GROUNDWATER QUESTIONS

(revised June 24, 2013)

Dawn Chapman:

GW samples were taken by the EPA in August 2012. The results came back and were presented at a January 2013 public meeting. One of the wells (Well PZ-109-SS) is 40 feet from the landfill fire. It tested positive for barium and two (2) other elements.

1. Q: What happens if the steam (containing leachate & contaminated groundwater) comes in contact with other elements?

   A: PZ-109-SS is on the north edge of the Former Active Sanitary Landfill cell but is not in the landfill waste mass. Its actual distance from the edge of the "fire" is not known with any certainty due to uncertainty in the fire's perimeter. PZ-109-SS is likely more than 200 feet from the fire, based on the data from the MDNR website. Barium is not a COC but is naturally occurring in soil.

2. Q: Aren't alpha emitters being inhaled by those who live near the landfill? We would like to have a scientific discussion on the data results and the potential health effects associated with the exceedances.

   A: MDNR has taken air samples around the landfill, and as far as EPA is aware, no elevated levels of alpha emitters have been found. If there are no particulates, the only radionuclide that could be detected in the air is radon.

3. Q: Would like EPA to consider Bob Criss's report and findings about West Lake Landfill and discuss publicly.
   (also asked by: MCE questions compiled by Ben Washburn in an e-mail dated 6/11/2013)

4. Q: When will the EPA be responding to the recommendations?
   (also asked by: Harvey Ferdman of State Stenator Bill Otto's Office)

5. Q: Will Bob Criss's report be responded to and will his concerns be addressed by EPA?

   A: As EPA continues its studies, we will address his issues as they come up in the course of other evaluations and reports. Some of the information he presented is being provided to USGS for their consideration.

6. Q: Uranium 235 has been found in many of the GW sample results. U-235 is an element NOT found in North America . . . could EPA explain why it keeps showing up and is being carried throughout the site?

   A: This statement is incorrect; U-235 is a naturally occurring isotope of uranium that is found in all natural uranium at a known percentage (0.7%). Mallinckrodt/St. Louis did the ore extraction of uranium, so the residues from its ore extraction would contain all naturally occurring uranium isotopes.

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GROUNDWATER QUESTIONS (cont.)

Harvey Ferdman of State Senator Bill Otto's Office:

7. Q: Will there be any other GW results to share with the public?

   A: Yes. There are two more site-wide groundwater sampling events scheduled for 2013, in July and October.

   Recommendations: Have Bob Criss sit at the table with EPA; hold two (2) separate public meetings – one to address technical issues about the landfill and the other to address the fire and odor issues; per Sharon Cottner (St. Louis COE) – once a ROD Is signed, and a FUSRAP designation is requested, the findings in the ROD must be contradicted; Mr. Ferdman has contacted the FUSRAP officials in D.C. to get details.

   A: EPA is working with community members who have formed a CAG.

Missouri Coalition for the Environment_ March 15, 2013

BKD: Groundwater Contamination
The commenter reiterates concerns about potential contaminant migration to the underlying aquifer that were raised and addressed in the public comment period and 2008 OU-1 ROD responsiveness summary. The commenter's statement about the lack of a protective cap and basal liner appears to argue for the installation of a cap, consistent with the 2008 OU-1 ROD remedy. As stated in the responsiveness summary, general comment 5, "It is important to understand that it is the cover, not a liner, which prevents surface water from contacting the waste material." It is surface water infiltration which generates leachate that can then migrate out of the landfill waste.
While some historical diagrams such as the one cited here by the commenter do show groundwater in contact with portions of the deepest municipal solid waste in the OU-1 landfill cells, it is important to note that little if any of the deepest waste is radiologically contaminated. Soil samples and vertical gamma profiling data collected from borings during the OU-1 Remedial Investigation and re-evaluated in greater detail in the SFS, show the three-dimensional extent of the radiological contamination within the overall waste mass. The commenter's final sentence in this section misinterprets the radionuclide data from the 2012 groundwater sampling event, as discussed in more detail below.

BKD: Groundwater migration
The 2012 groundwater sampling event results show radium in groundwater at levels above its MCL in more locations than were found in the sampling events prior to the OU-1 ROD in 2008. It is not clear at this time whether or not these results represent contamination migrating from the landfill for the following reasons.

(a) 2012 was a year with significantly lower than normal precipitation, which led to significantly less water infiltrating the OU-1 wastes. As discussed above, it is surface water infiltration which creates leachate that can potentially transport contaminants out of the waste mass. A drier year would be expected to create less leachate, reducing potential transport of contaminants out of the waste rather than increasing it, and lowering groundwater concentrations of waste-derived contaminants rather than increasing them.

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GROUNDWATER QUESTIONS (cont.)

Missouri Coalition for the Environment_ March 15, 2013 (cont.)

(b) Detections of radium in groundwater above its MCL were found across the site, in both shallow and deep wells, in locations both downgradient and upgradient of the OU-1 cells. There are also numerous wells across the site, both shallow and deep, in locations both downgradient and upgradient of the OU-1 cells, that contain radium in groundwater substantially below its MCL. There is no credible plume geometry or hydrologic system that can explain this site-wide distribution of radium contamination in groundwater as originating from the OU-1 cells. The disagreement between the commenter and EMSI over whether PZ-101-SS is downgradient or upgradient of OU-1 Area 1, due to the hydraulic draw-down from the leachate collection system at the former Active Sanitary Landfill, overlooks the larger site-wide distribution of radium contamination in groundwater.

