ENTACT
environmental tactics in waste management

1360 North Wood Dale Road
Suite A
Wood Dale, Illinois
60191

May 15, 2003

Mr. Juan Thomas, MPH
U.S. EPA Region 5
77 West Jackson Boulevard
Chicago, IL 60604-3507

Re: F006 and F001 Hazardous Waste Determination
Former Stanley Tools Facility – Fowlerville, MI
MID099124299

Dear Mr. Thomas:

On behalf of Johnson Controls Inc. (JCI), ENTACT is providing the following supplemental discussion concerning the hazardous waste determination of metal and TCE-impacted soils at the former Stanley Works facility. This discussion is an addendum to the information provided in a letter dated April 11, 2003.

Based on a review of the historical information concerning the operational history of the facility and the subsequent management of wastes generated from 1949 to 1970, ENTACT has been unable to find any conclusive information concerning the source of contamination contained in soils to a make hazardous waste determination with respect to the listed waste F006. These impacted soils that will be removed as part of the RCRA Corrective Action are not found in any formal or identified solid waste management unit operated at the Site. Past interim measures conducted at the Site has removed the various industrial sludges stored or placed in the former SWMUs.

With the information in the letter, ENTACT has identified several waste streams managed on site that clearly do not meet the listing description for F006 that may and may represent the source of contaminants found in the impacted soils at the site other than the waste water treatment sludges from electroplating operations. Since there is no conclusive information concerning the source of the contaminants, ENTACT cannot make any hazardous waste determination with respect to the listing F006.

With respect to the F001 listing determination, ENTACT also had difficulty identifying the source of three elevated area of TCE-impacted soils that can be conclusively be identified with spent solvents used in degreasing. Only in one area of the Site, in the area where degreasing operations may have been conducted during part of a manufacturing process, the presence of TCE-impacted soils may have come from spent solvents used in degreasing, but there is no conclusive information that it came from a spent solvent from the degreaser unit. There is no information from the other two areas concerning the source of the other elevated concentrations of TCE came form any listed source, as described at 40 CFR §261.31(a). Again, since there is no conclusive information concerning the source of the contaminants, ENTACT cannot make any hazardous waste determination with respect to the listing F001.

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In support of our hazardous waste determination concerning the listing F006 and F001 for impacted soils to be generated during the implementation of RCRA Corrective Action, ENTACT is providing additional information concerning the former operations conducted at the facility and sources of potential waste streams generated at the former facilities. The information in this letter will be presented in two parts, Part I will discuss the information concerning making a hazardous waste determination concerning the listed waste F006 and Part II will provide additional information concerning the TCE sources and the listed waste F001, as defined at 40 CFR §261.31(a).

Part I. F006 Discussion

Based on the historical information available, ENTACT is providing U.S. EPA past facility operating process facts and assumptions that have been made concerning the source of the residual contamination contained within the soils at the Site, as it pertains to the hazardous waste determination of F006 defined in 40 CFR §261.31(a), as wastewater treatment sludges from electroplating operations,

Relevant Facility Operational History

- The Utilex Manufacturing Company initiated operation in 1949 and began zinc die casting manufacturing operations per personal communication. Electroplating operations were initiated in 1953 per a Michigan Water Resource Commission (MWRC) letter. All manufacturing wastes generated at the facility were commingled in Pond B (SWMU B) until 1970, including cooling waters from the die cast area.

- ENTACT believes that the majority of the metal and cyanide contaminants found in the soils were introduced into the soils between 1949 and 1970. Contaminated sludges from the manufacturing operations placed in former surface impoundments or solid waste management units have been removed from the Site.

- Typically, cooling waters would have contained concentrations of chromium as a scale inhibitor. Treatment of hexavalent chromium in the cooling waters to trivalent chromium would probably be done before the cooling waters were discharged to the Pond B. The treatment process for cooling water containing hexavalent chromium is similar to the treatment process for chromium plating wastes.

- In 1968, the plant was operating as the Utilex Division of Hoover Ball and Bearing Company. In 1974, records from the MDNR indicated that a plastic mold injection machine was part of the manufacturing process.

- Stanley bought the plant in 1980 and operated the plant until 1985.

- Stanley Tools filed a Part A Permit Application in August 1980 in which the facility identified that it was generating and managing F006, F007, F008, and F009 wastes on-site.

- As described in a 1974 MDNR industrial wastewater survey concerning the plating operations as of 1974 relevant information concerning the F006, F007, F008, F009 listing is provided below:
    - The process wastewater from the plating lines is generated from the treatment of rinse waters and nonsystematic spills from the plating lines. Stanley Tools used a similar plating process as described in the RFI summary report. ENTACT was unable to find any records concerning the volume of spills versus the volume of rinse water treated in the wastewater treatment plant. In addition, the "spills" may have been "dragout" releases from the plating lines. ENTACT believes that the majority of the wastes from these operations have been removed from the site during the implementation of closure and interim stabilization measures components of RCRA Corrective Action.
    - The rinse waters from the plating lines were treated on site in a wastewater treatment system designed to treat all of the industrial wastewaters generated at the facility. The wastewater treatment sludges were disposed in various SWMUs at the site.
    - Spent plating baths containing both metals and/or cyanides were not discharged into the wastewater treatment system.
    - Historically, air emissions relating to the industrial process, including the electroplating operations, at the site became entrained in rainwater and became part of the stormwater run off at and from the site. Air emission pollution controls were not installed until the mid 1970s.
    - Routine and systematic discharges from the surface impoundments into ditches draining to the Red Cedar Creek were typically being conducted pursuant to permit issued by a NPDES permit or the like.

Regulatory Definition of F006

The F006 listing background document identified the listing for "electroplating operations" to cover the same process as was included under the U.S. EPA's Effluent Guideline Division's pretreatment standards for the Electroplating Point Source Category developed in the mid to late 1970s. The background document, which supported the listing of F006, initially included electro and electroless plating within the scope of the definition of electroplating. The scope of the F006 listing definition was narrowed and clarified in the December 2, 1986 Federal Register (see 54 FR 43351). The re-interpretation states that electroless plating was not considered an electroplating process.

In addition, in 1989, U.S. EPA further stated in a August 1989 RCRA/Superfund Hotline Monthly Summary that "Although the December 2, 1986, clarification was written specifically for the F006 listing, the definition of electroplating may be applied analogously to the F007, F008, and F009 listings. Therefore, plating bath solutions from electroless plating operations will not meet the F007 listing when disposed. The bath

would be regulated, however, if it exhibited one or more of the characteristics of hazardous waste."

In 1998, U.S. EPA provided additional clarification concerning contaminated rinse waters from electroplating operations, see attached document EPA530-R-98-005j. The U.S. EPA stated, "Rinse water from electroplating operations are not within the scope of the F007, F008, and F009 hazardous waste listings (Memo, Lowrance to Wagner, April 7, 1998). Therefore, rinse waters contaminated with plating bath solutions are not considered plating bath solutions and thus not F007 when spent. Similarly, rinse waters contaminated with stripping and cleaning baths solutions are not considered stripping and cleaning bath solutions, and thus not F009 when spent."

The U.S. EPA further added "... the rinse waters would not be F007 and F009 via the hazardous waste mixture rule...Trace amounts of plating and stripping solutions carried over to a rinse tanks (sometimes called "dragout") are not considered to be a hazardous waste mixing with another solid waste, because these materials are in use and are not wastes until they are spent and removed from the process (Memo, Strauss to Schiffman; July 28, 1987). The spent rinse waters would only be regulated as a hazardous waste, if they exhibited a characteristic of hazardous waste...."

Regulatory Analysis

Based on the former operational history of the facility and the regulatory listing definition of F006, ENTACT offers the following regulatory analysis:

1. Based on the regulatory definition of F006, ENTACT believes that the plating waste streams treated in the waste water treatment plant, i.e., rinse waters and "dragout", from the plating operations are not considered F007, F008, or F009. ENTACT believes that since the wastewater treatment sludges were generated from the treatment of several industrial wastewater streams unrelated to plating wastes, thus the wastewater treatment sludges do not meet the strict definition of F006.

2. Some of the chromium and/or cyanide impacted soils found at the site could have originated from waste streams not classified as "plating waste stream" meeting the definition F006 i.e., spent water from cooling towers and stormwater run-off contamination from entrained air emission contaminants related to the industrial activities conducted at the Site. See attached EPA 530-R-97-005f document.

3. Prior to 1974, a plastic molding machine was part of the manufacturing process conducted at the Site. Historically, Hoover conducted decorative electroless plating operations on plastic at other Hoover facilities where plastic automotive parts were manufactured and plated. ENTACT believes that some of the metal and cyanide impacted soils at the Site may have originated from the treatment of these electroless plating wastes. At the time when MDNR described these activities, electroplating plating operations

included both electroplating and electroless plating operations. U.S. EPA did not provide a re-interpretation of this listing until 1986. Some of the contaminants related to electroless plating operations are consistent with some of the metals and cyanide contamination found in the soils at the site.

4. In accordance with 40 CFR 261.4 (a)(2), metal and cyanide impacted soils removed from the drainage ditches that conveyed permitted wastewater discharges subject to regulation of the Section 402 of the Clean Water Act, as amended, are excluded as solid waste. Thus any impacted soils down-gradient of the permitted discharge point source are not considered a listed hazardous waste, when generated no matter what the source of the hazardous constituents or sludge contained in the impacted soils.

As was stated in our April 11, 2003 letter to U.S. EPA concerning a F006 hazardous waste determination, every effort has been made to determine if a material, i.e., the impacted soils generated from the past operations at the facility beginning in 1949 through 1970, is the listed hazardous waste F006. ENTACT notes that with the additional discussion and facts concerning the historical operations any evidence pointing to a determination that the material is the listed waste, F006, is at best inconclusive.

Part II. TCE-Impacted Soil

After my review of the information concerning past operations at the facility and in preparation of this letter, ENTACT was unable to make a conclusive listing determination for any of the impacted areas of the Site, as related to the listed waste F001. In the April 11, 2003 letter, ENTACT thought there was sufficient information at least in one of the areas, Area A, to make a hazardous waste determination concerning F001, but after a more thorough review, respect to the source of the TCE-impacted soils in Area A, a conclusive listing determination with respect to spent solvents could not be made.

With respect to the potential sources of TCE-impacted soils, ENTACT offers the following explanation. There are three hotspots in the southern portion of the site where the presence of TCE impacted soils has been identified, Areas A, B, and C, see Figure1. In only one of the three areas, Area A, there is some information to indicate that the TCE-impacted soil, when generated, might meet the definition of the listed hazardous waste (F001). This area is believed to be in an area where a degreaser may have been located. However, this information is not conclusive with respect to the source of the TCE-impacted soils being from spent solvents or spent solvents from degreasing operations.

The remaining two areas, Areas B and C, there is also not sufficient information to make a conclusive hazardous waste determination as it pertains to the identification of a listed hazardous waste in these areas. There were no degreasers believe to be located in or around these areas where the elevated TCE soil levels are located. However, some of the TCE-impacted soils in areas A, B and C, as generated, may contain concentrations of TCE so that some impacted soils contain wastes that exhibit the toxicity characteristic for TCE.

In conclusion, and pursuant to an October 14, 1998 Memorandum entitled "Management of Remediation Waste Under RCRA," U.S. EPA states that if a facility owner/operator makes a good faith effort to determine if a material is a listed hazardous waste, if generated, and is unable because of insufficient information, the facility or owner/operator may assume the source, contaminant or waste is not a listed hazardous waste. The memorandum further states that "...Listing determinations are often particularly difficult in the remedial context because listing are generally identified by sources of the hazardous wastes rather than the concentrations of various hazardous constituents; therefore, analytical testing alone, without information on a waste's source, will not generally produce information that will conclusively indicate whether a given waste is a listed waste."

Upon you review of the additional information, ENTACT is requesting a meeting in Chicago at your offices, as soon as possible, to discuss the issues raised in this letter and the April 11, 2003 to you. If you have any questions, please call me at 972.580.1323.

Respectfully,

Thad Slaughter

Thad Slaughter
ENTACT

Caroline Panico
ENTACT

Attachments

cc: George Hamper - USEPA
Dennis Reis - Dennis Reis, LLC
Andrew Lonergan, P.G. – Earth Tech

36133 Schoolcraft Road, Livonia, Michigan 48150

April 4, 2003

Juan Thomas, MPH
USEPA Region V
RCRA ECAB, DE-9J
77 W. Jackson Blvd
Chicago, IL. 60604-3590

Re: Former Stanley Tools Facility
Fowlerville, Michigan
Administrative Order on Consent, # RCRA-05-2003-004

Telephone
734.779.2800
Facsimile
734.779.2860

Dear Mr. Thomas,

On behalf of Johnson Controls, Inc., and pursuant to Paragraph 9 of the Order referenced above, the designated Project Manager has been changed to the following person:

Andrew Lonergan, PG
Earth Tech
36133 Schoolcraft Road
Livonia, MI 48150
Phone: 734-779-2812
Fax: 734-779-2860
email: andrew.lonergan@earthtech.com

We look forward to working with you towards the successful completion of this project. Please contact me at (734) 779-2810 if you have questions or require further clarification.

Sincerely,

EARTH TECH, INC.

Christopher F. Winkeljohn, PE
Director

cc: D. Reis, LLC

ENTACT
environmental tactics in waste management

1360 North Wood Dale Road
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Wood Dale, Illinois
60191

April 11, 2003 **LTR-STLY-05**

Mr. Juan Thomas, MPH
U.S. EPA Region 5
77 West Jackson Boulevard
Chicago, IL 60604-3507

RE: Characterization of Remediation Wastes
Former Stanley Tools Facility – Fowlerville, MI
MID099124299

Dear Mr. Thomas:

Please find enclosed a document describing the intended characterization of remediation wastes generated by activities conducted pursuant to the signed Administrative Order on Consent, U.S. EPA Docket No: RCRA-05-2003-0004. ENTACT, on behalf of Johnson Controls, Inc. is requesting U.S. EPA's review and concurrence with this attached information.

Please contact the undersigned if you have any questions or require additional information. We look forward to seeing you at the Site on Tuesday.

Respectfully submitted,

Christopher Preston, P.E.
ENTACT

Thad Slaughter
ENTACT

Caroline Panico
ENTACT

Attachment

cc: George Hamper - USEPA
Dennis Reis – Dennis Reis, LLC
Andrew Lonergan, P.G. – Earth Tech

FORMER STANLEY TOOLS FACILITY
WASTE CHARACTERIZATION DISCUSSION & MATRIX

A set of interim measures have been developed for the Former Stanley Tool Works facility to meet the target date set by the USEPA in the Administrative Order of Consent for submission of the Environmental Indicators Report and the Final Corrective Measures Proposal. The interim measures have been designed to address impacts to soil, sediment and groundwater caused by past manufacturing and waste management practices during the former operation of the facility. Based on activities data and historical information, it is anticipated that the following waste streams could be generated during the course of the interim measures:

- Metal/ CN^- Impacted Soil and Sediment
- TCE Impacted Soil
- Kerosene/PCB Impacted Soil and Recovered Free Product

The following sections, in conjunction with the attached Excavated Materials Management and Disposal Matrix, will briefly describe the management approach and characterization rationale for each of the waste streams generated during remedial activities to be conducted at the site. The approach is based on available historical data and application of federal and state Resource Conservation Recovery Act (RCRA) hazardous and non-hazardous waste regulations and federal Toxic Substance Control Act (TSCA) regulations.

Metal/ CN^- Impacted Soil

Metal/CN^- impacted soil will be encountered along the western portion of the site adjacent to the Red Cedar River, in and around Unit F, and in a drainage ditch which transverses the site from east to west along the southern border from operations conducted at the Site between 33 and 50 years ago, see Figure 1. The source of the metal/CN-impacted soils found in Unit F and in the ditch is believed to be from the operation and management of a mixture of various die tool manufacturing wastes, including plating wastes within the original effluent pond, i.e., Unit B. Effluent from the original site pond, Unit B, located in the southwest portion of the site adjacent to the former plant, was discharged into the southern drainage ditch, which fed into the Red Cedar River from 1953 to 1970. The Michigan Water Resources Commission (MWRC) regulated the discharge from the pond into the Red Cedar River. In 1970, pond sludge and soils were excavated from the pond upon closure and transported to the western portion of the site where it was further mixed with site soils. The soil and sediment from the southern drainage ditch should contain similar soils, as this ditch drained from the former effluent pond into the river.

With respect to the hazardous waste determination of material to be generated in and around Unit F, ENTACT provides the following discussion:

- The source of waste materials placed on the land from Unit B was a mixture of many industrial wastes generated at the facility, including some of the waste streams associated with plating operations at the facility. The sludges,

as generated in 1970, during the closure of Unit B, do not meet the definition of the listed waste F006, as discussed in the following bullet points. However, if the metal and CN^- impacted soils, as generated, contain a hazardous waste that exhibits a characteristic, e.g., toxicity and/or reactive, the impacted soils will be managed pursuant to the requirements of RCRA.

- Prior to 1970, the specific plating operations, electroplating versus electroless plating, and the management of the waste streams generated from the plating operations are not well understood or well documented. Without this information a conclusive determination concerning the applicability of F006 listing to the wastes generated prior to 1970 is not possible.

- Every effort has been made to determine if a material, i.e., the impacted soils/sludge mixture generated from the closure of the original effluent pond, Unit B, is a listed hazardous waste. ENTACT notes that any evidence pointing to a determination that the material is the listed waste, F006, is at best inconclusive. Pursuant to an October 14, 1998 Memorandum entitled "Management of Remediation Waste Under RCRA," U.S. EPA states that if a facility owner/operator makes a good faith effort to determine if a material is a listed hazardous waste, if generated, and is unable because of insufficient information, the facility or owner/operator may assume the source, contaminant or waste is not a listed hazardous waste. The memorandum further states that "Listing determinations are often particularly difficult in the remedial context because listing are generally identified by sources of the hazardous wastes rather than the concentrations of various hazardous constituents; therefore, analytical testing alone, without information on a waste's source, will not generally produce information that will conclusively indicate whether a given waste is a listed waste."

As stated above, ENTACT was not able to make a conclusive and accurate hazardous waste determination with respect to the F006 listing for soils/sediments/sludges placed in the vicinity of the former effluent pond, Unit B. Based on the concentration of chromium in material in the former effluent pond on-site pond, and the results of TCLP analysis of the dredged former on-site pond sludges, it is possible that, when generated, a portion of these materials may exhibit the hazardous toxicity characteristic for chromium and the reactive characteristic for free cyanides, and will be managed in accordance with applicable standards, pursuant to 40 CFR Parts 262, 263, 265, 265, and 268 of RCRA.

The following Interim Measure activities are proposed for those areas impacted by metal/ CN^- impacted soils with concentrations exceeding protective standards:

- The boundary of the impacted area that contains metal/ CN^- impacted soils will be identified, i.e., staked, in the field using historical and new data and further delineated utilizing an X-Ray Fluorescence (XRF) field instrument.

- Impacted soils exceeding concentrations that pose a risk to human health or the environment will be transported to a staging area and sampled for waste characterization.
- Impacted soils that exhibit a characteristic of hazardous waste will be treated on-site in a designated containment area and sampled to determine if the treatment standards have been met.
- A laboratory treatability test will be implemented to develop additive mixtures to be used in the field.
- Soils requiring stabilization will be treated in 250-500 cubic yard batches.
- Treated batches not meeting the required treatment standards will be retreated and re-sampled until the analytical results indicate that the impacted soils no longer exhibit a characteristic of hazardous waste.
- Stabilized soils will be removed from the treatment area and transported off-site for disposal at a Subtitle D landfill.
- Impacted metal/ CN^- soils found to be co-contaminated with "as-found" concentrations of PCBs exceeding 50 mg/kg will be managed pursuant to the TSCA regulations or RCRA regulations with the most stringent requirements.

TCE-Impacted Soil

There are three areas located on the southern portion of the site where the presence of TCE impacted soils has been identified, Areas TCE-1, TCE-2, and TCE-3, see Figure1. In only one of the three areas, Area TCE-1, is there sufficient information to conclusively indicate that the TCE-impacted soil, when generated, would meet the definition of the listed hazardous waste (F001). TCE-impacted source soils located in the former degreasing area will be considered to contain listed hazardous waste if it exceeds the MDEQ "contained-in" concentration of 44 ug/kg total TCE. Soils containing concentrations of TCE, as generated, not exceeding "contained-in" concentrations will be considered to no longer contain the listed hazardous waste and if the TCE impacted soils do not exhibit a toxicity characteristic, i.e., soil concentrations are below the toxicity characteristic criteria of 0.5 mg/L TCLP as defined in 40 CFR §261.24, the impacted soils will be characterized as non-hazardous. With respect to the remaining two areas, Areas TCE-2 and TCE-3, there is not sufficient information to make a conclusive hazardous waste determination as it pertains to the identification of a listed hazardous waste in these areas. However, some of the TCE-impacted soils in areas TCE-2 and TCE-3 as generated, may contain TCE at concentrations that allow the soils to exhibit the toxicity characteristic for TCE.

The following Interim Measure activities are proposed for those areas impacted by TCE-impacted soils with concentrations exceeding protective standards:

- Impacted soils exceeding concentrations that pose a risk to human health or the environment will be transported to a staging area and sampled for waste characterization.
- Impacted soils that contain a hazardous waste, i.e., listed or characteristic, will be shipped to a permitted Subtitle C hazardous waste facility for treatment and disposal.
- TCE-impacted soils not characterized as containing a hazardous waste will be sent to a Subtitle D landfill for disposal.

Recovered Kerosene/PCB Impacted Soils

Based on historical data, there are three former settling ponds where waste from kerosene emulsions baths was discharged. (Kerosene baths were used as an emulsifier during historic manufacturing operations at the site.) There are two potential types of kerosene/PCB-impacted wastes: free product or impacted soils. If free product is found on top of the water table, a passive extraction system may be designed and installed to remove free product. Recovered free product will be containerized and sampled to determine the applicable disposal or recycling options for the material generated.

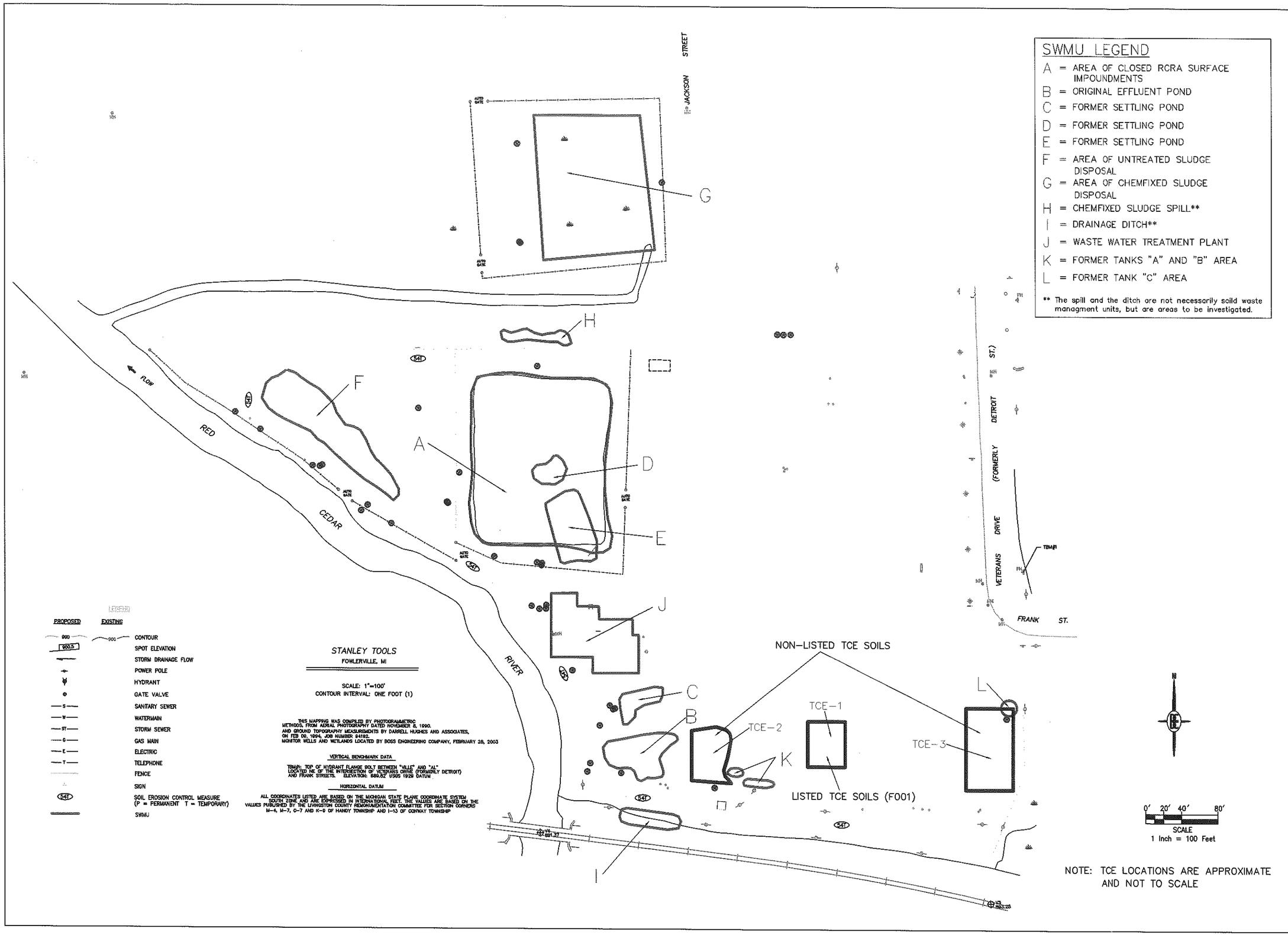
The removal of impacted soils containing kerosene/PCB contaminants that may be present in the vicinity of the former settling ponds will be conducted during the interim measures. Because PCBs may be commingled with the kerosene, samples will be collected prior to the start of removal activities to determine the "as found" PCB concentrations in the impacted soils. Pursuant to 40 CFR 761.77, ENTACT will request that a "Coordinated Approval" of the on-site PCB remediation activities be conducted in concert with the RCRA 3008(h) Corrective Action Order being implemented at the Site.

