.

The first draft EE/CA will be revised in response to EPA comments. A second draft EE/CA shall be submitted to EPA for review and comment, or modification if requested by EPA. If requested by EPA, a final version of the EE/CA shall be submitted to EPA for review and preliminary approval in accordance with the schedule set forth in Table 1 of this SOW. Upon preliminary approval of the EE/CA by EPA, the EE/CA will be released for a formal public comment period. The EE/CA will contain the following sections:

- Executive Summary;
- Introduction;
- Removal Action Area Characterization;
- The result of the analysis regarding the post Removal Action recontamination potential of the Arkema Removal Action Area by (1) in water contaminated sediments outside of the RAA and (2) upland sources of contamination, including whether source control actions will be sufficient or if additional actions may be required to control potential sources of significant recontamination;
- Procedures for addressing and protecting cultural resources in the Removal Action Area;
- Identification of Removal Action Objectives;
- Identification and Analysis of Removal Action Technologies;
- Identification and Analysis of Removal Action Alternatives, including the identification and analysis of disposal facility or containment options and incorporating the costs of any Removal Action and the alternative analysis for any proposed institutional controls, if applicable;
- Comparative Analysis of Removal Action Alternatives, including upland hydraulic control alternatives, if necessary;
- Recommended Removal Action Alternative, including the selection of any needed disposal facility;
- An assessment of the residual risk anticipated after Removal Action implementation;
- Schedule for recommended Removal Action; and
- Preliminary drafts of the Biological Assessment and Clean Water Act analysis memorandum for the recommended Removal Action alternative (see Section 4 below).

A public comment period of at least thirty (30) days is required for the EE/CA and any supporting documentation. Respondent shall assist EPA, as requested, before and during the comment period with its community relations activities concerning the EE/CA.

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005), OSWER Dir. 9355.0-74FS-P, Sept. 2000; all guidances referenced in the AOC; or CERCLA guidances otherwise appropriate for the removal action alternatives being considered.

Respondent shall also assist EPA in compiling the Administrative Record before and during the public comment period. If, based on public comments received, EPA determines additional data or analyses are required to complete the EE/CA, Respondent shall collect such data, or perform such analyses, as determined necessary by EPA.

4. Biological Assessment (BA) and Clean Water Act (CWA) (Section 404) Analysis Memorandum

In order to identify the presence of threatened, endangered, proposed or candidate species, or their habitat, within the vicinity of the proposed Arkema Removal Action Area, Respondent will prepare, for EPA approval, a draft BA to support compliance with the substantive requirements of the Endangered Species Act. The draft BA will characterize baseline conditions of existing habitat; address potential project impacts that the Removal Action may have on these species, their habitat, and their food stocks; and describe best management practices and conservation measures designed to avoid or minimize any negative impacts.

If dredging, capping, or other filling is a component of any of the alternatives, Respondent shall submit a draft memorandum that provides sufficient information to demonstrate compliance with the substantive requirements of Section 404(b) (1) of the CWA. The memorandum shall document the information gathered regarding practicability and cost, long- and short-term impacts from all proposed alternatives, minimization of adverse effects, and an analysis of the need for any mitigation.

5. Project Design Documents

After EPA has selected a removal action for the Removal Action Area and set forth its determination and selected action in an Arkema Removal Action Memorandum, Respondent shall prepare project design documents, including construction plans and specifications, to implement the Removal Action and shall demonstrate that the Removal Action design shall meet all objectives of any Action Memorandum or other EPA decision document. Respondent shall meet regularly with EPA prior to and during development of design documents and provide EPA, for review and approval, the key technical documents that support the removal design (see below). Design documents, including plans and specifications, shall be submitted in accordance with the schedule set forth in Table 1 of this SOW.

5.1 Conceptual, Prefinal, and Final Designs

Respondent shall submit the following levels of design:

- Conceptual design when the design effort is 30 percent complete;
- Prefinal design when the design effort is 90 percent complete;
- Final design when the design effort is 100 percent complete.

The final design shall fully address all EPA comments made on the prefinal design.

5.1.1 Conceptual (30 percent) Design shall include an overall explanation of the following as appropriate:

- If the selected alternative includes capping, the conceptual design will show capping areas and conceptual slope and cap designs;
- If the selected alternative includes dredging, the conceptual design will show dredging areas and conceptual cut thicknesses and slope angles;
- Proposed disposal technology (on-site or off-site) conceptual design including general disposal location, handling methods and transport approaches;
- Annotated outline of prefinal design analysis report;
- Annotated outline of plan drawings;
- Annotated outline of specifications.

5.1.2 Prefinal (90 percent) Design shall include three separate deliverables as follows:

- Prefinal (90 percent) Design Analysis Report;
- Prefinal (90 percent) Construction Documents and Schedule;
- Prefinal (90 percent) Design Plans.

5.1.2.1 Prefinal (90 percent) Design Analysis Report shall provide the design criteria and the basis of design for the Removal Action. Examples of the types of information to be included are described below:

- Technical parameters and supporting calculations upon which the design will be based, including but not limited to design requirements for each remedial action technology to be employed (e.g., dredging, capping);

- If the selected alternative includes capping:

  - appropriate physical and chemical characteristics of materials to be used for sediment capping and method for identifying and testing clean source material, including acceptance criteria for such material;

  - determinations regarding potential propeller scour for capped areas;

  - cap placement techniques;

- If the selected alternative includes dredging and/or excavation:

  - Identification of requirements for the contractor regarding the handling, transport (including haul routes) and disposal of dredged or excavated sediments , including identification of any best management practices, monitoring, and/or analyses necessary to protect personnel from potential chemical hazards posed by this Removal Action (such activities may be further described in the contractor's HASP);

- design dredge or excavation depths and overcut allowances, dredged or excavated material volumes, and dredging or excavation techniques;

- identification of potential location(s) for disposal of dredged or excavated sediments;

- if the proposed disposal technology is an off-site upland landfill, the design documents will include descriptions of sediment transloading (from water transport to land transport), stockpiling, dewatering, and overland transport;

- if the proposed disposal technology is an on-site near shore Confined Disposal Facility (CDF), the design documents will include fill closure approach, hydrogeologic and contaminant transport evaluation for the fill, static and seismic stability analyses, filling approach, consolidation analysis, and screening of other potential sources of material for the CDF;

- Descriptions of the analyses conducted to select the design approach, including a summary and detailed justification of design assumptions and verification that design will meet performance standards;

- Access and easement requirements, and permit requirements or substantive requirements of permits;

- Plan for reducing negative effects on the environment and community during the construction phase(s);

- An outline of the long-term monitoring and reporting plan; and

- Analysis and recommendations on institutional controls and/or engineering controls that may need to be implemented to ensure the long-term effectiveness of the Removal Action, including descriptions of how such controls would be implemented, by whom, and under what circumstances such controls could be removed or terminated (see "Institutional Controls" OSWER 9355.0-74FS-P, EPA 540-F-00-005, September 2000).

- If appropriate, conduct an update of the analysis regarding post Removal Action recontamination of the Arkema Removal Action Area by upland sources of contamination, including what source control actions have occurred since the EE/CA analysis and whether additional actions may be necessary to control potential sources of significant recontamination.

If the selected alternative includes capping, the cap design shall follow appropriate EPA guidance, including "Guidance for In-Situ Subaqueous Capping of Contaminated Sediments" (EPA 905-B96-004). Performance of capping activities shall be consistent

with federal regulations, including the requirements of Sections 401 and 404 of the CWA and Section 10 of the Rivers and Harbors Act.

If the selected alternative includes dredging, the performance standards shall be consistent with federal regulations, including requirements of Sections 404 and 401 of the CWA and Section 10 of the Rivers and Harbors Act.

5.1.2.2 Prefinal (90 percent) Construction Documents and Schedule, including:

- Construction plans/drawings/sketches and required specifications;
- Proposed locations of processes/construction activity or specific requirements for such locations;
- Schedule for construction and implementation of the Removal Action that identifies major milestones.

5.1.2.3 Prefinal (90 percent) Design Plans, including:

- Draft Construction Quality Assurance Plan (see Section III of this SOW) which shall detail the remediation verification method and approach to quality assurance during construction activities in the project area, including compliance with ARARs. The Plan will describe the methods used to measure compliance with measurement quality objectives (such as performance and method requirements), including target dredge or excavation depths, if appropriate. The Plan will include, as an attachment, a Draft Removal Action Sampling and Analysis Plan (see Section III of this SOW), which shall include a field sampling plan and a QAPP. If the selected alternative includes capping, performance monitoring will include characterization of in-place capping materials (e.g., coverage and thickness). If the selected alternative includes dredging or excavation, performance monitoring will be performed to confirm that dredged or excavated material is properly staged, dewatered, and transported to a suitable disposal site; and that field construction activities are properly sequenced.
- Draft Water Quality Monitoring Plan and its associated Quality Assurance Project Plan and HASP (see Section III of this SOW), which shall detail water quality monitoring to confirm that water quality standards as defined by substantive requirements of CWA Section 401 water quality certification for compliance with the requirements in CWA Section 404(b)(1) guidelines are met (or ensure approval to allow temporary exceedances of water quality standards has been received) during any capping and dredging operations and where return-water from barges or de-watering (as appropriate) may affect the water column. The plan shall describe the specific water quality monitoring requirements, including a schedule; sampling locations; sampling intervals; sampling equipment and parameters; analytical methods; key contacts; reporting requirements (including daily reports); daily contacts for notifications of any exceedances; result summaries; and draft and final

Water Quality Monitoring reports. A QAPP and a HASP specific to water quality monitoring shall be included in this deliverable.

5.1.3 Final (100 percent) Design:

The 100 percent Final Design submittal shall include the following:

- Final Design Analysis Report;
- Final construction documents and schedule;
- Final Design Plans;
- Operation, Maintenance, and Monitoring Plan;
- Final cost estimate for the Removal Action and estimated cost for long-term monitoring; and
- Final schedule.

6. Removal Action Work Plan

Respondent shall prepare a Removal Action Work Plan that outlines the implementation of the selected Removal Action alternative, including how construction activities are to be implemented by Respondent and coordinated with EPA. The Work Plan shall include, at a minimum, the following elements that are consistent with and implements the approved final design:

- Removal action project plan describing the sequence of activities;

- A description of how the removal action implements the final design;

- Schedule of activities for completion of the Removal Action, including inspections, meetings, and documents referenced in this task;

- Remedial action HASP that is designed to protect personnel from physical, chemical and other potential hazards posed by this Removal Action;

- Construction quality assurance plan (CQAP) and statement of qualifications (for the construction contractor). The CQAP will describe in detail the methods for direct measurements to be made during construction to ensure RAOs and performance standards will be met;

- Remedial action environmental protection plan;

- Procedures for processing design changes and securing EPA review and approval of such changes to ensure changes are consistent with the objectives of this Removal Action;

- Procedures for coordinating with EPA regarding compliance with EPA's Off-Site Rule, as applicable.

The HASP shall follow EPA guidance and all OSHA requirements as outlined in 29 C.F.R. 1910 and 1926. Respondent may utilize existing HASP project documents or other company/contractor HASPs provided that Respondent demonstrates the HASP has been modified, as necessary, or otherwise sufficiently addresses the activities covered by this SOW. Draft and Final versions of the Removal Action Work Plan shall be submitted to EPA for review and approval in accordance with the schedule set forth in Table 1 of this SOW.

7. Implementation of Removal Action

As described in Table 1, Respondent shall provide notification to EPA thirty (30) days prior to initiation of fieldwork to allow EPA to coordinate field oversight activities.

Respondent shall complete the sediment Removal Action in accordance with the approved Final Design documents and Removal Action Work Plan. The following activities shall be completed in constructing the Removal Action.

EPA and Respondent shall participate in a preconstruction meeting to:

- Review methods for documenting and reporting data, and compliance with specifications and plans including methods for processing design changes and securing EPA review and approval of such changes as necessary;

- Review methods for distributing and storing documents and reports;

- Review work area security and safety protocols, as appropriate;

- Demonstrate that construction management is in place, and discuss any appropriate modifications of the CQAP to ensure that project specific considerations are addressed;

- Discuss methods for direct measurement, including confirmation sampling of construction work to be used to ensure performance standards are met;

- If requested, conduct a Removal Action Area tour in the project area to verify that the design criteria, plans, and specifications are understood and to review material and equipment storage locations, as appropriate.

- If appropriate, conduct an update of the analysis regarding post Removal Action recontamination of the Arkema Removal Action Area by upland or upstream sources of contamination, including what source control actions have occurred since the EE/CA analysis, whether additional actions and/or schedule delays may be necessary to control potential sources of significant recontamination.

Respondent shall transmit (electronically) draft key points and action items of the preconstruction meeting to all parties identified in Section XXX of the AOC within seven (7) days of the meeting. Respondent shall submit final key points and action items of the preconstruction meeting to all parties identified in Section XXX of the AOC within fourteen (14) days of the meeting.

Pursuant to the CQAP, monthly reports shall be prepared and submitted (electronically) to EPA for review during the Removal Action. Monthly reports shall include work performed, problems encountered and solutions proposed, water quality monitoring results, and work to be performed during the following week. If applicable, Respondent shall inform EPA of the off-site disposal facility proposed to receive any debris or dredged/excavated materials from the Arkema Removal Action Area.

Within seven (7) days after Respondent makes a preliminary determination that construction is complete, Respondent shall orally notify EPA for the purposes of scheduling a final inspection and/or meeting. Within fourteen (14) days after the final inspection and/or meeting, Respondent shall send a letter to EPA stating that construction is complete and responding to any outstanding issues that were raised by EPA during the final inspection/meeting.

8. Removal Action Completion Report

Within 90 days after completion of the construction phase of the Removal Action, Respondent shall submit for EPA review and approval a Removal Action Completion Report. This report shall contain a description of the Work described in the Removal Action Work Plan and the Work that was actually performed. In the report, a registered professional engineer and Respondent shall state that the Removal Action has been constructed in accordance with the design and specifications. The report shall provide as-built drawings, signed and stamped by a professional engineer, showing the area and depth of the location remediated. The final report shall include a listing of quantities and types of materials removed off-site or handled on-site, a listing of the ultimate destination(s) of those materials, a presentation of the analytical results of all sampling and analyses performed (including a map showing the locations of any confirmatory samples), and accompanying appendices containing all relevant documentation generated during the Removal Action (e.g., manifests and permits). All analytical data collected under this AOC shall be provided electronically to EPA. The final Water Quality Monitoring report may be submitted as an appendix to the Removal Action Completion Report. This Removal Action Completion Report shall contain a description of any institutional controls that are in place, or engineering controls that are necessary to sustain the integrity of the Removal Action, along with copies of any agreements or other documents used to establish and implement such controls.

The final report shall also include the following certification signed by a person who supervised or directed the preparation of that report:

"Under penalty of perjury under the laws of the United States, I certify that to the best of my knowledge, after appropriate inquiries of all relevant persons involved in the preparation of the report, the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

9. Long-Term Monitoring and Reporting Plan

If identified as a component of the selected alternative, Respondent shall prepare a Long-Term Monitoring and Reporting Plan for the Arkema Removal Action Area. The Long-Term Monitoring and Reporting Plan shall include inspections and analyses to monitor the Removal Action implemented at the Arkema Removal Action Area, including the institutional controls contained in the Action Memorandum.

If required, the Long-Term Monitoring and Reporting Plan shall describe monitoring objectives, an overview of the monitoring approach, design of the monitoring program (e.g., sampling strategy, station locations and replication, field sampling methods, laboratory methods), data analysis and interpretation, reporting requirements, and a schedule. The Plan shall include, as appropriate, visual inspection, bathymetric survey, sediment deposition monitoring, chemical monitoring, and sediment samples in capped areas and non-capped areas (including excavated areas) to monitor for recontamination. Data from long-term monitoring shall be assembled into reports and submitted to EPA in accordance with the schedule set forth in the Long-Term Monitoring and Reporting Plan. Based on long-term monitoring results, EPA shall determine if future response actions are needed to achieve the cleanup objectives.

10. Community Involvement Activities

If requested by EPA, Respondent shall provide information supporting EPA's community involvement programs related to the Work performed pursuant to this Order, and shall participate in public meetings which may be held or sponsored by EPA to explain activities at the Removal Action Area or concerning Work performed pursuant to this Order. EPA will coordinate its community outreach efforts with DEQ.

III. CONTENT OF SUPPORTING PLANS

1. Sampling and Analysis Plan

Respondent shall develop a project-specific SAP, or if multiple rounds of sampling are to occur, a field sampling round-specific SAP, comprising an FSP and a project-specific or field sampling round-specific QAPP for sample analysis and data handling for samples collected at the Removal Action Area. The SAP shall be based upon the AOC, SOW and EPA guidance.

The FSP will define in detail the sampling and data-gathering methods that will be used on the project. It will include sampling objectives, a detailed description of sampling activities, sample locations, sample analysis, sampling equipment and procedures, sampling schedule, station positioning, and sample handling (e.g., sample containers and labels, sample preservation). The SAP will be prepared in accordance with "Methods for Collection, Storage and Manipulation of Sediments for Chemical and Toxicological Analyses: Technical Manual" (EPA/823/B-01-002, October 2001) or the most current version or updated guidance. The content of the SAP shall include the type of information described in EPA's Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA (EPA/540/G-89-004).

The QAPP will describe the quality assurance and quality control protocols necessary to achieve required data quality objectives. Respondent shall follow, as appropriate, "Quality Assurance/Quality Control Guidance for Removal Activities: Sampling QA/QC Plan and Data Validation Procedures" (OSWER Directive No. 9360.4-01, April 1, 1990), or the most current version, as guidance for QA/QC and sampling. Respondent shall only use laboratories that have a documented Quality System that complies with ANSI/ASQC E-4 1994, "Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs" (American National Standard, January 5, 1995). A Quality Assurance Project Plan shall be prepared for each sample collection activity in accordance with: (1) "EPA Requirements for Quality Management Plans (QA/R5) (2001)" or the most current version; (2) for data validation "Guidance on Environmental Data Verification and Validation, EPA QA/G8 (2002)", or the most current version; and (3) the EPA Functional Guidelines for Data Review. The QAPP will address sampling procedures, sample custody, analytical procedures, and data reduction, validation, reporting, and personnel qualifications. The laboratory performing the work must have and follow an approved Quality Assurance (QA) program, which complies with "EPA Requirements for Quality Management Plans (QA/R-2)" (EPA/240/B-01-002, March 2001) or equivalent documentation as determined by EPA. If a laboratory not in the EPA Contract Laboratory Program (CLP) is selected, the QAPP shall be consistent with the requirements of the CLP for laboratories proposed outside the CLP. Respondent will provide assurances that EPA has access to laboratory personnel, equipment and records for sample collection, transportation, and analysis at reasonable times and upon reasonable notice by EPA.

All sampling and analyses performed pursuant to this Order shall conform to EPA direction, approval, and guidance regarding sampling, quality assurance/quality control (QA/QC), data validation, and chain-of-custody procedures. Respondent shall ensure that the laboratory used to perform the analyses participates in a QA/QC program that complies with the appropriate EPA guidance.

Upon request by EPA, Respondent shall have such a laboratory analyze samples submitted by EPA for quality-assurance monitoring. Respondent agrees that EPA personnel may audit any laboratory that performs analytical work under this SOW. Prior to awarding any work to an analytical laboratory, Respondent will inform the laboratory

that an audit may be performed, and that the laboratory agrees to coordinate with EPA prior to performing analyses.

Respondent shall provide to EPA the quality assurance/quality control procedures followed by all sampling teams and laboratories performing data collection and/or analysis. Upon request by EPA, Respondent shall allow EPA or its authorized representatives to take split and/or duplicate samples. Respondent shall notify EPA not less than 14 days in advance of any sample collection activity, unless shorter notice is agreed to by EPA. EPA shall have the right to take any additional samples that EPA deems necessary. EPA shall use its best efforts to notify Respondent not less than 14 days in advance of any sample collection activity EPA conducts and allow Respondent to take split or duplicate samples of any samples it takes as part of its oversight of Respondent's implementation of the Work.

All analytical data collected under this SOW shall be provided electronically to EPA.

2. Health and Safety Plan(s)

The HASP(s) ensures protection of health and safety during the performance of work under the AOC and this SOW. The HASP shall be prepared in accordance with EPA's Standard Operating Safety Guide (PUB 9285.1-03, PB 92-963414, June 1992). In addition, the plan shall comply with all currently applicable Occupational Safety and Health Administration ("OSHA") regulations found at 29 C.F.R. Part 1910. Respondent shall incorporate all changes to the plan recommended by EPA and shall implement the plan during the Removal Action.

3. Construction Quality Assurance Plan

The CQAP describes the project-specific components of the performance methods and quality assurance program to ensure that the completed project meets or exceeds all design criteria, plans, and specifications. The draft Plan shall be submitted with the Prefinal design and the Final Plan shall be submitted with the Final Design. The Final Plan shall be submitted prior to the start of construction in accordance with the approved construction schedule. The Plan shall provide requirements for the following elements:

- Responsibilities and authorities of all organization and key personnel involved in the Removal Action construction, including EPA and other agencies.

- Qualifications of the Construction Quality Assurance (CQA) Officer. Establish the minimum training and experience of the CQA Officer and supporting inspection personnel.

- Inspection and verification activities. Establish the observations and tests that will be required to monitor the construction and/or installation of the components of the Removal Action. The plan shall include the scope and frequency of each type of inspection to be conducted. Inspections shall be required to verify compliance with

environmental requirements and ensure compliance with all health and safety procedures.

- Performance standards and methods. Describe all performance standards and methods necessary to implement the removal construction. Performance monitoring requirements shall be designed to demonstrate that best management practices have been implemented during dredging operations, dredged or excavated material transportation, and cap placement.

- Sampling activities. Establish requirements for quality assurance sampling activities, including the sampling protocols, sample size, sample locations, frequency of testing, acceptance and rejection data sheets, and plans for correcting problems as addressed in the project specifications.

- Documentation. Establish the reporting requirements for construction quality assurance activities. This shall include such items as daily and weekly summary reports, inspection data sheets, problem identification and corrective measures reports, design acceptance reports, and final documentation. A description of the provisions for final storage of all records consistent with the requirements of the AOC shall be included.

IV. SUMMARY OF MAJOR DELIVERABLES/SCHEDULE

The schedule for submission to EPA of deliverables described in the SOW is presented in Table 1.

TABLE 1 – Schedule of Project Deliverables		
Engineering Evaluation/Cost Analysis (EE/CA) Work Plan	Draft EE/CA Work Plan Final EE/CA Work Plan	Within 90 days after effective date of AOC. Within 30 days after receipt of EPA comments on draft.
Upland Source Control	Upland Source Control Evaluation Report	Evaluation of upland source control will be completed in accordance with the schedule in the final EE/CA work plan.
Removal Action Area Characterization Report	Draft Removal Action Area Characterization Reports Final Removal Action Area Characterization Report	Within 150 days after EPA approval of the EE/CA Work Plan unless otherwise approved in the schedule in the Final EE/CA Work Plan if adequate justification is given and is approved by EPA. Within 30 days after receipt of EPA comments on draft Report.
Engineering Evaluation/Cost Analysis (EE/CA) Report	Technical Briefing on Proposed Remedial Alternatives First Draft EE/CA Second Draft (Public Review) EE/CA Final EE/CA	Within 30 days after approval of the Final Removal Action Area Characterization Report by EPA. Within 90 days of the Technical Briefing on Proposed Removal Alternatives. Within 60 days after receipt of EPA comments on first draft EE/CA. Within 60 days after receipt of EPA comments on second draft EE/CA.
Biological Assessment and 404 Memorandum	Draft Biological Assessment and Draft Clean Water Act Section 404 Memorandum Revised Biological Assessment and Revised	Submitted with draft EE/CA Submitted with revised draft EE/CA, within 60 days after

TABLE 1 – Schedule of Project Deliverables		
	Clean Water Act Section 404 Memorandum Draft Final BA	receipt of EPA comments on first draft EE/CA. If the ESA agencies determine that additional design information is necessary for a final BA, then a draft final BA shall be due as determined by the ESA agencies.
Project Design Documents	Conceptual (30 percent) Design Prefinal (90 percent) Design Final (100 percent) Design	Within 90 days of EPA signature of the Action Memorandum. Within 90 days after receipt of EPA comments on conceptual design. Within 60 days after receipt of EPA comments on prefinal design. The above deadlines may be modified in accordance with the schedule in the EE/CA final report if adequate justification is given and is approved by EPA.
Removal Action Work Plan	Draft Removal Action Work Plan Final Removal Action Work Plan	Within 60 days after EPA approval of the Contractor or in accordance with the schedule in the 100% design deliverable, if changes are justified in the document and approved by EPA. Within 30 days after receipt of EPA comments on draft Removal Action Work Plan.
Implementation of Removal Action	Notification of Removal Action Start Removal Action Start	Provide notification to EPA 30 days prior to initiation of Removal Action fieldwork to allow EPA to coordinate field oversight activities. 30 days after Notification

TABLE 1 – Schedule of Project Deliverables		
		Removal Action
Removal Action Completion Report	Draft Removal Action Completion Report Final Removal Action Completion Report	Within 60 days after completion of Removal Action (construction phase). Within 30 days after receipt of EPA comments on Draft Removal Action Completion Report.
Long-Term Monitoring and Reporting Plan	Draft Long-Term Monitoring and Reporting Plan Final Long-Term Monitoring and Reporting Plan Monitoring Data Reports	Within 60 days after EPA approval of the Final Design. Within 60 days after completion of the removal action and receipt of EPA comments. Schedule to be proposed by Respondent in the Long-Term Monitoring and Reporting Plan.

Reference to EPA comments reflects EPA's consideration of comments, including comments from the Oregon DEQ, the Tribes, and federal and state Natural Resource Trustees.

To: Cora, Lori[Cora.Lori@epa.gov]
Cc: Lance Peterson (PetersonLE@cdmsmith.com)[PetersonLE@cdmsmith.com]; Koch, Kristine[Koch.Kristine@epa.gov]; Conley, Alanna[conley.alanna@epa.gov]
From: Sheldrake, Sean
Sent: Wed 9/17/2014 11:09:32 PM
Subject: FW: Request for Determination - Arkema Dispute Dated July 3, 2014 for review
Arkema Request for Determination Letter_2014-09-12.pdf
EPA Position Summary Memo (17-Sept-14).doc

Lori, to start your review.

Kristine, Alanna, is this the latest schedule that is referenceable?

Lance, the 11E response needs to be recast—point out the data is not being included in the FS, that we started talking about it much earlier, and that we are also offering them an opportunity to do sampling, just not right now. The 11E work was proposed over a year before LSS starting talking about this work, things have changed, etc.

Letter needs to be reformatted as a letter from Blocker to Rick not memo.

Delete conclusions regarding disputed items—our responses line by line are enough.

Thank you.

S

Sean Sheldrake, Unit Diving Officer, RPM

EPA Region 10, 1200 Sixth Ave., Suite 900; Mailstop DOC-01

Seattle, WA 98101

206.553.1220 desk

206.225.6528 cell

http://yosemite.epa.gov/r10/cleanup.nsf/sites/ptldharbor

http://www.epa.gov/region10/dive/

Like us on Facebook! https://www.facebook.com/EPADivers

From: Peterson, Lance [mailto:PetersonLE@cdmsmith.com]
Sent: Wednesday, September 17, 2014 3:55 PM
To: Sheldrake, Sean
Subject: FW: Request for Determination - Arkema Dispute Dated July 3, 2014

Sean, attached is a draft EPA position on the Arkema dispute. We were not sure about the format; the draft follows something put together for one of the previous Arkema disputes. The rebuttal text is italicized for clarity. We can modify/edit after EPA review. Also, we believe the embedded PH schedule is the most current "public" version but that should be checked.

Lance

From: Eron Dodak [mailto:edodak@integral-corp.com]
Sent: Friday, September 12, 2014 7:02 PM
To: 'albright.rick@epa.gov'
Cc: 'Sheldrake, Sean'; Cora, Lori; Alex Liverman (liverman.alex@deq.state.or.us); Allen, Elizabeth; audiehuber@ctuir.com; bayuk.dana@deq.state.or.us; schwarz.bob@deq.state.or.us; bob@ridolfi.com; callie@ridolfi.com; Coffey, Scott; Conley, Alanna; Cora, Lori; cunninghame@gorge.net; Dan Hafley (HAFLEY.Dan@deq.state.or.us); erin.madden@gmail.com; Fuentes, Rene; Gail Fricano (gfricano@indecon.com); Genevieve Angle - NOAA-NMFS (Genevieve.Angle@noaa.gov); Gustavson, Karl; Holly Partridge (Holly.Partridge@grandronde.org); jd@williamsjohnsonlaw.com; Jen Kassakian (jkassakian@indecon.com); Jeremy_Buck@fws.gov; johnson.keith@deq.state.or.us; jweis@hk-law.com; King, Todd W.; Kristin Callahan; Koch, Kristine; Peterson, Lance; mcclincy.matt@deq.state.or.us; tosm@yakamafish-nsn.gov; Michael.karnosh@grandronde.org; Muza, Richard; nancy.munn@noaa.gov; peterson.Jennifer@deq.state.or.us; poulsen.mike@deq.state.or.us; Rachel DelVecchio (rdelvecchio@indecon.com); Robert.Neely@noaa.gov; rose@yakamafish-nsn.gov; Penoyar, Susan; ted_buerger@fws.gov; tomd@ctsi.nsn.us; Tom Gainer (gainer.tom@deq.state.or.us); David Livermore; erik.ipsen@erm.com; Karen TRAEGER; Stephen T. Parkinson - Arkema (SParkinson@jzplaw.com); Todd SLATER; 'Fred WOLF'; Blocker, Shawn; Yamamoto, Deb; David Livermore; Bridgette DeShields
Subject: Request for Determination - Arkema Dispute Dated July 3, 2014

Mr. Albright -

On behalf of LSS, agent for Arkema Inc., please find attached the Request for Determination by EPA Region 10's Director of the Office of Environmental Cleanup re: Arkema Dispute dated July 3, 2014. The attachments and exhibits to this letter are too large to email. They can be downloaded by clicking on the following link: Personal Privacy / Ex. 6
Personal Privacy / Ex. 6

Please contact Todd Slater at 610-594-4430 or me at 503-943-3614 if you have any questions or difficulty accessing the letter and attachments/exhibits. Thank you for your consideration of this matter.

Eron

Eron J. Dodak, R.G., L.H.G. | Managing Hydrogeologist

Integral Consulting Inc. | www.integral-corp.com

319 SW Washington Street, Suite 1150 | Portland, OR 97204

Tel: 503.284.5545, ext. 614 | Direct: 503.943.3614 | Cell: 503.407.2933 | Fax: 503.284.5755

HEALTH **ENVIRONMENT** TECHNOLOGY SUSTAINABILITY

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To: Lance Peterson (PetersonLE@cdmsmith.com)[PetersonLE@cdmsmith.com]
Cc: Cora, Lori[Cora.Lori@epa.gov]; Koch, Kristine[Koch.Kristine@epa.gov]
From: Sheldrake, Sean
Sent: Mon 9/15/2014 4:22:35 PM
Subject: FW: Request for Determination - Arkema Dispute Dated July 3, 2014
2006-01-11 Round 3 Data Gaps LWG letter.pdf

A very helpful citation Kristine, thank you, will reference.

S

Sean Sheldrake, Unit Diving Officer, RPM

EPA Region 10, 1200 Sixth Ave., Suite 900; Mailstop DOC-01

Seattle, WA 98101

206.553.1220 desk

206.225.6528 cell

http://yosemite.epa.gov/r10/cleanup.nsf/sites/ptldharbor

http://www.epa.gov/region10/dive/

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From: Koch, Kristine
Sent: Monday, September 15, 2014 9:13 AM
To: Sheldrake, Sean
Subject: FW: Request for Determination - Arkema Dispute Dated July 3, 2014

Sean, I'm attaching a letter from the LWG on sampling that may be of use to you in the dispute.

Regards,

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
Region 10
1200 Sixth Avenue, Suite 900, M/S ECL-115
Seattle, Washington 98101-3140

(206)553-6705
(206)553-0124 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: Eron Dodak [mailto:edodak@integral-corp.com]
Sent: Friday, September 12, 2014 7:02 PM
To: Albright, Rick
Cc: Sheldrake, Sean; Cora, Lori; Alex Liverman (liverman.alex@deq.state.or.us); Allen, Elizabeth; audiehuber@ctuir.com; bayuk.dana@deq.state.or.us; schwarz.bob@deq.state.or.us; bob@ridolfi.com; callie@ridolfi.com; coffeyse@cdm.com; Conley, Alanna; Cora, Lori; cunninghame@gorge.net; Dan Hafley (HAFLEY.Dan@deq.state.or.us); erin.madden@gmail.com; Fuentes, Rene; Gail Fricano (gfricano@indecon.com); Genevieve Angle - NOAA-NMFS (Genevieve.Angle@noaa.gov); Gustavson, Karl; Holly Partridge (Holly.Partridge@grandronde.org); jd@williamsjohnsonlaw.com; Jen Kassakian (jkassakian@indecon.com); Jeremy_Buck@fws.gov; johnson.keith@deq.state.or.us; jweis@hk-law.com; KingTW@cdmsmith.com; Kristin Callahan; Koch, Kristine; Lance Peterson (PetersonLE@cdmsmith.com); mcclincy.matt@deq.state.or.us; tosm@yakamafish-nsn.gov; Michael.karnosh@grandronde.org; Muza, Richard; nancy.munn@noaa.gov; peterson.Jennifer@deq.state.or.us; poulsen.mike@deq.state.or.us; Rachel DelVecchio (rdelvecchio@indecon.com); Robert.Neely@noaa.gov; rose@yakamafish-nsn.gov; Susan Penoyar (PenoyarSJ@cdmsmith.com); ted_buerger@fws.gov; tomd@ctsi.nsn.us; Tom Gainer (gainer.tom@deq.state.or.us); David Livermore; erik.ipsen@erm.com; Karen TRAEGER; Stephen T. Parkinson - Arkema (SParkinson@jzplaw.com); Todd SLATER; 'Fred WOLF'; Blocker, Shawn; Yamamoto, Deb; David Livermore; Bridgette DeShields
Subject: Request for Determination - Arkema Dispute Dated July 3, 2014

Mr. Albright -

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EPA Region 10's Director of the Office of Environmental Cleanup re: Arkema Dispute dated July 3, 2014. The attachments and exhibits to this letter are too large to email. They can be downloaded by clicking on the following link: Personal Privacy / Ex. 6
Personal Privacy / Ex. 6

Please contact Todd Slater at 610-594-4430 or me at 503-943-3614 if you have any questions or difficulty accessing the letter and attachments/exhibits. Thank you for your consideration of this matter.

Eron

Eron J. Dodak, R.G., L.H.G. | Managing Hydrogeologist

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HEALTH **ENVIRONMENT** TECHNOLOGY SUSTAINABILITY

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To: Blocker, Shawn[Blocker.Shawn@epa.gov]
Cc: Cora, Lori[Cora.Lori@epa.gov]; Koch, Kristine[Koch.Kristine@epa.gov]; Yamamoto, Deb[Yamamoto.Deb@epa.gov]
From: Sheldrake, Sean
Sent: Sat 8/23/2014 4:29:01 PM
Subject: FW: Arkema Inc. - Portland, Oregon
Response to 7_3_14 Arkema Dispute Letter_8_7_14(REV1).docx
Final_BERA_Benthic_Risk_Areas.pdf
arkema_drivers B and F RAL_REV1.pdf

Hi Shawn, Here is the latest draft of a possible dispute letter for everyone's reference for the Wednesday call. Just as a reminder, Personal Privacy / Ex. 6
Personal Privacy / Ex. 6

I've reserved the 1st floor trillium room for the meeting which runs 1-230 in theory (11r, 11d not available)

Thank you.

S

Sean Sheldrake, Unit Diving Officer, RPM

EPA Region 10, 1200 Sixth Ave., Suite 900; Mailstop DOC-01

Seattle, WA 98101

206.553.1220 desk

206.225.6528 cell

http://yosemite.epa.gov/r10/cleanup.nsf/sites/ptldharbor

http://www.epa.gov/region10/dive/

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From: Sheldrake, Sean
Location: Call-in #: Personal Privacy / Ex. 6 Conference ID: Personal Privacy / Ex. 6 Passcode: Personal Privacy / Ex. 6
Importance: Normal
Subject: FW: Arkema Dispute Meeting
Start Date/Time: Wed 8/27/2014 8:00:00 PM
End Date/Time: Wed 8/27/2014 9:30:00 PM
Response to 7_3_14 Arkema Dispute Letter_8_7_14(REV1).docx
Final_BERA_Benthic_Risk_Areas.pdf
arkema_drivers B and F RAL_REV1.pdf

We'll be in the 1st floor trillium room.

-----Original Appointment-----
From: Matt Stock [mailto:mstock@jzplaw.com]
Sent: Thursday, July 31, 2014 2:27 PM
To: Matt Stock; Doug LOUTZENHISER; Karen TRAEGER; Todd SLATER; David Livermore (dlivermore@integral-corp.com); frederick.wolf@total.com; Cora, Lori; Sheldrake, Sean
Subject: Arkema Dispute Meeting
When: Wednesday, August 27, 2014 1:00 PM-2:30 PM (UTC-08:00) Pacific Time (US & Canada).
Where: Call-in #: Personal Privacy / Ex. 6 Conference ID: Personal Privacy / Ex. 6 Passcode: Personal Privacy / Ex. 6

To: Cora, Lori[Cora.Lori@epa.gov]; Koch, Kristine[Koch.Kristine@epa.gov]; Cohen, Lori[Cohen.Lori@epa.gov]; Muza, Richard[Muza.Richard@epa.gov]
Cc: Yamamoto, Deb[Yamamoto.Deb@epa.gov]
From: Sheldrake, Sean
Sent: Wed 7/23/2014 6:18:12 PM
Subject: RE: Followup to 7/8/14 meeting

Attorney Client / Ex. 5

Sean Sheldrake, Unit Diving Officer, RPM

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http://www.epa.gov/region10/dive/

Like us on Facebook! https://www.facebook.com/EPADivers

From: Cora, Lori
Sent: Wednesday, July 23, 2014 11:16 AM
To: Koch, Kristine; Cohen, Lori; Muza, Richard; Sheldrake, Sean
Cc: Yamamoto, Deb
Subject: RE: Followup to 7/8/14 meeting

Attorney Client / Ex. 5

Lori Houck Cora | Acting Unit 2 Manager
U.S. Environmental Protection Agency | Region 10

P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

From: Koch, Kristine
Sent: Tuesday, July 22, 2014 5:51 PM
To: Cohen, Lori; Muza, Richard; Sheldrake, Sean
Cc: Cora, Lori; Yamamoto, Deb
Subject: RE: Followup to 7/8/14 meeting

Sorry, I didn't see the message went out final so I thought I could still send comments.

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
Region 10
1200 Sixth Avenue, Suite 900, M/S ECL-115
Seattle, Washington 98101-3140

(206)553-6705
(206)553-0124 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: Cohen, Lori
Sent: Tuesday, July 22, 2014 5:07 PM
To: Koch, Kristine; Muza, Richard; Sheldrake, Sean
Cc: Cora, Lori; Yamamoto, Deb
Subject: RE: Followup to 7/8/14 meeting

All- My note was sent to DEQ on 7/18 after I incorporated Rich's comments. This would have been a good clarification to include… will just have to use this in discussions when we follow up with DEQ.

Thx,

Lori

From: Koch, Kristine
Sent: Tuesday, July 22, 2014 1:35 PM
To: Cohen, Lori; Muza, Richard; Sheldrake, Sean
Cc: Cora, Lori; Yamamoto, Deb
Subject: RE: Followup to 7/8/14 meeting

I made some suggested edits in red, below.

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: Cohen, Lori
Sent: Friday, July 18, 2014 3:31 PM
To: Muza, Richard; Koch, Kristine; Sheldrake, Sean
Cc: Cora, Lori; Yamamoto, Deb
Subject: FW: Followup to 7/8/14 meeting

FYI all.

Rich, thanks for your comments/ updates on the downtown reach – I incorporated this into this note (hopefully captured this correctly).

From: Cohen, Lori
Sent: Friday, July 18, 2014 3:30 PM
To: Nina DeConcini; 'PARRETT Kevin'; 'johnson.keith@deq.state.or.us'
Cc: Yamamoto, Deb
Subject: Followup to 7/8/14 meeting

Greetings Nina, Kevin and Keith,

Thank you for meeting with Deb and I last week regarding the Portland Harbor Superfund Site. We covered a lot of ground in a short time, and I wanted to just a highlight and follow up to a few of the discussion points. Please note, Deb is on leave this week so she has not seen these notes and may have additional thoughts to add when she gets back but I wanted to get these notes out before this week is over.

Additional Work – ~~We discussed DEQ's proposed assistance on in-water work.~~ In response to concerns raised by the community members regarding potential exposures in Willamette Cove by people who reside there, DEQ explained it is working with the Port to address upland soil contamination over the next four months. EPA acknowledged the importance of this work in this EJ community; please keep us posted as this progresses.

In addition, we discussed the possibility that DEQ work with other parties (eg. Gunderson, 11E) to do sediment cleanup work in advance of the EPA's ROD for the site. EPA expressed some concerns over this proposal emphasizing that EPA cannot give any kind of release of liability for such cleanup work in advance of the ROD and a settlement with the companies performing the work. That being said, EPA is willing to discuss this further with DEQ as long as it is clear there is a risk that EPA would not ultimately be able to approve such a cleanup if it ends up not being consistent with the ROD. Note that even if a company does a cleanup on or adjacent to its property, the company may have other liability at the Portland Harbor Superfund site for other releases of hazardous waste (including downriver impacts).

Further, Lori Cora provided me with the specific language in CERCLA that I wanted to share with you. The provision is Section 122(e)(6) of CERCLA and it says: "When either the President or a [PRP] pursuant to an administrative Order or consent decree under this chapter, has initiated a remedial investigation and feasibility study for a particular facility under this chapter, no [PRP] may undertake any remedial action at the facility unless such remedial action has been authorized by the President." This essentially says that no PRP can do remedial action

at a site unless EPA authorizes it. It does not prohibit removal actions and it does not prohibit DEQ from going out and do cleanup work. The language provides no PRP can do remedial work without EPA authorization and thus further supports that EPA will not give covenants for work PRPs may do with DEQ.

When we finished this part of the discussion, we understood that DEQ has some more thinking to do about this and we agreed to that before DEQ moves forward on any sediment work at the Site, we would discuss this further. I think you are aware that our preference is that DEQ use its resources to continue to address the challenging source control issues at the site rather than focus on the sediment cleanup work.

Downtown Reach – EPA brought up a question about ongoing source control work needed in the downtown reach to reduce the impacts that we see in the river. DEQ responded that a few years ago, it completed a study of the downtown reach and concluded that the downtown reach was not a source of contamination for sediments downriver. DEQ said that bringing up water quality concerns was a new issue – and asked that we discuss this further as to what EPA's concerns are. We agreed to a meeting to follow up on this issue where DEQ could present its findings to date, and we could discuss data gaps.

Both the draft RI and FS reports prepared by the LWG indicate that there is a significant loading of contamination to the study area from the downtown reach. This is why the LWG has argued that the background values for many contaminants should include loading from this reach and even their fate and transport model used loading values coming into the study area from the downtown reach. EPA has argued that the premise for the FS is that all sources are controlled, so it is inappropriate for the LWG to use this loading term in determining long-term equilibrium for the site in evaluating remedy effectiveness. The current loading to the river from the downtown reach threaten to limit any remedy selected by EPA of achieving protective levels. The State needs to ensure that sources in this reach of the river are controlled or EPA will need to conduct this work Post ROD.

I know that Rick Muza has already followed up with DEQ staff on this topic. With regards to DEQ's Downtown Reach study, Rich has provided some additional information that I wanted to highlight for you. Rich noted that DEQ's Phase II Report (September 2011) had a Table 8 which identified priority areas (ie., areas with elevated detections of COCs in sediment) for additional assessment and potential actions at various river miles within this reach. Rich said that he has asked several times for status updates on work that had been done by DEQ on these priority areas; sounds like Matt McClincy has agreed to pull this information together. This information will be provided to Rich and could be the basis of our next conversations about this topic. Rich

indicated that DEQ has not evaluated the Downtown Reach for future recontamination potential to the Portland Harbor site.

Rich said he has also been in contact with DEQ and BES staff on a number of occasions regarding the fish tissue sampling results up near RM16 that Deb mentioned were of a concern to EPA at our last week's meeting. Rich said it is his understanding, since our meeting, that, DEQ is prepared to have DEQ look into this area further if we determine we need additional assessment/evaluation. We appreciate this and will discuss this with you further.

FS Revisions and Schedule –

-

DEQ said that overall things are going wells as far as opportunities for technical input on the RI and FS; but there are some points in the process where DEQ would expect more review time. As an example, DEQ pointed to Ch 1 of the FS, and Appendix A and said that some information was missing from Appendix A and DEQ therefore could not provide comments. We checked this out with Kristine, and while this is true, we would like to emphasize that this review process is intended to be collaborative and DEQ is getting information to review as quickly as we can get it to you. Further, DEQ will have until Aug to provide its comments on these portions of the FS (we just wanted to get it to you early to start the review.

EPA is committed to continue to work closely with DEQ on the RI and FS issues, and on the development of proposed alternatives for cleanup. At our meeting, we committed to starting to have more regular discussions with DEQ as we develop our proposed cleanup plan for presentation to the National Remedy Review Board and Contaminated Sediments Advisory Group. We recognize a unique role for the state in this process because ultimately, per CERCLA, EPA will be seeking the state's acceptance of the ROD. We would seek state acceptance from DEQ. We noted that in past conversations with now retired Jim Anderson, he believed there was a difference in state acceptance and state concurrence – EPA does not see a distinction in these terms and while the nine criteria analysis in CERCLA refers to state acceptance, both terms seemed to be used interchangeably in our guidance documents. One last note of our discussion was that we will have to determine how best to have discussions with DEQ on remedy selection given the fact that the state is a PRP at the site, and we will need to better understand how the state plans to address its dual role.

I hope this summary/update is helpful as we continue to work together on these issues.

Thank you,

Lori

To: Sheldrake, Sean[sheldrake.sean@epa.gov]; Cora, Lori[Cora.Lori@epa.gov]
From: Koch, Kristine
Sent: Fri 7/18/2014 7:38:08 PM
Subject: FW: Dispute of EPA Letter dated June 6, 2014, Arkema Removal Action
EECA dispute letter July 3.pdf

What's the status of this?

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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From: David Livermore [mailto:dlivermore@integral-corp.com]
Sent: Thursday, July 03, 2014 4:16 PM
To: Sheldrake, Sean; Cora, Lori
Cc: 'Alex Liverman'; 'allenmc@cdm.com'; 'audiehuber@ctuir.com'; 'bayuk.dana@deq.state.or.us'; schwarz.bob@deq.state.or.us; 'bob@ridolfi.com'; callie@ridolfi.com; Conley, Alanna; 'cunninghame@gorge.net'; 'Dan Hafley'; 'erin.madden@gmail.com'; Fuentes, Rene; 'Gail Fricano'; 'Genevieve Angle'; Gustavson, Karl; 'Holly Partridge'; 'jd@williamsjohnsonlaw.com'; 'Jen Kassakian'; Jeremy_Buck@fws.gov; 'johnson.keith@deq.state.or.us'; 'jweis@hk-law.com'; 'KingTW@cdmsmith.com'; 'Kristin Callahan'; Koch, Kristine; 'Lance Peterson'; 'matt@williamsjohnsonlaw.com'; 'mcclincy.matt@deq.state.or.us'; tosm@yakamafish-nsn.gov; Michael.karnosh@grandronde.org; Muza, Richard; nancy.munn@noaa.gov; peterson.Jennifer@deq.state.or.us; 'Rachel DelVecchio'; Robert.Neely@noaa.gov; rose@yakamafish-nsn.gov; 'Susan Penoyar'; 'ted_buerger@fws.gov'; tomd@ctsi.nsn.us; 'Tom Gainer'; Todd SLATER (todd.slater@total.com); Doug LOUTZENHISER; 'Karen Traeger'; Karen TRAEGER (karen.traeger@external.total.com); Personal Privacy / Ex. 6 Personal Privacy / Ex. 6 Steve Parkinson (SParkinson@jzplaw.com); Bridgette DeShields; Erik Ipsen; Brendan Robinson; Eron Dodak; Matt Stock (mstock@jzplaw.com)
Subject: Dispute of EPA Letter dated June 6, 2014, Arkema Removal Action
Importance: High

Sean and Lori-

On behalf of LSS, agent for Arkema, please find attached a letter that invokes the dispute resolution process related to statements and positions in EPA's June 6, 2014 letter regarding the Draft Sediment Sampling Work Plan and in a subsequent follow-up conference call between EPA, its partners, and LSS on June 19, 2014. The exhibits to this letter are too large to email. They can be downloaded by clicking on the following link: Personal Privacy / Ex. 6

Personal Privacy / Ex. 6

LSS looks forward to continuing to work with EPA to explore reasonable options to resolve our differences such that the proposed Arkema sampling can be performed in a timely manner with little additional EPA effort. Please contact Todd Slater at 610-594-4430 or me at 503-943-3613 if you have any questions or difficulty accessing the letter and exhibits.

Thank you,

David

David Livermore, R.G., L.H.G. | Principal and Regional Director

Integral Consulting Inc. | www.integral-corp.com

319 SW Washington Street, Suite 1150 | Portland, OR 97204

Direct: 503.943.3613 | Cell: 503.806.4665 | Fax: 503.284.5755

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To: Sheldrake, Sean[sheldrake.sean@epa.gov]; Cora, Lori[Cora.Lori@epa.gov]
Cc: 'Alex Liverman'[liverman.alex@deq.state.or.us]; 'allenmc@cdm.com'[allenmc@cdm.com]; 'audiehuber@ctuir.com'[audiehuber@ctuir.com]; 'bayuk.dana@deq.state.or.us'[bayuk.dana@deq.state.or.us]; schwarz.bob@deq.state.or.us[schwarz.bob@deq.state.or.us]; 'bob@ridolfi.com'[bob@ridolfi.com]; callie@ridolfi.com[callie@ridolfi.com]; Conley, Alanna[conley.alanna@epa.gov]; 'cunninghame@gorge.net'[cunninghame@gorge.net]; 'Dan Hafley'[HAFLEY.Dan@deq.state.or.us]; 'erin.madden@gmail.com'[erin.madden@gmail.com]; Fuentes, Rene[fuentes.rene@epa.gov]; 'Gail Fricano'[gfricano@indecon.com]; 'Genevieve Angle'[Genevieve.Angle@noaa.gov]; Gustavson, Karl[Gustavson.Karl@epa.gov]; 'Holly Partridge'[Holly.Partridge@grandronde.org]; 'jd@williamsjohnsonlaw.com'[jd@williamsjohnsonlaw.com]; 'Jen Kassakian'[jkassakian@indecon.com]; Jeremy_Buck@fws.gov[Jeremy_Buck@fws.gov]; 'johnson.keith@deq.state.or.us'[johnson.keith@deq.state.or.us]; 'jweis@hk-law.com'[jweis@hk-law.com]; 'KingTW@cdmsmith.com'[KingTW@cdmsmith.com]; 'Kristin Callahan'[kristin@ridolfi.com]; Koch, Kristine[Koch.Kristine@epa.gov]; 'Lance Peterson'[PetersonLE@cdmsmith.com]; 'matt@williamsjohnsonlaw.com'[matt@williamsjohnsonlaw.com]; 'mcclincy.matt@deq.state.or.us'[mcclincy.matt@deq.state.or.us]; tosm@yakamafish-nsn.gov[tosm@yakamafish-nsn.gov]; Michael.karnosh@grandronde.org[Michael.karnosh@grandronde.org]; Muza, Richard[Muza.Richard@epa.gov]; nancy.munn@noaa.gov[nancy.munn@noaa.gov]; peterson.Jennifer@deq.state.or.us[peterson.Jennifer@deq.state.or.us]; 'Rachel DelVecchio'[rdelvecchio@indecon.com]; Robert.Neely@noaa.gov[Robert.Neely@noaa.gov]; rose@yakamafish-nsn.gov[rose@yakamafish-nsn.gov]; 'Susan Penoyar'[PenoyarSJ@cdmsmith.com]; 'ted_buerger@fws.gov'[ted_buerger@fws.gov]; tomd@ctsi.nsn.us[tomd@ctsi.nsn.us]; 'Tom Gainer'[gainer.tom@deq.state.or.us]; Todd SLATER (todd.slater@total.com)[todd.slater@total.com]; Doug LOUTZENHISER[doug.loutzenhiser@total.com]; 'Karen Traeger'[karen.traeger@total.com]; Karen TRAEGER (karen.traeger@external.total.com)[karen.traeger@external.total.com]; Fred Wolf Personal Privacy / Ex. 6 Fred WOLF[frederick.wolf@total.com]; Steve Parkinson (SParkinson@jzplaw.com)[SParkinson@jzplaw.com]; Bridgette DeShields[bdeshields@integral-corp.com]; Erik Ipsen[Erik.Ipsen@erm.com]; Brendan Robinson[Brendan.Robinson@erm.com]; Eron Dodak[edodak@integral-corp.com]; Matt Stock (mstock@jzplaw.com)[mstock@jzplaw.com]
From: David Livermore
Sent: Thur 7/3/2014 11:15:45 PM
Subject: Dispute of EPA Letter dated June 6, 2014, Arkema Removal Action
EECA dispute letter July 3.pdf

Sean and Lori-

On behalf of LSS, agent for Arkema, please find attached a letter that invokes the dispute resolution process related to statements and positions in EPA's June 6, 2014 letter regarding the Draft Sediment Sampling Work Plan and in a subsequent follow-up conference call between EPA, its partners, and LSS on June 19, 2014. The exhibits to this letter are too large to email. They can be downloaded by clicking on the following link: Personal Privacy / Ex. 6
Personal Privacy / Ex. 6

LSS looks forward to continuing to work with EPA to explore reasonable options to resolve our

differences such that the proposed Arkema sampling can be performed in a timely manner with little additional EPA effort. Please contact Todd Slater at 610-594-4430 or me at 503-943-3613 if you have any questions or difficulty accessing the letter and exhibits.

Thank you,

David

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To: Eron Dodak[edodak@integral-corp.com]
Cc: 'Alex Liverman'[liverman.alex@deq.state.or.us]; 'allenmc@cdm.com'[allenmc@cdm.com]; 'audiehuber@ctuir.com'[audiehuber@ctuir.com]; 'bayuk.dana@deq.state.or.us'[bayuk.dana@deq.state.or.us]; schwarz.bob@deq.state.or.us[schwarz.bob@deq.state.or.us]; 'bob@ridolfi.com'[bob@ridolfi.com]; callie@ridolfi.com[callie@ridolfi.com]; Conley, Alanna[conley.alanna@epa.gov]; Cora, Lori[Cora.Lori@epa.gov]; 'cunninghame@gorge.net'[cunninghame@gorge.net]; 'Dan Hafley'[HAFLEY.Dan@deq.state.or.us]; 'erin.madden@gmail.com'[erin.madden@gmail.com]; Fuentes, Rene[fuentes.rene@epa.gov]; 'Gail Fricano'[gfricano@indecon.com]; 'Genevieve Angle'[Genevieve.Angle@noaa.gov]; Gustavson, Karl[Gustavson.Karl@epa.gov]; 'Holly Partridge'[Holly.Partridge@grandronde.org]; 'jd@williamsjohnsonlaw.com'[jd@williamsjohnsonlaw.com]; 'Jen Kassakian'[jkassakian@indecon.com]; Jeremy_Buck@fws.gov[Jeremy_Buck@fws.gov]; 'johnson.keith@deq.state.or.us'[johnson.keith@deq.state.or.us]; 'jweis@hk-law.com'[jweis@hk-law.com]; 'KingTW@cdmsmith.com'[KingTW@cdmsmith.com]; 'Kristin Callahan'[kristin@ridolfi.com]; Koch, Kristine[Koch.Kristine@epa.gov]; 'Lance Peterson'[PetersonLE@cdmsmith.com]; 'matt@williamsjohnsonlaw.com'[matt@williamsjohnsonlaw.com]; 'mcclincy.matt@deq.state.or.us'[mcclincy.matt@deq.state.or.us]; tosm@yakamafish-nsn.gov[tosm@yakamafish-nsn.gov]; Michael.karnosh@grandronde.org[Michael.karnosh@grandronde.org]; Muza, Richard[Muza.Richard@epa.gov]; nancy.munn@noaa.gov[nancy.munn@noaa.gov]; peterson.Jennifer@deq.state.or.us[peterson.Jennifer@deq.state.or.us]; 'Rachel DelVecchio'[rdelvecchio@indecon.com]; Robert.Neely@noaa.gov[Robert.Neely@noaa.gov]; rose@yakamafish-nsn.gov[rose@yakamafish-nsn.gov]; 'Susan Penoyar'[PenoyarSJ@cdmsmith.com]; 'ted_buerger@fws.gov'[ted_buerger@fws.gov]; tomd@ctsi.nsn.us[tomd@ctsi.nsn.us]; 'Tom Gainer'[gainer.tom@deq.state.or.us]; Todd SLATER (todd.slater@total.com)[todd.slater@total.com]; Doug LOUTZENHISER[doug.loutzenhiser@total.com]; 'Karen Traeger'[karen.traeger@total.com]; Karen TRAEGER (karen.traeger@external.total.com)[karen.traeger@external.total.com]; Fred Wolf **Personal Privacy / Ex. 6** Fred WOLF[frederick.wolf@total.com]; Steve Parkinson (SParkinson@jzplaw.com)[SParkinson@jzplaw.com]; Bridgette DeShields[bdeshields@integral-corp.com]; David Livermore[dlivermore@integral-corp.com]; Erik Ipsen[Erik.Ipsen@erm.com]; Brendan Robinson[Brendan.Robinson@erm.com]
From: Sheldrake, Sean
Sent: Fri 6/6/2014 6:26:44 PM
Subject: RE: Draft Arkema Sediment Sampling Work Plan- review comments
sampling workplan 6 6 14.pdf

Hello Eron and Todd,

Please see the attached EPA review letter concerning the sediment sampling work plan for use on our upcoming telecon. Talk to you on June 19.

Thank you.

S

Sean Sheldrake, Unit Diving Officer, RPM

EPA Region 10, 1200 Sixth Ave., Suite 900

Seattle, WA 98101

206.553.1220 desk

206.225.6528 cell

http://yosemite.epa.gov/r10/cleanup.nsf/sites/ptldharbor

http://www.epa.gov/region10/dive/

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From: Eron Dodak [mailto:edodak@integral-corp.com]
Sent: Wednesday, April 30, 2014 8:56 PM
To: Sheldrake, Sean
Cc: 'Alex Liverman'; 'allenmc@cdm.com'; 'audiehuber@ctuir.com'; 'bayuk.dana@deq.state.or.us'; schwarz.bob@deq.state.or.us; 'bob@ridolfi.com'; callie@ridolfi.com; Conley, Alanna; Cora, Lori; 'cunninghame@gorge.net'; 'Dan Hafley'; 'erin.madden@gmail.com'; Fuentes, Rene; 'Gail Fricano'; 'Genevieve Angle'; Gustavson, Karl; 'Holly Partridge'; 'jd@williamsjohnsonlaw.com'; 'Jen Kassakian'; Jeremy_Buck@fws.gov; 'johnson.keith@deq.state.or.us'; 'jweis@hk-law.com'; 'KingTW@cdmsmith.com'; 'Kristin Callahan'; Koch, Kristine; 'Lance Peterson'; 'matt@williamsjohnsonlaw.com'; 'mcclincy.matt@deq.state.or.us'; tosm@yakamafish-nsn.gov; Michael.karnosh@grandronde.org; Muza, Richard; nancy.munn@noaa.gov; peterson.Jennifer@deq.state.or.us; 'Rachel DelVecchio'; Robert.Neely@noaa.gov; rose@yakamafish-nsn.gov; 'Susan Penoyar'; 'ted_buerger@fws.gov'; tomd@ctsi.nsn.us; 'Tom Gainer'; Todd SLATER (todd.slater@total.com); Doug LOUTZENHISER; 'Karen Traeger'; Karen TRAEGER (karen.traeger@external.total.com); Fred Wolf **Personal Privacy / Ex. 6**; Fred WOLF; Steve Parkinson (SParkinson@jzplaw.com); Bridgette DeShields; David Livermore; Erik Ipsen; Brendan Robinson
Subject: Draft Arkema Sediment Sampling Work Plan

Hi Sean,

On behalf of LSS, agent for Arkema Inc., please find attached an electronic copy of the draft sediment sampling work plan text, tables, and figures for the Arkema, Portland site. This work plan is being submitted in accordance with the Administrative Order on Consent and subsequent EPA-LSS agreements.

The ShareFile link below contains the appendices (Field Sampling Plan, Quality Assurance Project Plan, and Health and Safety Plan) that can be downloaded to your computer. Please note that this work plan is tagged to the extent feasible. Materials received from other sources and included in appendices may not be fully tagged.

Please let Todd Slater or me know if you have any questions about this submittal. Thanks!

Personal Privacy / Ex. 6

Eron

Eron J. Dodak, R.G., L.H.G. | Managing Hydrogeologist

Integral Consulting Inc. | www.integral-corp.com

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To: Cora, Lori[Cora.Lori@epa.gov]
Cc: Koch, Kristine[Koch.Kristine@epa.gov]
From: Sheldrake, Sean
Sent: Tue 6/3/2014 9:47:13 PM
Subject: Letter (draft), scheduling a call with LSS
Arkema Sed Samp WP Letter_6-2-14.docx

Hi Lori, per our meeting with ecl management, we talked about your notion of going forward with some of what they had proposed, but not tying it to the FS schedule. Can you look at the attached and see what you think? I'm trying to schedule a call with LSS for 6/18 or 6/19 Personal Privacy / Ex. 6

Personal Privacy / Ex. 6

Thank you.

S

Sean Sheldrake, Unit Diving Officer, RPM

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http://yosemite.epa.gov/r10/cleanup.nsf/sites/ptldharbor

http://www.epa.gov/region10/dive/

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To: Cora, Lori[Cora.Lori@epa.gov]
From: Koch, Kristine
Sent: Wed 4/16/2014 11:42:35 PM
Subject: RE: Draft FS Section 3.4
2012-03_Section 3_Tables.xlsx

Sorry Lori, I should have sent you the Word file. Here are the Tables for Section 3.

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
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1200 Sixth Avenue, Suite 900, M/S ECL-115
Seattle, Washington 98101-3140

(206)553-6705
(206)553-0124 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: Cora, Lori
Sent: Wednesday, April 16, 2014 3:14 PM
To: Koch, Kristine
Subject: Draft FS Section 3.4

Attorney Client / Ex. 5

Likewise, I didn't try to make changes to Table 3.4-1 but changes are needed to update the list. The Oregon hot spot regs should be deleted and the reference to oregon's Water Quality Standards needs to be updated to refer to all Tables containing updated numeric toxic standards for human health and eco (I believe that means Table 20, Table 40 and 33A and 33B). See my comment in Section 3.4 Also, the regulatory citation to Oregon's Water Quality standards is wrong as it only refers to the beneficial use designations for the lower Willamette. Basically, Oregon WQS (numeric, narrative, antidegradation and beneficial uses) are in a different section of the regs for each. So OAR 340-041-004, 007, 00011, 0033, and 0340 I believe is where all potential state WQS that are ARAR would be found.

If someone can send me the Table in word I would make more nits too. Let me know if you have questions about my changes or comments.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Sheldrake, Sean
Location: Anchor QEA 421 SW Sixth Avenue, Suite 750 / Personal Privacy / Ex. 6 and web meeting (see below)
Importance: Normal
Subject: FW: Portland Harbor FS - Principal Threat Material and Oregon Hot Spots (Issue 3.5 and 3.6)
Start Date/Time: Tue 4/15/2014 4:00:00 PM
End Date/Time: Tue 4/15/2014 8:00:00 PM

Hello everyone, in case you did not receive this already. S

-----Original Appointment-----
From: Jennifer Woronets [mailto:jworonets@anchorqea.com]
Sent: Thursday, March 13, 2014 8:19 AM
To: Jennifer Woronets; Carl Stivers; Amanda Shellenberger; Bob Wyatt; Jim McKenna (jim.mckenna@verdantllc.com); Humphrey, Chip; Koch, Kristine; Eric Blischke (blischkeel@cdm.com); Sheldrake, Sean; Tom Gainer (GAINER.Tom@deq.state.or.us); Eric Blischke (blischkeel@cdmsmith.com); Eric Blischke (blischkee@cdmsmith.com); Lance Peterson (PetersonLE@cdmsmith.com); Penoyar, Susan; Kim Cox (kim.cox@portlandoregon.gov); Dave Livesay; Mark Lewis (mlewis@formationenv.com); Madalinski, Kelly; Fred Wolf email 2 Personal Privacy / Ex. 6 Fred G. Wolf (Frederick.wolf@total.com)
Cc: Todd King (KingTW@cdmsmith.com); Matt Johnson (matt@williamsjohnsonlaw.com); Bob Dexter; Matt McClincy (mcclincy.matt@deq.state.or.us); Michael.karnosh@grandronde.org; Fuentes, Rene; Robert.Neely@noaa.gov; Rose Longoria; Erin Madden (erin.madden@gmail.com)
Subject: Portland Harbor FS - Principal Threat Material and Oregon Hot Spots (Issue 3.5 and 3.6)
When: Tuesday, April 15, 2014 9:00 AM-1:00 PM (UTC-08:00) Pacific Time (US & Canada).
Where: Anchor QEA 421 SW Sixth Avenue, Suite 750 / Personal Privacy / Ex. 6 and web meeting (see below)

Chip, Kristine, Eric, Sean, Tom G., Carl, Amanda, Bob, Jim -

Web meeting

Personal Privacy / Ex. 6

Jim will dial in as the host for this meeting.