(c) Uranium and thorium, the other radiological contaminants in the OU-1 cells, were not found at elevated concentrations in the groundwater across the site. Uranium did not exceed its MCL in any of the wells sampled in 2012, and thorium (which does not have an MCL) was found in dissolved samples at a maximum concentration of 2.04 pCi/L. Even accounting for the different solubilities of radium, thorium and uranium compounds in the landfill waste, the commenter's assertion that "…radionuclides are actively migrating in the groundwater…" cannot explain why only radium is exceeding its MCL in groundwater across the site.

(d) The isotopic abundances of radium in the landfill waste do not match those of radium found in the groundwater samples. Both Ra-226 and Ra-228 are found in the groundwater samples at fairly comparable concentrations, while the OU-1 soil samples contain primarily Ra-226 with little to no Ra-228. Leachate generation and migration would not alter these isotopic abundances.

8. Q: The commenter also discusses several different historical and current estimates of the hydraulic conductivity and flow velocity at the site. It is not unexpected that these estimates do not exactly match, due to differing methodologies for calculating these values and heterogeneity in the aquifer materials. Furthermore, demonstrating that an aquifer has a high hydraulic conductivity and flow velocity does not by itself mean that there is a groundwater contaminant plume at the site.

   (also asked by: MCE questions compiled by Ben Washburn in an e-mail dated 6/11/2013)

9. Q: Given the radioactive waste was dumped at West Lake 40 years ago, this year, and Dr. Criss's conclusion that the "radiologically-contaminated groundwaters have moved substantial lateral distances away from the original areas where the radwaste was dumped, and also have entered subjacent Mississipian bedrock: is it not more likely the reason the high levels of radium-226 and radium-228 are from the radioactive waste that was dumped and not naturally occurring as the EPA currently concluded?

   A: It is EPA's position that the 2012 groundwater data do not prove or disprove the existence of a groundwater contaminant plume at the site. For this reason EPA has requested that the PRPs conduct three additional rounds of groundwater sampling in 2013 to provide a more comprehensive picture of current groundwater conditions at the site.

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GROUNDWATER QUESTIONS (cont.)

Missouri Coalition for the Environment_ March 15, 2013 (cont.)

BKD: Background Radiation Levels (specific question not provided)

A: It is EPA's position that the 2012 groundwater data by itself does not prove or disprove a background source for radium in groundwater at the site. EPA will obtain assistance from the US Geological Survey, whose papers were cited by the commenter, to understand and interpret the groundwater results from the 2012 and upcoming 2013 sampling events and determine the background contribution to contaminant concentrations in the aquifer beneath the site.

10. Q: The EPA Remedial Investigation for the West Lake Landfill OU-1 (pg. 80) indicates that the normal groundwater flow is toward the Missouri River. However, its normal flow was being influenced by the leachate collection system in the adjacent landfill. It's our understanding that the leachate collection pumps have stopped working at the Bridgeton landfill. How will this affect groundwater flow in the West Lake Landfill OU-1 Area 1 and 2?

    A: Republic is enhancing the leachate collection system. EPA will evaluate the influence of the leachate collection system on the groundwater flow direction. The PRPs will construct a groundwater fate and transport model to help answer this question.

11. Q: Is the EPA sampling groundwater between West Lake OU-l and the Missouri River or anywhere offsite?

    A: Not at this time. If future evaluations by our technical experts (including USGS) indicate that this is necessary, EPA will request the PRPs to do this. The West Lake PRPs are sampling monitoring wells on-site. As part of the 2008 ROD remedy or any future remedy, additional groundwater monitoring wells would be required.

12. Q: Will EPA provide the data on groundwater sampling locations, results, and plans?

    A: Yes, we have done so and will continue to do so as the data becomes final. Sampling results are posted to the EPA Region 7 web site.

13. Q: How often is EPA sampling groundwater monitoring wells? What days did the EPA sample groundwater at the site in 2012 and 2013? What is the schedule for groundwater sampling in 2013?

    A: EPA has asked the PRPs to do four quarterly groundwater sampling events. The first occurred in July-August 2012, the second in April 2013, and the remaining two are planned for July and October 2013. EPA is collecting its own split samples as part of our oversight of the PRPs.

14. Q: Groundwater plumes are often seen at superfund sites where soil has been contaminated with chemicals. Soil is not the same as landfill waste. Would EPA expect to find a groundwater plume in a heterogeneous mixture of materials such as can be found in the West Lake landfill?

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GROUNDWATER QUESTIONS (cont.)

Missouri Coalition for the Environment_ March 15, 2013 (cont.)

A: Ongoing monitoring of groundwater across the site allows EPA to monitor and evaluate contaminant migration. A plume, if one existed, would be in the surrounding aquifer material, not the landfill waste itself.

15. Q: How would groundwater behave in landfill material that might be different from how groundwater would behave in a homogeneous material like soil?

    A: This is dependent on the exact composition of the landfill material and cannot be predicted generically. Soil is not a homogeneous material.

16. Q: What information would EPA need in order to predict groundwater movement in landfill material with some degree of accuracy? Does the agency have this information?

    A: EPA has tasked the PRPs to collect additional information on groundwater at the site, and this is ongoing. EPA has tasked USGS to help interpret the data as it is received, to inform future decision-making.

MCE questions compiled by Ben Washburn in an e-mail dated 6/11/2013:

17. Q: Besides the ASPECT plane and groundwater testing is the EPA doing anything else(i.e. soil samples) to better their understanding of the West Lake Landfill and the radioactive material that is present?

    A: The PRPs have already done this, at EPA's request, during the RI and several previous rounds of investigation. The available data adequately characterizes the radioactivity in the landfill, and there are no current plans to collect additional samples.

18. Q: How does the EPA explain levels of radium-226 and radium-228 outside of OU-1?

    A: All the data will be evaluated comprehensively and USGS will assist EPA in evaluating the data.