The following Interim Measure activities are proposed for those areas impacted by Kerosene/ PCB-impacted soils with concentrations exceeding protective standards:

- The boundary of the impacted area that contains kerosene/PCB-impacted soils will be further delineated by the collection of impacted soil samples for laboratory analyses.
- "As found" PCB concentrations in soils will be used to determine how the PCB-impacted material will be managed on-site and where the impacted soils will be disposed of off-site. PCB impacted sediments or soils with concentrations exceeding 50 mg/kg will be managed pursuant to the requirements of 40 CFR §761.61.
- If the saturated kerosene/PCB impacted soils are found during excavation, a sorbent material such as fly ash will be added to the bottom of the excavation and mixed with the bucket of the excavator to ensure that the soils will pass the paint filter requirements before being loaded for transportation to the appropriate disposal facility. If possible, unsaturated soils destined for disposal at the same facility will be used in lieu of the sorbent to reduce the amount of material being generated and sent off-site.
- Impacted soils exceeding concentrations that pose a risk to human health or to the environment will be transported to a staging area for preparation of off-site disposal.
- PCB-impacted soils with concentrations exceeding 50-mg/kg and not classified, as a hazardous waste will be sent to a TSCA permitted landfill for disposal. If the PCB concentration in soils, "as found", is less than 50 mg/kg, the PCB-impacted soils will be sent to a permitted Subtitle D landfill. If the PCB-impacted soils also exhibit a hazardous waste characteristic, e.g., exhibits a toxicity characteristic, the impacted soils will be treated on-site, if applicable, and sent to a TSCA landfill or a permitted Subtitle D landfill based on the "as found" concentration of PCBs in the impacted soils.

Excavated Materials Management and Disposal Matrix
Former Stanley Tools Facility – Fowlerville, Michigan

Waste Type	Characteristically Hazardous Waste (as generated)	Listed Hazardous Waste (as generated)	PCB wastes with concentration levels > 50 mg/kg (as found)	PCB wastes with concentration levels ≤ 50 mg/kg (as found)	Non Hazardous Waste (as generated)
Metal/CN Impacted Soil/Sludge/ Sediment	Treat on-site and send to Subtitle D landfill for disposal	NA	Manage as required on-site and send to a TSCA permitted landfill	Send to Subtitle D landfill for disposal	Send to Subtitle D landfill for disposal
TCE Impacted Soil Area A	Send to Subtitle C landfill for treatment and disposal	Send to Subtitle C landfill for treatment and disposal	Manage as required on-site and send to a TSCA permitted landfill	Send to Subtitle C landfill for disposal	NA
TCE Impacted Soil Areas B & C	Send to Subtitle C Landfill for treatment and disposal	NA	Manage as required on-site and send to a TSCA permitted landfill	Send to Subtitle C if hazardous or Subtitle D if non-hazardous	Send to Subtitle D landfill for disposal
Recovered Kerosene/PCB Free Product/Soil	Send to permitted facility	NA	Manage as required on-site and send to a TSCA permitted facility	Send to Subtitle D landfill/facility for disposal or recycling	Send to Subtitle D landfill/facility for disposal or recycling
Collected Residual Groundwater	Transport to permitted facility or discharge to POTW	Transport to permitted facility or discharge to POTW	Transport to permitted facility or discharge to POTW	Transport to permitted facility or discharge to POTW	Transport to permitted facility or discharge to POTW



SWMU LEGEND

A = AREA OF CLOSED RCRA SURFACE IMPOUNDMENTS
B = ORIGINAL EFFLUENT POND
C = FORMER SETTLING POND
D = FORMER SETTLING POND
E = FORMER SETTLING POND
F = AREA OF UNTREATED SLUDGE DISPOSAL
G = AREA OF CHEMFIXED SLUDGE DISPOSAL
H = CHEMFIXED SLUDGE SPILL**
I = DRAINAGE DITCH**
J = WASTE WATER TREATMENT PLANT
K = FORMER TANKS "A" AND "B" AREA
L = FORMER TANK "C" AREA

** The spill and the ditch are not necessarily solid waste managment units, but are areas to be investigated.

PROPOSED	EXISTING	
900	900	CONTOUR
900.5		SPOT ELEVATION
		STORM DRAINAGE FLOW
		POWER POLE
		HYDRANT
		GATE VALVE
	S	SANITARY SEWER
	W	WATERMAIN
	ST	STORM SEWER
	G	GAS MAIN
	E	ELECTRIC
	T	TELEPHONE
		FENCE
		SIGN
S-61		SOIL EROSION CONTROL MEASURE (P = PERMANENT T = TEMPORARY)
		SWMU

STANLEY TOOLS
FOWLERVILLE, MI

SCALE: 1"=100'
CONTOUR INTERVAL: ONE FOOT (1)

THIS MAPPING WAS COMPILED BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY DATED NOVEMBER 6, 1990. AND GROUND TOPOGRAPHY MEASUREMENTS BY DARRELL HUGHES AND ASSOCIATES, ON FEB 20, 1994, JOB NUMBER 64192. MONITOR WELLS AND WETLANDS LOCATED BY BOSS ENGINEERING COMPANY, FEBRUARY 26, 2003

VERTICAL BENCHMARK DATA

TBM#1: TOP OF HYDRANT FLANGE BOLT BETWEEN "VILLE" AND "AL" LOCATED NE OF THE INTERSECTION OF VETERANS DRIVE (FORMERLY DETROIT) AND FRANK STREETS. ELEVATION: 888.82' USGS 1929 DATUM

HORIZONTAL DATUM

ALL COORDINATES LISTED ARE BASED ON THE MICHIGAN STATE PLANE COORDINATE SYSTEM SOUTH ZONE AND ARE EXPRESSED IN INTERNATIONAL FEET. THE VALUES ARE BASED ON THE VALUES PUBLISHED BY THE LIVINGSTON COUNTY REMONUMENTATION COMMITTEE FOR SECTION CORNERS M-4, M-7, C-7 AND K-9 OF HANDY TOWNSHIP AND I-13 OF CONWAY TOWNSHIP

NO	REVISIONS	DRN	CHK	DATE

ENTACT & Associates, LLC.
1306 North Wood Dale Road Suite A
Wood Dale, IL 60191
Ph: 630-616-2100 Fx: 630-616-9503

DRN	MMC
DES	
CHK	
APP	

ENTACT
environmental tactics in waste management

Johnson Controls, Inc.
Former Stanley Tool Site
Fowlerville, Michigan

SWMU LOCATIONS

DATE: April 11, 2003
PROJECT NUMBER: C818
FILE NAME: Stanley
FIGURE NUMBER: 1

QUARTERLY PROGRESS REPORT
Former Stanley Tools Facility
Fowlerville, Michigan
EPA ID#: MID099124299

WORK PERFORMED TO DATE

Project Plans and Permits

- Develop Site Health and Safety Plan
- Prepare Quality Assurance Program Plan
- Prepare Field Sampling and Analysis Plan
- Development of laboratory analytical program
- Development of new site coordinate system consistent with Michigan State Plane Coordinate System
- Development of Sediment Sampling Approach Outline
- On-site meeting with MDEQ regarding wetlands permitting
- Wetland Delineation
- Prepare Wetland Permit Application
- Historical records research at the City of Fowlerville and Livingston County offices
- Historical records research at USEPA Region V Office in Chicago, IL
- Historical records research with MDEQ Waste Management Division in Lansing, MI
- Planning for Soil Interim Measures
- Analysis of historical records to determine applicability of F006 designation for certain on site wastes
- Letter to USEPA regarding Characterization of Remediation Wastes (April 11, 2003)
- Letter to TSCA requesting coordinated approval for PCB waste management at the site (April 11, 2003)

Data Gap Analysis and Investigation

- Confirm Trimatrix NELAC Lab Certification
- Development of Conceptual Site Model
- Detailed analysis of USEPA RFI review comments
- Detailed analysis of historical analytical data
- Historical aerial photograph interpretation
- Data Gap Investigation Planning (soils and groundwater)
- Access agreements for off-site properties
- Top-of-casing elevation surveying for all on-site wells
- Hydrogeological analysis of water levels
- Baseline groundwater sample collection

- Sediment sampling location reconnaissance to locate worst case depositional areas and upstream sampling locations
- Selection of worst case sediment sampling areas
- Detailed analysis of baseline groundwater sampling data

Corrective Measures Implementation

- Mobilization
- Subcontractor procurement for laboratory, geo-probe, drilling and surveying services
- Test pit excavation and initial PCB characterization planning (15 locations)
- Additional test pit excavation (44 locations)
- Building demolition planning for former WWTP structure
- ACM sample collection from former WWTP structure
- NESHAP permitting for demolition of former WWTP structure
- Temporary Free-Product abatement planning

Project Reporting and Closeout

- Agency Kick-off meeting (Feb, 2003)
- Initial Website development
- Conference call with USEPA regarding PE sampling and QAPP development
- EDR report for property
- TCE Investigation Sampling Program planning
- Weekly update conference call with USEPA PM, Juan Thomas

DATA COLLECTED

- Water levels
- Free-product measurements
- Baseline groundwater sampling round (analyzed 35 monitoring wells for: VOCs, BNAs, Metals, CN-, PCBs)
- Test pit characterization samples for PCBs
- Test pit characterization samples for the presence of free-product (test kits)
- Test pit characterization samples for VOCs
- Test pit characterization samples for Metals including Cr^{6+} and CN

PROBLEMS ENCOUNTERED

- N/A

PROJECT SCHEDULE / PERCENT COMPLETED

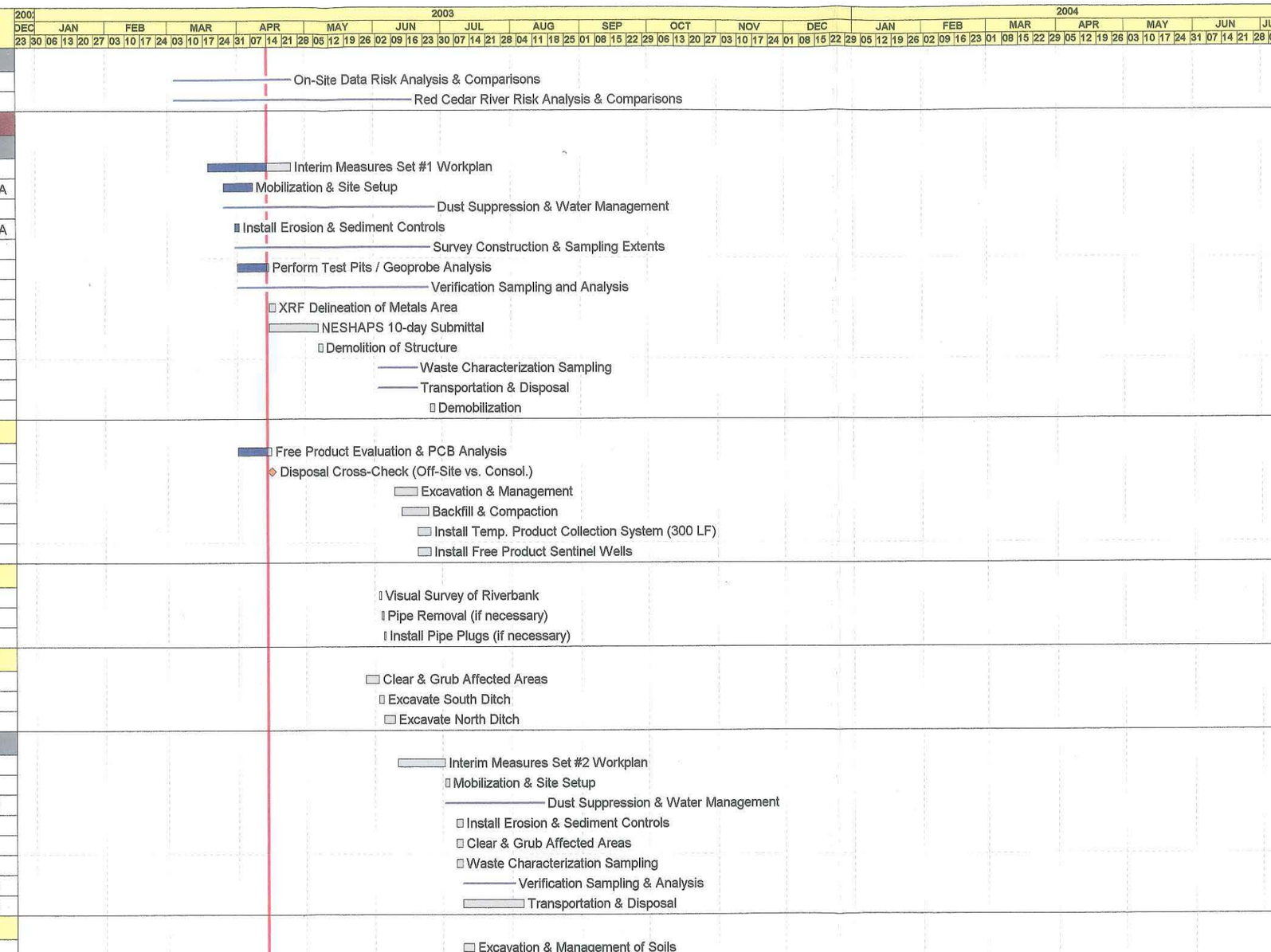
- Attached

	Field Sample ID	MWA1-030503-01	MWA1-030503-03	MWA2-030503-01	MWA3-030503-01	MWA4-030603-01	MWB1-030503-01	MWB2-030503-01	MWB3-030403-01	MWB4-030403-01	BCK1-030403-01	BCK2-030403-01	BCK2-030403-02	BCK3-030403-01	MWC2-030403-01	MWE1-030503-01	MWE2-030503-01	MWE3-030603-01	MWF1-030603-01	MWF2-030603-01
	Sample Date	3/5/2003	3/5/2003	3/5/2003	3/5/2003	3/6/2003	3/5/2003	3/5/2003	3/4/2003	3/4/2003	3/4/2003	3/4/2003	3/4/2003	3/4/2003	3/4/2003	3/5/2003	3/5/2003	3/6/2003	3/6/2003	3/6/2003
Parameter	GW GSI Standard																			
Dissolved Metals (mg/L)																				
Arsenic, Dissolved		0.072			0.014			0.01	0.005		0.003	0.013	0.013			0.004	0.005		0.006	9E-04 J
Barium, Dissolved		0.242			0.188	0.079		0.15	0.212		0.11	0.191	0.204			0.204	0.142		0.157	0.031
Cadmium, Dissolved		1E-04 J																		
Chromium, Dissolved		7E-04 J			0.004 J	0.008		0.004 J	0.006		0.004 J	0.004 J	0.004 J			0.003 J	0.004 J		0.007	0.005
Chromium, Hexavalent-Dissolved								0.001 J										9E-04 J		
Copper, Dissolved		0.008			0.002 J			0.003 J	0.001 J		0.002 J						7E-04 J		0.001 J	8E-04 J
Lead, Dissolved		6E-04 J			2E-04 J			3E-04 J			6E-04 J								6E-04 J	
Nickel, Dissolved		0.008 J			0.005 J	0.008 J		0.006 J	0.176		0.004 J	0.005 J	0.004 J			0.008 J	0.005 J		0.004 J	0.006 J
Selenium, Dissolved		8E-04 J							0.001				7E-04 J						0.002	0.005
Silver, Dissolved		3E-05 J																		
Zinc, Dissolved		0.019			0.011	0.006 J		0.011	0.008 J		0.021	0.002 J	0.004 J			0.015	0.009 J		0.049	0.003 J
Total Metals (mg/L)																				
Arsenic, Total	0.15	0.083		0.006	0.029	**1.15**	0.01	0.013	0.006	0.003	0.031	0.013	0.013	0.003	0.011	0.019	0.04	0.003	0.013	0.001
Barium, Total		0.252	6E-05 J	0.16	0.219	0.761	0.224	0.144	0.22	0.23	0.137	0.174	0.206	0.082	0.174	0.264	0.163	0.168	0.19	0.039
Cadmium, Total		2E-04 J	4E-05 J	1E-04 J	8E-05 J	0.002	8E-05 J	3E-04	6E-05 J	3E-05 J	8E-05 J	4E-05 J	5E-05 J	1E-04 J	5E-05 J	1E-04 J	2E-04 J	4E-05 J	5E-05 J	2E-04 J
Chromium, Total		0.002 J	2E-04 J	0.002 J	7E-04 J	0.011	6E-04 J	0.007	9E-04 J	7E-04 J	7E-04 J	6E-04 J	5E-04 J	7E-04 J	0.002	0.002 J	0.002 J	3E-04 J	2E-04 J	0.041
Copper, Total		0.004 J	0.002	0.006	0.001 J	0.065	0.002 J	0.008	0.002	0.001	0.001	8E-04 J	0.001 J	0.002	0.002	0.001 J	0.004 J	0.002 J	0.001 J	0.005
Cyanide, Total	0.0052	0.004 J				**0.27**														
Cyanide, Free		0.002 J				0.005 J														
Lead, Total		0.001		9E-05 J	6E-05 J	0.004	1E-04 J	0.001	1E-04 J	1E-04 J	9E-05 J			9E-04 J	2E-04 J	9E-05 J	5E-04 J	6E-05 J	1E-04 J	2E-04 J
Nickel, Total		0.009 J		0.006 J	0.004 J	0.044	0.127	0.011 J	0.174	0.004	0.005	0.005	0.005	0.004	0.005	0.008 J	0.006 J	0.008 J	0.005 J	0.045
Selenium, Total	0.005	7E-04 J		5E-04 J	6E-04 J	**0.323**	8E-04 J	4E-04 J	9E-04 J	5E-04 J	2E-04 J	6E-04 J	5E-04 J		5E-04 J	0.001	5E-04 J	9E-04 J	5E-04 J	0.003
Silver, Total	0.0002	6E-05 J	2E-05 J	3E-05 J	2E-05 J	9E-05 J	3E-05 J	5E-05 J	2E-05 J	2E-05 J	2E-05 J	2E-05 J	2E-05 J		3E-05 J	2E-05 J	4E-05 J	2E-05 J		3E-05 J
Zinc, Total		0.014	0.001 J	0.013	0.012	0.117	0.114	0.026	0.01	0.004 J	0.004 J	0.003 J	0.003 J	0.005 J	0.004 J	0.014	0.012	0.01 J	0.011	0.004 J
SVOCs (ug/L)																				
Di-N-Butyl phthalate	9.7																		9	8
VOCs (ug/L)																				
1,1-Dichloroethane	740						4.6		3											
Chlorobenzene	47	4.4																		
Chloroform	170		1.5																	
cis-1,2-Dichloroethene	620						190		150											
trans-1,2-Dichloroethyler	1500						8.8		3.6											
Trichloroethene	200						29		25											
Vinyl chloride	15						**37**		**36**							2.1		1.6		

Field Sample ID		MWF3-030603-01	MWF4-030603-01	MWF5-030503-01	MWG1-030603-01	MWG1-030603-03	MWG2-030603-01	MWG3-030603-01	MWG4-030603-01	MWG4-030603-03	MWJ1-030503-01	MWJ2-030503-01	MWJ3-030503-01	MWK1-030403-01	MWK1-030403-02	MWL1-030403-01	MWL1-030403-02
Sample Date		3/6/2003	3/6/2003	3/5/2003	3/6/2003	3/6/2003	3/6/2003	3/6/2003	3/6/2003	3/6/2003	3/5/2003	3/5/2003	3/5/2003	3/4/2003	3/4/2003	3/4/2003	3/4/2003
Parameter	GW GSI Standard																
Dissolved Metals (mg/L)																	
Arsenic, Dissolved		0.012		0.007	0.031		0.002	0.005	0.002				0.002				
Barium, Dissolved		0.253		0.303	0.357		0.056	0.34	0.365				0.008 J				
Cadmium, Dissolved		1E-04 J			2E-04								9E-05 J				
Chromium, Dissolved		4E-04 J		0.004 J	7E-04 J		0.007	0.006	0.008				0.001 J				
Chromium, Hexavalent-Dissolved																	
Copper, Dissolved		0.002 J			0.002 J			0.002 J					0.018				
Lead, Dissolved		4E-05 J			1E-04 J			4E-04 J					0.001				
Nickel, Dissolved		0.008 J		0.004 J	0.005 J		0.003 J	0.005 J	0.005 J				0.002 J				
Selenium, Dissolved		7E-04 J			3E-04 J		7E-04 J						0.002				
Silver, Dissolved		2E-05 J			3E-05 J								3E-05 J				
Zinc, Dissolved		0.013		0.017	0.018		0.003 J	0.023	0.019				0.007 J				
Total Metals (mg/L)																	
Arsenic, Total	0.15	0.055	0.022	0.008	0.05		0.004	0.011	0.016		0.006	0.012	0.002	0.005	0.005	0.004	0.004
Barium, Total		0.403	0.239	0.308	0.381	1E-04 J	0.071	0.378	0.456	1E-04 J	0.369	0.204	0.022	0.12	0.139	0.218	0.213
Cadmium, Total		2E-04	5E-05 J	1E-04 J	4E-04		9E-04	9E-05 J	8E-05 J				8E-05 J	4E-05 J	7E-05 J	6E-05 J	2E-05 J
Chromium, Total		7E-04 J	5E-04 J	5E-04 J	0.001 J		0.014	0.001 J	3E-04 J		3E-04 J	0.004 J	0.002 J	0.001	0.001	4E-04 J	5E-04 J
Copper, Total		0.001 J	0.002 J	0.003 J	0.001 J	0.001 J	0.008	0.004 J	0.001 J	5E-04 J	0.002 J	0.003 J	0.009	0.003	0.003	0.001	0.001
Cyanide, Total	0.0052		**0.02**								**0.006**	**0.06**	**3.4**	0.005			
Cyanide, Free			0.002 J								0.001 J	0.02 J	0.03 J	0.004 J			
Lead, Total		8E-05 J	8E-05 J	9E-05 J	4E-04 J	6E-05 J	0.002	3E-04 J	9E-05 J	7E-05 J	7E-04 J	0.005	0.001	9E-05 J	3E-04 J		2E-04 J
Nickel, Total		0.008 J	0.007 J	0.004 J	0.005 J		0.012 J	0.006 J	0.005 J		0.018 J	0.01 J	0.004 J	0.038	0.035	0.007	0.007
Selenium, Total	0.005	7E-04 J	3E-04 J	3E-04 J	6E-04 J		9E-04 J	7E-04 J	9E-04 J		0.001	8E-04 J	0.002	0.001	0.001	6E-04 J	5E-04 J
Silver, Total	0.0002	2E-05 J		2E-05 J	5E-05 J		1E-04 J				4E-05 J	3E-05 J	3E-05 J	1E-05 J	4E-05 J		
Zinc, Total		0.02	0.013	0.017	0.018	0.001 J	0.011	0.021	0.022	7E-04 J	0.019	0.013	0.005 J	0.011	0.011	0.003 J	0.003 J
SVOCs (ug/L)																	
Di-N-Butyl phthalate	9.7	8	6				7	8		8							
VOCs (ug/L)																	
1,1-Dichloroethane	740													5.3	3.6	43	51
Chlorobenzene	47																
Chloroform	170					1.3											
cis-1,2-Dichloroethene	620										14		1	52	64	310	340
trans-1,2-Dichloroethyler	1500													6.8	8	30	38
Trichloroethene	200													11	15	**3300**	**3700**
Vinyl chloride	15		1.1						2.6		13		**38**	**17**	**19**		

Former Stanley Tools Facility - Fowlerville, Michigan
Updated Project Schedule

Activity ID	Description	Orig Dur	Early Start	Early Finish
Risk Analysis & Control Evaluation				
1410	On-Site Data Risk Analysis & Comparisons	37 *	04MAR03 A	24APR03
1420	Red Cedar River Risk Analysis & Comparisons	74 *	04MAR03 A	17JUN03
Corrective Measure Implementation				
Interim Measures Set #1				
1150	Interim Measures Set #1 Workplan	10	19MAR03 A	24APR03
1470	Mobilization & Site Setup	3	26MAR03 A	07APR03 A
1500	Dust Suppression & Water Management	66 *	26MAR03 A	27JUN03
1480	Install Erosion & Sediment Controls	2	31MAR03 A	01APR03 A
1510	Survey Construction & Sampling Extents	61 *	31MAR03 A	25JUN03
1450	Perform Test Pits / Geoprobe Analysis	5	01APR03 A	14APR03
1530	Verification Sampling and Analysis	59 *	01APR03 A	24JUN03
1720	XRF Delineation of Metals Area	3	15APR03	17APR03
2400	NESHAPS 10-day Submittal	15	15APR03 *	06MAY03
2270	Demolition of Structure	2	07MAY03	08MAY03
1520	Waste Characterization Sampling	13 *	03JUN03	19JUN03
1540	Transportation & Disposal	13 *	03JUN03	19JUN03
1630	Demobilization	2	26JUN03	27JUN03
Free Product Areas				
2220	Free Product Evaluation & PCB Analysis	10	01APR03 A	15APR03
2290	Disposal Cross-Check (Off-Site vs. Consol.)	0		15APR03
1550	Excavation & Management	8	10JUN03	19JUN03
2240	Backfill & Compaction	8	13JUN03	24JUN03
1560	Install Temp. Product Collection System (300 LF)	4	20JUN03	25JUN03
2300	Install Free Product Sentinel Wells	4	20JUN03	25JUN03
Outfall & Piping Removal				
1570	Visual Survey of Riverbank	1	03JUN03	03JUN03
1580	Pipe Removal (if necessary)	1	04JUN03	04JUN03
1590	Install Pipe Plugs (if necessary)	1	05JUN03	05JUN03
North & South Ditch Remediation				
1490	Clear & Grub Affected Areas	4	28MAY03	02JUN03
1610	Excavate South Ditch	2	03JUN03	04JUN03
2230	Excavate North Ditch	3	05JUN03	09JUN03
Interim Measures Set #2				
1160	Interim Measures Set #2 Workplan	15	11JUN03	01JUL03
1620	Mobilization & Site Setup	2	02JUL03	03JUL03
1660	Dust Suppression & Water Management	31 *	02JUL03	14AUG03
1640	Install Erosion & Sediment Controls	3	07JUL03	09JUL03
1650	Clear & Grub Affected Areas	3	07JUL03	09JUL03
1680	Waste Characterization Sampling	3	07JUL03	09JUL03
1690	Verification Sampling & Analysis	17 *	10JUL03	01AUG03
1700	Transportation & Disposal	19	10JUL03	05AUG03
PCB Impacted Soils				
1750	Excavation & Management of Soils	3	10JUL03	14JUL03