Chip, Kristine - Please distribute this meeting notice to your team as appropriate.

To: Cora, Lori[Cora.Lori@epa.gov]
Cc: Koch, Kristine[Koch.Kristine@epa.gov]
From: Sheldrake, Sean
Sent: Thur 4/10/2014 3:22:26 PM
Subject: Re: Comments on the PTW Technical Memo - Portland Harbor

Ok, thx
Sean Sheldrake
Unit Diving Officer, RPM
206.553.1220 work cell
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From: Cora, Lori
Sent: Thursday, April 10, 2014 8:15:50 AM
To: Sheldrake, Sean
Cc: Koch, Kristine
Subject: RE: Comments on the PTW Technical Memo - Portland Harbor

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
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P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Sheldrake, Sean
Sent: Thursday, April 10, 2014 5:56 AM
To: Cora, Lori
Cc: Koch, Kristine
Subject: FW: Comments on the PTW Technical Memo - Portland Harbor

Lori, (and Kristine), In re-reading comment #4—I'm thinking HQ is reading this as a guidance doc that has to get thru OGC vs a AOC supporting doc that has to be clear where we are flexible

vs directing, so I'm not sure we should use that comment, but the others look solid., e.g. a phrase "shall be considered PTW for alternative evaluation in the FS" may be entirely appropriate in this context.

Let me know if you disagree…

Will call in by bike once I get off the ferry on the peninsula Kristine!

S

Sean Sheldrake, Unit Diving Officer, RPM

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http://www.epa.gov/region10/dive/

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From: Fonseca, Silvina
Sent: Wednesday, April 09, 2014 1:25 PM
To: Sheldrake, Sean; Koch, Kristine
Cc: Anderson, RobinM; Ells, Steve; Ammon, Doug; Lambert, Matthew; Gustavson, Karl; Legare, Amy
Subject: Comments on the PTW Technical Memo - Portland Harbor

Sean and Kristine,

We (Steve Ells, Robin Anderson, Doug Ammon, Matt Lambert, Karl Gustavson and I) met this morning to discuss the draft PTW Technical Memo. Given your short turn around request for input on this memo I am sending you today our general comments/issues/concerns we have with the current draft. I will be providing, at a later time – maybe by the end of the week, a redline/strikeout version of the document with specific comments and text edits. Thought these general issues could get you started in preparation for your meeting on the 15th.

First of all we would like to commend you on attempting to analyze the potential for PTW waste at this site and develop a rationale and to have a conversation on this topic early in the process and for reaching out to us for input.

Deliberative Process / Ex. 5

Deliberative Process / Ex. 5

Deliberative Process / Ex. 5

Deliberative Process / Ex. 5

Please let me know if you have any questions. We are available to discuss further with you, if needed.

Silvina Fonseca, Environmental Engineer
Office of Superfund Remediation and Technology Innovation

Phone #: 703-603-8799
Fax #: 703-603-9104

To: Cora, Lori[Cora.Lori@epa.gov]
From: Sheldrake, Sean
Sent: Tue 3/25/2014 1:35:12 AM
Subject: FW: Principal Threat Waste identification
PTW_Tech Memo_03-21-14_Final.pdf

Lori, Any comments on the current draft given that we'll revise and meet with LWG on this very soon and this could very likely be disputed? My comments fyi.

Thank you.

S

A few initial comments:

Attorney Client / Ex. 5

Sean Sheldrake, Unit Diving Officer, RPM

EPA Region 10, 1200 Sixth Ave., Suite 900

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http://yosemite.epa.gov/r10/cleanup.nsf/sites/ptldharbor

http://www.epa.gov/region10/dive/

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From: Penoyar, Susan [mailto:PenoyarSJ@cdmsmith.com]
Sent: Friday, March 21, 2014 2:04 PM
To: Humphrey, Chip; Koch, Kristine; Sheldrake, Sean; Gustavson, Karl
Cc: Peterson, Lance; Mullin, Jeanette; King, Todd W.; Blischke, Eric
Subject: Principal Threat Waste identification

Hi everyone!

Attached is a technical memo presenting an approach for identifying PTW at the Portland Harbor site for your review. We focused on presenting approaches that are consistent with EPA guidance. We identified three lines of evidence to identify PTW:

1. Observance of NAPL (mobility and toxicity)
2. Sediment contaminant concentrations that would exceed the contaminant's corresponding theoretical solubility limits in pore water (mobility)
3. Sediment contaminant concentrations that exceed a high concentration threshold equal to a sediment PRG multiplied by 1,000 (toxicity)

We are available to discuss the PTW identification approach at your convenience.

Have a great weekend!

Susan J. Penoyar, PE, LEG, BCEE | Vice President | CDM Smith

14432 SE Eastgate Way, Suite 100 | Bellevue, WA 98007

Ph: (425) 519-8300 | Fax: (425) 746-0197 | Cell: (206) 715-5971

penoyarsj@cdmsmith.com | cdmsmith.com

To: Cora, Lori[Cora.Lori@epa.gov]; Muza, Richard[Muza.Richard@epa.gov]
From: Yamamoto, Deb
Sent: Thur 3/6/2014 6:39:16 PM
Subject: RE: Letter to DEQ on the former Rhone Poulenc site

DEQ's consent, or an act of God, whichever is more difficult.

From: Cora, Lori
Sent: Thursday, March 06, 2014 8:53 AM
To: Muza, Richard; Yamamoto, Deb
Subject: RE: Letter to DEQ on the former Rhone Poulenc site

Thanks for your assessment. **Attorney Client / Ex. 5**

Lori Houck Cora | Assistant Regional Counsel
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From: Muza, Richard
Sent: Thursday, March 06, 2014 8:29 AM
To: Cora, Lori; Yamamoto, Deb
Subject: RE: Letter to DEQ on the former Rhone Poulenc site

No. When you look at the definitions in the JSCS for site priority, depending on your degree of conservatism, the plume here can be interpreted to be defined as either medium or high; that the medium will remain.

What does that really mean? It's the timing of taking actions. At the high priority sites, DEQ has required IRAMs to address migrating plumes (ie., Arkema, Gasco, etc). For medium priority sites, they work through the RI/FS process to select a remedy. For RP, I can say with 99% confidence that there will be in no actions in place to address the ground-water pathway at the

time of the PH Proposed Plan and can probably say with quite a bit of confidence that there will be no plans or time table for such an action at the time of the PH Proposed Plan, either. I expect that in response to the recent comment letters from DEQ, SLLI will at some point in 2014 go into formal dispute mode which will just delay getting anything done even longer. I cannot see them even having a draft FS by the time of the PH Proposed Plan. Even if DEQ changed the ranking, nothing get done anytime soon as SLLI would just dispute it. Sorry for being so damn pessimistic but I've seen this play way too many times in my career…

THANKS!

Rich

Rich Muza

Remedial Project Manager

U.S. EPA Region 10 Oregon Operations Office

805 SW Broadway, Suite 500 MS:OOO

Portland, Oregon 97205

Phone: 503-326-6554

Fax: 503-326-3399

From: Cora, Lori
Sent: Thursday, March 06, 2014 8:14 AM
To: Muza, Richard; Yamamoto, Deb
Subject: RE: Letter to DEQ on the former Rhone Poulenc site

Glad to hear DEQ agrees, so are or have they changed the priority to Extremely High?

Lori Houck Cora | **Assistant Regional Counsel**

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From: Muza, Richard
Sent: Thursday, March 06, 2014 8:05 AM
To: Cora, Lori; Yamamoto, Deb
Subject: RE: Letter to DEQ on the former Rhone Poulenc site

Lori & Deb

Hi. DEQ has absolutely no issues with anything in our letter and welcomed receiving it. DEQ has sent two recent comment letters on the RI-SCE Report that pretty much second our positions and further elaborate on the need for the FS to cover media and areas of the site that we want to see addressed. We're on the same page on this.

SLLI is what I like to call a "1980s PRP", one that just wants to spend money on consultants and meetings as that's a cheaper solution than ever really cleaning up a site. Our last meeting with them was a total waste of DEQ's, CDM's, and my time as they made statements that defied basic laws of physics and yet I was told by Dave Lacey (DEQ) just the other week that Joan recently said that EPA doesn't have any science to support its CSM data gaps claims… They are floundering right now from the punches that DEQ has thrown out in their recent letters and now they see this EPA letter. They recently requested a 60-day extension to respond to DEQ's latest comments and DEQ only gave them 45 days. Reality (ie., you really need to clean up this site sometime soon) may finally be sinking in for them but I'll be convinced when I see some real plans for an FS. At this point I'd recommend thanking her for her feedback and leave it at that. If she calls me, I'll deal with it.

THANKS!

Rich

Rich Muza

Remedial Project Manager

U.S. EPA Region 10 Oregon Operations Office

805 SW Broadway, Suite 500 MS:OOO

Portland, Oregon 97205

Phone: 503-326-6554

Fax: 503-326-3399

From: Cora, Lori
Sent: Thursday, March 06, 2014 7:45 AM
To: Yamamoto, Deb; Muza, Richard
Subject: RE: Letter to DEQ on the former Rhone Poulenc site

Attorney Client / Ex. 5

See suggested changes below that offers Rich and DEQ to meet with a company rep and the contractor.

Lori Houck Cora | Assistant Regional Counsel
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From: Yamamoto, Deb

Sent: Wednesday, March 05, 2014 3:22 PM
To: Muza, Richard
Cc: Cora, Lori
Subject: FW: Letter to DEQ on the former Rhone Poulenc site

Here's my proposed response to Joan. Edit as you see fit.

Hi Joan,

I appreciate your interest in meeting with EPA regarding the recent letter we sent to the Oregon DEQ on our concerns with groundwater contamination from the former Rhone Poulenc site and its status under DEQ's Source Control Program at Portland Harbor. In the first instance, it would be more appropriate for the Project Manager for Rhone Poulenc and you to meet with Rich Muza and _____ from DEQ to raise any concerns you have with our letter.

Sincerely,

Deb Yamamoto

From: Joan Underwood [mailto:junderwood@qmg-inc.com]
Sent: Tuesday, March 04, 2014 9:13 AM
To: Yamamoto, Deb
Subject: Letter to DEQ on the former Rhone Poulenc site

Hi Ms. Yamamoto, I left you a voice mail in addition to this email requesting a short phone call to discuss the letter that EPA sent to DEQ on Feb 24, 2014 concerning the former Rhone-Poulenc site. I am the project manager for StarLink for the site. If there is a specific time that works for you I would be happy to send out a meeting request that meets your schedule. I am in the Central time zone this week if we can work around that. My phone number is Personal Privacy / Ex. 6

Thank you for your consideration,

Joan

To: Cora, Lori[Cora.Lori@epa.gov]
Cc: Peterson, Lance[PetersonLE@cdmsmith.com]
From: Sheldrake, Sean
Sent: Thur 3/6/2014 5:28:53 PM
Subject: FW: Arkema and the early action
(CDM edit) Loutzenhiser.docx

Thanks Lance, that's just the excerpt I was looking for.

Lori, see what you think, but this may be water under the bridge if we close the entire AOC.

S

Sean Sheldrake, Unit Diving Officer, RPM

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From: Peterson, Lance [mailto:PetersonLE@cdmsmith.com]
Sent: Thursday, March 06, 2014 9:13 AM
To: Sheldrake, Sean
Subject: RE: Arkema and the early action

Sean, attached is CDM's proposed edits to the draft letter.

Lance

From: Sheldrake, Sean [mailto:sheldrake.sean@epa.gov]
Sent: Tuesday, March 04, 2014 5:15 PM
To: Peterson, Lance
Subject: FW: Arkema and the early action

Lance, could you add specific AOC/SOW references to the above letter for say less than 4 LOE to articulate the recontamination review that I see continuation of as critical to long term performance of the remedy?

Thanks

S

Sean Sheldrake, Unit Diving Officer, RPM

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http://yosemite.epa.gov/r10/cleanup.nsf/sites/ptldharbor

http://www.epa.gov/region10/dive/

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From: Cora, Lori
Sent: Tuesday, March 04, 2014 4:28 PM
To: Sheldrake, Sean; Blocker, Shawn
Subject: Arkema and the early action

Steve called to talk about the draft letter regarding putting the EE/CA on indefinite delay. See attached for your reference. They would like a more affirmative statement that the EE/CA will never be required. I told them that we didn't draft it that way because we could not do that unilaterally but if they mutually agree, we can both agree that the EE/CA is no longer a deliverable. They also would like more specificity as to what Work set forth in the AOC or SOW is still in force. They are wondering why the AOC still needs to stay in existence anymore because EPA is a support agency for all upland source control work and that is acknowledged in the RI/FS AOC. I said that the LWG did not agree to pay our oversight of upland source work.

Attorney Client / Ex. 5

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To: Cohen, Lori[Cohen.Lori@epa.gov]; Blocker, Shawn[Blocker.Shawn@epa.gov]; Yamamoto, Deb[Yamamoto.Deb@epa.gov]; Humphrey, Chip[Humphrey.Chip@epa.gov]; Koch, Kristine[Koch.Kristine@epa.gov]; Cora, Lori[Cora.Lori@epa.gov]
From: Sheldrake, Sean
Sent: Sat 1/25/2014 3:28:09 AM
Subject: Fw: LSS Dispute of EPA-Directed Issues/Comments-Arkema Portland
LSS Dispute Letter_2014-01-24.pdf

Hello everyone, its official, lss has invoked dispute on all issues we recently discussed. I'm transmitting this as an fyi for now; more to follow.

S
Sean Sheldrake
Unit Diving Officer, RPM
206.553.1220 work cell
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https://www.facebook.com/epaDIVERS

From: David Livermore <dlivermore@integral-corp.com>
Sent: Friday, January 24, 2014 4:53:55 PM
To: Sheldrake, Sean; Cora, Lori
Cc: Todd Slater (todd.slater@total.com); Karen TRAEGER (karen.traeger@external.total.com); Alex Liverman (liverman.alex@deq.state.or.us); allenmc@cdm.com; audiehuber@ctuir.com; bayuk.dana@deq.state.or.us; schwarz.bob@deq.state.or.us; brandy.humphreys@grandronde.org; callie@ridolfi.com; Conley, Alanna; cunninghame@gorge.net; Dan Hafley (HAFLEY.Dan@deq.state.or.us); erin.madden@gmail.com; Fuentes, Rene; Gail Fricano (gfricano@indecon.com); Genevieve Angle (Genevieve.Angle@noaa.gov); Humphrey, Chip; jd@williamsjohnsonlaw.com; Jen Kassakian (jkassakian@indecon.com); Jeremy_Buck@fws.gov; johnson.keith@deq.state.or.us; jweis@hk-law.com; Kristin Callahan; Koch, Kristine; Lance Peterson (PetersonLE@cdmsmith.com); matt@williamsjohnsonlaw.com; mcclincy.matt@deq.state.or.us; tosm@yakamafish-nsn.gov; Michael.karnosh@grandronde.org; Muza, Richard; Nancy.Munn@noaa.gov; peterson.Jennifer@deq.state.or.us; poulsen.mike@deq.state.or.us; Rachel DelVecchio (rdelvecchio@indecon.com); Robert.Neely@noaa.gov; rose@yakamafish-nsn.gov; ted_buerger@fws.gov; tomd@ctsi.nsn.us; Tom Gainer (gainer.tom@deq.state.or.us); Stephen T. Parkinson (sparkinson@jzplaw.com); Eron Dodak; Doug LOUTZENHISER
Subject: LSS Dispute of EPA-Directed Issues/Comments-Arkema Portland

Sean and Lori-

On behalf of LSS, agent for Arkema, please find attached a letter that invokes the dispute resolution process related to directed issues/comments presented in EPA's January 10, 2014 letter regarding the Draft EE/CA report. The exhibits to this letter are too large to email. They can be downloaded by clicking on the following link:

Personal Privacy / Ex. 6

LSS was encouraged by the cooperative and meaningful discussions last fall that ultimately led to resolving many of EPA's comments on the Draft EE/CA report. LSS looks forward to continuing to work with EPA in the formal negotiation period to explore reasonable options to resolve our differences.

David

David Livermore, R.G., L.H.G. | Principal

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To: Sheldrake, Sean[sheldrake.sean@epa.gov]; Cora, Lori[Cora.Lori@epa.gov]
Cc: Todd Slater (todd.slater@total.com)[todd.slater@total.com]; Karen TRAEGER (karen.traeger@external.total.com)[karen.traeger@external.total.com]; Alex Liverman (liverman.alex@deq.state.or.us)[liverman.alex@deq.state.or.us]; allenmc@cdm.com[allenmc@cdm.com]; audiehuber@ctuir.com[audiehuber@ctuir.com]; bayuk.dana@deq.state.or.us[bayuk.dana@deq.state.or.us]; schwarz.bob@deq.state.or.us[schwarz.bob@deq.state.or.us]; brandy.humphreys@grandronde.org[brandy.humphreys@grandronde.org]; callie@ridolfi.com[callie@ridolfi.com]; Conley, Alanna[conley.alanna@epa.gov]; cunninghame@gorge.net[cunninghame@gorge.net]; Dan Hafley (HAFLEY.Dan@deq.state.or.us)[HAFLEY.Dan@deq.state.or.us]; erin.madden@gmail.com[erin.madden@gmail.com]; Fuentes, Rene[fuentes.rene@epa.gov]; Gail Fricano (gfricano@indecon.com)[gfricano@indecon.com]; Genevieve Angle (Genevieve.Angle@noaa.gov)[Genevieve.Angle@noaa.gov]; Humphrey, Chip[Humphrey.Chip@epa.gov]; jd@williamsjohnsonlaw.com[jd@williamsjohnsonlaw.com]; Jen Kassakian (jkassakian@indecon.com)[jkassakian@indecon.com]; Jeremy_Buck@fws.gov[Jeremy_Buck@fws.gov]; johnson.keith@deq.state.or.us[johnson.keith@deq.state.or.us]; jweis@hk-law.com[jweis@hk-law.com]; Kristin Callahan[kristin@ridolfi.com]; Koch, Kristine[Koch.Kristine@epa.gov]; Lance Peterson (PetersonLE@cdmsmith.com)[PetersonLE@cdmsmith.com]; matt@williamsjohnsonlaw.com[matt@williamsjohnsonlaw.com]; mcclincy.matt@deq.state.or.us[mcclincy.matt@deq.state.or.us]; tosm@yakamafish-nsn.gov[tosm@yakamafish-nsn.gov]; Michael.karnosh@grandronde.org[Michael.karnosh@grandronde.org]; Muza, Richard[Muza.Richard@epa.gov]; Nancy.Munn@noaa.gov[Nancy.Munn@noaa.gov]; peterson.Jennifer@deq.state.or.us[peterson.Jennifer@deq.state.or.us]; poulsen.mike@deq.state.or.us[poulsen.mike@deq.state.or.us]; Rachel DelVecchio (rdelvecchio@indecon.com)[rdelvecchio@indecon.com]; Robert.Neely@noaa.gov[Robert.Neely@noaa.gov]; rose@yakamafish-nsn.gov[rose@yakamafish-nsn.gov]; ted_buerger@fws.gov[ted_buerger@fws.gov]; tomd@ctsi.nsn.us[tomd@ctsi.nsn.us]; Tom Gainer (gainer.tom@deq.state.or.us)[gainer.tom@deq.state.or.us]; Stephen T. Parkinson (sparkinson@jzplaw.com)[sparkinson@jzplaw.com]; Eron Dodak[edodak@integral-corp.com]; Doug LOUTZENHISER[doug.loutzenhiser@total.com]
From: David Livermore
Sent: Sat 1/25/2014 12:53:55 AM
Subject: LSS Dispute of EPA-Directed Issues/Comments-Arkema Portland
LSS Dispute Letter_2014-01-24.pdf

Sean and Lori-

On behalf of LSS, agent for Arkema, please find attached a letter that invokes the dispute resolution process related to directed issues/comments presented in EPA's January 10, 2014 letter regarding the Draft EE/CA report. The exhibits to this letter are too large to email. They can be downloaded by clicking on the following link:

Personal Privacy / Ex. 6

LSS was encouraged by the cooperative and meaningful discussions last fall that ultimately led to resolving many of EPA's comments on the Draft EE/CA report. LSS looks forward to continuing to work with EPA in the formal negotiation period to explore reasonable options to resolve our differences.

David

David Livermore, R.G., L.H.G. | Principal

Integral Consulting Inc. | www.integral-corp.com

319 SW Washington Street, Suite 1150 | Portland, OR 97204

Direct: 503.943.3613 | Cell: 503.806.4665 | Fax: 503.284.5755

HEALTH **ENVIRONMENT** **TECHNOLOGY** SUSTAINABILITY

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From: Peterson, Lance
Location: Conference Line Number: Personal Privacy / Ex. 6 Access Code: Personal Privacy / Ex. 6
Importance: Normal
Subject: Arkema EE/CA comment call
Start Date/Time: Thur 12/12/2013 5:00:00 PM
End Date/Time: Thur 12/12/2013 7:00:00 PM
LSS Discussion Comments_2013-11-14 Meeting with EPA.PDF
LSS-EPA Agreements_2013-11-14.pdf

This call is a follow-up to the November 14th meeting between EPA, partners and LSS that was held to discuss the comments on the draft Arkema EE/CA report. David Livermore with Integral Consulting provided the below message to EPA back before the November meeting describing LSS' proposed outline to discuss the comments. This Thursday's call will take up where we left off on 11/14 (we need to discuss Group 4 through Group 9 comments from below) and we may also discuss the attached "agreements" from the 11/14 meeting.

Lance and Sean,

Attached is a spreadsheet summarizing the 14 comments that LSS would like to discuss with EPA at the meeting tomorrow. These are comment numbers 10, 13, 14, 15, 16, 18, 19, 33, 34, 35, 36, 55, 80, and 105.

The spreadsheet also contains the 10 comments (53, 57, 58, 67, 69, 71, 72, 74, 75, and 78) that EPA noted in the September 18, 2013 comment response letter that require further development by LSS and discussion with EPA. The response to these comments will evolve with the harbor-wide FS process, so we will need to determine a path forward for discussing these comments.

There are 47 comments that EPA and LSS have agreement on pending EPA approval of the revised EE/CA report. These are comment numbers 9, 11, 12, 17, 21, 22, 23, 24, 25, 28, 30, 31, 32, 41, 42, 48, 50, 51, 54, 56, 59, 60, 62, 63, 64, 65, 66, 68, 70, 76, 77, 79, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 99, 100, 102, 104, and 110.

There are 33 comments that LSS feels might only be resolvable through the dispute process. These comments are broken into the following groups with bullets noting some of the key issues LSS has with the comments in each group:

- Group 1 – Waste Designation and K073 – Comment 20.
  - LSS does not agree the sediments within the RAA boundary will need to be managed at a Subtitle C permitted facility based on the Oregon Pesticide Rule.
- Group 2 – MNR/NAPL – Comments 26, 37, 38, 39, 40, 43, 44, 45, 46, 47.
  - LSS believes that natural recovery is actively occurring in AOPC 14.
  - LSS does not agree that there is NAPL in sediment within the RAA boundary.
- Group 3 – Other Sources of COIs – Comments 61, 92, 93, 94, 95, 96, 97, 98.
  - LSS believes that the discussion of other sources of COIs is allowed in the EE/CA.
- Group 4 – Remedy Implementation and Monitoring – Comments 106, 107, 108, 109, 111, 112.
  - LSS believes that the evaluation of the alternatives is unbiased and supported by industry standards.

- Group 5 – PRG/Risk Levels/RAOs – Comment 29
  - LSS believes that the COIs evaluated in the draft EE/CA report were consistent with the Portland Harbor FS and previous agreements with EPA.
- Group 6 – Capping as the Primary Remedial Approach – Comments 73, 101, 103.
  - LSS does not agree that capping is the primary remedial approach in any of the alternatives. Dredging will be conducted prior to cap placement for all alternatives.
- Group 8 – Mitigation and NRDA – Comments 27, 49.
  - Comment 27 – LSS believes that the habitat will improve under all alternatives except for the CDF, so mitigation is not necessary unless the CDF alternative is selected.
  - Comment 49 – The memo presented in Appendix A2 will be revised to clarify its use in the context of the EE/CA and CERCLA process.
- Group 9 – Other/Miscellaneous – Comments 52, 91.
  - Comment 52 – LSS believes the EVS model honors the data and it would be difficult and likely misleading to plot 3-D data on 2-D maps.
  - Comment 91 – LSS would like to keep footnote regarding the rejected EPA split data so that the discussion includes all available data and is presented in a transparent manner.

LSS is looking forward to discussing the draft EE/CA report comments with EPA tomorrow. Thanks.

David

To: Conley, Alanna[conley.alanna@epa.gov]; Alex Liverman (liverman.alex@deq.state.or.us)[liverman.alex@deq.state.or.us]; Audie Huber (audiehuber@ctuir.com)[audiehuber@ctuir.com]; brandy.humphreys@grandronde.org[brandy.humphreys@grandronde.org]; Brian Cunninghame (cunninghame@gorge.net)[cunninghame@gorge.net]; callie@ridolfi.com[callie@ridolfi.com]; Humphrey, Chip[Humphrey.Chip@epa.gov]; Cora, Lori[Cora.Lori@epa.gov]; Dan Hafley (HAFLEY.Dan@deq.state.or.us)[HAFLEY.Dan@deq.state.or.us]; Dana Bayuk (bayuk.dana@deq.state.or.us)[bayuk.dana@deq.state.or.us]; Erin Madden (erin.madden@gmail.com)[erin.madden@gmail.com]; Gail Fricano (gfricano@indecon.com)[gfricano@indecon.com]; Genevieve Angle (Genevieve.Angle@noaa.gov)[Genevieve.Angle@noaa.gov]; JD Williams (jd@williamsjohnsonlaw.com)[jd@williamsjohnsonlaw.com]; Jen Kassakian (jkassakian@indecon.com)[jkassakian@indecon.com]; peterson.Jennifer@deq.state.or.us[peterson.Jennifer@deq.state.or.us]; Jeremy_Buck@fws.gov[Jeremy_Buck@fws.gov]; Jim Anderson (ANDERSON.Jim@deq.state.or.us)[ANDERSON.Jim@deq.state.or.us]; Julie Weis (jweis@hk-law.com)[jweis@hk-law.com]; Keith Johnson (johnson.keith@deq.state.or.us)[johnson.keith@deq.state.or.us]; Kristin Callahan[kristin@ridolfi.com]; Koch, Kristine[Koch.Kristine@epa.gov]; Peterson, Lance[PetersonLE@cdmsmith.com]; Ader, Mark[Ader.Mark@epa.gov]; Matt Johnson (matt@williamsjohnsonlaw.com)[matt@williamsjohnsonlaw.com]; Matt McClincy (mcclincy.matt@deq.state.or.us)[mcclincy.matt@deq.state.or.us]; tosm@yakamafish-nsn.gov[tosm@yakamafish-nsn.gov]; Michael.karnosh@grandronde.org[Michael.karnosh@grandronde.org]; poulsen.mike@deq.state.or.us[poulsen.mike@deq.state.or.us]; Muza, Richard[Muza.Richard@epa.gov]; Nancy Munn (Nancy.Munn@noaa.gov)[Nancy.Munn@noaa.gov]; Rachel DelVecchio (rdelvecchio@indecon.com)[rdelvecchio@indecon.com]; Robert.Neely@noaa.gov[Robert.Neely@noaa.gov]; rose@yakamafish-nsn.gov[rose@yakamafish-nsn.gov]; schwarz.bob@deq.state.or.us[schwarz.bob@deq.state.or.us]; Ted Buerger (ted_buerger@fws.gov)[ted_buerger@fws.gov]; tomd@ctsi.nsn.us[tomd@ctsi.nsn.us]; Tom Gainer (gainer.tom@deq.state.or.us)[gainer.tom@deq.state.or.us]; Sheldrake, Sean[sheldrake.sean@epa.gov]; Rose Longoria[lonr@yakamafish-nsn.gov]
From: Peterson, Lance
Sent: Wed 11/13/2013 11:50:29 PM
Subject: FW: Arkema Meeting to discuss EE/CA Comments - November 14, 12:30 - 4:00 PM
LSS Discussion Comments_2013-11-14 Meeting with EPA.pdf

Please see attached agenda supplement for the 11/14 EE/CA comment meeting with LSS.

From: David Livermore [mailto:dlivermore@integral-corp.com]
Sent: Wednesday, November 13, 2013 3:40 PM
To: Peterson, Lance; Sean Sheldrake
Cc: Todd Slater (todd.slater@total.com); Eron Dodak
Subject: Arkema Meeting to discuss EE/CA Comments - November 14, 12:30 - 4:00 PM
Importance: High

Lance and Sean,

Attached is a spreadsheet summarizing the 14 comments that LSS would like to discuss with EPA at the meeting tomorrow. These are comment numbers 10, 13, 14, 15, 16, 18, 19, 33, 34, 35, 36, 55, 80, and 105.

The spreadsheet also contains the 10 comments (53, 57, 58, 67, 69, 71, 72, 74, 75, and 78) that EPA noted in the September 18, 2013 comment response letter that require further development by LSS and discussion with EPA. The response to these comments will evolve with the harbor-wide FS process, so we will need to determine a path forward for discussing these comments.

There are 47 comments that EPA and LSS have agreement on pending EPA approval of the revised EE/CA report. These are comment numbers 9, 11, 12, 17, 21, 22, 23, 24, 25, 28, 30, 31, 32, 41, 42, 48, 50, 51, 54, 56, 59, 60, 62, 63, 64, 65, 66, 68, 70, 76, 77, 79, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 99, 100, 102, 104, and 110.

There are 33 comments that LSS feels might only be resolvable through the dispute process. These comments are broken into the following groups with bullets noting some of the key issues LSS has with the comments in each group:

- Group 1 – Waste Designation and K073 – Comment 20.

o LSS does not agree the sediments within the RAA boundary will need to be managed at a Subtitle C permitted facility based on the Oregon Pesticide Rule.

- Group 2 – MNR/NAPL – Comments 26, 37, 38, 39, 40, 43, 44, 45, 46, 47.

o LSS believes that natural recovery is actively occurring in AOPC 14.

o LSS does not agree that there is NAPL in sediment within the RAA boundary.

- Group 3 – Other Sources of COIs – Comments 61, 92, 93, 94, 95, 96, 97, 98.

o LSS believes that the discussion of other sources of COIs is allowed in the EE/CA.

- Group 4 – Remedy Implementation and Monitoring – Comments 106, 107, 108, 109, 111, 112.

o LSS believes that the evaluation of the alternatives is unbiased and supported by industry standards.

- Group 5 – PRG/Risk Levels/RAOs – Comment 29

o LSS believes that the COIs evaluated in the draft EE/CA report were consistent with the Portland Harbor FS and previous agreements with EPA.

- Group 6 – Capping as the Primary Remedial Approach – Comments 73, 101, 103.

o LSS does not agree that capping is the primary remedial approach in any of the alternatives. Dredging will be conducted prior to cap placement for all alternatives.

- Group 8 – Mitigation and NRDA – Comments 27, 49.

o Comment 27 – LSS believes that the habitat will improve under all alternatives except for the CDF, so mitigation is not necessary unless the CDF alternative is selected.

o Comment 49 – The memo presented in Appendix A2 will be revised to clarify its use in the context of the EE/CA and CERCLA process.

- Group 9 – Other/Miscellaneous – Comments 52, 91.

o Comment 52 – LSS believes the EVS model honors the data and it would be difficult and likely misleading to plot 3-D data on 2-D maps.

o Comment 91 – LSS would like to keep footnote regarding the rejected EPA split data so that the discussion includes all available data and is presented in a transparent manner.

LSS is looking forward to discussing the draft EE/CA report comments with EPA tomorrow. Thanks.

David

From: David Livermore
Sent: Monday, November 11, 2013 10:26 AM
To: Lance E. Peterson LHG (petersonle@cdm.com); Sean Sheldrake
Cc: Todd Slater (todd.slater@total.com); Eron Dodak
Subject: Arkema Meeting to discuss EE/CA Comments - November 14, 12:30 - 4:00 PM
Importance: High

Lance and Sean

The meeting to discuss the comments on the draft EE/CA report is scheduled for Thursday, November 14. The meeting will be held in the office building adjacent to the front gate at the Arkema site. Here is the agenda for the meeting:

12:30 – 3:00 PM: Comment Discussion

1. Comments that LSS would like to discuss/clarify (LSS will circulate a list of comments prior to the meeting)

2. Comments that EPA would like to discuss/clarify

3. EPA/LSS agreements and process for moving forward.

3:00 – 4:00 PM: Stormwater and Groundwater SCM Site Walk

Please note that LSS will have additional hardhats for the folks participating in the site walk.

The following conference line will be available for people that are not attending the meeting in person:

Conference Line Number: Personal Privacy / Ex. 6 Access Code: Personal Privacy / Ex. 6

Please let me know if you have any questions or comments on the meeting schedule or agenda.

Thanks,
David

David Livermore, R.G., L.H.G. | Principal

Integral Consulting Inc. | www.integral-corp.com

319 SW Washington Street, Suite 1150 | Portland, OR 97204

Direct: 503.943.3613 | Cell: 503.806.4665 | Fax: 503.284.5755

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To: Cora, Lori[Cora.Lori@epa.gov]
Cc: Peterson, Lance[PetersonLE@cdmsmith.com]; Humphrey, Chip[Humphrey.Chip@epa.gov]; Koch, Kristine[Koch.Kristine@epa.gov]
From: Sheldrake, Sean
Sent: Fri 10/18/2013 8:53:15 PM
Subject: FW: Potential Meeting Dates and Directed Comments
Arkema EE-CA comment clarification_18_Oct_13.docx

Thanks Lance.

Lori, would be interested in your thoughts on this letter before sending—looks like we need to include a dispute trigger date (e.g. the meeting) in my quick review, anything else?

Have a good weekend everyone.

S

Sean Sheldrake, Unit Diving Officer, RPM

EPA Region 10, 1200 Sixth Ave., Suite 900

Seattle, WA 98101

206.553.1220 desk

206.225.6528 cell

http://yosemite.epa.gov/r10/cleanup.nsf/sites/ptldharbor

http://www.epa.gov/region10/dive/

Like us on Facebook! https://www.facebook.com/EPADivers

From: Peterson, Lance [mailto:PetersonLE@cdmsmith.com]
Sent: Friday, October 18, 2013 1:48 PM

To: Sheldrake, Sean
Subject: FW: Potential Meeting Dates and Directed Comments
Importance: High

Sean, attached is a draft letter responding to LSS's request for clarification on Arkema directed comments and dispute timeframe. No word for David L. regarding a meeting date – it's looking like it will need to be the week of 11/11.

Lance

From: Sheldrake, Sean [mailto:sheldrake.sean@epa.gov]
Sent: Thursday, October 17, 2013 8:53 AM
To: Peterson, Lance
Cc: Cora, Lori
Subject: FW: Potential Meeting Dates and Directed Comments
Importance: High

1-95 (contractor info) / Ex. 4

I think you've already conveyed my availability for a meeting for next week as well as the week of 11/11…

Thanks

S

Sean Sheldrake, Unit Diving Officer, RPM

EPA Region 10, 1200 Sixth Ave., Suite 900

Seattle, WA 98101

206.553.1220 desk

206.225.6528 cell

http://yosemite.epa.gov/r10/cleanup.nsf/sites/ptldharbor

http://www.epa.gov/region10/dive/

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From: David Livermore [mailto:dlivermore@integral-corp.com]
Sent: Wednesday, October 16, 2013 2:57 PM
To: Lance E. Peterson LHG (petersonle@cdm.com)
Cc: Todd Slater (todd.slater@total.com); Sheldrake, Sean; Eron Dodak
Subject: Potential Meeting Dates and Directed Comments
Importance: High

Lance,

Because of the uncertainty on when the Federal shutdown period will end, we have not been able to schedule the EE/CA meeting specified in Sean Sheldrake's September 18 letter. Based on telephone conversations with you, it is my understanding that Sean Sheldrake would not be available during the week of October 21st (assuming the shutdown ends by that time). The next period of availability for the LSS team would be the week of November 11th. Please let me know if there are dates available that week that the EPA team can meet to discuss comments in the September 18 EE/CA comment letter.

Also, LSS would like clarification on the directed comments in the September 18 letter. According to our understanding the comments listed below (as grouped by LSS) are directed comments and none of the other comments are directed. Please confirm or correct, if there is any misunderstanding.

- Comments 19, 20 (Group 1—Waste Designation and K073)
- Comments 26, 37, 38, 39, 40, 43, 44, 45, 46, 47 (Group 2—MNR/NAPL/RE Memo)
- Comments 61, 92, 93, 94, 95, 96, 97, 98 (Group 3—Other Sources of COIs)

- Comments 106, 107, 108, 109, 110, 111, 112 (Group 4—Remedy Implementation and Monitoring)
- Comments 10, 29, 30, 55, 58, 62 (Group 5—PRG/Risk Levels/RAOs)
- Comments 73, 101, 103, 105 (Group 6—Capping as the Primary Remedial Approach)
- Comments 14, 15, 16, 18, 33, 34 (Group 7—Costing Detail for the EE/CA)
- Comments 27, 31, 49 (Group 8—Mitigation and NRDA)
- Comments 9, 25, 35, 52, 80, 82, 84, 85, 89 (Group 9—Other miscellaneous)

Thanks, David

David Livermore, R.G., L.H.G. | Principal

Integral Consulting Inc. | www.integral-corp.com

319 SW Washington Street, Suite 1150 | Portland, OR 97204

Direct: 503.943.3613 | Cell: 503.806.4665 | Fax: 503.284.5755

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To: Sheldrake, Sean[sheldrake.sean@epa.gov]
Cc: Cora, Lori[Cora.Lori@epa.gov]
From: Peterson, Lance
Sent: Sat 9/14/2013 12:11:12 AM
Subject: RE: Arkema EE/CA comments - revision for review
Arkema EE-CA_EPA Comments Review Transmittal_13_Sept_13.docx
CoraREDLINEcoraArkema EE-CA_specific responses_8_Aug_13 (rev1).docx
Arkema EE-CA_specific comments responses_13_Sept_13.docx

Sean, CDM has attempted to address Lori's comments. As before I have included the redline of

Attorney Work Product / Ex. 5

Lance

From: Sheldrake, Sean [mailto:sheldrake.sean@epa.gov]
Sent: Tuesday, September 10, 2013 6:24 AM
To: Cora, Lori; Koch, Kristine; Humphrey, Chip; Peterson, Lance
Subject: FW: Arkema EE/CA comments - revision for review

Attorney Client / Ex. 5

Attorney Client / Ex. 5

I'm mostly offline this week, so hopefully we can get another revision out by early next week after revisions per above Lance?

Thanks

S

Sean Sheldrake, Unit Diving Officer, RPM

EPA Region 10, 1200 Sixth Ave., Suite 900

Seattle, WA 98101

206.553.1220 desk

206.225.6528 cell

http://yosemite.epa.gov/r10/cleanup.nsf/sites/ptldharbor

http://www.epa.gov/region10/dive/

Like us on Facebook! https://www.facebook.com/EPADivers

From: Cora, Lori
Sent: Monday, September 09, 2013 3:44 PM
To: Peterson, Lance; Sheldrake, Sean
Subject: RE: Arkema EE/CA comments - revision for review

See comments/revisions to cover letter and redlined version of comments. Big Issues: 1. The

Attorney Client / Ex. 5

Still some massaging needed on a few of the comments too. Let me know if we need to discuss.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

From: Peterson, Lance [mailto:PetersonLE@cdmsmith.com]
Sent: Friday, September 06, 2013 5:59 PM
To: Sheldrake, Sean
Cc: Cora, Lori
Subject: Arkema EE/CA comments - revision for review

Attorney Work Product / Ex. 5

Lance

==========

Lance E. Peterson, RG, LHG

Senior Project Manager

CDM Smith

14432 SE Eastgate Way, Suite 100, Bellevue, WA 98007

425-519-8300 (office) | 425-519-8382 (direct) | 425-417-5946 (mobile) | 425-746-0197 (fax)

mailto:petersonle@cdmsmith.com | cdmsmith.com

To: Sheldrake, Sean[sheldrake.sean@epa.gov]
Cc: Cora, Lori[Cora.Lori@epa.gov]
From: Peterson, Lance
Sent: Sat 9/7/2013 12:59:04 AM
Subject: Arkema EE/CA comments - revision for review
Arkema EE-CA_specific comments responses_6_Sept_13.docx
REDLINEcoraArkema EE-CA_specific comments responses_8_Aug_13.docx
Arkema EE-CA _EPA Comments Review Transmittal_6_Sept_13.docx

Sean, attached is the Arkema ee/ca comments and transmittal letter revised per Lori's 8/15 review. A redline of the comments is included to show how Lori's comments were addressed. The transmittal letter changed quite a bit so only a clean copy is provided. We think the letter addresses Lori's comments to make it clear that EPA is directing Arkema to address the non-placeholder comments hence LSS has 14 days to dispute this direction even though full direction on all comments is not being provided until the harbor wide issues are addressed. We were not sure how to handle a timeline in the letter for LSS to address non-placeholder comments

Attorney Work Product / Ex. 5

Lance

==========

Lance E. Peterson, RG, LHG

Senior Project Manager

CDM Smith

14432 SE Eastgate Way, Suite 100, Bellevue, WA 98007

425-519-8300 (office) | 425-519-8382 (direct) | 425-417-5946 (mobile) | 425-746-0197 (fax)

mailto:petersonle@cdmsmith.com | cdmsmith.com

To: Cora, Lori[Cora.Lori@epa.gov]
From: Koch, Kristine
Sent: Wed 9/4/2013 11:14:00 PM
Subject: RE: Portland Harbor BERA Section 12
koch_BERA Section 12 Combined LWG-EPA Risk Management Recommendations 083013.docx

Lori – The agreement was that we would not edit the LWGs recommendations (Sections 12.1 through 12.4). I changed the format so that all the LWGs recommendations are in 12.1 and EPA's recommendations will be in 12.2. I've modified the language in the LWG's section only to be clear that these are LWGs recommendations. I deleted only those things that are not "recommendations." Bruce Duncan and Elizabeth are looking over Burt's recommendations. 12.5 seems to be his recommendations, but 12.6 appears to be additional information on the ecological significance justification. If that is true, then that information will have to be moved to Section 11 (urgh! Thought we were done with that section!). The attached document only has my edits to the LWG section. Could you look that over and see if you agree with my edits?

Thanks,

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
Region 10
1200 Sixth Avenue, Suite 900, M/S ECL-115
Seattle, Washington 98101-3140

(206)553-6705
(206)553-0124 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: Cora, Lori
Sent: Tuesday, September 03, 2013 10:57 AM
To: Koch, Kristine
Subject: RE: Portland Harbor BERA Section 12

So I'm reading this but am very confused. Are there parts of Section 12 that have been drafted by the LWG and EPA has already agreed will be inserted? I don't want to waste my time commenting on something that is not going to change.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Koch, Kristine
Sent: Tuesday, September 03, 2013 9:43 AM
To: Cora, Lori
Subject: FW: Portland Harbor BERA Section 12

Lori - here is the latest from Burt on the Risk Management Recommendations. Please review and provide your comments to both Chip and myself.

Thanks!

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
Region 10
1200 Sixth Avenue, Suite 900, M/S ECL-115
Seattle, Washington 98101-3140

(206)553-6705
(206)553-0124 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: Shephard, Burt
Sent: Friday, August 30, 2013 3:05 PM
To: Personal Privacy / Ex. 6
Cc: Koch, Kristine; Yamamoto, Deb; Humphrey, Chip; Fleming, Sheila
Subject: Portland Harbor BERA Section 12

Chip,

Attached is the combined BERA Section 12 with both LWG and EPA risk management recommendations. Since this combined text comes from three sources, it will need some format touchup so it looks like the rest of the BERA. There are also some new literature citations that will need to be pulled out of the attached and added to the BERA's literature cited section.

Have a good Labor Day weekend.

Best regards,

Burt Shephard
Risk Evaluation Unit
Office of Environmental Assessment (OEA-095)
U.S. Environmental Protection Agency, Region 10
1200 6th Avenue
Seattle, WA 98101

Telephone: (206) 553-6359
Fax: (206) 553-0119

e-mail: Shephard.Burt@epa.gov

"Facts are stubborn things"
- John Adams

From: Personal Privacy / Ex. 6
Sent: Thursday, August 29, 2013 10:37 AM
To: Shephard, Burt
Cc: Koch, Kristine; Yamamoto, Deb
Subject: Re: Rationale for Contaminants of Secondary Ecological Significance

Burt
thanks can you insert this in the version I sent and resend to deb and kristine? I would insert right after the primary contam discussion. I can access through phone but can"t get email via laptop. I think it's complete but don't want to wait till I return to send to LWG.
chip

-----Original Message-----
From: Shephard.Burt@epa.gov
To: Personal Privacy / Ex. 6

Cc: Humphrey, Chip
Sent: Wed, Aug 28, 2013 4:59 pm
Subject: Rationale for Contaminants of Secondary Ecological Significance

Chip, This ought to put you to sleep Personal Privacy / Ex. 6 (or any other time you have trouble sleeping). Best regards, Burt ShephardRisk Evaluation UnitOffice of Environmental Assessment (OEA-095)U.S. Environmental Protection Agency, Region 101200 6th AvenueSeattle, WA 98101 Telephone: (206) 553-6359Fax: (206) 553-0119 e-mail: Shephard.Burt@epa.gov "Facts are stubborn things" - John Adams

To: Cora, Lori[Cora.Lori@epa.gov]
Cc: Sheldrake, Sean[sheldrake.sean@epa.gov]
From: Peterson, Lance
Sent: Wed 7/24/2013 10:56:52 PM
Subject: FW: Business impacts in 9 criteria analysis
Gasco- Inclusion and Exclusion of Cost Elements in EECA and FS Cost Estimates(16-Jan-13).docx

Lori, here is the Word version in case you want to mark it up.

Lance

From: Cora, Lori [mailto:Cora.Lori@epa.gov]
Sent: Wednesday, July 24, 2013 2:55 PM
To: Sheldrake, Sean; Peterson, Lance
Cc: Humphrey, Chip; Koch, Kristine
Subject: RE: Business impacts in 9 criteria analysis

Please don't send this until I have a chance to review which won't be this week.

From: Sheldrake, Sean
Sent: Wednesday, July 24, 2013 2:39 PM
To: Lance Peterson
Cc: Cora, Lori; Humphrey, Chip; Koch, Kristine
Subject: Re: Business impacts in 9 criteria analysis

Thanks Lance.

If everyone agrees, we can transmit the memo in advance of a call with nwn,siltronc.

S
Sean Sheldrake, UDO, RPM
USEPA
2065531220

From: Peterson, Lance <PetersonLE@cdmsmith.com>

Sent: Wednesday, July 24, 2013 3:18:19 PM
To: Sheldrake, Sean
Subject: RE: Business impacts in 9 criteria analysis

Sean, the attached memo CDM put together presents our understanding of the business impacts topic. I believe page 4 addresses Lori's specific question.

Lance

From: Sheldrake, Sean [mailto:sheldrake.sean@epa.gov]
Sent: Wednesday, July 24, 2013 9:27 AM
To: Peterson, Lance
Subject: Fw: Business impacts in 9 criteria analysis

Hi lance can you give me an loe for relevant guidance review?

Thx

S
Sean Sheldrake, UDO, RPM
USEPA
2065531220

From: Cora, Lori
Sent: Wednesday, July 24, 2013 9:52:41 AM
To: Sheldrake, Sean; Koch, Kristine; Humphrey, Chip
Subject: Business impacts in 9 criteria analysis

So I guess this issue of business impacts of alternatives is coming up at Portland Harbor. I assume what the PRPs want is to discuss whether and how and which criteria a narrative discussion of business disruption comes in and whether and how they can add such to the cost estimates for the alternatives.

Attorney Client / Ex. 5

Can any of you point me to any authority or guidance that discusses this issue? If you all don't know, you should consult your OSWER contacts (your new added team members?)

To: Lance Peterson (petersonle@cdmsmith.com)[petersonle@cdmsmith.com]
Cc: Cora, Lori[Cora.Lori@epa.gov]; Humphrey, Chip[Humphrey.Chip@epa.gov]; Koch, Kristine[Koch.Kristine@epa.gov]; Muza, Richard[Muza.Richard@epa.gov]
From: Sheldrake, Sean
Sent: Mon 7/22/2013 1:54:58 AM
Subject: FW: Arkama - draft comment responses for review
Arkema EE-CA_specific comments responses_7_18_13.docx
Arkema NAPL Evaluation Memo_6-25-13_REV 1.pdf
Portland_Harbor_Recontamination_Evaluation_Framework_Draft_4_JAN_2013.pdf

Lance, Please redraft with specific comment requests made as directions (e.g. adding text, adding justifictation, striking false or irrelevant statements). More nebulous comments in the vein of clarification can be left as-is to the extent we don't know definitively what we need at this point and are open to their suggestions that meet our general needs.

Please also incorporate Lori's comments.

Rich, Kristine, Chip, Anything else to add?

Thank you.

S

Sean Sheldrake, Unit Diving Officer, RPM

EPA Region 10, 1200 Sixth Ave., Suite 900

Seattle, WA 98101

206.553.1220 desk

206.225.6528 cell

http://yosemite.epa.gov/r10/cleanup.nsf/sites/ptldharbor

http://www.epa.gov/region10/dive/

Like us on Facebook! https://www.facebook.com/EPADivers

From: Peterson, Lance [mailto:PetersonLE@cdmsmith.com]
Sent: Thursday, July 18, 2013 7:28 AM
To: Sheldrake, Sean
Subject: Arkama - draft comment responses for review

Sean, this e-mail transmits draft responses to LSS' March 28, 2013 submittal responding to EPA's February 11, 2013 comments on the draft Arkema EE/CA. CDM can help draft a cover letter once the comments are ready to go to LSS. We modified the comment format from the previous table into something that is a bit more readable (unfortunately many of the comments and responses are a bit long). It remains organized by comment topic. This should be the format used to respond to LSS. I have also provided the two attachments referenced in the comment responses that we recommend providing to LSS (NAPL memo and recontamination framework).

Deliberative Process / Ex. 5

In addition, as requested, we have identified those comments that are suggested Lori Cora's review focus on. Here they are by comment topic:

ARARs

#10

EDITORIAL

#25 and 26

EVALUATION OF ALTERNATIVES

#37 and 40

NRDA

#49

RAOs, RGs, AND RALs

#52, 53, 57, 58, and 61

RECONTAMINATION EVALUATION

#67 and 73

RISK EVALUATION

#80 and 82

SITE CHARACTERIZATION

#85, 89, 92, 93, 95, 96, and 98

TECHNOLOGY EVALUATION – ASSIGNMENTS

#101

TECHNOLOGY EVALUATION - DREDGING

#112

==========

Lance E. Peterson, RG, LHG

Senior Project Manager

CDM Smith

14432 SE Eastgate Way, Suite 100, Bellevue, WA 98007

425-519-8300 (office) | 425-519-8382 (direct) | 425-417-5946 (mobile) | 425-746-0197 (fax)

mailto:petersonle@cdmsmith.com | cdmsmith.com

To: Cora, Lori[Cora.Lori@epa.gov]
From: Sheldrake, Sean
Sent: Thur 7/18/2013 8:27:18 PM
Subject: RE: Arkema - draft comment responses for review

Thanks Lori. S

Sean Sheldrake, Unit Diving Officer, RPM

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Seattle, WA 98101

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206.225.6528 cell

http://yosemite.epa.gov/r10/cleanup.nsf/sites/ptldharbor

http://www.epa.gov/region10/dive/

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From: Cora, Lori
Sent: Thursday, July 18, 2013 12:38 PM
To: Sheldrake, Sean; Peterson, Lance
Subject: RE: Arkema - draft comment responses for review

A comment on this response:

Response to LSS Response

Attorney Client / Ex. 5

Attorney Client / Ex. 5

From: Sheldrake, Sean
Sent: Thursday, July 18, 2013 11:00 AM
To: Cora, Lori; Muza, Richard; Humphrey, Chip; Koch, Kristine
Cc: Peterson, Lance
Subject: Arkema - draft comment responses for review

Thanks much Lance; I'll start taking a look.

All, Please let Lance and myself know if you have comments/questions.

S

Sean Sheldrake, Unit Diving Officer, RPM

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Seattle, WA 98101

206.553.1220 desk

206.225.6528 cell

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Sent: Thursday, July 18, 2013 7:28 AM
To: Sheldrake, Sean
Subject: Arkama - draft comment responses for review

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Deliberative Process / Ex. 5

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#67 and 73

RISK EVALUATION

#80 and 82

SITE CHARACTERIZATION

#85, 89, 92, 93, 95, 96, and 98

TECHNOLOGY EVALUATION – ASSIGNMENTS

#101

TECHNOLOGY EVALUATION - DREDGING

#112

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Lance E. Peterson, RG, LHG

Senior Project Manager

CDM Smith

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425-519-8300 (office) | 425-519-8382 (direct) | 425-417-5946 (mobile) | 425-746-0197 (fax)

mailto:petersonle@cdmsmith.com | cdmsmith.com

To: Cora, Lori[Cora.Lori@epa.gov]
From: Koch, Kristine
Sent: Fri 5/20/2016 7:50:02 PM
Subject: RE: Portland Harbor FS Section 4 attorney client communication

Thanks,

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
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Seattle, Washington 98101-3140

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(206)553-8581 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: Cora, Lori
Sent: Friday, May 20, 2016 10:52 AM
To: Koch, Kristine <Koch.Kristine@epa.gov>; Woolford, James <Woolford.James@epa.gov>; Grandinetti, Cami <Grandinetti.Cami@epa.gov>; Fonseca, Silvina <Fonseca.Silvina@epa.gov>; Christopher, Anne <Christopher.Anne@epa.gov>; Ells, Steve <Ells.Steve@epa.gov>; Legare, Amy <Legare.Amy@epa.gov>; Scott Coffey <coffeyse@cdmsmith.com>; Gustavson, Karl <Gustavson.Karl@epa.gov>
Cc: Allen, Elizabeth <allen.elizabeth@epa.gov>; Fleming, Sheila <fleming.sheila@epa.gov>; Zhen, Davis <Zhen.Davis@epa.gov>; Stalcup, Dana <Stalcup.Dana@epa.gov>; Charters, David <Charters.DavidW@epa.gov>
Subject: RE: Portland Harbor FS Section 4 attorney client communication

Attached are my comments, I mainly focused on ARARs . . . minimal comments.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Koch, Kristine
Sent: Friday, May 20, 2016 9:17 AM
To: Woolford, James <Woolford.James@epa.gov>; Grandinetti, Cami <Grandinetti.Cami@epa.gov>; Fonseca, Silvina <Fonseca.Silvina@epa.gov>; Christopher, Anne <Christopher.Anne@epa.gov>; Ells, Steve <Ells.Steve@epa.gov>; Legare, Amy <Legare.Amy@epa.gov>; Cora, Lori <Cora.Lori@epa.gov>; Scott Coffey <coffeyse@cdmsmith.com>; Gustavson, Karl <Gustavson.Karl@epa.gov>
Cc: Allen, Elizabeth <allen.elizabeth@epa.gov>; Fleming, Sheila <fleming.sheila@epa.gov>; Zhen, Davis <Zhen.Davis@epa.gov>; Stalcup, Dana <Stalcup.Dana@epa.gov>; Charters, David <Charters.DavidW@epa.gov>
Subject: RE: Portland Harbor FS Section 4

Deliberative Process / Ex. 5

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1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: Woolford, James
Sent: Friday, May 20, 2016 8:55 AM
To: Koch, Kristine <Koch.Kristine@epa.gov>; Grandinetti, Cami

<Grandinetti.Cami@epa.gov>; Fonseca, Silvina <Fonseca.Silvina@epa.gov>; Christopher, Anne <Christopher.Anne@epa.gov>; Ells, Steve <Ells.Steve@epa.gov>; Legare, Amy <Legare.Amy@epa.gov>; Cora, Lori <Cora.Lori@epa.gov>; Scott Coffey <coffeyse@cdmsmith.com>; Gustavson, Karl <Gustavson.Karl@epa.gov>
Cc: Allen, Elizabeth <allen.elizabeth@epa.gov>; Fleming, Sheila <fleming.sheila@epa.gov>; Zhen, Davis <Zhen.Davis@epa.gov>; Stalcup, Dana <Stalcup.Dana@epa.gov>; Charters, David <Charters.DavidW@epa.gov>
Subject: RE: Portland Harbor FS Section 4

Deliberative Process / Ex. 5

Deliberative Process / Ex. 5

Deliberative Process / Ex. 5

Deliberative Process / Ex. 5

Deliberative Process / Ex. 5

Jim Woolford, Director

Office of Superfund Remediation and Technology Innovation

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US Environmental Protection Agency

1200 Penn. Ave., NW

Washington, DC 20460

(Mail Code 5201-P)

Phone: (703) 603 8960– Main Office Line

Physically located at:

Room 5622

One Potomac Yard (South)
2777 S. Crystal Dr.
Arlington, VA 22202

From: Koch, Kristine
Sent: Wednesday, May 18, 2016 8:14 PM
To: Woolford, James <Woolford.James@epa.gov>; Grandinetti, Cami <Grandinetti.Cami@epa.gov>; Fonseca, Silvina <Fonseca.Silvina@epa.gov>; Christopher, Anne <Christopher.Anne@epa.gov>; Ells, Steve <Ells.Steve@epa.gov>; Legare, Amy <Legare.Amy@epa.gov>; Cora, Lori <Cora.Lori@epa.gov>; Scott Coffey <coffeyse@cdmsmith.com>; Gustavson, Karl <Gustavson.Karl@epa.gov>
Cc: Allen, Elizabeth <allen.elizabeth@epa.gov>; Fleming, Sheila <fleming.sheila@epa.gov>; Zhen, Davis <Zhen.Davis@epa.gov>
Subject: Portland Harbor FS Section 4

All – Here is the latest version of Section 4. Please provide comments by COB Friday so I can incorporate them. I've also included updates to Tables 4.3-1 and 4.3-2.

Also, please let me know which Appendices you would like to review so I can streamline the review process. I know that Jim wants to see Appendix D8 (MNR Analysis).

Appendix A: Database - complete

Appendix B: Development of PRGs - complete

Appendix C: Technology Evaluation – complete

Appendix D: Technical Calculations – partially complete (need MNR and transportation; CDM)

Appendix E: T4 Water Quality – complete

Appendix F: Transload Facilities – complete

Appendix G: Costs – being updated

Appendix H: HST Evaluation – complete

Appendix I: Uncertainty Analysis – complete

Appendix J: Residual Risk – incomplete (Elizabeth)

Appendix K: Loading Evaluation – incomplete (Kristine)

Appendix L: CWA 404 Analysis – incomplete (Anne & Silvina)

Appendix M: Green Remediation Plan – Complete

Appendix N: Cost Uncertainty – being updated

Appendix O: Dredge Water Quality & Residuals – incomplete (Kristine review)

Appendix P: Floodrise Analysis – incomplete (Kristine review)

Thanks,

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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To: Cora, Lori[Cora.Lori@epa.gov]; Koch, Kristine[Koch.Kristine@epa.gov]; Allen, Elizabeth[allen.elizabeth@epa.gov]; Jones, Jennifer M.[JonesJM@cdmsmith.com]; Sheldrake, Sean[sheldrake.sean@epa.gov]; Fonseca, Silvina[Fonseca.Silvina@epa.gov]; Vallette, Yvonne[Vallette.Yvonne@epa.gov]
Cc: Scott Coffey[coffeyse@cdmsmith.com]
From: Christopher, Anne
Sent: Wed 5/18/2016 6:20:39 AM
Subject: RE: Jennifer Jones's fieldwork next week (regarding 404/BA)
Draft 404(b)(1) Analysis_April272016_clean sf-ac-lc comments revised 5-18-16 .docx

Here is the document with Lori's edits combined with the edits that Silvina and I made with Yvonne.

Jennifer, Silvina and I will send you an invite tomorrow to chat about what needs to happen to finalize this appendix. Here is the To Do list from an email with a previous draft.

From: Christopher, Anne
Sent: Friday, May 06, 2016 4:14 PM
To: Sheldrake, Sean <sheldrake.sean@epa.gov>; Anderson, RobinM <Anderson.RobinM@epa.gov>; Cora, Lori <Cora.Lori@epa.gov>
Cc: Fonseca, Silvina <Fonseca.Silvina@epa.gov>; Koch, Kristine <Koch.Kristine@epa.gov>; Allen, Elizabeth <allen.elizabeth@epa.gov>; Grandinetti, Cami <Grandinetti.Cami@epa.gov>; Zhen, Davis <Zhen.Davis@epa.gov>
Subject: FS Appendix L

Hi Sean, Robin and Lori:

Deliberative Process / Ex. 5

Deliberative Process / Ex. 5

The following are items that need to be addressed prior to finalizing this Appendix:

Deliberative Process / Ex. 5

We are available to discuss this with any of you and would appreciate having a discussion with Jennifer Jones to move towards finalizing this appendix.

Thanks,

Silvina and Annie

From: Cora, Lori
Sent: Tuesday, May 17, 2016 9:52 AM
To: Koch, Kristine <Koch.Kristine@epa.gov>; Allen, Elizabeth <allen.elizabeth@epa.gov>; Christopher, Anne <Christopher.Anne@epa.gov>; Jones, Jennifer M. <JonesJM@cdmsmith.com>; Sheldrake, Sean <sheldrake.sean@epa.gov>; Fonseca, Silvina <Fonseca.Silvina@epa.gov>; Vallette, Yvonne <Vallette.Yvonne@epa.gov>
Cc: Scott Coffey <coffeyse@cdmsmith.com>
Subject: RE: Jennifer Jones's fieldwork next week (regarding 404/BA)

Attorney Client / Ex. 5

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
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From: Koch, Kristine
Sent: Tuesday, May 17, 2016 9:09 AM
To: Cora, Lori <Cora.Lori@epa.gov>; Allen, Elizabeth <allen.elizabeth@epa.gov>; Christopher, Anne <Christopher.Anne@epa.gov>; Jones, Jennifer M. <JonesJM@cdmsmith.com>; Sheldrake, Sean <sheldrake.sean@epa.gov>; Fonseca, Silvina <Fonseca.Silvina@epa.gov>; Vallette, Yvonne <Vallette.Yvonne@epa.gov>
Cc: Scott Coffey <coffeyse@cdmsmith.com>
Subject: RE: Jennifer Jones's fieldwork next week (regarding 404/BA)

Attorney Client / Ex. 5

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From: Cora, Lori
Sent: Tuesday, May 17, 2016 8:49 AM
To: Koch, Kristine <Koch.Kristine@epa.gov>; Allen, Elizabeth <allen.elizabeth@epa.gov>; Christopher, Anne <Christopher.Anne@epa.gov>; Jones, Jennifer M. <JonesJM@cdmsmith.com>; Sheldrake, Sean <sheldrake.sean@epa.gov>; Fonseca, Silvina <Fonseca.Silvina@epa.gov>; Vallette, Yvonne <Vallette.Yvonne@epa.gov>
Cc: Scott Coffey <coffeyse@cdmsmith.com>
Subject: RE: Jennifer Jones's fieldwork next week (regarding 404/BA)

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From: Koch, Kristine
Sent: Tuesday, May 17, 2016 8:40 AM
To: Cora, Lori <Cora.Lori@epa.gov>; Allen, Elizabeth <allen.elizabeth@epa.gov>; Christopher, Anne <Christopher.Anne@epa.gov>; Jones, Jennifer M.