FUSRAP Questions

Harvey Ferdman of State Senator Bill Otto's Office

19. Q: Should this site be placed under the FUSRAP designation, and if so, how do we get that done?

    A: This would require a formal designation by Congress or the Department of Energy. EPA does not participate in this decision process.

BKD: Copied verbatim from the response to Sen. Blunt inquiry last month. (May want to add that getting West Lake into FUSRAP would literally require an act of Congress.)

FUSRAP Questions (cont.)

Harvey Ferdman of State Senator Bill Otto's Office (cont.)

Both the EPA and the U.S. Army Corps of Engineers play a role in the cleanup of the St. Louis County sites, based on Congressional direction. In 1974, the Atomic Energy Commission created the Formerly Utilized Sites Remedial Action Program (FUSRAP) to address the cleanup of nuclear weapons production and to designate sites to receive federal funding for site cleanup. Responsibility for FUSRAP was assumed in 1977 by the U.S. Department of Energy and then transferred by statute to the Corps in 1997.

FUSRAP tasks the Corps to select and implement remedies at the designated sites. FUSRAP also directs the Corps to follow the EPA's remedy-selection critera, set forth in federal regulations implementing the 1980 Superfund law (formally known as the Comprehensive Environmental Response, Compensation and Liability act or CERCLA). In other words, although the Corps chooses the remedy to clean up a FUSRAP site, the standards that define its remedy selection and govern its cleanup mission are the same as those that the EPA follows through the CERCLA process. FUSRAP directs the EPA to oversee the Corps' implementation of remedies selected by the Corps.

The St. Louis Airport sites (SLAPS) which include Coldwater Creek, were designated by the Department of Energy to be part of FUSRAP. Therefore, the Corps selected the remedies for these sites and sees to their implementation. At the West Lake Landfill site, by contrast, the governing federal laws, and particularly CERCLA, require the EPA to select the appropriate remedy and to directly supervise the work of contractors hired by several private and public parties that have legal duties to remediate pollution they caused. At all these sites, statutes impose on DOE, the federal nuclear-weapons agency that originally created the radioactive waste material, enforceable financial and legal responsibilities.]

MCE questions compiled by Ben Washburn in an e-mail dated 6/11/2013:

20. Q: Is it possible to have you, the EPA, recommend to have West Lake Landfill be transferred to the FUSRAP program?
21. Q: Why not turn Area 1 over to FUSRAP?"

    A: No. This is not within EPA's purview, it is the responsibility of Congress and the Department of Energy, and is ultimately funded by Congress.

West Lake Landfill Questions

Harvey Ferdman of State Senator Bill Otto's Office_April 30, 2013 letter

22. Q: The 39,000 tons of top soil thought to dilute the 8700 tons of barium-sulfate at West Lake Landfill is really radioactive materials that are the leftovers of Congo and Colorado Raffinate after the bulk of them were shipped offsite, plus the top 12-18 inches of the soil they were sitting on (see bottom of page 4 and top of page 5 of AEC Inspection Report*). Logically, this would have included tailings of the Raffinate that had mixed in with the top soil or been too dispersed to be worth shipping out of state.

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Harvey Ferdman of State Senator Bill Otto's Office_April 30, 2013 letter (cont.)

A: It is likely that the soil removed from the Latty Avenue site and mixed with the barium sulfate residue contained residual amounts of the other radiological wastes stored there. However, it is impossible to say how much radiological material this soil contained. EPA has extensive analytical results for the materials actually present in West Lake Landfill. [Background: Since the Congo raffinate and Colorado raffinate were valuable enough to justify drying and shipping to Colorado, it is likely that very little of this material was left on-site.]

23. Q: The cover letter to the AEC report contains an error in the math that yielded the statement that the barium-sulfate was dilute to 0.0001% (see math below). This number should have read 0.01%** or 100 to 150 times higher than EPA reports, AND THIS CALCULATION ASSUMES NON-RIM SOIL WAS USED, WHICH IS NOT WHAT WAS USED*

    A: The NRC made a mathematical error on the first page of its November 1, 1974 letter to Cotter Corporation when it calculated the uranium concentration in the mixture of leached barium sulfate residue and soil as 0.0001%. Mr. Ferdman's calculations of the percentage below are correct. Regardless of the percentage calculation, the amount of uranium in this mixture (seven tons) has been consistently reported by NRC and EPA and is not in question, so this error does not affect the estimated total quantity of radiological material at the site.

24. Q: There appears to be an additional 350 T of "miscellaneous residues containing about 2 tons of uranium" that may have ended up at West Lake.

    A: EPA is relying on the NRC's report for an accounting of this material. According to the NRC's November 1, 1974 letter to Cotter Corporation, in the last paragraph on page 4, "The only residue then remaining at the site was the 8700 tons of leached barium sulfate." While not explicitly accounted for in the NRC's letter, these miscellaneous residues were apparently not included in the materials sent to the West Lake Landfill. Cotter Corporation may have further information on the disposition of these miscellaneous residues.

25. Q: In the Inspection Report (#2 on page 3) there is a list of the original materials from the Airport Site that were offered for bid in 1964, and subsequently, portions of this material were shipped to the Latty Avenue site. Included in the original materials list were: "1500 tons of barium sulfate cake (unleached) containing about 22 tons of barium sulfate cake (leached) containing about 7 tons of uranium; and approximately 350 tons of miscellaneous residues containing about 2 tons of uranium."

    a. Is there an explanation for how 1500 tons of barium sulfate, mostly unleached, became 8700 tons of leached barium sulfate? Note that the reference for the 8700 tons of leached barium sulfate came from Cotter Corporation representatives (see Inspection Report* page 4, last paragraph) and may not have had any other documentation.