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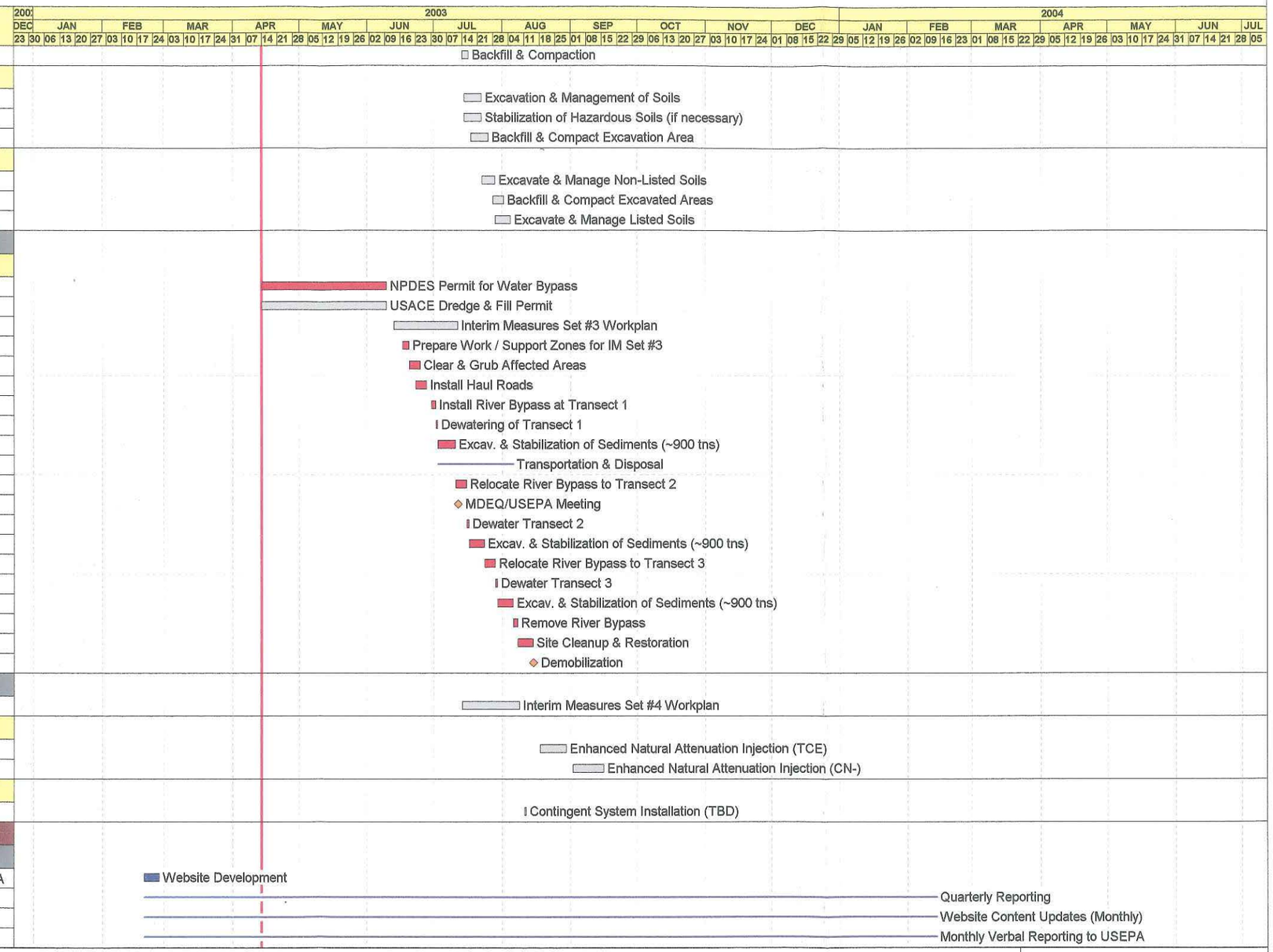
- Early bar
- Progress bar
- Critical bar
- Summary bar
- Start milestone point
- Finish milestone point

Former Stanley Tools Facility - Fowlerville, Michigan
Updated Project Schedule

Activity ID	Description	Orig Dur	Early Start	Early Finish
1760	Backfill & Compaction	3	14JUL03	16JUL03
CN- / Metal Impacted Soils				
1730	Excavation & Management of Soils	6	15JUL03	22JUL03
1740	Stabilization of Hazardous Soils (if necessary)	6	15JUL03	22JUL03
2250	Backfill & Compact Excavation Area	6	18JUL03	25JUL03
TCE Source Area Removals				
1780	Excavate & Manage Non-Listed Soils	4	23JUL03	28JUL03
2260	Backfill & Compact Excavated Areas	5	28JUL03	01AUG03
1770	Excavate & Manage Listed Soils	5	29JUL03	04AUG03
Interim Measures Set #3				
Red Cedar River Sediments				
1830	NPDES Permit for Water Bypass	60	14APR03 A	09JUN03
1840	USACE Dredge & Fill Permit	60	14APR03 A	09JUN03
1170	Interim Measures Set #3 Workplan	20	13JUN03	11JUL03
2380	Prepare Work / Support Zones for IM Set #3	3	17JUN03	19JUN03
1860	Clear & Grub Affected Areas	3	20JUN03	24JUN03
1870	Install Haul Roads	5	23JUN03	27JUN03
1290	Install River Bypass at Transect 1	2	30JUN03	01JUL03
1300	Dewatering of Transect 1	1	02JUL03	02JUL03
1880	Excav. & Stabilization of Sediments (~900 tns)	5	03JUL03	10JUL03
2210	Transportation & Disposal	23 *	03JUL03	05AUG03
1890	Relocate River Bypass to Transect 2	3	11JUL03	15JUL03
1820	MDEQ/USEPA Meeting	0		11JUL03
1900	Dewater Transect 2	1	16JUL03	16JUL03
2060	Excav. & Stabilization of Sediments (~900 tns)	5	17JUL03	23JUL03
2070	Relocate River Bypass to Transect 3	3	24JUL03	28JUL03
2080	Dewater Transect 3	1	29JUL03	29JUL03
2140	Excav. & Stabilization of Sediments (~900 tns)	5	30JUL03	05AUG03
2340	Remove River Bypass	2	06AUG03	07AUG03
2350	Site Cleanup & Restoration	5	08AUG03	14AUG03
2360	Demobilization	0		14AUG03
Interim Measures Set #4				
1180	Interim Measures Set #4 Workplan	20	14JUL03	08AUG03
GW Plumes (TCE & CN-)				
1910	Enhanced Natural Attenuation Injection (TCE)	10	18AUG03	29AUG03
2370	Enhanced Natural Attenuation Injection (CN-)	10	02SEP03	15SEP03
Free Product Recovery				
1920	Contingent System Installation (TBD)	1	11AUG03	11AUG03
Project Reporting & Closeout				
Progress Reporting				
1930	Website Development	5	20FEB03 A	26FEB03 A
1940	Quarterly Reporting	248 *	20FEB03 A	13FEB04
1990	Website Content Updates (Monthly)	248 *	20FEB03 A	13FEB04
2000	Monthly Verbal Reporting to USEPA	248 *	20FEB03 A	13FEB04



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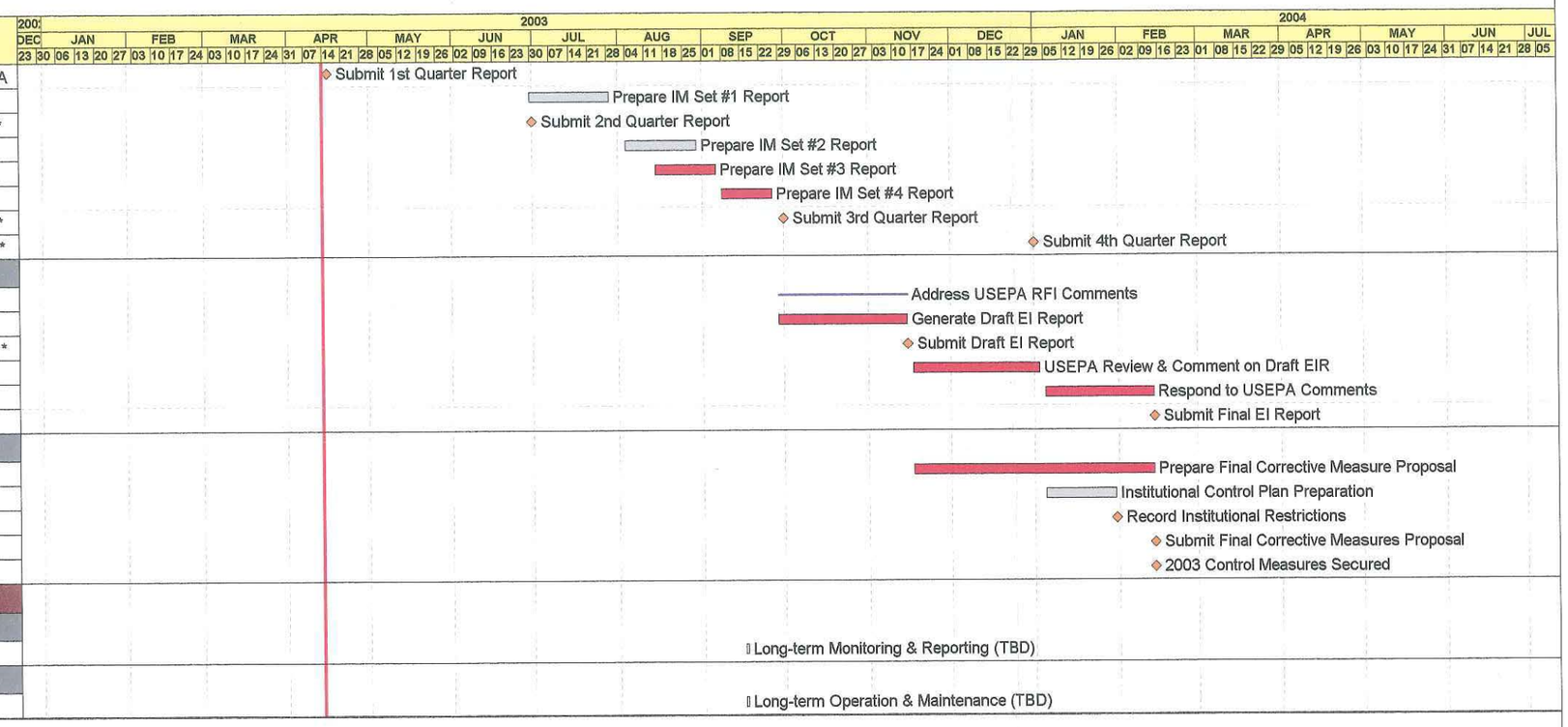
Former Stanley Tools Facility - Fowlerville, Michigan
Updated Project Schedule

Activity ID	Description	Orig Dur	Early Start	Early Finish
1950	Submit 1st Quarter Report	0		15APR03 A
2010	Prepare IM Set #1 Report	20	30JUN03	28JUL03
1960	Submit 2nd Quarter Report	0		30JUN03 *
2020	Prepare IM Set #2 Report	20	04AUG03	29AUG03
2030	Prepare IM Set #3 Report	15	15AUG03	05SEP03
2040	Prepare IM Set #4 Report	15	08SEP03	26SEP03
1970	Submit 3rd Quarter Report	0		30SEP03 *
1980	Submit 4th Quarter Report	0		31DEC03 *
Environmental Indicators Report				
2050	Address USEPA RFI Comments	35 *	29SEP03	14NOV03
2090	Generate Draft EI Report	35	29SEP03	14NOV03
2100	Submit Draft EI Report	0		14NOV03 *
2110	USEPA Review & Comment on Draft EIR	30	17NOV03	02JAN04
2120	Respond to USEPA Comments	30	05JAN04	13FEB04
2130	Submit Final EI Report	0		13FEB04
Final Corrective Measures Proposal				
2160	Prepare Final Corrective Measure Proposal	60	17NOV03	13FEB04
2150	Institutional Control Plan Preparation	20	05JAN04	30JAN04
2190	Record Institutional Restrictions	0		30JAN04
2170	Submit Final Corrective Measures Proposal	0		13FEB04
2390	2003 Control Measures Secured	0		13FEB04
Long Term Operation & Maintenance				
GW Plumes Mgmt (TCE & CN-)				
2180	Long-term Monitoring & Reporting (TBD)	1	16SEP03	16SEP03
Free Product Recovery				
2200	Long-term Operation & Maintenance (TBD)	1	16SEP03	16SEP03



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36133 Schoolcraft Road, Livonia, Michigan 48150

July 2, 2003

Mr. Anton Martig
TSCA Permit Division, Mail Code DT-8J
U.S. EPA-Region 5
77 West Jackson Boulevard
Chicago, Illinois 60604-3507

Re: Revised Verification Sampling Section
PCB Interim Measures Work Plan (June 12, 2003)
Former Stanley Works Facility, Fowlerville, Michigan
EPA ID# MID099124299

Telephone
734-779-2800
Facsimile
734-779-2860

Dear Mr. Martig:

The letter was prepared pursuant to our June 27, 2003 telephone conference call regarding your review of the PCB Interim Measures Work Plan (dated June 12, 2003) prepared on behalf of Johnson Controls, Inc. for the Former Stanley Works Facility in Fowlerville, Michigan. Section of 4.3.3 of the Work Plan discusses the collection of verification samples following the removal of PCB-impacted soils. As discussed during the conference call, the process used for verification sampling will be modified from that presented in the Work Plan and will no longer include the collection five-point composite samples. Guidance developed by the State for Michigan will be used for the verification of soil remediation.

The Michigan Department of Environmental Quality (MDEQ, formerly part of the Michigan Department of Natural Resources) prepared a guidance document to standardize the collection of cleanup confirmation samples. Guidance Document for Verification of Soil Remediation (VSR) (Michigan Department of Natural Resources, April 1994, Revision 1) will be followed for verification sampling during PCB soil cleanup at the site.

The VSR contains two parts, Part 1 Small Site Soil Cleanup Verification, and Part 2 Medium and Large Site Soil Cleanup Verification. Part 1 sample collection protocols will be applied on a per excavation basis to excavations that are 10, 890 ft^2 or less. For Part 1 sized excavations the look-up table in the guidance document will be used to determine the number of sidewall and floor samples collected from each excavation area. As discussed in the VSR, verification sample collection locations will be biased toward areas of suspected impact based on visual observation of the excavation and review of the pre-excavation PCB sampling data. All verification samples will be discrete grab samples; no composite samples will be collected.

Part 2 sample collection protocols will be applied on a per excavation basis to excavations that are greater than 10, 890 ft^2. For Part 2 sized excavations the formulae presented in the guidance document will be used to establish a grid interval for each excavation area. Both the sidewall and the excavation floor will be used to determine the size of the excavation area. A minimum of 12 samples or 25 percent of the grid nodes, whichever is larger, will be samples. Variations on the basic sampling Part 2 strategy may be employed, depending on visual

observation and review of the pre-excavation PCB sampling data to focus on suspected areas. All verification samples will be discrete grab samples; no composite samples will be collected.

Please feel free to call me at (734) 779-2812 if you have questions would like to discuss this matter further.

Sincerely
Earth Tech, Inc.

Andrew J. Lonergan, P.G.

cc: Dennis Reis - Dennis Reis, LLC
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Chris Preston, P.E. – ENTACT
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12/22

Dan,

These People received a fax and will receive the attached letter.

Terri

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:

DM-7J

December 22, 2006

Dear Interested Party:

Please find enclosed a copy of the U.S. Environmental Protection Agency's (U.S. EPA) Final Decision and Response to Comments for the Johnson Controls, Inc. (JCI) site in Fowlerville, Michigan.

Earlier this year, a public notice placed in the Lansing State Journal commenced a comment period, which provided the public the opportunity to comment on and/or inquire about the proposed clean up for JCI. The comment period ended on October 24, 2006. All comments received by that date were considered in the preparation of the enclosed document.

If you have questions or comment about this document, please direct them to Mr. Juan Thomas, Corrective Action Manager, U.S. EPA, at (312) 886-6010. If you wish, you may e-mail Mr. Thomas at Thomas.Juan@epa.gov.

Sincerely,

Terri J. Rancher
Community Involvement Coordinator
Program Management Branch

Enclosure

CC: Juan Thomas, U.S. EPA

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FINAL DECISION AND RESPONSE TO COMMENTS
SELECTION OF REMEDIAL ALTERNATIVE
FOR
JOHNSON CONTROLS, INC.
(FORMER STANLEY TOOLS FACILITY)
FOWLERVILLE, MICHIGAN
MID 099 124 299

Introduction

This RCRA Response to Comments (RTC) and Final Decision (FD) is presented by the United States Environmental Protection Agency (U.S. EPA) for the Johnsons Controls, Inc. site located in Fowlerville, Michigan. The purpose of this document is to identify the selected remedy, present concerns and issues raised during the public comment period, and provide responses. It consists of the previously issued Statement of Basis (Attachment I), and the Administrative Record (Attachment II). All of the comments received were carefully reviewed during the selection of the remedy, and have been answered in this RTC. The Statement of Basis provided the proposed remedy and was made available for public review and comment on August 31, 2006 through October 24, 2006. This FD supports the proposed remedy based on the Administrative Record (Attachment II). No additional alternatives were raised that were not considered in the Corrective Measures Study Report (CMS) and the proposed remedy was not altered as a result of public comments.

Assessment of the Facility

The response action documented in this Final Decision is necessary to protect human health and the environment.

Selected Remedies

The selected remedies for the site address past releases of chemical contaminants to soil, groundwater and sediments from manufacturing operations conducted from 1949 until 1985 when manufacturing operations at the facility ceased. The proposed remedies focus on reducing human and ecological exposure to contaminated media through removal of contaminated soils and sediments, the use of institutional controls, and monitoring the attenuation of contaminant concentrations in groundwater over time. Johnson Controls, Inc. (JCI), conducted Interim Remedial Measures in 2003 that consisted of removing and disposing of 83,900 tons of soil contaminated with volatile organic compounds (VOC's), metals, polychlorinated biphenyls (PCBs) and polycyclic aromatic hydrocarbons (PAH's). Contaminated soil was excavated to the beginning of groundwater depth from areas across the facility property and from two areas referred to as the North Ditch and South Ditch, which feed into the Red

Cedar River. The excavated soil material was disposed off-site in an approved landfill. Clean soil used to replace contaminated soil was backfilled in the excavated areas to original grade.

- Implement Institutional Controls for Contaminated Soils.
  Institutional controls will restrict future facility uses to industrial purposes. Institutional controls would consist of deed restrictions, local ordinances and/or zoning that would limit the future use of the property and ensure that any direct human exposure to on-site soils would be so incidental as to pose little or no health threat . To the extent future conveyances of the facility property or any portion of it are planned, the institutional controls would ensure that the transferees were aware of, and bound by, the restriction.

- Implement Institutional Controls, Deed Restrictions and Long-Term Monitoring for Groundwater
  Institutional controls will consist of deed restrictions, and/or zoning or other local ordinances devised to prohibit the extraction of groundwater for consumptive or irrigation purposes in areas affected by the contaminant plume. Such controls would be implemented to prohibit the placement of potable or irrigation wells, limit excavations below the water table, and/or limit land uses to commercial and industrial development. Future redevelopment would be limited to industrial uses, disclosure of potential hazards would be provided to current and future on-site construction workers through a Health and Safety Plan, and any use of groundwater would be prohibited. Periodic review of institutional controls will ensure that future facility use is limited to activities that do not pose an unacceptable human health risk

- Monitored Natural Attenuation (MNA), and Mixing Zone Determination for Groundwater
  MNA consist of routine monitoring of the contaminant plume in accordance with an approved RCRA Groundwater Monitoring Program Plan. The Michigan Department of Environmental Quality (MDEQ) has completed a Mixing Zone Determination that has established maximum allowable contaminant concentrations in groundwater at compliance well locations specified near the Red Cedar River. Monitoring would continue until attenuation achieves groundwater cleanup goals. The applicable groundwater cleanup goals for on-site groundwater are the Michigan Department of Environmental Quality (MDEQ), Final Acute Values and the Part 201 Generic Groundwater/Surface Water Interface (GSI) Criteria. The MDEQ has established "Final Acute Values" which are maximum allowable chemical concentrations in groundwater that are protective of the environment. Selected monitoring wells will be analyzed for VOC's, Michigan 10 metals (plus nickel and hexavalent chromium), cyanide and Monitored Natural Attenuation (MNA) parameters.

The proposed monitoring program would protect human and ecological health in the future by assessing the concentration, migration and attenuation of hazardous constituents in groundwater.

- Excavation of Red Cedar River Sediments
  Areas of river sediments that are contaminated at levels considered unsafe for aquatic animals would be removed from the river. The degree of cleanup in the river sediments are based on the goal of protecting the animals that live part or all of their lives in the sediment ("benthic organisms"), which are important in the food chain of the river's ecosystem. Cleaning up sediments to protect the benthic organisms is expected to benefit the fish, birds, and mammals that inhabit or feed in the river; this will also help to keep the surface water clean.
  Red Cedar River sediments will be tested in a laboratory to further evaluate their level of toxicity, in order to isolate the areas of sediment that will be removed and to establish site-specific cleanup goals. Interim Measures completed in 2003 included the excavation and backfilling of the North Ditch and South Ditch, which drain into the Red Cedar River. EPA believes that the removal of contaminated ditch sediments has eliminated the inflow of contaminated sediments to the river.

Public Participation Activities

The public comment period was announced through a newspaper advertisement, radio advertisements and online at the EPA website located at, http://www.epa.gov/reg5rcra/wptdiv/permits/index.htm. The public comment period ran from August 31, 2006, through October 24, 2006. The Statement of Basis (SB) and the supporting Administrative Record were placed in the Fowlerville District Public Library in Fowlerville, Michigan, and the U.S. EPA, Region 5, Waste, Pesticides, and Toxics Division Records Center for public review at the start of the public comment period.

Public Comments and Concerns

Public comment was received from company representatives during the comment period. The public comments received addressed a couple of historical inaccuracies as presented in the Statement of Basis Document and are noted below.

Comment: "Buildings at the facility were demolished in 1993, and no structures of any type remain. The facility currently consists of a relatively flat grassy field. Johnson Controls, Inc. ("JCI") currently owns the facility." However, in 2005 Johnson Controls sold the eastern approximately 5 acres (the portion which lies outside the approximate floodplain) to American Compounding Specialties, LLC, which has constructed a plastics manufacturing plant on the property. EPA received notification of the transaction pursuant to the consent order.

Response: Comment Noted.

Comment: In the first paragraph of section 3.0, the text states: "JCI purchased the facility in 1985." Actually, JCI purchased the facility from Stanley in 1996.....

Response: Comment Noted.

Administrative Record

The Administrative Record upon which the final remedy was selected is available at the Fowlerville District Public Library in Fowlerville, Michigan, and the Waste, Pesticides and Toxics Division Records Center of the U.S. EPA, Region 5 offices. Attachment II identifies the documents contained within the Administrative Record.

Future Actions

Within 45 days of receipt of this Final Decision and Response to Comments, Johnsons Controls, Inc., must submit a Corrective Measures Implementation Program Workplan for U.S. EPA's approval. Within 30 days of U.S. EPA's approval of the workplan, Johnsons Controls, Inc. must commence the work. During the remedy implementation period, U.S. EPA will provide information to the public by updating the Administrative Record and conducting meetings, as requested.

Declarations

Based on the Administrative Record compiled for this corrective action, U.S. EPA has determined that the selected remedy for the Johnsons Controls, Inc, site is appropriate and protective of human health and the environment.

Date: 12/1/06

for

Margaret M. Guerriero, Division Director
Waste, Pesticides and Toxics Division
U.S. EPA, Region 5

Attachments

Dennis Reis LLC

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January 9, 2003

Juan Thomas
U.S. Environmental Protection Agency
Region 5
77 W. Jackson Blvd.
Mail Stop DE-9J
Chicago, IL 60604-3590

Re: Johnson Controls, Inc., Fowlerville, Michigan
Administrative Order on Consent, # RCRA-05-2003-004

Dear Juan:

Pursuant to Paragraph 9 of the order referenced above, Johnson Controls, Inc. designates the following person as its Project Manager:

Gary Blinkiewicz, CPG
Earth Tech
36133 Schoolcraft Road
Livonia, MI 48150
Phone: 734-779-0361
Fax: 734-779-2860
Gary.Blinkiewicz@earthtech.com

We look forward to successful completion of this project.