<JonesJM@cdmsmith.com>; Sheldrake, Sean <sheldrake.sean@epa.gov>; Fonseca, Silvina <Fonseca.Silvina@epa.gov>; Vallette, Yvonne <Vallette.Yvonne@epa.gov>
Cc: Scott Coffey <coffeyse@cdmsmith.com>
Subject: RE: Jennifer Jones's fieldwork next week (regarding 404/BA)

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From: Cora, Lori
Sent: Tuesday, May 17, 2016 8:38 AM
To: Koch, Kristine <Koch.Kristine@epa.gov>; Allen, Elizabeth <allen.elizabeth@epa.gov>; Christopher, Anne <Christopher.Anne@epa.gov>; Jones, Jennifer M. <JonesJM@cdmsmith.com>; Sheldrake, Sean <sheldrake.sean@epa.gov>; Fonseca, Silvina <Fonseca.Silvina@epa.gov>; Vallette, Yvonne <Vallette.Yvonne@epa.gov>
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From: Koch, Kristine
Sent: Tuesday, May 17, 2016 8:24 AM
To: Cora, Lori <Cora.Lori@epa.gov>; Allen, Elizabeth <allen.elizabeth@epa.gov>; Christopher, Anne <Christopher.Anne@epa.gov>; Jones, Jennifer M. <JonesJM@cdmsmith.com>; Sheldrake, Sean <sheldrake.sean@epa.gov>; Fonseca, Silvina <Fonseca.Silvina@epa.gov>; Vallette, Yvonne <Vallette.Yvonne@epa.gov>
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From: Cora, Lori
Sent: Tuesday, May 17, 2016 8:21 AM
To: Koch, Kristine <Koch.Kristine@epa.gov>; Allen, Elizabeth <allen.elizabeth@epa.gov>; Christopher, Anne <Christopher.Anne@epa.gov>; Jones, Jennifer M. <JonesJM@cdmsmith.com>; Sheldrake, Sean <sheldrake.sean@epa.gov>; Fonseca, Silvina <Fonseca.Silvina@epa.gov>; Vallette, Yvonne <Vallette.Yvonne@epa.gov>
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From: Koch, Kristine
Sent: Tuesday, May 17, 2016 8:16 AM
To: Cora, Lori <Cora.Lori@epa.gov>; Allen, Elizabeth <allen.elizabeth@epa.gov>; Christopher, Anne <Christopher.Anne@epa.gov>; Jones, Jennifer M. <JonesJM@cdmsmith.com>; Sheldrake, Sean <sheldrake.sean@epa.gov>; Fonseca, Silvina <Fonseca.Silvina@epa.gov>; Vallette, Yvonne <Vallette.Yvonne@epa.gov>
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Attorney Client / Ex. 5

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Cc: Scott Coffey <coffeyse@cdmsmith.com>
Subject: RE: Jennifer Jones's fieldwork next week (regarding 404/BA)

Attorney Client / Ex. 5

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From: Koch, Kristine
Sent: Tuesday, May 17, 2016 7:45 AM
To: Allen, Elizabeth <allen.elizabeth@epa.gov>; Cora, Lori <Cora.Lori@epa.gov>; Christopher, Anne <Christopher.Anne@epa.gov>; Jones, Jennifer M. <JonesJM@cdmsmith.com>; Sheldrake, Sean <sheldrake.sean@epa.gov>; Fonseca, Silvina <Fonseca.Silvina@epa.gov>; Vallette, Yvonne <Vallette.Yvonne@epa.gov>
Cc: Scott Coffey <coffeyse@cdmsmith.com>
Subject: RE: Jennifer Jones's fieldwork next week (regarding 404/BA)

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From: Allen, Elizabeth
Sent: Monday, May 16, 2016 4:07 PM
To: Cora, Lori <Cora.Lori@epa.gov>; Christopher, Anne <Christopher.Anne@epa.gov>; Jones, Jennifer M. <JonesJM@cdmsmith.com>; Koch, Kristine <Koch.Kristine@epa.gov>; Sheldrake, Sean <sheldrake.sean@epa.gov>; Fonseca, Silvina <Fonseca.Silvina@epa.gov>; Vallette, Yvonne <Vallette.Yvonne@epa.gov>
Cc: Scott Coffey <coffeyse@cdmsmith.com>
Subject: RE: Jennifer Jones's fieldwork next week (regarding 404/BA)

Attorney Client / Ex. 5

From: Cora, Lori
Sent: Monday, May 16, 2016 4:04 PM
To: Christopher, Anne <Christopher.Anne@epa.gov>; Jones, Jennifer M. <JonesJM@cdmsmith.com>; Koch, Kristine <Koch.Kristine@epa.gov>; Allen, Elizabeth <allen.elizabeth@epa.gov>; Sheldrake, Sean <sheldrake.sean@epa.gov>; Fonseca, Silvina <Fonseca.Silvina@epa.gov>; Vallette, Yvonne <Vallette.Yvonne@epa.gov>
Cc: Scott Coffey <coffeyse@cdmsmith.com>
Subject: RE: Jennifer Jones's fieldwork next week (regarding 404/BA)

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
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From: Christopher, Anne
Sent: Monday, May 16, 2016 2:22 PM
To: Jones, Jennifer M. <JonesJM@cdmsmith.com>; Koch, Kristine <Koch.Kristine@epa.gov>; Allen, Elizabeth <allen.elizabeth@epa.gov>; Sheldrake, Sean <sheldrake.sean@epa.gov>; Fonseca, Silvina <Fonseca.Silvina@epa.gov>; Cora, Lori <Cora.Lori@epa.gov>; Vallette, Yvonne <Vallette.Yvonne@epa.gov>
Cc: Scott Coffey <coffeyse@cdmsmith.com>
Subject: RE: Jennifer Jones's fieldwork next week (regarding 404/BA)

Thanks for the heads up, Jennifer.

Silvina and I are incorporating Lori's edits/comments into the 404 document that we worked on with Yvonne. We will send it to you COB tomorrow for some final editing/formatting before you are out of the office.

Anne

From: Jones, Jennifer M. [mailto:JonesJM@cdmsmith.com]
Sent: Monday, May 16, 2016 1:52 PM
To: Koch, Kristine <Koch.Kristine@epa.gov>; Allen, Elizabeth <allen.elizabeth@epa.gov>; Sheldrake, Sean <sheldrake.sean@epa.gov>; Christopher, Anne <Christopher.Anne@epa.gov>
Cc: Scott Coffey <coffeyse@cdmsmith.com>
Subject: Jennifer Jones's fieldwork next week (regarding 404/BA)

Hi all,

I'll be out of the office working in the field all next week, May 23-27, so I won't have much time or accessibility next week to receive and respond to your comments on the 404/BA documents.

I know there's a lot going on, so I wanted to let you know that I'm fully available this week but next week will be difficult.

Thanks,

Jennifer

Jennifer Jones | CDM Smith | jonesjm@cdmsmith.com | 503.205.7403 | 1220 SW Morrison St, Suite 200
Portland, OR 97205 | cdmsmith.com

To: Cora, Lori[Cora.Lori@epa.gov]
From: Zhen, Davis
Sent: Wed 4/13/2016 9:46:33 PM
Subject: FW: Review of PP Second Draft
4-7-16 PH Proposed Plan revisions- JW comment.docx

Lori, here are Jim's comments.

Thanks,

****

Davis Zhen
Environmental Cleanup Unit 2

Office of Environmental Cleanup
1200 Sixth Avenue Suite 900
M/S ECL – 122, Seattle, WA 98101
Tel: (206) 553-7660

Cell: (206) 437-5826

****

From: Woolford, James
Sent: Friday, April 08, 2016 9:59 AM
To: Fonseca, Silvina <Fonseca.Silvina@epa.gov>; Grandinetti, Cami <Grandinetti.Cami@epa.gov>; Christopher, Anne <Christopher.Anne@epa.gov>; Fleming, Sheila <fleming.sheila@epa.gov>; Cora, Lori <Cora.Lori@epa.gov>; Zhen, Davis <Zhen.Davis@epa.gov>
Cc: Koch, Kristine <Koch.Kristine@epa.gov>; Allen, Elizabeth <allen.elizabeth@epa.gov>
Subject: RE: Review of PP Second Draft

HI everybody

Have been thinking how to get to the "tell a story" point that Dennis and others raise. Decided

the easiest way to do this was to add a section up front vs throughout the document. So, I've added about 2 or 3 pages at the beginning as an "overview". It is really a summary and draws mostly on the last set of PPts we did last week and a few other items. Essentially, I am trying to "tell the story" and add in a bit of context relative to SF remedy selection around the 9 criteria because those questions keep coming up. I believe this is in the ball park of what Dennis is looking for. Some of it may be overkill. There is a section right before the end about what we expect to be achieved at the end of cleanup – that needs some work, but I think it is important to lay this out as simply as possible. I see it as summarizing what it will mean to meet the 9 RAOs. The last sentence of my add is a simple statement that the Administrator will sign the final ROD. To the Q I raised yesterday.

Deliberative Process / Ex. 5

I HOPE THIS HELPS - …

Thanks again for all the effort.

Jim Woolford, Director

Office of Superfund Remediation and Technology Innovation

Office of Land and Emergency Management

US Environmental Protection Agency

1200 Penn. Ave., NW

Washington, DC 20460

(Mail Code 5201-P)

Phone: (703) 603 8960– Main Office Line

Physically located at:

Room 5622

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From: Fonseca, Silvina
Sent: Friday, April 08, 2016 11:02 AM
To: Grandinetti, Cami <Grandinetti.Cami@epa.gov>; Christopher, Anne <Christopher.Anne@epa.gov>; Fleming, Sheila <fleming.sheila@epa.gov>; Cora, Lori <Cora.Lori@epa.gov>; Zhen, Davis <Zhen.Davis@epa.gov>; Woolford, James <Woolford.James@epa.gov>
Cc: Koch, Kristine <Koch.Kristine@epa.gov>; Allen, Elizabeth <allen.elizabeth@epa.gov>
Subject: RE: Review of PP Second Draft

Thanks Cami,

That question about the HI is still on the radar. Elizabeth and I had a brief chat about that and I would like to be part of your discussion. This will impact the work underway to respond to Blumenauer's request. Messages should be consistent.

Thanks!

Silvina Fonseca, Environmental Engineer
Office of Superfund Remediation and Technology Innovation

Phone #: 703-603-8799
Fax #: 703-603-9104

From: Grandinetti, Cami
Sent: Friday, April 08, 2016 10:56 AM
To: Christopher, Anne <Christopher.Anne@epa.gov>; Fleming, Sheila <fleming.sheila@epa.gov>; Cora, Lori <Cora.Lori@epa.gov>; Zhen, Davis <Zhen.Davis@epa.gov>; Woolford, James <Woolford.James@epa.gov>
Cc: Fonseca, Silvina <Fonseca.Silvina@epa.gov>; Koch, Kristine <Koch.Kristine@epa.gov>; Allen, Elizabeth <allen.elizabeth@epa.gov>
Subject: RE: Review of PP Second Draft

I read through about 21 pages of the PP last night and it looks really good.

Elizabeth—I'm still thinking about how we communicate the risk info and would like to talk about some ideas with you. Nothing big—just some ways to characterize the HI—I saw a note in the last version with this question, which I had myself.

Thanks everyone!

From: Christopher, Anne
Sent: Wednesday, April 06, 2016 11:45 PM
To: Fleming, Sheila <fleming.sheila@epa.gov>; Cora, Lori <Cora.Lori@epa.gov>; Grandinetti, Cami <Grandinetti.Cami@epa.gov>; Zhen, Davis <Zhen.Davis@epa.gov>; Woolford, James <Woolford.James@epa.gov>
Cc: Fonseca, Silvina <Fonseca.Silvina@epa.gov>; Koch, Kristine <Koch.Kristine@epa.gov>; Allen, Elizabeth <allen.elizabeth@epa.gov>
Subject: Review of PP Second Draft

Review of PP Second Draft:

We edited through the Application of Technologies section (up to page 32). We are still working on plugging in the numbers from FS Section 3 for each alternative under the Remedial

Alternatives section (need to finish F-I), but you can at least see how we formatted it in Alternatives B-E (pages 32-39).

•□□□□□□□□ Figures and tables are still being finalized, but we are close to done with help from CDM.

•□□□□□□□□ We still have some comments from people who reviewed the first draft scattered throughout the document that we want to run past Kristine and Elizabeth.

•□□□□□□□□ Highlighted terms and acronyms throughout the document will be added to the glossary and acronym list.

•□□□□□□□□ Implementation language (old OU language) in the Preferred Alternative section needs to be tweaked based on what Cami sent…it will happen when we have Section 4 language to incorporate into that section.

We have worked really hard to incorporate the comments that we have received so far. Please send us comments on pages 1-39. We will fill in the rest of the info from FS Section 3 for Alternatives F-I and then incorporate the Comparative Analysis and Preferred Alternative sections once FS Section 4 is complete. We will also update the paragraph on SDU's from FS Section 4.

Let us know if you have any questions. Please send your comments/edits by 4/11.

Annie and Silvina

To: Conley, Alanna[conley.alanna@epa.gov]; Zhen, Davis[Zhen.Davis@epa.gov]; Philip, Jeff[Philip.Jeff@epa.gov]; Grandinetti, Cami[Grandinetti.Cami@epa.gov]; Robinson, Deborah[Robinson.Deborah@epa.gov]; MacIntyre, Mark[Macintyre.Mark@epa.gov]; Knudsen, Laura[Knudsen.Laura@epa.gov]
From: Cora, Lori
Sent: Thur 5/26/2016 5:57:31 PM
Subject: RE: Public Notice and Paid newspaper article - Review by COB today
CoraOregonian_Portland Harbor Proposed Plan Public Notice.docx

Attached are my suggested changes to the newspaper notice. If acceptable, the same changes would be made to the other article. In addition to mentioning that comments are sought on the supporting analysis and information and where the PP and administrative record can be viewed, I think in the description of the proposed preferred alternative we need to include the fact that

Deliberative Process / Ex. 5

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From: Conley, Alanna
Sent: Thursday, May 26, 2016 10:07 AM
To: Zhen, Davis <Zhen.Davis@epa.gov>; Philip, Jeff <Philip.Jeff@epa.gov>; Grandinetti, Cami <Grandinetti.Cami@epa.gov>; Robinson, Deborah <Robinson.Deborah@epa.gov>; MacIntyre, Mark <Macintyre.Mark@epa.gov>; Cora, Lori <Cora.Lori@epa.gov>; Knudsen, Laura <Knudsen.Laura@epa.gov>
Subject: Public Notice and Paid newspaper article - Review by COB today

Hello all,

Two items for your review by **COB today**. Yellow highlighted areas will be updated after the dates are confirmed.

Thank you – Hang in there…….

Public Notice. Print date in the Oregonian is set for June 8th barring no additional schedule

changes. I vetted *Alternative I* language with Annie and Elizabeth.

Paid newspaper article for publication in multicultural community papers. Not required by NCP. Publication dates and newspapers:

- June 17, Street Roots
- June 20, Asian Reporter
- June 22, Skanner
- July 5, KAHOH (translated to Russian)
- July 7, El Hispanic (translated to Spanish)
- July 8, Phong Dong Times (translated to Vietnamese)

To: Cora, Lori[Cora.Lori@epa.gov]
From: Koch, Kristine
Sent: Thur 5/21/2015 9:10:15 PM
Subject: RE: Section 2 FS Review Comments

Thanks Lori.

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
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Seattle, Washington 98101-3140

(206)553-6705
(206)553-8581 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: Cora, Lori
Sent: Thursday, May 21, 2015 2:00 PM
To: Koch, Kristine
Subject: RE: Section 2 FS Review Comments

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
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From: Koch, Kristine
Sent: Thursday, May 21, 2015 1:46 PM
To: Cora, Lori

Subject: FW: Section 2 FS Review Comments

Lori – these are the only other comments I have from DEQ on FS Section 2. I don't have anything from 4/2.

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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From: GAINER Tom [mailto:GAINER.Tom@deq.state.or.us]
Sent: Wednesday, March 25, 2015 10:48 AM
To: Koch, Kristine
Cc: MCCLINCY Matt; GAINER Tom; poulsen.mike@deq.state.or.us; PETERSON Jenn L; PARRETT Kevin; JOHNSON Keith
Subject: Section 2 FS Review Comments

Kristine-

Below are DEQ's comments on Section 2 of the 2/23/2015 Portland Harbor draft FS. DEQ sent EPA comments on the previous version of Section 2 on 9/4/2014 and responses were provided; DEQ is not repeating previously submitted comments. Please contact myself or Matt McClincy if you have questions.

Thanks-

Tom Gainer, P.E.

Project Manager/Environmental Engineer

Oregon Department of Environmental Quality, NW Region

503-229-5326

This spring, DEQ's Northwest Region Office will be moving to a new location - the 700 Lloyd Building at 700 NE Multnomah St., Suite #600, Portland, OR 97232. The target date for operating at the new location is May 26th, 2015.

Section 2.2, RAO 8 Suggest striking MCLs from this RAO as they are not relevant to ecological receptors.

Section 2.2.1

1. Identification of Contaminants of Concern, Weak Lines of Evidence: It is unclear how COCs were eliminated based on representing a weak line of evidence, and how they are tied to COCs in the BERA . It is unclear if the designation of a weak line was for one or all media in which it was identified. For example, diesel range hydrocarbons were identified in both sediment predictive models (LRM) and transition zone water. Additionally, it is unclear if spatial scale of exceedance harbor wide was a consideration in defining those as weak lines of evidence. While some COCs are found primarily in one area (e.g. trimethylbenzenes, off GASCO) it is unclear if this results in their designation as weak lines. A better way to state it would be that they are strong and appropriate lines for a given river mile (source) within the larger Site. This is also a more comprehensive way to connect upland source exceedances in groundwater with pore water exceedances in sediment. A table that lists those lines of evidence designated as weak, along with the reasoning, would be a better way to review this section.

2. Co-location with other contaminants: DEQ suggests that EPA name all contaminants as COCs, including those co-located with other contaminants, and then indicate that focusing on co-located COCs may achieve protectiveness. Dropping contaminants as COCs may hinder the ability to ensure that contaminants are adequately evaluated.

3. Related Contaminants Addressed by Other Contaminants (and Appendix B2, Section 1.3): The text states that Total DDD, DDE and DDT were grouped for PRG development and the individual sums were eliminated. For ecological risk PRG tables, both DDX and DDE are listed. Please note that DDE is the COC that came through the risk assessment for piscivorous birds, and that the DDX TRV may not be protective of DDE effects. Unlike the DDE TRV in the BERA, the ATLs calculated based on the individual and population-based TRVs for DDX of 0.227 and 2.27 mg/kg-day generally exceed concentrations considered protective of fish-eating birds. Due to the significant differences in the TRVs for the DDE and DDX, DEQ does not believe that DDE effects will be sufficiently represented by DDX and recommends that DDE be the primary PRG. Alternatively, a DDX TRV that better considers DDE effects could be used as a surrogate for transformation.

Table 2.1-4 This table identifies a number of values from DEQ Water Table 31 Aquatic Life Water Quality Guidance Values for Toxic Pollutants as DEQ Ambient Water Quality Criteria (acute and chronic). Values from Table 31 are not DEQ AWQC. Table 2.1-4 should be edited accordingly.

Table 2.2-1

1. We suggest adding headers (*e.g.*, Drinking Water/Direct Contact) under RAO 3 and RAO 4. In general, the PRGs for RAO 3 and RAO 4 are identical. Table 2.2-3 provides the basis for selection of the COCs for each RAO. In some cases, the basis for a COC is provided but there is no PRG (*e.g.*, PBDE for RAO 3), and in other cases there is a PRG, but no basis provided in Table 2.2-3 (*e.g.*, zinc PRG for RAO 3, aldrin and dieldrin for RAO 4).

2. A beach PRG for RAO 1 is not provided, although a basis is presented in Table 2.2-12.

3. Footnotes 16 and 17 are not included.

4. RAO 8, Manganese PRG: The chronic criteria of 120 ug/L to screen risks to aquatic organisms from exposure to dissolved manganese (Mn) is a tier II water quality benchmark, published in 1996 by Suter and Tsao (Suter GW, Tsao CL, 1996, Toxicological benchmarks for screening potential contaminants of concern for effects on

aquatic biota: 1996 revision, Prepared for U.S. Department of Energy Office of Environmental Management, Risk Assessment Program, Health Sciences Research Division). In a November 25, 2014 technical memo addressed to EPA, Windward Environmental, on behalf of the LWG, proposed revising the Mn PRG based on a more robust set of toxicity tests than those used by Suter and Tsao and additional studies that demonstrate Mn toxicity is influenced by water hardness. Windward compiled bioassay results from published and unpublished studies and employed EPA protocols to derive acute and chronic SLVs for Mn based on hardness.

DEQ Cleanup has been working on internal guidance for project managers on issues associated with Mn. This effort included a review of the Windward Environmental memo, as DEQ supports the development of a hardness-based SLV and would like to match the Portland Harbor Mn PRG with the Mn risk values identified by our work group. This DEQ review of the Windward memo concluded:

A. Much of the data used by Windward to derive acute and chronic criteria does not appear to meet the guidelines for minimum data quality set out by Stephan (Stephan CE, Mount DI, Hansen DJ, Gentile JH, Chapman GA, Brungs WA, 1985, Guidelines for deriving numerical national water quality criteria for the protection of aquatic organisms and their uses, PB85-227049, Office of Research and Development, US Environmental Protection Agency, Washington, DC.) and followed by Suter and Tsao (1996). DEQ has questions regarding the following data quality issues:

- Absence of information on test conditions
- Use of non-native species
- Accuracy of data transcription from the literature

B. Re-calculation of the CMC based only on those tests that meet EPA guidelines may result in a different value than those presented by Windward.

Recommendations:

a. Explicitly state the criteria used for including bioassay tests in the data compilation and confirm the studies included meet these criteria.

b. When testing protocols deviate from EPA guidelines, explain the mitigating factors or circumstances that warrant or justify inclusion of the data.

c. Eliminate exotic species from the calculations unless supporting justification is provided.

d. Identify all deviations from EPA protocols in calculating CMCs and justify the excursion.

e. Review hardness and contaminant concentration data for accuracy, and recalculate hardness-toxicity relationship.

f. Re-calculate FAVs and CMCs following the above corrections.

The following detail is provided to support the above conclusions and recommendations.

Windward compiled bioassay data drawn from studies of Mn toxicity conducted between 1960 and 2012. However, it appears much of the data presented in the tech memo does not meet the test guidelines or data quality objectives described in Stephen and utilized by other investigators such as Suter and Tsao (1996) in developing Tier II benchmarks. Deviations from Stephen (1985) and Suter and Tsao (1996) include:

•□□□□□□□□ Guidelines regarding variation in acute values indicate " *If the acute values within a species or among species in a genus differ by a factor of 10 or more, the higher values were excluded, and those that are within the factor of 10 range were used to attain a more conservative estimate.*"

In Table 1 of the Windward memo, this guideline was not followed for the following species: *Chironomus tentans, Daphnia magna, Oncorhynchus mykiss,* and *Pimephales promelas.*

•□□□□□□□□ Stephan (1985) also indicates that only tests with essential information on basic test conditions and protocols be included in the calculations. Data included from several investigators, representing 33 of 82 individual tests presented in Table 1, did not report: 1) the type of exposure (static, renewal, or flow-through), 2) whether the contaminant of interest was sampled during the test, or 3) the duration of the test. The majority of these bioassays are attributed to ENSR (1990, 1992, 1994 and 1996).

•□□□□□□□□ For several genera and species only one test result is reported. A partial list of these includes: *Aeolosoma sp.* (oligochete worm), *Agosia chrysogaster (longfin dace), Anodanta imbecillis (freshwater mussel), Aselius aquaticus (isopod), Bufo boreus (western toad), Colise fasciata (giant gourami), Crangonyx pseugracillis (amphipod), Dutephrynus melanostictus (Asian common toad), Lampsillius siliquoidea (fatmucket clam).*

Inclusion of these species, most of which represent the adult stage of their lifecycle rather than the more sensitive embryonic or juvenile stages has an effect on the FCV. Although only the lowest 4 GMAVs are included in the calculations, the number of species with GMAVs is a factor. These species represent the most tolerant of the organisms used in the calculations. The LC50s for several of these organisms are listed below along with their rank in tolerance. (1) *Crangonyx pseugracillis,* 694,000 ug/L; (2) *Colise fasciata*, 542,969 ug/L; (3) *Aselius aquaticus,* 330,000 ug/L; (4) *Bufo boreus,* 211,027 ug/L; (6) *Dutephrynus melanostictus,* 81,261 ug/L.

The use of these test results is questionable in the derivation of acute criteria due to the limited amount, quality, applicability, and/or age of the data. Studies included in the report date as early as 1960, and although available to previous researchers like Suter and Tsao (1996) were not used or referred to by them in deriving acute and chronic criteria. The authors of the Windward memo do not discuss the sources and quality of the data and what guidelines they used when deciding to include/exclude the results of a study.

•□□□□□□□□ Test data from one of the EPA publications cited by Windward (EPA, 2010 Final Report on Acute and Chronic Toxicity of Nitrate, Nitrite, Boron, Manganese, Fluoride, Chloride and Sulfate to Several Animal Species. EPA 905-R-10-002. USEPA, Chicago, IL.). As reported in Table 92 of the document, the water hardness of the two test solutions that bracket the interpolated LC50 value for *Lampsilis silquoidea* were 150 ppm and 220 ppm, not the 90 ppm reported in Table 1 of the Windward memo. Similarly and from the same report, for the tests conducted on *Megalonaias nervosa,* the hardness was 112 ppm, not 90 ppm as indicated in the Windward memo. These errors lead to an overestimation of the mitigating effects of hardness on manganese toxicity. The additional studies cited by Windward were not reviewed to confirm accuracy of the data used in the Windward hardness evaluation, but DEQ recommends a quality assurance review for data compiled from literature.

•□□□□□□□□ Stephan (1985) indicates organisms without reproducing populations in North America should not be used in the derivation of criteria. Windward included the giant gourami (*Colise fasciata) and* Asian common toad *Dutephrynus melanostictus,*), which are native to south east Asia, in the derivation of acute criteria. Although not flagged by Windward, Stephan (1985) indicates *Asellius aquaticus* is not native to North America.

•□□□□□□□□ In calculating final acute values or FAVs, Stephan (1985) indicates "*if for a commercially or recreational important species the geometric mean of the acute values from flow-through tests in which the concentrations of test material were measured is lower than the calculated Final Acute Value, then that geometric mean should be used as the Final Acute Value instead of the calculated Final Acute Value*'.

The coho salmon is a recreationally and commercially valuable species that had a SMAV that was lower than the FAV. Based on the Stephan's scheme for deriving criteria, the coho SMAV would be used instead of the FAV in calculating a CMC.

•□□□□□□□□ It is not clear why two separate SMAVs and GMAVs were reported for the same species *Lymnaea stagnalis,* whereas the protocol described by Stephan would result a single SMAV and GMAV.

•□□□□□□□□ There appears to be an error in table with respect to calculating the hardness adjusted LC50 for *Lampsilis silquoidea.* The adjusted value should be less

than 43,300 ug/L, not greater than this value.

5. RAO 8, TPH PRG: EPA proposed a PRG of 2.6 ug/L for the petroleum hydrocarbon aliphatic $C_{10} – C_{12}$ fraction to protect aquatic organisms from narcosis effects. DEQ agrees with this PRG. During recent discussions with EPA, we discussed refinements to the method of calculating PRGs for petroleum hydrocarbons fractions, and how the fractions should be analyzed. Based on our subsequent evaluations, we offer the following comments on the TPH fraction PRGs. Table 1 shows our proposed modifications to EPA's development of screening levels for TPH fractions. The most important proposed revision is the listing of screening values for higher molecular weight aromatic fractions because of revised solubility limits.

Equivalent Carbon Numbers

The nomenclature of $C_{10} – C_{12}$ is ambiguous as to whether actual carbon numbers or equivalent carbon numbers are intended. The aliphatic and aromatic fractions in Table 1 are based on Oregon's definition. The basic petroleum fractions used in DEQ's 2003 Risk-Based Decision Making (RBDM) document were developed by the TPH Criteria Working Group (TPHCWG, 1997a). The carbon numbers used to designate the fractions are "equivalent carbon numbers", based on a compound's boiling point or elution time on a gas chromatograph. In addition to the TPHCWG and DEQ, Washington and Massachusetts use equivalent carbons (EC) numbers in their evaluations of TPH fractions. It appears Alaska also uses EC numbers. For example, their designation of $C_6 – C_{10}$ and $C_{10} – C_{25}$ fractions would be ambiguous with regard to which fraction compounds with ten carbon atoms belong if actual carbon numbers were intended. If C_{10} was intended to belong to the first fraction, the second fraction should be designated $C_{11} – C_{25}$ rather than $C_{10} – C_{25}$. To avoid confusion, we propose that equivalent carbon fractions be explicitly named according to TPHCWG convention, such as $EC_{>10} – EC_{12}$. We include this convention for the DEQ fractions in Table 1.

Analytical Method

A consultant on the Premier Edible Oils project asked which laboratory analytical method should be used for the petroleum hydrocarbon fractions. Given that the basis for the fractions is DEQ RBDM guidance, we recommend using the extractable petroleum hydrocarbon and volatile petroleum hydrocarbon methods presented in guidance. However, because of the low screening values for some of the fractions, these analytical methods need to be modified to meet lower method detection limits. DEQ's laboratory can provide those modifications.

Maximum Water Solubility

Maximum water solubilities were originally calculated using equations based on surrogate carbon numbers for the fractions. The TPHCWG evaluated three methods of estimating parameter values for TPH fractions. The methods were simple averaging of constituent properties in each fraction, composition-based averaging, and correlation to relative boiling point index. The three approaches gave similar results. We propose to use the values based on the TPHCWG's recommended approach, the correlation method.

A comparison of original calculated and current proposed water solubilities in Table 1 shows that aromatic fraction solubilities were previously underestimated. As EPA states in your supporting material for the derivation of TPH fraction screening values, it is inappropriate to propose a screening value for narcosis effects if the screening value is greater than the maximum solubility. This is because the primary toxic effects will be due to the physical presence of a separate phase petroleum product rather than narcosis. For this reason, screening levels were not previously provided for aromatic fractions $EC_{>12} – EC_{16}$, $EC_{>16} – EC_{21}$, and $EC_{>21} – EC_{34}$. Using the proposed revisions, screening levels are now provided for these aromatic fractions. This is a substantial change.

Molecular Weight

To convert from the molar basis of toxicity to a mass basis for screening levels, we need an estimate of the molecular weight for each fraction. We propose to use the recommended molecular weights from the TPHCWG study rather than the surrogate compounds originally proposed. This revision does not have a substantial effect on the calculated screening values.

Organic-Carbon Partition Coefficient, K_{oc}

For consistency with the other parameter values, we propose to use the recommended $\log K_{oc}$ values from the TPHCWG study rather than the values originally proposed. This revision does not have a substantial effect on the calculated screening values.

Chemical Constituents

For completeness and for consistency with DEQ's approach for calculating TPH risk-based concentrations, we added individual chemical constituents to Table 1. Calculations were performed the same as for chemical fractions. We note that calculated screening levels for individual constituents are typically much higher than screening values based on benthic toxicity.

Portland Harbor Example

The evaluation of petroleum hydrocarbon fractions in the BERA was performed using assumed percentages of aliphatic and aromatic fractions in TPH-gasoline, not measured fractions. To get a better understanding of the composition of hydrocarbons, including diesel, we evaluated measured fraction data from the February 2014 Groundwater Monitoring Report for the Arco/BP Terminal 22T bulk fuel facility in Portland Harbor. Data from both shallow and deep groundwater monitoring wells showed higher molecular weight aromatic fractions at concentrations greater than the new calculated SLVs shown in Table 1. Because the material is an LNAPL, the presence of TPH fractions in deep groundwater makes it more likely the concentrations are representative of dissolved phase hydrocarbons. There were also higher molecular weight aliphatic fractions at concentrations greater than SLVs, and in some cases greater than solubility limits.

Conclusion

To create a more consistent and defensible approach, we are suggesting modifications to EPA's approach for calculating screening levels for petroleum hydrocarbon fractions. The one modification that results in a substantive change to screening values is a correction to maximum solubility values for aromatic fractions. After making this revision, it is clear to us that it is important to have screening levels for higher molecular weight aromatic fractions to evaluate potential narcosis effects on aquatic organisms.

Tables 2.2-6 and 2.2-7 The RSLs for RAOs 3 and 4 do not appear to be from the current EPA table (January 2015). There are minor differences for most of the chemicals.

Appendix B-2, Ecological Risk Based PRG Derivation

Section 1.1, Benthic Invertebrate PRGs The text should specify that the L2 SQV values used were from a Logistic Regression Model using a pMax of 0.50.

Section 1.1, Benthic Risk Areas The text states that benthic risk areas were identified using numerical sediment PRGs (those listed in Table B-2), and empirical bioassay test results. However, since the benthic risk areas will not be available for review until Section 3, perhaps a placeholder statement could be added that states criteria used for this identification will be presented later. DEQ will withhold comments on the criteria for identification of these areas until Section 3 is available for review. DEQ recommends that the approach for defining these areas include specific details that describe how these areas were identified based on multiple lines of evidence. The approach should include models (e.g., LRM, FPM or PEC Quotient) or appropriate combinations that most closely predict achievement of the toxicity test criteria listed as PRGs in this section. Although empirical tests results will be the strongest line of evidence and final PRG evaluated, the areas identified that may require bioassay testing is one objective of these criteria. For example, this may include use of complete LRM Level 2 model at a pMax of 0. 50 as presented in Table 6-11 in the BERA.

Section 1.2, Sediment PRGs based on Ingestion of Biota (Prey) Please include calculations related to the use of a weighted mean based on prey consumption portions.

Section 1.3, Sediment PRG for Piscivorous Bird Egg Unlike the DDE TRV in the BERA, the ATLs calculated based on the individual and population-based TRVs for DDX of 0.227 and 2.27 mg/kg-day generally exceed concentrations considered protective of fish-eating birds. Due to the significant differences in the TRVs for the DDE and DDX, DEQ does not believe that DDE effects will be sufficiently represented by DDX and recommends that DDE be the primary PRG. See also Comment #3 on Section 2.2.1.

To: Cora, Lori[Cora.Lori@epa.gov]
From: Koch, Kristine
Sent: Fri 5/15/2015 3:59:56 PM
Subject: FW: Final Comments on Section 2 of draft FS PH
Section 2 HQ ALL Comments final.docx

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
Region 10
1200 Sixth Avenue, Suite 900, M/S ECL-122
Seattle, Washington 98101-3140

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(206)553-8581 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: Fonseca, Silvina
Sent: Thursday, May 14, 2015 2:28 PM
To: Koch, Kristine
Cc: Allen, Elizabeth; Grandinetti, Cami; Ammon, Doug; Stalcup, Dana; Ells, Steve; Charters, David; Anderson, RobinM; Legare, Amy; Gustavson, Karl
Subject: Final Comments on Section 2 of draft FS PH

Hi Kristine,

The attached document has our comments. Please note, that there are some comments related to the ARARs, which we need some further discussion on. We will need to include Lori Cora on those. Let's touch base on that on Monday.

Deliberative Process / Ex. 5

Deliberative Process / Ex. 5

Again, let's touch base on Monday about this.

Have a great weekend.

Silvina Fonseca, Environmental Engineer
Office of Superfund Remediation and Technology Innovation

Phone #: 703-603-8799
Fax #: 703-603-9104

To: Cora, Lori[Cora.Lori@epa.gov]; Openchowski, Charles[openchowski.charles@epa.gov]
Cc: Fonseca, Silvina[Fonseca.Silvina@epa.gov]
From: Anderson, RobinM
Sent: Thur 5/14/2015 3:38:48 PM
Subject: FW: Portland Harbor -- Oregon Std and ICs -- follow-up from discussion on ICs last night on call I was not on.

My notes are below regarding the background and the IC provisions — Thank you

Attorney Client / Ex. 5

Attorney Client / Ex. 5

Thank you

Robin M Anderson

OSRTI/ARD/SARDB

703-603-8747

From: Cora, Lori
Sent: Thursday, May 14, 2015 11:26 AM
To: Anderson, RobinM; Openchowski, Charles
Subject: RE: Portland Harbor -- Oregon Std and ICs -- follow-up from discussion on ICs last night on call I was not on.

Attorney Client / Ex. 5

465.315 Standards for degree of cleanup required; Hazard Index; risk protocol; hot spots of contamination; exemption; rules. (1)(a) Any removal or remedial action performed under the provisions of ORS 465.200 to 465.545 and 465.900 shall attain a degree of cleanup of the hazardous substance and control of further release of the hazardous substance that assures protection of present and future public health, safety and welfare and of the environment.

(b) The Director of the Department of Environmental Quality shall select or approve remedial actions that are protective of human health and the environment. The protectiveness of a remedial action shall be determined based on application of both of the following:

(A) The acceptable risk level for exposures. For protection of humans, the acceptable risk level for exposure to individual carcinogens shall be a lifetime excess cancer risk of one per one million people exposed, and the acceptable risk level for exposure to noncarcinogens shall be the exposure that results in a Hazard Index number equal to or less than one. "Hazard Index number" means a number equal to the sum of the noncarcinogenic risks (hazard quotient) attributable to systemic toxicants with similar toxic endpoints. For protection of ecological receptors, if a release of hazardous substances causes or is reasonably likely to cause significant adverse impacts to the health or viability of a species listed as threatened or endangered pursuant to 16 U.S.C. 1531 et seq. or ORS 496.172, or a population of plants or animals in the locality of the facility, the acceptable risk level shall be the point before such significant adverse impacts occur.

(B) A risk assessment undertaken in accordance with the risk protocol established by the Environmental Quality Commission in accordance with subsection (2)(a) of this section. [Are we reading this to say that risk assessment (and we use CERCLA risk methodology since the States generally would be considered procedural –would then need to meet the HI of 1 or cancinogenic risk level of 10-6 for the cleanup value?]

(c) A remedial action may achieve protection of human health and the environment through:

(A) Treatment that eliminates or reduces the toxicity, mobility or volume of hazardous substances;

(B) Excavation and off-site disposal;

(C) Containment or other engineering controls;

(D) Institutional controls; [so we can use ICs to meet the 10-6 or HI of 1 number – EPA as the decision maker stands in the shoes of the director and decides.]

(E) Any other method of protection; or

(F) A combination of the above.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

From: Anderson, RobinM
Sent: Thursday, May 14, 2015 7:30 AM
To: Cora, Lori; Openchowski, Charles
Subject: FW: Portland Harbor -- Oregon Std and ICs -- follow-up from discussion on ICs last night on call I was not on.

The the stuff below and reading 340-122-0115 (definition that mentions HI of 1 and 10-5 excess cancer is in 047 which is referenced in 040 which is the standards sections has the following:

"The fifth bullet should be about resolution of the State's cleanup standards that do not account for anthropogenic background. We discussed whether an ARAR waiver may be needed. The specific regulation is OAR 340-122-040(2) under Standards:

(2) In the event of a release of a hazardous substance, remedial actions shall be implemented to achieve:

(a) Acceptable risk levels defined in OAR 340-122-0115, as demonstrated by a residual risk assessment; or

(b) Numeric cleanup standards developed as part of an approved generic remedy identified or developed by the Department under OAR 340-122-0047, if applicable; or

(c) For areas where hazardous substances occur naturally, the background level of the hazardous substances, if higher than those levels specified in subsections (2)(a) through (2)(b) of this rule."

Attorney Client / Ex. 5

Attorney Client / Ex. 5

340-122-0040

Standards

(1) Any removal or remedial action shall address a release or threat of release of hazardous substances in a manner that assures protection of present and future public health, safety, and welfare, and the environment.

(2) In the event of a release of a hazardous substance, remedial actions shall be implemented to achieve:

(a) Acceptable risk levels defined in OAR 340-122-0115, as demonstrated by a residual risk assessment; or

(b) Numeric cleanup standards developed as part of an approved generic remedy identified or developed by the Department under OAR 340-122-0047, if applicable; or

(c) For areas where hazardous substances occur naturally, the background level of the hazardous substances, if higher than those levels specified in subsections (2)(a) through (2)(b) of this rule.

(3) In the event of a release of methane from a historic solid waste landfill, removal or remedial actions

shall be implemented to prevent concentrations of methane exceeding or likely to exceed 1.25% by volume in confined spaces and structures, other than in equipment, piping, wells, or other structures designed for the collection and management of methane and approved by the Department.

(4) In the event of a release of hazardous substances to groundwater or surface water constituting a hot spot of contamination, treatment shall be required in accordance with OAR 340-122-0085(5) and 340-122-0090.

(5) A removal or remedial action shall prevent or minimize future releases and migration of hazardous substances in the environment. A removal or remedial action and related activities shall not result in greater environmental degradation than that existing when the removal or remedial action commenced, unless short-term degradation is approved by the Director under OAR 340-122-0050(4).

(6) A removal or remedial action shall provide long-term care or management, as necessary and appropriate, including but not limited to monitoring, operation, maintenance, and periodic review.

Stat. Auth.: ORS 465.400(1), 466 & 468.020
Stats. Implemented: ORS 465.200 - 465.455 & 465.900
Hist.: DEQ 26-1988, f. & cert. ef. 9-16-89; DEQ 12-1992, f. & cert. ef. 6-9-92; DEQ 2-1997, f. & cert. ef. 2-7-97; DEQ 3-2002(Temp), f. 2-21-02 thru 8-20-02; DEQ 9-2002, f. & cert. ef. 8-22-02; DEQ 3-2006, f. & cert. ef. 3-17-06

From: Fonseca, Silvina
Sent: Thursday, May 14, 2015 10:05 AM
To: Anderson, RobinM
Subject: FW: 4/8 EPA/DEQ Next Steps and 4/21 Execs Schedule

FYI…

Silvina Fonseca, Environmental Engineer
Office of Superfund Remediation and Technology Innovation

Phone #: 703-603-8799
Fax #: 703-603-9104

From: Stalcup, Dana
Sent: Wednesday, May 13, 2015 6:34 PM
To: Ammon, Doug; Fonseca, Silvina; Legare, Amy; Ells, Steve; Charters, David; Gustavson, Karl

Subject: FW: 4/8 EPA/DEQ Next Steps and 4/21 Execs Schedule

I think this is the note that might have been discussed today....

Dana Stalcup

Director, Assessment and Remediation Division

OSWER/Office of Superfund Remediation and Technology Innovation (OSRTI)

Desk – 703-603-8702

Cell – 202-309-5473

From: PARRETT Kevin [mailto:Parrett.Kevin@deq.state.or.us]
Sent: Friday, April 10, 2015 12:20 PM
To: Robinson, Deborah; Grandinetti, Cami; Yamamoto, Deb; Cohen, Lori; Koch, Kristine; Sheldrake, Sean; Muza, Richard; Christopher, Anne; Allen, Elizabeth; Cora, Lori; Conley, Alanna; DECONCINI Nina; JOHNSON Keith; GAINER Tom; MCCLINCY Matt; gilles.bruce@deq.state.or.us; Fonseca, Silvina; Legare, Amy; Stalcup, Dana; Ammon, Doug
Subject: RE: 4/8 EPA/DEQ Next Steps and 4/21 Execs Schedule

Hi Debbie. The fifth bullet should be about resolution of the State's cleanup standards that do not account for anthropogenic background. We discussed whether an ARAR waiver may be needed. The specific regulation is OAR 340-122-040(2) under Standards:

(2) In the event of a release of a hazardous substance, remedial actions shall be implemented to achieve:

(a) Acceptable risk levels defined in OAR 340-122-0115, as demonstrated by a residual risk assessment; or

(b) Numeric cleanup standards developed as part of an approved generic remedy identified or developed by the Department under OAR 340-122-0047, if applicable; or

(c) For areas where hazardous substances occur naturally, the background level of the hazardous substances, if higher than those levels specified in subsections (2)(a) through (2)(b) of this rule.

-Kevin

From: Robinson, Deborah [mailto:Robinson.Deborah@epa.gov]
Sent: Wednesday, April 08, 2015 3:42 PM
To: Grandinetti, Cami; Yamamoto, Deb; Cohen, Lori; Koch, Kristine; Sheldrake, Sean; Muza, Richard; Christopher, Anne; Allen, Elizabeth; Cora, Lori; Conley, Alanna; DECONCINI Nina; PARRETT Kevin; JOHNSON Keith; GAINER Tom; MCCLINCY Matt; GILLES Bruce A; Fonseca, Silvina; Legare, Amy; Stalcup, Dana; Ammon, Doug
Subject: 4/8 EPA/DEQ Next Steps and 4/21 Execs Schedule

Please forward this to whoever should receive it:

EPA/DEQ Monthly Meeting - 4/8/15

Next Steps:

- Lori Cohen - Invite Dana to the LWG meeting next week.
- Cami/Debbie - Set up briefing for Dick and Dennis on FS Sec 3 and 4 prior to 7/29
- Kristine/Debbie - Be sure TCT understands that we will not release preferred alternative prior to completion of Sec 4 comments.
- Cami - Send Kevin sample conceptual remedy and that state's package submitted to NRRB.
- Debbie/Kristine - Are Fed agencies invited to present to Board? Follow up on how many presentations to expect.
- Cami - talk to Lori Cora - Future conversation on background (?) Involve Silvina and Robin.
- Matt - DEQ find out about which WQS to use and let EPA know.
- Debbie/Cami - Schedule next execs meeting before NRRB
- Kevin - To prep for Execs meeting on 4/21, State meet with Dennis at noon on 4/21.

Schedule for 4/21 Meetings with Dennis, Jim, Dick and LWG, and follow up stakeholder meetings:

12:00 – 1:00 – OOO - Pre-brief for Dennis, Jim and State over lunch

1:30-3:00 - City Hall, Rose Room – Execs meeting

3:30 – 4:15 – OOO – Follow up meeting with TCT/MOU partners

4:30 – 5:15 – OOO – Follow up meeting with community groups

==========

From the Desk of:
Debbie Robinson
US EPA Region 10, M/S OMP-211, 1200 Sixth Avenue, Suite 900, Seattle, WA 98101
Tel: 206-553-4961
robinson.deborah@epa.gov

To: Cora, Lori[Cora.Lori@epa.gov]
Cc: Lance Peterson (PetersonLE@cdmsmith.com)[PetersonLE@cdmsmith.com]; Koch, Kristine[Koch.Kristine@epa.gov]
From: Sheldrake, Sean
Sent: Fri 4/10/2015 5:32:54 PM
Subject: FW: OPR related arkema correspondence
eeca comments 9 18 13.pdf
LSS Dispute Letter_2014-01-24.pdf
OR_PesticideRuleAndWasteDesignationClarification.pdf
RE: Arkema Dispute -- Planning agenda for 2/25 meeting

Lori, As requested, please see the attached on OPR related direction we've given LSS in the past. I interpret a nearshore fill to trigger the state's interpretation of upland for sediment placed there (not sediment that doesn't get moved within the footprint)—subtitle C and/or D design build standards would be triggered. S

Sean Sheldrake, Unit Diving Officer, RPM

EPA Region 10, 1200 Sixth Ave., Suite 900; Mailstop DOC-01

Seattle, WA 98101

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206.225.6528 cell

http://yosemite.epa.gov/r10/cleanup.nsf/sites/ptldharbor

http://www.epa.gov/region10/dive/

Like us on Facebook! https://www.facebook.com/EPADivers

From: Peterson, Lance [mailto:PetersonLE@cdmsmith.com]
Sent: Thursday, April 09, 2015 3:33 PM
To: Sheldrake, Sean
Subject: FW: OPR related arkema correspondence

Sean, EE/CA comment #20 deals with the OPR topic. The following correspondence is attached:

EE/CA comment back and forth from 2013 (see comment #20)

LSS 1/24/14 EE/CA dispute letter (includes comment #20)

DEQ letters dated 2/20/14 and 11/20/08

DEQ e-mail dated 2/24/14

From: Sheldrake, Sean [mailto:sheldrake.sean@epa.gov]
Sent: Thursday, April 09, 2015 10:31 AM
To: Peterson, Lance
Subject: OPR related arkema correspondence

Hi Lance, could you pull all the correspondence on the OPR we had leading up to and surrounding the draft ee/ca, for say 1-95 (contractor info) / Ex. 4

Thank you.

S

Sean Sheldrake, Unit Diving Officer, RPM

EPA Region 10, 1200 Sixth Ave., Suite 900; Mailstop DOC-01

Seattle, WA 98101

206.553.1220 desk

206.225.6528 cell

http://yosemite.epa.gov/r10/cleanup.nsf/sites/ptldharbor

http://www.epa.gov/region10/dive/

Like us on Facebook! https://www.facebook.com/EPADivers

To: Fonseca, Silvina[Fonseca.Silvina@epa.gov]; Ells, Steve[Ells.Steve@epa.gov]; Legare, Amy[Legare.Amy@epa.gov]
Cc: Cora, Lori[Cora.Lori@epa.gov]
From: Koch, Kristine
Sent: Thur 3/26/2015 3:58:37 PM
Subject: FW: LWG Comments on EPA's FS Revised Draft Section 2
2015-03-25 LWG Comments on Revised FS Section 2 Cover Letter.pdf
2015-03-25 LWG Comments Section 2 FS.pdf

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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Seattle, Washington 98101-3140

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From: Jennifer Woronets [mailto:jworonets@anchorqea.com]
Sent: Wednesday, March 25, 2015 4:44 PM
To: Koch, Kristine
Cc: Jennifer Woronets; Amanda Shellenberger; Bob Wyatt; Carl Stivers; Jennifer Woronets; Jim McKenna (jim.mckenna@verdantllc.com); King, Todd W.; Koch, Kristine; Mullin, Jeanette; Patty Dost; Scott Coffey (coffeyse@cdmsmith.com); Sheldrake, Sean; audiehuber@ctuir.com; Bob Wyatt; callie@ridolfi.com; cunninghame@gorge.net; Dave Livesay; erin.madden@gmail.com; Gabriel Moses Personal Privacy / Ex. 6 Gail Fricano (gfricano@indecon.com); Holly Partridge (Holly.Partridge@grandronde.org); JD Williams (jd@williamsjohnsonlaw.com); Jennifer Kassakian (jkassakian@indecon.com); Jennifer Woronets; Jim McKenna (jim.mckenna@verdantllc.com); Julie Weis; Kim Cox (kim.cox@portlandoregon.gov); Koch, Kristine; Madalinski, Kelly; MCCLINCY Matt; Michael.karnosh@grandronde.org; Rachel DelVecchio (rdelvecchio@indecon.com); Robert.Neely@noaa.gov; rose@yakamafish-nsn.gov; ryan sudbury (Ryan.Sudbury@grandronde.org); Sheldrake, Sean; Tom Gainer (GAINER.Tom@deq.state.or.us)
Subject: LWG Comments on EPA's FS Revised Draft Section 2

Kristine,

Please see attached LWG comments on EPA's FS revised draft Section 2.

Let us know if you have any questions.

Thank you,

Jen Woronets ☺

Anchor QEA, LLC

jworonets@anchorqea.com

421 SW Sixth Avenue, Suite 750

Portland, OR 97204

503-972-5014

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The information is intended to be for the use of the individual or entity named above. If you are not the intended recipient, please be aware that any disclosure, copying, distribution or use of the contents of this information is prohibited. If you have received this electronic transmission in error, please notify us by electronic mail at jworonets@anchorqea.com

To: Fonseca, Silvina[Fonseca.Silvina@epa.gov]; Ells, Steve[Ells.Steve@epa.gov]; Legare, Amy[Legare.Amy@epa.gov]
Cc: Cora, Lori[Cora.Lori@epa.gov]
From: Koch, Kristine
Sent: Thur 3/26/2015 3:12:03 PM
Subject: FW: LWG Comments on EPA's FS Revised Draft Section 2
2015-03-25 LWG Comments on 2015-02-23_Table 2_1-1_ARARs.pdf

Here are the LWG's comments on FS Section 2.

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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From: Jennifer Woronets [mailto:jworonets@anchorqea.com]
Sent: Thursday, March 26, 2015 7:02 AM
To: Koch, Kristine
Cc: Amanda Shellenberger; Bob Wyatt; Carl Stivers; Jim McKenna (jim.mckenna@verdantllc.com); King, Todd W.; Koch, Kristine; Mullin, Jeanette; Patty Dost; Scott Coffey (coffeyse@cdmsmith.com); Sheldrake, Sean; audiehuber@ctuir.com; Bob Wyatt; callie@ridolfi.com; cunninghame@gorge.net; Dave Livesay; erin.madden@gmail.com; Gabriel Moses; Personal Privacy / Ex. 6; Gail Fricano (gfricano@indecon.com); Holly Partridge (Holly.Partridge@grandronde.org); JD Williams (jd@williamsjohnsonlaw.com); Jennifer Kassakian (jkassakian@indecon.com); Jim McKenna (jim.mckenna@verdantllc.com); Julie Weis; Kim Cox (kim.cox@portlandoregon.gov); Koch, Kristine; Madalinski, Kelly; MCCLINCY Matt; Michael.karnosh@grandronde.org; Rachel DelVecchio (rdelvecchio@indecon.com); Robert.Neely@noaa.gov; rose@yakamafish-nsn.gov; ryan sudbury (Ryan.Sudbury@grandronde.org); Sheldrake, Sean; Tom Gainer (GAINER.Tom@deq.state.or.us); Jennifer Woronets
Subject: RE: LWG Comments on EPA's FS Revised Draft Section 2

Kristine,

The attached LWG comments on the February 23 Table 2.1-1 should have been included in yesterday's email. I apologize for the error.

Thank you,

Jen Woronets ☺

Anchor QEA, LLC

jworonets@anchorqea.com

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Portland, OR 97204

503-972-5014

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From: Jennifer Woronets
Sent: Wednesday, March 25, 2015 4:44 PM
To: Koch, Kristine (Koch.Kristine@epa.gov)
Cc: Jennifer Woronets; Amanda Shellenberger; Bob Wyatt; Carl Stivers; Jennifer Woronets; Jim McKenna (jim.mckenna@verdantllc.com); King, Todd W.; Koch.Kristine@epamail.epa.gov; Mullin, Jeanette; Patty Dost; Scott Coffey (coffeyse@cdmsmith.com); Sean Sheldrake; audiehuber@ctuir.com; Bob Wyatt; Callie Ridolfi; cunninghame@gorge.net; Dave Livesay; erin.madden@gmail.com; Gabriel Moses (gabriel_moses@hotmail.com); Gail Fricano (gfricano@indecon.com); Holly Partridge (Holly.Partridge@grandronde.org); JD Williams (jd@williamsjohnsonlaw.com); Jennifer Kassakian (jkassakian@indecon.com); Jennifer Woronets; Jim McKenna (jim.mckenna@verdantllc.com); Julie Weis; Kim Cox (kim.cox@portlandoregon.gov); Koch.Kristine@epamail.epa.gov; Madalinski, Kelly; MCCLINCY Matt; Michael Karnosh (Michael.Karnosh@grandronde.org); Rachel DelVecchio (rdelvecchio@indecon.com); Robert Neely; Rose Longoria (rose@yakamafish-nsn.gov); ryan sudbury (Ryan.Sudbury@grandronde.org); Sean Sheldrake; Tom Gainer (GAINER.Tom@deq.state.or.us)
Subject: LWG Comments on EPA's FS Revised Draft Section 2

Kristine,

Please see attached LWG comments on EPA's FS revised draft Section 2.

Let us know if you have any questions.

Thank you,

Jen Woronets ☺

Anchor QEA, LLC

jworonets@anchorqea.com

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Portland, OR 97204

503-972-5014

Please consider the environment before printing this email.

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To: Humphrey, Chip[Humphrey.Chip@epa.gov]; Shephard, Burt[Shephard.Burt@epa.gov]
Cc: Yamamoto, Deb[Yamamoto.Deb@epa.gov]; Cohen, Lori[Cohen.Lori@epa.gov]; Cora, Lori[Cora.Lori@epa.gov]; Fleming, Sheila[fleming.sheila@epa.gov]
From: Koch, Kristine
Sent: Sat 6/22/2013 7:43:14 PM
Subject: FW: LWG Final BERA
2013-06-14_Final BERA_final_edits_Clean.doc

Deliberative Process / Ex. 5

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
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Seattle, Washington 98101-3140

(206)553-6705
(206)553-0124 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: Humphrey, Chip
Sent: Friday, June 21, 2013 9:59 AM
To: Shephard, Burt; 'GAINER.tom@deq.state.or.us'; Jeremy_Buck@fws.gov; 'anderson.jim@deq.state.or.us'; Koch, Kristine; 'MCCLINCY.matt@deq.state.or.us'; Fuentes, Rene; Robert.Neely@noaa.gov; Sheldrake, Sean; tomd@ctsi.nsn.us; 'erin.madden@gmail.com'; 'audiehuber@ctuir.com'; Michael.karnosh@grandronde.org; 'dallen@stratusconsulting.com'; 'jpeers@stratusconsulting.com'; 'Bob@ridolfi.com'; 'cunninghame@gorge.net'; 'jweis@hk-law.com'; 'genevieve.angle@noaa.gov'; 'Jessica.Winter@noaa.gov'; Allen, Elizabeth; 'AEbbets@stratusconsulting.com'; 'penoyarSJ@cdm.com'; Muza, Richard; Conley, Alanna; rose@yakamafish-nsn.gov
Subject: LWG Final BERA

Attached is the Final BERA which was submitted to EPA in response to our June 6, 1013 letter.

EPA's letter provided the redline/strikeout revisions to the April 1, 2013 document that EPA determined were needed for approval and instructed the LWG to incorporate the revisions and resubmit the document by June 20th. We are reviewing this document to verify that the changes were made and, if so, we'll proceed with approval.

I will also provide the redline/strikeout version of this document in a separate email.

Chip Humphrey

To: Cohen, Lori[Cohen.Lori@epa.gov]; Yamamoto, Deb[Yamamoto.Deb@epa.gov]
Cc: Humphrey, Chip[Humphrey.Chip@epa.gov]; Cora, Lori[Cora.Lori@epa.gov]
From: Koch, Kristine
Sent: Tue 5/14/2013 6:46:46 PM
Subject: FW: Portland Harbor RI Section 7
2013-05-08 Portland Harbor Proposed Tiered Approval Process.pdf

Attorney Client / Ex. 5

Deliberative Process / Ex. 5

Let us know how you think we should proceed. We have a meeting with the Bob and Jim tomorrow afternoon, and I'd like to discuss this with them so it would be nice to know your thoughts on this.

Thanks,

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
Region 10
1200 Sixth Avenue, Suite 900, M/S ECL-115
Seattle, Washington 98101-3140

(206)553-6705
(206)553-0124 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: Wyatt, Robert [mailto:rjw@nwnatural.com]
Sent: Monday, May 13, 2013 4:23 PM
To: Koch, Kristine; James McKenna
Cc: Jennifer Worenets (jworonets@anchorqea.com); Humphrey, Chip; Allen, Elizabeth
Subject: RE: Portland Harbor RI Section 7

Kristine:

Thank you for the update on Section 7 of the RI. We look forward to working with you and your team on the issues associated with background so we can get Section 7 wrapped up. Hopefully we can get the PRG and other FS issues resolved in the next couple of weeks which will help free-up some key EPA resources for the RI.

Regarding the LWG's proposed revisions to the RI review process, Jim and I want to make it clear that it is our intent to continue the discussion of these ideas with you and Chip prior to sending anything in writing to the Senior Managers. As we've discussed over the last couple of weeks, our proposal involves two main themes: a) combining revisions to Sections 5, 6, and 7 into a single and more comprehensive effort; and b) ensuring we have full agreement on the changes to each section prior to development of the final RLSO version later this year (i.e., a tiered approach to

approval).

Jim and I are available to further discuss the pros and cons of combining the review and resolution of Sections 5, 6 and 7, but it appears you have an alternate approach in mind for revising those sections collaboratively. We look forward to working with you on a final approach and schedule for those sections. We are also very interested in implementing a tiered approval process for the RI sections. I've attached a memo that outlines our current thinking for your consideration. Again, our goal is to resolve any adjustments to the RI approach and schedule with you and Chip before finalizing them and providing them to our senior managers.

Please call me if you have any questions,

Bob

From: Koch, Kristine [Koch.Kristine@epa.gov]
Sent: Monday, May 13, 2013 1:34 PM
To: James McKenna; Wyatt, Robert
Cc: Jennifer Worenets (jworonets@anchorqea.com); Humphrey, Chip; Allen, Elizabeth
Subject: Portland Harbor RI Section 7

Bob and Jim – EPA will not be providing comments on Section 7 this week. This section has been delayed due to discussions on other sections and FS issues (PRG development). The background discussion will be relevant to both documents, so it may involve more people in the review and modification. I will get you a new date soon. Additionally, you had indicated combining sections 5, 6 and 7 together. I don't think it is a good idea based on all the work that will be required for these sections and think that it would be better to work on them together as we go through cleaning them up. You were going to get back to me on whether you wanted them all together or keeping them separate. I also understand from my Senior Management that the LWG is supposed to be providing EPA with an alternative schedule, which we have not seen yet. Any ideas on what you are thinking?

Regards,

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

To: Cohen, Lori[Cohen.Lori@epa.gov]
Cc: Yamamoto, Deb[Yamamoto.Deb@epa.gov]; Cora, Lori[Cora.Lori@epa.gov]
From: Koch, Kristine
Sent: Wed 5/1/2013 12:13:00 AM
Subject: FW: Congressional Briefing Presentation
2013-04-24 DRAFT Congressional Update PPT suggested edits.pptx

Lori – here is the joint presentation that we will be giving. We combined the topics III, IV, and V into this presentation. We also have a couple slides on 11E, but they are at the end in case Dennis discusses this earlier. If you or Dennis would like us to put up those slides (one with talking points, one with picture) we can do that. I have 10 copies of the presentation. We will be brining a projector.

See you in the morning. Please contact me on my cell if you need anything – Personal Privacy / Ex. 6

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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From: Jennifer Woronets [mailto:jworonets@anchorqea.com]
Sent: Tuesday, April 30, 2013 4:38 PM
To: Koch, Kristine
Cc: Humphrey, Chip; 'James McKenna'; Bob Wyatt; Jennifer Woronets
Subject: RE: Congressional Briefing Presentation

Please see attached revised presentation.

Thank you,

Jen Woronets

Anchor QEA, LLC

jworonets@anchorqea.com

421 SW Sixth Avenue, Suite 750

Portland, OR 97204

503-972-5014

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From: Koch, Kristine [mailto:Koch.Kristine@epa.gov]
Sent: Tuesday, April 30, 2013 3:43 PM
To: Jennifer Woronets
Cc: Humphrey, Chip; 'James McKenna'; Bob Wyatt
Subject: Congressional Briefing Presentation

Jen – here is the presentation for you to clean-up.

Thanks!!!!!

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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To: Cora, Lori[Cora.Lori@epa.gov]
From: Yamamoto, Deb
Sent: Wed 4/24/2013 5:26:11 PM
Subject: FW: Portland Harbor HHRA fact sheet
Portland Harbor HHHRA fact sheet dy com 4 23 13.pdf

FYI. This needs a lot of work. Sheila is working with Elizabeth to address all the comments. FYI, the first version had way too much in it and was pretty disjointed. This second version has too little. I feel for Alanna in trying to come up with a succinct discussion on risks and risk assessment. It's very hard to do.

Deb

From: Yamamoto, Deb
Sent: Tuesday, April 23, 2013 5:50 PM
To: Conley, Alanna
Cc: Koch, Kristine; Allen, Elizabeth; Fleming, Sheila; Humphrey, Chip
Subject: RE: Portland Harbor HHRA fact sheet

Alanna,

Deliberative Process / Ex. 5

Deb

From: Conley, Alanna
Sent: Tuesday, April 23, 2013 11:08 AM
To: Yamamoto, Deb; Humphrey, Chip; Koch, Kristine
Subject: Portland Harbor HHRA fact sheet

All,

Attached is the revised fact sheet.

Unless there are other significant comments, we plan to finalize and print on Thursday.

Next steps:

Thursday- Send R10 web team fact sheet and Final HHRA report to post to website.

April 30, after webposting - GovDelivery announcement of availability of Fact sheet and locations for viewing report.

Thanks

Alanna M. Conley

U.S. EPA, Region 10

Community Involvement & Healthy Schools Coordinator

805 SW Broadway Street, Suite 500

Portland, OR 97205

Phone (503) 326-6831

www.epa.gov/region10/portlandharbor

www.epa.gov/schools

To: Cora, Lori[Cora.Lori@epa.gov]
From: Koch, Kristine
Sent: Thur 4/18/2013 4:54:26 PM
Subject: FW: Portland Harbor "Final BERA" edits, revisions needed to make approvable
EPA Opinion on 2013-04-01_Final_BERA_Response_to_EPA_Comments 041513.docx

FYI…

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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From: Shephard, Burt
Sent: Tuesday, April 16, 2013 9:51 PM
To: Humphrey, Chip; Koch, Kristine
Subject: Portland Harbor "Final BERA" edits, revisions needed to make approvable

See attached, which has in the far right hand column in red the changes/edits needed to make the final BERA approvable. You'll note most of the changes from the draft final BERA were made acceptably. Pieces needing the most work:

Deliberative Process / Ex. 5

Deliberative Process / Ex. 5

Hope neither of you are red-green color blind. Talk with you tomorrow.