    A: EPA has no independent information on this subject. Clarification would have to come from Cotter Corporation. EPA notes that NRC refers to these materials using subtly different names (1500 tons barium sulfate cake [unleached] versus 8700 tons of leached barium sulfate).

West Lake Landfill Questions (cont.)

Harvey Ferdman of State Senator Bill Otto's Office_April 30, 2013 letter (cont.)

Note: I was able to obtain copies of invoices from B & K to Cotter showing that 48,538 tons of materials were shipped from Latty to the landfill; 10758 tons were shipped by rail; and 10,753 tons of materials were brought in. It appears that this material was used to backfill the site after the removal of the 39,000 tons of the top 12-18 inches of RIM soil – see Inspection Report* page 6 – which states that this was done before any surveys were done (see *** below).

A: Noted

*U. S. Atomic Energy Commission RO Inspection Report No. 040-8035/74-01 for an inspection preformed April 10 and 21-24, 1974

**It appears that the AEC Nov 1, 1974 document cover letter was in error in stating the following: "… about 8700 tons of leached barium sulfate containing about seven tons or averaging about 0.08% natural uranium was scooped up for disposal with approximately 39,000 tons of soil, and the resulting uranium concentration was about .00001%."

Here's the math:
7 tons U / 8700 tons = 0.0008 or 0.08%
Add 39000 tons of "soil" = 47700 tons
7 tons U / 47700 tons = 0.0001 or 0.01% (rounded) = 100 times previously stated level
7 tons U / 47700 tons = 0.00015 or 0.015% = 150 times previously stated level

*** Ryckman/Edgerley/Tomlison & Associates, Inc. report RETA-780 dated May 1, 1974 showing the site layout and MR/hr. readings after backfilling

Jim Salter, AP-St. Louis

State Rep. Bill Otto, D-St. Charles, is holding a news conference at 3:30 today to announce that he is asking EPA for what he calls "emergency removal action" to transport away some of the nuclear waste at the West Lake Landfill in Bridgeton. Otto says someone on his staff checked old documents and found a significant error _ the nuclear waste makes up .0146 of the landfill, not .000146 as had been previously thought. He said EPA confirmed the error.

26. Q: Has EPA confirmed old documentation was in error? If so, is there some sort of emergency declaration procedure that could expedite the removal, and what needs to be done for that to occur? IF the amount of waste really is much greater than originally thought, is there any renewed concern in EPA about the danger posed by the underground smoldering?

Jim Salter, AP-St. Louis

A: The Nuclear Regulatory Commission made a mathematical error on the first page of its November 1, 1974 letter to Cotter Corporation when it calculated the uranium concentration in the mixture of leached barium sulfate residue and soil as 0.0001%. The value should have been 0.01%. Regardless of the percentage calculation, the amount of uranium in this mixture (seven tons) has been consistently reported by NRC and EPA and is not in question. Most importantly, EPA has extensive analytical results for the materials actually present in West Lake Landfill, as reported in the Remedial Investigation Report, the Record of Decision, and other documents in the Administrative Record. The actual site conditions, analytical results and risk assessments form the basis for EPA's decision-making at the site.

27. Q: Can you respond on the record to Rep. Otto's call for emergency action to remove the radioactive waste? That is, does EPA have a provision for emergency removal and would the radioactive material at West Lake be eligible?

A: EPA has authority to conduct removal actions based on an evaluation of eight criteria set forth in the National Contingency Plan (40 CFR 300.415). This evaluation guides the agency in determining the appropriateness of a removal action. These response actions are generally limited to shorter term actions (1 year or less) which cost less than $2 million and where there is risk to public health or the environment. A majority of R7's response actions pertain to drums of hazardous substances disposed of improperly, contaminated water supplies, mainly private wells, yards contaminated with lead from historic mining operations and mercury releases where human contact is probable.

The site is presently fenced and does not pose a direct contact threat to members of the public, the drinking water supply is not contaminated, and there is no data to suggest that the community is currently being exposed to radiological contaminants from OU 1. Based on such conditions, EPA has not determined this case meets the removal action criteria.

<u>8 Removal Criteria (40 CFR 300.415)</u>

(1) Actual or potential exposure to nearby human populations, animals or the food chain from hazardous substances or pollutants or contaminants;
(2) Actual or potential contamination of drinking water supplies or sensitive ecosystems;
(3) Hazardous substances or pollutants or contaminants in drums, barrels, tanks, or other bulk storage containers, that may pose a threat of release;
(4) High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface that may migrate;
(5) Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released;
(6) Threat of fire or explosion;
(7) The availability of other appropriate federal or state response mechanisms to respond to the release; or
(8) Other situations or factors that may pose threats to public health or welfare of the United States or the environment.

West Lake Landfill Questions (cont.)