Yours very truly,

Dennis Reis LLC

Dennis P. Reis

Addendum to the Baseline Ecological Risk Assessment (BERA)

Former Stanley Tools Facility (MID 099 124 299)
Fowlerville, Michigan

Prepared for:

JOHNSON CONTROLS, INC
49200 HALYARD DRIVE
PLYMOUTH, MI 48170

Submitted to:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5, RCRA CORRECTIVE ACTION SECTION
77 W. JACKSON BOULEVARD
CHICAGO, IL 60604

Prepared by:

CTI and Associates, Inc
51331 W. Pontiac Trail
Wixom, MI 48393

June 7, 2012

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- 2011 December 5: Letter from EPA to JCI – Revision to EPA Letter
- 2012 March 8: Letter from MDEQ to EPA
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1.0 INTRODUCTION

1.1 PURPOSE AND OBJECTIVE

This document is prepared as an addendum to the "Technical Report: March 2008 Groundwater Monitoring Program Results and Baseline Ecological Risk Assessment" (Entact, 2008), referred to as the BERA, at the request of the USEPA per a letter dated December 5, 2011. This report memorializes additional sampling, data, and discussions regarding ecological risk assessment since the submittal of the original BERA.

1.2 SITE BACKGROUND

Johnson Controls, Inc. (JCI) currently holds Resource Conservation and Recovery Act (RCRA) corrective action responsibility at the Former Stanley Tools Facility (MID 099 124 299) in Fowlerville, Michigan. JCI's ultimate goal is to eliminate unacceptable risks to public health and the environment resulting from past releases, and obtain closure in accordance with the site's "Final Decision and Response to Comments, Selection of Remedial Alternatives for Johnson Controls, Inc." dated December 2006.

The site is located at 425 Frank Street, in Fowlerville, Livingston County, Michigan (Figure 1). It is approximately 14 acres in size. Following soil cleanup in 2003, a portion of the site was sold to, and re-developed by American Compounding Specialties, Inc. The remainder of the site is undeveloped. The site layout is shown on Figure 2.

The site is bordered to the north by the Copeland Construction property and Grand River Avenue; to the south by the CSX rail line; to the west by the Red Cedar River; and to the east by Veterans Drive (formerly Detroit Street). The area surrounding the site is largely commercial and light industrial with some interspersed residential properties to the north, east, and south. A variety of businesses operate in the immediate vicinity of the site, including; a metals shop, an auto parts store, an auto body shop, a video store, a warehouse, and the local VFW hall.

In 1949, Utilex Manufacturing Company first developed the site for zinc die casting operations. The plant underwent several expansions and ownership transfers between 1949 and 1980. Stanley Tools purchased the plant to make hand tools in 1980. Various plating operations continued at the site until 1985. Plating operations produced a variety of liquid wastes and sludges that were treated on-site using multiple treatment/holding pits and/or lagoons. Several known spills and releases of wastes were documented over the years that resulted in contamination of the site. Wastes were known to have been discharged onto the soil surface at various locations, in two drainage ditches, and into the Red Cedar River. The plant was closed in 1985 and remained unused until 1993, when building demolitions were completed. JCI assumed responsibility for site cleanup efforts with the purchase of the former Stanley Tools facility.

In October 2002, EPA provided a draft Administrative Order of Consent (AOC) to JCI, and through negotiations, a final AOC was executed in December 2002 for the site (U.S. EPA Docket No. RCRA-05-2003-004). The AOC focused on (a) the submittal of the EI Reports (demonstrating stabilization of impacted groundwater migration, and positive control of human health exposures) by February 15, 2004; (b) the Final Corrective Measures Proposal (FCMP) was required to be submitted by February 15, 2004; (c) corrective measures for the site as needed to protect human health and the environment; and (d) submission of a Final Remedy Construction Completion Report. Complete site historical information is

contained in the site's administrative record, located at the Fowlerville Public Library in Fowlerville, Michigan.

1.3 PREVIOUS INVESTIGATIONS AND ACTIVITIES

Several environmental activities were performed at the site between 1988 and 2002, including multiple soil and water investigations; sampling and analysis; a RCRA Facility Investigation (RFI); and several Interim Measures (IMs). These activities were summarized in a RFI Report submitted to the EPA in October 2001. In December 2002, the AOC was finalized.

In 2003, over 90,000 tons of impacted soils were removed from the site; groundwater characterization was completed; and Draft Environmental Indicator (EI) reports for Groundwater Under Control and Human Health Under Control were prepared and submitted as drafts for USEPA review. As required by the AOC, both the EI reports and the FCMP were submitted in February 2004. The FCMP made the following recommendations.

- Soil impacts at the site were remediated and no further action for soil was required.
- Residual groundwater impacts at the site were expected to improve because the soil sources were removed and that groundwater should be controlled with the proposed monitoring program conducted under a Mixing Zone Determination issued by the State of Michigan (MDEQ, 2006).
- Institutional controls would be placed on soil and groundwater at the site.
- Sediments did not pose a threat to human receptors, but comparison of sediment data to available screening criteria indicated potential ecological impacts. It was recommended that an ecological study be completed to develop site-specific cleanup levels protective of ecological receptors. Sediment removal, as appropriate, would then follow.

In 2006, USEPA issued a Statement of Basis for the site and held public comment. On December 1, 2006, the USEPA issued the Final Decision and Response to Comments, Selection of Remedial Alternative for the site. The Final Decision accepted the sediment recommendation from the FCMP and JCI began work on implementing the ecological study to identify site-specific sediment cleanup levels protective of ecological receptors.

The ecological study was completed by Entact, Inc. of Chicago, Illinois and was presented in a document entitled, "Technical Report: March 2008 Groundwater Monitoring Program Results and Baseline Ecological Risk Assessment" (Entact, 2008), referred to as the BERA. Following USEPA review of the BERA, meetings, and associated correspondence, the USEPA issued a letter on June 19, 2009 regarding corrective measure implementation for sediment. The June 19, 2009 letter listed Remedial Objectives (ROs) for selected metals in sediment, limited the data used for the evaluation to data collected in 2003 and later, and called for submission of a Remedial Design Plan for sediment corrective measures.

Upon receipt of the June 19, 2009 USEPA letter, JCI initiated work on collection of additional pre-design data for the sediment corrective measure and began work on the Sediment Remedial Design Plan. In November 2009, additional sampling was done to provide additional characterization to support the sediment remedial design plan. This additional sample collection included supplemental in-channel locations, as well as collection of bank and overbank samples. The Sediment Remedial Design Plan was submitted January 29, 2010.

During a meeting held April 13, 2010 to discuss the Sediment Remedial Design Plan (RDP), the Region V EPA requested that further screening of site data be completed and presented in an addendum to the

Sediment RDP. On November 10, 2010 the Addendum to Sediment Remedial Design Plan was issued. Over the next year a series of conference calls and meetings took place to work collaboratively with the USEPA to complete the evaluation of risk posed by the site, and to solicit input from the Michigan Department of Environmental Quality (MDEQ). The outcome of this collaborative effort is summarized in a letter issued from the USEPA December 5, 2011, and clarified in follow up meetings. On March 8, 2012, the MDEQ issued a letter concurring with USEPA's December 2011 assessment and conclusions. Appendix A contains the letters, correspondence, and meeting minutes with the USEPA.

The December 5, 2011 letter requested that an addendum to the BERA be issued summarizing all additional criteria and developments since March 2008. This document serves as that addendum. In addition, the December 5, 2011 letter also requests that an addendum to the Sediment Remedial Design Plan be prepared and submitted for review. During subsequent discussion, it was agreed that a revised Sediment Remedial Design Plan would be submitted rather than an Addendum. The Final Sediment Remedial Design Plan will be submitted under separate cover.

2.0 STUDY AREA INVESTIGATION

The USEPA's letter dated June 19, 2009 stated that data collected since 2003 could be used for the characterization of sediment impacts at the site, and that data collected prior to 2003 should not be used. During planning for the sediment removal effort, preparation of the January 2010 Sediment Remedial Design Plan, and subsequent correspondence, sampling results collected prior to 2003 were removed from data set, and data collected since 2003 have been incorporated into the data set as appropriate. This section summarizes the sources of data used in this report.

2.1 2003 SAMPLING DATA

Data collected in 2003 from several soil and sediment sampling locations are used in this BERA Addendum. This section summarizes use of 2003 data.

SOIL DATA: After soil removal from the site proper in 2003, cleanup confirmation samples were collected and analyzed prior to the placement of clean fill over the remediated area. This soil removal effort and associated sampling are documented in the FCMP Appendix D Interim Measures Report dated February 2004. During evaluation of overbank soils in this BERA Addendum, selected cleanup confirmation sampling data from 2003 was used. 2003 soil data used during the overbank evaluation are shown on Figures 3, 4 and 5; all sampling locations on the east side of the river are denoted with a sampling ID that starts with either an "MD" or an "MS" prefix.

SEDIMENT DATA: In 2003 in-channel sediment were collected from several locations in the river between the CSX bridge (to the south) and the Grand River Avenue bridge (to the north). Transects A through M were established for the sampling effort. Transects A through M sediment sampling are shown on Figure 3, 4 and 5. Collection of samples in 2003 is summarized in the "Technical Memorandum: Sediment Quality Survey, Preliminary Sediment Cleanup Criteria and Data Evaluation" in the FCMP 2004. All sediment sampling data from 2003 was used in this BERA Addendum unless specifically noted below.

BACKGROUND SEDIMENT DATA: In 2003 in-channel sediment samples were collected upstream of the former Stanley Tools site. The purpose of these samples was to establish a site-specific background data set by combining the 2003 results with results for previously collected upstream samples. Background values representative of the Red Cedar River upstream of the site were developed in the "Technical Memorandum: Sediment Quality Survey, Preliminary Sediment Cleanup Criteria and Data Evaluation" in the FCMP 2004. Appendix B contains a summary and map of the background data developed. Table B-1 displays all sediment background data collected and Table B-2 summarizes the background criteria and calculations from the 2004 FCMP.

2.2 2007 SAMPLING EVENT

A total of four in-channel sediment samples were collected by Entact in 2007 between the CSX bridge (to the south) and the Grand River Avenue bridge (to the north) to supplement the 2003 sediment data set. These samples were collected at previously sampled locations A1, C1, E2, and J2. Results from the 2007 sampling were used during the evaluation of in-channel sediments in this BERA Addendum.

2.3 2009 SAMPLING EVENT

In November 2009, additional characterization was conducted to support the Sediment Remedial Design Plan. Sample collection transects are shown in Figure 2, with the locations of individual sampling points shown on Figures 3-6. The objectives of additional characterization are provided below:

1. Surface grab samples were collected from bank and overbank locations along the west side of the river in line with each of the original 2003 transects (A through M).
2. Two sets of bank and overbank surface grab samples were obtained from the east side of the stream, located upstream and downstream of the "L" transect (LD and LU). These samples provide data north of the drainage ditch and south of Grand River Avenue, where no soil samples from historical site remediation exist.
3. In-channel sediment samples were collected from three new transects (N, O, P) as shown in Figure 6. Bank and overbank samples were obtained from both sides of the river at these new transects. These transects are located north of Grand River Avenue and south of the City of Fowlerville Drain located approximately 600 feet north of Grand River Avenue.
4. Historical "L" transect was re-sampled, and two new transects immediately upstream (LU) and downstream (LD) of transect "L" were added. The sampling objective at these new transects was to verify results from historical sample SDL1012-052003-02 (a duplicate at the SD-L1 location), that showed a lead remedial objective (RO) criteria exceedence.
5. A composite sample was obtained from in-channel sediment located between transects A and H (locations SD-A1, SD-C1, SD-E1, SD-E2 and SD-H1). Sediment stabilization treatability testing was conducted with this sample to evaluate sediment stabilization options. Results from this composite sample were not used in this BERA Addendum.

Lab data from the 2009 event can be found in Appendix C.

<u>2009 EVENT SAMPLE COLLECTION METHDOLOGY:</u>

To prevent cross contamination of samples, sediment sampling was conducted starting downstream near the Fowlerville Drain and working upstream towards the CSX Railroad. A total of 27 sediment discrete samples were collected using a 2-inch steel sediment sampler. The sampler uses a disposable plastic soil catcher that fits on the end of a 2-inch plastic liner fitted into the steel sleeve. The core tip allows the plastic soil core catcher and liner to fit snuggly over the lip of the core tip. After the soil core catcher and liner are placed on the core tip, they are loaded into a standard multi-stage base section and screwed together. A sliding hammer is used to drive the sampler into the sediment until no further penetration is achieved after three successive blows. During deployment, the flap cap opens and allows excess air and water to escape through the top of the sampler – eliminating pressure buildup. The sediment enters and fills the liner. When the sampler is lifted the flap closes and creates suction to assist the soil core catcher in retaining the sample.

The depth of sampler penetration, sediment characteristics and recovery was logged for each sampling location. For depths greater than 15-inches, the sediment was divided into two portions and transferred to two stainless steel bowls. After gently mixing the contents in the bowls, samples were placed in laboratory provided containers, and stored in coolers with ice pack for transport to laboratory. One duplicate sample and three field blanks were analyzed for quality control evaluation. The sediment sampler was decontaminated after each sample. New liners were used to sample each location.

A total of 42 soil samples were collected from bank and overbank locations. These soil samples were collected from 0 to 6 inches below the surface. Two duplicates and seven field blanks were collected for quality control evaluation.

Sediment and soil samples were analyzed for the following parameters using the indicated methods:

Parameter(s)	Analytical Method
Volatile Organic Chemicals	SW-846 8260B
Semi-Volatile Organic Chemicals	SW-846 8270C
Polychlorinated Biphenols (as Aroclors)	SW-846 8082
Metals (arsenic, aluminum, barium, cadmium, chromium, copper, lead, nickel, selenium, silver, zinc, mercury)	SW-846 6020A/7470A/7471A
Hexavalent chromium	SW-846 3060A/7196A
Cyanide, free and total	SW-846 9010B/9014
Total Organic Carbon	Walkley-Black
Fractional Organic Carbon	ASTM D 2974-87
Percent Solids	SW-846 3550B/SM 2540B.3

2.4 HABITAT ASSESMENT

As part of the Addendum to the RDP submitted November 2010, the USEPA requested that Johnson Controls provide a point by point screening of overbank samples to the most restrictive terrestrial Ecological Soil Screening Level (Eco-SSL) value available. As a supplement to the ecological screening requested, Johnson Controls also completed a habitat assessment of the site. The purpose was to assess plant communities in and near the site, and characterize potential ecological receptors present. The assessment, entitled "Field Assessment Memorandum" is attached in Appendix D.

2.5 pH SAMPLING

Overbank soil samples collected and analyzed for aluminum were at or below the State of Michigan Part 201 Statewide Default Background Level with the exception of four sample locations (E-09-WO, F-09-WO, K-09-WO, and LU-09-EO). The USEPA's letter dated December 5, 2011 states that the Eco-SSL soil screening benchmark for aluminum assumes the soil has pH of 5.5 or lower in order to render it biologically available. The soil pH was not anticipated to be less than 5.5 at the site, but sample confirmations would alleviate the concern. In response to the EPA's comments, overbank soil samples were collected and analyzed for pH so that aluminum concentrations can be evaluated for compliance with risk-based criteria. The sampling objective was to confirm the pH of site soils was greater than 5.5 and the aluminum in soil was not biologically available.

A letter was sent to the USEPA on December 12, 2011 (Appendix E) outlining CTI's plan for sample collection. Samples were collected at prior sampling locations E-09-WO, F-09-WO, and K-09-WO. A total of three grab soil samples and one duplicate were collected from a depth interval of 0-6 inches. At each sampling location, vegetation above the soil surface was removed. Utilizing a 6-inch stainless steel hand shovel, a hole measuring 6-inches deep was dug, the excavated soil was placed in a stainless steel bowl and thoroughly homogenized and a sample of the soil was then placed in a laboratory-provided sample container for analysis. Appendix E contains the laboratory data for this event confirming that site specific soils have a pH in the range of 7.3 – 7.7, well above the 5.5.

3.0 STUDY AREA SETTING

3.1 PHYSICAL DESCRIPTION

The site is located at 425 Frank Street, in Fowlerville, Livingston County, Michigan (Figure 1). It is approximately 14 acres in size. Following soil cleanup in 2003, a portion of the site was sold to, and re-developed by American Compounding Specialties, Inc. The remainder of the site is undeveloped. The area surrounding the site is largely commercial and light industrial with some interspersed residential properties to the north, east, and south. A variety of businesses operate in the immediate vicinity of the site, including; a metals shop, an auto parts store, an auto body shop, a video store, a warehouse, and the local VFW hall.

The study area along the river is bordered to the south by the CSX rail line, and extends north to approximately 600 feet north of Grand River Avenue.

A description of in-channel sediment at transects LU, L, LD, N, O, and P is found in Table 1: 2009 Sediment Sampling Field Log. In channel sediment consists of primarily Fine to medium sand or silty sand, with some areas of course sand, gravel, and organics.

3.2 HABITAT DESCRIPTION

Based on the Habitat Assessment (Appendix D) submitted in 2010. The area includes primarily riparian woods and emerging wetlands adjacent to the stream with some upland areas consisting of old field, young upland woods, and mowed lawn. The plant and wildlife observed were dominated by species commonly found in urban and suburban areas, with a few invasive non-native species of plants. No endangered, threatened, or critically listed species were found. The Assessment concluded that overbank areas were primarily wetlands and the comparison of overbank data to terrestrial ecological screening criteria was highly conservative.

Observations indicate that the overbank area adjacent to the river is primarily a wetland / saturated soil environment. Per the EPA letter issued December 5, 2011, since the water table is at or close to the soil surface, it is reasonable to conclude these soils are unlikely to support habitat for earthworms, which eliminates the food web exposure pathway to birds and mammals that consume soil invertebrates.

3.3 HYDROLOGIC CHARECTERISTICS

The Red Cedar River is a small shallow warm water stream. The river is not used as potable water supply, nor does it support boating or a significant source of sports fishing. The Red Cedar River is a gaining stream, bringing water in from the groundwater aquifer. The MDEQ issues a Mixing Zone Determination as part of the site's groundwater remedy. Groundwater monitoring is conducted at the site on a semi-annual basis in accordance with the MDEQ approved Mixing Zone Monitoring Plan (Earth Tech, 2006).

The river flows northward in this area, from the CSX railroad bridge toward Grand River Avenue, and continuing northward. Direction of flow is shown on Figure 2.

3.4 OUTSIDE INFLUENCES

Storm sewers and drainage ditches direct storm water runoff from a significant portion of the City of Fowlerville, Michigan into the Red Cedar River. Drainage ditches that flow into the River are located immediately north and south of the CSX Railroad track located south of the site. A storm sewer accounts for most of the flow observed in the drainage ditch at the north end of the site proper (ditch entering River immediately south of Transect J; Figure 2). Two storm sewer lines are located adjacent to Grand River Avenue and drain from east to west into the Red Cedar. These lines, located on the north and south sides of the road, drain most of the downtown portion of the City. Discharge from both of the Grand River Avenue storm sewers enters the River between Transects M and N. The location of drainage ditches and storm sewers are shown on Figure 2.

4.0 DATA EVALUATION

Data from in-channel samples, bank samples and overbanks samples are evaluated in this BERA Addendum. The evaluation methods used are summarized in Section 4.1, and then evaluation of the in-channel data, bank data, and overbank data is presented in Sections 4.2, 4.3, and 4.4 respectively.

Johnson Controls, Inc., as presented in the January 2010 Sediment Remedial Design Plan (CTI, 2010), plans to removed impacted sediments from the Red Cedar River via dredging. The upcoming 2012 Sediment Remedial Design Plan (CTI, in press) will supersede the 2010 version of the Plan. Because in-channel sediments from selected transects will be removed during dredging program, the discussion presented in this section focuses on evaluation of media that will be left in place after dredging is complete and provides the "leave in place" decision rationale.

4.1 DATA EVALUATION METHODS

4.1.1 Direct Data Comparisons

Laboratory analytical data generated since 2003 were in all cases compared directly to available criteria on a compound by compound basis. This comparison was completed to identify the individual locations where exceedences of screening and/or cleanup criteria for a given analyte occurred and to facilitate spatial analysis of the data.

4.1.2 Surface Weighted Average Concentration (SWAC)

The SWAC value for each chemical constituent is an area weighted average that represents the concentration attributable to a particular constituent for the representative area being evaluated. The calculated SWAC values for each chemical constituent can then be compared with cleanup criteria to identify chemical constituents that contribute to ecological risk within the appropriate length of stream.

The river area was divided into three "types", in channel, bank, and overbank, and a separate SWAC calculation was done for each. Figures 7-9 show the SWAC polygons for each area. The boundary for in-channel is the water's edge; the boundaries for the banks are the water's edge and top of bank on both sides of the river; and the boundaries for overbank areas defined based on field observations to be within 20 feet of the top of stream bank identified in the 2009 land survey. The areas of overbank covered by clean fill during the 2003 removal action (documented in the FCMP, Appendix D – Interim measures report) are not included in this analysis.

The SWAC calculation consists of establishing two parameters: 1) determining the area influenced by each sampling location and 2) assigning a conservative concentration value for each chemical constituent equally distributed throughout the influence area. This allows for analysis by the sum of products for individual constituents and the area associated with that sampling location (area concentration). The sum of all individual area concentrations for each constituent is then divided by the sum of all areas to render an average concentration for the area being evaluated.

The SWAC for a chemical constituent is calculated using the formula:

$$SWAC_i = \left[(C_1 * A_1) + (C_2 * A_2) \ldots\ldots (C_n * A_n)\right] \Big/ \left[A_1 + A_2 \ldots\ldots A_n\right]$$

Where, i – chemical constituent

Cn – concentration of chemical constituent, i, at sampling location n

An – polygon area of sample location n

The method of determining the area influenced by each sampling location, and the chemical constituent concentration associated with each area of influence, is provided below.

Influence Area of Sample Points

Influence area for each sample location is identified using the Thiessen Method. Creation of polygons using this method consists of connecting the perpendicular bisectors of lines drawn between the sample locations and surface type boundaries to develop polygons. The boundary for in-channel is the water's edge; the boundaries for the banks are the water's edge and top of bank on both sides of the river; and the boundaries for overbank areas defined based on field observations to be within 20 feet of the top of stream bank identified in the 2009 land survey. The sketch below illustrates the creation of polygons using Thiessen method. Figures 7-9 show the polygons and representative areas for each in channel, bank, and overbank sample.

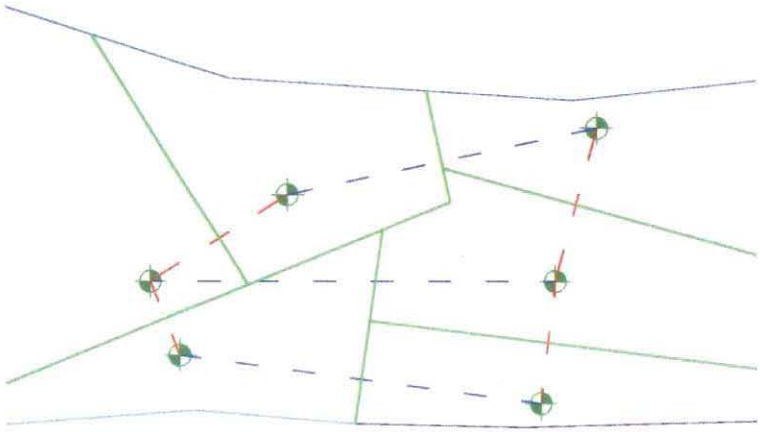

Illustration 1: Assigning areas to each sampling location

Chemical Constituent Concentration

At sampling locations where there are more than one sample results from varying depths, or multiple sampling events, or duplicate samples, the maximum of these results for each chemical constituent is considered to represent that particular sampling location.

Laboratory data, especially at low concentration, is often qualified with "flags". The "U" flags show that an analyte is not detected (ND) above the method detection limit (MDL). The MDLs vary for the same chemical constituent at different sampling locations. For purposes of calculating SWAC, half the

maximum MDL was used for "U" flagged analytical results. The "J" flags show that a chemical constituent was observed below the reporting limit, but above the MDL and therefore the actual concentration is considered an estimated value. For "J" flagged results, the concentration reported by the laboratory was used in the SWAC calculation.

4.1.3 Mean Probable Effect Concentration Quotient Analysis

The mean probable effect concentration quotient (PEC-Q) provides a basis for assessing the potential toxicity of sediment contaminants when they occur in complex mixtures. The analysis simultaneously accounts for both the presence and the concentrations of multiple chemicals at an individual sampling location relative to sediment quality guidelines (specifically the PEC). The method used was performed, as suggested by the USEPA, in accordance with Appendix A of the "Consensus Based Sediment Quality Guidelines, Recommendations for Use & Application, Interim Guidance" developed by the Contaminated Sediment Standing Team for the Wisconsin Department of Natural Resources in December 2003 (WDNR 2003).

This method calculates a PEC-Q for each organic chemical with an available PEC by dividing the concentrations normalized to 1% total organic compounds (TOC) based on TOC results at each sampling location by the respective PEC. Because TOC does not play a major role in the bioavailability of metals, TOC normalization is not performed prior to calculating the PEC-Q. The straight average or mean of all the individual PEC-Qs is then calculated for that sampling location.

For each sampling location analyzed with this method, a mean PEC Quotient for metals (not TOC normalized), a mean PEC quotient for total PAH's (normalized to 1% TOC), and an overall mean PEC quotient was calculated.

A mean PEC quotient of less than 0.5 predicts that the sediments at that particular location are not toxic to ecological receptors.