Best regards,

Burt Shephard
Risk Evaluation Unit
Office of Environmental Assessment (OEA-095)
U.S. Environmental Protection Agency, Region 10
1200 6th Avenue
Seattle, WA 98101

Telephone: (206) 553-6359
Fax: (206) 553-0119

e-mail: Shephard.Burt@epa.gov

"Facts are stubborn things"
- John Adams

To: Cora, Lori[Cora.Lori@epa.gov]
From: Koch, Kristine
Sent: Tue 4/16/2013 7:11:29 PM
Subject: RE: Review of the Portland Harbor Draft Final RI, Section 4

Attorney Client / Ex. 5

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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(206)553-0124 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: Cora, Lori
Sent: Tuesday, April 16, 2013 11:58 AM
To: Koch, Kristine
Subject: RE: Review of the Portland Harbor Draft Final RI, Section 4

Attorney Client / Ex. 5

From: Koch, Kristine
Sent: Tuesday, April 16, 2013 8:23 AM
To: Cora, Lori
Subject: RE: Review of the Portland Harbor Draft Final RI, Section 4

Attorney Client / Ex. 5

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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From: Cora, Lori
Sent: Tuesday, April 16, 2013 8:17 AM
To: Koch, Kristine
Subject: RE: Review of the Portland Harbor Draft Final RI, Section 4

Attorney Client / Ex. 5

From: Koch, Kristine
Sent: Tuesday, April 16, 2013 7:35 AM
To: Cora, Lori
Subject: FW: Review of the Portland Harbor Draft Final RI, Section 4

Attorney Client / Ex. 5

Kristine Koch
Remedial Project Manager

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From: Teela Labrum [mailto:tl@bhlaw.com]
Sent: Monday, April 15, 2013 5:41 PM
To: sparkinson@jzplaw.com
Cc: mike@reedconsulting.comcastbiz.net; Koch, Kristine
Subject: Review of the Portland Harbor Draft Final RI, Section 4

Good Evening,

Please see the attached correspondence from Attorney Steve Schell.

Best,

Teela

Teela Labrum
Paralegal & Legal Assistant
BLACK | HELTERLINE LLP
805 S.W. Broadway, Suite 1900
Portland, OR 97205
503.417.2124 (d)
503.224.5560 (p)
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tl@bhlaw.com

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To: Michael.karnosh@grandronde.org[Michael.karnosh@grandronde.org]; jim@jimrobison.org[jim@jimrobison.org]; ROICK Tom[ROICK.Tom@deq.state.or.us]; Rose Longoria[lonr@yakamafish-nsn.gov]; Bob Wyatt (rjw@nwnatural.com)[rjw@nwnatural.com]
Cc: brandy.humphreys@grandronde.org[brandy.humphreys@grandronde.org]; Holly Partridge (Holly.Partridge@grandronde.org)[Holly.Partridge@grandronde.org]; Courtney Johnson (courtney@crag.org)[courtney@crag.org]; Gabriel Moses Personal Privacy / Ex. 6 Julie Weis (jweis@hk-law.com)[jweis@hk-law.com]; tomd@ctsi.nsn.us[tomd@ctsi.nsn.us]; Brian Cunninghame (cunninghame@gorge.net)[cunninghame@gorge.net]; Elmer Ward[elmer.ward@ctwsbnr.org]; Gail Fricano (gfricano@indecon.com)[gfricano@indecon.com]; Rita Cabral (rcabral@indecon.com)[rcabral@indecon.com]; Peter DeFur (pldefur@igc.org)[pldefur@igc.org]; PARRETT Kevin[Parrett.Kevin@deq.state.or.us]; Conley, Alanna[conley.alanna@epa.gov]; Travis Williams-WRK[travis@willametteriverkeeper.org]; callie@ridolfi.com[callie@ridolfi.com]; Jen Woronets[jworonets@anchorqea.com]; Grandinetti, Cami[Grandinetti.Cami@epa.gov]; Robinson, Deborah[Robinson.Deborah@epa.gov]; Cora, Lori[Cora.Lori@epa.gov]
From: Koch, Kristine
Sent: Fri 10/23/2015 5:31:24 PM
Subject: Comments to NRRB/CSTAG
Comments to NRRB_CSTAG from 5Tribes.pdf
Comments to NRRB_CSTAG from ODEQ.PDF
Comments to NRRB_CSTAG from PHCAG.pdf
Comments to NRRB_CSTAG from PRP Group.pdf
Comments to NRRB_CSTAG from Yakama Nation.pdf

All – As stakeholders for the Portland Harbor Superfund site, we are sharing with you the comments from all the stakeholders that were sent to the board. We thank you all for taking the time and effort to craft these comments.

Regards,

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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To: Ingemansen, Dean[Ingemansen.Dean@epa.gov]
From: Cora, Lori
Sent: Tue 8/25/2015 4:26:53 PM
Subject: FW: Portland Harbor FS Section 4
2015-08-18 Portland Harbor FS Section 4.doc
2015-08-18 Section 4 Tables.xlsx
2015-08-18 Table 4.3-1_Comparative Analysis.docx
2015-08-18 Table 4.3-2 Qualitative Comparative Analysis.docx
2015-08-18 Appendix F_HST Evaluation.pdf
2015-08-18 Appendix G_Cost.pdf
2015-08-18 Appendix H_Residual Risk.pdf
2015-08-18 Appendix I_Rolling Rivermile Curves.pdf
2015-08-18 Appendix J_404 mitigation strategy.pdf
Figure 4.1-4_Absolute Bathymetric Change.pdf
Figure 4.1-5a-h_Bathymetry Compare Maps.pdf
Figure 4.1-6_2007_2012 Fish Tissue Data.pdf

Lori Houck Cora | Assistant Regional Counsel
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From: Koch, Kristine
Sent: Tuesday, August 25, 2015 9:26 AM
To: Cora, Lori
Subject: FW: Portland Harbor FS Section 4

Lori – I thought I had sent to you. Sorry about that. To get the additional figures, you will have to go to the FTP site below and use the password. Let me know if you have any problems.

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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From: Koch, Kristine
Sent: Tuesday, August 18, 2015 8:58 PM
To: Bob Wyatt (rjw@nwnatural.com); Jim McKenna (jim.mckenna@verdantllc.com)
Cc: Jennifer Woronets (jworonets@anchorqea.com)
Subject: Portland Harbor FS Section 4

Jim and Bob – EPA's draft modifications to the 2011 Draft FS submitted by the LWG regarding the detailed evaluation of the alternatives and comparative analysis is attached. The figures are attached and the rest are provided in the FTP link, below. This information has been combined into a new Section 4 and Appendices F, G, H, I and J for the draft Final FS. Per the agreed process between the LWG and EPA, the LWG has 15 days to identify significant issues and until October 10, 2015 to review and provide comments to EPA from the time they receive FS Section 4. Therefore, the LWG is to identify significant issues by September 2, 2015. Additionally, if you have any technical issues that you would like to discuss in this time frame, please contact me. Further, per the agreed process, any issues raised during the 30-day review period are to be resolved within the subsequent 14-day period.

Regards,

Kristine

Please use the following URL to view this package over a secure connection. After viewing this package, you may also download any associated attachments or compose a reply using your favorite web browser.

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Use the following password when prompted:

Personal Privacy / Ex. 6

EPA is transmitting Section 4 of the Portland Harbor Draft Final Feasibility Study for review and comment to the Lower Willamette Group (LWG), the Oregon Department of Environmental Quality (ODEQ), six federally recognized tribal governments, other federal and state partners, and the Community Advisory Group (CAG). These parties are receiving these documents because they have been working with EPA under special agreements in developing the Remedial Investigation and Feasibility Study for the Portland Harbor Superfund Site.

Section 4 presents the detailed evaluation of 7 NCP criteria, 2 threshold criteria and 5 balancing criteria, and a comparative analysis of the alternatives.

EPA is working to address concerns that have been raised both regionally and nationally regarding how it addresses sediment sites. The EPA draft FS is responsive to many of the concerns in the following specific ways:

•□□□□□□□ Regional and Headquarters staff and management are working together to ensure the FS complies with CERCLA, the NCP, EPA policy and guidance. The Headquarters team has experience with sediment sites nation-wide. Therefore, lessons learned at other sites including sediment sites, are used to inform decision-making at Portland Harbor.

•□□□□□□□ EPA is including an appropriate range of technologies to address contaminated sediment such as dredging, capping, enhanced monitored natural recovery, monitored natural recovery, ex-situ treatment, in-situ treatment and institutional controls.

•□□□□□□□ EPA has evaluated and is including natural recovery in all cleanup alternatives.

•□□□□□□□ EPA's evaluation of remedial alternatives is focused on risk reduction with achievable cleanup goals over the long term.

•□□□□□□□ When developing the alternatives, EPA will consider the environmental conditions of the river (erosional, transitional or depositional) the current and potential future uses (industrial, recreational, etc.) and will seek to limit the use restrictions. For example:

o EPA will consider limiting the use of caps in locations where commercial and shipping activities occur.

o EPA will also consider future navigation and maintenance dredging when determining the appropriate cleanup technology.

o Appropriate beach material will be placed in sediment cleanup locations that serve as public access points for recreation or wildlife habitat.

Next Steps

Internal EPA meeting with the National Remedy Review Board (NRRB) and the Contaminated Sediment Technical Advisory Group (CSTAG) is scheduled for November 18 and 19 in Portland, Oregon. EPA policy requires a conceptual remedy to be presented to the NRRB and the CSTAG for internal review prior to issuing the Proposed Plan for sites where cleanup will cost more than $50 million. The Portland Harbor cleanup will require this review. The NRRB and CSTAG review conceptual remedies to ensure national consistency with CERCLA, the NCP, and EPA policies and guidances. Both groups also take into consideration past practice at sites similar magnitude and provide advisory recommendations for the concept remedy. The EPA Portland Harbor team will use the advisory recommendations from the NRRB and CSTAG in developing the Proposed Plan. The LWG, ODEQ, six federally recognized tribal governments, and CAG can provide input to the NRRB and CSTAG on the concept remedy. To facilitate their ability to provide input, EPA will share the concept remedy with these parties on September 18, 2015.

EPA expects to release a proposed cleanup plan for public review and comment in the spring of 2016. EPA has several internal steps to complete before releasing the Proposed Plan.

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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To: Ingemansen, Dean[Ingemansen.Dean@epa.gov]
From: Cora, Lori
Sent: Mon 8/24/2015 8:51:37 PM
Subject: FW: Powerpoint For Today's Briefing and Agenda for Tuesday Dennis/Jim/Dick meeting are attached - RE: RA/DRA Prep for 8/25 Dick/Dennis PDX Harbor Meeting
2015 8-25 Dennis-Jim-Dick Presentation for pre-Brief 8-24.pptx
Portland Harbor: Agenda for 8/25 Dennis/Dick/Jim briefing

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P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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---

From: Robinson, Deborah
Sent: Monday, August 24, 2015 1:44 PM
To: McLerran, Dennis; Koch, Kristine; Cora, Lori; Grandinetti, Cami; Pirzadeh, Michelle; Zhen, Davis; Sheldrake, Sean; Woolford, James; Allen, Elizabeth; Christopher, Anne; DeMaria, Eva; Conley, Alanna; Fonseca, Silvina; Stalcup, Dana; Legare, Amy
Subject: Powerpoint For Today's Briefing and Agenda for Tuesday Dennis/Jim/Dick meeting are attached - RE: RA/DRA Prep for 8/25 Dick/Dennis PDX Harbor Meeting

Thanks,
Debbie
==========
From the Desk of:
Debbie Robinson
Tel: 206-553-4961
robinson.deborah@epa.gov
US EPA Region 10, M/S ECL 122, 1200 Sixth Avenue, Suite 900, Seattle, WA 98101

-----Original Appointment-----
From: McLerran, Dennis
Sent: Monday, May 11, 2015 1:57 PM
To: McLerran, Dennis; Koch, Kristine; Cora, Lori; Grandinetti, Cami; Robinson, Deborah; Pirzadeh, Michelle; Zhen, Davis; Sheldrake, Sean; Woolford, James; Allen, Elizabeth; Christopher, Anne; DeMaria, Eva; Conley, Alanna; Fonseca, Silvina; Stalcup, Dana
Subject: RA/DRA Prep for 8/25 Dick/Dennis PDX Harbor Meeting
When: Monday, August 24, 2015 2:00 PM-3:30 PM (UTC-08:00) Pacific Time (US & Canada).
Where: ET conf room + conf line: Personal Privacy / Ex. 6 code: Personal Privacy / Ex. 6

Subj: Prep RA for 8/25 Dick/Dennis Call re: PDX Harbor

Scheduling ct: Matt Magorrian/3-6284

Participants:
RA, DRA
Kristine Koch
Lori Cora
Cami Grandinetti
Davis Zhen
Sean Sheldrake
Jim Woolford
Elizabeth Allen
Anne Christopher
Eva DeMaria
Alanna Conley
Silvina Fonseca
Dana Stalcup

SF cross charging: 2015 10A TR2B 303DD2 108TBD00

To: Cora, Lori[Cora.Lori@epa.gov]; Legare, Amy[Legare.Amy@epa.gov]; Fonseca, Silvina[Fonseca.Silvina@epa.gov]
Cc: Koch, Kristine[Koch.Kristine@epa.gov]
From: Grandinetti, Cami
Sent: Wed 8/12/2015 4:57:27 PM
Subject: RE: PCI group presentation
Final.RPM.NRRB.Manual.12.29.11[1].docx

Attorney Client / Ex. 5

Cami Grandinetti

Program Manager, Remedial Cleanup Program

USEPA

1200 6th Ave, Suite 900

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206-553-8696 (desk)

206-390-8890 (cell)

206-553-0124 (fax)

From: Cora, Lori
Sent: Wednesday, August 12, 2015 9:47 AM
To: Grandinetti, Cami; Legare, Amy; Fonseca, Silvina
Cc: Koch, Kristine
Subject: RE: PCI group presentation

Attorney Client / Ex. 5

They are pretty intent on having an in-person meeting vs a webinar is that ok with us? Also, Kristine, is there any date sooner than September 22 you could go to Portland or do a webinair for this purpose? Again, I am unavailable September 8 through the 18th.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Grandinetti, Cami
Sent: Wednesday, August 12, 2015 9:27 AM
To: Cora, Lori; Legare, Amy; Fonseca, Silvina
Cc: Koch, Kristine
Subject: RE: PCI group presentation

Attorney Client / Ex. 5

Cami Grandinetti

Program Manager, Remedial Cleanup Program

USEPA

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206-390-8890 (cell)

206-553-0124 (fax)

From: Cora, Lori
Sent: Wednesday, August 12, 2015 8:29 AM
To: Grandinetti, Cami; Legare, Amy; Fonseca, Silvina
Cc: Koch, Kristine
Subject: FW: PCI group presentation

Attorney Client / Ex. 5

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U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: White, Bruce [mailto:Bruce.White@btlaw.com]
Sent: Wednesday, August 12, 2015 7:18 AM
To: Cora, Lori
Cc: Koch, Kristine; Klinger, Nanci
Subject: RE: PCI group presentation

Lori

Thanks for your response below.

The PCI Group would prefer an earlier in person presentation because either the group or members of the group, not affiliated with the LWG, intend to file comments with the Remedy Review Board. Group members have advised that they would very much appreciate such a presentation from EPA, as soon as possible after Ch 4 of the FS is issued, and preferably before the Labor Day weekend.

Additionally, from a larger perspective, as the site moves toward a proposed plan and a ROD, we believe that insofar as the US will be looking to the members of the PCI Group for an agreement, EPA needs to engage and keep the larger Group informed on a timely basis.

We look forward to receiving some earlier suggested dates.

Thanks,

Bruce White

312-214-4584 (DD)

Personal Privacy / Ex. 6 (Cell)

From: Cora, Lori [mailto:Cora.Lori@epa.gov]
Sent: Tuesday, August 11, 2015 1:22 PM
To: White, Bruce
Cc: Koch, Kristine; Klinger, Nanci
Subject: RE: PCI group presentation

Hello, Bruce. I've checked in with Kristine. We would like to propose a webinair format for the presentation. A webinair eliminates the need to travel which should help maximize participation by the PCI members and reduces the resources and time for everyone. The dates Kristine and I are available are September 22, 24, and September 29. Let us know which of those dates work for the group. Thanks.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: White, Bruce [mailto:Bruce.White@btlaw.com]
Sent: Monday, August 10, 2015 12:20 PM
To: Cora, Lori
Cc: Koch, Kristine; Klinger, Nanci
Subject: RE: PCI group presentation

Lori

In an effort to do some PCI Group planning we would greatly appreciate your providing, before our 8/13 meeting, some dates in the near future when EPA would be available to make a presentation to the PCI Group.

We would like to lock in one of those dates when we have group together this week.

Thanks,

Bruce White

312-214-4584 (DD)

Personal Privacy / Ex. 6 (Cell)

From: White, Bruce
Sent: Wednesday, August 05, 2015 4:50 PM
To: Cora, Lori
Cc: Koch, Kristine; Klinger, Nanci
Subject: Re: PCI group presentation

Lori

Thanks for getting back so quickly.

If your schedules happen to change between now and then, please let us know - we can be flexible.

Bruce White

312.214.4584 (W)

Personal Privacy / Ex. 6 (C)

On Aug 5, 2015, at 4:45 PM, Cora, Lori <Cora.Lori@epa.gov> wrote:

> Hello, Bruce. Unfortunately, Kristine and I both are not available for meeting with the PCI group on the 13th. We will be in touch about a proposed time and process by which we can present the draft FS to the PCI group sometime in the future.

Lori Houck Cora | Assistant Regional Counsel
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P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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> **From:** White, Bruce [mailto:Bruce.White@btlaw.com]
> **Sent:** Wednesday, August 05, 2015 2:00 PM
> **To:** Cora, Lori
> **Cc:** Koch, Kristine; Klinger, Nanci
> **Subject:** Re: PCI group presentation
>
> Lori
>
> Just wanted to follow up to see if there was any way possible that you and Kristine might be able to open up your schedule to be available on the 13th; or, alternatively, if Kristine could make it, perhaps another of EPA's regional counsel might accompany here.

This in person meeting has been scheduled for some time, and is likely to be the only such meeting through year-end at which more than 100 party representatives will be together in the same room in Portland. We believe that the timing of this in person meeting, with chapters 2 and 3 of the FS having recently been distributed by EPA, offers a particularly good opportunity for the Agency to connect with the PCI Group.

We can include such a presentation most any time that day, though earlier would be preferable if that works for EPA.

We greatly appreciate EPA's further consideration of this request.

Thanks,

Bruce White

312.214.4584 (W)

Personal Privacy / Ex. 6 (C)

On Aug 3, 2015, at 7:36 PM, Klinger, Nanci <Nanci.Klinger@portlandoregon.gov> wrote:

Lori,

Thank you very much. I have included Bruce and he can work with you to coordinate with the Group.

Nanci

Nanci Klinger

Deputy City Attorney

Phone 503.823.3022

This email contains confidential and privileged information. If you receive this message in error, please notify me and delete all versions of the email.

From: Cora, Lori [mailto:Cora.Lori@epa.gov]
Sent: Monday, August 03, 2015 3:42 PM
To: Klinger, Nanci
Cc: Koch, Kristine
Subject: RE: PCI group presentation

Hello, Nancy. We can provide a presentation to the PCI group but neither Kristine nor I are available on August 13th. We are also going to think about how it could be done most efficiently. We will be back with you to schedule a day and time but it likely will not be until later in August or September.

Lori Houck Cora | **Assistant Regional Counsel**
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From: Klinger, Nanci [mailto:Nanci.Klinger@portlandoregon.gov]
Sent: Monday, August 03, 2015 10:35 AM
To: Cora, Lori
Subject: RE: PCI group presentation

Hi Lori,

Yes, I think there is value in the PCI Group understanding EPA's approach to the site as early as possible.

The allocation process is proceeding simultaneously with the EPA administrative process. The FS plays a critical role in helping the PCI Group determine how to apply its allocation process to specific areas (e.g. the new draft FS has changes to SMA, SDUs cost assumptions, etc). The FS draft described on Friday has implications for the Group's approach to advocacy. The Group needs to understand how the decision trees and scoring matrices developed by EPA may operate in the selection of a remedy

so that the Group can get its process to match-up with the requirements of the ROD. There are many steps to developing an allocation process that all the participating parties can agree to and so the Group has been and is working on that process now. The draft FS structure influences our process and our process needs time to incorporate those changes. We understand that it is early and it is a draft, but I think this will keep the allocation process moving forward effectively.

I would be happy to talk and am around the office most of the day.

Nanci Klinger

Deputy City Attorney

Phone 503.823.3022

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From: Cora, Lori [mailto:Cora.Lori@epa.gov]
Sent: Monday, August 03, 2015 9:35 AM
To: Klinger, Nanci
Cc: Koch, Kristine
Subject: PCI group presentation

Hello, Nanci. Kristine informs me that you would like Kristine to present Chapters 3 and 4 to the PCI group. In thinking about what the appropriate time for outreach to the PCI might be, we would like to understand the allocation process better. Is the allocation process proceeding based on EPA's draft FS modifications that we are providing to the LWG for comment or will it be based on the final FS? Or might the allocation even wait for the ROD? Thanks for your attention to this request.

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To: Koch, Kristine[Koch.Kristine@epa.gov]
From: Cora, Lori
Sent: Thur 7/30/2015 3:52:53 PM
Subject: RE: Portland Harbor Draft Final FS Section 3 and updates to Section 2

Oops, ok

Lori Houck Cora | **Assistant Regional Counsel**
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From: Koch, Kristine
Sent: Wednesday, July 29, 2015 3:52 PM
To: Cora, Lori
Subject: RE: Portland Harbor Draft Final FS Section 3 and updates to Section 2

You have to go to the FTP site and use the password to download the files.

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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Seattle, Washington 98101-3140

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From: Cora, Lori
Sent: Wednesday, July 29, 2015 3:50 PM
To: Koch, Kristine
Subject: RE: Portland Harbor Draft Final FS Section 3 and updates to Section 2

Hi, Kristine. I don't see any documents that refer to Section 3 in this message.

Lori Houck Cora | Assistant Regional Counsel
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From: Koch, Kristine
Sent: Wednesday, July 29, 2015 3:31 PM
To: Alex Liverman (liverman.alex@deq.state.or.us); Allen, Elizabeth; Audie Huber (audiehuber@ctuir.com); Blischke, Eric; brandy.humphreys@grandronde.org; Brian Cunninghame (cunninghame@gorge.net); callie@ridolfi.com; Christopher, Anne; Coffey, Scott; Conley, Alanna; Courtney Johnson (courtney@crag.org); Elmer Ward; Fuentes, Rene; Personal Privacy / Ex. 6 Personal Privacy / Ex. 6); Gail Fricano (gfricano@indecon.com); Genevieve Angle (Genevieve.Angle@noaa.gov); Hagerman, Paul; Holly Partridge (Holly.Partridge@grandronde.org); JD Williams (jd@williamsjohnsonlaw.com); Jeanette Mullin (mullinjm@cdmsmith.com); peterson.Jennifer@deq.state.or.us; Jeremy_Buck@fws.gov; Julie Weis (jweis@hk-law.com); Gustavson, Karl; Matt McClincy (mcclincy.matt@deq.state.or.us); Michael.karnosh@grandronde.org; poulsen.mike@deq.state.or.us; Morrison, Kay; Paul Bianco; rdelvecchio@indecon.com DelVecchio; Rita Cabral (rcabral@indecon.com); Robert.Neely@noaa.gov; Robinson, Deborah; rose@yakamafish-nsn.gov; Sheldrake, Sean; Shephard, Burt; Todd King (KingTW@cdmsmith.com); tomd@ctsi.nsn.us; Tom Roick (roick.tom@deq.state.or.us); Zhen, Davis
Cc: Fonseca, Silvina; Legare, Amy; Ells, Steve; Charters, David; Cora, Lori
Subject: FW: Portland Harbor Draft Final FS Section 3 and updates to Section 2

Included in this email is Section 3 of the Portland Harbor Draft Final FS and updates to Section 2 for your review and comment per the Portland Harbor MOU. This has also been provided to the LWG for their review and comment.

Due to the heightened interest in this project, parties beyond the LWG, MOU partners and CAG may receive copies of the transmitted information. Therefore, the following provides an update of where we are in the process and steps we expect to occur over the next several months. If any party requests a copy of this information, please provide a copy of this email, too.

EPA is transmitting Section 3 of the Portland Harbor Draft Final Feasibility Study and updates to Section 2 for review and comment to the Lower Willamette Group (LWG), the Oregon Department of Environmental Quality (ODEQ), six federally recognized tribal governments, other federal and state partners, and the Community Advisory Group (CAG). These parties are receiving these documents because they have been working with EPA under special agreements in developing the Remedial Investigation and Feasibility Study for the Portland Harbor Superfund Site.

Section 3 presents seven different cleanup alternatives that EPA is evaluating to address risks posed by the contamination at the site. The "no action" alternative is presented as Alternative A, and the other six alternatives, Alternative B through G, all use the same combination of technologies to differing degrees. The combined technologies include dredging, capping, in-situ treatment, ex-situ treatment, enhanced monitored natural recovery, monitored natural recovery, and institutional controls. Other information provided in this section includes:

•□□□□□□□ Developing alternatives that include sediments and riverbanks contaminated with 23 contaminants of concern

•□□□□□□□ Defining and addressing Principal Threat Waste (PTW) – including pure chemical product seeping from the sediments within the Site, as well as highly contaminated sediments

•□□□□□□□ Removal, treatment, and appropriate disposal of NAPL and PTW material that cannot be reliably contained

•□□□□□□□ Addressing contaminated groundwater seeping into the river

•□□□□□□□ Cleanup of Swan Island Lagoon.

EPA is working to address concerns that have been raised both regionally and nationally regarding how it addresses sediment sites. The EPA draft FS is responsive to many of the concerns in the following specific ways:

•□□□□□□□ Regional and Headquarters staff and management are working together to ensure the FS complies with CERCLA, the NCP, EPA policy and guidance. The Headquarters team has experience with sediment sites nation-wide. Therefore, lessons learned at other sites including sediment sites, are used to inform decision-making at Portland Harbor.

•□□□□□□□ EPA is including an appropriate range of technologies to address contaminated sediment such as dredging, capping, enhanced monitored natural recovery, monitored natural

recovery, ex-situ treatment, in-situ treatment and institutional controls.

•□□□□□□□ EPA has evaluated and is including natural recovery in all cleanup alternatives.

•□□□□□□□ EPA's evaluation of remedial alternatives is focused on risk reduction with achievable cleanup goals over the long term.

•□□□□□□□ When developing the alternatives, EPA will consider the environmental conditions of the river (erosional, transitional or depositional) the current and potential future uses (industrial, recreational, etc.) and will seek to limit the use restrictions. For example:

o EPA will consider limiting the use of caps in locations where commercial and shipping activities occur.

o EPA will also consider future navigation and maintenance dredging when determining the appropriate cleanup technology.

o Appropriate beach material will be placed in sediment cleanup locations that serve as public access points for recreation or wildlife habitat.

Next Steps

•□□□□□□□ EPA will be releasing Section 4 of the Draft Final Feasibility Study on August 7, 2015.

•□□□□□□□ Internal EPA meeting with the National Remedy Review Board (NRRB) and the Contaminated Sediment Technical Advisory Group (CSTAG) is scheduled for November 18 and 19 in Portland, Oregon. EPA policy requires a conceptual remedy to be presented to the NRRB and the CSTAG for internal review prior to issuing the Proposed Plan for sites where cleanup will cost more than $50 million. The Portland Harbor cleanup will require this review. The NRRB and CSTAG review conceptual remedies to ensure national consistency with CERCLA, the NCP, and EPA policies and guidances. Both groups also take into consideration past practice at sites similar magnitude and provide advisory recommendations for the concept remedy. The EPA Portland Harbor team will use the advisory recommendations from the NRRB and CSTAG in developing the Proposed Plan. The LWG, ODEQ, six federally recognized tribal governments, and CAG can provide input to the NRRB and CSTAG on the concept remedy. To facilitate their ability to provide input, EPA will share the concept remedy with these parties on September 18, 2015.

•□□□□□□□ EPA expects to release a proposed cleanup plan for public review and comment in

the spring of 2016. EPA has several internal steps to complete before releasing the Proposed Plan.

Thank you for your continuing involvement in the Portland Harbor cleanup.

Sincerely,

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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From: Koch, Kristine
Sent: Wednesday, July 29, 2015 3:29 PM
To: Bob Wyatt (rjw@nwnatural.com); Jim McKenna (jim.mckenna@verdantllc.com)
Cc: Jen Woronets
Subject: Portland Harbor Draft Final FS Section 3 and updates to Section 2

Jim and Bob – EPA's draft modifications to the 2011 Draft FS subitted by the LWG regarding development and screening of the alternatives is provided in the FTP link, below. This information has been combined into a new Section 3 and Appendices C, D and E for the draft Final FS. Per the agreed process between the LWG and EPA, the LWG has 15 days to identify significant issues and 30 days to review and provide comments to EPA from the time they receive FS Section 4. Therefore, the LWG is to identify significant issues by August 28, 2015, and provide comments to EPA by September 8, 2015. Additionally, if you have any technical issues that you would like to discuss in this time frame, please contact me. We already have three technical sessions scheduled on August 11, 13 and 27. Further, per the agreed process, any issues raised during the 30-day review period are to be resolved within the subsequent 14-day period.

In addition, I am providing updated information for FS Section 2. As we indicated, we have been making modifications to the ARARs table. Attached is the latest version of that table. Additionally, the national AWQCs for human health have been finalized, so the attached PRG tables have been updated to reflect those numbers. We have also updated Figure 2.2-2 and some text in Section 2, which are also attached.

Regards,

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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From: Jones, Jennifer M. via CDM Smith Files Notification Service [mailto:NoReply@files.cdmsmith.com]
Sent: Wednesday, July 29, 2015 12:02 PM
To: Koch, Kristine
Subject: New Package Notification

New Package Notification

A package has been posted for you.

From: Jones, Jennifer M.
Subject: Section 3- all files

Please use the following URL to view this package over a secure connection. After viewing this package, you may also download any associated attachments or compose a reply using your favorite web browser.

Personal Privacy / Ex. 6

Use the following password when prompted:

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If you need assistance, please contact CDM Smith Business Technology at / .

Regards,
CDM Smith Files Notification Service

To: Lori Cora Personal Privacy / Ex. 6
From: Cora, Lori
Sent: Thur 7/23/2015 11:32:09 PM
Subject: documents
Copy of 2015-07-21 Draft Final Tables 2 1-1 through 2 1-3 ARARs.xlsx
Cora 7-22_2015-07-08_Portland Harbor FS Section 4_Toxicity_ARARs update (2).doc

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P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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To: Hiltner, Allison[Hiltner.Allison@epa.gov]
From: Cora, Lori
Sent: Thur 7/23/2015 3:58:34 PM
Subject: RE: ATTORNEY CLIENT PRIVILEGE Portland Harbor revised ARARs chart

Yes, that's ok, just tell them to not distribute outside EPA.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Hiltner, Allison
Sent: Thursday, July 23, 2015 8:32 AM
To: Cora, Lori
Subject: FW: ATTORNEY CLIENT PRIVILEGE Portland Harbor revised ARARs chart

Hi Lori –

I was going to wait til we sent the FS to the PRPs, but I've given some RPMs a heads up and they've indicated they'd rather see this new table sooner than later. Are you ok with me sending this version out to the RPMs who have upcoming proposed plans and RODs?

Thanks

Allison

From: Grandinetti, Cami
Sent: Tuesday, July 21, 2015 10:05 AM
To: Hiltner, Allison
Subject: FW: ATTORNEY CLIENT PRIVILEGE Portland Harbor revised ARARs chart

Cami Grandinetti

Program Manager, Remedial Cleanup Program

USEPA

1200 6th Ave, Suite 900

ECL-113

Seattle, Wa. 98101

206-553-8696 (desk)

206-390-8890 (cell)

206-553-0124 (fax)

From: Cora, Lori
Sent: Wednesday, July 15, 2015 10:52 AM
To: Grandinetti, Cami
Subject: FW: ATTORNEY CLIENT PRIVILEGE Portland Harbor revised ARARs chart

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Cora, Lori
Sent: Monday, July 13, 2015 12:00 PM
To: Anderson, RobinM; Fonseca, Silvina
Cc: Koch, Kristine; Sheldrake, Sean; Zhen, Davis; Grandinetti, Cami; Ingemansen, Dean
Subject: ATTORNEY CLIENT PRIVILEGE Portland Harbor revised ARARs chart

Hello, Robin and Silvina. Attached is are revised and updated ARARs tables for the Portland

Attorney Client / Ex. 5

The chart also has been revised to be as specific as possible or practical about the federal or state statutory provision or specific regulation that is ARAR. Also the description of what the law or regulations are or require and how that law or regulation relates to the Portland Harbor alternatives have been made more specific or complete in the tables.

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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To: Cora, Lori[Cora.Lori@epa.gov]
From: Koch, Kristine
Sent: Mon 7/20/2015 9:18:43 PM
Subject: FW: ARARs
2015-07-13 Draft Final Tables 2 1-1 through 2 1-3 ARARs_cas review 7-20-2015.xlsx

Lori – Here are the comments (see email below) on the ARARs from CDM. Let me know if you want me to set up a call.

Thanks,

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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Seattle, Washington 98101-3140

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(206)553-8581 (fax)
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From: Coffey, Scott [mailto:CoffeySE@cdmsmith.com]
Sent: Monday, July 20, 2015 2:15 PM
To: Koch, Kristine
Cc: Sayler, Cheryl Ann
Subject: FW: ARARs

Hi Kristine.

Below are review comments on the PH ARARs from our RCRA expert – Cheryl Sayler.

Let me know if you and Lori would like to have a call over these comments (please provide some available dates/times) and I'll set up the conference call.

Scott

From: Sayler, Cheryl Ann
Sent: Monday, July 20, 2015 1:56 PM
To: Coffey, Scott; Hazen, Gary
Cc: Wood, Steven; Sayler, Cheryl Ann
Subject: RE: ARARs

Attorney Client / Ex. 5

Attorney Client / Ex. 5

Attorney Client / Ex. 5

Thanks for including me in this review.

Cheryl

Cheryl Ann Sayler, CHMM

Environmental Scientist

CDM Smith | East Tennessee Technolgy Park, Hwy 58. K-1007, MS 7240 | Oak Ridge, TN 37831

865-576-5566 (O) | 865-635-1693 (C) | 865-241-9484 (Fax)

saylerc@cdmsmith.com

cdmsmith.com

Sent: Tuesday, July 14, 2015 5:51 PM
To: Sayler, Cheryl Ann
Cc: Wood, Steven
Subject: FW: ARARs

Hi Cheryl.

See the message and direction from the RPM for what they are looking for you to do.

Please charge your time to the following charge code:

Personal Privacy / Ex. 6

Feel free to give me a call if you have any questions.

Thanks!
Scott

Scott Coffey, L.Hg.
Hydrogeologist
CDM Smith | consulting engineering construction operations
1218 Third Avenue, Suite 1100 | Seattle, WA 98101
phone: (206) 336-4904 | fax: (206) 223-2340 / mobile (206) 457-9270
email: coffeyse@cdmsmith.com | www.cdmsmith.com

From: Koch, Kristine [mailto:Koch.Kristine@epa.gov]
Sent: Tuesday, July 14, 2015 12:41 PM
To: Coffey, Scott
Subject: RE: ARARs

Attorney Client / Ex. 5

Thanks,

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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From: Coffey, Scott [mailto:CoffeySE@cdmsmith.com]
Sent: Tuesday, July 14, 2015 8:49 AM
To: Koch, Kristine
Subject: RE: ARARs

Hi Kristine.

A follow-up to my voice mail about our RCRA expertise:

I've now learned that our NW RCRA expert has more experience with Oregon specific regs than I originally understood.

Our CDM Smith NW RCRA expert (Cheryl Sayler) has 9 years of experience with Oregon RCRA regs.

Let me know if you'd like to speak with her, or have her call Lori directly.

Scott

From: Koch, Kristine [mailto:Koch.Kristine@epa.gov]
Sent: Thursday, July 09, 2015 10:37 AM
To: Coffey, Scott
Subject: ARARs

Scott – Do you have someone who is an expert on RCRA? Lori has some questions for the ARARs tables in Section 2 that she needs someone with RCRA expertise to answer as they relate to Portland Harbor.

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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To: Grandinetti, Cami[Grandinetti.Cami@epa.gov]
From: Cora, Lori
Sent: Wed 7/15/2015 5:52:16 PM
Subject: FW: ATTORNEY CLIENT PRIVILEGE Portland Harbor revised ARARs chart
Copy of 2015-07-13 Draft Final Tables 2 1-1 through 2 1-3 ARARs.xlsx

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From: Cora, Lori
Sent: Monday, July 13, 2015 12:00 PM
To: Anderson, RobinM; Fonseca, Silvina
Cc: Koch, Kristine; Sheldrake, Sean; Zhen, Davis; Grandinetti, Cami; Ingemansen, Dean
Subject: ATTORNEY CLIENT PRIVILEGE Portland Harbor revised ARARs chart

Attorney Client / Ex. 5

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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To: Cora, Lori[Cora.Lori@epa.gov]
From: Sheldrake, Sean
Sent: Tue 7/14/2015 3:40:26 PM
Subject: RE: ATTORNEY CLIENT PRIVILEGE Portland Harbor revised ARARs chart

Nice summary, thanks Lori. S

Sean Sheldrake, Unit Diving Officer, RPM

EPA Region 10, 1200 Sixth Ave., Suite 900; Mailstop DOC-01

Seattle, WA 98101

206.553.1220 desk

206.225.6528 cell

http://yosemite.epa.gov/r10/cleanup.nsf/sites/ptldharbor

http://www.epa.gov/region10/dive/

206.553.6379 Dive Operations Center

206.369.7500 Dive Unit cell

Like us on Facebook! https://www.facebook.com/EPADivers

From: Cora, Lori
Sent: Monday, July 13, 2015 12:00 PM
To: Anderson, RobinM; Fonseca, Silvina
Cc: Koch, Kristine; Sheldrake, Sean; Zhen, Davis; Grandinetti, Cami; Ingemansen, Dean
Subject: ATTORNEY CLIENT PRIVILEGE Portland Harbor revised ARARs chart

Attorney Client / Ex. 5

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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To: 'Vrooman Gary L'[Gary.L.Vrooman@doj.state.or.us]
Cc: Koch, Kristine[Koch.Kristine@epa.gov]; Sheldrake, Sean[sheldrake.sean@epa.gov]
From: Cora, Lori
Sent: Mon 7/13/2015 7:28:15 PM
Subject: Portland Harbor Revised ARARs tables
Copy of 2015-07-13 Draft Final Tables 2 1-1 through 2 1-3 ARARs.xlsx

Deliberative Process / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
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To: Cora, Lori[Cora.Lori@epa.gov]; Sheldrake, Sean[sheldrake.sean@epa.gov]
From: Koch, Kristine
Sent: Mon 7/13/2015 4:21:25 PM
Subject: RE: Oregon Authorized Program
2015-07-13 Draft Final Tables 2 1-1 through 2 1-3 ARARs.xlsx

Here is the table.

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
Region 10
1200 Sixth Avenue, Suite 900, M/S ECL-122
Seattle, Washington 98101-3140

(206)553-6705
(206)553-8581 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: Cora, Lori
Sent: Monday, July 13, 2015 9:03 AM
To: Sheldrake, Sean; Koch, Kristine
Subject: RE: Oregon Authorized Program

Attorney Client / Ex. 5

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From: Sheldrake, Sean
Sent: Monday, July 13, 2015 9:01 AM
To: Cora, Lori; Koch, Kristine

Subject: RE: Oregon Authorized Program

Attorney Client / Ex. 5

Sean Sheldrake, Unit Diving Officer, RPM

EPA Region 10, 1200 Sixth Ave., Suite 900; Mailstop DOC-01

Seattle, WA 98101

206.553.1220 desk

206.225.6528 cell

http://yosemite.epa.gov/r10/cleanup.nsf/sites/ptldharbor

http://www.epa.gov/region10/dive/

206.553.6379 Dive Operations Center

206.369.7500 Dive Unit cell

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From: Cora, Lori
Sent: Friday, July 10, 2015 1:32 PM
To: Sheldrake, Sean; Koch, Kristine
Subject: FW: Oregon Authorized Program

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
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P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: McCullough, Barbara
Sent: Friday, July 10, 2015 1:14 PM
To: Schanilec, Kevin; Cora, Lori
Subject: Re: Oregon Authorized Program

Hi Lori and Kevin,

Attorney Client / Ex. 5

Thanks and have a great weekend.

Barbara

Barbara McCullough
US EPA Region 10
Office of Air, Waste and Toxics
1200 Sixth Avenue, Ste. 900
Seattle, WA 98101
206-553-2416
mccullough.barbara@epa.gov

From: Schanilec, Kevin
Sent: Friday, July 10, 2015 10:19 AM
To: Cora, Lori; McCullough, Barbara
Subject: Re: Oregon Authorized Program

Sounds like a plan ☺

From: Cora, Lori
Sent: Friday, July 10, 2015 9:47 AM
To: Schanilec, Kevin; McCullough, Barbara
Subject: RE: Oregon Authorized Program

Attorney Client / Ex. 5

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P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Schanilec, Kevin
Sent: Friday, July 10, 2015 9:33 AM
To: Cora, Lori; McCullough, Barbara
Subject: Fw: Oregon Authorized Program

Barb:

Attorney Client / Ex. 5

Thanks - Kevin

From: Cora, Lori

Sent: Friday, July 10, 2015 8:33 AM
To: Schanilec, Kevin; McCullough, Barbara
Subject: RE: Oregon Authorized Program

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
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From: Schanilec, Kevin
Sent: Thursday, July 09, 2015 4:09 PM
To: McCullough, Barbara; Cora, Lori
Subject: Re: Oregon Authorized Program

Hi Lori:

Attorney Client / Ex. 5

Kevin

From: McCullough, Barbara
Sent: Thursday, July 9, 2015 3:48 PM

To: Cora, Lori
Cc: Schanilec, Kevin
Subject: RE: Oregon Authorized Program

Hi Lori,

Thanks for the email. I did some review and below is what I found and my responses to your questions.

Attorney Client / Ex. 5

Please let me know if you need anything else.

Thanks, Barbara

Barbara

Barbara G. McCullough
Office of Air, Waste and Toxics
US EPA, Region 10
1200 Sixth Avenue, M/S: AWT-122
Seattle, WA 98101

(206) 553-2416 - phone
mccullough.barbara@epa.gov

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From: Cora, Lori
Sent: Thursday, July 09, 2015 1:58 PM
To: McCullough, Barbara
Subject: Oregon Authorized Program

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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To: Sheldrake, Sean[sheldrake.sean@epa.gov]; Zhen, Davis[Zhen.Davis@epa.gov]
From: Cora, Lori
Sent: Thur 2/25/2016 6:05:16 PM
Subject: FW: disposal flow chart?
Figure 3.3-40 Sediment Management and Disposal Decision Tree.pdf

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Koch, Kristine
Sent: Monday, November 09, 2015 3:22 PM
To: Hiltner, Allison <Hiltner.Allison@epa.gov>; Cora, Lori <Cora.Lori@epa.gov>
Subject: RE: disposal flow chart?

Attorney Client / Ex. 5

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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Seattle, Washington 98101-3140

(206)553-6705
(206)553-8581 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: Hiltner, Allison

Sent: Monday, November 09, 2015 2:33 PM
To: Cora, Lori <Cora.Lori@epa.gov>; Koch, Kristine <Koch.Kristine@epa.gov>
Subject: disposal flow chart?

Hi Lori and Kristine –

I talked to Dave Bartus and I think I can come up with language for your flow chart that addresses both his and Lori's concerns, but the e-mail chain Lori sent me doesn't have the flow chart attached. If you could send that to me, I'll suggest language changes.

Allison Hiltner

EPA Region 10

1200 Sixth Avenue, Suite 900, MC ECL-122

Seattle, WA 98101

(206) 553-2140

hiltner.allison@epa.gov

To: Sheldrake, Sean[sheldrake.sean@epa.gov]; Jones, Jennifer M.[JonesJM@cdmsmith.com]
From: Cora, Lori
Sent: Thur 2/25/2016 4:48:39 PM
Subject: ORC comments on latest avoidance and minimization section
Cora comnstsSection 2 4 Avoidance and Minimization Measures_2-22_clean.docx

Attorney Client / Ex. 5

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To: 'Jones, Jennifer M.'[JonesJM@cdmsmith.com]; Sheldrake, Sean[sheldrake.sean@epa.gov]; Barton, Justine[Barton.Justine@epa.gov]; Vallette, Yvonne[Vallette.Yvonne@epa.gov]; Coffey, Scott[CoffeySE@cdmsmith.com]
From: Cora, Lori
Sent: Tue 2/16/2016 6:14:17 PM
Subject: RE: Discuss Portland Harbor 404(b)(1) evaluation
CoraSection 2 4 Avoidance and Minimization Measures.docx

Attorney Client / Ex. 5

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-----Original Appointment-----
From: Jones, Jennifer M. [mailto:JonesJM@cdmsmith.com]
Sent: Thursday, February 11, 2016 3:53 PM
To: Sheldrake, Sean; Barton, Justine; Vallette, Yvonne; Cora, Lori; Coffey, Scott
Subject: Discuss Portland Harbor 404(b)(1) evaluation
When: Thursday, February 25, 2016 10:00 AM-11:00 AM (UTC-08:00) Pacific Time (US & Canada).
Where: 1-719-457-1414,934632#

Attorney Client / Ex. 5

Attorney Client / Ex. 5

Thanks!
Jennifer

<< File: Draft 404(b)(1) Purpose and Need_2016-02-02.docx >> << File: Draft 404(b)(1) Evaluation outline_2016-01-19.docx >> << File: Draft 404(b)(1) Section 2.docx >> << File: Section 2.4 Avoidance and Minimization Measures.docx >>

To: 'White, Bruce'[Bruce.White@btlaw.com]
Cc: Koch, Kristine[Koch.Kristine@epa.gov]; Grandinetti, Cami[Grandinetti.Cami@epa.gov]
From: Cora, Lori
Sent: Sat 2/6/2016 5:50:12 PM
Subject: RE: Portland Harbor Superfund Site

Hello, Bruce. Sorry for the delay in responding. I've been informed that EPA will provide a breakdown of costs by SDU on the proposed remedy in the Proposed Plan that is published and submitted for public comment. The FS is now being finalized in substantial part based on the comments we received from various stakeholders, including the LWG and NRRB, on our August 2015 draft FS. The proposed remedy in our Proposed Plan too many be somewhat different from what was presented to the NRRB. Let me know if you have questions. Thanks.

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From: White, Bruce [mailto:Bruce.White@btlaw.com]
Sent: Thursday, January 28, 2016 10:01 AM
To: Cora, Lori <Cora.Lori@epa.gov>
Cc: Koch, Kristine <Koch.Kristine@epa.gov>; Grandinetti, Cami <Grandinetti.Cami@epa.gov>
Subject: Re: Portland Harbor Superfund Site

Lori

Now that EPA has issued a preferred option to the NRRB, and the NRRB has completed its review and Region 10 has responded to the NRRB comments, we are renewing our request on behalf of the PCI Group that EPA provide its costs for the preferred option broken down by SDU.

Given the effort devoted to development of that option, we anticipate that those figures should be readily available to the Agency.

Thanks in advance for a prompt response.

Regards,

Bruce White

312.214.4584 (W)

Personal Privacy / Ex. 6

On Oct 16, 2015, at 12:50 PM, Cora, Lori <Cora.Lori@epa.gov> wrote:

Hello, Bruce. I think you or others may have misunderstood what EPA said at the meeting on this issue. I heard one or more PCI members ask for the costs be developed by SDU, and I heard Kristine very specifically say that we had no reason to do that. Nonetheless, EPA wants to help facilitate the allocation within reason. Currently, EPA's revised draft FS is being reviewed by the LWG, Tribes, and CAG/TAG. The FS on which we base our proposed plan and seek public comment will be different than the current draft FS. EPA does not see the value in developing something for the PCI group on costs based on the draft FS at this time. Once EPA has proposed a remedial alternative, and the PCI sees the revised FS its based on, we can discuss with the PCI group what if anything more might be helpful to the group to facilitate the allocation process.

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From: White, Bruce [mailto:Bruce.White@btlaw.com]
Sent: Friday, October 16, 2015 9:24 AM
To: Koch, Kristine; Cora, Lori
Subject: RE: Portland Harbor Superfund Site

Kristine

Thanks - appears I was not as clear as I should have been.

The group members already had access to this Appendix.

AT the 9/29 meeting EPA related that its representative would be willing to work with the Allocation Team/PCI Group to facilitate sharing or development of costs as broken down by Sediment Decision Unit (previously known as AOPCs or SMAs). As related at the meeting this information that is particularly important for development of the allocation.

This is the information we are following up for and would appreciate your advising of the best path to obtain/develop it.

Regards,

Bruce White

312-214-4584 (DD)

Personal Privacy / Ex. 6

From: Koch, Kristine [mailto:Koch.Kristine@epa.gov]
Sent: Friday, October 16, 2015 10:04 AM
To: White, Bruce; Cora, Lori
Subject: RE: Portland Harbor Superfund Site

Bruce – Attached is the detailed costs. If there are specific questions, please let me know.

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
Region 10

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Seattle, Washington 98101-3140

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(206)553-8581 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: White, Bruce [mailto:Bruce.White@btlaw.com]
Sent: Thursday, October 15, 2015 1:53 PM
To: Koch, Kristine; Cora, Lori
Subject: Portland Harbor Superfund Site

Kristine/Lori

During the EPA presentation to the PCI Group, EPA indicated that it was willing to provide us more detail on the manner in which the costs were calculated for the various FS options.

What would be the best way to go about obtaining that information expeditiously?

Thanks,

Bruce White

Barnes & Thornburg LLP
One North Wacker Drive
Suite 4400
Chicago, IL 60606-2833
312.214.4584 (DD)
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To: Grandinetti, Cami[Grandinetti.Cami@epa.gov]; McLerran, Dennis[mclerran.dennis@epa.gov]; Woolford, James[Woolford.James@epa.gov]
Cc: Ingemansen, Dean[Ingemansen.Dean@epa.gov]; Stern, Allyn[Stern.Allyn@epa.gov]
From: Cora, Lori
Sent: Thur 2/4/2016 8:33:18 PM
Subject: FW: Draft Mutual Settlement Letter
draft settlement letter 2-3-16 lwg redlines.docx

Attorney Client / Ex. 5

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U.S. Environmental Protection Agency | Region 10
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From: Patty Dost [mailto:pdost@pearllegalgroup.com]
Sent: Thursday, February 04, 2016 12:18 PM
To: Cora, Lori <Cora.Lori@epa.gov>
Subject: RE: Draft Mutual Settlement Letter

From: Cora, Lori [mailto:Cora.Lori@epa.gov]
Sent: Thursday, February 4, 2016 9:23 AM
To: Patty Dost <pdost@pearllegalgroup.com>
Cc: Ebright, Stephanie <EBRIGHT.STEPHANIE@EPA.GOV>; Ingemansen, Dean <Ingemansen.Dean@epa.gov>; Grandinetti, Cami <Grandinetti.Cami@epa.gov>
Subject: RE: Draft Mutual Settlement Letter

Hello, Patty. The full paragraph below is important to EPA to show the level of coordination and opportunities to comment on the FS that the LWG has had and that EPA is considering them in finalizing the FS. I would think it would help the LWG to have it in the letter when you seek recovery of costs incurred in doing such coordination/commenting.

We accept your rephrasing to obligation #3.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
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From: Patty Dost [mailto:pdost@pearllegalgroup.com]
Sent: Wednesday, February 03, 2016 5:39 PM
To: Cora, Lori <Cora.Lori@epa.gov>
Cc: Ebright, Stephanie <EBRIGHT.STEPHANIE@EPA.GOV>
Subject: RE: Draft Mutual Settlement Letter

Lori, thank you for this. I have two initial questions. First, does EPA still need this paragraph?

By letter dated, December 18, 2012, EPA notified the LWG that we did not approve its March 2012 draft FS, and listed key deficiencies. After the disapproval notice, we agreed to coordinate our proposed modifications section by section with the LWG, as documented in the Portland Harbor Superfund Site Revision Process for Feasibility Study, modified December 15, 2014. In accordance with the agreed process, the EPA shared Sections 1 and 2 on July 8, 2014, and February 23, 2015, and the LWG and EPA discussed the LWG's comments on those

sections. We provided Section 3 on July 29, 2015 and Section 4 on August 7, 2015. Since release of those sections, the LWG has met to talk through the Decision Trees on November 2, 2015, and December 3, 2015, and the LWG has provided extensive comments on those sections. The EPA is considering the LWG's comments and will make appropriate changes in the revised final FS. The LWG provided the National Remedy Review Board and Contaminated Sediments Technical Advisory Group (collectively "the Boards") with comments and concerns on the FS and direction of the cleanup for Portland Harbor. The Region is also considering those comments in revising the FS.

Since we are agreeing to EPA's production of the final FS, we don't believe this information is necessary to support the following paragraph, and we would prefer to delete it.

Second, we would prefer to rephrase our obligation #3 upon receipt of the letter to something like, "not pursue any other legal claims or process related to EPA's production of the final FS." Our understanding is that this settlement would resolve only those legal claims, processes and requests for dispute resolution (via ADR or otherwise) arising out of EPA's decision to complete production of the FS, and we would like to avoid any possible interpretation of this later as restricting any future claim or defense we may have related to EPA's final FS itself.

I will forward to the LWG now and check in with you in the morning.

Patty

From: Cora, Lori [mailto:Cora.Lori@epa.gov]
Sent: Wednesday, February 3, 2016 5:17 PM
To: Patty Dost <pdost@pearllegalgroup.com>
Cc: Ebright, Stephanie <EBRIGHT.STEPHANIE@EPA.GOV>
Subject: Draft Mutual Settlement Letter

Hello, Patty. As we discussed today, attached is a draft of the letter that would document the mutual agreements reached between the LWG and EPA and resolve the January 19, 2016 dispute. This letter would supersede the January 4 letter as noted in the attached draft. If this letter is acceptable to the LWG, we need to discuss how the LWG will transmit in writing its agreement tomorrow. Thanks for your help.

Lori Houck Cora | Assistant Regional Counsel
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P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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To: Grandinetti, Cami[Grandinetti.Cami@epa.gov]; Ingemansen, Dean[Ingemansen.Dean@epa.gov]
Cc: Northridge, Michael[Northridge.Michael@epa.gov]
From: Cora, Lori
Sent: Wed 2/3/2016 8:40:28 PM
Subject: DRAFT Settlement Letter agreed to by LWG --
draft settlement letter 2-3-16.docx

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
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To: Northridge, Michael[Northridge.Michael@epa.gov]
From: Cora, Lori
Sent: Mon 1/4/2016 5:31:40 PM
Subject: Happy New Year! Attorney Client privilege
FS completion notice 12_30_2015_docx.docx

It's me again ☺ I'm thinking of Jack Nicholson's face and him saying "Here's Johnny"

Attorney Client / Ex. 5

Personal Privacy / Ex. 6

Lori Houck Cora | Assistant Regional Counsel
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To: 'Katherine Pease - NOAA Federal'[katherine.pease@noaa.gov]; Deirdre Donahue[deirdre.donahue@sol.doi.gov]
From: Cora, Lori
Sent: Wed 12/30/2015 11:50:12 PM
Subject: ATTORNEY WORK PRODUCT -- CONFIDENTIAL -- Portland Harbor

Attorney Work Product – Confidential – Portland Harbor

Deliberative Process / Ex. 5

Deliberative Process / Ex. 5

Deliberative Process / Ex. 5

Deliberative Process / Ex. 5

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Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

To: Mackey, Cyndy[Mackey.Cyndy@epa.gov]
From: Cora, Lori
Sent: Tue 12/29/2015 7:18:42 PM
Subject: RE: Draft Portland Harbor FS notice letter

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

From: Mackey, Cyndy
Sent: Tuesday, December 29, 2015 11:08 AM
To: Cora, Lori <Cora.Lori@epa.gov>
Subject: Re: Draft Portland Harbor FS notice letter

How about 1:00 PST (4:00 EST)?

Attorney Client / Ex. 5

Sent from my iPhone

On Dec 29, 2015, at 1:36 PM, "Cora, Lori" <Cora.Lori@epa.gov> wrote:

Hi, Cyndy. Michelle told me she sent you the draft notice letter. Are you around today to discuss?

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

To: Openchowski, Charles[openchowski.charles@epa.gov]; Luzecky, Hollis[Luzecky.Hollis@epa.gov]
Cc: Legare, Amy[Legare.Amy@epa.gov]
From: Cora, Lori
Sent: Tue 12/22/2015 6:50:51 PM
Subject: RE: ATTORNEY CLIENT PRIVILEGE === Portland Harbor NRRB comment

Attorney Client / Ex. 5

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From: Openchowski, Charles
Sent: Tuesday, December 22, 2015 10:29 AM
To: Cora, Lori <Cora.Lori@epa.gov>; Luzecky, Hollis <Luzecky.Hollis@epa.gov>
Cc: Legare, Amy <Legare.Amy@epa.gov>
Subject: RE: ATTORNEY CLIENT PRIVILEGE === Portland Harbor NRRB comment

Attorney Client / Ex. 5

From: Cora, Lori
Sent: Monday, December 21, 2015 12:57 PM
To: Luzecky, Hollis <Luzecky.Hollis@epa.gov>; Openchowski, Charles <openchowski.charles@epa.gov>
Cc: Legare, Amy <Legare.Amy@epa.gov>
Subject: RE: ATTORNEY CLIENT PRIVILEGE === Portland Harbor NRRB comment

Thanks, Hollis. Charles, if you are ok with the revised language, Amy Legare says you should include these changes in your review and Amy will circle back with Mark.

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From: Luzecky, Hollis
Sent: Monday, December 21, 2015 9:47 AM
To: Cora, Lori <Cora.Lori@epa.gov>; Openchowski, Charles <openchowski.charles@epa.gov>
Subject: RE: ATTORNEY CLIENT PRIVILEGE === Portland Harbor NRRB comment

Attorney Client / Ex. 5

><(((º>`•.¸¸.•´¯`•.¸><(((º>¸.•.
Hollis Luzecky, Attorney-Advisor
Office of Site Remediation Enforcement
US Environmental Protection Agency
Phone: 202-564-4217 / Fax: 202-501-0269

"Far and away the best prize that life offers is the chance to work hard at work worth doing." Theodore Roosevelt

From: Cora, Lori
Sent: Monday, December 21, 2015 12:10 PM

To: Luzecky, Hollis <Luzecky.Hollis@epa.gov>; Openchowski, Charles <openchowski.charles@epa.gov>
Subject: RE: ATTORNEY CLIENT PRIVILEGE === Portland Harbor NRRB comment

Thanks, Hollis. I like your changes.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

From: Luzecky, Hollis
Sent: Monday, December 21, 2015 8:40 AM
To: Cora, Lori <Cora.Lori@epa.gov>; Openchowski, Charles <openchowski.charles@epa.gov>
Subject: RE: ATTORNEY CLIENT PRIVILEGE === Portland Harbor NRRB comment

Attorney Client / Ex. 5

><(((°>`•.¸¸.•´¯`•.¸><(((°>¸.•.
Hollis Luzecky, Attorney-Advisor
Office of Site Remediation Enforcement

US Environmental Protection Agency
Phone: 202-564-4217 / Fax: 202-501-0269

"Far and away the best prize that life offers is the chance to work hard at work worth doing." Theodore Roosevelt

From: Cora, Lori
Sent: Monday, December 21, 2015 11:27 AM
To: Openchowski, Charles <openchowski.charles@epa.gov>; Luzecky, Hollis <Luzecky.Hollis@epa.gov>
Subject: FW: ATTORNEY CLIENT PRIVILEGE === Portland Harbor NRRB comment

Hello, Charles and Hollis. Charles I understand you have been given the latest version of the NRRB comments. Please see my earlier email to Hollis. I've not heard from Hollis yet, but wanted to forward my concern to you too, Charlies. I would be happy to discuss and am around Mon thru Wednesday this week.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

From: Cora, Lori
Sent: Thursday, December 17, 2015 3:39 PM
To: Luzecky, Hollis <Luzecky.Hollis@epa.gov>
Subject: ATTORNEY CLIENT PRIVILEGE === Portland Harbor NRRB comment

Attorney Client / Ex. 5

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

To: Ingemansen, Dean[Ingemansen.Dean@epa.gov]
From: Cora, Lori
Sent: Mon 12/21/2015 10:30:29 PM
Subject: RE: Portland Harbor - Interested in your comments on the email below....
2015 12-00 Administrator PH OPTIONS PAPER FS Completion FINAL.docx

Matt Magorrian sent a sharepoint with Dennis' upcoming meetings/briefings on PH. That is where I saw something got scheduled with the Administrator on 12/28, but I'm not invited to the call. My understanding is Jim and Dennis are talking to her just about which FS completion option to use. The two options are attached.

Lori Houck Cora | **Assistant Regional Counsel**
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P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

From: Ingemansen, Dean
Sent: Monday, December 21, 2015 1:57 PM
To: Cora, Lori <Cora.Lori@epa.gov>
Subject: FW: Portland Harbor - Interested in your comments on the email below....

Hi Lori,

I heard at the Monday morning ECL meeting that there was going to be a briefing of the EPA Administrator on Monday, Dec. 28th. Is that true? If so, is it going to cover just the remedial options, or will it also include your options paper on how to proceed with the FS and PP?

-Dean

From: Cora, Lori
Sent: Friday, December 18, 2015 1:37 PM
To: Stern, Allyn <Stern.Allyn@epa.gov>; Cora, Lori <Cora.Lori@epa.gov>; Ingemansen, Dean <Ingemansen.Dean@epa.gov>
Subject: RE: Portland Harbor - Interested in your comments on the email below....

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Stern, Allyn
Sent: Thursday, December 17, 2015 10:27 PM
To: Cora, Lori <Cora.Lori@epa.gov>; Ingemansen, Dean <Ingemansen.Dean@epa.gov>
Subject: Re: Portland Harbor - Interested in your comments on the email below....

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From: Cora, Lori
Sent: Thursday, December 17, 2015 12:52 PM
To: Ingemansen, Dean; Stern, Allyn
Subject: FW: Portland Harbor - Interested in your comments on the email below....

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Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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twitter.com

U.S. EPA Region 10 @ EPAnorthwest. Environmental news and eco-tips from the US EPA Northwest office. Serving Alaska, Idaho, Oregon, Washington and 271 Tribes.

From: Mackey, Cyndy
Sent: Thursday, December 17, 2015 12:32 PM
To: Northridge, Michael <Northridge.Michael@epa.gov>; Cora, Lori <Cora.Lori@epa.gov>
Subject: Portland Harbor - Interested in your comments on the email below....

DRAFT – Propose sending to Dennis, Jim, etc.

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Cyndy Mackey

Director, Office of Site Remediation Enforcement

EPA-Office of Enforcement and Compliance Assurance (Mail Code-2271A)

1200 Pennsylvania Ave., N.W. (Room-WJC 5206) Washington, DC 20460

202 564-8206 (Direct Line)

202 564-5110 (Office Line)

202 591-6184(Office Cell)

This email is for the intended recipient only and may contain material that is privileged and/or confidential. If you believe you have received this email in error, please notify the sender. Thank you

To: Luzecky, Hollis[Luzecky.Hollis@epa.gov]; Openchowski, Charles[openchowski.charles@epa.gov]
Cc: Legare, Amy[Legare.Amy@epa.gov]
From: Cora, Lori
Sent: Mon 12/21/2015 5:57:03 PM
Subject: RE: ATTORNEY CLIENT PRIVILEGE === Portland Harbor NRRB comment

Thanks, Hollis. Charles, if you are ok with the revised language, Amy Legare says you should include these changes in your review and Amy will circle back with Mark.

Lori Houck Cora | Assistant Regional Counsel
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P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Luzecky, Hollis
Sent: Monday, December 21, 2015 9:47 AM
To: Cora, Lori <Cora.Lori@epa.gov>; Openchowski, Charles <openchowski.charles@epa.gov>
Subject: RE: ATTORNEY CLIENT PRIVILEGE === Portland Harbor NRRB comment

Attorney Client / Ex. 5

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Hollis Luzecky, Attorney-Advisor
Office of Site Remediation Enforcement
US Environmental Protection Agency
Phone: 202-564-4217 / Fax: 202-501-0269

"Far and away the best prize that life offers is the chance to work hard at work worth doing." Theodore Roosevelt

From: Cora, Lori
Sent: Monday, December 21, 2015 12:10 PM
To: Luzecky, Hollis <Luzecky.Hollis@epa.gov>; Openchowski, Charles <openchowski.charles@epa.gov>
Subject: RE: ATTORNEY CLIENT PRIVILEGE === Portland Harbor NRRB comment

Thanks, Hollis. I like your changes.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
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From: Luzecky, Hollis
Sent: Monday, December 21, 2015 8:40 AM
To: Cora, Lori <Cora.Lori@epa.gov>; Openchowski, Charles <openchowski.charles@epa.gov>
Subject: RE: ATTORNEY CLIENT PRIVILEGE === Portland Harbor NRRB comment

Attorney Client / Ex. 5

(CWA 404). Mark Sprenger

><(((º>`•.¸¸.•´¯`•.¸><(((º>¸.•.
Hollis Luzecky, Attorney-Advisor
Office of Site Remediation Enforcement
US Environmental Protection Agency
Phone: 202-564-4217 / Fax: 202-501-0269

"Far and away the best prize that life offers is the chance to work hard at work worth doing." Theodore Roosevelt

From: Cora, Lori
Sent: Monday, December 21, 2015 11:27 AM
To: Openchowski, Charles <openchowski.charles@epa.gov>; Luzecky, Hollis <Luzecky.Hollis@epa.gov>
Subject: FW: ATTORNEY CLIENT PRIVILEGE === Portland Harbor NRRB comment

Hello, Charles and Hollis. Charles I understand you have been given the latest version of the NRRB comments. Please see my earlier email to Hollis. I've not heard from Hollis yet, but wanted to forward my concern to you too, Charlies. I would be happy to discuss and am around Mon thru Wednesday this week.