Missouri Coalition for the Environment_ March 15, 2013

Chemical and physical character of the radioactive material:

28. Q: The commenter speculates that "…complete analyses of the original radwaste, and possibly even actual samples of the leached barium sulfate exist today." EPA is unaware of any samples of or analytical results for the "original radwaste" that might exist, and does not have any such samples or analytical results in its possession. All of the information EPA has on how the radiological waste came to be in the West Lake Landfill was provided by the Nuclear Regulatory Commission, primarily in its reports of 1976, 1982 and 1988. (also asked by Harvey Ferdman)

29. Q: Kay Drey and other professionals are asking about Bob Criss's report. EPA states in its technical findings throughout the history of the site that barium-sulfate is the key element of concern – Bob Criss disagrees with EPA's findings. Would like EPA to respond?
    (also asked by: MCE questions compiled by Ben Washburn in an e-mail dated 6/11/2013)

30. Q: Does the EPA understand the physical and chemical properties of the radioactive material dumped at the landfill?

    A: The commenter states his disagreement with the NRC's conclusion that the radiological material at West Lake Landfill is leached barium sulfate residue, basing this opinion on the barium to sulfate ratios in NRC's samples. EPA disagrees with this view. The commenter overlooks the fact that the NRC's samples did not represent the original leached barium sulfate residue generated by Mallinckrodt's ore processing facility. Information reflected in public records indicate the residue had been mixed with 39,000 tons of soil of an unknown composition, spread over and incorporated into two large municipal solid waste landfill cells, and left uncapped for at least three years before NRC collected its first samples in 1976. Given that NRC collected samples three years after the barium sulfate was disposed and that the barium sulfate was mixed with other soils at the landfill, the barium to sulfate ratios of the NRC's samples would not necessarily match the stoichiometric ratio of pure barium sulfate ($BaSO_4$).
    In addition, the leached barium sulfate residue from the multi-step ore extraction process would not be expected to be pure barium sulfate, but would contain residuals from all steps.

    EPA would prefer that samples of the original residue had been analyzed, but this does not call into question EPA's investigation and decision-making for the site. NRC has well-established expertise in assessing radiological sites, and while there is speculation by the commenter to the contrary, there is no credible evidence to refute NRC's conclusion that leached barium sulfate residue was placed in the West Lake Landfill.

BKD: Radiological character of waste:
The commenter discusses the decay of thorium and the ingrowth of radium over time as these two elements re-establish the secular equilibrium of their decay series. EPA does not dispute the comments. The commenter describes a well-known process which was discussed in Section 2.2.7 of the final Supplemental Feasibility Study report as well as earlier documents. The increase in radium activity with time was fully considered in the landfill cap design presented in the SFS report. The commenter raises no new issues here. In fact, this issue was raised during the public comment period on the proposed plan and addressed in the responsiveness summary for the 2008 OU-1 ROD.

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Missouri Coalition for the Environment_ March 15, 2013 (cont.)

Nature of the landfill:

The commenter restates facts about the landfill waste and distribution of the radiological contamination in the OU-1 cells and the subsurface fire in one of the OU-2 cells that is more than 1,000 feet away from the nearest radiological contamination. EPA agrees in part but disagrees with the claims presented in points (1), (3) and (5) about effects the OU-2 fire could have on the OU-1 radiological contamination. The commenter raises the possibility of "particulates" or "smoke" being released from the subsurface fire and carrying radiation away from the site. EPA notes that the FEMA reference cited here discusses both surface and subsurface fires. To the best of EPA's knowledge, the OU-2 subsurface fire has caused gas releases but not particulate releases [NOTE: checking with MDNR; no response from HWP]. With the exception of radon, the radionuclides and their decay products (and their oxide compounds) in the landfill are non-flammable solids with very high melting points that will not become gases. However, in the interest of addressing public concerns on this issue, EPA will review available data on the effects of subsurface landfill fires on hazardous substances (including radionuclides) to determine what effects such a fire might have on the OU-1 Area 1 cell.

Assessment and Recommendations

The commenter reiterates the points made earlier in the document, which have already been addressed above.

The commenter's suggestion here that samples of the radiologically contaminated material within the landfill should be dug up and analyzed now to obtain results indicative of the original barium sulfate waste is not sound scientifically. This material has been in contact with a diverse mixture of soils, municipal solid waste, and other wastes in uncontrolled conditions for the past forty years. The original radiological material has been unavoidably altered by this contact, and there is no way the material could be reliably "re-constituted" now.

The commenter recommends "several dozen new monitoring sites … at least 1000 feet away from the landfill boundaries". EPA disagrees. Based on available data, there is no justification for the "several dozen new monitoring sites … at least 1000 feet away from the landfill boundaries". However, regardless of the remedy eventually selected for OU-1, the site will always be a landfill and thus will require groundwater monitoring and Five-Year reviews for the foreseeable future. If future groundwater results definitively demonstrate a contaminant plume at the facility boundary, off-site monitoring wells would be installed as necessary to define the plume and help select a groundwater remedy.

(2 questions below also asked by:MCE questions compiled by Ben Washburn in an e-mail dated 6/11/2013)

31. Q: Is EPA conducting groundwater samples outside of the West Lake Landfill? If no, why not?

32. Q: Does the EPA intend to respond to the conclusion and recommendations in Dr. Criss's report, which was submitted to the EPA on March 15th, 2013?

West Lake Landfill Questions (cont.)

MCE questions compiled by Ben Washburn in an e-mail dated 6/11/2013:

33. Q: Does the EPA plan on taking physical soil samples at any point in order to properly analyze the radioactivity of the landfill?

A : The PRPs have already done this, at EPA's request, during the RI and several previous rounds of investigation. The available data adequately characterizes the radioactivity in the landfill, and there are no current plans to collect additional samples.

34. Q: Is there some trend or similarity between all the sites?

A: don't understand this question

BLOG

35. Q. When will EPA make a decision and start cleaning up the site?

A: EPA will evaluate the new groundwater data and the additional analyses the PRPs are doing. EPA will present this information to the National Remedy Review Board, and then will hold a public meeting and comment period for the new proposed plan.

36. Q: Have any studies been performed to evaluate chronic (as opposed to acute) exposures for risk to OU1 landfill contaminants?

A: There is no data to suggest that the community is currently being exposed to radiological contaminants from OU1. Therefore, no exposure studies have been performed.