4.2 IN CHANNEL DATA

Based on the documents and discussions with the EPA, all in-channel sediment samples collected since 2003 were evaluated. Table 2 presents all in-channel sediment laboratory analytical data from the 2003 to 2009 sampling events evaluated against the Remedial Objectives (RO), and the EPA Region V RCRA Sediment ESL where a RO was not available. One RO exceedence for lead from the 2003 sampling event was observed at transect L in the duplicate sample only. As part of the 2009 sampling event additional sampling was done at transect L, as well as upstream and downstream of transect L. Additional sampling at this location showed lead well below criteria levels at all samples in transects LU and L. The historical RO exceedence at the L transect is considered an anomaly based on the resample results from the 2009 sampling event.

Based on the RO exceedences highlighted in Table 2, transects A-H, and LD-M were selected for removal via dredging. Figure 10 shows the in-channel areas proposed for dredging. At the top of Table 2, individual samples from the proposed dredge area are highlighted in red. Individual RO exceedences are shown highlighted in yellow on Table 2.

Further evaluation of the in-channel sediment data was performed using the SWAC analysis as presented in section 4.1. Table 3 presents a summary of all the in-channel data evaluated using SWAC, to represent

the concentration attributable a particular constituent for a particular stream section. SWAC results are presented for three sections of in-channel stream data:

- Transects A-M: Those transects south of Grand River Avenue
- Transects N-P: Those transects north of Grand River Avenue, which include contamination from storm water runoff from Grand River Avenue.
- Transects A-P: An evaluation of the entire sampled area on both sides of Grand River Avenue.

Analysis of the SWAC data in Table 3 shows no RO exceedences. Exceedences of the EPA Region V RCRA sediment ESL's are highlighted on the table.

Table 4 shows in-channel sediment data for those transects that will remain in place after the proposed removal, and only those compounds that had detected concentrations at one or more of the remaining transects. These remaining data were further evaluated against additional sediment criteria. A summary of the in-channel criteria evaluation is outlined below.

- USEPA in the letter dated June 11, 2009: Remedial Objectives (RO)s for in-channel sediments were issued by the USEPA as listed: Chromium – 110 mg/kg; Nickel – 49 mg/kg; Zinc – 460 mg/kg; Copper – 91 mg/kg; and Lead – 83 mg/kg.
- November 10, 2010 Addendum to RDP: "The USEPA requested that Johnson Controls provide a point by point screening of in-channel sediments against the TECs/MECs/PECs for all sediments that would not be removed during Option 2…if a parameter does not have a TEC/MEC/PEC, it should be screened against the USEPA Region V, Sediment Ecological Screening Level (ESL)."
- January 29, 2010 RDP: Site-specific background values for sediment were developed in 2003 and presented in Technical Memorandum: Sediment Quality Survey, Preliminary Sediment Cleanup Criteria and Data Evaluation, and summarized in Appendix B.
    - March 22, 2012 conference call: Site-specific background (SSB) values developed include background samples collected before 2003 to ensure adequate quantity of samples for the statistical analysis. USEPA agreed with the use of pre 2003 data for background purposes only.
    - March 22, 2012 conference call: Site specific background values were used to screen in-channel sediment constituents without published screening criteria available. These include 1,2,4-Trimethylbenzene, Chloromethane, Aluminum, Barium, and Selenium.
    - March 22, 2012 conference call: Acetone, methyl ethyl ketone (MEK), Benz(a)anthracene, Benzo(a)pyrene, Chysene, Pyrene, and Fluoranthene have values above the R5 RCRA Sediment ESL, but below the site specific background, no PEC is available for these compounds.

Table 4 compares sediment data for transects that will not be removed against the sediment criteria. The following table provides leave in place rationale for highlighted compounds on Table 4.

Compound	Transects A-M	Transects N-P
Acetone	Compound is a lab contaminant, and all values are below SSB.	Compound is a lab contaminant, and all values are below SSB.
Carbon disulfide	Compound is a lab contaminant.	Compound is a lab contaminant.
Methyl ethyl ketone	All values are below the SSB, except I3[a], K1, and K3. SWAC value is below SSB.	No detections.
Acenaphthene	All values are below the MEC.	All values are below the MEC,

		except N3[1] and O2[1] which exceed the PEC value.
Acenaphthylene	No exceedences.	All values are below the MEC.
Anthracene	All values are below the MEC.	All values are below the MEC.
Benz(a)anthracene	All values are below the MEC.	All values are below the PEC.
Benzo(a)pyrene	All values are below the MEC, and below the SSB.	All values are below the MEC.
Benzo(b)floranthene	All values are below the MEC, and the EPA R5 RCRA Sediment ESL.	All values are below the EPA R5 RCRA sediment ESL.
Benzo(g,h,i)perylene	All values are below the MEC.	All values are below the MEC.
Benzo(k)fluoranthene	No exceedences.	All values are below the MEC.
Benzyl alcohol	All values are below the TEC.	All values are below the TEC.
Bis(2-Ethylhexyl)phthalate	No exceedences.	Exceedence at N1. SWAC value is below the EPA R5 RCRA Sediment ESL.
Chrysene	All values are below the MEC.	All values are below the MEC, except N3[1] and O2[1] which are below the PEC value.
Dibenz(a,h)anthracene	No exceedences.	No exceedences, except N3[1] which is below the PEC value.
Fluoranthene	All values are below the MEC.	All values are below the MEC, except N3[1] and O2[1] which exceed the PEC value.
Fluorene	No exceedences.	All values are below the MEC.
Ideno(1,2,3-cd)pyrene	No exceedences.	All values are below the MEC.
Naphtalene	No exceedences.	All values are below the MEC.
Phenanthrene	All values are below the MEC.	All values are below the MEC, except N3[1] and O2[1] which exceed the PEC value.
Pyrene	All values are below the MEC.	All values are below the MEC, except N3[1] and O2[1] which exceed the PEC value.
PCB's, Total	All values are below the MEC.	No exceedences.
Arsenic, Total	All values are below the MEC, and below the SSB.	All values are below the MEC, and below the SSB, except P3[1] which exceeds the PEC value.
Mercury, Total	All values are below the MEC.	No exceedences.
Cyanide, Free	Exceedence at L2. SWAC value is below the EPA R5 RCRA Sediment ESL.	No detections.
Cyanide, Total	All values are below the SSB, except I3[a] and L2. SWAC value is below the SSB.	No detections.
[a] Location I3 was evaluated by USEPA using mean PEC quotient calculation (see below) [1] N3, O2, and P3 were evaluated using a mean PEC quotient calculation (see below).		

Additionally, USEPA's evaluation of location I3 was discussed in their December 5 2011 letter (Appendix A). The USEPA ecologist evaluated location I3 (0-12 inches) for metal toxicity using the

mean PEC quotient calculation and obtained a mean PEC-Q for metals of 0.424 which is less than 0.5 and subsequently predicted to be non-toxic.

As part of the November 10, 2010 Addendum to RDP: CTI stated "the in-channel evaluation supports the Sediment RDP's finding that sediments north of the Grand River Avenue bridge show a different contaminant signature and have been impacted by municipal/road runoff." Per a conference call May 17, 2011 the USEPA requested that a mean PEC quotient calculation be done for locations P3, O2, and N3 to quantify the overall hazard associated with the detections at these locations. Table 5 presents a summary of the Mean PEC Quotients for these transects located north of Grand River Avenue, and tables 5(a), 5(b), and 5(c) show a breakdown of the mean PEC quotient calculations for locations P3, O2, and N3. The mean PEC quotient for these three locations was less than 0.5 indicating they are not-toxic. In the December 5, 2011 letter the EPA concurred that remediation at locations N3, O2, and P3 was not required based on mean PEC quotient results.

4.3 BANK DATA

During a meeting held in Chicago in April 2010 (prior to the November 10, 2010 Addendum to Sediment Remedial Design Plan) the USEPA requested that bank and overbank samples be excluded from consideration when making decisions regarding areas for in-channel sediment removal. Additionally, the USEPA requested that Johnson Controls provide a point by point screening of overbank samples only for terrestrial ecological screening. Bank samples were also excluded from the terrestrial screening.

Because the banks are saturated, steep, and do not provide sufficient area for terrestrial habitat, the bank analytical data was evaluated against sediment criteria in this BERA Addendum. Table 6 presents all bank data from the 2009 sampling event. A direct data comparison to criteria was performed on the bank data and individual exceedences were highlighted. Several exceedences of the ROs or PEC values were found as summarized below.

- Transect A west bank had a PEC exceedence for arsenic. Arsenic does not have an RO, and transect A is slated for in-channel sediment removal.
- Transect LD east bank had RO exceedences for chromium copper, and nickel. Transect LD is slated for in-channel sediment removal.
- Transect L west bank had RO exceedences for chromium and copper.
- Transect N east and west bank had RO exceedences for chromium, copper, and nickel. Transect N is located north of Grand River Avenue and has contribution from road/municipal runoff.
- Transect O east bank had a RO exceedence for Chromium, and O east and west bank had RO exceedences for copper. Transect O is located north of Grand River Avenue and has contribution from road/municipal runoff.

Evaluation of the laboratory analytical data from bank samples was also performed using the SWAC methodology (described in Section 4.1). Table 7 presents a summary of all the bank data evaluated using SWAC. Results are presented for three sections of in-channel stream data:

- Transects A-M: Those transects south of Grand River Avenue
- Transects N-P: Those transects north of Grand River Avenue, which includes contamination from storm water runoff from the road.
- Transects A-P: An evaluation of the entire sampled area on both sides of Grand River Avenue.

The SWAC data in Table 7 shows no RO exceedences for transects A-M. Exceedences of the EPA Region V RCRA sediment ESL's are highlighted on the table. RO exceedences are only observed in Transects N-P located north of the Grand River Avenue bridge.

Mean PEC quotient calculations were done for those sampling locations where exceedences of the ROs or PEC values were found. Table 8 presents a summary of the Bank Mean PEC Quotients. Tables 8(a-i) show a breakdown of the mean PEC quotient calculations for the individual bank sampling locations; A west bank, L west bank, LD east bank, and N, O, and P east and west banks. The overall mean PEC quotients for all locations were less than 0.5 and considered non-toxic.

Based on the above evaluation of data from bank samples remediation of the Red Cedar River's banks is not proposed.

4.4 OVERBANK DATA

Based on the documents and discussions referenced in Section 1.3 (Appendix A) a set of criteria to evaluate overbank samples were agreed upon. Table 9 provides a summary of ecological criteria considered, as well as the screening value used for each compound evaluated.

November 10, 2010 Addendum to RDP: "The USEPA requested that Johnson Controls provide a point by point screening of overbank samples, not bank samples, to the most restrictive terrestrial Eco-SSL value available. If no Eco-SSL is available for a particular constituent, then that constituent should be screened against the USEPA, Region V, Soil Ecological Screening Levels." The most restrictive terrestrial Eco-SSL was used for overbank screening, except in the following cases:

- As part of the January 29, 2010 RDP, Johnson controls proposed Michigan Statewide default soil background levels (Part 201) as a one of the screening levels for overbank soils. In the December 5, 2011 letter the USEPA concurred that cleanup below background levels was not required.
- December 5, 2011 EPA letter stated that: "Since the water table is at or close to the soil surface (within six inches), it's reasonable to conclude these soils are unlikely to support habitat for earthworms which eliminates the exposure (food web) pathway to birds and mammals (i.e. robin and shrew) that consume soil invertebrates."
    - During the March 22, 2012 conference call USEPA agreed that the saturated soil Eco-SSL would be used as the screening criteria for chromium, lead, zinc, and copper.
- December 5, 2011 EPA letter: A food web ingestion model (abbreviated BERA) was evaluated by EPA Region 5 using a sensitive receptor and a low dose not expected to result in chronic adverse effects. This lowest adverse effect level (LOAEL) of 535 mg/kg was provided for copper in soil protective of a dove
    - During the March 22, 2012 conference call USEPA agreed that the LOEL of 535 mg/kg would be used as the screening criteria for copper.

The results from all overbank sampling are presented in Table 10. The sampling results were then compared to the screening criteria, and any samples that exceeded were highlighted. Table 11 shows only those compounds that had exceedences over the screening criteria at one or more sampling locations.

For those compounds with exceedences further evaluation of the data was performed using SWAC to develop a concentration attributable a particular constituent for the overbank along portions of the stream reach and the entire stream reach. Table 12 presents a summary of the overbank SWAC concentrations

relative to the screening criteria. Three SWAC calculations were completed for overbank data as described below:

- Transects A-M: The overbank areas south of Grand River Avenue
- Transects N-P: The overbank areas north of Grand River Avenue. The impacts in this area are likely due to anthropomorphic source other than the site, including storm drain run-off and sheet flow runoff from the Grand River Avenue corridor.
- Transects A-P: An evaluation of the entire overbank area on both sides of Grand River Avenue.

For all constituents evaluated (except PCB's) the SWAC value for the river reach south of Grand River Avenue (Transects A – M) is below the selected screening criteria. The data from transects north of Grand River Avenue have higher SWAC values. The increase for overbank results downstream of Grand River Avenue is similar to that observed for the in-channel sediments (i.e., there is a different contaminant signature likely resulting from municipal/road runoff).

During the March 22, 2012 conference call it was agreed that USEPA Region 5's upper bound ecological clean up value of 600 µg/kg for PCBs would be used to evaluate locations that exceed the Region 5 RCRA soil ESL value of 0.332 µg/kg. No PCB values exceed the 600 µg/kg upper bound ecological cleanup value.

On February 2, 2012 a meeting took place with Johnson Controls, the USEPA, and the Michigan Department of Environmental Quality (MDEQ). The MDEQ requested that overbank data be evaluated against Michigan Part 201 background and exposure pathway criteria. Table 13 shows the overbank data evaluated against the Part 201 criteria, with exceedences highlighted.

The overbank analytical results were compared with Part 201 generic residential soil direct contact criteria (RSDC) to determine potential risk due to human direct contact with soils. The only compound that exceeds RSDC is arsenic.

Arsenic, Chromium, Copper, Lead, Mercury, Selenium, Zinc, and total Cyanide exceeded the Groundwater Surface Water Interface Criteria. Nickel, Arsenic, and Aluminum exceeded the Drinking Water Criteria; however the Red Cedar River is not used as a potable water source.

Table 14 shows the overbank SWAC data evaluated against the Part 201 criteria. Based on the SWAC data only Copper and Selenium exceeded the groundwater surface water interface criteria, and Arsenic exceeds RSDC for transects A-M.

In a letter from the MDEQ dated March 8, 2012 (Appendix A), the MDEQ stated that it concurs with the assessments and conclusions of the USEPA addressed in the December 5, 2011 letter.

5.0 CONCLUSIONS

5.1 IN CHANNEL DATA

Johnson Controls, Inc. plans to dredge impacted sediments from the Red Cedar River, with the proposed dredging areas shown Figure 10. The proposed dredging effort will remove all RO exceedences from the River. The BERA evaluation presented above focused on comparison of those in-channel sediments to remain in place (and not be dredged) with conservative ecological screening criteria. The data from areas to remain in place were evaluated using direct criteria comparison, SWAC analyses, and Mean PEC Quotient calculations.

Based on the evaluation completed, the following conclusions were reached:

- Areas designated to remain in place south of the Grand River Avenue bridge do not pose an unacceptable risk to ecological receptors;
- Transects N, O, and P, located north of the Grand River Avenue bridge, do not pose an unacceptable risk to ecological receptors; and

Data evaluation for sediments located at Transects N, O, and P, north of the Grand River Avenue bridge, have a significantly different contaminant signature that is not attributable to the Former Stanley Tools site.

5.2 BANK DATA

Samples for laboratory analysis were collected from both banks of the Red Cedar River throughout the study area as shown on Figures 3 through 6. During collaboration with the USEPA, it was agreed that the bank sample results would be compared to sediment criteria in this BERA Addendum. The bank sample data were evaluated using direct criteria comparison, SWAC analyses, and Mean PEC Quotient calculations.

Based on the evaluation performed, bank sediments are considered non-toxic and no removal of the bank sediments is proposed.

5.3 OVERBANK DATA

Samples for laboratory analysis were collected from several overbank locations adjacent to the Red Cedar River as shown on Figures 3 through 6. During collaboration with the USEPA, it was agreed that the overbank sample results would be compared to the "most restrictive" terrestrial Eco-SSL. Following comparison to the "most restrictive" screening criteria, selected terrestrial criteria were evaluated on an individual basis for applicability to conditions present at the site. This 2nd evaluation resulted in a set of criteria (see Table 9) that were used for final evaluation of the overbank data relative to terrestrial screening criteria. The overbank sample data were evaluated using direct criteria comparison and SWAC analyses.

Based on the evaluation performed, and as documented in the USEPA's December 5 2012 letter, no removal of the overbank is required.

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RCRA CORRECTIVE ACTION FOR JOHNSON CONTROLS, INC
FORMER STANLEY TOLLS SITE, FOLWERVILLE, MI
MEETING OF FEBRUARY 20, 2003 ATTENDANCE SHEET

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MEETING AGENDA
FORMER STANLEY TOOLS FACILITY
RCRA CORRECTIVE ACTION
FOWLERVILLE, MI
FEBRUARY 20, 2003

Introductions
- Site History
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  - Specific Data Gap and Interim Measure Work Plans
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U.S. Environmental Protection Agency (U.S. EPA). 1997. *Representative Sampling Guidance Document, Volume 3: Ecological, Draft.* Edison, NJ: Environmental Response Team, Office of Emergency and Remedial Response.

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* Community Outreach - repository of data and information

RCRA CORRECTIVE ACTION FOR JOHNSON CONTROLS, INC
FORMER STANLEY TOLLS SITE, FOLWERVILLE, MI
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MI/DNR/SWQ-92-201

Michigan Department of Natural Resources
Surface Water Quality Division
January, 1992

Staff Report

A Biological Survey of the Red Cedar River, Livingston and Ingham Counties, Michigan June 24-28, 1991.

A biological survey was conducted on the Red Cedar River during June 24-28, 1991, by staff from the Great Lakes and Environmental Assessment Section. The objective of this survey was to document the effects on the biological, physical, and chemical parameters of land use practices, non point source discharges, and urban impacts to the river. In addition, sampling was done to assess the river's recovery from discharges from the old Hoover Ball and Bearing plant in Fowlerville as compared to past reports by Jackson (1971) and Saalfeld (1978). The Red Cedar River ranges from a first order stream at its headwaters in southern Livingston County to a fourth order river at its confluence with the Grand River in northeastern Ingham County. The watershed flows predominantly through agricultural and woodlands and bisects five urban areas including Fowlerville, Williamston, Okemos, East Lansing and Lansing. The entire watershed lies in the Southern Michigan Northern Indiana Till Plain Ecoregion.

Summary

1) Eighteen stations were sampled on the Red Cedar River and its tributaries, from the headwaters (Cedar Lake) in Livingston County to East Lansing, near the confluence with the Grand River (Ingham County). Figure 1 shows the approximate locations of all sampling sites. The tributaries sampled included two in Livingston County (the Middle Branch and the West Branch of the Red Cedar River) and four in Ingham County (Kalamink Creek, Wolf Creek, Squaw Creek, and Doan Creek). Sycamore Creek a major tributary in Ingham County, was not sampled due to recent extensive work (Clark 1989). Fish and macroinvertebrate populations were sampled and habitat assessed at all stations (Tables 1-18). Sediment and water chemistry samples were taken at selected sites (Tables 19 and 20).

2) The upstream sites (stations 1-4) included three sites on the main branch of the river and one on the Middle Branch, Red Cedar River. These sites ranged from poor to fair for macroinvertebrate communities. The habitat was poor at 3 out of 4 sites. Although fish populations were rated as good, limited diversity was apparent. Heavy silt loads from intense agricultural activities were the leading factors of degradation. Station 4 on the Middle Branch, was the worst location sampled with 2-4' of muck across the

entire stream.

3) Sampling stations 5-10 were evaluated to determine continuing impacts from the defunct Hoover Ball and Bearing plant in Fowlerville. Some initial improvements immediately downstream of the plant (station 6) were observed. The 1991 survey showed 19 taxa of macroinvertebrates and 9 fish taxa. Jackson (1971) found 10 macroinvertebrate taxa and Saalfeld (1979) found 17 macroinvertebrate taxa and 2 fish taxa. Further downstream at stations 7 and 8, the number of macroinvertebrate taxa were reduced and habitat was fair. Station 9 on the West Branch, Red Cedar River, showed good fish community diversity but was rated only fair for macroinvertebrates and the habitat, which was heavily impacted with silt, was poor. Downstream of Webberville at station 10, the river showed improvement with fish and macroinvertebrate taxa increasing. Habitat was greatly improved from fair to excellent. The stations downstream from Fowlerville that showed decreased macroinvertebrate diversity are most likely a result of continued downstream flushing of contaminated sediments. Improvements in fish communities downstream may be partially due to migration from degraded upstream sites. Ongoing cleanup at the Hoover site may also be periodically introducing contaminants to the river.

4) Four tributaries (stations 11-14) upstream of Williamston were sampled during the survey. Kalamink Creek (station 11) and Squaw Creek (station 13) were rated good. Both contained good numbers of macroinvertebrates and fish. Station 12 on Wolf Creek was poor, due to local farming practices. Excessive growths of filamentous algae, visible floating animal waste and an obvious lack of macroinvertebrates and fish indicated severe degradation. Doan Creek (station 14) was rated fair due to sediment loads and lack of habitat which reduced fish and macroinvertebrate numbers.

5) The downstream four sites were done in close proximity to urban areas. The Red Cedar River becomes a fourth order stream near station 15. The backwaters of the Williamston Dam (station 15) were pond like and supported more lacustrine species of macroinvertebrates and fish. The habitat was rated as poor with turbidity, little flow and increased water temperatures. Station 16 was approximately one quarter mile downstream of the Williamston WWTP, where excellent habitat produced good population numbers and diversity of fish and macroinvertebrates. The Okemos site (station 17) was moderately degraded, mainly from sand and some turbidity, but good stream depth and habitat produced a good diversity in macroinvertebrates and fish communities. The final sampling site (station 18) was just downstream of East Lansing. Areas of heavy sedimentation and urban debris were common. In addition high flow fluctuations and many combined sewer overflows were contributing to degraded conditions. Low numbers of fish and macroinvertebrate communities reflected the lack of habitat.

6) These survey results showed the Red Cedar River watershed varies in quality from poor to good. The main problems appear to be siltation in the upper reaches, past contamination from the

Hoover plant in Fowlerville, and localized impacts on some of the tributaries. The causes appear to be poor land use practices, channelization resulting in flow fluctuations, and urbanization in the form of debris and combined sewer overflows. Overall ratings for the Red Cedar River (Table 21) found fish communities were uniformly good, macroinvertebrates were fair, with more varied results, and habitat was mainly poor but varied greatly depending upon location.

7) Sediment sampling results indicated elevated levels of chromium, copper, lead, and zinc downstream of the Hoover plant (Table 19). Duplicate samples revealed extreme variability in sediment levels for these four parameters. Four sites (stations 10, 15-17) had additional sediment analyses done for Scan 3 parameters including polychlorinated biphenyls (PCB). The four stations showed elevated levels of several base neutrals, but no detectable levels of PCBs were observed at any of the locations.

8) Water samples were collected at all stations on the Red Cedar River. Results are given in Table 20. Elevated levels of ammonia (1.5 mg/l) were observed at one location, station 12, on Wolf Creek. Phosphorus was elevated (>0.1 mg/l) at seven of the eighteen stations. Wolf Creek again showed the highest level at 0.31 mg P/l. All other parameters tested including metals, were at detectable levels not exceeding Water Quality Standards.

Literature Cited

Jackson, G. 1971. Report on the Biological Conditions of the Red Cedar River as Affected by the Discharges from the Hoover Ball and Bearing Company, Utilex Division, Fowlerville, Michigan. MI DNR SWQ-01820.

Saalfeld, G. 1978. Biological Investigation of the Red Cedar River in the Vicinity of the Hoover, Universal-Utilix Division, Fowlerville, Michigan, Livingston County. MI DNR SWQ-03350.

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MDNR 1981. Quality Assurance for Water and Sediment Sampling. Environmental Protection Bureau, Lansing, Michigan. Publication #3730-0028.