Lori Houck Cora | Assistant Regional Counsel
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From: Cora, Lori
Sent: Thursday, December 17, 2015 3:39 PM
To: Luzecky, Hollis <Luzecky.Hollis@epa.gov>
Subject: ATTORNEY CLIENT PRIVILEGE === Portland Harbor NRRB comment

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From: Cora, Lori
Required Attendees: Ingemansen, Dean; Stern, Allyn
Location: Allyn's office
Importance: High
Subject: Canceled: Status Update on Portland Harbor -- EPA taking over FS
Start Date/Time: Tue 12/15/2015 11:00:00 PM
End Date/Time: Tue 12/15/2015 11:30:00 PM
PH finalizing FS options 12_7_2015.docx

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To: Ingemansen, Dean[Ingemansen.Dean@epa.gov]; Stern, Allyn[Stern.Allyn@epa.gov]; Northridge, Michael[Northridge.Michael@epa.gov]; Mackey, Cyndy[Mackey.Cyndy@epa.gov]; Mott, Patricia[Mott.Patricia@epa.gov]; Grandinetti, Cami[Grandinetti.Cami@epa.gov]; Zhen, Davis[Zhen.Davis@epa.gov]
From: Cora, Lori
Sent: Sat 12/12/2015 12:50:08 AM
Subject: Revised Supplement fleshing out FS finalization options
Options 3 and 4 fleshed out with Option 5 added-12-11-15.docx

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
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P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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To: Ingemansen, Dean[Ingemansen.Dean@epa.gov]
From: Cora, Lori
Sent: Fri 12/11/2015 7:12:45 PM
Subject: RE: CERCLA APA case?

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Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

From: Ingemansen, Dean
Sent: Friday, December 11, 2015 11:02 AM
To: Cora, Lori <Cora.Lori@epa.gov>
Subject: RE: CERCLA APA case?

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-Dean

From: Cora, Lori
Sent: Friday, December 11, 2015 9:22 AM
To: Ingemansen, Dean <Ingemansen.Dean@epa.gov>
Subject: CERCLA APA case?

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Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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To: Grandinetti, Cami[Grandinetti.Cami@epa.gov]; Zhen, Davis[Zhen.Davis@epa.gov]
From: Cora, Lori
Sent: Fri 12/11/2015 5:11:53 PM
Subject: FW: "Fleshed Out" options for finalizing the Portland Harbor FS
Options 2 and 3 and 4 fleshed out-osre comments-12-11-15.docx

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Lori Houck Cora | Assistant Regional Counsel
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P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Northridge, Michael
Sent: Friday, December 11, 2015 9:04 AM
To: Mackey, Cyndy <Mackey.Cyndy@epa.gov>
Cc: Cora, Lori <Cora.Lori@epa.gov>; Ingemansen, Dean <Ingemansen.Dean@epa.gov>; Mott, Patricia <Mott.Patricia@epa.gov>
Subject: FW: "Fleshed Out" options for finalizing the Portland Harbor FS

Confidential and privileged

Cyndy,

Personal Privacy / Ex. 6 FYI – Lori and

Attorney Client / Ex. 5

Attorney Client / Ex. 5

Feel free to call my cell Personal Privacy / Ex. 6 with any questions...

From: Ingemansen, Dean
Sent: Thursday, December 10, 2015 11:56 PM
To: Cora, Lori <Cora.Lori@epa.gov>; Grandinetti, Cami <Grandinetti.Cami@epa.gov>; Zhen, Davis <Zhen.Davis@epa.gov>; Northridge, Michael <Northridge.Michael@epa.gov>
Subject: RE: "Fleshed Out" Options 3 and 4 -- Finalizing the FS

Folks,

My comments are attached in track changes view of Word. Thanks, and good job!

-Dean

From: Cora, Lori
Sent: Thursday, December 10, 2015 3:32 PM
To: Grandinetti, Cami <Grandinetti.Cami@epa.gov>; Zhen, Davis <Zhen.Davis@epa.gov>; Ingemansen, Dean <Ingemansen.Dean@epa.gov>; Northridge, Michael <Northridge.Michael@epa.gov>
Subject: "Fleshed Out" Options 3 and 4 -- Finalizing the FS

A follow-up to yesterday's meeting was for me to flesh out Options 3 and 4 for a briefing with Administrator McCarthy as soon as it can be scheduled. Let me know if you think this draft as the fat Dennis was looking for. Thanks.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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To: Stern, Allyn[Stern.Allyn@epa.gov]
Cc: Ingemansen, Dean[Ingemansen.Dean@epa.gov]
From: Cora, Lori
Sent: Fri 12/11/2015 4:52:50 PM
Subject: RE: Status Update on Portland Harbor -- EPA taking over FS
Options 3 and 4 fleshed out-deans comments-12-10-15.docx
PH finalizing FS options 12_7_2015 (00000003).docx

I attached the option paper in the invite but attach it here again. Also attached is a draft supplement on Options 3 and 4 that Dennis asked for. Dean's comments on the supplement are included. I'm still awaiting feedback on the supplement from others. This is moving faster than I realized when I scheduled our Tuesday meeting. Dennis has sent an invite to talk with Cyndy, Jim Woolford and Dennis again at 3 p.m. Monday to discuss what to propose to the Administrator. I think Dennis wants to talk with the Administrator before he goes on Holiday break. You should have gotten the invite to the Monday meeting.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov
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-----Original Message-----
From: Stern, Allyn
Sent: Thursday, December 10, 2015 5:41 PM
To: Cora, Lori <Cora.Lori@epa.gov>
Cc: Ingemansen, Dean <Ingemansen.Dean@epa.gov>
Subject: Re: Status Update on Portland Harbor -- EPA taking over FS

I definitely need to get up to speed on Portland Harbor. I don't think I even know exactly what our options are. I will be in DC next week but this meeting seems late enough that I can do it by phone. Can you call me on my cell - Personal Privacy / Ex. 6

Also, can you send me one of the background papers that talks about the options so I can put option 4 into context?

Thanks.

Allyn Stern
Regional Counsel
US EPA Region 10
1200 Sixth Avenue, Seattle, WA 98101
206-553-1223

> On Dec 10, 2015, at 1:21 PM, Cora, Lori <Cora.Lori@epa.gov> wrote:
>

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>
> <PH finalizing FS options 12_7_2015.docx> <meeting.ics>

From: Cora, Lori
Required Attendees: Ingemansen, Dean; Stern, Allyn
Location: Allyn's office
Importance: Normal
Subject: Status Update on Portland Harbor -- EPA taking over FS
Start Date/Time: Tue 12/15/2015 11:00:00 PM
End Date/Time: Tue 12/15/2015 11:30:00 PM
PH finalizing FS options 12_7_2015.docx

In a meeting held on December 9, 2015 with Dennis, Jim Woolford, Cyndy Mackey et al. Jim and

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want to brief Administrator McGarthy about the proposal.

To: Northridge, Michael[Northridge.Michael@epa.gov]
From: Cora, Lori
Sent: Mon 12/7/2015 5:30:03 PM
Subject: RE: Reply re: revised version of draft paper on FS takeover options
PH finalizing FS options 12_7_2015.docx

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Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Northridge, Michael
Sent: Monday, December 07, 2015 9:14 AM
To: Cora, Lori <Cora.Lori@epa.gov>
Subject: Reply re: revised version of draft paper on FS takeover options

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From: Cora, Lori
Sent: Monday, December 07, 2015 11:51 AM
To: Northridge, Michael <Northridge.Michael@epa.gov>
Subject: Revised Memo

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Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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To: Sheldrake, Sean[sheldrake.sean@epa.gov]
Cc: DeMaria, Eva[DeMaria.Eva@epa.gov]
From: Cora, Lori
Sent: Thur 12/3/2015 8:01:49 PM
Subject: RE: DEQ - Evraz Mn concerns-- Additional considerations for reviewing PRG table based on 304(a) criteria

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U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Sheldrake, Sean
Sent: Thursday, December 03, 2015 9:34 AM
To: Cora, Lori <Cora.Lori@epa.gov>
Cc: DeMaria, Eva <DeMaria.Eva@epa.gov>
Subject: RE: DEQ - Evraz Mn concerns-- Additional considerations for reviewing PRG table based on 304(a) criteria

Atty client priv.

Attorney Client / Ex. 5

S

Sean Sheldrake, Unit Diving Officer, RPM

EPA Region 10, 1200 Sixth Ave., Suite 900; Mailstop DOC-01

Seattle, WA 98101

206.553.1220 desk

206.225.6528 cell

http://yosemite.epa.gov/r10/cleanup.nsf/sites/ptldharbor

http://www.epa.gov/region10/dive/

206.553.6379 Dive Operations Center

206.369.7500 Dive Unit cell

Like us on Facebook! https://www.facebook.com/EPADivers

From: Cora, Lori
Sent: Wednesday, December 02, 2015 4:38 PM
To: Koch, Kristine <Koch.Kristine@epa.gov>; DeMaria, Eva <DeMaria.Eva@epa.gov>; Allen, Elizabeth <allen.elizabeth@epa.gov>; Fuentes, Rene <fuentes.rene@epa.gov>; Shephard, Burt <Shephard.Burt@epa.gov>; Sheldrake, Sean <sheldrake.sean@epa.gov>; Ebright, Stephanie <EBRIGHT.STEPHANIE@EPA.GOV>; Christopher, Anne <Christopher.Anne@epa.gov>
Cc: Zhen, Davis <Zhen.Davis@epa.gov>
Subject: RE: DEQ - Evraz Mn concerns-- Additional considerations for reviewing PRG table based on 304(a) criteria

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P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Koch, Kristine
Sent: Wednesday, December 02, 2015 8:20 AM
To: Cora, Lori <Cora.Lori@epa.gov>; DeMaria, Eva <DeMaria.Eva@epa.gov>; Allen, Elizabeth <allen.elizabeth@epa.gov>; Fuentes, Rene <fuentes.rene@epa.gov>; Shephard, Burt <Shephard.Burt@epa.gov>; Sheldrake, Sean <sheldrake.sean@epa.gov>; Ebright, Stephanie <EBRIGHT.STEPHANIE@EPA.GOV>; Christopher, Anne <Christopher.Anne@epa.gov>
Cc: Zhen, Davis <Zhen.Davis@epa.gov>
Subject: RE: DEQ - Evraz Mn concerns

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Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
Region 10
1200 Sixth Avenue, Suite 900, M/S ECL-122
Seattle, Washington 98101-3140

(206)553-6705
(206)553-8581 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: Cora, Lori

Sent: Tuesday, December 01, 2015 4:16 PM
To: DeMaria, Eva <DeMaria.Eva@epa.gov>; Koch, Kristine <Koch.Kristine@epa.gov>; Allen, Elizabeth <allen.elizabeth@epa.gov>; Fuentes, Rene <fuentes.rene@epa.gov>; Shephard, Burt <Shephard.Burt@epa.gov>; Sheldrake, Sean <sheldrake.sean@epa.gov>; Ebright, Stephanie <EBRIGHT.STEPHANIE@EPA.GOV>; Christopher, Anne <Christopher.Anne@epa.gov>
Cc: Zhen, Davis <Zhen.Davis@epa.gov>
Subject: RE: DEQ - Evraz Mn concerns

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Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: DeMaria, Eva
Sent: Tuesday, December 01, 2015 2:48 PM
To: Koch, Kristine <Koch.Kristine@epa.gov>; Allen, Elizabeth <allen.elizabeth@epa.gov>; Fuentes, Rene <fuentes.rene@epa.gov>; Shephard, Burt <Shephard.Burt@epa.gov>; Cora, Lori <Cora.Lori@epa.gov>; Sheldrake, Sean <sheldrake.sean@epa.gov>; Ebright, Stephanie <EBRIGHT.STEPHANIE@EPA.GOV>; Christopher, Anne <Christopher.Anne@epa.gov>
Cc: Zhen, Davis <Zhen.Davis@epa.gov>
Subject: DEQ - Evraz Mn concerns

Hi all-

Attorney Client / Ex. 5

Eva

To: Northridge, Michael[Northridge.Michael@epa.gov]
Cc: Mott, Patricia[Mott.Patricia@epa.gov]
From: Cora, Lori
Sent: Tue 12/1/2015 2:07:08 AM
Subject: RE: Revised Portland Harbor FS memo with options and schedules

Yes, I put Cyndy on the list for the invite. Thanks.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Northridge, Michael
Sent: Monday, November 30, 2015 4:58 PM
To: Cora, Lori <Cora.Lori@epa.gov>
Cc: Mott, Patricia <Mott.Patricia@epa.gov>
Subject: RE: Revised Portland Harbor FS memo with options and schedules

Let's get Cyndy Mackey included too (even though neither Ken Patterson nor Ben Lammie were able to join us today --- I hope Trish raises this to them (and her) asap).

From: Cora, Lori
Sent: Monday, November 30, 2015 7:56 PM
To: Grandinetti, Cami <Grandinetti.Cami@epa.gov>; Ingemansen, Dean <Ingemansen.Dean@epa.gov>; Zhen, Davis <Zhen.Davis@epa.gov>; Koch, Kristine <Koch.Kristine@epa.gov>; Allen, Elizabeth <allen.elizabeth@epa.gov>; Ebright, Stephanie <EBRIGHT.STEPHANIE@EPA.GOV>; Fonseca, Silvina <Fonseca.Silvina@epa.gov>; Stalcup, Dana <Stalcup.Dana@epa.gov>; Northridge, Michael <Northridge.Michael@epa.gov>
Subject: Revised Portland Harbor FS memo with options and schedules

Attorney Client / Ex. 5

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Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

To: Ingemansen, Dean[Ingemansen.Dean@epa.gov]; Stern, Allyn[Stern.Allyn@epa.gov]
From: Cora, Lori
Sent: Thur 11/19/2015 3:20:48 PM
Subject: FW: Cong call

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Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Woolford, James
Sent: Wednesday, November 18, 2015 10:09 AM
To: Grandinetti, Cami <Grandinetti.Cami@epa.gov>; Fonseca, Silvina <Fonseca.Silvina@epa.gov>; Stalcup, Dana <Stalcup.Dana@epa.gov>; Mackey, Cyndy <Mackey.Cyndy@epa.gov>; Cora, Lori <Cora.Lori@epa.gov>; Legare, Amy <Legare.Amy@epa.gov>; Koch, Kristine <Koch.Kristine@epa.gov>; Ells, Steve <Ells.Steve@epa.gov>; Deitz, Randy <Deitz.Randy@epa.gov>
Subject: Cong call

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Attorney Client / Ex. 5

Attorney Client / Ex. 5

That's about it...

Jim Woolford, Director
Office of Superfund Remediation & Technology Innovation
US EPA

Sent from my Windows Phone
Please excuse typos

To: Northridge, Michael[Northridge.Michael@epa.gov]
From: Cora, Lori
Sent: Fri 11/13/2015 12:36:14 AM
Subject: RE: Challenges to EPA takeover of RI/FS or RD/RA (or RV)

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

From: Northridge, Michael
Sent: Thursday, November 12, 2015 4:02 PM
To: Cora, Lori <Cora.Lori@epa.gov>
Subject: FW: Challenges to EPA takeover of RI/FS or RD/RA (or RV)

Confidential and privileged

Attorney Client / Ex. 5

From: Northridge, Michael
Sent: Thursday, November 12, 2015 6:34 PM
To: Linett, Janice <Linett.Janice@epa.gov>; Dixon, Douglas <Dixon.Douglas@epa.gov>
Cc: Worthman, Gary <Worthman.Gary@epa.gov>
Subject: Challenges to EPA takeover of RI/FS or RD/RA (or RV)

Confidential and privileged

Doug and Janice (cc: Gary, for his 'institutional memory'),

Attorney Client / Ex. 5

Attorney Client / Ex. 5

Attorney Client / Ex. 5

Attorney Client / Ex. 5

From: Ingemansen, Dean
Sent: Thursday, November 12, 2015 4:57 PM
To: Cora, Lori <Cora.Lori@epa.gov>
Cc: Northridge, Michael <Northridge.Michael@epa.gov>
Subject: RE: Portland Harbor -- Completing FS memo

ATTORNEY WORK PRODUCT

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PREPARED IN ANTICIPATION OF LITIGATION

DO NOT RELEASE

Lori and Mike,

Attorney Client / Ex. 5

Thanks!

-Dean

From: Cora, Lori
Sent: Monday, November 09, 2015 4:24 PM
To: Ingemansen, Dean <Ingemansen.Dean@epa.gov>
Subject: FW: Portland Harbor -- Completing FS memo

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

To: Northridge, Michael[Northridge.Michael@epa.gov]
From: Cora, Lori
Sent: Fri 11/13/2015 12:34:28 AM
Subject: RE: Portland Harbor -- Completing FS memo

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

From: Northridge, Michael
Sent: Thursday, November 12, 2015 3:58 PM
To: Cora, Lori <Cora.Lori@epa.gov>
Subject: RE: Portland Harbor -- Completing FS memo

Confidential and privileged

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Attorney Client / Ex. 5

Sorry, I'm off work tomorrow…

From: Cora, Lori
Sent: Thursday, November 12, 2015 5:57 PM
To: Ingemansen, Dean <Ingemansen.Dean@epa.gov>
Cc: Northridge, Michael <Northridge.Michael@epa.gov>
Subject: RE: Portland Harbor -- Completing FS memo

Attorney Client / Ex. 5

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
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P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

From: Ingemansen, Dean
Sent: Thursday, November 12, 2015 1:57 PM
To: Cora, Lori <Cora.Lori@epa.gov>
Cc: Northridge, Michael <Northridge.Michael@epa.gov>
Subject: RE: Portland Harbor -- Completing FS memo

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Lori and Mike,

Attorney Client / Ex. 5

Thanks!

-Dean

From: Cora, Lori
Sent: Monday, November 09, 2015 4:24 PM
To: Ingemansen, Dean <Ingemansen.Dean@epa.gov>
Subject: FW: Portland Harbor -- Completing FS memo

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
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P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

From: Northridge, Michael
Sent: Monday, November 09, 2015 2:29 PM
To: Cora, Lori <Cora.Lori@epa.gov>
Subject: RE: Portland Harbor -- Completing FS memo

Attorney Client / Ex. 5

From: Cora, Lori
Sent: Monday, November 09, 2015 12:14 PM
To: Northridge, Michael <Northridge.Michael@epa.gov>
Subject: Portland Harbor -- Completing FS memo

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

To: Ingemansen, Dean[Ingemansen.Dean@epa.gov]
Cc: Northridge, Michael[Northridge.Michael@epa.gov]
From: Cora, Lori
Sent: Thur 11/12/2015 11:20:27 PM
Subject: RE: Portland Harbor -- Completing FS memo
PH unilateral modification of FS-deans comments-11-12-15.docx

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
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P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

From: Ingemansen, Dean
Sent: Thursday, November 12, 2015 1:57 PM
To: Cora, Lori <Cora.Lori@epa.gov>
Cc: Northridge, Michael <Northridge.Michael@epa.gov>
Subject: RE: Portland Harbor -- Completing FS memo

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Lori and Mike,

Attorney Client / Ex. 5

Thanks!

-Dean

From: Cora, Lori
Sent: Monday, November 09, 2015 4:24 PM
To: Ingemansen, Dean <Ingemansen.Dean@epa.gov>
Subject: FW: Portland Harbor -- Completing FS memo

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
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P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Northridge, Michael
Sent: Monday, November 09, 2015 2:29 PM
To: Cora, Lori <Cora.Lori@epa.gov>
Subject: RE: Portland Harbor -- Completing FS memo

Attorney Client / Ex. 5

From: Cora, Lori
Sent: Monday, November 09, 2015 12:14 PM
To: Northridge, Michael <Northridge.Michael@epa.gov>
Subject: Portland Harbor -- Completing FS memo

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

To: Ingemansen, Dean[Ingemansen.Dean@epa.gov]
Cc: Northridge, Michael[Northridge.Michael@epa.gov]
From: Cora, Lori
Sent: Thur 11/12/2015 10:56:37 PM
Subject: RE: Portland Harbor -- Completing FS memo
2014-06-11 FS Revision Process Final.pdf
2014-12-17 PH FS Revision Process.pdf
2014-12-12 FS Revision Process Final Draft.docx

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Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
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From: Ingemansen, Dean
Sent: Thursday, November 12, 2015 1:57 PM
To: Cora, Lori <Cora.Lori@epa.gov>
Cc: Northridge, Michael <Northridge.Michael@epa.gov>
Subject: RE: Portland Harbor -- Completing FS memo

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Lori and Mike,

Attorney Client / Ex. 5

Thanks!

-Dean

From: Cora, Lori
Sent: Monday, November 09, 2015 4:24 PM
To: Ingemansen, Dean <Ingemansen.Dean@epa.gov>
Subject: FW: Portland Harbor -- Completing FS memo

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
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P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

From: Northridge, Michael
Sent: Monday, November 09, 2015 2:29 PM
To: Cora, Lori <Cora.Lori@epa.gov>
Subject: RE: Portland Harbor -- Completing FS memo

Attorney Client / Ex. 5

From: Cora, Lori
Sent: Monday, November 09, 2015 12:14 PM
To: Northridge, Michael <Northridge.Michael@epa.gov>
Subject: Portland Harbor -- Completing FS memo

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

To: Ingemansen, Dean[Ingemansen.Dean@epa.gov]
From: Cora, Lori
Sent: Thur 11/5/2015 7:32:49 PM
Subject: RE: ATTORNEY CLIENT PRIVILEGE Portland Harbor revised ARARs chart

I did not get anything directly from them, the RPM, Kristine Koch, told me and Cami that HQ had no more comments in an email dated July 20th.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

From: Ingemansen, Dean
Sent: Thursday, November 05, 2015 11:11 AM
To: Cora, Lori <Cora.Lori@epa.gov>
Subject: RE: ATTORNEY CLIENT PRIVILEGE Portland Harbor revised ARARs chart

What reply did you get back from Robin or Silvina to your email?

-Dean

From: Cora, Lori
Sent: Wednesday, November 04, 2015 4:20 PM
To: Ingemansen, Dean <Ingemansen.Dean@epa.gov>
Subject: FW: ATTORNEY CLIENT PRIVILEGE Portland Harbor revised ARARs chart

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel

U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

From: Cora, Lori
Sent: Monday, July 13, 2015 12:00 PM
To: Anderson, RobinM <Anderson.RobinM@epa.gov>; Fonseca, Silvina <Fonseca.Silvina@epa.gov>
Cc: Koch, Kristine <Koch.Kristine@epa.gov>; Sheldrake, Sean <sheldrake.sean@epa.gov>; Zhen, Davis <Zhen.Davis@epa.gov>; Grandinetti, Cami <Grandinetti.Cami@epa.gov>; Ingemansen, Dean <Ingemansen.Dean@epa.gov>
Subject: ATTORNEY CLIENT PRIVILEGE Portland Harbor revised ARARs chart

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P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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To: Sheldrake, Sean[sheldrake.sean@epa.gov]
From: Cora, Lori
Sent: Thur 11/5/2015 12:42:03 AM
Subject: RE: Early action incorporation into harborwide remedy

See suggested changes below

Lori Houck Cora | Assistant Regional Counsel
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P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Sheldrake, Sean
Sent: Wednesday, November 04, 2015 12:44 PM
To: Cora, Lori <Cora.Lori@epa.gov>
Subject: Early action incorporation into harborwide remedy

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Attorney Client / Ex. 5

Attorney Client / Ex. 5

Attorney Client / Ex. 5

Sean Sheldrake, Unit Diving Officer, RPM

EPA Region 10, 1200 Sixth Ave., Suite 900; Mailstop DOC-01

Seattle, WA 98101

206.553.1220 desk

206.225.6528 cell

http://yosemite.epa.gov/r10/cleanup.nsf/sites/ptldharbor

http://www.epa.gov/region10/dive/

206.553.6379 Dive Operations Center

206.369.7500 Dive Unit cell

Like us on Facebook! https://www.facebook.com/EPADivers

To: Ingemansen, Dean[Ingemansen.Dean@epa.gov]
From: Cora, Lori
Sent: Thur 11/5/2015 12:19:34 AM
Subject: FW: ATTORNEY CLIENT PRIVILEGE Portland Harbor revised ARARs chart
Copy of 2015-07-13 Draft Final Tables 2 1-1 through 2 1-3 ARARs.xlsx

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
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P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

From: Cora, Lori
Sent: Monday, July 13, 2015 12:00 PM
To: Anderson, RobinM <Anderson.RobinM@epa.gov>; Fonseca, Silvina <Fonseca.Silvina@epa.gov>
Cc: Koch, Kristine <Koch.Kristine@epa.gov>; Sheldrake, Sean <sheldrake.sean@epa.gov>; Zhen, Davis <Zhen.Davis@epa.gov>; Grandinetti, Cami <Grandinetti.Cami@epa.gov>; Ingemansen, Dean <Ingemansen.Dean@epa.gov>
Subject: ATTORNEY CLIENT PRIVILEGE Portland Harbor revised ARARs chart

Attorney Client / Ex. 5

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

To: Bartus, Dave[Bartus.Dave@epa.gov]
Cc: Koch, Kristine[Koch.Kristine@epa.gov]
From: Cora, Lori
Sent: Thur 10/29/2015 5:47:44 PM
Subject: FW: Latest version of disposal decision tree? Can someone send to me before call today? Thanks
NEW Fig3-03-40_Sediment Management and Disposal Decision Tree.pdf

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

From: Koch, Kristine
Sent: Thursday, October 29, 2015 10:27 AM
To: Cora, Lori <Cora.Lori@epa.gov>; Fonseca, Silvina <Fonseca.Silvina@epa.gov>
Cc: Anderson, RobinM <Anderson.RobinM@epa.gov>
Subject: RE: Latest version of disposal decision tree? Can someone send to me before call today? Thanks

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
Region 10
1200 Sixth Avenue, Suite 900, M/S ECL-122
Seattle, Washington 98101-3140

(206)553-6705
(206)553-8581 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: Cora, Lori
Sent: Thursday, October 29, 2015 10:25 AM
To: Fonseca, Silvina <Fonseca.Silvina@epa.gov>; Koch, Kristine <Koch.Kristine@epa.gov>
Subject: Latest version of disposal decision tree? Can someone send to me before call today? Thanks

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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To: Northridge, Michael[Northridge.Michael@epa.gov]
From: Cora, Lori
Sent: Tue 10/27/2015 10:52:38 PM
Subject: RE: Draft memo re: taking over the FS at Portland Harbor

Attorney Client / Ex. 5

Lori Houck Cora | **Assistant Regional Counsel**
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

From: Northridge, Michael
Sent: Monday, October 26, 2015 3:06 PM
To: Cora, Lori
Subject: RE: Draft memo re: taking over the FS at Portland Harbor

See attached. I didn't get too much farther with this today (just polishing a lot of the language (---feel free to reject) and not really anything substantive). Will try again tomorrow. Gotta head home now…

From: Cora, Lori
Sent: Wednesday, October 21, 2015 7:37 PM
To: Northridge, Michael <Northridge.Michael@epa.gov>
Cc: Ingemansen, Dean <Ingemansen.Dean@epa.gov>
Subject: Draft memo re: taking over the FS at Portland Harbor

Attorney Client / Ex. 5

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

To: 'Northridge, Michael'[Northridge.Michael@epa.gov]
Cc: 'Ingemansen, Dean'[Ingemansen.Dean@epa.gov]
From: Cora, Lori
Sent: Wed 10/21/2015 11:37:16 PM
Subject: Draft memo re: taking over the FS at Portland Harbor
Legal QUESTIONs memo 102115.docx

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

To: Legare, Amy[Legare.Amy@epa.gov]; Grandinetti, Cami[Grandinetti.Cami@epa.gov]; Koch, Kristine[Koch.Kristine@epa.gov]
From: Cora, Lori
Sent: Tue 10/20/2015 4:02:26 PM
Subject: RE: Input for the National Remedy Review Board Meeting on the PHSS

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

From: Legare, Amy
Sent: Tuesday, October 20, 2015 8:47 AM
To: Grandinetti, Cami; Koch, Kristine; Cora, Lori
Subject: RE: Input for the National Remedy Review Board Meeting on the PHSS

Attorney Client / Ex. 5

From: Grandinetti, Cami
Sent: Monday, October 19, 2015 7:00 PM
To: Koch, Kristine <Koch.Kristine@epa.gov>; Cora, Lori <Cora.Lori@epa.gov>; Legare, Amy <Legare.Amy@epa.gov>
Subject: RE: Input for the National Remedy Review Board Meeting on the PHSS

Attorney Client / Ex. 5

Cami Grandinetti

Program Manager, Remedial Cleanup Program

USEPA

1200 6th Ave, Suite 900

ECL-123

Seattle, Wa. 98101

206-553-8696 (desk)

206-390-8890 (cell)

206-553-0124 (fax)

From: Koch, Kristine
Sent: Monday, October 19, 2015 3:47 PM
To: Grandinetti, Cami <Grandinetti.Cami@epa.gov>; Cora, Lori <Cora.Lori@epa.gov>; Legare, Amy <Legare.Amy@epa.gov>
Subject: FW: Input for the National Remedy Review Board Meeting on the PHSS

So what should I do with these?

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
Region 10
1200 Sixth Avenue, Suite 900, M/S ECL-122

Seattle, Washington 98101-3140

(206)553-6705
(206)553-8581 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: Wetzsteon, Jackie [mailto:Jackie.Wetzsteon@pacificorp.com]
Sent: Monday, October 19, 2015 3:25 PM
To: Koch, Kristine
Cc: Sheldrake, Sean; Legare, Amy; 'Betz, Jan'; 'Bryan Wigginton'; Dave Livesay; 'Denis Roznowski; Erin Carroll Hughes; 'Ford, Bill (LG)'; 'Groy, Jeff'; Harse, Grant A. (LG); 'Jeff Dresser'; 'Kathryn R. Huibregtse; 'Kim.Cox@portlandoregon.gov'; 'KIRK.WILKINSON@lw.com'; 'Klinger, Nanci'; Libby Smith; 'Matt Wells'; mhahn@environcorp.com; 'Michelle Rosenthal'; Paul Fuglevand; 'Rick Ernst'; 'Russ P Cepko; 'Sanders, Dawn'; Till, Dustin; Wiencke, Mary; 'Alex Liverman; Allen, Elizabeth; 'Audie Huber; Bob Dexter; brandy.humphreys@grandronde.org; 'Brian Cunninghame; 'callie@ridolfi.com'; Conley, Alanna; Cora, Lori; courtney@crag.org; 'Dan Hafley; 'Dana Bayuk; Eric Blischke; 'Gail Fricano; 'Genevieve Angle; Holly Partridge; 'JD Williams; 'Jen Kassakian; 'Jeremy_Buck@fws.gov'; 'Julie Weis; 'Keith Johnson; Koch, Kristine; 'Kristin Callahan'; 'Lance Peterson; 'Matt Johnson; 'Matt McClincy; 'Michael.karnosh@grandronde.org'; nancy.munn@noaa.gov; 'peterson.Jennifer@deq.state.or.us'; 'poulsen.mike@deq.state.or.us'; 'Rachel DelVecchio; 'Robert.Neely@noaa.gov'; 'rose@yakamafish-nsn.gov'; 'schwarz.bob@deq.state.or.us'; 'Ted Buerger; 'tomd@ctsi.nsn.us'; 'tosm@yakamafish-nsn.gov'
Subject: Input for the National Remedy Review Board Meeting on the PHSS

Ms. Koch,

The RM11E Group has prepared the attached technical comments for the National Remedy Review Board's consideration at its upcoming meeting to discuss the conceptual remedy for the Portland Harbor Superfund Site.

Thank you in advance for sharing these comments with the NRRB. The RM11E group is prepared to discuss our comments and to provide any additional information that would be helpful to EPA or the NRRB in its review of the Portland Harbor remedy.

Sincerely,

Jackie Wetzsteon

RM11E Project Coordinator

Jackie Wetzsteon

PacifiCorp

Strategic Policy and Environment

825 NE Multnomah, LCT 1500

Portland, OR 97232

(503) 813 5036 (work)

(503) 961 3955 (cell)

To: Koch, Kristine[Koch.Kristine@epa.gov]
From: Cora, Lori
Sent: Mon 10/19/2015 6:14:36 PM
Subject: RE: ph decision tree ATTORNEY CLIENT PRIVILEGE

Hi, Kristine. Are you looking for comments? If so, do you have this in word or something I can edit?

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Koch, Kristine
Sent: Monday, October 19, 2015 11:02 AM
To: Cora, Lori; Allen, Elizabeth; Anderson, RobinM; Legare, Amy; Fonseca, Silvina; Ells, Steve; Charters, David; Christopher, Anne
Subject: FW: ph decision tree ATTORNEY CLIENT PRIVILEGE

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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Seattle, Washington 98101-3140

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(206)553-8581 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: Coffey, Scott [mailto:CoffeySE@cdmsmith.com]
Sent: Monday, October 19, 2015 10:35 AM
To: Koch, Kristine; Allen, Elizabeth

Cc: Chan, Arthur; Blischke, Eric; Foster, Malena L.; Jones, Jennifer M.
Subject: FW: ph decision tree ATTORNEY CLIENT PRIVILEGE

Here is the latest Disposal Decision Tree with Amy's comments incorporated.

From: Foster, Malena L.
Sent: Monday, October 19, 2015 10:15 AM
To: Blischke, Eric <blischkee@cdmsmith.com>; Coffey, Scott <CoffeySE@cdmsmith.com>
Cc: Sayler, Cheryl Ann <saylerc@cdmsmith.com>; Hazen, Gary <HazenGL@cdmsmith.com>; Jones, Jennifer M. <JonesJM@cdmsmith.com>
Subject: RE: ph decision tree ATTORNEY CLIENT PRIVILEGE

Here's the latest version with the edits.

Malena

From: Blischke, Eric
Sent: Monday, October 19, 2015 9:57 AM
To: Foster, Malena L. <fosterml@cdmsmith.com>
Subject: RE: ph decision tree ATTORNEY CLIENT PRIVILEGE

I made a few revisions to footnotes 1 and 4 as highlighted in purple. Please incorporate these into your version and then we should be good to go.

Thanks, Eric

From: Foster, Malena L.
Sent: Monday, October 19, 2015 10:40 AM
To: Blischke, Eric <blischkee@cdmsmith.com>
Cc: Coffey, Scott <CoffeySE@cdmsmith.com>
Subject: RE: ph decision tree ATTORNEY CLIENT PRIVILEGE

Hi Eric,

Attached are the changes we discussed. Let me know if everything works okay.

Scott, Eric will review and then send on to the group.

Thanks,

Malena

From: Blischke, Eric
Sent: Monday, October 19, 2015 6:06 AM
To: Foster, Malena L. <fosterml@cdmsmith.com>; Coffey, Scott <CoffeySE@cdmsmith.com>; Jones, Jennifer M. <JonesJM@cdmsmith.com>
Cc: Hazen, Gary <HazenGL@cdmsmith.com>; Sayler, Cheryl Ann <saylerc@cdmsmith.com>
Subject: RE: ph decision tree ATTORNEY CLIENT PRIVILEGE

Attorney Client / Ex. 5

Eric

From: Foster, Malena L.
Sent: Monday, October 19, 2015 2:15 AM
To: Blischke, Eric <blischkee@cdmsmith.com>; Coffey, Scott <CoffeySE@cdmsmith.com>; Jones, Jennifer M. <JonesJM@cdmsmith.com>
Cc: Hazen, Gary <HazenGL@cdmsmith.com>; Sayler, Cheryl Ann <saylerc@cdmsmith.com>
Subject: RE: ph decision tree ATTORNEY CLIENT PRIVILEGE

I will have to talk to Eric on Monday about the latest changes.

Malena

From: Blischke, Eric
Sent: Sunday, October 18, 2015 9:16 AM
To: Coffey, Scott <CoffeySE@cdmsmith.com>; Foster, Malena L. <fosterml@cdmsmith.com>; Jones, Jennifer M. <JonesJM@cdmsmith.com>
Cc: Hazen, Gary <HazenGL@cdmsmith.com>; Sayler, Cheryl Ann <saylerc@cdmsmith.com>
Subject: RE: ph decision tree ATTORNEY CLIENT PRIVILEGE

Hi Scott. Here are my thoughts on Lori's comments in Red Text. Malena, can you make these revisions? I do not think that I can edit this effectively in Blue Beam. Proposed text revisions are garishly highlighted in blue.

Thanks, Eric

From: Coffey, Scott
Sent: Friday, October 16, 2015 7:50 PM
To: Blischke, Eric <blischkee@cdmsmith.com>; Foster, Malena L. <fosterml@cdmsmith.com>; Jones, Jennifer M. <JonesJM@cdmsmith.com>
Subject: Fwd: ph decision tree ATTORNEY CLIENT PRIVILEGE

Sorry. I just got through all of the email that came in while I was in my meeting. Kristine didn't Ccussations Jennifer on this email. Attached are Lori Cora's comments. Not sure if this changes much from what was sent. Her commments start with a lot of "agreed" statements.

Sent via the Samsung Galaxy S™ III, an AT&T 4G LTE smartphone

-------- Original message --------

From: "Koch, Kristine"

Date:10/16/2015 2:59 PM (GMT-08:00)

To: "Coffey, Scott"

Subject: FW: ph decision tree ATTORNEY CLIENT PRIVILEGE

Here are Lori's comments on Robins comments. I have not heard from CDM on this or water. I'm leaving shortly and will not be back on-line until Sunday. I was hoping to get these from you before I quit working today in case I have any questions. I guess that won't be happening. Please sent the information ASAP. I will be working on this tonight and tomorrow, but will not be connected.

Thanks,

Kristine Koch
Remedial Project Manager

USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
Region 10
1200 Sixth Avenue, Suite 900, M/S ECL-122
Seattle, Washington 98101-3140

(206)553-6705
(206)553-8581 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: Cora, Lori
Sent: Friday, October 16, 2015 2:51 PM
To: Anderson, RobinM; Koch, Kristine; Allen, Elizabeth; Fonseca, Silvina; Legare, Amy; Sheldrake, Sean; Christopher, Anne; Ells, Steve; Charters, David
Subject: RE: ph decision tree ATTORNEY CLIENT PRIVILEGE

See my comments below.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Anderson, RobinM
Sent: Friday, October 16, 2015 9:09 AM
To: Koch, Kristine; Allen, Elizabeth; Fonseca, Silvina; Legare, Amy; Cora, Lori; Sheldrake, Sean; Christopher, Anne; Ells, Steve; Charters, David
Subject: FW: ph decision tree

Thank you for the opportunity to review the draft Sediment Soil Disposal Decision Tree. My comments are in pen on the chart itself. Since so much of this (at least half is regulatory) I am interested in hearing Lori's take as well.

Comments

Attorney Client / Ex. 5

This comment has been addressed through new Footnote 1.

Attorney Client / Ex. 5

Attorney Client / Ex. 5

Attorney Client / Ex. 5

Attorney Client / Ex. 5

To: Koch, Kristine[Koch.Kristine@epa.gov]
From: Cora, Lori
Sent: Fri 10/9/2015 4:38:28 PM
Subject: RE: City of Portland comments on Draft FS

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Koch, Kristine
Sent: Friday, October 09, 2015 7:57 AM
To: Cora, Lori
Subject: FW: City of Portland comments on Draft FS

Hmmm….why are we getting comments from individual parties of the LWG?

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
Region 10
1200 Sixth Avenue, Suite 900, M/S ECL-122
Seattle, Washington 98101-3140

(206)553-6705
(206)553-8581 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: Von Burg, Annie [mailto:Annie.VonBurg@portlandoregon.gov]
Sent: Thursday, October 08, 2015 5:03 PM
To: Koch, Kristine
Cc: Grandinetti, Cami; Cox, Kim (Environmental Services)
Subject: City of Portland comments on Draft FS

Hello Kristine,

Attached is the City of Portland's comments on the Draft FS. Please feel free to contact me if you have any questions.

Sincerely,

Annie

Annie Von Burg

City of Portland, Bureau of Environmental Services

888 SW 5th Avenue, Suite 400

Portland, Oregon 97204

Ph: (503) 823-7859 | Fax: (503) 823-5228

Email: Annie.VonBurg@portlandoregon.gov

To: Openchowski, Charles[openchowski.charles@epa.gov]
Cc: Ingemansen, Dean[Ingemansen.Dean@epa.gov]
From: Cora, Lori
Sent: Tue 10/6/2015 10:20:27 PM
Subject: Summary of October 1 telephone conference -- Attorney Client Privilege
Summary of Oct1 call-als edits-10-2-2015.docx

Hi, Charles. Cami Grandinetti asked Dean and I to write up the major advice that was discussed in our TC on October 1. Attached is my draft. I would like to confirm with you that I got each

Attorney Client / Ex. 5

Our RA is interested in having a meeting with congressional members to explain our RI/FS and we anticipate a meeting will occur in the next week or two.

We would appreciate your input on this draft as soon as you can get to it. Let me know if you want to have a call to provide your feedback. Thanks.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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To: Ingemansen, Dean[Ingemansen.Dean@epa.gov]
From: Cora, Lori
Sent: Tue 10/6/2015 7:06:59 PM
Subject: RE: Portland Harbor

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Ingemansen, Dean
Sent: Tuesday, October 06, 2015 10:51 AM
To: Cora, Lori
Subject: RE: Portland Harbor

Yes I did. I forgot to send it last Friday. Here it is.

-Dean

From: Cora, Lori
Sent: Monday, October 05, 2015 4:19 PM
To: Ingemansen, Dean
Subject: FW: Portland Harbor

FYI. Stakeholder meetings with DC folks and we hope they include the Region are being requested. I would like to get the summary of last Thursday's call with OGC out to Jim Woolford and Cami/Dennis. Have you had a chance to look at my draft? Thanks.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Woolford, James
Sent: Monday, October 05, 2015 2:43 PM
To: Cora, Lori
Subject: FW: Portland Harbor

The incoming

Jim Woolford, Director

Office of Superfund Remediation and Technology Innovation

Office of Solid Waste and Emergency Response

US Environmental Protection Agency

1200 Penn. Ave., NW

Washington, DC 20460

(Mail Code 5201-P)

Phone: (703) 603 8960– Main Office Line

Physically located at:

Room 5622

One Potomac Yard (South)
2777 S. Crystal Dr.
Arlington, VA 22202

From: Marianne Horinko [mailto:mhorinko@thehorinkogroup.org]
Sent: Monday, October 05, 2015 11:27 AM
To: Meiburg, Stan
Cc: Elliott Laws; Jessica Hamilton; Margaret Kirkpatrick; Justin Oberst; Woolford, James; Stanislaus, Mathy; Breen, Barry
Subject: Portland Harbor

Stan,

Several members of the Lower Willamette Group, the Port of Portland and Northwest Natural, will be in D.C. the week of October 19 and would like to sit down with you and your colleagues in OSWER to discuss some of the issues raised by the draft Feasibility Study at the Portland Harbor Superfund site. Some of the issues include the relationship of the proposed Remedial Action Levels (RALs) to risk; the treatment of Principal Threat Waste (PTW); and the assumptions with respect to production rates.

I am copying my colleague Justin Oberst, who can coordinate with your scheduler.

Many thanks in advance for this opportunity.

Kind regards,

Marianne

****

Marianne L. Horinko
President
The Horinko Group
1001 Pennsylvania Ave. NW Suite 7105
Washington, DC 20004
Tel: 202-955-6202
Fax: 202-955-6207
www.thehorinkogroup.org

To: Dowton, David[Dowton.David@epa.gov]
From: Cora, Lori
Sent: Thur 10/1/2015 4:48:56 PM
Subject: RE: Portland Harbor Superfund Site; Congressional inquiries/involvement ATTORNEY CLIENT PRIVILEGE

Personal Privacy / Ex. 6

I'm getting concerned we may have too many people calling in than can use this line. If there others in OSRE could you all use one line? or if you can go to OGC's offices that would be good. Thanks.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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---

From: Dowton, David
Sent: Thursday, October 01, 2015 9:46 AM
To: Cora, Lori
Subject: RE: Portland Harbor Superfund Site; Congressional inquiries/involvement ATTORNEY CLIENT PRIVILEGE

Lori, is there a call-in number? Thanks.

-----Original Appointment-----
From: Cora, Lori
Sent: Wednesday, September 30, 2015 3:08 PM
To: Cora, Lori; Dowton, David; Michaud, John; Salo, Earl; Openchowski, Charles; Ingemansen, Dean; Zhen, Davis; Grandinetti, Cami; McLerran, Dennis; Stalcup, Dana; Woolford, James; Northridge, Michael
Cc: Robinson, Deborah; Dunbar, Bill
Subject: FW: Portland Harbor Superfund Site; Congressional inquiries/involvement ATTORNEY CLIENT PRIVILEGE
When: Thursday, October 01, 2015 10:00 AM-11:00 AM (UTC-08:00) Pacific Time (US & Canada).
Where: R10Sea-Room-11Camas-ORC-VTC/R10-Rooms-Restricted

David,

Ken Patterson just directed that you should participate in this call, and he asked me to forward the call-invitation to you.

-----Original Appointment-----
From: Cora, Lori
Sent: Monday, September 28, 2015 12:34 PM
To: Cora, Lori; Michaud, John; Salo, Earl; Openchowski, Charles; Ingemansen, Dean; Zhen, Davis; Grandinetti, Cami; McLerran, Dennis; Stalcup, Dana; Woolford, James; Northridge, Michael
Cc: Robinson, Deborah; Dunbar, Bill
Subject: Portland Harbor Superfund Site; Congressional inquiries/involvement ATTORNEY CLIENT PRIVILEGE
When: Thursday, October 01, 2015 10:00 AM-11:00 AM (UTC-08:00) Pacific Time (US & Canada).
Where: R10Sea-Room-11Camas-ORC-VTC/R10-Rooms-Restricted

For Region 10 Folks: we have reserved the Camas Meeting Room on the 11th floor for the conversation.

Attorney Client / Ex. 5

To: Grandinetti, Cami[Grandinetti.Cami@epa.gov]; Legare, Amy[Legare.Amy@epa.gov]; Fonseca, Silvina[Fonseca.Silvina@epa.gov]
Cc: Koch, Kristine[Koch.Kristine@epa.gov]
From: Cora, Lori
Sent: Wed 8/12/2015 4:47:00 PM
Subject: RE: PCI group presentation

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Grandinetti, Cami
Sent: Wednesday, August 12, 2015 9:27 AM
To: Cora, Lori; Legare, Amy; Fonseca, Silvina
Cc: Koch, Kristine
Subject: RE: PCI group presentation

Attorney Client / Ex. 5

Cami Grandinetti

Program Manager, Remedial Cleanup Program

USEPA

1200 6th Ave, Suite 900

ECL-113

Seattle, Wa. 98101

206-553-8696 (desk)

206-390-8890 (cell)

206-553-0124 (fax)

From: Cora, Lori
Sent: Wednesday, August 12, 2015 8:29 AM
To: Grandinetti, Cami; Legare, Amy; Fonseca, Silvina
Cc: Koch, Kristine
Subject: FW: PCI group presentation

Attorney Client / Ex. 5

Lori Houck Cora | **Assistant Regional Counsel**
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

From: White, Bruce [mailto:Bruce.White@btlaw.com]
Sent: Wednesday, August 12, 2015 7:18 AM
To: Cora, Lori
Cc: Koch, Kristine; Klinger, Nanci
Subject: RE: PCI group presentation

Lori

Thanks for your response below.

The PCI Group would prefer an earlier in person presentation because either the group or members of the group, not affiliated with the LWG, intend to file comments with the Remedy Review Board. Group members have advised that they would very much appreciate such a presentation from EPA, as soon as possible after Ch 4 of the FS is issued, and preferably before the Labor Day weekend.

Additionally, from a larger perspective, as the site moves toward a proposed plan and a ROD, we believe that insofar as the US will be looking to the members of the PCI Group for an agreement, EPA needs to engage and keep the larger Group informed on a timely basis.

We look forward to receiving some earlier suggested dates.

Thanks,

Bruce White

312-214-4584 (DD)

Personal Privacy / Ex. 6

From: Cora, Lori [mailto:Cora.Lori@epa.gov]
Sent: Tuesday, August 11, 2015 1:22 PM
To: White, Bruce
Cc: Koch, Kristine; Klinger, Nanci
Subject: RE: PCI group presentation

Hello, Bruce. I've checked in with Kristine. We would like to propose a webinair format for the presentation. A webinair eliminates the need to travel which should help maximize participation by the PCI members and reduces the resources and time for everyone. The dates Kristine and I are available are September 22, 24, and September 29. Let us know which of those dates work

for the group. Thanks.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: White, Bruce [mailto:Bruce.White@btlaw.com]
Sent: Monday, August 10, 2015 12:20 PM
To: Cora, Lori
Cc: Koch, Kristine; Klinger, Nanci
Subject: RE: PCI group presentation

Lori

In an effort to do some PCI Group planning we would greatly appreciate your providing, before our 8/13 meeting, some dates in the near future when EPA would be available to make a presentation to the PCI Group.

We would like to lock in one of those dates when we have group together this week.

Thanks,

Bruce White

312-214-4584 (DD)

Personal Privacy / Ex. 6

From: White, Bruce
Sent: Wednesday, August 05, 2015 4:50 PM
To: Cora, Lori
Cc: Koch, Kristine; Klinger, Nanci
Subject: Re: PCI group presentation

Lori

Thanks for getting back so quickly.

If your schedules happen to change between now and then, please let us know - we can be flexible.

Bruce White

312.214.4584 (W)

Personal Privacy / Ex. 6

On Aug 5, 2015, at 4:45 PM, Cora, Lori <Cora.Lori@epa.gov> wrote:

Hello, Bruce. Unfortunately, Kristine and I both are not available for meeting with the PCI group on the 13th. We will be in touch about a proposed time and process by which we can present the draft FS to the PCI group sometime in the future.

Lori Houck Cora | **Assistant Regional Counsel**
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

From: White, Bruce [mailto:Bruce.White@btlaw.com]
Sent: Wednesday, August 05, 2015 2:00 PM
To: Cora, Lori
Cc: Koch, Kristine; Klinger, Nanci
Subject: Re: PCI group presentation

Lori

Just wanted to follow up to see if there was any way possible that you and Kristine might be able to open up your schedule to be available on the 13th; or, alternatively, if Kristine could make it, perhaps another of EPA's regional counsel might accompany here.

This in person meeting has been scheduled for some time, and is likely to be the only such meeting through year-end at which more than 100 party representatives will be together in the same room in Portland. We believe that the timing of this in person meeting, with chapters 2 and 3 of the FS having recently been distributed by EPA, offers a particularly good opportunity for the Agency to connect with the PCI Group.

We can include such a presentation most any time that day, though earlier would be preferable if that works for EPA.

We greatly appreciate EPA's further consideration of this request.

Thanks,

Bruce White

312.214.4584 (W)

Personal Privacy / Ex. 6

On Aug 3, 2015, at 7:36 PM, Klinger, Nanci <Nanci.Klinger@portlandoregon.gov> wrote:

> Lori,
>
> Thank you very much. I have included Bruce and he can work with you to coordinate with the Group.
>
> Nanci

Nanci Klinger

Deputy City Attorney

Phone 503.823.3022

This email contains confidential and privileged information. If you receive this message in error, please notify me and delete all versions of the email.

From: Cora, Lori [mailto:Cora.Lori@epa.gov]
Sent: Monday, August 03, 2015 3:42 PM
To: Klinger, Nanci
Cc: Koch, Kristine
Subject: RE: PCI group presentation

Hello, Nancy. We can provide a presentation to the PCI group but neither Kristine nor I are available on August 13th. We are also going to think about how it could be done most efficiently. We will be back with you to schedule a day and time but it likely will not be until later in August or September.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Klinger, Nanci [mailto:Nanci.Klinger@portlandoregon.gov]
Sent: Monday, August 03, 2015 10:35 AM
To: Cora, Lori
Subject: RE: PCI group presentation

Hi Lori,

Yes, I think there is value in the PCI Group understanding EPA's approach to the site as early as possible.

The allocation process is proceeding simultaneously with the EPA administrative process. The FS plays a critical role in helping the PCI Group determine how to apply its allocation process to specific areas (e.g. the new draft FS has changes to SMA, SDUs cost assumptions, etc). The FS draft described on Friday has implications for the Group's approach to advocacy. The Group needs to understand how the decision trees and scoring matrices developed by EPA may operate in the selection of a remedy so that the Group can get its process to match-up with the requirements of the ROD. There are many steps to developing an allocation process that all the participating parties can agree to and so the Group has been and is working on that process now. The draft FS structure influences our process and our process needs time to incorporate those changes. We understand that it is early and it is a draft, but I think this will keep the allocation process moving forward effectively.

I would be happy to talk and am around the office most of the day.

Nanci Klinger

Deputy City Attorney

Phone 503.823.3022

This email contains confidential and privileged information. If you receive this message in error, please notify me and delete all versions of the email.

From: Cora, Lori [mailto:Cora.Lori@epa.gov]
Sent: Monday, August 03, 2015 9:35 AM
To: Klinger, Nanci
Cc: Koch, Kristine
Subject: PCI group presentation

Hello, Nanci. Kristine informs me that you would like Kristine to present Chapters 3 and 4 to the PCI group. In thinking about what the appropriate time for outreach to the PCI might be, we would like to understand the allocation process better. Is the allocation process proceeding based on EPA's draft FS modifications that we are providing to the LWG for comment or will it be based on the final FS? Or might the allocation even wait for the ROD? Thanks for your attention to this request.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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To: Grandinetti, Cami[Grandinetti.Cami@epa.gov]; Legare, Amy[Legare.Amy@epa.gov]; Fonseca, Silvina[Fonseca.Silvina@epa.gov]
Cc: Koch, Kristine[Koch.Kristine@epa.gov]
From: Cora, Lori
Sent: Wed 8/12/2015 3:28:46 PM
Subject: FW: PCI group presentation

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: White, Bruce [mailto:Bruce.White@btlaw.com]
Sent: Wednesday, August 12, 2015 7:18 AM
To: Cora, Lori
Cc: Koch, Kristine; Klinger, Nanci
Subject: RE: PCI group presentation

Lori

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The PCI Group would prefer an earlier in person presentation because either the group or members of the group, not affiliated with the LWG, intend to file comments with the Remedy Review Board. Group members have advised that they would very much appreciate such a presentation from EPA, as soon as possible after Ch 4 of the FS is issued, and preferably before the Labor Day weekend.

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We look forward to receiving some earlier suggested dates.

Thanks,

Bruce White

312-214-4584 (DD)

Personal Privacy / Ex. 6

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To: White, Bruce
Cc: Koch, Kristine; Klinger, Nanci
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Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

From: White, Bruce [mailto:Bruce.White@btlaw.com]
Sent: Monday, August 10, 2015 12:20 PM

To: Cora, Lori
Cc: Koch, Kristine; Klinger, Nanci
Subject: RE: PCI group presentation

Lori

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Thanks,

Bruce White

312-214-4584 (DD)

Personal Privacy / Ex. 6

From: White, Bruce
Sent: Wednesday, August 05, 2015 4:50 PM
To: Cora, Lori
Cc: Koch, Kristine; Klinger, Nanci
Subject: Re: PCI group presentation

Lori

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Bruce White

312.214.4584 (W)

Personal Privacy / Ex. 6

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Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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Cc: Koch, Kristine; Klinger, Nanci
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Bruce White

312.214.4584 (W)

Personal Privacy / Ex. 6

On Aug 3, 2015, at 7:36 PM, Klinger, Nanci <Nanci.Klinger@portlandoregon.gov> wrote:

Lori,

Thank you very much. I have included Bruce and he can work with you to coordinate with the Group.

Nanci

Nanci Klinger

Deputy City Attorney

Phone 503.823.3022

This email contains confidential and privileged information. If you receive this message in error, please notify me and delete all versions of the email.

From: Cora, Lori [mailto:Cora.Lori@epa.gov]
Sent: Monday, August 03, 2015 3:42 PM
To: Klinger, Nanci
Cc: Koch, Kristine
Subject: RE: PCI group presentation

Hello, Nancy. We can provide a presentation to the PCI group but neither Kristine nor I are available on August 13th. We are also going to think about how it could be done most efficiently. We will be back with you to schedule a day and time but it likely will not be until later in August or September.

Lori Houck Cora | **Assistant Regional Counsel**
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Klinger, Nanci [mailto:Nanci.Klinger@portlandoregon.gov]
Sent: Monday, August 03, 2015 10:35 AM
To: Cora, Lori
Subject: RE: PCI group presentation

Hi Lori,

Yes, I think there is value in the PCI Group understanding EPA's approach to the site as early as possible.

The allocation process is proceeding simultaneously with the EPA administrative process. The FS plays a critical role in helping the PCI Group determine how to apply its allocation process to specific areas (e.g. the new draft FS has changes to SMA, SDUs cost assumptions, etc). The FS draft described on Friday has implications for the Group's approach to advocacy. The Group needs to understand how the decision trees and scoring matrices developed by EPA may operate in the selection of a remedy so that the Group can get its process to match-up with the requirements of the ROD. There are many steps to developing an allocation process that all the participating parties can agree to and so the Group has been and is working on that process now.

The draft FS structure influences our process and our process needs time to incorporate those changes. We understand that it is early and it is a draft, but I think this will keep the allocation process moving forward effectively.

I would be happy to talk and am around the office most of the day.

Nanci Klinger

Deputy City Attorney

Phone 503.823.3022

This email contains confidential and privileged information. If you receive this message in error, please notify me and delete all versions of the email.

From: Cora, Lori [mailto:Cora.Lori@epa.gov]
Sent: Monday, August 03, 2015 9:35 AM
To: Klinger, Nanci
Cc: Koch, Kristine
Subject: PCI group presentation

Hello, Nanci. Kristine informs me that you would like Kristine to present Chapters 3 and 4 to the PCI group. In thinking about what the appropriate time for outreach to the PCI might be, we would like to understand the allocation process better. Is the allocation process proceeding based on EPA's draft FS modifications that we are providing to the LWG for comment or will it be based on the final FS? Or might the allocation even wait for the ROD? Thanks for your attention to this request.

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To: Robinson, Deborah[Robinson.Deborah@epa.gov]
From: Cora, Lori
Sent: Thur 8/6/2015 6:35:06 PM
Subject: RE: Agenda for 8/6/15 PH Executives Meeting

Yes, I would like to listen in to any debrief.

Lori Houck Cora | **Assistant Regional Counsel**
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Robinson, Deborah
Sent: Thursday, August 06, 2015 11:30 AM
To: Cora, Lori
Subject: RE: Agenda for 8/6/15 PH Executives Meeting

No costs. Dennis will talk some about assumptions. It is possible he will come back and debrief at a little after 12. I can open up a phone line if it happens. Let me know.

Personal Privacy / Ex. 6

Thanks,

Debbie

==========
From the Desk of:
Debbie Robinson
Tel: 206-553-4961
robinson.deborah@epa.gov

US EPA Region 10, M/S ECL 122, 1200 Sixth Avenue, Suite 900, Seattle, WA 98101

From: Cora, Lori
Sent: Thursday, August 06, 2015 9:25 AM
To: Robinson, Deborah
Subject: RE: Agenda for 8/6/15 PH Executives Meeting

Interesting

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Robinson, Deborah
Sent: Thursday, August 06, 2015 8:47 AM
To: Cora, Lori
Subject: RE: Agenda for 8/6/15 PH Executives Meeting

Yes, I did not have them as of the time I signed off last night. I am checking through emails now, hoping something is there, but Woolford has not received anything yet.

Thanks,

Debbie

==========
From the Desk of:
Debbie Robinson
Tel: 206-553-4961
robinson.deborah@epa.gov

US EPA Region 10, M/S ECL 122, 1200 Sixth Avenue, Suite 900, Seattle, WA 98101

From: Cora, Lori

Sent: Thursday, August 06, 2015 8:21 AM
To: Robinson, Deborah
Subject: RE: Agenda for 8/6/15 PH Executives Meeting

Hi, Debbie. I've not received the alternatives' cost estimates. I see Dennis is discussing today. Can you send them to me? Thanks.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Robinson, Deborah
Sent: Wednesday, August 05, 2015 5:23 PM
To: Tyler, Kendra; Magorrian, Matthew; Woolford, James; McLerran, Dennis; Kevin Parrett (parrett.kevin@deq.state.or.us); Kirkpatrick, Margaret; Hamilton, Jessica; Cox, Kim (BES)
Cc: Grandinetti, Cami; Zhen, Davis; Koch, Kristine; Christopher, Anne; DeMaria, Eva; Sheldrake, Sean; Conley, Alanna; Cora, Lori; Allen, Elizabeth; MacIntyre, Mark; Fonseca, Silvina; Legare, Amy; Holsman, Marianne; Stalcup, Dana; Ammon, Doug; Matt McClincy - ODEQ (mcclincy.matt@deq.state.or.us); Tom Roick - ODEQ (ROICK.Tom@deq.state.or.us); gilles.bruce@deq.state.or.us; Keith Johnson - ODEQ (johnson.keith@deq.state.or.us); Kirkpatrick, Margaret; Hamilton, Jessica; Jen Woronets; Dunbar, Bill
Subject: Agenda for 8/6/15 PH Executives Meeting

Attached is the revised agenda for the 8/6/15 Portland Harbor Executive Meeting.

If there are further changes tomorrow, I will send out another revision.

Thanks,

Debbie

==========
From the Desk of:
Debbie Robinson
Tel: 206-553-4961
robinson.deborah@epa.gov

US EPA Region 10, M/S ECL 122, 1200 Sixth Avenue, Suite 900, Seattle, WA 98101

To: Northridge, Michael[Northridge.Michael@epa.gov]
From: Cora, Lori
Sent: Mon 7/20/2015 5:53:55 PM
Subject: RE: reply -- DELIBERATIVE PROCESS
2015 July Portland Harbor Administrator briefing final.pptx

No bother. FYI. Here is a ppt presentation that will be presented to Administrator this Wednesday.

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Northridge, Michael
Sent: Monday, July 20, 2015 10:06 AM
To: Cora, Lori
Subject: reply

Okay, understood. Sorry to bother you with this. Many thanks… ;-)

From: Cora, Lori
Sent: Monday, July 20, 2015 12:36 PM
To: Northridge, Michael
Subject: FW: Can you send me the FS process document -- OSRE is asking for it

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Koch, Kristine
Sent: Friday, July 17, 2015 2:50 PM
To: Cora, Lori
Subject: RE: Can you send me the FS process document -- OSRE is asking for it

This one?

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
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1200 Sixth Avenue, Suite 900, M/S ECL-122
Seattle, Washington 98101-3140

(206)553-6705
(206)553-8581 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: Cora, Lori
Sent: Friday, July 17, 2015 2:25 PM
To: Koch, Kristine
Subject: Can you send me the FS process document -- OSRE is asking for it

I know its been overcome by events and our schedule, but OsRE is still curious.

Lori Houck Cora | Assistant Regional Counsel
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P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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To: Chu Rebecca[Chu.Rebecca@epa.gov]; Fullagar, Jill[Fullagar.Jill@epa.gov]
Cc: DeMaria, Eva[DeMaria.Eva@epa.gov]
From: Cora, Lori
Sent: Thur 7/9/2015 9:37:26 PM
Subject: RE: Follow Up Question for Portland Harbor Sediment Listing

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Chu Rebecca
Sent: Thursday, July 09, 2015 2:19 PM
To: Fullagar, Jill
Cc: DeMaria, Eva; Cora, Lori
Subject: Follow Up Question for Portland Harbor Sediment Listing

Hi Jill

Attorney Client / Ex. 5

Attorney Client / Ex. 5

Hopefully not muddying the waters too much here.

Becky

Rebecca Chu | Remedial Project Manager

United States Environmental Protection Agency

Region 10

1200 Sixth Ave Suite 900

ECL-122

Seattle, WA 98101

(206) 553-1774

Chu.Rebecca@epa.gov

To: 'Vrooman Gary L'[Gary.L.Vrooman@doj.state.or.us]
From: Cora, Lori
Sent: Mon 7/6/2015 3:15:40 PM
Subject: RE: Discussion on a couple ARARs requested

Thanks, Gary. How about 2:30 p.m. today? I can call you. I would appreciate it if you could get a water attorney to look at my second question and either email me the answer or call me to discuss. As usual I need this advice yesterday ☺ Thanks.

Lori Houck Cora | Assistant Regional Counsel
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P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Vrooman Gary L [mailto:Gary.L.Vrooman@doj.state.or.us]
Sent: Thursday, July 02, 2015 4:47 PM
To: Cora, Lori
Subject: RE: Discussion on a couple ARARs requested

Hi Lori,

On the first question, yes I let's talk. How about some time between 2 and 4 on Monday?

I can talk about the second issue but I don't think I'd be much help. I can forward your second question on to DEQ's water attorney if you would like.