ANTICIPATED

37. Q: Have any health studies been conducted at West Lake?

A: No.

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Flood/Earthquake Questions

Missouri Coalition for the Environment_ March 15, 2013

Hydrologic and Geologic Risk Factors of the West Lake Landfill Site

The commenter reiterates concerns about potential flood and earthquake risks to the site that were raised and addressed in the public comment period and 2008 OU-1 ROD responsiveness summary. As EPA has stated previously, the cap-in-place remedy selected in the 2008 OU-1 ROD does not depend on the integrity of the Earth City Levee system. Portions of the toe of the OU-1 Area 2 radiologically-contaminated cell would be armored with rip-rap (large boulders) to prevent erosion of the cap in the event that the levee failed or was overtopped by a "greater-than-500-year" flood event. Due to fill activities, the West Lake Landfill is now the highest area in Earth City, and its elevation is substantially above the top of the Earth City levee. Specifically, the topographic relief from the river to the landfill is about 55 feet.

38, Q. The commenter asserts that the site has "high" liquefaction potential. EPA disagrees. The assertion is not supported by the reference cited, which is an MDNR Earthquake Hazards Map for the St. Louis metro area. This map shows all areas built on alluvial deposits from the Missouri and Mississippi rivers as having "potential for liquefaction and/or soil amplification". Also, the assertion that the site is near areas that have "significant" landslide potential is unsupported by this reference, which identifies sloped areas throughout the metro area as having "potential for landslide". The risks for liquefaction or landslide at the site are no greater than those anywhere else along these rivers.

A: EPA disagrees with the statement that the erosional events on the toe of OU-1 Area 2 were caused by a slope failure or landslide rather than surface erosion. Historical aerial photos of the area show no evidence of a slope failure, ground scarp or landslide, but do show material eroding off of the Area 2 toe onto the adjacent Buffer Zone/Ford Property. The re-evaluation of the ROD cap-in-place remedy in the SFS includes regrading of the landfill, primarily to reduce the steepness of the slopes on the perimeters of OU-1 Areas 1 and 2, to further reduce the risk of future erosion events.

The 2008 OU-1 ROD remedy of capping in place includes cap maintenance in perpetuity which would repair any future damage caused by surface erosion, settling (due to earthquake-induced liquefaction or other causes), desiccation cracking, or any other processes.

MCE questions compiled by Ben Washburn in an e-mail dated 6/11/2013:

39. Q. Given that the radioactive waste will become more radioactive for the next 9,000 years, West Lake sits in a floodplain, in an urban area, and in a seismic zone, several tornadoes have come close to hitting the landfill in the last couple of years, and there is a smoldering landfill fire in close proximity, how can the EPA claim that capping and leaving in place the radioactive waste is the best solution?

A: EPA is re-evaluating alternatives and will issue a new proposed plan with a new public comment period.

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BRIDGETON LANDFILL Questions

Missouri Coalition for the Environment_ May 23, 2013

40. Q: 1. Can the EPA say with 100% confidence that the landfill fire will not reach the nuclear weapons wastes? If yes, will the EPA explain to the community, in detail, the information it is using to make this determination. If no, what is the EPA plan to ensure the fire does not reach the nuclear weapons wastes?

A: EPA believes the contingency measures required under the Missouri Attorney General's consent order with Republic will prevent the subsurface oxidation event from reaching the radioactively contaminated landfill cells. [Placeholder: refer to ORD evaluations]

41. Q: 2. How does EPA explain that the temperatures in the landfill past the interceptor wells are rising above levels of concern-170 degrees at several of the monitoring wells including at TMPS, TMP13 and TMP14?

A: MDNR is monitoring the situation in the Bridgeton Sanitary Landfill. EPA is reviewing the data MDNR generates on the progress of the SSO. This question should be referred to MDNR. [Have MDNR update EPA with most recent data prior to meeting]

MCE questions compiled by Ben Washburn in an e-mail dated 6/11/2013:

42. Q: "Does the EPA know exactly how far the landfill fire is from the radioactive waste?

A: EPA is monitoring the data from MDNR. MDNR's current evaluation as of June 14, 2013 is that the SSE has reached the line of interceptor wells but has not passed them. The distance from the interceptor wells to the nearest edge of OU1 Area 1 is more than 1,000 feet.

43. Q: As the EPA you are in charge of all that goes on in, at, and around the landfill, as the entire landfill is a Superfund site, therefore how can you continually say that MDNR has the data and you are unsure about the status of the fire? You are overseeing the MDNR therefore shouldn't YOU know what is going on at YOUR Superfund site under YOUR jurisdiction?

A: MDNR administers the approved solid waste disposal program in Missouri and issued a solid waste landfill permit for the cell with the SSE. MDNR's permit and its solid waste regulations, that apply to the landfill, are not enforceable by EPA. Also, OU2 ROD basically delegates management of the OU2 cells to MDNR.

44. Q: At what concrete point will the EPA/MDNR say that the gas interceptor wells have failed?

A: The PRPs are developing contingency plans to address these issues and EPA and MDNR will be evaluating the contingency plans.

45. Q: Does the EPA have a red line for the removal of the radwaste from Area 1 in regards to the fire?
A: EPA is tasking its internal experts, including USGS, to evaluate the current SSO data and make recommendations

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BRIDGETON LANDFILL Questions (cont.)

Harvey Ferdman, June 20, 2013

FYI, the MDNR Landfill Fire Expert is calling for construction of a firewall between the fire and the North Quarry (home of Area 1) within the next 60 days!

Attached is a report from the Missouri Department of Naturals Resources landfill fire expert dated June 17, 2013.