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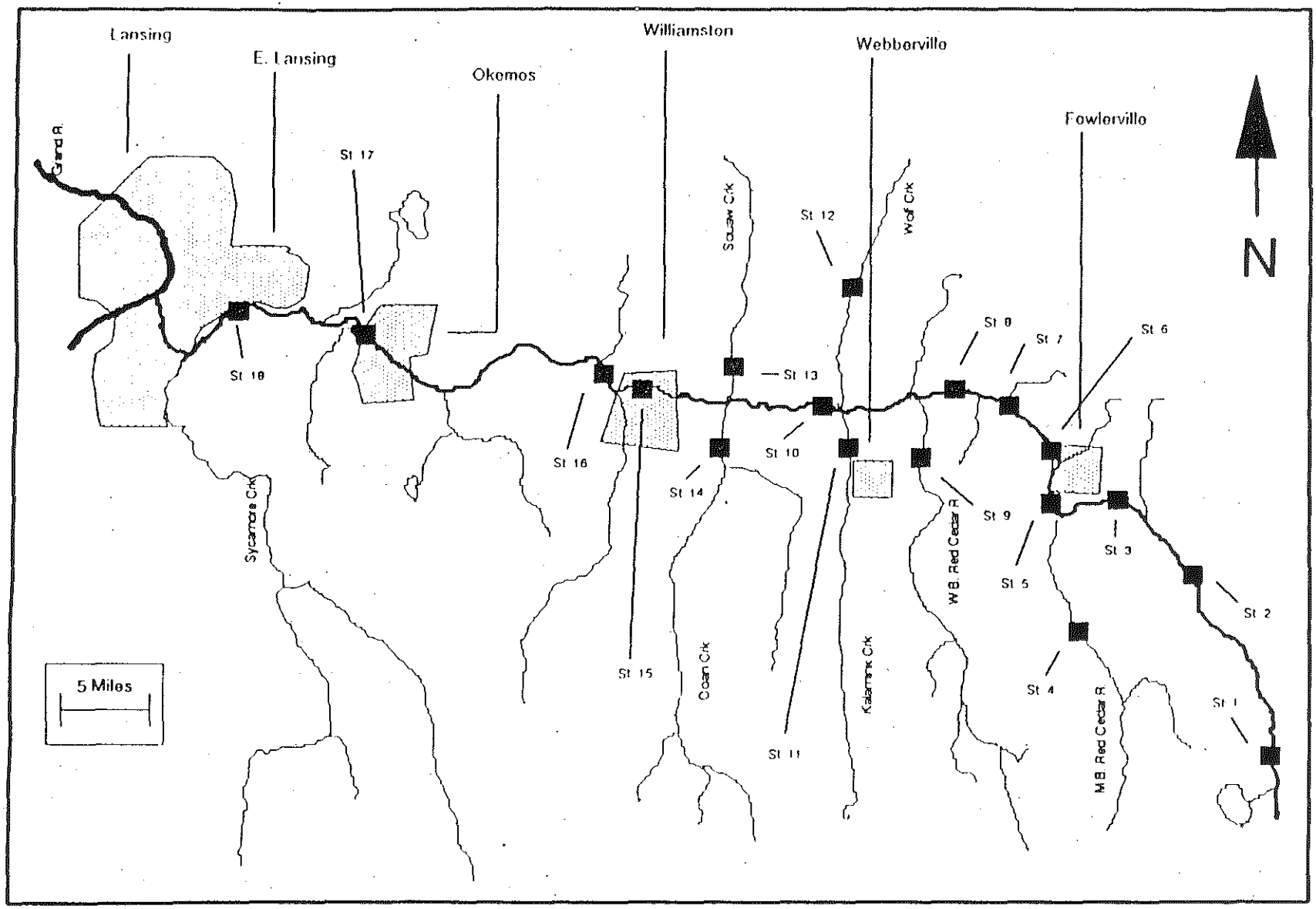

Figure 1. Sampling locations on the Red Cedar River, June 24-28, 1991.

Table 1A. Qualitative macroinvertebrate sampling results for Red Cedar River (1st Order), June 24-26, 1991.

TAXA	STATION 1	STATION 2	STATION 11	ST. 12
PLATYHELMINTHES (flatworms)			1	
ANNELIDA (segmented worms)				
Oligochaeta (worms)			1	12
Hirudinea (leeches)	1	1	2	10
ARTHROPODA				
Amphipoda (scuds)	30	25	15	
Decapoda (crayfish)	1	3	5	
Insecta				
Ephemeroptera (mayflies)				
Baetidae		1		
Heptageniidae			5	
Odonata				
Calopterygidae		1		
Lestidae			1	
Coenagrionidae			1	
Aeshnidae		2	2	
Libellulidae		1		
Hemiptera (true bugs)				
Belostomatidae				
Belastoma	2			
Nepidae	1			
Corixidae	20		5	1
Notonectidae	5			
Gerridae	5	4	2	
Hydropsychidae		1	5	
Macronema			1	
Hydroptilidae		5		
Limnephilidae	1	8	2	
Leptoceridae		1		
Coleoptera (beetles)				
Gyrinidae (adults)				1
Haliplidae (adults)	5		5	
Dytiscidae (total)	7			
Hydrophilidae (total)	3	4		
Psephenidae (adults)			1	
Elmidae		1	5	
Diptera (flies)				
Tipulidae			1	
Simulidae		10	1	3
Ceratopogonidae			1	
Chironomidae	8			20
Rheotanytarsus		8	3	
Syrphidae		1		1
MOLLUSCA				
Gastropoda (snails)				
Physa			20	15
Pelecypoda (clams)				
Pisidium	1	1	10	
TOTAL INDIVIDUALS	90	78	95	63

Table 1B. Macroinvertebrate metric evaluation of Red Cedar River (1st Order), June 24-26, 1991.

METRIC	STATION 1 Value	STATION 1 Score	STATION 2 Value	STATION 2 Score	STATION 11 Value	STATION 11 Score	STATION 12 Value	STATION 12 Score
TOTAL NUMBER OF TAXA	14	2	20.0	4	23.0	4	8.0	0
NUMBER OF MAYFLY TAXA	0	0	2.0	4	1.0	2	0.0	0
NUMBER OF CADDISFLY TAXA	1	0	4	4	3	4	0	0
NUMBER OF STONEFLY TAXA	0	0	0	0	0	0	0	0
PERCENT MAYFLY COMP.	0.0	0	1.3	0	5.3	0	0.0	0
PERCENT CADDISFLY COMP.	1.1	0	19.2	2	8.4	0	0.0	0
PERCENT CONTR. DOM. TAXON	33.3	2	32.1	2	21.1	4	31.7	2
PERCENT ISOPOD, SNAIL, LEECH	1.1	4	1.3	4	23.2	0	39.7	0
PERCENT SURFACE AIR BREATHERS	53.3	0	11.5	4	13.7	4	4.8	6
TOTAL SCORE		8		24		18		8
MACROINVERTEBRATE COMMUNITY CATEGORY	POOR (SEVERELY IMPAIRED)		FAIR (MODERATELY IMPAIRED)		FAIR (MODERATELY IMPAIRED)		POOR (SEVERELY IMPAIRED)	

Table 2A. Qualitative macroinvertebrate sampling results for Red Cedar River (1st Order), June 26, 1991.

TAXA	STATION 13
ANNELIDA (segmented worms)	
Oligochaeta (worms)	1
Hirudinea (leeches)	2
ARTHROPODA	
Amphipoda (scuds)	60
Decapoda (crayfish)	2
Arachnoidea	
Insecta	
Ephemeroptera (mayflies)	
Baetiscidae	1
Odonata	
Coenagrionidae	2
Aeshnidae	1
Plecoptera (stoneflies)	
Hemiptera (true bugs)	
Belostomatidae	
Corixidae	3
Gerridae	3
Megaloptera	
Neuroptera (spongilla flies)	
Trichoptera (caddisflies)	
Hydropsychidae	6
Limnephilidae	2
Lepidoptera (moths)	
Coleoptera (beetles)	
Elmidae	1
Diptera (flies)	
Ceratopogonidae	1
Chironomidae	10
MOLLUSCA	
Gastropoda (snails)	
Pelecypoda (clams)	
TOTAL INDIVIDUALS	95

Table 2B. Macroinvertebrate metric evaluation of Red Cedar River (1st Order), June 26, 1991.

METRIC	STATION 13 Value	Score
TOTAL NUMBER OF TAXA	14	2
NUMBER OF MAYFLY TAXA	1	2
NUMBER OF CADDISFLY TAXA	2	2
NUMBER OF STONEFLY TAXA	0	0
PERCENT MAYFLY COMP.	1.1	0
PERCENT CADDISFLY COMP.	8.4	0
PERCENT CONTR. DOM. TAXON	63.2	0
PERCENT ISOPOD, SNAIL, LEECH	2.1	4
PERCENT SURFACE AIR BREATHERS	6.3	4
TOTAL SCORE		14

MACROINVERTEBRATE COMMUNITY CATEGORY FAIR (MODERATELY IMPAIRED)

Table 3A. Qualitative macroinvertebrate sampling results for Red Cedar River (2nd Order), June 24-27, 1991.

TAXA	STATION 3	STATION 4	STATION 14
ANNELIDA (segmented worms)			
Hirudinea (leeches)	1		
ARTHROPODA			
Isopoda (sowbugs)	1		50
Amphipoda (scuds)	20	20	
Decapoda (crayfish)	1	4	15
Arachnoidea			
Insecta			
Ephemeroptera (mayflies)			
Heptageniidae	1		
Odonata			
Calopterygidae	1	4	
Lestidae	3	7	
Coenagrionidae	1		
Aeshnidae	1		
Plecoptera (stoneflies)			
Hemiptera (true bugs)			
Belostomatidae			
Belastoma	1		
Corixidae		3	
Notonectidae	1		1
Gerridae	3	3	10
Megaloptera			
Sialis sp.		2	1
Neuroptera (spongilla flies)			
Trichoptera (caddisflies)			
Hydropsychidae			6
Limnephilidae	5	2	10
Leptoceridae		1	3
Lepidoptera (moths)			
Coleoptera (beetles)			
Gyrinidae (adults)	2		
Haliplidae (adults)		3	
Dytiscidae (total)	3		
Noteridae (adults)		13	
Chrysomelidae (adults)		5	
Elmidae	15	3	
Diptera (flies)			
Simulidae		2	15
Ceratopogonidae			12
Chironomidae	5	2	
Rheotanytarsus	10		
MOLLUSCA			
Gastropoda (snails)			
Helisoma			5
Physa	5		
Pelecypoda (clams)			
Pisidium			2
TOTAL INDIVIDUALS	80	74	130

Table 3B. Macroinvertebrate metric evaluation of Red Cedar River (2nd Order), June 24-27, 1991.

METRIC	STATION 3 Value	STATION 3 Score	STATION 4 Value	STATION 4 Score	STATION 14 Value	STATION 14 Score
TOTAL NUMBER OF TAXA	19	4	15.0	4	12.0	2
NUMBER OF MAYFLY TAXA	1	0	0.0	0	0.0	0
NUMBER OF CADDISFLY TAXA	1	0	2	2	3	4
NUMBER OF STONEFLY TAXA	0	0	0	0	0	0
PERCENT MAYFLY COMP.	1.3	0	0.0	0	0.0	0
PERCENT CADDISFLY COMP.	6.3	0	4.1	0	14.6	0
PERCENT CONTR. DOM. TAXON	25.0	4	27.0	4	38.5	2
PERCENT ISOPOD, SNAIL, LEECH	8.8	0	0.0	6	42.3	0
PERCENT SURFACE AIR BREATHERS	12.5	4	36.5	2	8.5	4
TOTAL SCORE		12		18		12
MACROINVERTEBRATE COMMUNITY CATEGORY	FAIR (MODERATELY IMPAIRED)		FAIR (MODERATELY IMPAIRED)		FAIR (MODERATELY IMPAIRED)	

Table 4A. Qualitative macroinvertebrate sampling results for Red Cedar River (3rd Order), June 25-26, 1991.

TAXA	STATION 5	STATION 6	STATION 7	STATION 8
PORIFERA (sponges)	1			
PLATYHELMINTHES (flatworms)	1	2		
ANNELIDA (segmented worms)				
Hirudinea (leeches)		2	3	
ARTHROPODA				
Amphipoda (scuds)	13	3	30	30
Decapoda (crayfish)	2	6		3
Insecta				
Ephemeroptera (mayflies)				
Heptageniidae	8	7	3	
Odonata				
Calopterygidae	6	5	3	
Lestidae	2		5	1
Aeshnidae		1		
Hemiptera (true bugs)				
Belostomatidae				
Belastoma	2	6	2	1
Nepidae	3		1	
Corixidae	20		7	1
Notonectidae				1
Gerridae	1	3	4	3
Megaloptera				
Sialis sp.	2	1	1	
Hydropsychidae	4	6		1
Limnephilidae		5	3	
Coleoptera (beetles)				
Gyrinidae (adults)	1	5	1	
Haliplidae (adults)	1	2		1
Dytiscidae (total)	15	1	2	4
Elmidae	23	5	4	13
Chironomidae	3	3		1
Rheotanytarsus	2			
Tabanidae	1			
MOLLUSCA				
Gastropoda (snails)				
Limnea		7		
Physa		3		5
Pelecypoda (clams)				
TOTAL INDIVIDUALS	111	73	69	65

Table 4B. Macroinvertebrate metric evaluation of Red Cedar River (3rd Order), June 25-26, 1991.

METRIC	STATION 5 Value	STATION 5 Score	STATION 6 Value	STATION 6 Score	STATION 7 Value	STATION 7 Score	STATION 8 Value	STATION 8 Score
TOTAL NUMBER OF TAXA	21	6	19.0	6	14.0	4	13.0	4
NUMBER OF MAYFLY TAXA	1	2	1.0	2	1.0	2	0.0	0
NUMBER OF CADDISFLY TAXA	1	2	2	4	1	2	1	2
NUMBER OF STONEFLY TAXA	0	0	0	0	0	0	0	0
PERCENT MAYFLY COMP.	7.2	0	9.6	0	4.3	0	0.0	0
PERCENT CADDISFLY COMP.	3.6	0	15.1	6	4.3	0	1.5	0
PERCENT CONTR. DOM. TAXON	20.7	4	9.6	6	43.5	0	46.2	0
PERCENT ISOPOD, SNAIL, LEECH	0.0	6	16.4	0	4.3	2	7.7	0
PERCENT SURFACE AIR BREATHERS	38.7	2	23.3	2	24.6	2	16.9	4
TOTAL SCORE		22		26		12		10
MACROINVERTEBRATE COMMUNITY CATEGORY		FAIR (MODERATELY IMPAIRED)		FAIR (MODERATELY IMPAIRED)		FAIR (MODERATELY IMPAIRED)		FAIR (MODERATELY IMPAIRED)

Table 5A. Qualitative macroinvertebrate sampling results for Red Cedar River (3rd Order), June 26, 1991.

TAXA	STATION 9
ANNELIDA (segmented worms)	
Oligochaeta (worms)	3
Hirudinea (leeches)	2
ARTHROPODA	
Amphipoda (scuds)	40
Decapoda (crayfish)	4
Insecta	
Ephemeroptera (mayflies)	
Heptageniidae	7
Ephemeridae	2
Odonata	
Lestidae	1
Coenagrionidae	2
Hemiptera (true bugs)	
Belostomatidae	
Corixidae	2
Gerridae	2
Megaloptera	
Sialis sp.	8
Coleoptera (beetles)	
Gyrinidae (adults)	1
Dytiscidae (total)	3
Elmidae	3
Diptera (flies)	
Ceratopogonidae	2
TOTAL INDIVIDUALS	87

Table 5B. Macroinvertebrate metric evaluation of Red Cedar River (3rd Order), June 26, 1991.

METRIC	STATION 9 Value	Score
TOTAL NUMBER OF TAXA	16	4
NUMBER OF MAYFLY TAXA	2	4
NUMBER OF CADDISFLY TAXA	0	0
NUMBER OF STONEFLY TAXA	0	0
PERCENT MAYFLY COMP.	10.3	0
PERCENT CADDISFLY COMP.	0.0	0
PERCENT CONTR. DOM. TAXON	46.0	0
PERCENT ISOPOD, SNAIL, LEECH	2.3	4
PERCENT SURFACE AIR BREATHERS	9.2	4
TOTAL SCORE		16
MACROINVERTEBRATE COMMUNITY CATEGORY		FAIR (MODERATELY IMPAIRED)

Table 6A. Qualitative macroinvertebrate sampling results for Red Cedar River (4th Order), June 26-28, 1991.

TAXA	STATION 10	STATION 15	STATION 16	ST. 17
PLATYHELMINTHES (flatworms)	1	6		
ANNELIDA (segmented worms)				
Hirudinea (leeches)		2	2	
ARTHROPODA				
Isopoda (sowbugs)				10
Amphipoda (scuds)	12	17	12	15
Decapoda (crayfish)	2		15	5
Insecta				
Ephemeroptera (mayflies)				
Siphlonuridae				8
Baetidae	3		3	2
Heptageniidae	6		7	10
Ephemerellidae				1
Caenidae				1
Ephemeridae		4	8	1
Odonata				
Calopterygidae	1			1
Lestidae	1	4	1	
Coenagrionidae	1			
Plecoptera (stoneflies)				
Perlodidae		1	1	
Hemiptera (true bugs)				
Belostomatidae				
Belastoma	1	1		
Nepidae		1		
Corixidae	10	4	1	
Gerridae	1	2	3	5
Mesoveliidae			15	
Megaloptera				
Sialis sp.			5	1
Trichoptera (caddisflies)				
Philopotamidae	2			
Polycentropodidae			7	
Hydropsychidae	11	4	10	15
Limnephilidae	5		32	5
Helicopsychidae				3
Coleoptera (beetles)				
Gyrinidae (adults)	3	2		
Haliplidae (adults)		3		
Dytiscidae (total)		3		
Hydrophilidae (total)		4		
Psephenidae (adults)				2
Dryopidae			1	
Elmidae	5	3		20
Diptera (flies)				
Simulidae	15		3	
Ceratopogonidae	1			
MOLLUSCA				
Gastropoda (snails)				
Campeloma			2	
Physa	1	3	6	1
Pelecypoda (clams)				
Pisidium				3
TOTAL INDIVIDUALS	82	65	134	112

Table 6B. Macroinvertebrate metric evaluation of Red Cedar River (4th Order), June 26-28, 1991.

METRIC	STATION 10 Value	STATION 10 Score	STATION 15 Value	STATION 15 Score	STATION 16 Value	STATION 16 Score	STATION 17 Value	STATION 17 Score
TOTAL NUMBER OF TAXA	19	6	18.0	6	21.0	6	20.0	6
NUMBER OF MAYFLY TAXA	2	4	1.0	2	3.0	6	6.0	6
NUMBER OF CADDISFLY TAXA	3	4	1	0	3	4	3	4
NUMBER OF STONEFLY TAXA	0	0	1	6	1	6	0	0
PERCENT MAYFLY COMP.	11.0	0	6.2	0	11.4	0	20.5	4
PERCENT CADDISFLY COMP.	22.0	0	6.2	0	31.0	2	20.5	0
PERCENT CONTR. DOM. TAXON	18.3	6	26.2	4	20.3	4	17.9	6
PERCENT ISOPOD, SNAIL, LEECH	1.2	4	7.7	0	6.3	0	9.8	0
PERCENT SURFACE AIR BREATHERS	18.3	4	30.8	2	12.0	4	6.3	4
TOTAL SCORE		28		20		32		30
MACROINVERTEBRATE COMMUNITY CATEGORY	FAIR (MODERATELY IMPAIRED)		FAIR (MODERATELY IMPAIRED)		GOOD (SLIGHTLY IMPAIRED)		GOOD (SLIGHTLY IMPAIRED)	

Table 7A. Qualitative macroinvertebrate sampling results for Red Cedar River (4th Order), June 28, 1991.

TAXA	STATION 18
BRYOZOA (moss worms)	1
ARTHROPODA	
Isopoda (sowbugs)	8
Amphipoda (scuds)	5
Decapoda (crayfish)	11
Insecta	
Ephemeroptera (mayflies)	
Baetidae	3
Heptageniidae	9
Ephemerellidae	1
Hemiptera (true bugs)	
Belostomatidae	
Corixidae	3
Gerridae	3
Hydropsychidae	3
Limnephilidae	16
Helicopsychidae	1
Leptoceridae	1
Coleoptera (beetles)	
Gyrinidae (adults)	10
Elmidae	3
Chironomidae	10
Rheotanytarsus	20
Pelecypoda (clams)	
Sphaerium	1
TOTAL INDIVIDUALS	109

Table 7B. Macroinvertebrate metric evaluation of Red Cedar River (4th Order), June 28, 1991.

METRIC	STATION 18 Value	Score
TOTAL NUMBER OF TAXA	18	6
NUMBER OF MAYFLY TAXA	3	6
NUMBER OF CADDISFLY TAXA	4	6
NUMBER OF STONEFLY TAXA	0	0
PERCENT MAYFLY COMP.	11.9	0
PERCENT CADDISFLY COMP.	19.3	0
PERCENT CONTR. DOM. TAXON	18.3	6
PERCENT ISOPOD, SNAIL, LEECH	7.3	0
PERCENT SURFACE AIR BREATHERS	14.7	4
TOTAL SCORE		28
MACROINVERTEBRATE COMMUNITY CATEGORY	FAIR (MODERATELY IMPAIRED)	

Table 8A. Qualitative fish sampling results for Red Cedar River (1st Order), June 24, 1991.

TAXA	STATION 1	STATION 2	STATION 11	ST. 12
Umbridae (Mudminnows)				
Umbra limi (Central mudminnow)	14	1	3	15
Esocidae (Pikes)				
Esox americanus ver. (Grass Pike)	7			
E. niger (Chain pickerel)			1	
Cyprinidae (Minnows and Carps)				
Semotilus atromaculatus (Creek)		14		
N. cornutus (Common shiner)	8		13	
N. heterolepis (Blacknose shiner)	1			
P. notatus (Bluntnose minnow)		3	2	
Catostomidae (Suckers)				
Catostomus commersoni (W. sucker)		7	17	8
Ictaluridae (Bullhead, Catfish)				
Ictalurus melas (Black bullhead)			1	
Gasterosteidae (Sticklebacks)				
Culaea inconstans (Brook)				5
Centrarchidae (Sunfish)				
Ambloplites rupestris (Rock bass)			1	
Lepomis cyanellus (Green sunfish)	7		7	1
L. macrochirus (Bluegill)	7	1	14	2
P. nigromaculatus (Black crappie)			1	
Lepomis megalotus (Longear s.)			2	
Micropterus salmoides (Lm. bass)	1		5	
Percidae (Perches)				
E. nigrum (Johnny darter)	4	10	36	
Percina maculata (Blackside dar.)		3		
TOTAL INDIVIDUALS	49	39	103	31
NUMBER OF ANOMALIES	0	0	0	0
SQUARE FOOT SAMPLED	2625	2200	1620	1980
DENSITY OF INDIVIDUALS (#/SF)	0.019	0.018	0.064	0.016

Table 8B. Fish metric evaluation of Red Cedar River (1st Order), June 24, 1991.

METRIC	STATION 1 Value	STATION 1 Score	STATION 2 Value	STATION 2 Score	STATION 11 Value	STATION 11 Score	STATION 12 Value	STATION 12 Score
TOTAL NUMBER OF TAXA	8	3	7	3	15	5	5	3
NUMBER OF DARTER SPECIES	1	3	2	5	1	3	0	1
NUMBER OF SUNFISH SPECIES	2	3	1	3	6	5	2	3
NUMBER OF SUCKER SPECIES	0	1	1	3	1	3	1	3
PERCENT CARP, G.SUNFISH, W.SUCKER	14.3	3	17.9	3	23.3	3	29.0	1
PERCENT OMNIVORES	0.0	5	25.6	3	18.4	5	25.8	3
PERCENT INSECTIVO. CYPRINIDS	18.4	1	0.0	1	12.6	1	0.0	1
PERCENT PISCIVORES	16.3	5	0.0	1	6.8	5	0.0	1
DENSITY OF INDIVIDUALS	0.019	3	0.018	3	0.064	5	0.016	3
PERCENT ANOMALIES	0.0	5	0.0	5	0.0	5	0.0	5
TOTAL SCORE		32		30		40		24
FISH COMMUNITY CATEGORY		GOOD (SLIGHTLY IMPAIRED)		GOOD (SLIGHTLY IMPAIRED)		GOOD (SLIGHTLY IMPAIRED)		FAIR (MODERATELY IMPAIRED)

Table 9A. Qualitative fish sampling results for Red Cedar River (1st Order), June 26, 1991.

TAXA	STATION 13
Umbridae (Mudminnows)	
Umbra limi (Central mudminnow)	11
Esocidae (Pikes)	
E. lucius (Northern Pike)	1
Cyprinidae (Minnows and Carps)	
P. notatus (Bluntnose minnow)	2
Rhinichthys atratulus (Blacknose)	2
Catostomidae (Suckers)	
Catostomus commersoni (W. sucker)	5
Gasterosteidae (Sticklebacks)	
Culaea inconstans (Brook)	5
Centrarchidae (Sunfish)	
Lepomis cyanellus (Green sunfish)	6
L. macrochirus (Bluegill)	1
Micropterus salmoides (Lm. bass)	1
Percidae (Perches)	
E. nigrum (Johnny darter)	45
TOTAL INDIVIDUALS	79
NUMBER OF ANOMALIES	0
SQUARE FOOT SAMPLED	1400
DENSITY OF INDIVIDUALS (#/SF)	0.056

Table 9B. Fish metric evaluation of Red Cedar River (1st Order), June 26, 1991.

METRIC	STATION 13 Value	Score
TOTAL NUMBER OF TAXA	10	3
NUMBER OF DARTER SPECIES	1	3
NUMBER OF SUNFISH SPECIES	2	3
NUMBER OF SUCKER SPECIES	1	3
PERCENT CARP, G.SUNFISH, W.SUCKER	13.9	3
PERCENT OMNIVORES	8.9	5
PERCENT INSECTIVO. CYPRINIDS	0.0	1
PERCENT PISCIVORES	2.5	3
DENSITY OF INDIVIDUALS	0.056	5
PERCENT ANOMALIES	0.0	5
TOTAL SCORE		34
FISH COMMUNITY CATEGORY	GOOD (SLIGHTLY IMPAIRED)	

Table 10A. Qualitative fish sampling results for Red Cedar River (2nd Order), June 24, 1991.

TAXA	STATION 3	STATION 4	STATION 14
Umbridae (Mudminnows)			
Umbra limi (Central mudminnow)	45	41	
Esocidae (Pikes)			
E. lucius (Northern Pike)	3		
Cyprinidae (Minnows and Carps)			
N. cornutus (Common shiner)	2		1
P. notatus (Bluntnose minnow)		3	13
Catostomidae (Suckers)			
Catostomus commersoni (W. sucker)	5	1	3
Minytrema melanops (Spot. sucker)	1	1	
Ictaluridae (Bullhead, Catfish)			
N. gyrinus (Tadpole madtom)	2		
Gasterosteidae (Sticklebacks)			
Culaea inconstans (Brook)	1		
Centrarchidae (Sunfish)			
Ambloplites rupestris (Rock bass)	3	1	
Lepomis cyanellus (Green sunfish)		10	1
Percidae (Perches)			
E. nigrum (Johnny darter)	25	1	25
Percina maculata (Blackside dar.)	7		10
TOTAL INDIVIDUALS	94	58	53
NUMBER OF ANOMALIES	0	0	0
SQUARE FOOT SAMPLED	3600	1200	8000
DENSITY OF INDIVIDUALS (#/SF)	0.026	0.048	0.007

Table 10B. Fish metric evaluation of Red Cedar River (2nd Order), June 27, 1991.