Gary Vrooman

971.673.1878

From: Cora, Lori [mailto:Cora.Lori@epa.gov]
Sent: Thursday, July 02, 2015 4:21 PM

To: Vrooman Gary L
Subject: Discussion on a couple ARARs requested

Hi, Gary. Hope all is well. Sorry for all of the inquiries lately, you've been very accommodating with your quick responses. I would like to set up a call for next week if possible to discuss a few implementation specifics on a couple state regulations for the Portland Harbor cleanup.

Attorney Client / Ex. 5

Attorney Client / Ex. 5

I'm in all next week. Could you let me know when we may be able to chat? Thanks. Have a great long weekend.

Lori Houck Cora | Assistant Regional Counsel
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****

From: Cora, Lori
Required Attendees: Ingemansen, Dean
Location: Dean's office
Importance: Normal
Subject: Portland Harbor -- DEQ early action
Start Date/Time: Thur 6/11/2015 9:00:00 PM
End Date/Time: Thur 6/11/2015 10:00:00 PM
coraWillamette Cove framework June 2015.docx
Briefing Paper on In-water Work Proposal (2-4-15).docx

Attorney Client / Ex. 5

To: Grandinetti, Cami[Grandinetti.Cami@epa.gov]; Sheldrake, Sean[sheldrake.sean@epa.gov]
Cc: DeMaria, Eva[DeMaria.Eva@epa.gov]
From: Cora, Lori
Sent: Tue 6/9/2015 10:44:27 PM
Subject: RE: Willamette Cove framework June 2015
coraWillamette Cove framework June 2015.docx

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Grandinetti, Cami
Sent: Tuesday, June 09, 2015 2:20 PM
To: Sheldrake, Sean
Cc: Cora, Lori; DeMaria, Eva
Subject: Re: Willamette Cove framework June 2015

Yes thanks.

Sent from my iPhone

On Jun 9, 2015, at 5:18 PM, Sheldrake, Sean <sheldrake.sean@epa.gov> wrote:

Attorney Client / Ex. 5

I should probably fwd to the broader team to get their review, no?

S

p.s. you're in dc right? No word yet on the tribal letters, I guess Michelle has revisions.

Sean Sheldrake, Unit Diving Officer, RPM

EPA Region 10, 1200 Sixth Ave., Suite 900; Mailstop DOC-01

Seattle, WA 98101

206.553.1220 desk

206.225.6528 cell

http://yosemite.epa.gov/r10/cleanup.nsf/sites/ptldharbor

http://www.epa.gov/region10/dive/

Like us on Facebook! https://www.facebook.com/EPADivers

From: Grandinetti, Cami
Sent: Tuesday, June 09, 2015 1:40 PM
To: Cora, Lori; Sheldrake, Sean; DeMaria, Eva
Subject: Fwd: Willamette Cove framework June 2015

I haven't looked at this yet. Let me know what you think and I will get back to Keith. Friday okay?

Sent from my iPhone

Begin forwarded message:

> **From:** JOHNSON Keith <JOHNSON.Keith@deq.state.or.us>
> **Date:** June 9, 2015 at 1:35:47 PM EDT
> **To:** "'Grandinetti, Cami'" <Grandinetti.Cami@epa.gov>
> **Cc:** "'Hamilton, Jessica'" <Jessica.Hamilton@portofportland.com>, PARRETT Kevin <Parrett.Kevin@deq.state.or.us>, JOHNSON Keith <JOHNSON.Keith@deq.state.or.us>
> **Subject: Willamette Cove framework June 2015**

Cami, here is the framework document I mentioned. Again, the purpose of this is to set forth some general understandings for what we would like to do, why, and how we'll do it.

It's been through a review by DEQ and the Port for the appropriate sections. A couple of notes:

•□□□□□□□ There is a space for EPA to add some information on Page 1

•□□□□□□□ On page 2 there is a description of "comment resolution process"- this is just a cut and paste from the April email sent to you.

Let me know what you think- I believe the Port's legal folks looked at this, as did ODOJ. If you are in town next week perhaps we can meet and discuss, if there's time. Otherwise, we should plan some time to come up to Seattle.

Thanks!

Keith

To: Koch, Kristine[Koch.Kristine@epa.gov]
From: Cora, Lori
Sent: Fri 4/10/2015 3:02:58 PM
Subject: RE: LWG Comments on EPA's FS Revised Draft Section 2

Attorney Client / Ex. 5

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U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Koch, Kristine
Sent: Friday, April 10, 2015 7:56 AM
To: Fonseca, Silvina; Ells, Steve; Legare, Amy; Charters, David; Cora, Lori
Cc: Yamamoto, Deb; Grandinetti, Cami; Cohen, Lori
Subject: FW: LWG Comments on EPA's FS Revised Draft Section 2

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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From: Koch, Kristine
Sent: Friday, April 10, 2015 7:55 AM
To: 'Jennifer Woronets'

Cc: Amanda Shellenberger; Bob Wyatt; Carl Stivers; Jim McKenna (jim.mckenna@verdantllc.com); King, Todd W.; Mullin, Jeanette; Patty Dost; Scott Coffey (coffeyse@cdmsmith.com); Sheldrake, Sean; audiehuber@ctuir.com; Bob Wyatt; callie@ridolfi.com; cunninghame@gorge.net; Dave Livesay; erin.madden@gmail.com; Gabriel Moses [Personal Privacy / Ex. 6]; Gail Fricano (gfricano@indecon.com); Holly Partridge (Holly.Partridge@grandronde.org); JD Williams (jd@williamsjohnsonlaw.com); Jennifer Kassakian (jkassakian@indecon.com); Jim McKenna (jim.mckenna@verdantllc.com); Julie Weis; Kim Cox (kim.cox@portlandoregon.gov); Madalinski, Kelly; MCCLINCY Matt; Michael.karnosh@grandronde.org; Rachel DelVecchio (rdelvecchio@indecon.com); Robert.Neely@noaa.gov; rose@yakamafish-nsn.gov; ryan sudbury (Ryan.Sudbury@grandronde.org); Sheldrake, Sean; Tom Gainer (GAINER.Tom@deq.state.or.us)
Subject: RE: LWG Comments on EPA's FS Revised Draft Section 2

Bob and Jim – Attached are EPA's responses to the LWG's comment on EPA's revisions to FS Section 2. The LWG expressed concerns about the EPA's approach being consistent with the NCP and EPA guidance. The sole purpose EPA is making revisions to the draft FS is stated in EPA's December 18, 2012 letter which notified the LWG that the draft FS was not adequate for its intended purpose and was not approved by EPA. The report has many deficiencies and needs substantial revision in order to fully support EPA's evaluation of alternatives and provide an adequate basis for remedial decision making at the Portland Harbor Site. Both EPA Region 10 and Headquarters are working together to ensure that the FS is consistent with the NCP and EPA policy and guidance.

We look forward to discussing our responses with you this morning.

Regards,

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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Seattle, Washington 98101-3140

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From: Jennifer Woronets [mailto:jworonets@anchorqea.com]
Sent: Wednesday, March 25, 2015 4:44 PM
To: Koch, Kristine
Cc: Jennifer Woronets; Amanda Shellenberger; Bob Wyatt; Carl Stivers; Jennifer Woronets; Jim McKenna (jim.mckenna@verdantllc.com); King, Todd W.; Koch, Kristine; Mullin, Jeanette; Patty Dost; Scott Coffey (coffeyse@cdmsmith.com); Sheldrake, Sean; audiehuber@ctuir.com; Bob Wyatt; callie@ridolfi.com; cunninghame@gorge.net; Dave Livesay; erin.madden@gmail.com; Gabriel Moses [Personal Privacy / Ex. 6]; Gail Fricano (gfricano@indecon.com); Holly Partridge (Holly.Partridge@grandronde.org); JD Williams (jd@williamsjohnsonlaw.com); Jennifer Kassakian (jkassakian@indecon.com); Jennifer Woronets; Jim McKenna (jim.mckenna@verdantllc.com); Julie Weis; Kim Cox (kim.cox@portlandoregon.gov); Koch, Kristine; Madalinski, Kelly; MCCLINCY Matt; Michael.karnosh@grandronde.org; Rachel DelVecchio (rdelvecchio@indecon.com); Robert.Neely@noaa.gov; rose@yakamafish-nsn.gov; ryan sudbury (Ryan.Sudbury@grandronde.org); Sheldrake, Sean; Tom Gainer (GAINER.Tom@deq.state.or.us)
Subject: LWG Comments on EPA's FS Revised Draft Section 2

Kristine,

Please see attached LWG comments on EPA's FS revised draft Section 2.

Let us know if you have any questions.

Thank you,

Jen Woronets ☺

Anchor QEA, LLC

jworonets@anchorqea.com

421 SW Sixth Avenue, Suite 750

Portland, OR 97204

503-972-5014

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To: Koch, Kristine[Koch.Kristine@epa.gov]
From: Cora, Lori
Sent: Thur 4/2/2015 10:55:58 PM
Subject: RE: Section 2 FS Review Comments

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Koch, Kristine
Sent: Thursday, April 02, 2015 1:59 PM
To: Cora, Lori
Subject: RE: Section 2 FS Review Comments

See comment on Table 2.1-4

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: Cora, Lori
Sent: Wednesday, April 01, 2015 4:33 PM
To: Koch, Kristine
Subject: RE: Section 2 FS Review Comments

Hi, Kristine. I don't see any DEQ comments on ARARs. Am I missing something?

Lori Houck Cora | Assistant Regional Counsel
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P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

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From: Koch, Kristine
Sent: Tuesday, March 31, 2015 2:44 PM
To: Cora, Lori
Subject: FW: Section 2 FS Review Comments

Here are DEQ's comments. I thought I had already sent them to you.

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
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Seattle, Washington 98101-3140

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From: GAINER Tom [mailto:GAINER.Tom@deq.state.or.us]
Sent: Wednesday, March 25, 2015 10:48 AM
To: Koch, Kristine
Cc: MCCLINCY Matt; GAINER Tom; poulsen.mike@deq.state.or.us; PETERSON Jenn L; PARRETT Kevin; JOHNSON Keith
Subject: Section 2 FS Review Comments

Kristine-

Below are DEQ's comments on Section 2 of the 2/23/2015 Portland Harbor draft FS. DEQ sent EPA comments on the previous version of Section 2 on 9/4/2014 and responses were provided; DEQ is not repeating previously submitted comments. Please contact myself or Matt McClincy if you have questions.

Thanks-

Tom Gainer, P.E.

Project Manager/Environmental Engineer

Oregon Department of Environmental Quality, NW Region

503-229-5326

This spring, DEQ's Northwest Region Office will be moving to a new location - the 700 Lloyd Building at 700 NE Multnomah St., Suite #600, Portland, OR 97232. The target date for operating at the new location is May 26th, 2015.

Section 2.2, RAO 8 Suggest striking MCLs from this RAO as they are not relevant to ecological receptors.

Section 2.2.1

1. Identification of Contaminants of Concern, Weak Lines of Evidence: It is unclear how COCs were eliminated based on representing a weak line of evidence, and how they are tied to COCs in the BERA . It is unclear if the designation of a weak line was for one or all media in which it was identified. For example, diesel range hydrocarbons were identified in both sediment predictive models (LRM) and transition zone water. Additionally, it is unclear if spatial scale of exceedance harbor wide was a consideration in defining those as weak lines of evidence. While some COCs are found primarily in one area (e.g. trimethylbenzenes, off GASCO) it is unclear if this results in their designation as weak lines. A better way to state it would be that they are strong and appropriate lines for a given river mile (source) within the larger Site. This is also a more comprehensive way to connect upland source exceedances in groundwater with pore water exceedances in sediment. A table that lists those lines of evidence designated as weak, along with the reasoning, would be a better way to review this section.

2. Co-location with other contaminants: DEQ suggests that EPA name all contaminants as COCs, including those co-located with other contaminants, and then indicate that focusing on co-located COCs may achieve protectiveness. Dropping contaminants as COCs may hinder the ability to ensure that contaminants are adequately evaluated.

3. Related Contaminants Addressed by Other Contaminants (and Appendix B2, Section 1.3): The text states that Total DDD, DDE and DDT were grouped for PRG development and the individual sums were eliminated. For ecological risk PRG tables, both DDX and DDE are listed. Please note that DDE is the COC that came through the risk assessment for piscivorous birds, and that the DDX TRV may not be protective of DDE effects. Unlike the DDE TRV in the BERA, the ATLs calculated based on the individual and population-based TRVs for DDX of 0.227 and 2.27 mg/kg-day generally exceed concentrations considered protective of fish-eating birds. Due to the significant differences in the TRVs for the DDE and DDX, DEQ does not believe that DDE effects will be sufficiently represented by DDX and recommends that DDE be the primary PRG. Alternatively, a DDX TRV that better considers DDE effects could be used as a surrogate for transformation.

Table 2.1-4 This table identifies a number of values from DEQ Water Table 31 Aquatic Life Water Quality Guidance Values for Toxic Pollutants as DEQ Ambient Water Quality Criteria (acute and chronic). Values from Table 31 are not DEQ AWQC. Table 2.1-4 should be edited accordingly.

Table 2.2-1

1. We suggest adding headers (*e.g.*, Drinking Water/Direct Contact) under RAO 3 and RAO 4. In general, the PRGs for RAO 3 and RAO 4 are identical. Table 2.2-3 provides the basis for selection of the COCs for each RAO. In some cases, the basis for a COC is provided but there is no PRG (*e.g.*, PBDE for RAO 3), and in other cases there is a PRG, but no basis provided in Table 2.2-3 (*e.g.*, zinc PRG for RAO 3, aldrin and dieldrin for RAO 4).

2. A beach PRG for RAO 1 is not provided, although a basis is presented in Table 2.2-12.

3. Footnotes 16 and 17 are not included.

4. RAO 8, Manganese PRG: The chronic criteria of 120 ug/L to screen risks to aquatic organisms from exposure to dissolved manganese (Mn) is a tier II water quality benchmark, published in 1996 by Suter and Tsao (Suter GW, Tsao CL, 1996, Toxicological benchmarks for screening potential contaminants of concern for effects on aquatic biota: 1996 revision, Prepared for U.S. Department of Energy Office of Environmental Management, Risk Assessment Program, Health Sciences Research Division). In a November 25, 2014 technical memo addressed to EPA, Windward Environmental, on behalf of the LWG, proposed revising the Mn PRG based on a more robust set of toxicity tests than those used by Suter and Tsao and additional studies that demonstrate Mn toxicity is influenced by water hardness. Windward compiled bioassay results from published and unpublished studies and employed EPA protocols to derive acute and chronic SLVs for Mn based on hardness.

DEQ Cleanup has been working on internal guidance for project managers on issues associated with Mn. This effort included a review of the Windward Environmental memo, as DEQ supports the development of a hardness-based SLV and would like to match the Portland Harbor Mn PRG with the Mn risk values identified by our work group. This DEQ review of the Windward memo concluded:

A. Much of the data used by Windward to derive acute and chronic criteria does not appear to meet the guidelines for minimum data quality set out by Stephan (Stephan CE, Mount DI, Hansen DJ, Gentile JH, Chapman GA, Brungs WA, 1985, Guidelines for

deriving numerical national water quality criteria for the protection of aquatic organisms and their uses, PB85-227049, Office of Research and Development, US Environmental Protection Agency, Washington, DC.) and followed by Suter and Tsao (1996). DEQ has questions regarding the following data quality issues:

- Absence of information on test conditions
- Use of non-native species
- Accuracy of data transcription from the literature

B. Re-calculation of the CMC based only on those tests that meet EPA guidelines may result in a different value than those presented by Windward.

Recommendations:

a. Explicitly state the criteria used for including bioassay tests in the data compilation and confirm the studies included meet these criteria.

b. When testing protocols deviate from EPA guidelines, explain the mitigating factors or circumstances that warrant or justify inclusion of the data.

c. Eliminate exotic species from the calculations unless supporting justification is provided.

d. Identify all deviations from EPA protocols in calculating CMCs and justify the excursion.

e. Review hardness and contaminant concentration data for accuracy, and recalculate hardness-toxicity relationship.

f. Re-calculate FAVs and CMCs following the above corrections.

The following detail is provided to support the above conclusions and recommendations.

Windward compiled bioassay data drawn from studies of Mn toxicity conducted between 1960 and 2012. However, it appears much of the data presented in the tech memo does not meet the test guidelines or data quality objectives described in Stephen and utilized by other investigators such as Suter and Tsao (1996) in developing Tier II benchmarks. Deviations from Stephen (1985) and Suter and Tsao (1996) include:

•□□□□□□ Guidelines regarding variation in acute values indicate " *If the acute values within a species or among species in a genus differ by a factor of 10 or more, the higher values were excluded, and those that are within the factor of 10 range were used to attain a more conservative estimate.*"

In Table 1 of the Windward memo, this guideline was not followed for the following species: *Chironomus tentans, Daphnia magna, Oncorhynchus mykiss,* and *Pimephales promelas.*

•□□□□□□ Stephan (1985) also indicates that only tests with essential information on basic test conditions and protocols be included in the calculations. Data included from several investigators, representing 33 of 82 individual tests presented in Table 1, did not report: 1) the type of exposure (static, renewal, or flow-through), 2) whether the contaminant of interest was sampled during the test, or 3) the duration of the test. The majority of these bioassays are attributed to ENSR (1990, 1992, 1994 and 1996).

•□□□□□□ For several genera and species only one test result is reported. A partial list of these includes: *Aeolosoma sp.* (oligochete worm), *Agosia chrysogaster (longfin dace), Anodanta imbecillis (freshwater mussel), Aselius aquaticus (isopod), Bufo boreus (western toad), Colise fasciata (giant gourami), Crangonyx pseugracillis (amphipod), Dutephrynus melanostictus (Asian common toad), Lampsillius siliquoidea (fatmucket clam).*

Inclusion of these species, most of which represent the adult stage of their lifecycle rather than the more sensitive embryonic or juvenile stages has an effect on the FCV. Although only the lowest 4 GMAVs are included in the calculations, the number of species with GMAVs is a factor. These species represent the most tolerant of the organisms used in the calculations. The LC50s for several of these organisms are listed below along with their rank in tolerance. (1) *Crangonyx pseugracillis,* 694,000 ug/L; (2) *Colise fasciata*, 542,969 ug/L; (3) *Aselius aquaticus,* 330,000 ug/L; (4) *Bufo boreus,* 211,027 ug/L; (6) *Dutephrynus melanostictus,* 81,261 ug/L.

The use of these test results is questionable in the derivation of acute criteria due to the limited amount, quality, applicability, and/or age of the data. Studies included in the report date as early as 1960, and although available to previous researchers like Suter and Tsao (1996) were not used or referred to by them in deriving acute and chronic criteria. The authors of the Windward memo do not discuss the sources and quality of the data and what guidelines they used when deciding to include/exclude the results of a study.

•□□□□□□ Test data from one of the EPA publications cited by Windward (EPA, 2010 Final Report on Acute and Chronic Toxicity of Nitrate, Nitrite, Boron, Manganese, Fluoride, Chloride and Sulfate to Several Animal Species. EPA 905-R-10-002. USEPA, Chicago, IL.). As reported in Table 92 of the document, the water hardness of the two test solutions that bracket the interpolated LC50 value for *Lampsilis silquoidea* were 150 ppm and 220 ppm, not the 90 ppm reported in Table 1 of the Windward memo. Similarly and from the same report, for the tests conducted on *Megalonaias nervosa,* the hardness was 112 ppm, not 90 ppm as indicated in the Windward memo. These errors lead to an overestimation of the mitigating effects of hardness on manganese toxicity. The additional studies cited by Windward were not reviewed to confirm accuracy of the data used in the Windward hardness evaluation, but DEQ recommends a quality assurance review for data compiled from literature.

•□□□□□□ Stephan (1985) indicates organisms without reproducing populations in North America should not be used in the derivation of criteria. Windward included the giant gourami (*Colise fasciata) and* Asian common toad *Dutephrynus melanostictus,*), which are native to south east Asia, in the derivation of acute criteria. Although not flagged by Windward, Stephan (1985) indicates *Asellius aquaticus* is not native to North America.

•□□□□□□ In calculating final acute values or FAVs, Stephan (1985) indicates "*if for a commercially or recreational important species the geometric mean of the acute values from flow-through tests in which the concentrations of test material were measured is lower than the calculated Final Acute Value, then that geometric mean should be used as the Final Acute Value instead of the calculated Final Acute Value*'.

The coho salmon is a recreationally and commercially valuable species that had a SMAV that was lower than the FAV. Based on the Stephan's scheme for deriving criteria, the coho SMAV would be used instead of the FAV in calculating a CMC.

•□□□□□□ It is not clear why two separate SMAVs and GMAVs were reported for the same species *Lymnaea stagnalis,* whereas the protocol described by Stephan would result a single SMAV and GMAV.

•□□□□□□ There appears to be an error in table with respect to calculating the hardness adjusted LC50 for *Lampsilis silquoidea.* The adjusted value should be less than 43,300 ug/L, not greater than this value.

5. RAO 8, TPH PRG: EPA proposed a PRG of 2.6 ug/L for the petroleum hydrocarbon aliphatic $C_{10} – C_{12}$ fraction to protect aquatic organisms from narcosis effects. DEQ agrees with this PRG. During recent discussions with EPA, we discussed refinements to the method of calculating PRGs for petroleum hydrocarbons fractions, and how the fractions should be analyzed. Based on our subsequent evaluations, we offer the following comments on the TPH fraction PRGs. Table 1 shows our proposed modifications to EPA's development of screening levels for TPH fractions. The most important proposed revision is the listing of screening values for higher molecular weight aromatic fractions because of revised solubility limits.

<u>Equivalent Carbon Numbers</u>

The nomenclature of $C_{10} – C_{12}$ is ambiguous as to whether actual carbon numbers or equivalent carbon numbers are intended. The aliphatic and aromatic fractions in Table 1 are based on Oregon's definition. The basic petroleum fractions used in DEQ's 2003 Risk-Based Decision Making (RBDM) document were developed by the TPH Criteria Working Group (TPHCWG, 1997a). The carbon numbers used to designate the fractions are "equivalent carbon numbers", based on a compound's boiling point or

elution time on a gas chromatograph. In addition to the TPHCWG and DEQ, Washington and Massachusetts use equivalent carbons (EC) numbers in their evaluations of TPH fractions. It appears Alaska also uses EC numbers. For example, their designation of $C_6 – C_{10}$ and $C_{10} – C_{25}$ fractions would be ambiguous with regard to which fraction compounds with ten carbon atoms belong if actual carbon numbers were intended. If C_{10} was intended to belong to the first fraction, the second fraction should be designated $C_{11} – C_{25}$ rather than $C_{10} – C_{25}$. To avoid confusion, we propose that equivalent carbon fractions be explicitly named according to TPHCWG convention, such as $EC_{>10} – EC_{12}$. We include this convention for the DEQ fractions in Table 1.

Analytical Method

A consultant on the Premier Edible Oils project asked which laboratory analytical method should be used for the petroleum hydrocarbon fractions. Given that the basis for the fractions is DEQ RBDM guidance, we recommend using the extractable petroleum hydrocarbon and volatile petroleum hydrocarbon methods presented in guidance. However, because of the low screening values for some of the fractions, these analytical methods need to be modified to meet lower method detection limits. DEQ's laboratory can provide those modifications.

Maximum Water Solubility

Maximum water solubilities were originally calculated using equations based on surrogate carbon numbers for the fractions. The TPHCWG evaluated three methods of estimating parameter values for TPH fractions. The methods were simple averaging of constituent properties in each fraction, composition-based averaging, and correlation to relative boiling point index. The three approaches gave similar results. We propose to use the values based on the TPHCWG's recommended approach, the correlation method.

A comparison of original calculated and current proposed water solubilities in Table 1 shows that aromatic fraction solubilities were previously underestimated. As EPA states in your supporting material for the derivation of TPH fraction screening values, it is inappropriate to propose a screening value for narcosis effects if the screening value is greater than the maximum solubility. This is because the primary toxic effects will be due to the physical presence of a separate phase petroleum product rather than narcosis. For this reason, screening levels were not previously provided for aromatic fractions $EC_{>12} – EC_{16}$, $EC_{>16} – EC_{21}$, and $EC_{>21} – EC_{34}$. Using the proposed revisions, screening levels are now provided for these aromatic fractions. This is a substantial change.

Molecular Weight

To convert from the molar basis of toxicity to a mass basis for screening levels, we need an estimate of the molecular weight for each fraction. We propose to use the recommended molecular weights from the TPHCWG study rather than the surrogate compounds originally proposed. This revision does not have a substantial effect on the calculated screening values.

Organic-Carbon Partition Coefficient, K_{oc}

For consistency with the other parameter values, we propose to use the recommended $\log K_{oc}$ values from the TPHCWG study rather than the values originally proposed. This revision does not have a substantial effect on the calculated screening values.

Chemical Constituents

For completeness and for consistency with DEQ's approach for calculating TPH risk-based concentrations, we added individual chemical constituents to Table 1. Calculations were performed the same as for chemical fractions. We note that calculated screening levels for individual constituents are typically much higher than screening values based on benthic toxicity.

Portland Harbor Example

The evaluation of petroleum hydrocarbon fractions in the BERA was performed using assumed percentages of aliphatic and aromatic fractions in TPH-gasoline, not measured fractions. To get a better understanding of the composition of hydrocarbons, including diesel, we evaluated measured fraction data from the February 2014 Groundwater Monitoring Report for the Arco/BP Terminal 22T bulk fuel facility in Portland Harbor. Data from both shallow and deep groundwater monitoring wells showed higher molecular weight aromatic fractions at concentrations greater than the new calculated SLVs shown in Table 1. Because the material is an LNAPL, the presence of TPH fractions in deep groundwater makes it more likely the concentrations are representative of dissolved phase hydrocarbons. There were also higher molecular weight aliphatic fractions at concentrations greater than SLVs, and in some cases greater than solubility limits.

Conclusion

To create a more consistent and defensible approach, we are suggesting modifications to EPA's approach for calculating screening levels for petroleum hydrocarbon fractions. The one modification that results in a substantive change to screening values is a correction to maximum solubility values for aromatic fractions. After making this revision, it is clear to us that it is important to have screening levels for higher molecular weight aromatic fractions to evaluate potential narcosis effects on aquatic organisms.

Tables 2.2-6 and 2.2-7 The RSLs for RAOs 3 and 4 do not appear to be from the current EPA table (January 2015). There are minor differences for most of the chemicals.

Appendix B-2, Ecological Risk Based PRG Derivation

Section 1.1, Benthic Invertebrate PRGs The text should specify that the L2 SQV values used were from a Logistic Regression Model using a pMax of 0.50.

Section 1.1, Benthic Risk Areas The text states that benthic risk areas were identified using numerical sediment PRGs (those listed in Table B-2), and empirical bioassay test results. However, since the benthic risk areas will not be available for review until Section 3, perhaps a placeholder statement could be added that states criteria used for this identification will be presented later. DEQ will withhold comments on the criteria for identification of these areas until Section 3 is available for review. DEQ recommends that the approach for defining these areas include specific details that describe how these areas were identified based on multiple lines of evidence. The approach should include models (e.g., LRM, FPM or PEC Quotient) or appropriate combinations that most closely predict achievement of the toxicity test criteria listed as PRGs in this section. Although empirical tests results will be the strongest line of evidence and final PRG evaluated, the areas identified that may require bioassay testing is one objective of these criteria. For example, this may include use of complete LRM Level 2 model at a pMax of 0. 50 as presented in Table 6-11 in the BERA.

Section 1.2, Sediment PRGs based on Ingestion of Biota (Prey) Please include calculations related to the use of a weighted mean based on prey consumption portions.

Section 1.3, Sediment PRG for Piscivorous Bird Egg Unlike the DDE TRV in the BERA, the ATLs calculated based on the individual and population-based TRVs for DDX of 0.227 and 2.27 mg/kg-day generally exceed concentrations considered protective of fish-eating birds. Due to the significant differences in the TRVs for the DDE and DDX, DEQ does not believe that DDE effects will be sufficiently represented by DDX and recommends that DDE be the primary PRG. See also Comment #3 on Section 2.2.1.

To: Koch, Kristine[Koch.Kristine@epa.gov]; Sheldrake, Sean[sheldrake.sean@epa.gov]
From: Cora, Lori
Sent: Wed 4/1/2015 8:06:51 PM
Subject: Early ARAR communications with LWG
EPAARARs010610.pdf
Encl1ARARS010610.pdf

Attorney Client / Ex. 5

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To: Sheldrake, Sean[sheldrake.sean@epa.gov]
Cc: Koch, Kristine[Koch.Kristine@epa.gov]
From: Cora, Lori
Sent: Wed 4/1/2015 4:22:26 PM
Subject: RE: Arkema CDF screening

Attorney Client / Ex. 5

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From: Sheldrake, Sean
Sent: Wednesday, April 01, 2015 9:12 AM
To: Cora, Lori
Cc: Koch, Kristine
Subject: RE: Arkema CDF screening

Attorney Client / Ex. 5

the intent of the call tomorrow I was trying to prime you on, not sure if we'll have time today, I'm triple booked much of the day.

Getting on the team call?

S

Sean Sheldrake, Unit Diving Officer, RPM

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From: Cora, Lori
Sent: Wednesday, April 01, 2015 9:09 AM
To: Sheldrake, Sean
Cc: Koch, Kristine
Subject: Arkema CDF screening

Before our discussion, here are some things you and CDM need to review and consider.

Attorney Client / Ex. 5

Attorney Client / Ex. 5

Attorney Client / Ex. 5

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To: Cohen, Lori[Cohen.Lori@epa.gov]; Grandinetti, Cami[Grandinetti.Cami@epa.gov]; Yamamoto, Deb[Yamamoto.Deb@epa.gov]; Sheldrake, Sean[sheldrake.sean@epa.gov]; Robinson, Deborah[Robinson.Deborah@epa.gov]
From: Cora, Lori
Sent: Wed 2/25/2015 10:33:42 PM
Subject: FW: Portland Harbor - Draft letter for FS Sec 1

FYI. My thoughts on draft FS 1 letter. It needs more work.

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From: Cora, Lori
Sent: Wednesday, February 25, 2015 1:39 PM
To: Koch, Kristine
Subject: RE: Portland Harbor - Draft letter for FS Sec 1

Attorney Client / Ex. 5

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From: Koch, Kristine
Sent: Tuesday, February 24, 2015 2:34 PM

To: Yamamoto, Deb; Cora, Lori; Cohen, Lori; Grandinetti, Cami
Cc: Allen, Elizabeth; Sheldrake, Sean; Allen, Elizabeth
Subject: Portland Harbor - Draft letter for FS Sec 1

All – here is a draft of the letter for FS Sec 1 comments that were provided recently.

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

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To: Peterson, Lance[PetersonLE@cdmsmith.com]
Cc: Cora, Lori[Cora.Lori@epa.gov]
From: Sheldrake, Sean
Sent: Mon 2/11/2013 8:30:44 PM
Subject: Re: Arkema EE/CA Comments - final drafts and revised transmittal letter
Arkema EE-CA Comments - Harbor-Wide_11_FEB_2013.pdf
Arkema EE-CA Comments - Harbor-Wide_11_FEB_2013.docx
EE-CA Comments - Arkema-Specific_11_FEB_2013.pdf
EE-CA Comments - Arkema-Specific_11_FEB_2013.docx
Arkema EE-CA_EPA Comments Transmittal_11-Feb-2013.docx

Thanks Lance. I'll be transmitting soon. S

Sean Sheldrake, RPM, Unit Diving Officer
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Personal Privacy / Ex. 6
EPA Divers only: **Personal Privacy / Ex. 6**
Deliveries: Parking Garage mailroom (1st floor)
Visitors: Check-in @ PERC / Service Center on 12th floor:
http://yosemite.epa.gov/r10/extaff.nsf/Homepage/Visiting+Seattle

From: "Peterson, Lance" <PetersonLE@cdmsmith.com>
To: Sean Sheldrake/R10/USEPA/US@EPA
Date: 02/11/2013 11:58 AM
Subject: Arkema EE/CA Comments - final drafts and revised transmittal letter

Sean,

Attached are the final versions of the specific and FS related EE/CA comment sets in pdf and Word format. The pdf's have been prepped for web posting. Also attached is the revised version of the Arkema EE/CA comments transmittal letter, which was revised slightly based on Lori's comments. Responses to Lori's comments are provided below:

Attorney Client / Ex. 5

Attorney Client / Ex. 5

==========

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To: Peterson, Lance[PetersonLE@cdmsmith.com]
Cc: Ader, Mark[Ader.Mark@epa.gov]; Humphrey, Chip[Humphrey.Chip@epa.gov]; Koch, Kristine[Koch.Kristine@epa.gov]; Sheldrake, Sean[sheldrake.sean@epa.gov]; Muza, Richard[Muza.Richard@epa.gov]; Cora, Lori[Cora.Lori@epa.gov]
From: Sheldrake, Sean
Sent: Sat 2/9/2013 10:39:11 PM
Subject: Re: Arkema EE/CA Comments - draft transmittal letter for review
Arkema EE-CA_EPA Comments Transmittal_06-Feb-2013.docx

Lance, that makes sense. When you send the specific final version, if you could send a pdf of that and the FS related run thru the pdf prep checklist, that would be great.

Lori, Chip, Kristine, Any last thoughts before this is sent?

Thank you.

S

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Personal Privacy / Ex. 6
Health and Safety (EPA only):
Personal Privacy / Ex. 6
EPA Divers only: **Personal Privacy / Ex. 6**
Deliveries: Parking Garage mailroom (1st floor)
Visitors: Check-in @ PERC / Service Center on 12th floor:
http://yosemite.epa.gov/r10/extaff.nsf/Homepage/Visiting+Seattle

From: "Peterson, Lance" <PetersonLE@cdmsmith.com>
To: Sean Sheldrake/R10/USEPA/US@EPA
Date: 02/06/2013 11:04 AM
Subject: Arkema EE/CA Comments - draft transmittal letter for review

Deliberative Process / Ex. 5

Deliberative Process / Ex. 5

Lance

==========

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To: Peterson, Lance[PetersonLE@cdmsmith.com]
Cc: Ader, Mark[Ader.Mark@epa.gov]; Humphrey, Chip[Humphrey.Chip@epa.gov]; Koch, Kristine[Koch.Kristine@epa.gov]; Sheldrake, Sean[sheldrake.sean@epa.gov]; Muza, Richard[Muza.Richard@epa.gov]; Cora, Lori[Cora.Lori@epa.gov]
From: Sheldrake, Sean
Sent: Wed 2/6/2013 2:38:16 PM
Subject: Re: Arkema EE/CA Comments (revised versions)
EE-CA Comments - Arkema-Specific_05_FEB_2013_clean.docx
EE-CA Comments - Arkema-Specific_05_FEB_2013_redline.docx
Arkema EE-CA Comments - Harbor-Wide_05_FEB_2013_clean.docx
Arkema EE-CA Comments - Harbor-Wide_05_FEB_2013_redline.docx

Thanks Lance; I'll take a look when I'm back to the office tomorrow.

Chip, Kristine, Lori, Any comments?

Thanks

S
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Green Cleanups (EPA only):
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Health and Safety (EPA only):
Personal Privacy / Ex. 6
EPA Divers only: **Personal Privacy / Ex. 6**
Deliveries: Parking Garage mailroom (1st floor)
Visitors: Check-in @ PERC / Service Center on 12th floor:
http://yosemite.epa.gov/r10/extaff.nsf/Homepage/Visiting+Seattle

From: "Peterson, Lance" <PetersonLE@cdmsmith.com>
To: Sean Sheldrake/R10/USEPA/US@EPA
Date: 02/05/2013 04:12 PM
Subject: Arkema EE/CA Comments (revised versions)

Deliberative Process / Ex. 5

Deliberative Process / Ex. 5

Lance

==========

Lance E. Peterson, RG, LHG
Senior Project Manager
CDM Smith
14432 SE Eastgate Way, Suite 100, Bellevue, WA 98007
425-519-8300 (office) | 425-519-8382 (direct) | 425-417-5946 (mobile) | 425-746-0197 (fax)
mailto:petersonle@cdmsmith.com | cdmsmith.com

To: Grandinetti, Cami[Grandinetti.Cami@epa.gov]; Zhen, Davis[Zhen.Davis@epa.gov]
From: Sheldrake, Sean
Sent: Mon 4/18/2016 8:51:34 PM
Subject: Fwd: SWAC vs RAL PCB DDX PAH

Deliberative Process / Ex. 5

S

Sean Sheldrake, Unit Diving Officer, RPM
USEPA
206.553.1220 desk
206.225.6528 cell

Sent from my iPhone

Begin forwarded message:

From: "Coffey, Scott" <CoffeySE@cdmsmith.com>
To: "Koch, Kristine" <Koch.Kristine@epa.gov>, "Allen, Elizabeth" <allen.elizabeth@epa.gov>, "Sheldrake, Sean" <sheldrake.sean@epa.gov>
Cc: "Hazen, Gary" <HazenGL@cdmsmith.com>, "Blischke, Eric" <blischkee@cdmsmith.com>, "Chan, Arthur" <ChanWC@cdmsmith.com>, "Foster, Malena L." <fosterml@cdmsmith.com>, "John Kern" <kernstat@gmail.com>
Subject: FW: SWAC vs RAL PCB DDX PAH

Hi Kristine.

Attached is John's memo (to become Appendix I). This is a more complete version for your review/input. As John states below, please contact him if you have any questions.
Also let us know if you want a conclusion section. If yes, we should probably have a brief meeting discussing what the conclusions should focus on.

Scott

From: **Personal Privacy / Ex. 6** On Behalf Of John Kern
Sent: Monday, April 18, 2016 1:21 PM
To: Coffey, Scott <CoffeySE@cdmsmith.com>
Subject: SWAC vs RAL PCB DDX PAH

Hello Scott,

At long last, here is the memo summarizing the SWAC vs RAL uncertainty analysis. Let me know if you have questions, and encourage EPA to comment and ask any questions they may have. Note I didn't do any sort of discussion or conclusions, as these ususally end up getting off track and causing problems. I can add such a section if you/EPA would like, but I would want to do it in conjunction with you and EPA input.

Thanks for your patience,

John

--
John W. Kern PhD
Kern Statistical Services, Inc.
5175 NE River RD
Sauk Rapids, MN 56379
T: 320-281-0676
C: 509-432-6400

DRAFT

APPENDIX

PORTLAND HARBOR SUPERFUND SITE

SURFACE WEIGHTED AVERAGE CONCENTRATION UNCERTAINTY ANALYSIS (TOTAL PCBS, TOTAL PAHS, TOTAL DDX)

Prepared By:

Kern Statistical Services, Inc.
PO Box 205
Sauk Rapids, MN

Under Contract To:

CDM Federal Programs Corp.
3201 Jermantown Road
Suite 400
Fairfax, VA 22030

April 14, 2016

To: Grandinetti, Cami[Grandinetti.Cami@epa.gov]
Cc: Zhen, Davis[Zhen.Davis@epa.gov]; Robinson, Deborah[Robinson.Deborah@epa.gov]
From: Bill Ross
Sent: Tue 2/23/2016 5:02:50 PM
Subject: RE: thoughts on 'as if no OU' approach

Another thought, perhaps a new # 6. Something about EPA supporting developing OU's after the ROD 'if it would accelerate cleanup and not become an impediment for RP's who want to move forward quickly based on the information in the ROD concerning SDUs'. (We would do OU's if it helps; won't let them become a delaying tactic.)

Thanks

From: Grandinetti, Cami [mailto:Grandinetti.Cami@epa.gov]
Sent: Monday, February 22, 2016 5:37 PM
To: Bill Ross <bross@rossstrategic.com>
Cc: Zhen, Davis <Zhen.Davis@epa.gov>; Robinson, Deborah <Robinson.Deborah@epa.gov>
Subject: Re: thoughts on 'as if no OU' approach

This is great and gives me a lot to work with. Thank you Bill.

Personal Privacy / Ex. 6

Sent from my iPhone

On Feb 22, 2016, at 4:19 PM, Bill Ross <bross@rossstrategic.com> wrote:

Hi Cami,

Sorry these are late. **Personal Privacy / Ex. 6**
Personal Privacy / Ex. 6

I offer these for you to ponder, use, reject as you see fit. I have tried to arrange them as a coherent 'story' of the signal an know that they are not in the language that you would use or the lawyers approve, most likely. In fact it might not even be accurate in some respects or tell the wrong story at times. Having said that, there is a story in what you are thinking about and I share this with the intent to help you say it as you write something up for Kevin and me Thursday.

I get what you were telling me between the state looking for sufficient certainty of implementation and the PRPs looking for the promise full release of their individual liability as soon as possible before they might step forward to initiate hotspot cleanup. I have developed this with that in mind.

(my short hand of what I am really trying to say follows each point after the narrative!)

Let me know if you want to talk. See you Thursday.

1. EPA understands and supports that some responsible parties (RP) will want to move forward on cleanup at specific areas where their liability is obvious to them and who do not want to wait for some global site-wide settlement before beginning remediation. (EPA eager to support those RPs that want to get moving after the ROD.)

2. Sequencing of site-specific cleanup moving forward prior to a site-wide settlement will be important in order to consider potential otherwise upstream recontamination of downstream sites cleaned up earlier; ensuring that responsible parties that should be involved in such cleanup are indeed either voluntarily or otherwise engaged in the activity and its costs. (Got to make sure that nothing stupid happens to those who move out quickly and if they are doing so without all of the ultimately other RPs they don't get screwed on cost allocation.)

3. The number of such early actions should not exceed EPA's ability to manage them appropriately and so multiple 'hotspot' actions should be considered by the PRP's who want to begin cleanup as soon as possible after the ROD is issued. (There won't be 13 of these 'early RDs and consent decrees so early acting RPs should consider teaming up with others and come to EPA as a 'team' on multiple hotspots,)

4. EPA views the remedial design phase as being the next step in determining boundaries, contaminants and technologies necessary to meet clean-up targets and is ready to work with those RPs that want to move forward quickly remedial design. (RD can answer more definitely what RPs actually have to do so don't hang back just because the ROD doesn't answer all of their questions or resolve all of their issues.)

5. The SDU's in the ROD give RPs sufficient information on boundaries, contaminants, clean-up levels and cost to determine where their site-specific obligations likely lie and assist them in moving forward quickly after the ROD is completed. (EPA believes there is indeed enough information in the ROD to enable RPs that want to move forward quickly into the RD phase.)

6. For those RPs that move forward quickly, EPA will offer release from further

obligations on cleanup of those areas that are done according to the consent decree that the RPs would enter into with EPA subject to adequate performance of the work and its subsequent achievement of relevant cleanup targets. All such work would of course be reviewed under the normal 5 review cycle in all Superfund cleanups. (EPA can give some form of clear but ultimately limited (by common sense under the Superfund process) release for work that is approved by EPA and well done by the RPs.)

7. Those RPs that begin and complete such site-specific work would still be accountable for their share of the cleanup, monitoring and review of the site-wide activities that will also need to be performed for the PHC to be completed. (The '14th' SDU for site-wide cleanup and responsibilities still have everyone on the hook until those costs get sorted out.)

8. For those site-specific cleanup areas and actions that do not have willing RPs stepping forward quickly, EPA will pursue it full range of enforcement tools to ensure that the cleanup of Portland Harbor begins quickly after the ROD is completed and is not unduly delayed by dispute within the PRPs over allocation of costs or other PRP-centric issues. (Where no RP steps forward in a timely manner, EPA will aggressively go out and put the right RPs on the hook and do so in a manner that does not punish those who did step forward early.)

Cheers, Bill

Bill Ross | Founder
Ross Strategic | 1218 3rd Ave, Suite 1207, Seattle WA 98101
Desk: 206.792.4040 | Cell: 206.669.8376

bross@rossstrategic.com | http://rossstrategic.com

To: Grandinetti, Cami[Grandinetti.Cami@epa.gov]
From: Bill Ross
Sent: Tue 2/23/2016 2:25:57 PM
Subject: Re: thoughts on 'as if no OU' approach

U got that right! Personal Privacy / Ex. 6 On PHC I am imagining an mou with DEQ. To give Kevin something to hold onto if you leave EPA to become an astronaut! Think about it. Just a thought.

Also think about Kevin's desire to have a metric for beginning RD's by a certain date. As an aspiration not a commitment. As part of an MOU?

See you Thursday. Good luck tomorrow!

Feeling better....

Sent from my iPhone

On Feb 22, 2016, at 5:37 PM, Grandinetti, Cami <Grandinetti.Cami@epa.gov<mailto:Grandinetti.Cami@epa.gov>> wrote:

This is great and gives me a lot to work with. Thank you Bill.
Personal Privacy / Ex. 6

Sent from my iPhone

On Feb 22, 2016, at 4:19 PM, Bill Ross <bross@rossstrategic.com<mailto:bross@rossstrategic.com>> wrote:

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Personal Privacy / Ex. 6

I offer these for you to ponder, use, reject as you see fit. I have tried to arrange them as a coherent 'story' of the signal an know that they are not in the language that you would use or the lawyers approve, most likely. In fact it might not even be accurate in some respects or tell the wrong story at times. Having said that, there is a story in what you are thinking about and I share this with the intent to help you say it as you write something up for Kevin and me Thursday.

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6. For those RPs that move forward quickly, EPA will offer release from further obligations on cleanup of those areas that are done according to the consent decree that the RPs would enter into with EPA subject to adequate performance of the work and its subsequent achievement of relevant cleanup targets. All such work would of course be reviewed under the normal 5 review cycle in all Superfund cleanups. (EPA can give some form of clear but ultimately limited (by common sense under the Superfund process) release for work that is approved by EPA and well done by the RPs.)

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Cheers, Bill

Bill Ross | Founder
Ross Strategic | 1218 3rd Ave, Suite 1207, Seattle WA 98101
Desk: 206.792.4040 | Cell: 206.669.8376
bross@rossstrategic.com<mailto:bross@rossstrategic.com> | http://rossstrategic.com

To: Hamilton, Jessica[Jessica.Hamilton@portofportland.com]
Cc: Stern, Allyn[Stern.Allyn@epa.gov]; Pirzadeh, Michelle[Pirzadeh.Michelle@epa.gov]; Grandinetti, Cami[Grandinetti.Cami@epa.gov]; Woolford, James[Woolford.James@epa.gov]; Mackey, Cyndy[Mackey.Cyndy@epa.gov]
From: McLerran, Dennis
Sent: Tue 1/19/2016 4:35:55 AM
Subject: Re: Portland Harbor Superfund Site--Request to Resolve Issues re Jan 4 Letter

Thanks Jessica.

Dennis McLerran

Sent from my EPA iPhone

On Jan 18, 2016, at 8:35 PM, Hamilton, Jessica <Jessica.Hamilton@portofportland.com> wrote:

We can use this number tomorrow. I will dial in as host.

Toll Free:

Host Code:

Participant Code:

Personal Privacy / Ex. 6

Talk to you tomorrow. Jessica

Sent from my iPhone

Sent from my iPhone
On Jan 18, 2016, at 7:16 PM, McLerran, Dennis <mclerran.dennis@epa.gov> wrote:

Jessica:

If you could set up a call in number that would be great. I look forward to talking tomorrow.

Dennis McLerran

Regional Administrator

EPA Region 10

From: Hamilton, Jessica <Jessica.Hamilton@portofportland.com>
Sent: Monday, January 18, 2016 11:13 AM
To: McLerran, Dennis
Cc: Grandinetti, Cami; Tom Imeson; Robinhold, Curtis; Magorrian, Matthew; Pirzadeh, Michelle; Woolford, James; Stern, Allyn; Mackey, Cyndy; Cora, Lori
Subject: Re: Portland Harbor Superfund Site--Request to Resolve Issues re Jan 4 Letter

Confirmed for 9am. Tom and I will be making the call from separate locations so please let me know if you need me to supply a call-in number. Thanks. Jessica

Sent from my iPhone

On Jan 17, 2016, at 3:53 PM, McLerran, Dennis <mclerran.dennis@epa.gov> wrote:

Jessica:

Cami and I can be available to talk at 9 AM Tuesday. Please call 206 553-1234 and we will take the call from my office. We would like to work on a way to keep the schedule while making sure you have the opportunity to build your record. At this point our attorneys do not believe the AOC provides for a dispute of the final FS content but we are willing to hear why you believe otherwise.

Dennis McLerran
Regional Administrator
EPA Region 10

Sent from my EPA iPhone

On Jan 16, 2016, at 10:38 AM, Hamilton, Jessica <Jessica.Hamilton@portofportland.com> wrote:

Dennis and Cami:

The LWG is facing a dispute deadline of Tuesday, January 19, and we intend to file our dispute, unless we can work something out with EPA that protects our ability to recover costs and also allows us to maintain our right to dispute the final FS, which is clearly contemplated and agreed to by the agency under the FS Process Agreement, which ties that right to the AOC, as well as a plain reading of the AOC itself.

The LWG, as we expressed when we first received the letter, believes that there is an acceptable solution out there, for both parties, to achieve EPA's goal of completing the FS and staying on schedule, well short of the approach outlined in your January 4 letter.

We would like to explore again with you whether we can reach agreement without initiating dispute. **We propose we discuss via conference call on Tuesday morning. Tom and I can both be available at 7:30 am, 9 am, or noon for a call.** Please let me know if you would like to try to work this out with us.

In anticipation of being able to come to a conceptual agreement, I will also ask for authority from the LWG to accept a short extension of the deadline to dispute in the event that EPA would like more time to memorialize the terms. Just to be clear, we do not need an extension in order to file our dispute; rather any extension would solely be accepted to allow for the LWG and EPA to be able to finalize an agreement without LWG having to preemptively file a dispute to avoid waiving any rights.

We remain very hopeful and optimistic that we can work something out that allows EPA to stay on schedule and to complete the FS, but also accommodates the needs of the LWG to protect our legal rights.

We look forward to hearing from you about whether you would like to discuss on Tuesday, and if so, what time will work.

Thank you,

Jessica and Tom

Jessica Hamilton

General Manager, Harbor Environmental

Port of Portland

7200 NE Airport Way

Portland, OR 97218

PO Box 3529

Portland, OR 97208

Cell: 503-740-0819

Direct: 503-415-6033

Fax: 503-548-5546

Jessica.Hamilton@portofportland.com

The information contained in this e-mail message may be privileged, confidential and protected from disclosure. If you are not the intended recipient, any dissemination, distribution or copying is strictly prohibited. If you think that you have received this e-mail in error, please e-mail the sender at Jessica.Hamilton@portofportland.com

To: McLerran, Dennis[mclerran.dennis@epa.gov]
Cc: Stern, Allyn[Stern.Allyn@epa.gov]; Pirzadeh, Michelle[Pirzadeh.Michelle@epa.gov]; Grandinetti, Cami[Grandinetti.Cami@epa.gov]; Woolford, James[Woolford.James@epa.gov]; Mackey, Cyndy[Mackey.Cyndy@epa.gov]
From: Hamilton, Jessica
Sent: Tue 1/19/2016 4:34:51 AM
Subject: Re: Portland Harbor Superfund Site--Request to Resolve Issues re Jan 4 Letter

We can use this number tomorrow. I will dial in as host.

Toll Free:

Host Code:

Participant Code:

Personal Privacy / Ex. 6

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EPA Region 10

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Thank you,

Jessica and Tom

Jessica Hamilton

General Manager, Harbor Environmental

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Fax: 503-548-5546

Jessica.Hamilton@portofportland.com

The information contained in this e-mail message may be privileged, confidential and protected from disclosure. If you are not the intended recipient, any dissemination, distribution or copying is strictly prohibited. If you think that you have received this e-mail in error, please e-mail the sender at Jessica.Hamilton@portofportland.com

To: Grandinetti, Cami[Grandinetti.Cami@epa.gov]
From: PARRETT Kevin
Sent: Wed 12/30/2015 4:42:24 PM
Subject: Re: Portland Harbor

Thanks

On Dec 30, 2015, at 8:28 AM, Grandinetti, Cami <Grandinetti.Cami@epa.gov<mailto:Grandinetti.Cami@epa.gov>> wrote:

Kevin-- Dennis asked to reach out to Dick directly in the process question. Attached is his email on the topic.
The approach we discussed has not changed. Thank you.

Sent from my iPhone

Begin forwarded message:

From: "McLerran, Dennis" <mclerran.dennis@epa.gov<mailto:mclerran.dennis@epa.gov>>
Date: December 29, 2015 at 10:47:11 AM PST
To: "pedersen.dick@deq.state.or.us<mailto:pedersen.dick@deq.state.or.us>" <pedersen.dick@deq.state.or.us<mailto:pedersen.dick@deq.state.or.us>>
Cc: "Pirzadeh, Michelle" <Pirzadeh.Michelle@epa.gov<mailto:Pirzadeh.Michelle@epa.gov>>, "Grandinetti, Cami" <Grandinetti.Cami@epa.gov<mailto:Grandinetti.Cami@epa.gov>>
Subject: Portland Harbor

Hi Dick,

Personal Privacy / Ex. 6 I wanted to let you know that Cami and Kevin have been in communication about process options for finalizing the Portland Harbor Feasibility Study to support our proposed cleanup plan. We are planning to notify the LWG of our approach on Monday January 4<x-apple-data-detectors://0>th<x-apple-data-detectors://0> and I wanted to make sure you are aware of how we are planning to move forward. If you'd like to talk before you return to the office please feel free to call me on my cell **Personal Privacy / Ex. 6**

Personal Privacy / Ex. 6

Happy New Year to you.

Dennis

Sent from my EPA iPhone

To: Grandinetti, Cami[Grandinetti.Cami@epa.gov]
Cc: Zhen, Davis[Zhen.Davis@epa.gov]; JOHNSON Keith[JOHNSON.Keith@deq.state.or.us]
From: PARRETT Kevin
Sent: Thur 12/17/2015 6:06:03 AM
Subject: RE: Operable Units for Portland Harbor Proposed Plan

Sure. Let me know what works.

-Kevin

From: Grandinetti, Cami [Grandinetti.Cami@epa.gov]
Sent: Wednesday, December 16, 2015 3:51 PM
To: PARRETT Kevin
Cc: Zhen, Davis; JOHNSON Keith
Subject: RE: Operable Units for Portland Harbor Proposed Plan

Kevin, If it's okay, I'd rather that you and I have more follow up discussion, and specifically not paper on this, and we can include Bill Ross if that makes sense. Personal Privacy / Ex. 6 but could be available for a follow up call.

Cami Grandinetti
Program Manager, Remedial Cleanup Program
USEPA
1200 6th Ave, Suite 900
ECL-123
Seattle, Wa. 98101
206-553-8696 (desk)
206-390-8890 (cell)
206-553-0124 (fax)

From: PARRETT Kevin [mailto:Parrett.Kevin@deq.state.or.us]
Sent: Wednesday, December 16, 2015 2:02 PM
To: Grandinetti, Cami <Grandinetti.Cami@epa.gov>
Cc: Zhen, Davis <Zhen.Davis@epa.gov>; JOHNSON Keith <JOHNSON.Keith@deq.state.or.us>
Subject: Operable Units for Portland Harbor Proposed Plan

Hi Cami,

I am following up on our conversation last week about DEQ's request for operable units to be specified in the Portland Harbor Proposed Plan. Attached is an initial cut at delineation of these OUs and identification of the most likely primary (lead) liable party for implementing the remedy within each OU.

The proposed OUs are based on EPA's Optimized Alternative that was presented to the NRRB/CSTAG. The attached figure shows 13 area-specific OUs plus an OU for the remainder of the site. The area-specific OUs address nearly all areas requiring active remediation and nearly all of these OUs have an obvious lead liable party.

You have expressed concern about specifying OUs in the Proposed Plan. And, I've expressed concern about not doing so. In order to resolve this impasse, I propose the following path forward:

- By Dec 31 – Gary V and Lori C talk to develop list of pros and cons.

- Early Jan – You and I brief Dick/Dennis/Jim on DEQ's proposal and pros/cons.
- Jan 21 – Bill Ross facilitate discussion at DEQ/EPA project team meeting (Gary and Lori attend).
- By Jan 29 – You and I, in consultation with Gary and Lori, refine agencies positions and pros/cons.
- Early Feb – Bill Ross facilitate your and my recommendations to Dick/Dennis/Jim.
- By Feb 29 – If necessary, Dick submits formal written request to Dennis.

Also, at some point in this process, Gary and Lori should follow up with the LWG (probably Patty Dost) on the LWG's recommendation to the NRRB that the site be broken into OUs in order to facilitate the administrative implementability of the remedy.

Let me know what you think about this path forward. I'm available Friday if you'd like to talk.

Thanks.

Kevin Parrett, Manager
NW Region Cleanup Program
Oregon Department of Environmental Quality
700 NE Multnomah Street, Suite 600,
Portland, OR 97232
Office: 503-229-5567
Mobile: 503-997-4313

To: Grandinetti, Cami[Grandinetti.Cami@epa.gov]
From: PARRETT Kevin
Sent: Tue 12/8/2015 5:14:27 PM
Subject: Re: NCP requirement for "State Involvement in Selection of Remedy"

OK. I'll call you.

-Kevin

> On Dec 8, 2015, at 8:59 AM, Grandinetti, Cami <Grandinetti.Cami@epa.gov> wrote:
>
> I could start earlier--12:30?
>
> _____
> Cami Grandinetti
> Program Manager, Remedial Cleanup Program
> USEPA
> 1200 6th Ave, Suite 900
> ECL-123
> Seattle, Wa. 98101
> 206-553-8696 (desk)
> 206-390-8890 (cell)
> 206-553-0124 (fax)
>
>
> -----Original Message-----
> From: PARRETT Kevin [mailto:Parrett.Kevin@deq.state.or.us]
> Sent: Tuesday, December 08, 2015 8:56 AM
> To: Grandinetti, Cami <Grandinetti.Cami@epa.gov>
> Subject: Re: NCP requirement for "State Involvement in Selection of Remedy"
>
> I can do 1 - 1:15. Does that work for you ?
>
> -Kevin
>
>> On Dec 8, 2015, at 8:52 AM, Grandinetti, Cami <Grandinetti.Cami@epa.gov> wrote:
>>
>> Okay, **Personal Privacy / Ex. 6** **Personal Privacy / Ex. 6** I won't be available at 3:30. What does your morning tomorrow look like?
>>
>> _____
>> Cami Grandinetti
>> Program Manager, Remedial Cleanup Program USEPA
>> 1200 6th Ave, Suite 900
>> ECL-123
>> Seattle, Wa. 98101
>> 206-553-8696 (desk)
>> 206-390-8890 (cell)
>> 206-553-0124 (fax)
>>
>>
>> -----Original Message-----
>> From: PARRETT Kevin [mailto:Parrett.Kevin@deq.state.or.us]
>> Sent: Monday, December 07, 2015 5:05 PM
>> To: Grandinetti, Cami <Grandinetti.Cami@epa.gov>

>> Subject: Re: NCP requirement for "State Involvement in Selection of Remedy"
>>
>> 3:30 would be best.
>>
>> -Kevin
>>
>> On Dec 7, 2015, at 3:41 PM, Grandinetti, Cami
<Grandinetti.Cami@epa.gov<mailto:Grandinetti.Cami@epa.gov>> wrote:
>>
>> 1 to 1:30 or 3:30?
>>
>> _____
>> Cami Grandinetti
>> Program Manager, Remedial Cleanup Program USEPA
>> 1200 6th Ave, Suite 900
>> ECL-123
>> Seattle, Wa. 98101
>> 206-553-8696 (desk)
>> 206-390-8890 (cell)
>> 206-553-0124 (fax)
>>
>> From: PARRETT Kevin [mailto:Parrett.Kevin@deq.state.or.us]
>> Sent: Monday, December 07, 2015 3:01 PM
>> To: Grandinetti, Cami
>> <Grandinetti.Cami@epa.gov<mailto:Grandinetti.Cami@epa.gov>>
>> Subject: RE: NCP requirement for "State Involvement in Selection of Remedy"
>>
>> I'm in solid meetings from 8am to noon. Do you have time in the afternoon?
>>
>> From: Grandinetti, Cami [mailto:Grandinetti.Cami@epa.gov]
>> Sent: Monday, December 07, 2015 1:25 PM
>> To: PARRETT Kevin
>> Subject: Re: NCP requirement for "State Involvement in Selection of Remedy"
>>
>> On you r specific question about statements in the proposed plan you can leave yourself room to see public comment or see how EPA responds to comments before saying whether you agree with proposed plan. On the operable units-- that is a much bigger deal and not something we can do in a decision. Remedy decision can and is different from implementation. I get the concern but I know we can work thru it post rod. We can discuss more tomorrow.
>>
>> Sent from my iPhone
>>
>> On Dec 7, 2015, at 12:28 PM, PARRETT Kevin
<Parrett.Kevin@deq.state.or.us<mailto:Parrett.Kevin@deq.state.or.us>> wrote:
>> Hi Cami. One of the topics that I'd like to discuss before EPA gets too far down the road in drafting the Proposed Plan is NCP 300.515(e) which states: "At conclusion of the RI/FS, the lead agency, in conjunction with the support agency shall develop a proposed plan" and "Included in the proposed plan shall be a statement that the lead and support agencies have reached agreement or, where this is not the case, a statement explaining the concerns of the support agency with the lead agency's proposed plan."
>>
>> Perhaps there is discretion with the extent that DEQ "develop(s)" the Proposed Plan and perhaps our periodic meetings and intra-agency coordination suffice. However, I'm concerned about the second provision which appears to strictly require that DEQ indicate whether it agrees with EPA on the Proposed Plan. If this is indeed the case, it will need to be factored into the schedule in developing the Proposed Plan.
>>

>> Also, there is a significant issue about the Proposed Plan that we need to discuss as soon as possible and I'd like Gary Vrooman to be part of the conversation. It is Operable Units. We touched on this several months ago and I decided not to include it in the State's comments to the NRRB. However, after further reflection, I am convinced that a Portland Harbor remedy will not be implementable unless the site is broken into OUs. I see this as a threshold issue for the State and we will want OUs to be reflected in the Proposed Plan.
>>
>> I sent you an email yesterday asking that we talk before our team meeting Wed afternoon. I am available the remainder of today and tomorrow afternoon.
>>
>> Kevin Parrett, Manager
>> NW Region Cleanup Program
>> Oregon Department of Environmental Quality
>> 700 NE Multnomah Street, Suite 600,
>> Portland, OR 97232
>> Office: 503-229-5567
>> Mobile: 503-997-4313
>>

To: Grandinetti, Cami[Grandinetti.Cami@epa.gov]
From: Prince, John
Sent: Fri 12/4/2015 11:57:04 PM
Subject: Re: PH recommendation #9

Deliberative Process / Ex. 5

Sent from my iPhone

On Dec 4, 2015, at 6:02 PM, Grandinetti, Cami <Grandinetti.Cami@epa.gov> wrote:

Deliberative Process / Ex. 5

Cami Grandinetti
Program Manager, Remedial Cleanup Program
USEPA
1200 6th Ave, Suite 900
ECL-123
Seattle, Wa. 98101
206-553-8696 (desk)
206-390-8890 (cell)
206-553-0124 (fax)

From: Prince, John
Sent: Friday, December 04, 2015 2:39 PM
To: Grandinetti, Cami <Grandinetti.Cami@epa.gov>
Subject: RE: PH recommendation #9

You bet.

Deliberative Process / Ex. 5

Deliberative Process / Ex. 5

Good weekend to you too – off on Monday and I am taking it. Amy gave me a kitchen pass for the NRRB call.

From: Grandinetti, Cami
Sent: Friday, December 04, 2015 5:02 PM
To: Prince, John <Prince.John@epa.gov>
Subject: RE: PH recommendation #9

Thanks for all your help on this—much appreciated. And as to the point you made about not remembering the end of construction risks, it was something developed just before the presentation (I had not yet seen the data) and I had to go back and re-look at it to see it the way I do now.
Have a great weekend and we'll talk more on Monday.

Cami Grandinetti
Program Manager, Remedial Cleanup Program
USEPA
1200 6th Ave, Suite 900
ECL-123
Seattle, Wa. 98101
206-553-8696 (desk)
206-390-8890 (cell)
206-553-0124 (fax)

From: Prince, John
Sent: Friday, December 04, 2015 9:31 AM
To: Legare, Amy <Legare.Amy@epa.gov>; Chesnutt, John <Chesnutt.John@epa.gov>; Christopher,

Anne <Christopher.Anne@epa.gov>; Grandinetti, Cami <Grandinetti.Cami@epa.gov>; Fonseca, Silvina <Fonseca.Silvina@epa.gov>; Openchowski, Charles <openchowski.charles@epa.gov>
Subject: RE: PH recommendation #9

<< File: Alternate 9 10 and 11.docx >>

Sorry for late developments. I took John C's rewrite, Earl's language, and the original "phased/adaptive/interim" comment and rewrote them as three semi-linked comments. Hearing where we were heading, I then chopped comment 11 down to one paragraph. This will be much easier for us to work from, I think, then trying to work from the version 2 that Amy posted this morning.

Amy if you can upload this we might work off of it?

I have an emergency conference call that I am on and will be a few moments delayed in signing on.