In his General Findings section, it is stated that the fire is advancing northward at the rate of 1 to 2 feet per day, down from 3 feet per day. Note that Area 1 is currently around 1000 feet from the leading edge of the fire, and less than1000 feet from the heat/steam front. There are uncertainties in just how close to Area 1 it may be due to scarcity of CO2 monitoring probes in that area. This raises concerns that Republic (the landfill operator) and MDNR did not expect the fire to spread this far this fast!

The expert's report voices concern that the proximity of Area 1, given the approach the Operator has chosen to contain the fire, i.e., not following his repeated recommendations to isolate the South Quarry from the North Quarry, may cause the dump operator to have to dig into the garbage to erect an additional firewall which in turn will create an immediate exposure of the community to documented toxins that include dioxins as well as odors so distressing that many have been temporarily relocated out of the area.

MO DNR's expert's recommendations issued Monday June 17th are pasted in below for your convenience. Please read #3, 4, and especially 12 and 13 in which he is calling for the erection of a fire wall within 60 days of this report.

What can the EPA and/or DOE/FUSRAP do to help this community given that may feel that it would be preferable to remove Area 1 over trenching and erecting a firewall in the garbage.

It is our understanding that the EPA has a procedure for an Emergency Removal Action. Please provide documentation of the criteria for such an action and the procedure for it to be invoked. It will also be appreciated if you let us know of any other expedited methods to help this community remove this immediate threat to its wellbeing and to allow the fire fighters to focus on the fire without the being impeded by the presence of Area 1.

Mr. Ferdman's RECOMMENDATIONS

The following is a summary of the preliminary recommendations at the Bridgeton Sanitary Landfill.

1. The operator should continue installing the temporary cover/cap in the South Quarry in an expedited manner. The cap is a key component in meeting the objective of reducing odors and minimizing oxygen intrusion.

2. Per the North Quarry Contingency Plan in the Order, the operator should install a line of five to six TMPs capable of measuring 500°F to the northeast of TMP line 1 through 4. All components used in constructing of the TMPs shall be able to withstand temperatures up to 500°F. The line of new TMPs should be placed 25 to 50 feet off center of TMP line 1 through 4. The operator should also install a line

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of monitoring wells 25 to 50 feet on center that are screened for two to three elevations in the North

Mr. Ferdman's RECOMMENDATIONS

Quarry 50 feet from TMP line 1 through 4. The screening levels should be defined by the average depth of the waste divided into thirds unless the depth is less than 100 feet, then only two screened levels would be necessary.

3. The combined well and TMP monitoring line should be used as a sentry line; if any of the pre-defined criteria are exceeded, the operator shall immediately implement a fire break/isolation barrier between the North Quarry Landfill and Operable Unit 1, the Radiological Unit.

4. The operator and DNR should agree within the time frames in the established order on a set of pre-defined criteria that will immediately require the implementation and construction of the fire break/isolation barrier between the North Quarry Landfill and Operable Unit 1, the Radiological Unit. The criteria should be based on a sustained temperature and/or CO level, such as detailed in Table 2.

5. To allow for enhanced analysis of the sentry line, temperatures and gas (i.e., CO, methane, hydrogen, etc.) data logs and maps should be collected and provided no less than weekly to DNR.

6. The operator should submit designs for the fire break/isolation barrier between the North Quarry and Operable Unit 1, the Radiological Unit, within the time frames in the established order. The design should completely isolate potentially combustible materials between the Bridgeton Landfill and Operable Unit 1.

7. The additional oxygen concentrations as shown in Figures 2 and 3 may increase the potential rate of spread and should be kept below the 5% NSPS limit for all interior gas extraction wells.

8. In facilities with smoldering events, it is recommended the oxygen concentration for all interior gas extraction wells be kept below 1%.

9. In areas where the gas or waste temperatures exceed 180°F, the oxygen concentrations in the waste mass should be kept below 1% and optimally it should be kept below 0.5% for an interior gas extraction well.

10. All wells in the North Quarry should be kept to below 1% oxygen.

11. Excessive oxygen in the waste prisms should be avoided. While landfill odors can be a driving factor in increasing the vacuum on a gas collection system, the operator should examine the design and operation of the gas collection system first and keep "overdraw" conditions to a minimum.

12. While I understand from discussions with DNR staff that Republic Services previously rejected Dr. Stark's January 22, 2013, vertical barrier wall design at the border of the neck and North Quarry, based on the latest data markers, there appears to be a small construction window to install this barrier and reduce the likelihood of this smoldering event impacting the North Quarry.

13. I would again recommend the operator start the construction of a vertical barrier wall in the narrow portion of the landfill within 60 days of this report unless new data indicates the reaction is in the North

Mr. Ferdman's RECOMMENDATIONS

Quarry or the rate at which the reaction is expanding would interfere with completion of the wall construction. The vertical barrier wall should also incorporate a set of 8 to12 gas carbon dioxide, injection wells as a failsafe.

14. Based on the data conditions above, site conditions, fire science, and engineering, I do not recommend allowing the North Quarry to be used as a fire break from the Radiological Unit. There are a number of reasons why the reaction should be contained to the South Quarry, of primary concern is allowing the North Quarry, an unknown waste mass, to react over time and assume it will respond the same as the South Quarry. The impact to the community from another long term landfill gas exposure must be considered and accounted for in making this decision. All attempts to contain the smoldering and heating event should be done at the narrow portion of the facility. The operator should be required to use all available technology to contain the reaction in the South Quarry and allow no advancement through the neck area into the North Quarry.

15. If Republic Services once again elects not to install the vertical barrier wall put forward by Dr. Stark, a third set of gas interceptor wells at distance of 25% less than previously installed TMP line GIW-8 to GIW-13 or the addition of 8 to 9 GIW should be installed within 45 days of this report to contain the reaction.