METRIC	STATION 3 Value	STATION 3 Score	STATION 4 Value	STATION 4 Score	STATION 14 Value	STATION 14 Score
TOTAL NUMBER OF TAXA	10	3	7	3	6	1
NUMBER OF DARTER SPECIES	2	3	1	1	2	3
NUMBER OF SUNFISH SPECIES	1	1	2	3	1	1
NUMBER OF SUCKER SPECIES	2	5	2	5	1	3
PERCENT CARP, G.SUNFISH, W.SUCKER	5.3	5	19.0	3	7.5	5
PERCENT OMNIVORES	6.4	5	8.6	5	30.2	3
PERCENT INSECTIVO. CYPRINIDS	2.1	1	0.0	1	1.9	1
PERCENT PISCIVORES	6.4	5	1.7	3	0.0	1
DENSITY OF INDIVIDUALS	0.026	5	0.048	5	0.007	3
PERCENT ANOMALIES	0.0	5	0.0	5	0.0	5
TOTAL SCORE		38		34		26
FISH COMMUNITY CATEGORY		GOOD (SLIGHTLY IMPAIRED)		GOOD (SLIGHTLY IMPAIRED)		FAIR (MODERATELY IMPAIRED)

Table 11A. Qualitative fish sampling results for Red Cedar River (3rd Order), June 25, 1991.

TAXA	STATION 5	STATION 6	STATION 7	STATION 8
Umbridae (Mudminnows)				
Umbra limi (Central mudminnow)	15	4	8	3
Esocidae (Pikes)				
E. lucius (Northern Pike)	2	1	1	
Cyprinidae (Minnows and Carps)				
Cyprinus carpio (Carp)	1		1	
P. notatus (Bluntnose minnow)	4	7		3
Catostomidae (Suckers)				
Catostomus commersoni (W. sucker)		3	4	3
Ictaluridae (Bullhead, Catfish)				
Ictalurus melas (Black bullhead)				1
I. nebulosus (Brown bullhead)			1	
N. gyrinus (Tadpole madtom)	1			
Gasterosteidae (Sticklebacks)				
Culaea inconstans (Brook)				1
Centrarchidae (Sunfish)				
Ambloplites rupestris (Rock bass)	4	2		
Lepomis cyanellus (Green sunfish)	5		1	
L. gibbosus (Pumpkinseed)	1	2		
L. macrochirus (Bluegill)	1	1	3	
Lepomis megalotis (Longear s.)			2	
Micropterus salmoides (Lm. bass)			1	
Percidae (Perches)				
E. nigrum (Johnny darter)	5	3	1	16
Percina maculata (Blackside dar.)	8	1		9
TOTAL INDIVIDUALS	47	24	23	36
NUMBER OF ANOMALIES	0	0	0	0
SQUARE FOOT SAMPLED	13750	16500	10000	21000
DENSITY OF INDIVIDUALS (#/SF)	0.003	0.001	0.002	0.002

Table 11B. Fish metric evaluation of Red Cedar River (3rd Order), June 25, 1991.

	STATION 5		STATION 6		STATION 7		STATION 8	
METRIC	Value	Score	Value	Score	Value	Score	Value	Score
TOTAL NUMBER OF TAXA	11	5	9	3	10	5	7	3
NUMBER OF DARTER SPECIES	2	5	2	5	1	3	2	5
NUMBER OF SUNFISH SPECIES	4	5	3	5	3	5	0	1
NUMBER OF SUCKER SPECIES	0	1	1	3	1	3	1	3
PERCENT CARP, G.SUNFISH, W.SUCKER	12.8	3	12.5	3	26.1	1	8.3	5
PERCENT OMNIVORES	10.6	5	41.7	3	21.7	3	16.7	5
PERCENT INSECTIVO. CYPRINIDS	0.0	1	0.0	1	0.0	1	0.0	1
PERCENT PISCIVORES	12.8	5	12.5	5	8.7	5	0.0	1
DENSITY OF INDIVIDUALS	0.003	1	0.001	1	0.002	1	0.002	1
PERCENT ANOMALIES	0.0	5	0.0	5	0.0	5	0.0	5
TOTAL SCORE		36		34		32		30
FISH COMMUNITY CATEGORY		GOOD (SLIGHTLY IMPAIRED)		GOOD (SLIGHTLY IMPAIRED)		GOOD (SLIGHTLY IMPAIRED)		GOOD (SLIGHTLY IMPAIRED)

Table 12A. Qualitative fish sampling results for Red Cedar River (3rd Order), June 26, 1991.

TAXA	STATION 9
Cyprinidae (Minnows and Carps)	
Cyprinus carpio (Carp)	3
N. cornutus (Common shiner)	3
P. notatus (Bluntnose minnow)	4
Catostomidae (Suckers)	
Catostomus commersoni (W. sucker)	10
Ictaluridae (Bullhead, Catfish)	
Ictalurus melas (Black bullhead)	1
Centrarchidae (Sunfish)	
Ambloplites rupestris (Rock bass)	6
Lepomis cyanellus (Green sunfish)	6
Lepomis megalotis (Longear s.)	2
Percidae (Perches)	
E. nigrum (Johnny darter)	1
Percina maculata (Blackside dar.)	2
Perca flavescens (Yellow perch)	3
TOTAL INDIVIDUALS	41
NUMBER OF ANOMALIES	0
SQUARE FOOT SAMPLED	6300
DENSITY OF INDIVIDUALS (#/SF)	0.007

Table 12B. Fish metric evaluation of Red Cedar River (3rd Order), June 26, 1991.

METRIC	STATION 9 Value	Score
TOTAL NUMBER OF TAXA	11	5
NUMBER OF DARTER SPECIES	2	5
NUMBER OF SUNFISH SPECIES	3	5
NUMBER OF SUCKER SPECIES	1	3
PERCENT CARP, G.SUNFISH, W.SUCKER	46.3	1
PERCENT OMNIVORES	41.5	3
PERCENT INSECTIVO. CYPRINIDS	7.3	1
PERCENT PISCIVORES	22.0	5
DENSITY OF INDIVIDUALS	0.007	1
PERCENT ANOMALIES	0.0	5
TOTAL SCORE		34
FISH COMMUNITY CATEGORY	GOOD (SLIGHTLY IMPAIRED)	

Table 13A. Qualitative fish sampling results for Red Cedar River (4th Order), June 27-28, 1991.

TAXA	STATION 10	STATION 15	STATION 16	ST. 18
Petromyzontidae (Lampreys)				
L. castaneus (Chestnut)			1	
Umbridae (Mudminnows)				
Umbra limi (Central mudminnow)		1		
Esocidae (Pikes)				
Esox americanus var. (Grass Pike)	1			
Cyprinidae (Minnows and Carps)				
Cyprinus carpio (Carp)	5	1		
Nocomis biguttatus (Horneyhead)			3	
N. cornutus (Common shiner)	1		1	
Pimephales promelas (Fathead mi.)			4	
P. notatus (Bluntnose minnow)		53	7	
Catostomidae (Suckers)				
Catostomus commersoni (W. sucker)	2			6
Moxostoma anisurum (Silver redh.)			2	
M. erthrurum (Golden redhorse)				2
Minytrema melanops (Spot. sucker)		2		
Ictaluridae (Bullhead, Catfish)				
I. natalis (Yellow bullhead)				1
N. gyrinus (Tadpole madtom)	1			
Gasterosteidae (Sticklebacks)				
Culaea inconstans (Brook)		2		
Centrarchidae (Sunfish)				
Ambloplites rupestris (Rock bass)	5		6	3
Lepomis cyanellus (Green sunfish)		6		4
L. macrochirus (Bluegill)	2	1	2	
Lepomis megalotis (Longear sunfish)		4		
Micropterus salmoides (Lm. bass)	1			
M. dolomieui (Smallmouth bass)			2	3
Percidae (Perches)				
Etheostoma caeruleum (Rainbow d.)			17	
E. nigrum (Johnny darter)	6	4	1	
Percina maculata (Blackside dar.)	5	2	4	
Stizostedion vitreum v. (Walleye)			1	
TOTAL INDIVIDUALS	29	76	51	19
NUMBER OF ANOMALIES	0	0	0	1
SQUARE FOOT SAMPLED	18500	9750	14600	15000
DENSITY OF INDIVIDUALS (#/SF)	0.002	0.008	0.003	0.001

Table 13B. Fish metric evaluation of Red Cedar River (4th Order), June 27-28, 1991.

METRIC	STATION 10 Value	STATION 10 Score	STATION 15 Value	STATION 15 Score	STATION 16 Value	STATION 16 Score	STATION 18 Value	STATION 18 Score
TOTAL NUMBER OF TAXA	12	5	10	5	13	5	6	5
NUMBER OF DARTER SPECIES	2	5	2	5	3	5	0	1
NUMBER OF SUNFISH SPECIES	2	5	3	5	2	5	2	5
NUMBER OF SUCKER SPECIES	2	5	1	3	1	3	2	5
PERCENT CARP, G.SUNFISH, W.SUCKER	24.1	3	9.2	5	0.0	5	52.6	1
PERCENT OMNIVORES	24.1	3	71.1	1	23.5	3	31.6	3
PERCENT INSECTIVO. CYPRINIDS	3.4	1	0.0	1	7.8	1	0.0	1
PERCENT PISCIVORES	24.1	5	0.0	1	17.6	5	31.6	5
DENSITY OF INDIVIDUALS	0.002	1	0.008	1	0.003	1	0.001	1
PERCENT ANOMALIES	0.0	5	0.0	5	0.0	5	5.3	1
TOTAL SCORE		38		32		38		28
FISH COMMUNITY CATEGORY		GOOD (SLIGHTLY IMPAIRED)		GOOD (SLIGHTLY IMPAIRED)		GOOD (SLIGHTLY IMPAIRED)		GOOD (SLIGHTLY IMPAIRED)

Table 14A. Qualitative fish sampling results for Red Cedar River (4th Order), June 21, 1991.

TAXA	STATION 17
Cyprinidae (Minnows and Carps)	
Semotilus atromaculatus (Creek)	8
N. cornutus (Common shiner)	1
P. notatus (Bluntnose minnow)	2
Catostomidae (Suckers)	
Catostomus commersoni (W. sucker)	2
Hypentelium nigricans (N. hogsu.)	5
Ictaluridae (Bullhead, Catfish)	
I. nebulosus (Brown bullhead)	1
Centrarchidae (Sunfish)	
Ambloplites rupestris (Rock bass)	15
Lepomis cyanellus (Green sunfish)	2
L. gibbosus (Pumpkinseed)	1
L. macrochirus (Bluegill)	1
M. dolomieui (Smallmouth bass)	1
Percidae (Perches)	
Etheostoma caeruleum (Rainbow d.)	20
E. nigrum (Johnny darter)	3
Percina maculata (Blackside dar.)	1
TOTAL INDIVIDUALS	63
NUMBER OF ANOMALIES	1
SQUARE FOOT SAMPLED	18540
DENSITY OF INDIVIDUALS (#/SF)	0.003

Table 14B. Fish metric evaluation of Red Cedar River (4th Order), June 21, 1991.

METRIC	STATION 17 Value	Score
TOTAL NUMBER OF TAXA	14	5
NUMBER OF DARTER SPECIES	3	5
NUMBER OF SUNFISH SPECIES	4	5
NUMBER OF SUCKER SPECIES	2	5
PERCENT CARP, G.SUNFISH, W.SUCKER	6.3	5
PERCENT OMNIVORES	6.3	5
PERCENT INSECTIVO. CYPRINIDS	1.6	1
PERCENT PISCIVORES	25.4	5
DENSITY OF INDIVIDUALS	0.003	1
PERCENT ANOMALIES	1.6	3
TOTAL SCORE		40
FISH COMMUNITY CATEGORY	GOOD (SLIGHTLY IMPAIRED)	

Table 15. Habitat evaluation for Red Cedar River (1st Order), June 26-27, 1991.

HABITAT METRIC	STATION 1 SCORE	STATION 2 SCORE	STATION 11 SCORE	STATION 12 SCORE	STATION 13 SCORE
Bottom Substrate Available Cover:	0	2	5	3	12
Embeddedness:	0	3	6	2	11
Velocity:Depth:	1	10	12	3	11
Flow Stability:	4	11	10	9	10
Bottom Deposition:	1	7	3	2	9
Pools-Riffles-Runs-Bends:	0	7	7	3	4
Bank Stability:	2	6	8	3	6
Bank Vegetative Stability:	4	5	6	3	9
Streamside Cover:	9	9	5	5	9
TOTAL SCORE	21	60	62	33	81
HABITAT CONDITION CATEGORY	POOR (SEVERELY IMPAIRED)	FAIR (MODERATELY IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)	POOR (SEVERELY IMPAIRED)	EXCELLENT (NON-IMPAIRED)
Date:	June 24, 1991	June 24, 1991	June 26, 1991	June 26, 1991	June 26, 1991
Stream Type:	Warmwater	Warmwater	Warmwater	Warmwater	Warmwater
Weather:	Sunny	Sunny	Sunny	Sunny	Sunny
Stream Order:	First	First	First	First	First
Air Temperature:	77 Deg. F.	74 Deg. F.	78 Deg. F.	85 Deg. F.	74 Deg. F.
Water Temperature:	60 Deg. F.	58 Deg. F.	67 Deg. F.	65 Deg. F.	68 Deg. F.
Ave. Stream Width:	15 Feet	12 Feet	12 Feet	10 Feet	8 Feet
Ave. Stream Depth:	0.5 Feet	0.33 Feet	0.5 Feet	0.5 Feet	0.5 Feet
Surface Velocity:	0.1 Ft./Sec.	1 Ft./Sec.	0.75 Ft./Sec.	0.5 Ft./Sec.	1.5 Ft./Sec.
Estimated Flow:	1 CFS	4 CFS	4 CFS	2 CFS	6 CFS

Table 16. Habitat evaluation for Red Cedar River (2nd Order), June 24-27, 1991.

HABITAT METRIC	STATION 3 SCORE	STATION 4 SCORE	STATION 14 SCORE
Bottom Substrate Available Cover:	3	3	6
Embeddedness:	2	5	6
Velocity:Depth:	11	6	8
Flow Stability:	9	7	4
Bottom Deposition:	3	2	6
Pools-Riffles-Runs-Bends:	5	1	9
Bank Stability:	5	6	3
Bank Vegetative Stability:	8	8	5
Streamside Cover:	9	5	6
TOTAL SCORE	55	43	53
HABITAT CONDITION CATEGORY	POOR (SEVERELY IMPAIRED)	POOR (SEVERELY IMPAIRED)	POOR (SEVERELY IMPAIRED)
Date:	June 24, 1991	June 24, 1991	June 27, 1991
Stream Type:	Warmwater	Warmwater	Warmwater
Weather:	Ptly Cl.	Ptly Cl.	Sunny
Stream Order:	Second	Second	Second
Air Temperature:	74 Deg. F.	86 Deg. F.	81 Deg. F.
Water Temperature:	66 Deg. F.	78 Deg. F.	69 Deg. F.
Ave. Stream Width:	15 Feet	12 Feet	25 Feet
Ave. Stream Depth:	1.5 Feet	0.5 Feet	2 Feet
Surface Velocity:	0.5 Ft./Sec.	0.5 Ft./Sec.	0.5 Ft./Sec.
Estimated Flow:	11 CFS	3 CFS	25 CFS

Table 17. Habitat evaluation for Red Cedar River (3rd Order), June 24-26, 1991.

HABITAT METRIC	STATION 5 SCORE	STATION 6 SCORE	STATION 7 SCORE	STATION 8 SCORE	STATION 9 SCORE
Bottom Substrate Available Cover:	4	12	8	9	6
Embeddedness:	3	10	7	6	6
Velocity:Depth:	5	9	7	7	7
Flow Stability:	10	10	9	9	9
Bottom Deposition:	5	9	6	6	2
Pools-Riffles-Runs-Bends:	4	8	6	7	4
Bank Stability:	7	7	8	6	6
Bank Vegetative Stability:	6	9	9	9	7
Streamside Cover:	8	9	9	8	7
TOTAL SCORE	52	83	69	67	54
HABITAT CONDITION CATEGORY	POOR (SEVERELY IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)	FAIR (MODERATELY IMPAIRED)	FAIR (MODERATELY IMPAIRED)	POOR (SEVERELY IMPAIRED)
Date:	June 25, 1991	June 24, 1991	June 25, 1991	June 25, 1991	June 26, 1991
Stream Type:	Warmwater	Warmwater	Warmwater	Warmwater	Warmwatr
Weather:	Ptly Cl.	Ptly Cl.	Sunny	Ptly Cl.	Sunny
Stream Order:	Third	Third	Third		Third
Air Temperature:	71 Deg. F.	79 Deg. F.	78 Deg. F.	76 Deg. F.	77 Deg. F.
Water Temperature:	67 Deg. F.	68 Deg. F.	74 Deg. F.	71 Deg. F.	73 Deg. F.
Ave. Stream Width:	25 Feet	30 Feet	25 Feet	35 Feet	35 Feet
Ave. Stream Depth:	2 Feet	3 Feet	3 Feet	3.5 Feet	2 Feet
Surface Velocity:	0.5 Ft./Sec.	0.25 Ft./Sec.	0.5 Ft./Sec.	0.3 Ft./Sec.	0.25 Ft./Sec.
Estimated Flow:	25 CFS	22 CFS	38 CFS	37 CFS	18 CFS

Table 18. Habitat evaluation for Red Cedar River (4th Order), June 27-28, 1991.

HABITAT METRIC	STATION 10 SCORE	STATION 15 SCORE	STATION 16 SCORE	STATION 17 SCORE	STATION 18 SCORE
Bottom Substrate Available Cover:	11	7	15	15	7
Embeddedness:	14	8	15	12	6
Velocity:Depth:	16	2	17	16	6
Flow Stability:	10	8	11	11	9
Bottom Deposition:	9	5	10	5	5
Pools-Riffles-Runs-Bends:	10	3	12	10	6
Bank Stability:	8	8	5	4	8
Bank Vegetative Stability:	9	8	7	6	6
Streamside Cover:	9	5	8	6	6
TOTAL SCORE	96	54	100	85	59
HABITAT CONDITION CATEGORY	EXCELLENT (NON-IMPAIRED)	POOR (SEVERELY IMPAIRED)	EXCELLENT (NON-IMPAIRED)	GOOD (SLIGHTLY IMPAIRED)	POOR (SEVERELY IMPAIRED)
Date:	June 27, 1991	June 27, 1991	June 28, 1991	June 21, 1991	June 28, 1991
Stream Type:	Warmwater	Warmwater	Warmwater	Warmwater	Warmwater
Weather:	Sunny	Sunny	Sunny	Sunny	Sunny
Stream Order:	Fourth	Fourth	Fourth	Fourth	Fourth
Air Temperature:	74 Deg. F.	84 Deg. F.	74 Deg. F.	78 Deg. F.	80 Deg. F.
Water Temperature:	71 Deg. F.	76 Deg. F.	74 Deg. F.	73 Deg. F.	77 Deg. F.
Ave. Stream Width:	40 Feet	65 Feet	45 Feet	60 Feet	60 Feet
Ave. Stream Depth:	3 Feet	3 Feet	2 Feet	1.5 Feet	3 Feet
Surface Velocity:	0.5 Ft./Sec.	0.25 Ft./Sec.	1 Ft./Sec.	0.5 Ft./Sec.	0.75 Ft./Sec.
Estimated Flow:	60 CFS	49 CFS	90 CFS	45 CFS	135 CFS

Table 20. Water chemistry results from the Red Cedar River, June 24-28, 1991.

Parameter	St. 1	St. 2	St. 3	St. 4	St. 5	St. 6	St. 7	St. 8	St. 9
Ammonia (mg N/l)	0.44	0.053	0.089	0.093	0.084	0.087	0.043	0.048	0.056
Kj. Nitrogen (mg N/l)	1.57	0.47	0.65	0.87	0.96	0.92	0.65	0.68	0.87
Nitrate+Nitrite (mg N/l)	0.25	0.42	0.71	0.196	0.50	0.51	0.42	0.62	0.93
TOC (mg/l)	10	4.8	6.8	8.8	7.8	8.2	7.4	8.0	8.3
Tot. Phosphorus (mg P/l)	0.144	0.04	0.057	0.079	0.079	0.088	0.058	0.062	0.11
Arsenic (ug/l)	--	--	--	--					--
Cadmium (ug/l)	--	--	--	--	K 20	K20	K 20	K 20	--
Chromium (ug/l)	--	--	--	--	K 25	K 25	K 25	K 25	--
Copper (ug/l)	--	--	--	--	K 20	K 20	K 20	K 20	--
Iron (ug/l)	--	--	--	--	--	--	--	--	--
Lead (ug/l)	--	--	--	--	K 50	K 50	K 50	K 50	--
Nickel (ug/l)	--	--	--	--	K 50	K 50	K 50	K 50	--
Silver (ug/l)	--	--	--	--	--	--	--	--	--
Zinc (ug/l)	--	--	--	--	K 50	K 50	K 50	K 50	--

Parameter	St. 10	St. 11	St. 12	St. 13	St. 14	St. 15	St. 16	St. 17	St. 18
Ammonia (mg N/l)	0.071	0.077	1.5	0.070	0.058	0.068	0.065	0.036	0.058
Kj. Nitrogen (mg N/l)	0.83	1.19	3.1	0.94	0.76	0.99	0.87	0.8	0.81
Nitrate+Nitrite (mg N/l)	0.82	1.57	7.5	0.96	1.6	1.26	1.3	1.32	1.34
TOC (mg/l)	8.4	10	11	12	6.6	8.4	7.6	7.2	7.6
Tot. Phosphorus (mg P/l)	0.068	0.28	0.31	0.09	0.087	0.133	0.107	0.092	0.103
Arsenic (ug/l)	4.5	--	--	--	3	3.5	3.1	3.4	3.4
Cadmium (ug/l)	K 2	--	--	--	K 0.2	K 0.2	K 0.2	K 0.2	0.4
Chromium (ug/l)	1.9	--	--	--	K 1	K 1	K 1	K 1	K 1
Copper (ug/l)	3.2	--	--	--	1.2	3.2	2.6	2.1	2.4
Iron (ug/l)	759	--	--	--	617	1400	728	381	291
Lead (ug/l)	1.7	--	--	--	K 1	K 1	K 1	K 1	1.2
Nickel (ug/l)	K 2	--	--	--	K 2	K 2	K 2	K 2	K 2
Silver (ug/l)	K 0.5	--	--	--	K 0.5	K 0.5	K 0.5	K 0.5	K 0.5
Zinc (ug/l)	5.2	--	--	--	K 4	6.4	4.6	K 4	6.9

Appendix 1. Specific station locations for the Red Cedar River, June 24-2

Station #	County	Location
1	Livingston	Coon Lake Rd.
2	"	Radio Tower Rd.
3	"	Smith Rd.
4	"	Mason Rd. (Middle B. R.C.R.)
5	"	Garden Lane
6	"	Grand River Ave.
7	"	Gregory Rd.
8	"	Stow Rd.
9	"	Grand River Ave. (W.B. R.C.R.)
10	Ingham	Gramer Rd.
11	"	Pardee Rd. (Kalamink Crk.)
12	"	Moyer Rd. (Wolf Crk.)
13	"	Rowley Rd. (Squaw Crk.)
14	"	Linn Rd. (Doan Crk.)
15	"	Williamston Rd.
16	"	Beeman Rd. (d/s of Williamston WWTP)
17	"	Okemos Rd.
18	"	Kalamazoo St.

MICHIGAN Environmental Council

Mid-Michigan Environmental Action Council

ecology center

UAW

January 18, 2002

RECEIVED
JAN 23 2002
Enforcement & Compliance Assurance Branch
Waste, Pesticides & Toxics Division
U.S. EPA – REGION 5

Joe Boyle
Chief of Enforcement and Compliance Assurance
US Environmental Protection Agency
77 W. Jackson Blvd.
Chicago, IL 60604-3590

Dear Mr Boyle:

We would like to bring your attention to our serious concerns regarding environmental damage to the Red Cedar River being caused by discharges from a Johnson Controls Inc. ("JCI") site in Fowlerville, MI.

Over two decades have passed since ground water contamination was first detected at the JCI Fowlerville site. For close to fifty years, the site has been discharging a variety of chemical and metal wastes (including PCBs and TCE) into the Red Cedar River, one of Michigan's great natural resources. The Fowlerville site has been studied under RCRA since the early 1980s, yet no long-term plan to clean up the site has been selected. In fact, the site continues to contaminate the Red Cedar River.

Furthermore, an assessment report recently completed by Disposal Safety Incorporated ("DSI"), a nationally known environmental firm, shows severe deficiencies in the most recent investigation of the site done by JCI. This report concludes, among other things, that there are significant data gaps and that existing data on the extent of contamination has yet to be fully or appropriately analyzed.

It is our understanding the EPA and JCI are currently negotiating a new "consent order" and that a corrective measures study is the next step in the regulatory process. We strongly urge you to do everything possible to end this pattern of delay regarding clean up at this site.

JCI should immediately take action to stop ongoing discharges into the Red Cedar River and be required to quickly come up with a thorough and comprehensive plan for an expeditious long-term clean up at the site. Perhaps most importantly, a comprehensive human health and ecological risk assessment of the impact of the JCI site on the River and its sediment should be conducted directly by EPA personnel rather than JCI consultants.

Taking the above steps and considering seriously our concerns as well as the findings of the enclosed DSI report would ensure progress towards an actual clean up of the continuing environmental damage at the site. This action is long overdue.

We greatly appreciate your prompt attention to this matter and look forward to meeting with you and any other appropriate EPA staff to discuss our concerns further.