From: Legare, Amy
Sent: Friday, December 04, 2015 12:07 PM
To: Prince, John <Prince.John@epa.gov>; Chesnutt, John <Chesnutt.John@epa.gov>; Christopher, Anne <Christopher.Anne@epa.gov>; Grandinetti, Cami <Grandinetti.Cami@epa.gov>; Fonseca, Silvina <Fonseca.Silvina@epa.gov>; Openchowski, Charles <openchowski.charles@epa.gov>
Subject: RE: PH recommendation #9

Personal Privacy / Ex. 6

-----Original Appointment-----
From: Legare, Amy
Sent: Wednesday, December 02, 2015 5:02 PM
To: Legare, Amy; Prince, John; Chesnutt, John; Christopher, Anne; Grandinetti, Cami; Fonseca, Silvina; Openchowski, Charles
Subject: PH recommendation #9
When: Friday, December 04, 2015 12:30 PM-2:30 PM (UTC-05:00) Eastern Time (US & Canada).
Where: **Personal Privacy / Ex. 6**

From: Jen Woronets
Location: Anchor QEA, 720 Olive Way, Suite 1900, Seattle, WA, Galena Room/Conference Line Personal Privacy / Ex. 6
Importance: Normal
Subject: Gasco EE/CA Meeting
Start Date/Time: Mon 11/2/2015 6:00:00 PM
End Date/Time: Mon 11/2/2015 9:00:00 PM
Gasco Sediments Flow Chart Eval Figs_102115.pdf
Fig3-03-40_Sediment Management and Disposal Decision Tree_20151030_1440.pdf
Post-FS-Process-Flow-Chart_20151012.pdf

;;
Cami, Kristine, Sean, Anne, Davis, Bob, Margaret, Ben, Carl, Ryan, Joe, and Lance,
A meeting between EPA and NW Natural representatives has been confirmed for this coming Monday from 10-1pm at Anchor QEA's office located at 720 Olive Way, Suite 1900 (top floor). The objective of the meeting is collectively discuss application of the FS decision flow charts at the Gasco Sediments Site and refinements to the FS-level assumptions using Gasco site-specific data and evaluations. Anchor QEA will provide hardcopies of the attached FS decision flow charts for easy reference during the meeting.
AGENDA

1. Review and Discussion of EPA Revised Decision Flow Charts
2. Application of Revised Decision Flow Charts Using Gasco Site-specific Data
3. Gasco Sediments Site Remedial Design Next Steps and Schedule

To: Koch, Kristine[Koch.Kristine@epa.gov]
Cc: Woolford, James[Woolford.James@epa.gov]; Ells, Steve[Ells.Steve@epa.gov]; Grandinetti, Cami[Grandinetti.Cami@epa.gov]; brandy.humphreys@grandronde.org[brandy.humphreys@grandronde.org]; audiehuber@ctuir.com[audiehuber@ctuir.com]; Bob Wyatt[rjw@nwnatural.com]; callie@ridolfi.com[callie@ridolfi.com]; Courtney Johnson (courtney@crag.org)[courtney@crag.org]; cunninghame@gorge.net[cunninghame@gorge.net]; Dave Livesay[dlivesay@gsiws.com]; Elmer Ward (elmer.ward@ctwsbnr.org)[elmer.ward@ctwsbnr.org]; Personal Privacy / Ex. 6 Personal Privacy / Ex. 6 Gail Fricano (gfricano@indecon.com)[gfricano@indecon.com]; Holly Partridge (Holly.Partridge@grandronde.org)[Holly.Partridge@grandronde.org]; Jennifer Kassakian (jkassakian@indecon.com)[jkassakian@indecon.com]; Jim McKenna (jim.mckenna@verdantllc.com)[jim.mckenna@verdantllc.com]; Julie Weis[jweis@hk-law.com]; Kim Cox (kim.cox@portlandoregon.gov)[kim.cox@portlandoregon.gov]; Kim D'Aquila (kim.daquila@grandronde.org)[kim.daquila@grandronde.org]; Madalinski, Kelly[Kelly.Madalinski@portofportland.com]; MCCLINCY Matt[MCCLINCY.Matt@deq.state.or.us]; Michael.karnosh@grandronde.org[Michael.karnosh@grandronde.org]; Rachel DelVecchio (rdelvecchio@indecon.com)[rdelvecchio@indecon.com]; Rita Cabral[RCabral@indecon.com]; Robert.Neely@noaa.gov[Robert.Neely@noaa.gov]; rose@yakamafish-nsn.gov[rose@yakamafish-nsn.gov]; Sheldrake, Sean[sheldrake.sean@epa.gov]; tomd@ctsi.nsn.us[tomd@ctsi.nsn.us]; Carl Stivers[cstivers@anchorqea.com]; Amanda Shellenberger[ashellenberger@anchorqea.com]; Patty Dost[pdost@pearllegalgroup.com]; Jen Woronets[jworonets@anchorqea.com]
From: Jen Woronets
Sent: Fri 10/9/2015 9:30:30 PM
Subject: LWG Comments On EPA Draft FS Sections 3 and 4
2015_10_08_FS Section 3 and 4 Additional LWG Comments.pdf
2015_10_08_FS Section 3 and 4 LWG Significant Issue Clarifications.pdf
LWG Comments on EPA FS Previously Submitted to EPA.pdf

Kristine,

Per EPA's instruction the LWG is submitting its full set of comments on EPA's draft FS. The attached packet of comments includes:

- Copies of previously submitted comments on Sections 1 and 2, as well as the LWG's initial list of significant comments on Sections 3 and 4; and
- The LWG's additional comments on Sections 3 and 4 (i.e., those beyond our initial list of significant comments).

We remain available to meet with you and your team to discuss these comments.

Please contact us if you have any questions or to arrange technical meetings.

Thank you,

Jen Woronets ☺

Anchor QEA, LLC

jworonets@anchorqea.com

421 SW Sixth Avenue, Suite 750

Portland, OR 97204

503-972-5014

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Oregon DEQ's Perspectives on Portland Harbor

2014 Oregon Environmental Cleanup Conference

- *Source Control Update*
- *State Acceptance and Concurrence*

Kevin Parrett, PhD
Manager, NWR Cleanup and Leaking USTs
Oregon DEQ

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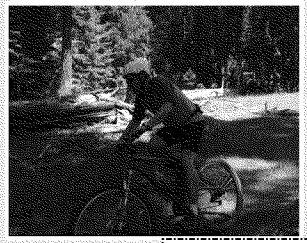
DEQ's Core Team

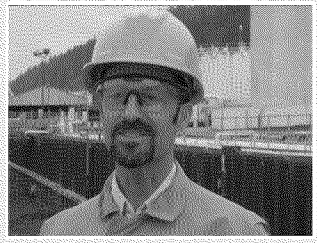
- Matt McClincy – Source Control & Interim In-water
- Tom Roick – State Government Coordinator
- Alex Liverman – Stormwater
- Mike Poulsen – Human Health Toxicologist
- Jennifer Peterson – Ecological Toxicologist
- Christine Svetkovich – Environmental Justice and Tribal Liaison
- Kevin Parrett, Keith Johnson, Bruce Gilles – Regional and Program Managers
- Nina Deconcini – Regional Administrator
- Dick Pedersen – Director

Dart board of former DEQ PMs

Eric Blische EPA Nov '03



Jim Anderson Personal Privacy / Ex. 6



Tom Gaine Personal Privacy / Ex. 6

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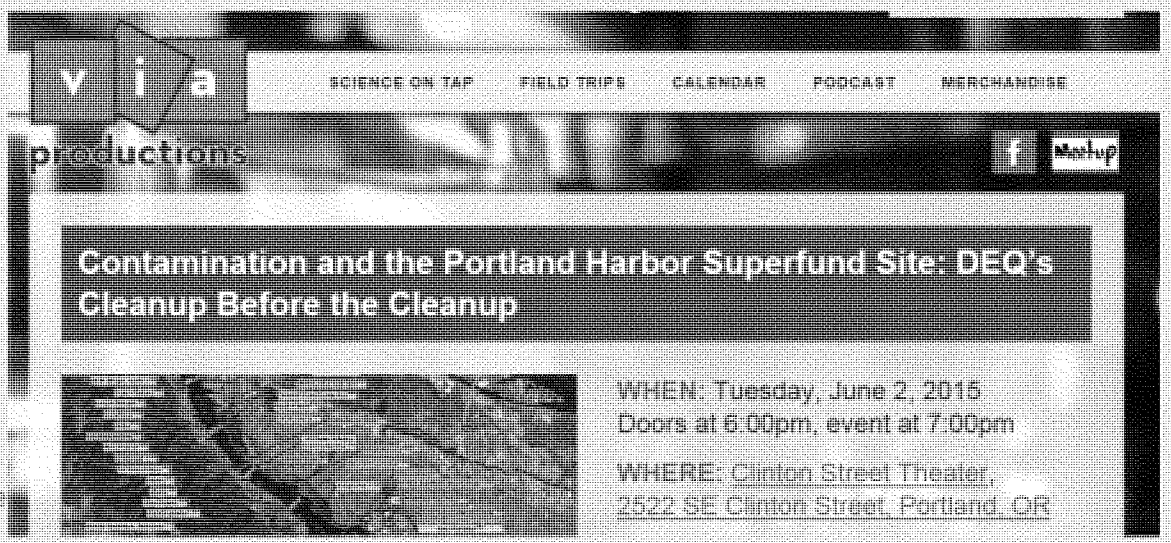
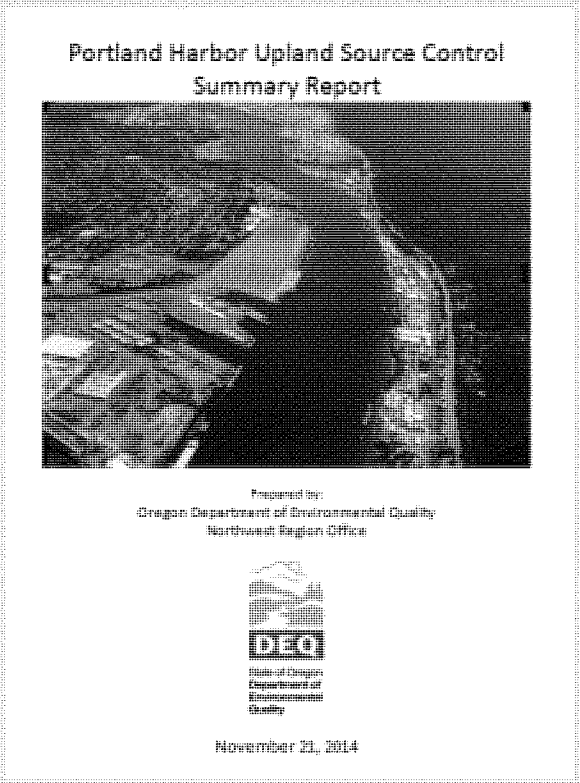
Matt ?

Source Control Updates

- Goal to identify, characterize and cleanup upland sites prior to EPA issuing ROD
- DEQ seeks concurrence from EPA on SCDs
- 168 upland sites in 9 georegions
- Focus on stormwater, groundwater, bank erosion
- Upstream inputs
- DEQ SC Summary Rpt – Submit to EPA – fall 2014
- Outreach kick off spring 2015
  - Video (http://www.deq.state.or.us/lq/cu/nwr/portlandharbor)
  - Xx public events



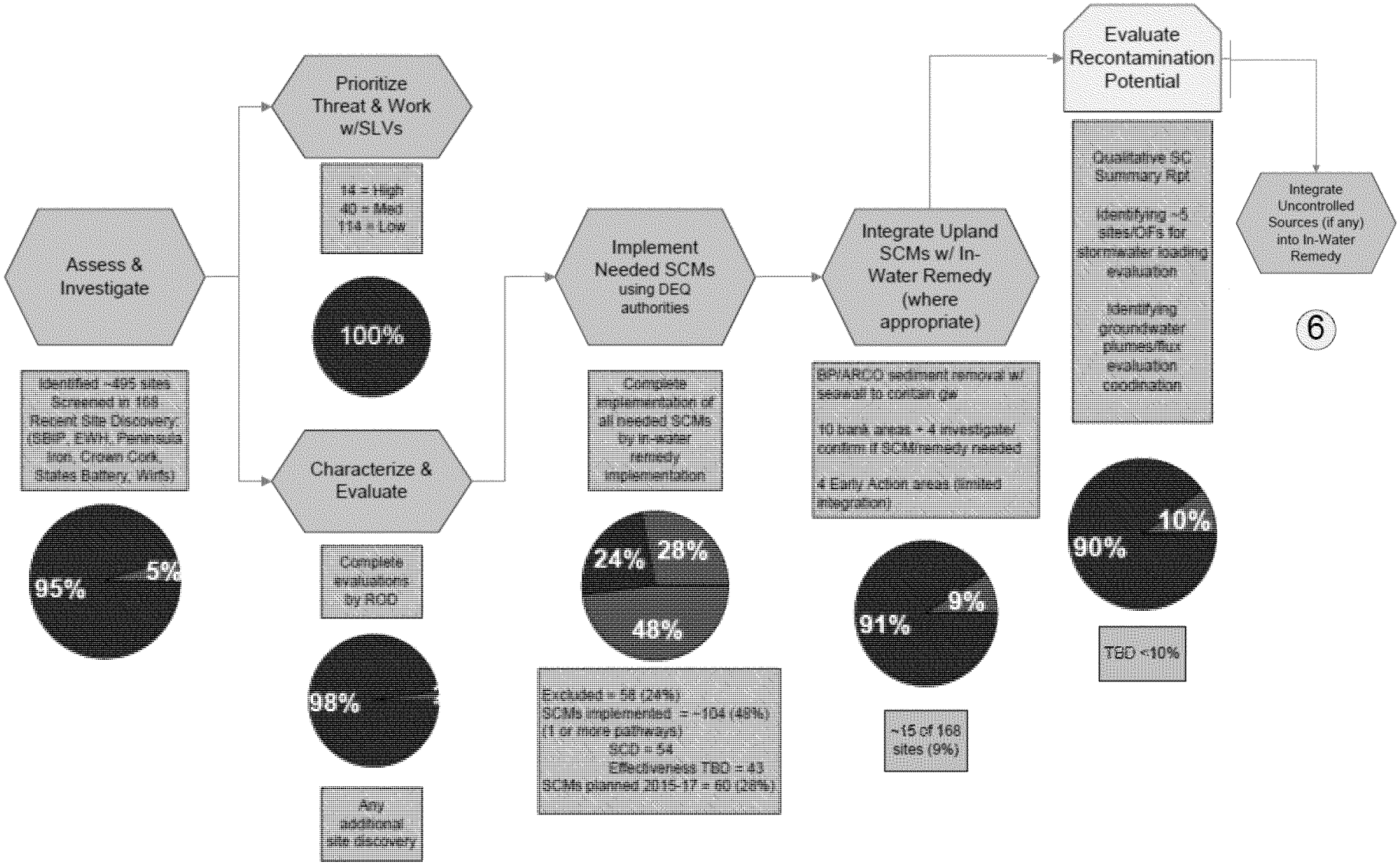

Portland Harbor Upland Source Control Summary Report

Prepared by:
Oregon Department of Environmental Quality
Northwest Region Office

November 21, 2014

Matt ?

Source Control Steps and Status



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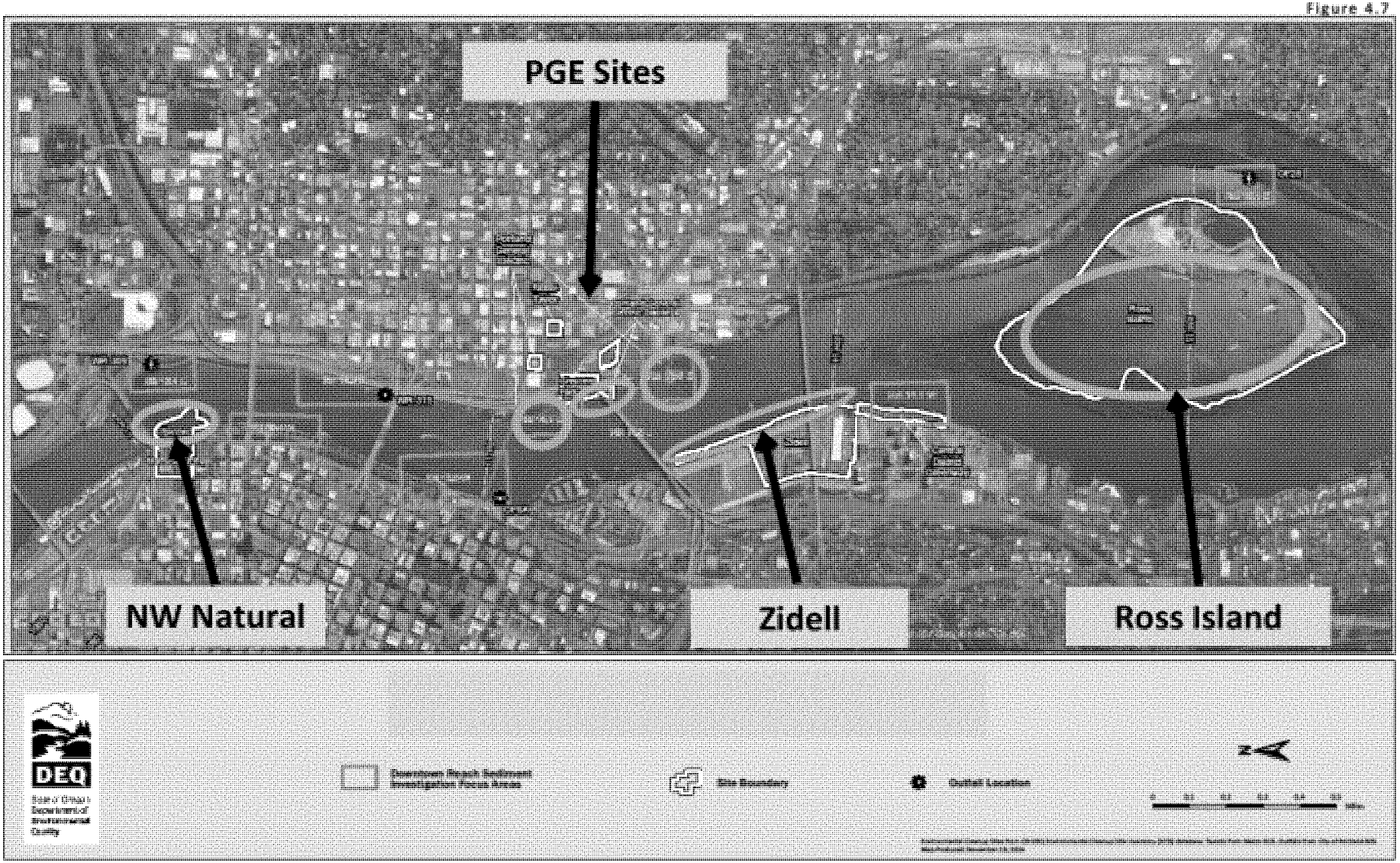
Downtown Reach Work

Figure 4.7



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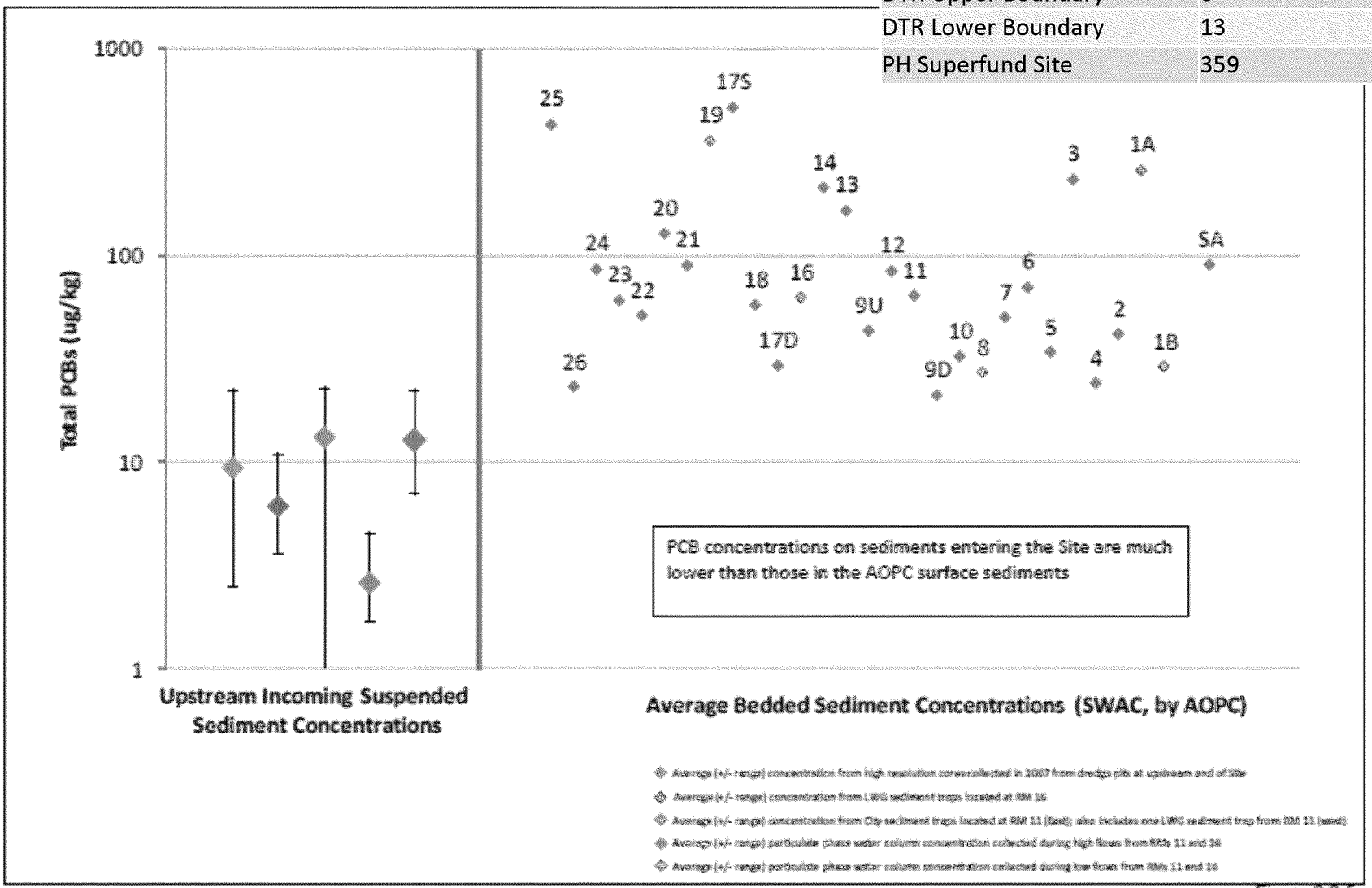
Sediment Traps	Average
DTR Upper Boundary	6
DTR Lower Boundary	13
PH Superfund Site	359



LWG
Lower Willamette Group
ANCHOR QEA

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This document is currently under review by US EPA and its federal, state, and tribal partners, and is subject to change in whole or in part

Figure 6.2-6
Portland Harbor RI/FS
Draft Feasibility Study Report
Contaminant Concentrations on Incoming Suspended Sediments Compared with Study Area Bedded Sediments (Total PCB)

DEQ
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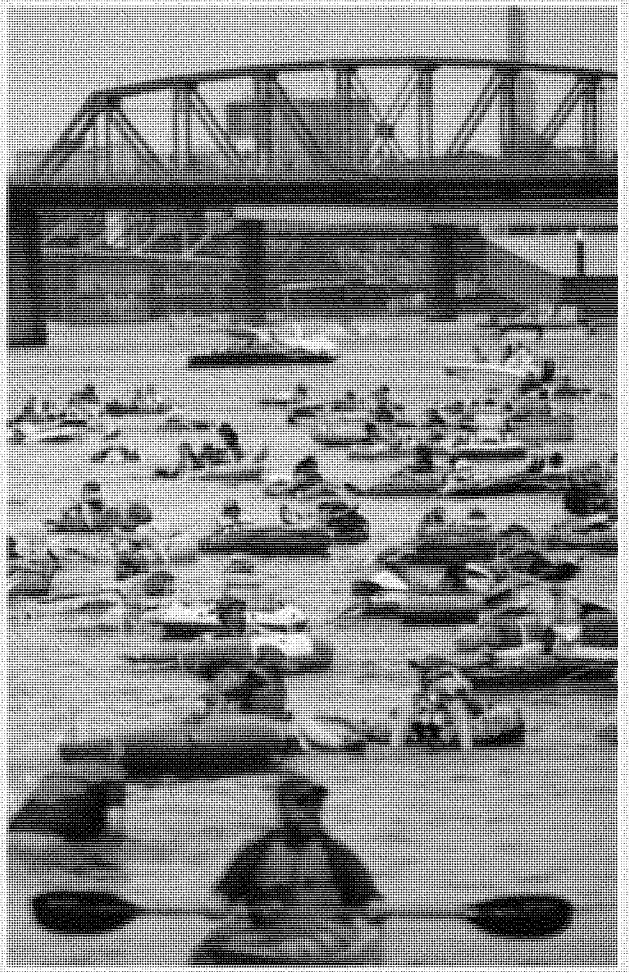
Downtown Reach - Conclusions

- DTR does not pose a recontamination threat to Portland Harbor and will not impede remedy implementation
- Most significant sites identified, cleaned up or in process of cleanup
- PCBs, dioxins/furans, PAHs primary COCs
- Suspended sediment concentrations approaching background levels
- Majority of StW draining to City OFs has been redirected to Col Blvd treatment plan or to infiltration. City has implemented BMPs in other areas.
- No known or on-going upland sources adding to contaminant loads
- DEQ working with several parties to close minor data gaps
- DEQ will consider additional sediment cleanup following PH ROD



Big Float 2014

DEQ
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State Concurrence and Acceptance

40 CFR 300.430(e)(9)(iii) – "State Acceptance" is one of the Nine Criteria for Evaluating Remedial Alternatives Developed in the Feasibility Study

Threshold Criteria

- Overall protection of human health and the environment
- Compliance with ARARs

Primary Balancing Criteria

- Long-term effectiveness and permanence
- Reduction of toxicity, mobility or volume through treatment
- Short-term effectiveness
- Implementability
- Cost

Modifying Criteria

- State acceptance
- Community acceptance

40 CFR 300.515(e) – Requires EPA to provide an opportunity for the state to be involved in remedy selection and to "concur" with EPA's ROD

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So What's Going On?

- DEQ reviewing draft feasibility study
- Draft FS adequate for EPA to recommend conceptual remedy
- DEQ coordinating with other State agencies and Gov office
- DEQ will present key comments on CR to NRRB in November
  - Cost – What can be cut?
  - Treatment of Principal Threat Waste – Value added?
  - Navigation and other uses – Minimize restrictions and impediments
  - Technology assignments – Benefits of dredging outside Nav area?
  - Remedial Design – Flexibility
  - MNR – Addressing uncertainties
  - Effectiveness and residual risks – Focus on hot spot areas
  - RALs – Refinements?
  - Contingency Remedies – EMNR?
- DEQ will comment on EPA's Proposed Plan
- State will determine concurrence on EPA's Record of Decision

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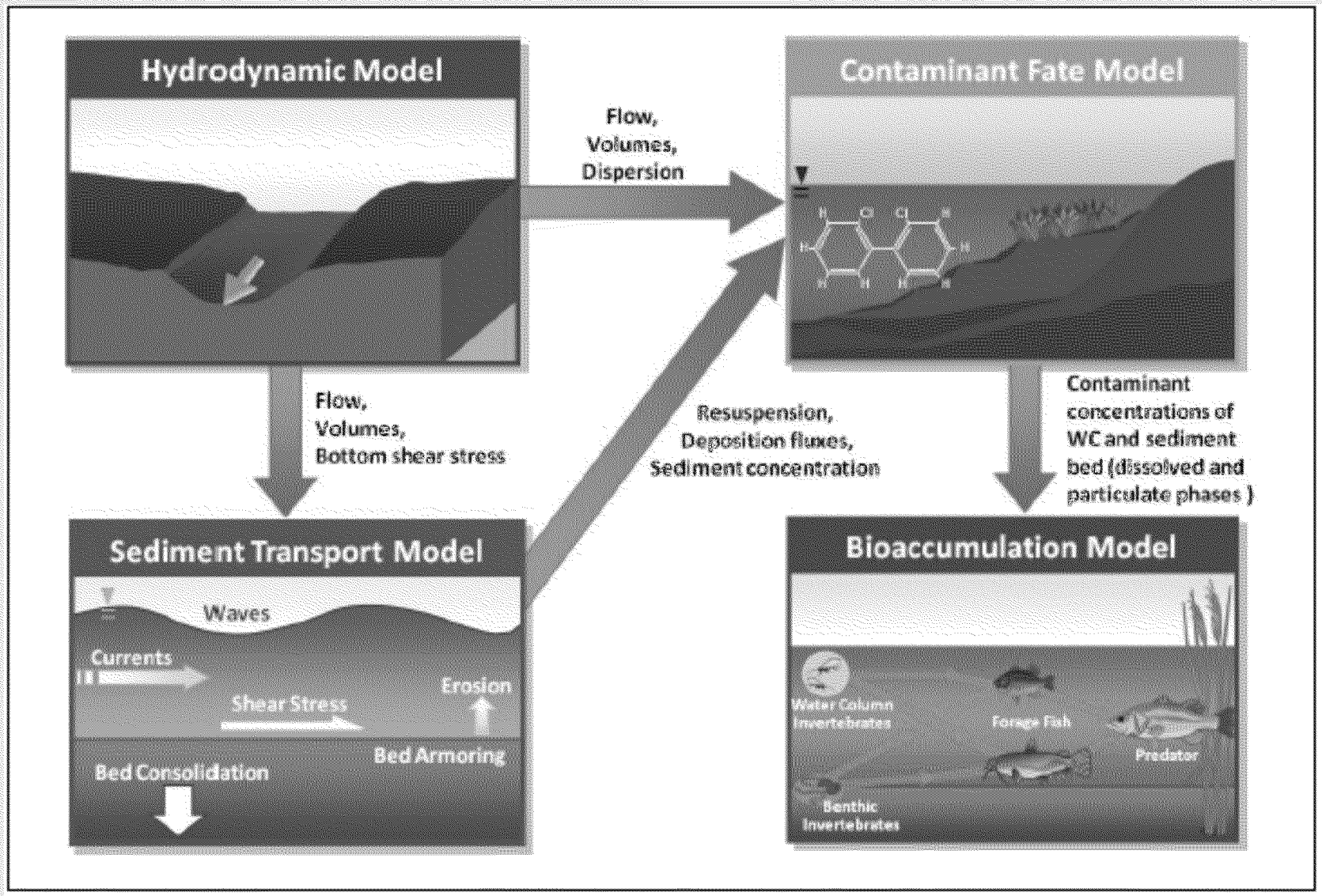
Modeling Approach



LWG Lower Willamette Group
ANCHOR QEA

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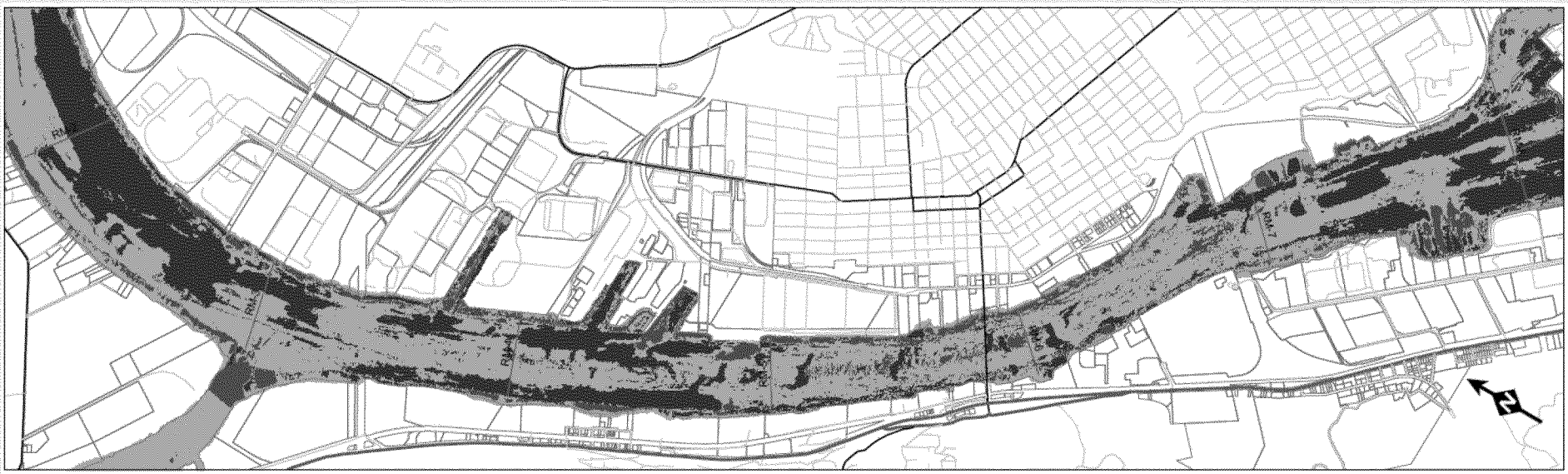
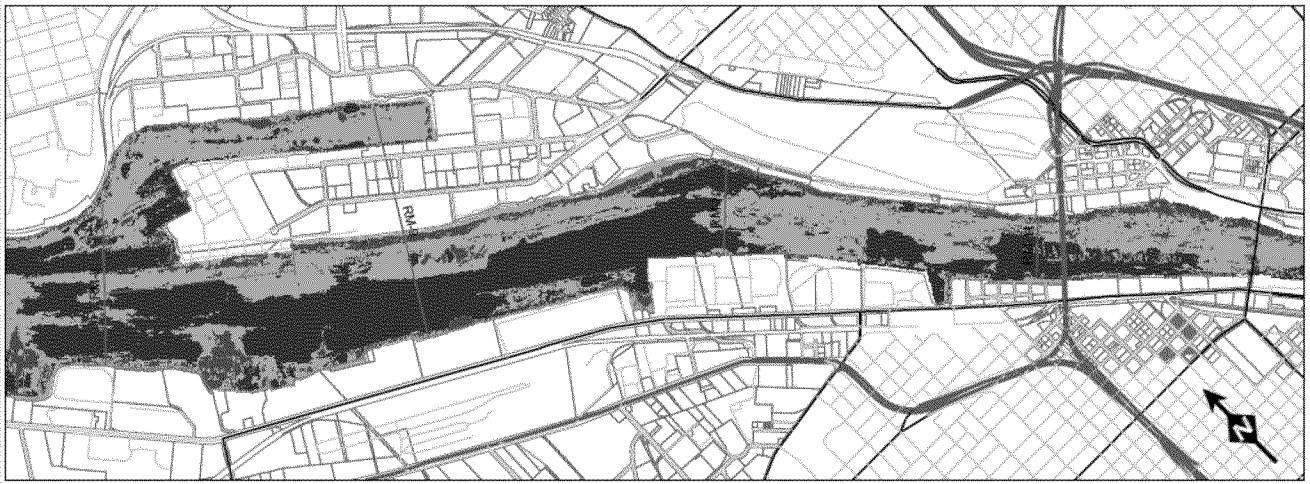
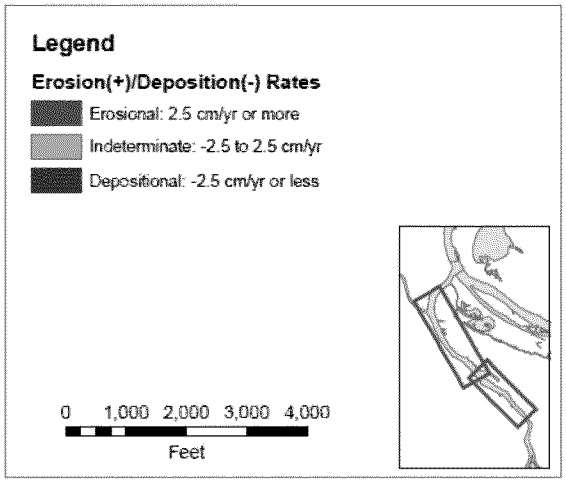
Figure 2.1-1
Portland Harbor RI/FS
Draft Feasibility Study Report
Generalized Model Framework and Model Linkages

DEQ

Modeling Challenge







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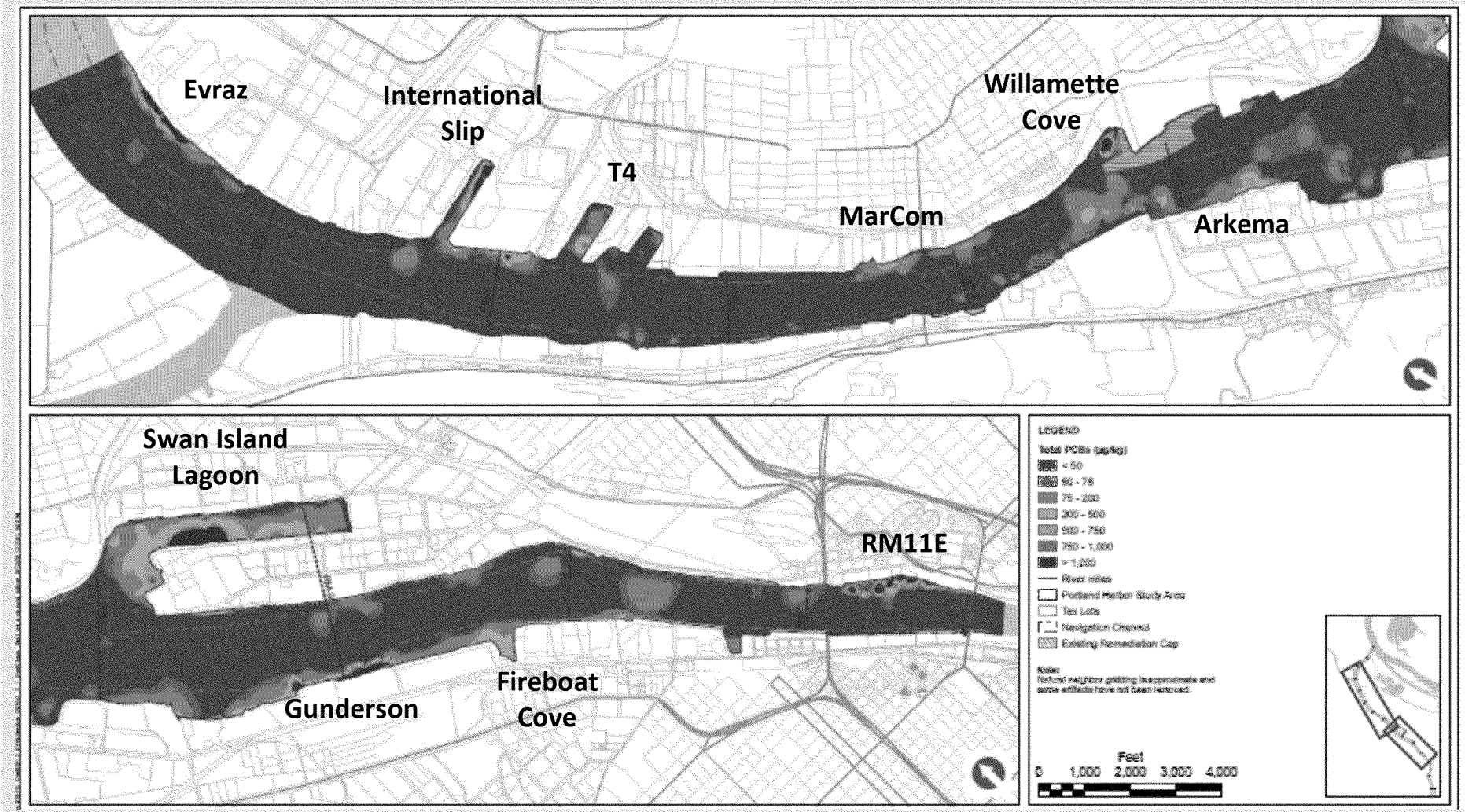
Modeling Hot Spot (e.g., PCBs)



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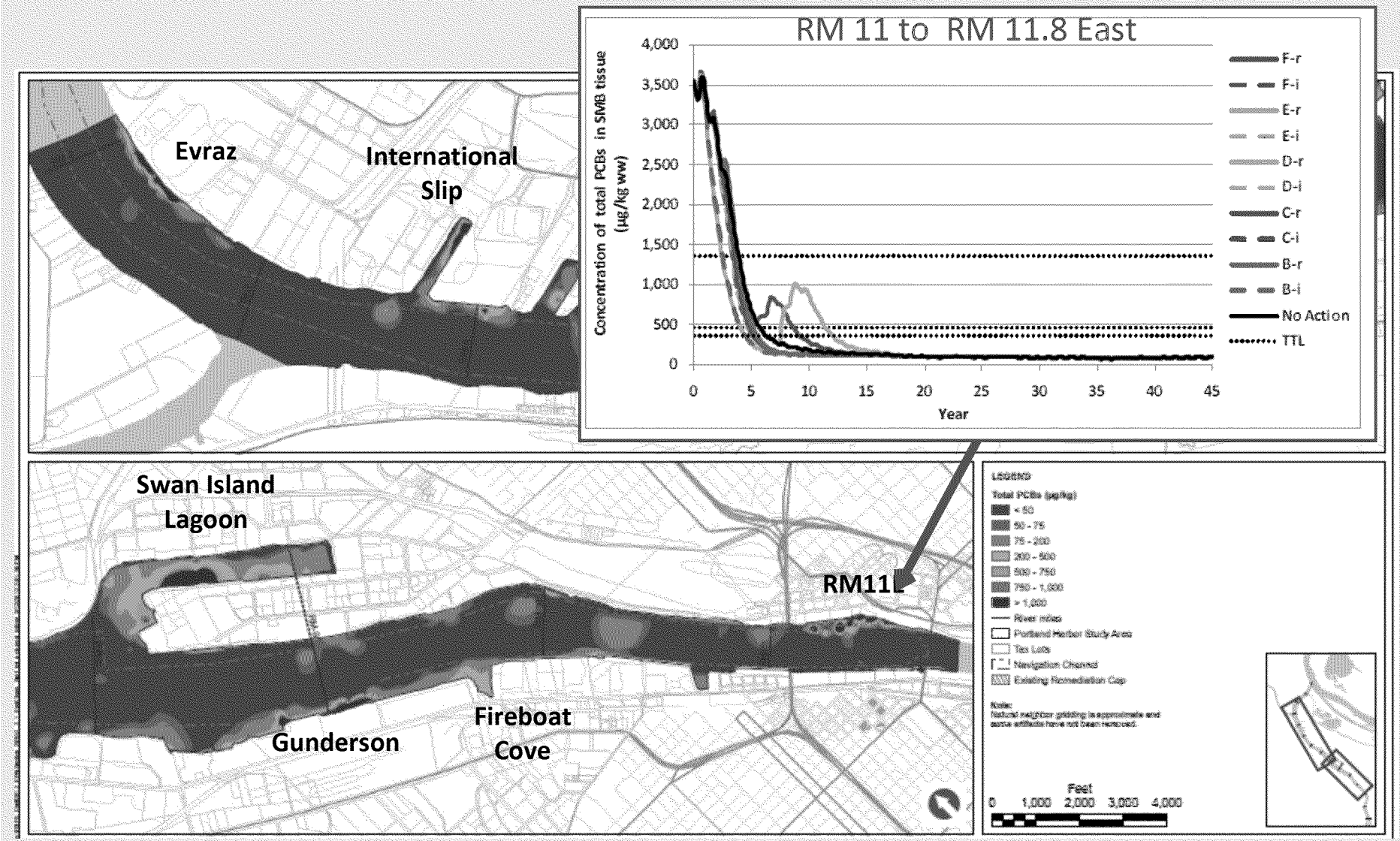
RM11E Area
Results – Full Recovery of Fish Tissue within 10 Years



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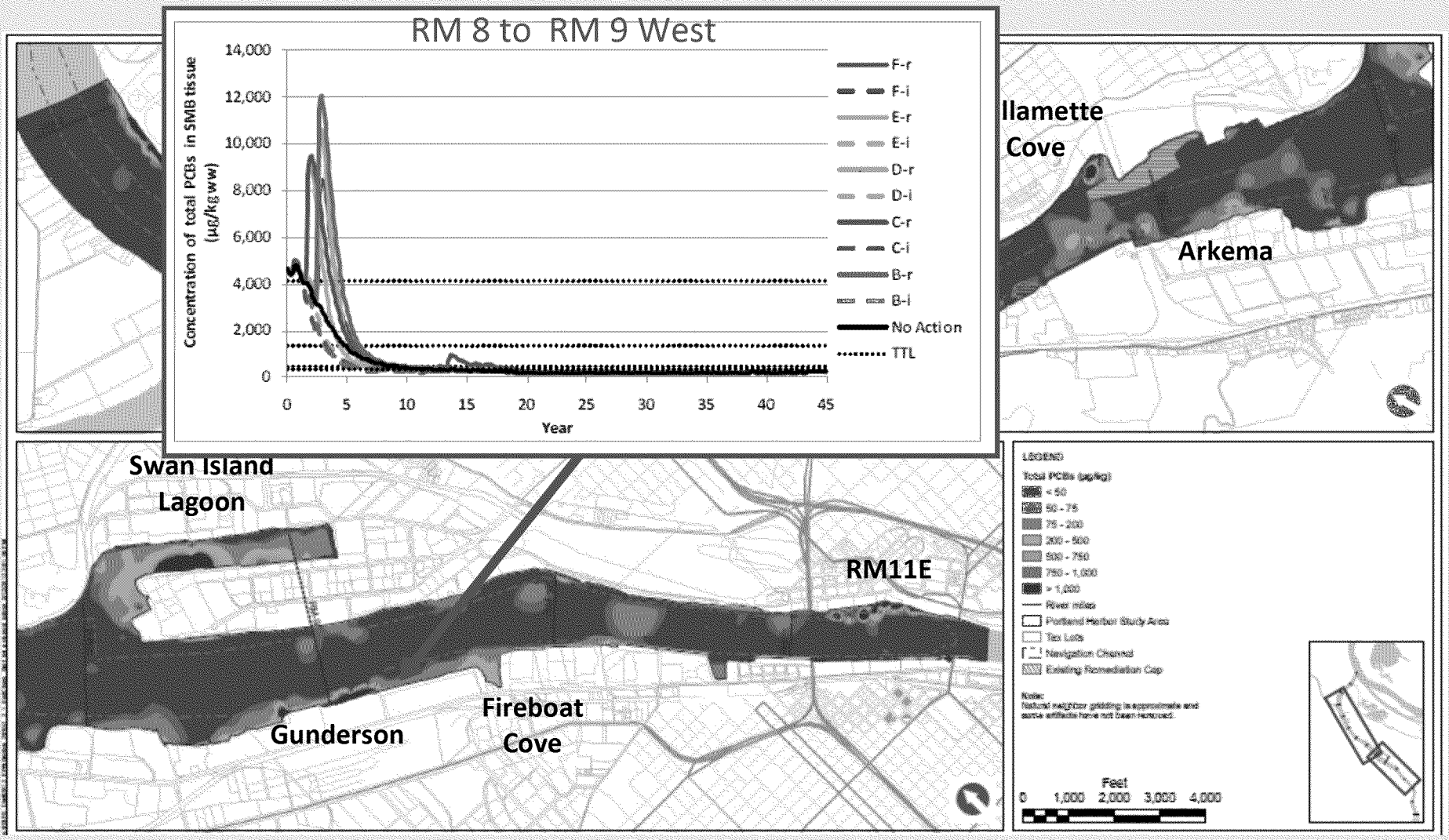
Gunderson Area
Results – Full Recovery of Fish Tissue within 10 Years



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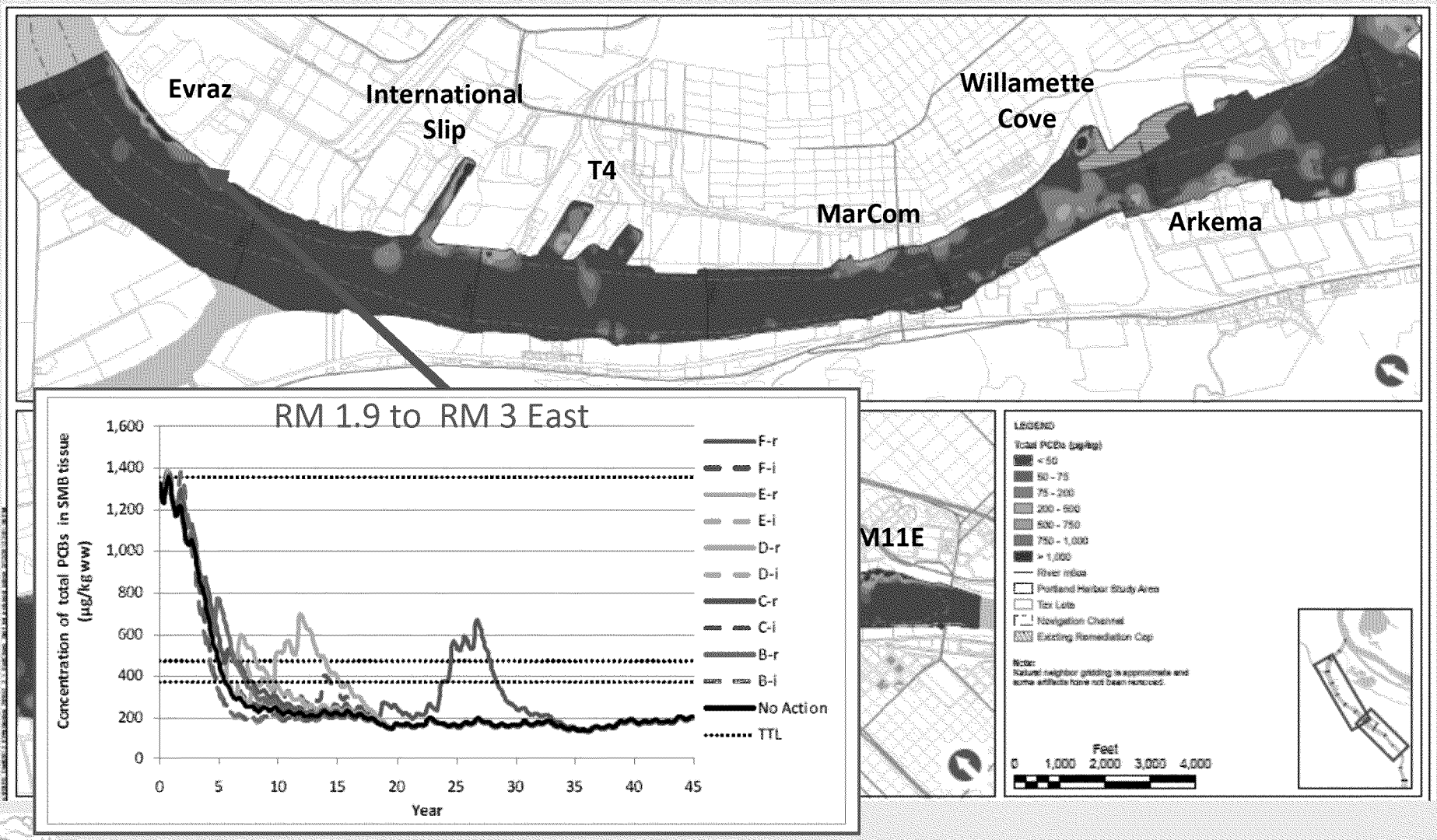
Evraz Area
Results – Full Recovery of Fish Tissue within 10 Years



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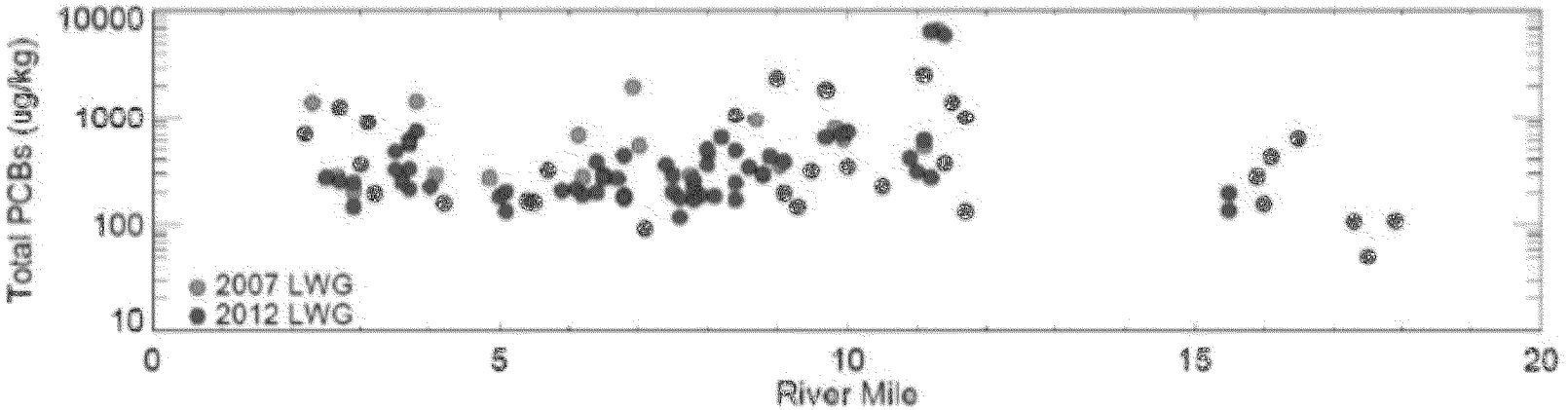
Empirical Data ≠ Model Results

2007 and 2012 PCB Concentrations in Whole Smallmouth Bass by River Mile



EPA Draft Feasibility Study Figure 4.1-6

ED_000959_PST_00081830-00016 12/23/2020 SEMS_0337997

~ The End ~

"over 900 full-time jobs will be lost in Multnomah County each year the remediation is underway"

Economic Impacts of Remediation the Portland Harbor Superfund Site, The Brattle Group, January 2012
-Funded by undisclosed group of PLPs

"the cleanup would increase the utilization of the Portland region's economic capacity – boosting incomes, employment, and tax revenues"

Economic Impacts of the Portland Harbor Superfund Site Cleanup, ECONorthwest, June 2012
-Funded by City of Portland

"Tongans do not go out fishing on the weekends because it's beautiful out or sunny: they go out there for food. It's important for us to teach our children how to fish and for us to eat fresh food."

"It needs to be cleaner, but it needs to stay commercial. Portland's shipping business is vital to its continued survival as a meaningful metropolis."

Community Perspectives on the Future of the Portland Harbor and the Willamette River, Portland State University, May 2012
-Funded by Portland Harbor Partnership

DEQ
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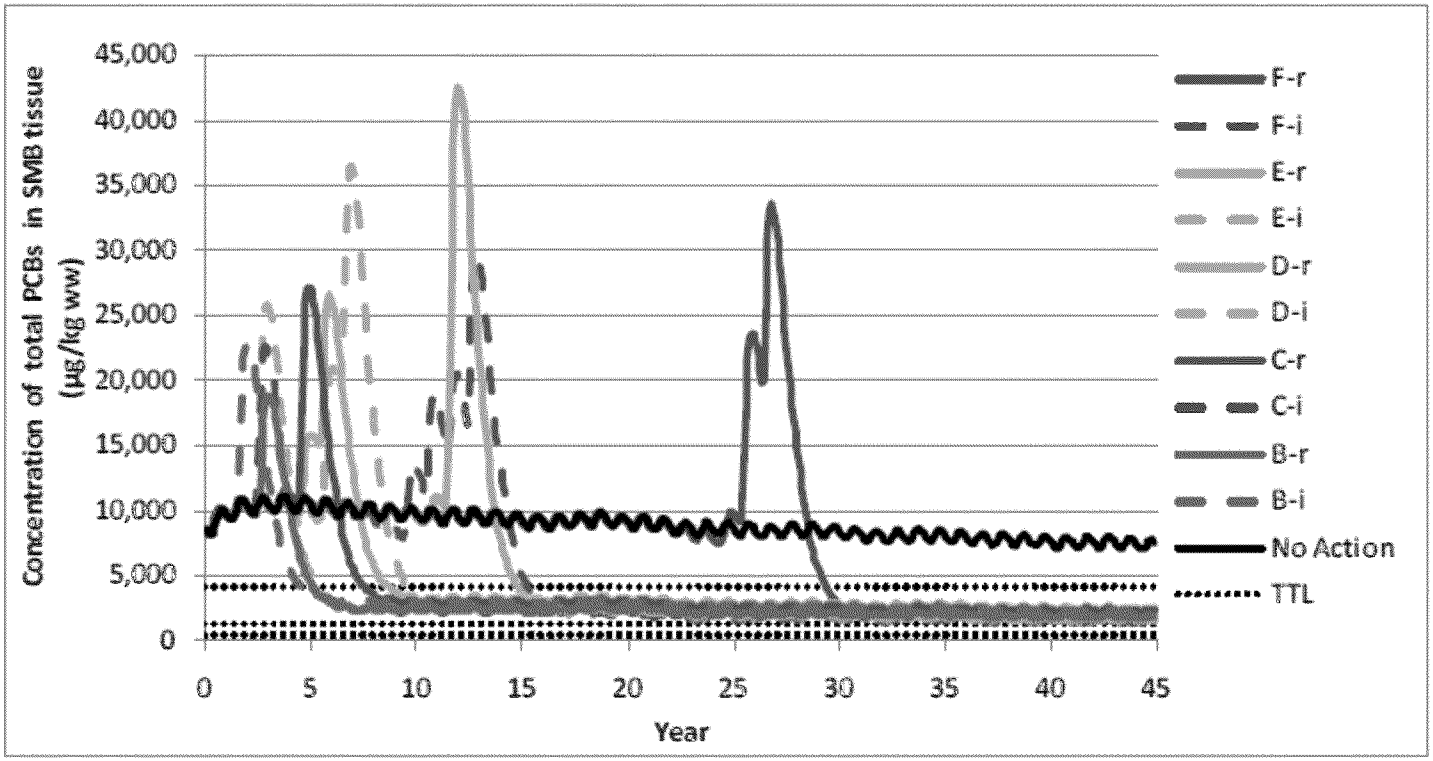
Extras

ED_000959_PST_00081830-00018 12/23/2020 SEMS_0337997

No Action
SI Lagoon – Model Predicts Little Recovery



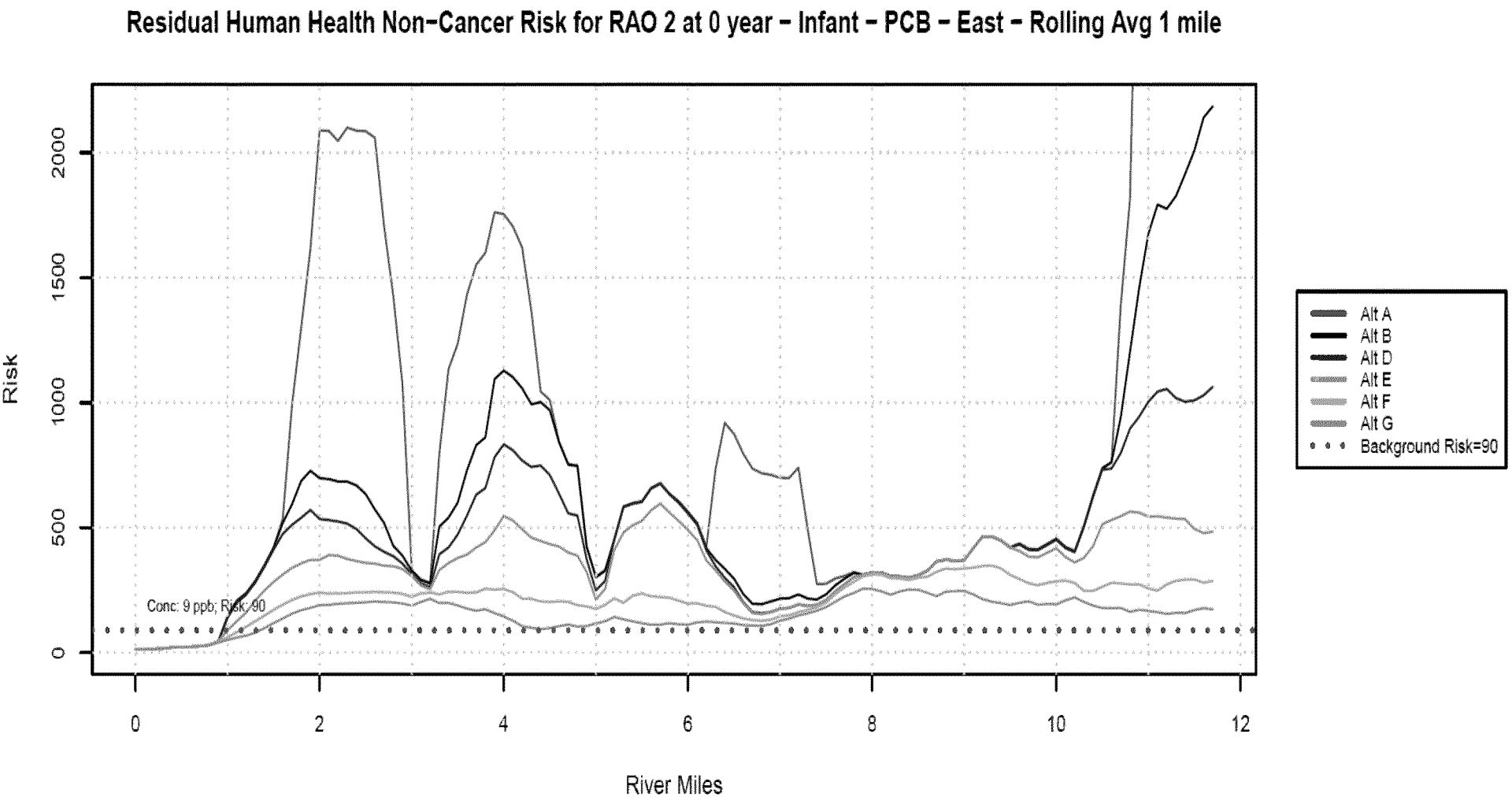
Note: i – integrated, r – removal, SMB – smallmouth bass; TTL – target tissue level

Dotted horizontal lines indicate SMB TTLs for the 10^{-4} excess cancer risk level, corresponding to the 90th percentile (4,140 µg/kg ww), point estimate (1,356 µg/kg ww), 95th percentile (470 µg/kg ww), and 99th percentile (372 µg/kg ww). TTLs are only shown on the graph if they fit within the scale shown.

Figure 3-31. Comparison of Alternatives for Smallmouth Bass for Swan Island Lagoon

ED_000959_PST_00081830-00019 12/23/2020 SEMS_0337997

Residual Risks of alternatives



To: Woolford, James[Woolford.James@epa.gov]
Cc: Grandinetti, Cami[Grandinetti.Cami@epa.gov]
From: McLerran, Dennis
Sent: Sat 9/12/2015 2:49:50 AM
Subject: Re: Heads up: Rep. Schrader comments re: Portland Harbor at hearing today

Jim and Cami:

I spoke with Dick Pedersen and Richard Whitman late today. It was a good conversation and the Governor's Office is trying to manage the political side of this. There is apparently discussion amongst some of the LGW to request we not put the concept plan forward to the Remedy Review Board. Their concept is not to cancel the Remedy Review Board but to keep the date and only put in front of it a set of issue statements for feedback. I told Richard that would not be possible, which is the answer he expected. He indicated there is more coordination going on between the State and the City now and that they both want to see this stay on schedule and on track. He believes the other LWG members want to keep the schedule too but are just extraordinarily nervous that the headlines will focus on the concept plan and its cost and that we will be locked in by that. I walked Richard through many of our key points including that the best focus now would be on what treatment technologies should be applied to the 13 hot spots that would preserve future uses of the river and would be protective of human health. He gets that and is supportive of that. I told him it would be good if the State could go out with a message about what the State would like to see achieved by a cleanup of the river that would focus on the framing identified in our discussions with Kevin Parrett and Dick. He said they might try to do that jointly with the City but at this time their highest priority is to try to work this politically to keep things on the current schedule. That is very positive.

Deliberative Process / Ex. 5

Deliberative Process / Ex. 5

Deliberative Process / Ex. 5

Dennis

Dennis McLerran
Regional Administrator
EPA Region 10
(206) 553-1234

On Sep 11, 2015, at 7:06 PM, Woolford, James <Woolford.James@epa.gov> wrote:

> Given his statements, we shld consider addressing these head on Wednesday.
>
> Jim Woolford, Director
> Office of Superfund Remediation & Technology Innovation
> US EPA
>
> Sent from my Windows Phone
> Please excuse typos

From: McLerran, Dennis
Sent: 9/11/2015 7:15 PM
To: Grandinetti, Cami
Cc: Schuster, Cindy; Levine, Carolyn; Woolford, James; Holsman, Marianne; Dunbar, Bill; MacIntyre, Mark; Robinson, Deborah; Koch, Kristine; Allen, Elizabeth; Fonseca, Silvina; Legare, Amy; Stalcup, Dana; Zhen, Davis
Subject: Re: Heads up: Rep. Schrader comments re: Portland Harbor at hearing today

Cami and all:

I viewed as well. It pretty much tracked the major issues raised in the Bob Wyatt cover letter.