16. I also recommend the North Quarry be capped with the same cover system being applied in the South Quarry to further reduce the possibility of oxygen intrusion into the waste mass and to minimize odors.

17. Gas temperature data from the GIW system should be plotted and submitted weekly to DNR until all the data shows a decreasing trend and all gas temperatures are below 165°F.

A: See page 9.

BLOG

46. Q: What about the blog post that showed the odors were radioactive?

A: MDHSS has conducted screening for radioactive compounds. It has been determined it does not present a health threat to off-site residents. Information can be found on the MDHSS webpage.

Anticipated

47. Q: What do you think about MDNR's expert's report?

A: We have asked our ORD experts to review the gas composition, temperature and the measurements at the site along with the Thallhamer report. They have not completed the evaluation of the data.

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Community Questions

Missouri Coalition for the Environment_ May 23, 2013

48. Q: Has the EPA conducted community interviews of "impacted communities" in the last 10 years? If yes, does EPA have evidence to support that community interviews were conducted? If yes, how have community interviews guided EPA response to community concerns? If no, what is the EPA plan for conducting community interviews and when will people be notified?
A: EPA conducted initial community interviews in 1994. Since that time, EPA has canvassed community members, elected officials, and other interested stakeholders by phone and at community meetings throughout the history of the site. Most recently, EPA conducted door-to-door interviews on January 9, 2013. Follow-up phone calls were conducted with 20 community points of contact, which included residents, businesses, churches, and academia. The last two weeks of March, 2013, numerous contacts were made with members of the Spanish Village community and the nearby trailer park. The focus on the recent interviews was to talk about EPA upcoming meetings and to discern how people best received information, i.e., via mail, phone, computer, to name a few. Community interviews and interactions are consistently used to provide EPA with information about community concerns. Other forms of social media are also used to gauge the community climate. EPA will continue to interact with community members and other West Lake Landfill stakeholders throughout the Superfund process. .#####. EPA followed up in March and April of 2013 with targeted interviews of community members. [OPA and EJ to edit]

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ASPECT Questions

Missouri Coalition for the Environment_ May 23, 2013

49. (Set of questions presented by MCE regarding ASPECT)

    11. In March, EPA told the public that it flew the Aspect plane over the area to measure airborne radiological hazards. Where is the data from the Aspect plane?

    12. Will EPA provide the raw data to the public?

    13. What are the abilities and limitations of the ASPECT plane monitors?

    14. Did the ASPECT plane conduct a thermal analysis of the landfill?

    15. Who requested the ASPECT plane flyover?

    16. Why was the ASPECT plane flown over?

    17. Where did it take measurements?

    A: Questions 11-17 (above) answered by the ASPECT report. (Dan will cover these questions in his presentation)

50. Does the EPA have any air data on radon/radon daughters from north St. Louis?

    A: ASPECT did not measure radioactivity in the air. MDNR and/or MDHSS have taken air samples and have this information. EPA had the PRPs collect radon emission data on OU-1 during the RI in the late 1990s.

MCE questions compiled by Ben Washburn in an e-mail dated 6/11/2013:

51. Q: How can the EPA concluded that the radioactive material is contained based on the ASPECT plane when it can only measure gamma radiation up to one foot?

    A: The ASPECT Plane measured radiation up to one foot below ground surface. Extensive soil and waste data collected during the Remedial Investigation defined the extent of the radioactive material in OU1.

52. Q: In regard to the conclusion from the ASPECT plane, "...this material poses no health risks to the public; a person would have to illegally trespass onto the site to be exposed to elevated levels of radiation." how are you able to say this when the radioactive waste cell DOES NOT have a liner?

    A: The ASPECT plane evaluated radiation from the surface soil. Currently, there are no current exposure pathways to off-site receptors.

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ASPECT Questions

53. Q: Does the EPA have any air data on radon/radon daughters from north St. Louis?

A: ASPECT did not measure radioactivity in the air. MDNR and/or MDHSS have taken air samples and have this information. EPA had the PRPs collect radon emission data on OU-1 during the RI in the late 1990s.

BLOG

54. Q. Will EPA fly the ASPECT airplane again over the site?

A: EPA doesn't plan to.

Facts on SLAPS/FUSRAP/Coldwater Creek

- The Corps is the lead agency for the St Louis FUSRAP projects for any technical questions in regards to FUSRAP.

- The ASPECT report for Coldwater Creek was requested by the Agency for Toxic Substances and Disease Registry (ATSDR) due to several health concerns raised by the community.

- The Coldwater Creek ASPECT survey is a screening tool to determine any elevated radionuclide concentrations. The results did not show any elevated concentrations and is consistent with samples taken by the Corps, who is lead agency for FUSRAP. The report is available on EPA website: www.epa.gov/region 7

- Coldwater Creek health concerns by the community are lead and being addressed by the Agency for Toxic Substances and Disease Registry (ATSDR) and Missouri Department of Health and Senior Services (MDHSS).`

DOJ Compensation Program (need verification from ATSDR)

Denise is this the right DOJ compensation program? We need to add to our Q & A so that we can be responsive. If not can you direct jaci to the correct one so that she can add it under our Coldwater Creek/SLAPs category

Radiation Exposure Compensation Act ("RECA"). 1-800-729-7327.

The Act presents an apology and monetary compensation to individuals who contracted certain cancers and other serious diseases:

- following their exposure to radiation released during the atmospheric nuclear weapons tests, or
- following their occupational exposure to radiation while employed in the uranium industry during the Cold War arsenal buildup.

http://www.justice.gov/civil/common/reca.html

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