Dennis

Dennis McLerran
Regional Administrator
EPA Region 10
(206) 553-1234

On Sep 11, 2015, at 3:23 PM, Grandinetti, Cami <Grandinetti.Cami@epa.gov> wrote:

Group--I just quickly reviewed the "interview" with Mathy. Schrader made the following points:

•□□□□□□ EPA didn't do a quantitative analysis in the FS (we didn't rely on their model, and there are other quantitative lines of evidence we used)

•□□□□□□ Is it common for EPA to ignore MNR in remedies? (we have MNR in our remedy—it's the biggest part of it)

•□□□□□□ How can EPA not include MNR in the remedy (my response here—MNR is being used on 2100 out of 2200 acres at the Portland Harbor site, so the facts don't support this statement)

•□□□□□□ How do we determine PTW? There are unprecedented levels identified here.

•□□□□□□ No Federal party at the table even though they are a contributor through war efforts

•□□□□□□ Big difference between how EPA does work and how private parties do work.

Cami Grandinetti

Program Manager, Remedial Cleanup Program

USEPA

1200 6th Ave, Suite 900

ECL-113

Seattle, Wa. 98101

206-553-8696 (desk)

206-390-8890 (cell)

206-553-0124 (fax)

From: Schuster, Cindy
Sent: Friday, September 11, 2015 9:18 AM
To: Levine, Carolyn <Levine.Carolyn@epa.gov>; Woolford, James <Woolford.James@epa.gov>; Grandinetti, Cami <Grandinetti.Cami@epa.gov>; Holsman, Marianne <Holsman.Marianne@epa.gov>; Dunbar, Bill <dunbar.bill@epa.gov>
Cc: Schuster, Cindy <Schuster.Cindy@epa.gov>
Subject: RE: Heads up: Rep. Schrader comments re: Portland Harbor at hearing today

Thanks, Carolyn.

From: Levine, Carolyn
Sent: Friday, September 11, 2015 9:16 AM
To: Woolford, James; Grandinetti, Cami; Holsman, Marianne; Schuster, Cindy; Dunbar, Bill
Subject: Heads up: Rep. Schrader comments re: Portland Harbor at hearing today

Hi all,

I want to make sure you are aware of Congressman Schrader's questioning of Mathy re: feasibility study and quantitative analyses at today's House Energy and Commerce Committee hearing on federal facilities cleanup.

Schrader starts speaking at 1 hour:08:44

http://energycommerce.house.gov/hearing/oversight-federal-facility-cleanup-under-cercla

---

Carolyn Levine

Office of Congressional and Intergovernmental Relations

U.S. EPA

(202) 564-1859

levine.carolyn@epa.gov

To: Robinson, Deborah[Robinson.Deborah@epa.gov]; Grandinetti, Cami[Grandinetti.Cami@epa.gov]; Zhen, Davis[Zhen.Davis@epa.gov]
From: Bill Ross
Sent: Wed 9/9/2015 7:16:23 PM
Subject: Fwd: LWG Information Needs to Enable Review of EPA's Revised FS Sections 3 and 4
2015-09-08 LWG Letter to EPA re Information Requests.pdf
ATT00001.htm
2015-09-08 Information Requests from EPA.pdf
ATT00002.htm

FYI. What I got from Kevin which he got from Matt which was sent to Kristine. See you soon!

Sent from my iPhone

Begin forwarded message:

From: PARRETT Kevin <Parrett.Kevin@deq.state.or.us<mailto:Parrett.Kevin@deq.state.or.us>>
Date: September 8, 2015 at 10:10:41 PM PDT
To: Bill Ross <bross@rossstrategic.com<mailto:bross@rossstrategic.com>>
Subject: FW: LWG Information Needs to Enable Review of EPA's Revised FS Sections 3 and 4

Bill. This is an indicator of the challenges that EPA (and DEQ) will face over the next year.

-Kevin

From: MCCLINCY Matt
Sent: Tuesday, September 08, 2015 6:03 PM
To: ROICK Tom; PARRETT Kevin
Subject: FW: LWG Information Needs to Enable Review of EPA's Revised FS Sections 3 and 4

From: Jen Woronets [mailto:jworonets@anchorqea.com]
Sent: Tuesday, September 08, 2015 12:45 PM
To: Koch.Kristine@epamail.epa.gov<mailto:Koch.Kristine@epamail.epa.gov>
Cc: (Brandy.Humphreys@grandronde.org<mailto:Brandy.Humphreys@grandronde.org>); audiehuber@ctuir.com<mailto:audiehuber@ctuir.com>; Bob Wyatt; Callie Ridolfi; Courtney Johnson (courtney@crag.org<mailto:courtney@crag.org>); cunninghame@gorge.net<mailto:cunninghame@gorge.net>; Dave Livesay; Elmer Ward (elmer.ward@ctwsbnr.org<mailto:elmer.ward@ctwsbnr.org>); Personal Privacy / Ex. 6 Personal Privacy / Ex. 6 ; Gail Fricano (gfricano@indecon.com<mailto:gfricano@indecon.com>); Holly Partridge (Holly.Partridge@grandronde.org<mailto:Holly.Partridge@grandronde.org>); Jennifer Kassakian (jkassakian@indecon.com<mailto:jkassakian@indecon.com>); Jen Woronets; Jim McKenna (jim.mckenna@verdantllc.com<mailto:jim.mckenna@verdantllc.com>); Julie Weis; Kim Cox (kim.cox@portlandoregon.gov<mailto:kim.cox@portlandoregon.gov>); Kim D'Aquila (kim.daquila@grandronde.org<mailto:kim.daquila@grandronde.org>); Madalinski, Kelly; MCCLINCY Matt; Michael Karnosh (Michael.Karnosh@grandronde.org<mailto:Michael.Karnosh@grandronde.org>); Rachel DelVecchio (rdelvecchio@indecon.com<mailto:rdelvecchio@indecon.com>); Rita Cabral; Robert Neely; Rose Longoria (rose@yakamafish-nsn.gov<mailto:rose@yakamafish-nsn.gov>); Sean Sheldrake; Tom Downey (tomd@ctsi.nsn.us<mailto:tomd@ctsi.nsn.us>); Patty Dost; Carl Stivers; Amanda Shellenberger
Subject: LWG Information Needs to Enable Review of EPA's Revised FS Sections 3 and 4

Kristine,

Please find attached information needs to enable review of EPA's revised FS Sections 3 and 4.

Let us know if you have any questions.

Thank you,
Jen Woronets :)
Anchor QEA, LLC
jworonets@anchorqea.com<mailto:jworonets@anchorqea.com><https://deqmail.deq.state.or.us/owa/UrlBlockedError.aspx>
421 SW Sixth Avenue, Suite 750
Portland, OR 97204
503-972-5014

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jworonets@anchorqea.com<mailto:jworonets@anchorqea.com><mailto:jworonets@anchorenv.com>

To: Koch, Kristine[Koch.Kristine@epa.gov]
Cc: Woolford, James[Woolford.James@epa.gov]; Ells, Steve[Ells.Steve@epa.gov]; Grandinetti, Cami[Grandinetti.Cami@epa.gov]; brandy.humphreys@grandronde.org[brandy.humphreys@grandronde.org]; audiehuber@ctuir.com[audiehuber@ctuir.com]; Bob Wyatt[rjw@nwnatural.com]; callie@ridolfi.com[callie@ridolfi.com]; Courtney Johnson (courtney@crag.org)[courtney@crag.org]; cunninghame@gorge.net[cunninghame@gorge.net]; Dave Livesay[dlivesay@gsiws.com]; Elmer Ward (elmer.ward@ctwsbnr.org)[elmer.ward@ctwsbnr.org]; Personal Privacy / Ex. 6 Personal Privacy / Ex. 6 Gail Fricano (gfricano@indecon.com)[gfricano@indecon.com]; Holly Partridge (Holly.Partridge@grandronde.org)[Holly.Partridge@grandronde.org]; Jennifer Kassakian (jkassakian@indecon.com)[jkassakian@indecon.com]; Jen Woronets[jworonets@anchorqea.com]; Jim McKenna (jim.mckenna@verdantllc.com)[jim.mckenna@verdantllc.com]; Julie Weis[jweis@hk-law.com]; Kim Cox (kim.cox@portlandoregon.gov)[kim.cox@portlandoregon.gov]; Kim D'Aquila (kim.daquila@grandronde.org)[kim.daquila@grandronde.org]; Madalinski, Kelly[Kelly.Madalinski@portofportland.com]; MCCLINCY Matt[MCCLINCY.Matt@deq.state.or.us]; Michael.karnosh@grandronde.org[Michael.karnosh@grandronde.org]; Rachel DelVecchio (rdelvecchio@indecon.com)[rdelvecchio@indecon.com]; Rita Cabral[RCabral@indecon.com]; Robert.Neely@noaa.gov[Robert.Neely@noaa.gov]; rose@yakamafish-nsn.gov[rose@yakamafish-nsn.gov]; Sheldrake, Sean[sheldrake.sean@epa.gov]; tomd@ctsi.nsn.us[tomd@ctsi.nsn.us]; Carl Stivers[cstivers@anchorqea.com]; Amanda Shellenberger[ashellenberger@anchorqea.com]; Patty Dost[pdost@pearllegalgroup.com]
From: Jen Woronets
Sent: Tue 9/8/2015 9:37:01 PM
Subject: LWG List of Significant Issues with EPA's Revised FS Sections 3 and 4
2015-09-08 LWG Letter re Significant Issues on EPA FS Section 3 and 4.pdf
2015-09-08 FS Sec 3 and 4 List of Significant Issues.pdf

Kristine,

Per Jim Woolford's request, attached please find the list of significant issues with EPA's revised FS Sections 3 and 4.

Let us know if you have any questions.

Thank you,

Jen Woronets ☺

Anchor QEA, LLC

jworonets@anchorqea.com

421 SW Sixth Avenue, Suite 750

Portland, OR 97204

503-972-5014

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To: Woolford, James[Woolford.James@epa.gov]
Cc: Grandinetti, Cami[Grandinetti.Cami@epa.gov]; Stalcup, Dana[Stalcup.Dana@epa.gov]; Zhen, Davis[Zhen.Davis@epa.gov]; Robinson, Deborah[Robinson.Deborah@epa.gov]; McLerran, Dennis[mclerran.dennis@epa.gov]; pedersen.dick@deq.state.or.us[pedersen.dick@deq.state.or.us]; Keith Johnson (JOHNSON.Keith@deq.state.or.us)[JOHNSON.Keith@deq.state.or.us]; Kevin Parrett (parrett.kevin@deq.state.or.us)[parrett.kevin@deq.state.or.us]; Koch, Kristine[Koch.Kristine@epa.gov]; Pirzadeh, Michelle[Pirzadeh.Michelle@epa.gov]; Nina Deconcini[deconcini.nina@deq.state.or.us]; Tom Roick[ROICK.Tom@deq.state.or.us]; Joni Hammond (hammond.joni@deq.state.or.us)[hammond.joni@deq.state.or.us]
From: Bill Ross
Sent: Fri 8/21/2015 2:03:39 AM
Subject: Re: Portland Harbor: Agenda for 8/25 Dennis/Dick/Jim briefing

Understood. Just wanted to keep you in the loop. Have a great time off.

Cheers, Bill

Sent from my iPhone

On Aug 20, 2015, at 6:41 PM, Woolford, James <Woolford.James@epa.gov<mailto:Woolford.James@epa.gov>> wrote:

Bill, et al. **Personal Privacy / Ex. 6** I have forwarded this to Dana Stalcup.

Jim Woolford, Director
Office of Superfund Remediation & Technology Innovation
US EPA

Sent from my Windows Phone
Please excuse typos

From: Bill Ross<mailto:bross@rossstrategic.com>
Sent: ?8/?20/?2015 6:14 PM
To: Grandinetti, Cami<mailto:Grandinetti.Cami@epa.gov>; Stalcup, Dana<mailto:Stalcup.Dana@epa.gov>; Zhen, Davis<mailto:Zhen.Davis@epa.gov>; Robinson, Deborah<mailto:Robinson.Deborah@epa.gov>; McLerran, Dennis<mailto:mclerran.dennis@epa.gov>; pedersen.dick@deq.state.or.us<mailto:pedersen.dick@deq.state.or.us>; Woolford, James<mailto:Woolford.James@epa.gov>; Keith Johnson (JOHNSON.Keith@deq.state.or.us)<mailto:JOHNSON.Keith@deq.state.or.us>; Kevin Parrett (parrett.kevin@deq.state.or.us)<mailto:parrett.kevin@deq.state.or.us>; Koch, Kristine<mailto:Koch.Kristine@epa.gov>; Pirzadeh, Michelle<mailto:Pirzadeh.Michelle@epa.gov>; 'Nina Deconcini'<mailto:deconcini.nina@deq.state.or.us>; 'Tom Roick'<mailto:ROICK.Tom@deq.state.or.us>; Joni Hammond (hammond.joni@deq.state.or.us)<mailto:hammond.joni@deq.state.or.us>
Subject: Portland Harbor: Agenda for 8/25 Dennis/Dick/Jim briefing

Hello, what follows below is the agenda for the Dennis/Dick/Jim briefing next Tuesday August 25 at 1:00 pm PDT. Note that there will be briefing materials and they will be sent to you directly by EPA and the call-in number will be distributed by EPA at that time also.

The purpose of this 2 hour briefing is to inform and ground Dennis, Dick and Jim on the summary data contained primarily in chapters 3 and 4 of the FS, the analysis done to date regarding the alternatives in Chapter 4 that lays the foundation for the proposed draft conceptual plan and to provide them with an initial look at what the draft conceptual plan might entail and why. The briefing will also update all on the feedback received to date on Chapters 3 and 4 of the FS and to begin preparations for the messaging and engagement that will accompany the release of the draft conceptual plan in mid-September. The agenda follows.

Agenda

1. Introductions and Agenda Review (Bill)

2. Present the Technical Summary and Overview of the Key Factors that Will Shape the Draft Conceptual Plan (Cami)

· These include the sediments to be remediated and the corresponding remedial action levels; the cleanup technologies to be deployed; and the costs they represent.

· The briefing will highlight the three most feasible alternatives and illustrative the effect of these alternatives on an area (International Slip) that is highly impacted with PCB. The site-wide scale also will be shown.

3. Discuss Residual Risks Associated with the three Alternatives and Why Time to Reach Cleanup Levels Cannot Be Modeled at This Time (Cami and Kristine)

4. Examine Which Alternative Appears To Be the Best Fit for the Draft Conceptual Remedy at this First Initial Look (Cami and Kristine)

5. How best to focus people's review of the draft conceptual plan on the key issues EPA would like to receive comment upon. (Cami)

6. Begin Preparation for the Release of the Draft Conceptual Plan and Share Any Feedback on the Release of chapters 3 and 4 of the FS. (Cami and Kevin). Issues to be discussed include:

· Key messages for the congressional delegation, areas of emphasis with the LWG, the TCT, the Tribes and the CAC.

· What should be described for the general public regarding what has been released, how it was developed and what the next steps in the process are.

· How might EPA and DEQ respond to questions regarding what they 'support or not' at this time that reflects both the information that has been released, the rationale for selecting the draft conceptual remedy and what are the next steps in the process.

7. Next Steps: (All)

· Including determining the draft conceptual plan, what areas of inquiry to emphasize upon its release and developing appropriate talking points for Dennis, Dick and Jim. (All) (Note the next briefing for Dennis, Dick and Jim is September 10 at 1:00 pm PDT.)

8. Adjourn

To: MacIntyre, Mark[Macintyre.Mark@epa.gov]
Cc: Smith, Judy[Smith.Judy@epa.gov]; Morrison, Kay[morrison.kay@epa.gov]; Grandinetti, Cami[Grandinetti.Cami@epa.gov]; Robinson, Deborah[Robinson.Deborah@epa.gov]
From: AM
Sent: Fri 7/31/2015 7:39:10 PM
Subject: Re: Alanna (listserve announcement)
2015 7-28 PDX Harbor FS Section 3 Cover Letter and Listserv message FINALa.docx

Mark,
The edits are included in this version.
Please contact me after it has been reviewed. I will need to send this out by 2pm today. If not, please contact Judy to send next week -OR it will be done when I return on Aug 11th.
Thanks.

From: **Personal Privacy / Ex. 6**
To: "Mark' 'MacIntyre" <Macintyre.Mark@epa.gov>
Cc: "smith judy" <smith.judy@epa.gov>, "morrison kay" <morrison.kay@epa.gov>, "grandinetti cami" <grandinetti.cami@epa.gov>, "robinson deborah" <robinson.deborah@epa.gov>
Sent: Friday, July 31, 2015 12:27:09 PM
Subject: Alanna (listserve announcement)

Mark, please disregard previous email.

I suggest sending the notice that was attached to this email to the listserve with the edits below. Ill resend an edited version in a few.

•□□□□□□ 1st paragraph: These parties are receiving these documents because they have been working with EPA in reviewing ~~developing~~ the Remedial Investigation/Feasibility Study for the Portland Harbor Superfund Site.

•□□□□□□ In the paragraphs under "Next Steps" spell out the acronyms. NRRB, CSTAG, NCP, CERCLA and the others that are listed.

From: MacIntyre, Mark [mailto:Macintyre.Mark@epa.gov]
Sent: Friday, July 31, 2015 11:41 AM
To: Personal Privacy / Ex. 6
Subject: Fwd: As per my Vmail

Alanna: here is the current version that the team wants to send to the ListServ....

Sent from my iPhone

Begin forwarded message:

From: "MacIntyre, Mark" <Macintyre.Mark@epa.gov>
Date: July 31, 2015 at 7:21:01 AM PDT
To: "Conley, Alanna" <conley.alanna@epa.gov>
Subject: As per my Vmail

Sent from my iPhone

Begin forwarded message:

From: "Robinson, Deborah" <Robinson.Deborah@epa.gov>
Date: July 28, 2015 at 4:35:26 PM PDT
To: "Koch, Kristine" <Koch.Kristine@epa.gov>, "Conley, Alanna" <conley.alanna@epa.gov>, "Holsman, Marianne" <Holsman.Marianne@epa.gov>, "MacIntyre, Mark" <Macintyre.Mark@epa.gov>, "Grandinetti, Cami" <Grandinetti.Cami@epa.gov>, "Zhen, Davis" <Zhen.Davis@epa.gov>, "Cora, Lori" <Cora.Lori@epa.gov>, "Allen, Elizabeth" <allen.elizabeth@epa.gov>, "Sheldrake, Sean" <sheldrake.sean@epa.gov>, "DeMaria, Eva" <DeMaria.Eva@epa.gov>, "Schuster, Cindy" <Schuster.Cindy@epa.gov>, "Tyler, Kendra" <Tyler.Kendra@epa.gov>, "Magorrian, Matthew" <Magorrian.Matthew@epa.gov>, "Woods, Jim" <Woods.Jim@epa.gov>, "Barber, Anthony" <Barber.Anthony@epa.gov>
Cc: "Kevin Parrett (parrett.kevin@deq.state.or.us)" <parrett.kevin@deq.state.or.us>, DECONCINI Nina <DECONCINI.Nina@deq.state.or.us>
Subject: PLEASE USE THIS ONE - Sec 3 Cover Letter/Listserv message

Cindy found one last typo. Attached is the corrected version of the message to

- Accompany FS section 3

•□□□□□□ Go out on the listserv

•□□□□□□ Send to congressional staff

Thanks,

Debbie

==========

From the Desk of:
Debbie Robinson
Tel: 206-553-4961
robinson.deborah@epa.gov

US EPA Region 10, M/S ECL 122, 1200 Sixth Avenue, Suite 900, Seattle, WA 98101

To: Bill Ross[bross@rossstrategic.com]; Grandinetti, Cami[Grandinetti.Cami@epa.gov]; Zhen, Davis[Zhen.Davis@epa.gov]; Robinson, Deborah[Robinson.Deborah@epa.gov]; Keith Johnson (JOHNSON.Keith@deq.state.or.us)[JOHNSON.Keith@deq.state.or.us]; Kevin Parrett (parrett.kevin@deq.state.or.us)[parrett.kevin@deq.state.or.us]; 'Tom Roick'[ROICK.Tom@deq.state.or.us]
From: Bill Ross
Sent: Wed 7/22/2015 8:29:19 PM
Subject: RE: Portland Harbor: prep for Dennis/Dick

At our call today, we will cover the following topics:

1. Status of completing Chapters 3 and 4 of the FS.
2. What information contained in Chapter 4 will be available to ODEQ and the LWG prior to the release of Chapter 4.
3. How are the talking points for Dennis, Dick and Jim for the Congressional briefings coming along? When will they go to Dennis, Jim and Dick?
4. What issues should Dennis, Dick and Jim connect on at the briefing?
5. Preliminary ideas on the purpose and structure of the EPA/ODWQ Workshop on August 7.
6. Others?

Thanks, I look forward to the call.

Cheers, Bill

-----Original Appointment-----
From: Suzanne Walker **On Behalf Of** Bill Ross
Sent: Tuesday, July 14, 2015 11:18 AM
To: Bill Ross; Cami Grandinetti (grandinetti.cami@epa.gov); 'Davis Zhen'; Deborah Robinson (robinson.deborah@epa.gov); Keith Johnson (JOHNSON.Keith@deq.state.or.us); Kevin Parrett (parrett.kevin@deq.state.or.us); 'Tom Roick'
Subject: Portland Harbor: prep for Dennis/Dick
When: Wednesday, July 22, 2015 3:00 PM-4:00 PM (UTC-08:00) Pacific Time (US & Canada).
Where: Call-in number Personal Privacy / Ex. 6, pass code Personal Privacy / Ex. 6

To: PARRETT Kevin[Parrett.Kevin@deq.state.or.us]
Cc: MCCLINCY Matt[MCCLINCY.Matt@deq.state.or.us]; DeMaria, Eva[DeMaria.Eva@epa.gov]; JOHNSON Keith[JOHNSON.Keith@deq.state.or.us]
From: Sheldrake, Sean
Sent: Sat 6/27/2015 3:44:01 AM
Subject: Re: Portland Harbor Source Control Report Meeting

Eva and I will be there Kevin, I know Matt is aware but off today-but I thought I'd mention just in case. See you there. S

Sean Sheldrake, Unit DivingOfficer, RPM
USEPA
206.553.1220 desk
206.225.6528 cell

Sent from my iPhone

On Jun 26, 2015, at 8:04 PM, PARRETT Kevin <Parrett.Kevin@deq.state.or.us> wrote:

DEQ folks are attending in person. Don't know about EPA.

On Jun 26, 2015, at 3:12 PM, Jen Woronets <jworonets@anchorqea.com> wrote:

Keith, Matt, Kevin, Sean, Eva,

Please let me know if you plan to attend this meeting in person.

Attendees should check in with the receptionist on the 16th floor.

Tonkon Torp, 1600 Pioneer Tower, 888 SW Fifth Avenue, conference room 15A/B.

Call in number

Personal Privacy / Ex. 6

Participant Passcode: Personal Privacy / Ex. 6

Meeting Among DEQ, EPA's Portland Harbor Partners, and LWG Members Working with DEQ on Portland Harbor Source Control

June 29, 2015

10:00 – Noon

Conference Line: Personal Privacy / Ex. 6

Passcode Personal Privacy / Ex. 6

1. Welcome and Introductions
2. Portland Harbor Source Control Process Status and Summary Report Update
3. DEQ Response to LWG Members' Comments on Summary Report
4. Mechanism and Timeline for Revising Report
5. Role of EPA's Riverbank RAO in Ongoing DEQ Source Control Work
6. Effect of The Riverbank Designations on Figure 2.2-2 of EPA's FS
7. Other Q&A

Please register for Portland Harbor Source Control Report Meeting on Jun 29, 2015 10:00 AM PDT at:

Personal Privacy / Ex. 6

Portland Harbor Source Control Report Meeting

After registering, you will receive a confirmation email containing information about joining the webinar.

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<meeting.ics>

DRAFT PH Schedule of Meetings as of 4/28/15

- Please see ? to confirm dates or topics.
- See italics for meetings that need to be scheduled
- Need to add
    - Pre-Briefs for Dick/Dennis, Congressional Delegation and Execs meetings
    - Congressional Updates and Staff Briefings
    - Congressional Delegation Meeting
    - EPA/LWG Senior Leadership meetings (approx. every 6 weeks.)

Date	Meeting Type	Focus Topic	Facil	DEQ	Notes
May 13	TCT and CAG		KK, AC	MM KP-TCT?	
" "	Monthly EPA/DEQ Staff/Managers	Example of LWG alternative compared to EPA alternative	Cami	ND, KP, KJ, MM	Deb out of town Keith only attend managers session
Jun 3	Dick/Dennis monthly call	Follow-up to 5/13 monthly meeting	BR	DP, ND, KP, KJ	Nina unavailable from 10:30-1:30
June 10	TCT and CA		KK	MM KP-TCT?	
June 17	Monthly EPA/DEQ Staff/Managers	Walk through EPA revised alternatives and introduction to trade-offs that will be used for evaluation	DR	ND, KP, KJ, MM	
Week of June 29 ***or*** *July 6 or 7*	Dick/Dennis special briefing/monthly call	2 hours – Workshop - Focus on alternatives and introduction to trade-offs that will be used for evaluation	BR	DP, ND, KP, KJ	KK, EA? ~~Kevin prefers week of 6/29 Keith unavailable 6/30-7/2~~
July 8	TCT and CAG		KK, AC	MM	
" "	Monthly EPA/DEQ Staff/Managers	Continued discussion of alternative evaluation Intro to conceptual remedy	DR	ND, KP, KJ, MM	Kevin start briefing Dick Personal Privacy / Ex. 6 but can attend
Week of July 20 or July 27 or 28	Dick/Dennis monthly call	Discuss what's in Sections 3 and 4 highlighting any significant items Check-in, intro to conceptual remedy?	BR	DP, ND, KP, KJ	Nina unavailable 7/22-7/24

July 29		Provide FS			
Aug 6	Execs-EPA/DEQ/LWG MOU CAG	FS – Focus on Sections 3 and 4	DM	Joni H*, ND, KP	DM JW – Personal Privacy / Ex. 6
Aug 7 if possible, otherwise Aug 12 or 13?	Monthly EPA/DEQ Staff/Managers/ special workshop (lall day?)	Workshop - Focus on Conceptual Remedy	BR	ND, KP, KJ, MM	Aug 12/13 does not work for DEQ
Aug 12	TCT and CAG		KK, AC	MM	
Aug 12 or 13 (if needed)	*? Monthly EPA/DEQ Staff/Managers (if needed)*	*2 hours – Workshop - Focus on Conceptual Remedy*	*BR*	ND, KJ, MM	Aug 12/13 does not work for DEQ
Week of Aug 24	Dick/Dennis special briefing/monthly call	2 hours – Focus on Conceptual Remedy	BR	DP, ND, KP, KJ	KK, EA? Keith unavailable afternoon of 8/13
Sept 9	TCT and CAG (final meetings)		KK, AC	MM KP-TCT?	
" "	Monthly EPA/DEQ Staff/Managers		DR	ND, KP, KJ, MM	
Sept 10	Dick/Dennis monthly call/prep for Senior Execs	Follow-up to 9/9 monthly meeting – check-in	BR	ND, KP, KJ	Afternoon is best for Nina
Sept 15 or 17	Execs-EPA/DEQ/LWG MOU CAG	Conceptual Remedy	DM	DP, ND, KP	DM JW DP
Sept 18		Provide Conceptual Remedy/NRRB Package	KK		
Week of Oct 5	Dick/Dennis monthly call	Check-in—where is state on NRRB comments		ND, KP, KJ	Nina not available
Oct 14	Monthly EPA/DEQ Staff/Managers	Where is state on NRRB comments	DR	ND, KP, KJ, MM	
Oct 19		Stakeholder comments to NRRB	KK		
Week of Nov 2	Dick/Dennis/monthly call	Follow-up to 10/14 - Check-in	BR	ND, KP, KJ	Nina only available 9/4 and 9/6
? Week of Nov 9 (If needed)	? Dick/Dennis or EPA/DEQ Staff/Managers	? Conference Call or VTC Check-in – if needed	BR	DP, ND, KP, KJ	Nina not available Thu morning
Nov 18-19	NRRB		AL		
Week of Nov 30 or Dec 7	Dick/Dennis monthly call	Check-in	BR	DP, ND, KP, KJ	KP suggests - change to debrief on NRRB

Personal Privacy / Ex. 6

Personal Privacy / Ex. 6 can attend an in-person meeting if necessary or call in

– unavailable

Personal Privacy / Ex. 6

Personal Privacy / Ex. 6

To: Grandinetti, Cami[Grandinetti.Cami@epa.gov]
From: Legare, Amy
Sent: Tue 2/24/2015 1:59:22 PM
Subject: Re: Proposed Agenda for next week's meeting in Seattle

Hi Cami - I won't be making the trip this week. **Personal Privacy / Ex. 6** Personal Privacy / Ex. 6 plan on being in the office next week.

Amy Legare

EPA/OSWER/OSRTI/ARD/SARDB

5828 Potomac Yard South

703-347-0124

From: Grandinetti, Cami
Sent: Monday, February 23, 2015 6:06 PM
To: Stalcup, Dana; Cohen, Lori; Yamamoto, Deb; Koch, Kristine; Allen, Elizabeth; Robinson, Deborah; Christopher, Anne; Cora, Lori; Sheldrake, Sean; Albright, Rick; Grandinetti, Cami
Cc: Woolford, James; Ammon, Doug; Charters, David; Ells, Steve; Fonseca, Silvina; Legare, Amy; Gustavson, Karl
Subject: RE: Proposed Agenda for next week's meeting in Seattle

Hi Dana—I added the site-specific updates you mentioned to me and tried to firm up our time and location for Wednesday and Thursday.

We will be meeting on the 12th floor Maple Room both Wednesday and Thursday. Wednesday's schedule is 8 am to 1 pm and then we have our office All Staff from 1-3 pm. At this point, I am not going to ask our technical team to reconvene after the All Staff.

Thursday we have the 12th floor Maple room all day. Let's start at 8 am and plan to be wrapped up by 4-4:30 pm.

I also note that we need to find time for Jim and Rick to get together during these two days too.

-

Draft Agenda Portland Harbor

HQ and Region 10 Meeting February 25-27, 2015

Wednesday AM 8:00 am – 10:00 am

•□□□□□□ Process/Schedule and Role of HQ Team Members

o Consultations with other stakeholders, including government to government

o Role of teams and decision-making process

o Key Review Steps and Timing

▪· NRRB, CSTAG

▪· OSRTI

▪· Public Comment

o Briefings for Headquarters and Regional Senior Leaders

o Response to Comments

▪· Contractor Support

o Parallel Activities?

o Other considerations for full team involvement

10:00 – 10:30 am

•□□□□□□ Other Topics or Sites of Interest

o **FMC**

o **Wyckoff**

o **Asarco Ruston**

After 10:30 am Wednesday PM and Thursday

•□□□□□□ Background

o Status, Impact/use for Remedy Decisions

•□□□□□□ Overview of the Conceptual Site Model(s)

o COCs, concentrations (general info regarding surface and subsurface)

o Risk, Exposure Scenarios, Uncertainties

- □□□□□□ RAOs
  - Groundwater RAO
  - Basis for cleanup levels (ARARs, background, RBCs)
    - Fish Tissue levels
  - Surface Sediment Recontamination
    - Recontamination, COCs, PCBs
  - Measurement/Monitoring to show how RAOs will be achieved

- □□□□□□ RALs
  - Process for determining RALs / remediation footprint
  - Process to identify areas for dredging, capping, in-situ
  - Monitored Natural Recovery

- □□□□□□ Upland Sources
  - State Actions, Source control
    - Adequate? Impact?
  - Relationship with Remedy
- □□□□□□ Issues/Disputes with PRPs
  - Outstanding/Current and Future/Anticipated
  - Previously resolved (brief description)

- □□□□□□ Stakeholder Positions
  - State, City, Port, Tribes

- □□□□□□ Outstanding work/evaluations needed to support Preferred Remedy

To: Bill Ross[bross@rossstrategic.com]; Grandinetti, Cami[Grandinetti.Cami@epa.gov]
Cc: JOHNSON Keith[JOHNSON.Keith@deq.state.or.us]; Yamamoto, Deb[Yamamoto.Deb@epa.gov]
From: PARRETT Kevin
Sent: Fri 2/20/2015 11:06:56 PM
Subject: RE: Lower Duwamish Cleanup Levels

Call-in # **Personal Privacy / Ex. 6**

From: Bill Ross [bross@rossstrategic.com]
Sent: Friday, February 20, 2015 3:05 PM
To: Grandinetti, Cami
Cc: JOHNSON Keith; PARRETT Kevin; Yamamoto, Deb
Subject: Re: Lower Duwamish Cleanup Levels

i am having trouble getting in. can someone send me the number and code please/? thanks

Sent from my iPad

> On Feb 20, 2015, at 3:00 PM, Grandinetti, Cami <Grandinetti.Cami@epa.gov> wrote:
>
> So, here's where I get to sound like a beaurocrat. PRGs are preliminary and it's in the ROD where we select final cleanup levels. Most often, the PRGs do become the cleanup level but in some cases, they do not. At Lower Duwamish, we had selected fish tissue PRGs but ultimately didn't select fish tissue cleanup levels (we called them "targets") which is an important difference because cleanup levels have importance in CERCLA.
>
> We can talk more.
> _____
> Cami Grandinetti
> Program Manager, Remedial Cleanup Program
> USEPA
> 1200 6th Ave, Suite 900
> ECL-113
> Seattle, Wa. 98101
> 206-553-8696 (desk)
> 206-390-8890 (cell)
> 206-553-0124 (fax)
>
> -----Original Message-----
> From: JOHNSON Keith [mailto:JOHNSON.Keith@deq.state.or.us]
> Sent: Friday, February 20, 2015 8:22 AM
> To: Grandinetti, Cami; PARRETT Kevin; Bill Ross
> Cc: Yamamoto, Deb
> Subject: RE: Lower Duwamish Cleanup Levels
>
> So PRG's will eventually = cleanup levels, right?
>
> -----Original Message-----
> From: Grandinetti, Cami [mailto:Grandinetti.Cami@epa.gov]
> Sent: Friday, February 20, 2015 8:13 AM
> To: PARRETT Kevin; JOHNSON Keith; Bill Ross
> Cc: Yamamoto, Deb
> Subject: RE: Lower Duwamish Cleanup Levels
>

> One thing I forgot to mention is that the info I provided is for the cleanup levels at Lower Duwamish. Those goals are different from the Remedial Action Levels (RALs) that will be used to trigger action in different areas of the site. RALS are higher--because the assumption is that cleaner material gradually "dilutes" the sediments over time. I think you are familiar with that concept? (I don't want to assume too much.) We will have both cleanup levels and RALs at Portland Harbor.
>
> _____
> Cami Grandinetti
> Program Manager, Remedial Cleanup Program USEPA
> 1200 6th Ave, Suite 900
> ECL-113
> Seattle, Wa. 98101
> 206-553-8696 (desk)
> 206-390-8890 (cell)
> 206-553-0124 (fax)
>
> -----Original Message-----
> From: PARRETT Kevin [mailto:Parrett.Kevin@deq.state.or.us]
> Sent: Thursday, February 19, 2015 9:03 PM
> To: Grandinetti, Cami; JOHNSON Keith; Bill Ross
> Cc: Yamamoto, Deb
> Subject: RE: Lower Duwamish Cleanup Levels
>
> Thanks Cami.
>
> _____
> From: Grandinetti, Cami [Grandinetti.Cami@epa.gov]
> Sent: Thursday, February 19, 2015 9:55 AM
> To: PARRETT Kevin; JOHNSON Keith; Bill Ross
> Cc: Yamamoto, Deb
> Subject: Lower Duwamish Cleanup Levels
>
> Sorry it took me longer than I anticipated to pull this together (it's harder to pull pages from a .pdf than I would have imagined). Anyway, attached to this email are some pages from the LDW ROD that outline the cleanup goals. The first table you see is the one that identifies what the different cleanup goals are for different receptors (benthics, people that clam, people that eat seafood) and then you can see which of those levels is the cleanup driver and therefore the ultimate cleanup level. This is the same process we will follow at Portland Harbor.
> Speaking of Portland Harbor, I am working with Elizabeth and Kristine to send to you the tables that show the preliminary cleanup goals for each receptor so that you can begin to see how this will shake out for PH.
>
> _____
> Cami Grandinetti
> Program Manager, Remedial Cleanup Program USEPA
> 1200 6th Ave, Suite 900
> ECL-113
> Seattle, Wa. 98101
> 206-553-8696 (desk)
> 206-390-8890 (cell)
> 206-553-0124 (fax)
>

To: Grandinetti, Cami[Grandinetti.Cami@epa.gov]; Yamamoto, Deb[Yamamoto.Deb@epa.gov]; Cohen, Lori[Cohen.Lori@epa.gov]
From: Koch, Kristine
Sent: Tue 5/6/2014 9:36:27 PM
Subject: FW: Oregon Hot Spot Regulation ARAR analysis
HotSpot ARAR Memo.pdf

FYI…

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
Region 10
1200 Sixth Avenue, Suite 900, M/S ECL-115
Seattle, Washington 98101-3140

(206)553-6705
(206)553-0124 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: Cora, Lori
Sent: Tuesday, May 06, 2014 12:40 PM
To: Koch, Kristine; Sheldrake, Sean; Muza, Richard
Subject: Oregon Hot Spot Regulation ARAR analysis

Attorney Client / Ex. 5

Lori Houck Cora | Assistant Regional Counsel
U.S. Environmental Protection Agency | Region 10
P: (206) 553.1115 | F: (206) 553.1762 | cora.lori@epa.gov

Follow @EPAnorthwest on Twitter! https://twitter.com/EPAnorthwest

To: Hayter, Earl J ERDC-RDE-EL-MS CIV[Earl.J.Hayter@erdc.dren.mil]; Gustavson, Karl[Gustavson.Karl@epa.gov]
From: Todd King
Sent: Tue 5/24/2016 5:50:15 AM
Subject: Deliberative Process / Ex. 5

See attached. TK
FractionPCBhomologs.pdf

Todd King, Principal
AKC Environment & Infrastructure PLLC
(313) 799-0289
kingtw@me.com

Cc: Gustavson, Karl[Gustavson.Karl@epa.gov]
To: Hayter, Earl J ERDC-RDE-EL-MS CIV[Earl.J.Hayter@erdc.dren.mil]
From: Todd King
Sent: Mon 5/2/2016 11:04:42 PM
Subject: Emailing - 2012-03-30_Draft FS_Appendix La.pdf
2012-03-30_Draft FS_Appendix La.pdf
ATT00001.htm

Earl-

Deliberative Process / Ex. 5

To: Gustavson, Karl[Gustavson.Karl@epa.gov]
From: King, Todd W.
Sent: Thur 3/27/2014 4:22:50 PM
Subject: Re: Confirmation: "Portland Harbor FS - Sediment Decision Units and Unresolved COC/PRG/RAL Issues"

Indeed.

Todd King
kingtw@cdmsmith.com<mailto:kingtw@cdmsmith.com>
c:(313)670-6020

On Mar 27, 2014, at 12:17 PM, "Gustavson, Karl" <Gustavson.Karl@epa.gov<mailto:Gustavson.Karl@epa.gov>> wrote:

Jim said, “first 90 min on PRGs…”

That was not my vision!

From: King, Todd W. [mailto:KingTW@cdmsmith.com]
Sent: Thursday, March 27, 2014 12:14 PM
To: Gustavson, Karl
Subject: RE: Confirmation: "Portland Harbor FS - Sediment Decision Units and Unresolved COC/PRG/RAL Issues"

As they say at the end of every CDM Smith annual review letter…”working together we will achieve our vision”

From: Gustavson, Karl [mailto:Gustavson.Karl@epa.gov]
Sent: Thursday, March 27, 2014 12:10 PM
To: King, Todd W.
Subject: RE: Confirmation: "Portland Harbor FS - Sediment Decision Units and Unresolved COC/PRG/RAL Issues"

Thanks! I would have forgotten.

From: King, Todd W. [mailto:KingTW@cdmsmith.com]
Sent: Thursday, March 27, 2014 12:05 PM
To: Gustavson, Karl
Subject: FW: Confirmation: "Portland Harbor FS - Sediment Decision Units and Unresolved COC/PRG/RAL Issues"

From: Jen Woronets [mailto:GoToWebinar.Notifications@citrixonline.com]
Sent: Thursday, March 27, 2014 11:57 AM
To: King, Todd W.
Subject: Confirmation: "Portland Harbor FS - Sediment Decision Units and Unresolved COC/PRG/RAL Issues"

Portland Harbor FS - Sediment Decision Units and Unresolved COC/PRG/RAL Issues

Personal Privacy / Ex. 6

Join us on Thursday, Mar 27, 2014 9:00 AM - 1:00 PM PDT

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Portland Harbor FS - Sediment Decision Units and Unresolved COC/PRG/RAL Issues
Thursday, Mar 27, 2014 9:00 AM - 1:00 PM PDT

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jworonets@anchorqea.com<mailto:jworonets@anchorqea.com>.

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To: Gustavson, Karl[Gustavson.Karl@epa.gov]
From: King, Todd W.
Sent: Thur 3/27/2014 4:13:57 PM
Subject: RE: Confirmation: "Portland Harbor FS - Sediment Decision Units and Unresolved COC/PRG/RAL Issues"

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From: Gustavson, Karl [mailto:Gustavson.Karl@epa.gov]
Sent: Thursday, March 27, 2014 12:10 PM
To: King, Todd W.
Subject: RE: Confirmation: "Portland Harbor FS - Sediment Decision Units and Unresolved COC/PRG/RAL Issues"

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From: King, Todd W. [mailto:KingTW@cdmsmith.com]
Sent: Thursday, March 27, 2014 12:05 PM
To: Gustavson, Karl
Subject: FW: Confirmation: "Portland Harbor FS - Sediment Decision Units and Unresolved COC/PRG/RAL Issues"

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To: King, Todd W.
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To: Gustavson, Karl[Gustavson.Karl@epa.gov]
From: King, Todd W.
Sent: Thur 3/27/2014 4:04:36 PM
Subject: FW: Confirmation: "Portland Harbor FS - Sediment Decision Units and Unresolved COC/PRG/RAL Issues"

From: Jen Woronets [mailto:GoToWebinar.Notifications@citrixonline.com]
Sent: Thursday, March 27, 2014 11:57 AM
To: King, Todd W.
Subject: Confirmation: "Portland Harbor FS - Sediment Decision Units and Unresolved COC/PRG/RAL Issues"

Portland Harbor FS - Sediment Decision Units and Unresolved COC/PRG/RAL Issues

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To: King, Todd W.[KingTW@cdmsmith.com]; Humphrey, Chip[Humphrey.Chip@epa.gov]
Cc: Gustavson, Karl[Gustavson.Karl@epa.gov]
From: Koch, Kristine
Sent: Wed 3/26/2014 6:04:06 PM
Subject: RE: Draft, deliberative, privileged, confidential: Revised Slides for LWG SDU Conversation this Thursday
koch_EPA_LWG_Meeting_20140327v2.pptx

I made a slight change to slide 17 second bullet. Otherwise, looks good to me.

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
Region 10
1200 Sixth Avenue, Suite 900, M/S ECL-115
Seattle, Washington 98101-3140

(206)553-6705
(206)553-0124 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: King, Todd W. [mailto:KingTW@cdmsmith.com]
Sent: Tuesday, March 25, 2014 5:26 PM
To: Humphrey, Chip
Cc: Koch, Kristine; Gustavson, Karl
Subject: RE: Draft, deliberative, privileged, confidential: Revised Slides for LWG SDU Conversation this Thursday

I think I got what Karl was asking for, but have included the powerpoint too in case I missed the mark.

TK

From: Humphrey, Chip [mailto:Humphrey.Chip@epa.gov]
Sent: Tuesday, March 25, 2014 7:10 PM
To: King, Todd W.
Cc: Koch, Kristine; Gustavson, Karl

Subject: RE: Draft, deliberative, privileged, confidential: Revised Slides for LWG SDU Conversation this Thursday

Todd – We're in agreement with Karl's suggestion – can you modify highlighted areas to capture this and resend tomorrow? We haven't sent to LWG yet, but will once we get the revision.

Thanks

Chip

From: Gustavson, Karl
Sent: Tuesday, March 25, 2014 11:42 AM
To: Koch, Kristine; Humphrey, Chip
Cc: King, Todd W.
Subject: Draft, deliberative, privileged, confidential: Revised Slides for LWG SDU Conversation this Thursday

I've been thinking about the last meeting we had with LWG and their comments regarding exposure areas, appropriate receptors, and corresponding PRGs. Probably something you've all thought of too, but this is intertwined with the development of the SDUs.

Deliberative Process / Ex. 5

From: Koch, Kristine
Sent: Tuesday, March 25, 2014 11:17 AM
To: King, Todd W.; Humphrey, Chip; Sheldrake, Sean; Gustavson, Karl
Cc: Penoyar, Susan; Blischke, Eric; Mullin, Jeanette; Peterson, Lance; Rood, Stephen
Subject: RE: Revised Slides for LWG SDU Conversation this Thursday

Thanks Todd.

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
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1200 Sixth Avenue, Suite 900, M/S ECL-115
Seattle, Washington 98101-3140

(206)553-6705
(206)553-0124 (fax)
1-800-424-4372 extension 6705 (M-F, 8-4 Pacific Time, only)

From: King, Todd W. [mailto:KingTW@cdmsmith.com]
Sent: Tuesday, March 25, 2014 7:31 AM
To: Humphrey, Chip; Koch, Kristine; Sheldrake, Sean; Gustavson, Karl
Cc: Penoyar, Susan; Blischke, Eric; Mullin, Jeanette; Peterson, Lance; Rood, Stephen
Subject: Revised Slides for LWG SDU Conversation this Thursday

Please review and forward to LWG if no further changes.

Thanks,

Todd

To: Humphrey, Chip[Humphrey.Chip@epa.gov]
Cc: Koch, Kristine[Koch.Kristine@epa.gov]; Gustavson, Karl[Gustavson.Karl@epa.gov]
From: King, Todd W.
Sent: Wed 3/26/2014 12:25:33 AM
Subject: RE: Draft, deliberative, privileged, confidential: Revised Slides for LWG SDU Conversation this Thursday
EPA_LWG_Meeting_20140327v2.pptx
EPA_LWG_Meeting_20140327v2.pdf

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TK

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Sent: Tuesday, March 25, 2014 7:10 PM
To: King, Todd W.
Cc: Koch, Kristine; Gustavson, Karl
Subject: RE: Draft, deliberative, privileged, confidential: Revised Slides for LWG SDU Conversation this Thursday

Todd – We're in agreement with Karl's suggestion – can you modify highlighted areas to capture this and resend tomorrow? We haven't sent to LWG yet, but will once we get the revision.

Thanks

Chip

From: Gustavson, Karl
Sent: Tuesday, March 25, 2014 11:42 AM
To: Koch, Kristine; Humphrey, Chip
Cc: King, Todd W.
Subject: Draft, deliberative, privileged, confidential: Revised Slides for LWG SDU Conversation this Thursday

I've been thinking about the last meeting we had with LWG and their comments regarding

exposure areas, appropriate receptors, and corresponding PRGs. Probably something you've all thought of too, but this is intertwined with the development of the SDUs.

Deliberative Process / Ex. 5

From: Koch, Kristine
Sent: Tuesday, March 25, 2014 11:17 AM
To: King, Todd W.; Humphrey, Chip; Sheldrake, Sean; Gustavson, Karl
Cc: Penoyar, Susan; Blischke, Eric; Mullin, Jeanette; Peterson, Lance; Rood, Stephen
Subject: RE: Revised Slides for LWG SDU Conversation this Thursday

Thanks Todd.

Kristine Koch
Remedial Project Manager
USEPA, Office of Environmental Cleanup

U. S. Environmental Protection Agency
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1200 Sixth Avenue, Suite 900, M/S ECL-115
Seattle, Washington 98101-3140

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Sent: Tuesday, March 25, 2014 7:31 AM
To: Humphrey, Chip; Koch, Kristine; Sheldrake, Sean; Gustavson, Karl
Cc: Penoyar, Susan; Blischke, Eric; Mullin, Jeanette; Peterson, Lance; Rood, Stephen
Subject: Revised Slides for LWG SDU Conversation this Thursday

Please review and forward to LWG if no further changes.

Thanks,

Todd

CSTAG Call – 2/15/ 14

Nonresponsive

4 - Site Updates

Nonresponsive

Portland Harbor Meeting week of April 28, location ??

Nonresponsive

To: Penoyar, Susan[PenoyarSJ@cdmsmith.com]
Cc: King, Todd W.[KingTW@cdmsmith.com]; Gustavson, Karl[Gustavson.Karl@epa.gov]
From: Blischke, Eric
Sent: Wed 1/22/2014 12:10:42 AM
Subject: Particualte Concentrtions
Evaluation of monitored natural recovery at the Portland Harbor Site.docx
PH_Suspended_PCB_Particulate.pptx

Deliberative Process / Ex. 5

Let me know what you think.

Thanks, Eric

Eric Blischke

CDM Smith

319 SW Washington St, Suite 900

Portland, OR 97204

503-205-7406 direct

503-720-0754 cell

To: Humphrey, Chip[Humphrey.Chip@epa.gov]; Koch, Kristine[Koch.Kristine@epa.gov]
Cc: Jennifer Woronets[jworonets@anchorqea.com]; Jim McKenna (jim.mckenna@verdantllc.com)[jim.mckenna@verdantllc.com]; Carl Stivers[cstivers@anchorqea.com]; Bob Wyatt[rjw@nwnatural.com]; Dave Livesay[dlivesay@gsiws.com]; David Ashton[david.ashton@portofportland.com]; Fred G. Wolf (Frederick.wolf@total.com)[Frederick.wolf@total.com]; Personal Privacy / Ex. 6 Personal Privacy / Ex. 6 Jennifer Woronets[jworonets@anchorqea.com]; Jessica Hamilton (Jessica.Hamilton@portofportland.com)[Jessica.Hamilton@portofportland.com]; Jim McKenna (jim.mckenna@verdantllc.com)[jim.mckenna@verdantllc.com]; Karen Moynahan (karen.moynahan@portlandoregon.gov)[karen.moynahan@portlandoregon.gov]; Karen Traeger (karen.traeger@total.com)[karen.traeger@total.com]; Kim Cox (kim.cox@portlandoregon.gov)[kim.cox@portlandoregon.gov]; Madalinski, Kelly[Kelly.Madalinski@portofportland.com]; Patty Dost[pdost@pearllegalgroup.com]; Steve Parkinson (sparkinson@jzplaw.com)[sparkinson@jzplaw.com]; Gustavson, Karl[Gustavson.Karl@epa.gov]; Earl.Hayter@usace.army.mil[Earl.Hayter@usace.army.mil]
From: Jennifer Woronets
Sent: Fri 1/17/2014 3:37:29 PM
Subject: Portland Harbor - Items 2, 3, and 4 of EPA November 20, 2013 FS Supplemental Information Requests
Dredge Production Rate and Residual_20140115.pdf
EPA RALs Decision Steps Process_20140115.pdf
LWR Model Output Transfer_20140115.pdf

Chip, Kristine,

Per your email request dated November 20, 2013, the LWG is providing to EPA Items 2, 3, and 4 of EPA FS supplemental information requests:

•□□□□□□□□ Item 2 - Modeling Analysis - Please run the sediment transport model for the following events: Two Year Event and Twenty-five Year Event.

•□□□□□□□□ Item 3 - Dredge production and dredge residuals analysis - Propose a process that incorporates the dredge production and dredge residuals recommendations in the Corps ERDC memos that EPA sent to the LWG on September 10, 2013.

•□□□□□□□□ Item 4 - EPA RALs - Propose a process that incorporates EPA's July 2011 RALs (also presented at the "all hands" meeting with the LWG last week) in the analysis of alternatives B, C and D.

The Item 2 memo also refers to a 10 MB data file that we will transmit by CD, due to the size of file.

Also, we seek EPA's written concurrence that with these submittals Items 2, 4, and 4 of EPA's

November 20, 2013 supplemental information request has been met. Please let us know if your understanding is different.

Please let us know if you have any questions.

Thank you,

Jen Woronets ☺

Anchor QEA, LLC

jworonets@anchorqea.com

421 SW Sixth Avenue, Suite 750

Portland, OR 97204

503-972-5014

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To: OSWER OSRTI CSTAG[OSWER_OSRTI_CSTAG@epa.gov]; Hayter, Earl J ERDC-RDE-EL-MS[Earl.J.Hayter@erdc.dren.mil]
From: Ells, Steve
Sent: Mon 1/13/2014 8:39:06 PM
Subject: FW: NRRB calendar changes - please let me know of any changes

FYI

From: Legare, Amy
Sent: Monday, January 13, 2014 1:05 PM
To: Corbett, Chris; Bartenfelder, David; Barth, Edwin; Campbell, Richard; Chesnutt, John; Drake, Dave; Gartner, Lois; Grandinetti, Cami; Jasinski, Michael; Jewett, David; Ludzia, Peter; Luzecky, Hollis; Mott, Timothy; Openchowski, Charles; Prince, John; Sanchez, Carlos; Sivak, Michael; Sprenger, Mark; Street, Kerry; Su, Chunming; Wharton, Steve
Cc: Ells, Steve
Subject: NRRB calendar changes - please let me know of any changes

Planned Reviews

Nonresponsive

April 28 – May 2, 2014

Nonresponsive

Portland Harbor – R10 (with CSTAG, 2-day meeting) I expect this to slip

Nonresponsive

-

Nonresponsive

Amy Legare

EPA/OSWER/OSRTI/ARD/SARDB

5828 Potomac Yard South

703-347-0124

To: Gustavson, Karl[Gustavson.Karl@epa.gov]
Cc: Penoyar, Susan[PenoyarSJ@cdmsmith.com]
From: King, Todd W.
Sent: Thur 10/10/2013 8:36:45 PM
Subject: FW: Request for backup cost information
Cost Estimate Backup.pdf

FYI…

TK

From: Jennifer Woronets [mailto:jworonets@anchorqea.com]
Sent: Thursday, October 10, 2013 4:34 PM
To: Humphrey, Chip
Cc: Koch, Kristine; Penoyar, Susan; James McKenna; Bob Wyatt; King, Todd W.; Hazen, Gary; Bob Wyatt; Dave Livesay; David Ashton; Fred G. Wolf (Frederick.wolf@total.com); Personal Privacy / Ex. 6 Personal Privacy / Ex. 6 Jennifer Woronets; Jessica Hamilton (Jessica.Hamilton@portofportland.com); Jim McKenna (jim.mckenna@verdantllc.com); Karen Moynahan (karen.moynahan@portlandoregon.gov); Karen Traeger (karen.traeger@total.com); Kim Cox (kim.cox@portlandoregon.gov); Madalinski, Kelly; Patty Dost; Steve Parkinson (sparkinson@jzplaw.com); (Brandy.Humphreys@grandronde.org); ANDERSON.Jim@deq.state.or.us; audiehuber@ctuir.com; Bob Wyatt; Colin Wagoner ; cunninghame@gorge.net; Dave Livesay; erin.madden@gmail.com; Gail Fricano (gfricano@indecon.com); Humphrey.Chip@epamail.epa.gov; JD Williams (jd@williamsjohnsonlaw.com); Jennifer Kassakian (jkassakian@indecon.com); Jennifer Woronets; Jim McKenna (jim.mckenna@verdantllc.com); Julie Weis; Kim Cox (kim.cox@portlandoregon.gov); Kim D'Aquila (kim.daquila@grandronde.org); Koch.Kristine@epamail.epa.gov; Madalinski, Kelly; Matt Johnson (matt@williamsjohnsonlaw.com); MCCLINCY Matt; Rachel DelVecchio (rdelvecchio@indecon.com); Robert Neely; Rose Longoria (rose@yakamafish-nsn.gov); Tom Gainer (GAINER.Tom@deq.state.or.us); John Verduin; Jeff Warren; Amanda Shellenberger; Carl Stivers; Jennifer Woronets
Subject: RE: Request for backup cost information

Chip,

Please see attached response to EPA's September 10 request for additional backup cost information.

Let us know if you have any questions.

Thank you,

Jen Woronets ☺

Anchor QEA, LLC

jworonets@anchorqea.com

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From: Humphrey, Chip [mailto:Humphrey.Chip@epa.gov]
Sent: Tuesday, September 10, 2013 11:26 AM
To: Bob Wyatt; James McKenna
Cc: Jennifer Woronets; Koch, Kristine; Penoyar, Susan
Subject: Request for backup cost informaiton

Bob and Jim

As we have discussed, EPA is conducting an independent analysis of many of the elements presented in the draft FS. These include the screening of remedial technologies, the development of remedial action alternatives and the detailed and comparative analysis of remedial action alternatives.

As part of this independent analysis, EPA has been reviewing cost information presented in Appendix K of the draft FS. However, Appendix K of the draft FS does not provide sufficient backup for unit costs. For example, while Section 2.3 of Appendix K includes assumptions for the development of the unit costs, quotations from suppliers and subcontractors are not documented in the backup.

Please provide the backup cost information described below so EPA can to conduct an independent evaluation of remedial action alternatives. The information should be consistent with EPA cost estimation guidance (A Guide to Developing and Documenting Cost Estimates during the Feasibility Study - EPA 540 - R - 00 - 002). Exhibit 6 - 1 of EPA 540 - R - 00 - 002 presents an example of the level of transparency required to independently review and confirm unit cost elements. EPA needs sufficient backup and transparency to properly evaluate the remedial action alternatives in the draft FS.

Backup information should include copies of specific vendor quotes, the unit cost base year for escalation if necessary, project location information, and any applied contractor markups, including overhead and profit. If the unit cost is based on a similar project, the scope, location and date of the previous project should be summarized.

In addition to the backup, the assumptions used to develop the cost estimates should also be provided. For example, the cost estimate for off-site disposal should present how the disposal costs are allocated between construction of the transload facility, transport to the disposal site and disposal at the off-site location.

A cost summary for each individual remedial alternative that identifies the total quantity and cost for each cost element and sub-element should be provided such that the electronic version of the tool is not necessary to follow the derivation of the quantities for each cost element. The cost summary can be used to trace each cost element to its underlying assumptions.

Please provide this information to EPA within 30 days of this request. Feel free to contact me if you have any questions regarding this request or if you would like to have your consultants contact EPA's consultants directly on this matter.

Chip Humphrey

EPA

To: Gustavson, Karl[Gustavson.Karl@epa.gov]
Cc: Roberts, Keegan[robertsk@cdmsmith.com]
From: Penoyar, Susan
Sent: Fri 8/23/2013 7:06:01 PM
Subject: Portland Harbor
Mechanical dredging production rate calculations 2013_08_23 -SJP changes accepted.docx

Howdy, Karl!

Things are moving along, right? A few things to touch bases with you on – floating them in this email, and we can talk if it's easier than responding by email.

•□□□□□□□ We've redrafted a 5-page Production tech memo (working draft attached) and the accompanying calculator for calculating production rates with various input parameters. With the question about citing your memo (below) concluded, we will be ready to wrap up our production memo. It would be great to have your quick review if you are able.

•□□□□□□□ Paul/Karl Memo – We would like to cite production rate variables as described your memo in our tech memo about production rates. This brings up a couple of questions:

o Is your memo "final" (will you be changing it since the May 27, 2013 date?)

o Your memo is labeled draft, deliberative, and confidential. Will it be unveiled? Is it "cite-able" if it is still caveated with confidentiality?

•□□□□□□□ Next update discussions:

o We are thinking about an FS Team update webinar on September 12 – hope you can hold time that day. Before then, we would like to go through a detailed update with you and Kristine Personal Privacy / Ex. 6 to get your input in advance of presenting to the full FS team. Todd will be contacting you to find a time for this update (about 2 hours)

•□□□□□□□ Earl's figure – of course! Is the 2 weeks up soon? ☺

•□□□□□□□ Tomatoes – deluged.

Susan J. Penoyar, PE, LEG, BCEE | Vice President | CDM Smith

14432 SE Eastgate Way, Suite 100 | Bellevue, WA 98007

Ph: (425) 519-8300 | Fax: (425) 746-0197 | Cell: (206) 715-5971

penoyarsj@cdmsmith.com | cdmsmith.com

To: Gustavson, Karl[Gustavson.Karl@epa.gov]
From: King, Todd W.
Sent: Mon 7/29/2013 8:55:27 PM
Subject: FW: Portland Harbor Robust UPL estimation
Robust Estimation of Upper Prediction Limits Lower Willamette River Area of Concern (2).docx
ATT00001.htm

From: King, Todd W.
Sent: Thursday, July 11, 2013 7:11 AM
To: Chip Humphrey; Kristine Koch; Elizabeth Allen
Cc: John Kern; Penoyar, Susan
Subject: Fwd: Portland Harbor Robust UPL estimation

For discussion today.

Todd King

kingtw@cdmsmith.com

c:(313)670-6020

Begin forwarded message:

From: "John Kern" < Personal Privacy / Ex. 6
To: "King, Todd W." <KingTW@cdmsmith.com>
Subject: Portland Harbor Robust UPL estimation

Please circulate to appropriate people.

--
John W. Kern PhD
Kern Statistical Services, Inc.
5175 NE River RD
Sauk Rapids, MN 56379
T: 320-281-0676
C: 509-432-6400

To: Bob Wyatt[rjw@nwnatural.com]; James McKenna[jim.mckenna@verdantllc.com]; Carl Stivers[cstivers@anchorqea.com]; Amanda Shellenberger[ashellenberger@anchorqea.com]; Michael Werth[mwerth@anchorqea.com]; Kevin Russell[krussell@anchorqea.com]; Kirk Ziegler[kziegler@anchorqea.com]; Humphrey, Chip[Humphrey.Chip@epa.gov]; Koch, Kristine[Koch.Kristine@epa.gov]; 'Hayter, Earl ERDC-CHL-MS'[Earl.Hayter@usace.army.mil]; Gustavson, Karl[Gustavson.Karl@epa.gov]; Todd King (kingtw@cdm.com)[kingtw@cdm.com]; (RobertsK@cdmsmith.com)[RobertsK@cdmsmith.com]; David Glaser[dglaser@anchorqea.com]
Cc: Jennifer Woronets[jworonets@anchorqea.com]
From: Jennifer Woronets
Sent: Fri 3/15/2013 4:23:43 PM
Subject: RE: Portland Harbor Modeling Conference Call Monday, March 18th 8:30 - 11:30 am (pacific) Preliminary Slides on Fish Tissue Data MNR Evaluations
Fish data_20130314.pdf

Chip, Kristine,

Per Chip's request, attached are preliminary slides on fish tissue data MNR evaluations that we would like to go over at the March 18th conference call. Please note these are preliminary working files that may contain errors and should be subject to limited distribution (and are stamped as such).

Please let us know if you have questions.

Thank you,

Jen Woronets ☺

Anchor QEA, LLC

jworonets@anchorqea.com

421 SW Sixth Avenue, Suite 750

Portland, OR 97204

503-972-5014

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From: Jennifer Woronets
Sent: Thursday, March 14, 2013 5:29 PM
To: Bob Wyatt; James McKenna; Carl Stivers; Amanda Shellenberger; Michael Werth; Kevin Russell; Kirk Ziegler; Humphrey.Chip@epamail.epa.gov; Koch.Kristine@epamail.epa.gov; 'Hayter, Earl ERDC-CHL-MS'; 'Gustavson.Karl@epamail.epa.gov'; Todd King (kingtw@cdm.com); (RobertsK@cdmsmith.com); David Glaser
Cc: Jennifer Woronets
Subject: RE: Portland Harbor Modeling Monday, March 18th 8:30 - 11:30 am (pacific) Conference Call Suggested Agenda Items

Chip,

Per your recent request, we suggest the following broad agenda items for the March 18th call on modeling and MNR:

- Status Update Earl's Model Calibration Evaluation
- AQ Evaluation of Model Feedback Linkage Uncertainty
- AQ Preliminary Evaluation of Smallmouth Fish Tissue Data as MNR Line of Evidence

Thank you,

Jen Woronets ☺

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From: Jennifer Woronets
Sent: Thursday, March 07, 2013 11:26 AM
To: Bob Wyatt; James McKenna; Carl Stivers; Amanda Shellenberger; Michael Werth; Kevin Russell; Kirk Ziegler; Humphrey.Chip@epamail.epa.gov; Koch.Kristine@epamail.epa.gov; 'Hayter, Earl ERDC-CHL-MS'; 'Gustavson.Karl@epamail.epa.gov'; Todd King (kingtw@cdm.com); (RobertsK@cdmsmith.com); David Glaser
Cc: Jennifer Woronets
Subject: Portland Harbor Modeling Conference Call - Monday, March 18th 8:30 - 11:30 am (pacific)

Bob, Jim, Carl, Amanda, Mike, Kevin, Kirk, Chip, Kristine, Earl, Karl, Todd, Keegan, David,

The next modeling/MNR conference call and web meeting has been scheduled for Monday, March 18th from 8:30 to 11:30 am (pacific) / 11:30 am to 2:30 pm (eastern).

Call in number

Personal Privacy / Ex. 6

Web meeting link

Personal Privacy / Ex. 6

An Outlook meeting notice will follow shortly. Please let me know if you have any questions.

Thank you,

Jen Woronets ☺

Anchor QEA, LLC

jworonets@anchorqea.com

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