Sincerely,

Dave Dempsey
Michigan Environmental Council

Jeff Gearheart
Ann Arbor Ecology Center

Missy Luyk
Mid-Michigan Environmental Action Council

Sam Warren
UAW Local 602

Please respond to:

Michigan Environmental Council
119 Pere Marquette Dr., Suite 2A
Lansing, MI 48912
(517) 487-9539

Solidarity House
8000 EAST JEFFERSON AVE.
DETROIT, MICHIGAN 48214
PHONE (313) 926-5000
FAX (313) 823-6016

INTERNATIONAL UNION, UNITED AUTOMOBILE, AEROSPACE & AGRICULTURAL IMPLEMENT WORKERS OF AMERICA—UAW

STEPHEN P. YOKICH, *PRESIDENT* RUBEN BURKS, *SECRETARY-TREASURER*

VICE PRESIDENTS: ELIZABETH BUNN • RON GETTELFINGER • NATE GOODEN • BOB KING • RICHARD SHOEMAKER

January 11, 2002

Mr. Juan Thomas,
RCRA Corrective Project Manager, Mail Stop DE-9J
US Environmental Protection Agency, Region 5
77 West Jackson Boulevard
Chicago, Ill 60604-3590

Dear Mr. Thomas:

Please find enclosed our report on the RCRA Facility Investigation for the Johnson Controls, Inc. site in Fowlerville, Michigan. Our consultant, Disposal Safety Incorporated, has found severe deficiencies in Johnson Controls' investigation, and we urge you to carefully consider our findings as you review the RFI Summary report that Johnson Controls recently submitted, as well as future work at the site.

Sincerely,

Bob King, Vice President &
Director UAW National Organizing
Department

BK:lh/opeiu494/afl-cio

Enclosure

JOHNSON CONTROLS MEETING
27 OCTOBER 1999

NAME	AFFILIATION	PHONE/FAX
Michael Valentino	U.S. EPA, WPTD, ECAB	(312) 886-4582 / (312) 353-4342
Juan Thomas	U.S EPA, WPTD, ECAB	(312) 886-6010 same ↑
Michael Stoeltzer	Johnson Controls Inc.	(734) 254-5657 fax 6488
Dennis Reis	Quarles + Brady	(414) 271-5573 / (414) 271-3552
Dennis Connor	Dames & Moore	513-651-3440 / 3452
Mike Wagner	Dames & Moore	(513) 651-3440 / 3452
JOHN KOEHNEN	TECHLAW, INC.	(312) 345-8938

JOHNSON CONTROLS
MEETING AGENDA

I. Introductions

II. Discussion/Resolution of RFI Phase III Technical Issues (Rf. Dames & Moore letter to EPA, dated 20 October 1999)

III. Discussion of Phase III Schedule

JOHNSON CONTROLS, INC.
MEETING WITH U. S. EPA, REGION V
CHICAGO, ILLINOUS

OCTOBER 27, 1999

AGENDA: Open discussion addressing Region V comments and JCI's response to comments concerning the Phase III RFI Work Plan for proposed activities at the former Stanley Facility located in Fowlerville, Michigan. This open discussion will also address comments from Region V concerning the April 16, 1999 letter from JCI and Dames & Moore. The following is a list of topics and issuse which JCI and Dames & Moore would like to address during this meeting:

1. Current site status concerning the Consent Order and with the agency.
2. Selection of monitoring wells to be sampled. will do 1 deep well
3. Questions and issues concerning the ERA.
4. Discussion of Red Cedar River sediment and the request for additional samples. [illegible]
5. Questions and issues concerning the TCE investigation scope of work.
6. Off site groundwater issues west of the Red Cedar River.

Enclosed documents (Figures from Phase II RFI Report, June 1994):

Figure 4-12	Geologic Cross Section E-E'
Figure 4-17	Groundwater Surface, Shallow Wells, February 8, 1994
Figure 5-9	Groundwater Quality, Shallow Monitoring Wells, (January and February 1994)
Figure 5-10	Groundwater Quality, Intermediate and Deep Monitoring Wells, (February 1994)
Figure 5-11	Red Cedar River, Soil and Sediment Quality, January 1994
Figure 5-12	Drainage Ditch Sediment Quality
Figure 5-13	Total Halogenated Volatile Organic Compounds (VOCs) in Groundwater

JOHNSON CONTROLS, INC.
MEETING WITH U. S. EPA, REGION V
CHICAGO, ILLINOUS

OCTOBER 27, 1999

AGENDA: Open discussion addressing Region V comments and JCI's response to comments concerning the Phase III RFI Work Plan for proposed activities at the former Stanley Facility located in Fowlerville, Michigan. This open discussion will also address comments from Region V concerning the April 16, 1999 letter from JCI and Dames & Moore. The following is a list of topics and issuse which JCI and Dames & Moore would like to address during this meeting:

ok

1. Current site status concerning the Consent Order and with the agency.
2. Selection of monitoring wells to be sampled. ✓ — those proposed in 6/20/99 WP along w/ one deep well, B-2
3. Questions and issues concerning the ERA.
4. Discussion of Red Cedar River sediment and the request for additional samples. ✓
5. Questions and issues concerning the TCE investigation scope of work. ✓ JK - Include some criteria for field which could lead to more samples taken. RC - agreed.
6. Off site groundwater issues west of the Red Cedar River.

Enclosed documents (Figures from Phase II RFI Report, June 1994):

Figure 4-12	Geologic Cross Section E-E'
Figure 4-17	Groundwater Surface, Shallow Wells, February 8, 1994
Figure 5-9	Groundwater Quality, Shallow Monitoring Wells, (January and February 1994)
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Figure 5-11	Red Cedar River, Soil and Sediment Quality, January 1994
Figure 5-12	Drainage Ditch Sediment Quality
Figure 5-13	Total Halogenated Volatile Organic Compounds (VOCs) in Groundwater

WHERE DO WE GO FROM HERE?

1. Land use intention: brownfield, reusable land w/ deed restrictions.
   Use of MI clean-up levels for closure. 201 generic sites → target levels.
   ERA separate issue.
2. DNR needs PCB guidance. JK will look into this. Also, ✓ w/ eco PA at EPA. PAHs in sediments → need to look at guidance levels.
3. Finalize Ph III WP and submit to EPA. Target: early ~~December~~. → mid/late-November. 11/22 for WP to EPA
   EPA will turnaround WP < 2 wk.

✓ w/ Brian Freeman on OAPP: ask to expedite (Quantera, Denver Co)

will respond in W.P. accordingly.

CONFERENCE CALL WITH JOHNSON CONTROLS, INC
MEETING AGENDA MAY 2, 2000

I. **INTRODUCTIONS**

II. **PURPOSE OF MEETING: to establish agreement on the proposed scope of the work for JCI Revised Phase III Work Plan (TCE Source Investigation)**

III. **DISCUSSION POINTS**

- **A. Modified Scope of Work**
- **B. Other Issues and Concerns**
- **C. New Issues**

IV. **CMS/CMI & POSSIBILITY OF REVISING EXISTING ORDER**

V. **CLOSING COMMENTS**

VI. **ADJOURN**

participants in meeting

U.S. EPA
Juan Thomas (CA Project Mgr.)
Tom Williams (atty. USEPA ORC)
John Koelmen (Consultant, Tech Law)

Johnson Controls
Dennis Connair (Dames & Moore)
Mike Wagner (Dames & Moore)
Dennis Reis (atty. Dames & Moore)
Mike Stockton (Johnson Controls)

Johnson Controls, Inc.
Meeting Agenda May 2, 2000

I. Introductions

II. Purpose of Meeting: to establish agreement on the proposed scope of work for the Phase III RFI Work (TCE Source Investigation)

III. Discussion Points: (discuss only points of non-agreement and new issues):

3.2.2. Modified Scope of Work page 8, paragraph 2 discuss that there approach leaves 3-4' of ~~depth~~ height from top of confining clay rich layer to where well samples will be collected. Would like to see perhaps one or two more wells drilled down to approx 6" to 1' above the confining layer to rule out the presence of DNAPL

Simple to measure top of confining layer OK

Other issues and Concerns:

OK Since cyanide and plating baths were part of the on-site operations of the facility, and the fact that total CN was detected in numerous locations, we request free CN being analyzed in SW20 samples in all samples where previously detected. ... this will serve as a means of measuring the effectiveness of the interim remedial measures done on site as well as providing current site data that can be used in subsequent phases of the CA process

Also Area A (MW-A1 and MW A-3 both had high levels of benzene in SW20) should probably collect both soil and SW20 samples from this location. ... This area had been remediated, but final closure activities were

OK

suspended

OK For Area J collecting soil samples and sludge samples since this area was also subject to ~~the~~ soil and sludge removal previously since very high CN concentrations were detected here. OK

free CN OK Include area E as part of the present CAI evaluation ... if I recall this area was also excavated and backfilled, but not all of the sludge was removed. (should probably include soil data as well) ... also sludge did not include area E because cyanide CN in sludge was below Reg. Limits

New Issues To Discuss

- Discuss the possibility of conducting off-site ~~non~~ sludge monitoring in area of Unit L (or SWMU L). This will determine if off-site sludge is present can serve to delineate the ~~[illegible]~~ horizontal extent of the TCE contamination ... is this a possibility

- to have soil cores generated as part of freeze sampling in the area of units K and L to in conjunction with the soil screen to submit samples to the lab as a way of further delineating the horizontal position and vertical mass distribution of DNAPL. (Gas Chromatography or liquid Chromatography as a way of getting specific information on volatile compounds and will also help for obtaining data for risk assessment. (Perhaps Encore Sampling) up to 8-10 feet soil screen from PID

- In the River sediment analysis ... to speciate the PAH's OK

Questions

1. Has there been any subsequent SVOC monitoring on-site since the last round of SVOC sampling — No per Mike Wagner

2. What about the next phase of the project.... need to move into the CMS / CMI phase

New Order!

5-2-2000 Mtg w/ JCI (Rgerkerson)

Issues to discuss monitoring for TCE as a potential DNAPL
- including CMI (as free organic) in their monitoring
- best way of determining if offsite source is to monitor offsite (what's upgradient)
- possibility of conducting soil samples (Encore Samples) in areas of [illegible] 2 pk
(see RFI) + (p. 5-39 of RFI re: discovery of free product)
- to include benzene as a monitoring in all areas previously closed with benzene
- to speciate PAH's in sediment samples (perhaps benzo(a) pyrene, the most toxic)
- to speciate PCBs in river sediment
(see previous results where total PCBs are given)
- next steps, where do we go from here

read RCRA Orientation Manual → [illegible] in progress

- find out about any subsequent sites monitoring being conducted on-site personnel
  Mike Wagner on 4-12-2000
  ask Gretchen, what are Transnet drums required to be tested and disposed for on site ... (since PCBs have been found)

- discuss w/ Tom Williams
  - possibility of negotiating a new order to go into CMS and CMI w/ modifying language in existing order to accomplish an actual CMS

→ This came up in the context of free product discovery as well as rationale for not conducting GW sampling this round.

trichloroethene	0.47	intermed	VOC	0.005	5	
trans 1,2-dichloroethene	13 - 28	shallow	VOC	0.1	100	no
carbon disulfide	8.8	shallow	VOC	no value		
carbon disulfide	13	intermed	VOC			
tetrachlorethene	1.8J	intermed	VOC	0.005	5	no

cobalt	4.1 - 5.2	shallow	metals
cobalt	5.3	intermed	metals
sulfur	510	shallow	inorganic
sulfur	58 - 959	intermed	inorganic
Cyanide	110 - 5100	shallow	inorganic cpd
	13 - 16,900	deep	inorganic cpd

Groundwater Sampling data for the Johnson Controls, Inc, Site Fowlerville, MI (Latest Round From Jan and Feb 1994: shallow, intermediate and deep wells

Constituent	Concentration Range (ug / L)	Well	Constituent Class	MCL (mg/l)	MCL (ug/L)	Concentration exceeds MCL
xylene	.31 - 27	shallow	VOC	10	10000	no
xylene	2	deep	VOC	10	10000	no
1,2-dichlorobenzene	.30 - 160	shallow	VOC	0.6	600	no
1,2-dichlorobenzene	0.46	deep	VOC	0.6	600	no
1,3-dichlorobenzene	0.77	shallow	VOC	no value		
1,3-dichlorobenzene	.49 - .51	deep	VOC			
1,4-dichlorobenzene	.81 - 100	shallow	VOC	0.075	75	yes
1,4-dichlorobenzene	.51 - .95	deep	VOC	0.075	75	
chlorobenzene	1.9 - 9.8	shallow	VOC	0.1	100	no
chlorobenzene	.67 - 2.0	deep	VOC	0.1	100	no
benzene	.28 - 83	shallow	VOC	0.005	5	yes
benzene	0.54	deep	VOC	0.005	5	
toluene	.25 - 3.3J	shallow	VOC	1	1000	no
toluene	0.63	deep	VOC	1	1000	no
ethylbenzene	.61 - 3.8J	shallow	VOC	0.7	700	no
ethylbenzene	0.72	deep	VOC	0.7	700	no
acetone	630JB	shallow	VOC	no value		
carbon tetrachloride	1.5	shallow	VOC	0.005	5	no
carbon tetrachloride	1.3J	deep	VOC	0.005	5	no
methylene chloride	1.1J - 360	shallow	VOC	0.005	5	yes
methylene chloride	1.1J - 2.6JB	deep	VOC	0.005	5	
vinyl chloride	1 - 400	shallow	VOC	0.002	2	yes
vinyl chloride	17	intermed	VOC			
1,1-dichloroethane	1.4 - 15J	shallow	VOC	no value		
1,2-dichloroethene	43 - 770	shallow	VOC	0.1	100	yes
1,2-dichloroethene	1.5	intermed	VOC	0.1	100	
trichloroethene	77 - 5000	shallow	VOC	0.005	5	yes

Constituent	Concentration Range (ug / L)	Well	Constituent Class	MCL (mg/l)	MCL (ug/L)	Concentration exceeds MCL
bis(2-ethylhexyl)phthalate	1.1J - 650	shallow	SVOC	no value		
bis(2-ethylhexyl)phthalate	1.2J - 10	deep	SVOC			
2-methylnapthalene	.18J - 630	shallow	SVOC	no value		
napthalene	110J	shallow	SVOC			
PCB (arochlor 1248)	1.2 - 98	shallow	SVOC	0.0005		
di-n-butyl phthalate	1.6	shallow	SVOC	no value		
fluorene	53J	shallow	SVOC	no value		
cobalt	4.1 - 5.2	shallow	metals	no value		
arsenic	2.4 - 98	shallow	metals			
arsenic	2.0 - 14	deep	metals			
barium	33 - 680	shallow	metals			
barium	31 - 310	deep	metals	no value		
selenium	1J - 3.3J	shallow	metals			
selenium	1J - 3.5J	deep	metals			
zinc	3.6 - 250	shallow	metals			
zinc	4.6 - 130	deep	metals			
nickel	7.1 - 560	shallow	metals			
nickel	7.5	deep	metals			
cadmium	5.3	shallow	metals			
lead	1.5 - 6	shallow	metals			
lead	10	deep	metals			
Antimony	18	intermed	metals			
vanadium	4.5J	intermed	metals			

J. Thomas

20 NORTH WACKER DRIVE, SUITE 1260, CHICAGO, IL 60606

TECHLAW INC.

PHONE: (312) 578-8900
FAX: (312) 578-8904

RZ2.R05703.01.ID.012

June 29, 2000

Mr. Thomas Manning
Work Assignment Manager
U.S. EPA Region 5, DW-8J
77 W. Jackson Boulevard
Chicago, IL 60604

Reference: EPA Contract No. 68-W-99-017; EPA Work Assignment No. R05703: Multi-Site Field Oversight Support; Johnson Controls, Inc.; Fowlerville, MI; EPA ID No. MID099124299; Field Oversight Report for Phase III RFI Field Activities; Task 02 Deliverable

Dear Mr. Manning:

Please find enclosed TechLaw's Field Oversight Report of the Phase III RCRA Facility Investigation (RFI) activities at the Johnson Controls, Inc. Facility in Fowlerville, MI. TechLaw personnel conducted field oversight on June 21 and June 22, 2000. During and after the oversight activities, TechLaw provided Mr. Juan Thomas with a verbal briefing of the oversight activities. In addition, since field conditions during the oversight period were not optimal, the facility did not conduct the entire Phase III RFI (i.e., sediment sampling of the Red Cedar River was not completed). Therefore, a second trip to the site in the near future may be warranted. We will provide an update on this as additional details are made available.

Please feel free to contact either myself or Mr. Terry Uecker at (312) 345-8974 if you have any questions.

Sincerely,

John Koehnen

John Koehnen
Regional Manager

cc: F. Norling, EPA Region 5 Project Officer (w/out att)
J. Thomas, EPA Region 5
T. Uecker
W. Jordan/Central Files
Chicago Central Files

JOHNSON CONTROLS, INC.
FOWLERVILLE, MI
EPA ID NO. MID099124299

FIELD OVERSIGHT REPORT
FOR PHASE III RFI FIELD ACTIVITIES

Submitted to:

Mr. Thomas Manning
U.S. Environmental Protection Agency
Region 5 - DW-8J
77 West Jackson Boulevard
Chicago, Illinois 60604

Submitted by:

TechLaw, Inc.
20 N. Wacker Drive, Suite 1260
Chicago, Illinois 60606

EPA Work Assignment No.	: R05703
Contract No.	: 68-W-99-017
TechLaw WAM	: Terry Uecker
Telephone No.	: 312/345-8974
EPA WAM	: Thomas Manning
Telephone No.	: 312/886-6943
EPA TA	: Juan Thomas
Telephone No.	: 312/886-6010

June 29, 2000

JOHNSON CONTROLS, INC.
FOWLERVILLE, MI
EPA ID NO. MID099124299

FIELD OVERSIGHT REPORT FOR PHASE III RFI FIELD ACTIVITIES

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JOHNSON CONTROLS, INC.
FOWLERVILLE, MI
EPA ID NO. MID099124299

FIELD OVERSIGHT REPORT FOR PHASE III RFI FIELD ACTIVITIES

1.0 Introduction

At the request of Mr. Thomas Manning, the United States Environmental Protection Agency (U.S. EPA) Work Assignment Manager (EWAM) and Mr. Juan Thomas, the U.S. EPA Technical Advisor (TA), TechLaw, Inc. (TechLaw) performed oversight of the Phase III Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI)-related field activities at Johnson Controls, formerly known as the Stanley Tools Facility (Facility) in Fowlerville, MI. The oversight was performed under the RCRA Enforcement Permitting and Assistance Contract No. 68-W-99-017, EPA Work Assignment No. R05703, Project 10, Task 02.

This field oversight was conducted June 20 and 21, 2000 by Mr. William Hopkins of TechLaw. Oversight activities included observation of Geoprobe™ soil boring and groundwater sampling performed by URS/Dames & Moore. This work corresponds to trichloroethene (TCE) Source Identification (Objective 2) of the Revised Phase II RFI Work Plan, Former Stanley Tools Facility, Fowlerville, MI dated December 3, 1999 (Work Plan). In addition, TechLaw performed a general site reconnaissance of the facility, including assessment of conditions at the Red Cedar River. A figure depicting the majority of sampling locations observed is included as Appendix A of this report. Appendix B of this report contains a photograph log documenting field activities, and the field log is included as Appendix C.

2.0 Summary of Field Activities

TechLaw personnel arrived at the Facility on June 20, 2000. Mr. Hopkins of TechLaw met with Ms. Stacey Lane, Geologist and Site Safety Officer for Dames and Moore. Also present were Mr. Chris Spielman of Dames and Moore and Mr. Dave Castle of Belasco Drilling Services, Inc. After a health and safety briefing, TechLaw began observation of the TCE source identification borings and associated soil and groundwater sampling. During the oversight period, general site reconnaissance was also conducted, including an assessment of water levels on the Red Cedar River. These observations are documented below.

Field Oversight Observations

The following subsections provide a brief discussion of the notable observations made during the oversight activities.

2.1 Geoprobe Boring Locations

TechLaw personnel were present during the installation of Geoprobe soil borings for the TCE Source Identification (Objective 2) of the Work Plan. These borings were performed to collect soil and groundwater samples in an attempt to define the potential source of previously detected TCE around monitoring well (MW)-L1.

Geoprobe™ activities were performed by Belasco Drilling Services, Columbus OH. Equipment used included a Simco 2400 DrillTeam Geoprobe™ mounted on a Ford F350 chassis. Borings were advanced using a direct push method of 4-foot sections of 1 1/4 inch hollow outer rods with a 4-foot inner acetate sleeve for sample collection. Each of the acetate sleeves was then logged by Dames and Moore personnel and screened with a photoionization detector (PID) (see discussion of sampling in Section 2.2 below).

A general diagram of the TCE Source Identification sampling locations near MW-L1 and the corresponding sample designations is provided in Appendix A. Further discussions of sampling locations in this oversight report will utilize this nomenclature. For example, "TCE-3" refers to TCE Source Identification, boring number 3. Samples collected and prepared for laboratory analysis utilize similar nomenclature. For example, "SO-TCE-3-7-8", refers to soil samples at the TCE-3 location, taken at a depth of 7-8 feet below ground surface (bgs). Conversely, "GW-TCE-3-7" refers to a groundwater sample at the same location at a depth of 7 feet bgs.

TechLaw personnel observed differing geology in several of the TCE borings near MW-L1. Several of the borings contained a wet sandy layer that extended to depths down to 20 feet bgs. The borings with the deeper sand layer (boring numbers 6, 9, 10, and 12) appeared to correlate with a slight surface depression which extended through the area. Boring logs for the reference well for this area, MW-L1, indicate that it was only drilled to a depth of 13.4 feet. Therefore, there is apparently a different geology in certain areas around MW-L1 that was not reflected by past investigations.

2.2 Soil Sample Collection

As discussed above, each of the collected acetate sleeves were screened with a PID meter. Dames and Moore used a Photovac Microtip HL-2000 PID meter for screening. Soil samples were collected for volatile organic compounds (VOCs) using EnCore 5 gram plug samplers. Three EnCore samplers were used to collect each VOC sample. Samples were collected in areas with the highest PID hits. In the absence of PID hits, samples were collected within the middle confining layer, which ranged from 4-10 feet bgs. An additional 8 ounce soil jar was also collected at each location. Dames and Moore informed TechLaw that the additional 8 ounce soil jars were collected to conduct geophysical tests.

(how many... were collected for each probe (at this area))

Yes... confining layer was penetrated

which ones did... which ones did not
All but TCE-7

how was this determined
how was that established? and how does this affect the PID ... what info do you have that supports this claim

The ~~majority~~ of soil borings near MW-L1 did not register significant PID hits (e.g., greater than 10 parts per million(ppm)). The boring at TCE-7, which is nearest to existing MW-L1, did register elevated PID hits. The TCE-7 boring was advanced on June 21, 2000 at 0920. During the time the boring was advanced, a series of weather fronts and humidity changes appeared to affect the PID meter's accuracy as background readings went as high as 50 ppm. However, PID readings at the TCE-7 borehole and soil cuttings remained significantly higher than background (up to 150 ppm above background).

where were they?

?

2.3 Groundwater Sample Collection

what was used and when was it established and how ... this should be an awareness time interval.

Groundwater samples were collected at each of the boring locations. Samples were collected using the following methodology. Upon completion of the soil boring, the hollow drill rods were removed from the borehole. A one-half inch polyvinyl chloride (PVC) pipe was then placed down the borehole to the selected depth. The end of the PVC pipe was slotted using a hacksaw to allow entry of groundwater and screening of sand. Three-eighths inch polyethylene tubing was then advanced down the PVC pipe. The polyethylene tubing was attached to a short length of silicone tubing that was used in the peristaltic pump (Dames and Moore used a portable MasterFlex Sampling Pump). A column of water was drawn from the well. The polyethylene was removed from the pump and used to pour into three I Chem 40-ml VOC bottles. If the total amount of water required per location (i.e., 120 ml) was not collected on the first attempt, the procedure was repeated.

Complete samples were collected at each of the locations with the exception of TCE 5. TCE 5 was a relatively dry hole which produced insufficient quantities to fill all three bottles. Therefore, only two bottles were filled at this location. In addition, the quality of water varied from location to location. Generally, samples collected contained various degrees of sand and other suspended sediments.

2.4 General Site Reconnaissance

During breaks between soil borings at the TCE Source Identification locations, TechLaw personnel performed a general site reconnaissance. The site was walked and photographs were taken of various locations.

Of particular interest was the water level of the Red Cedar River. The Work Plan called for a Screening Level Evaluation of the Red Cedar River sediments (Objective 3). TechLaw was informed by Dames and Moore that, due to poor visibility and high water levels caused by recent heavy rainfall, it would be unsafe to enter the river and collect sediment samples. On June 20, 2000, TechLaw acquired keys to the Red Cedar River gate, evaluated river levels, and took photographs. Observations confirm Dames and Moore's position that current conditions were unsafe to perform sampling. However, given the relatively small width and depth of the Red

per Bill Hopkins 10 ppm - an arbitrary threshold based on Bill's experience

Cedar River, it is possible that conditions have improved since the last reconnaissance. If water levels do not recede, alternate sediment collection methods could be pursued, such as use of a ponar dredge or hand auger.

3.0 Conclusions and Recommendations

TechLaw observed two days of soil borings performed by Dames and Moore. Generally, the work plan was adequately followed and work activities conducted appeared to match Objective 2 of the Work Plan. TechLaw was not present during groundwater collection (Objective 1) conducted during the week of June 12, 2000. As discussed above, Objective 3 of the work plan, the collection of sediments from the Red Cedar River, was not conducted due to elevated water levels.

Based on the chosen field screening tool, the PID, the area of concern appears to be the TCE 7 boring in the vicinity of MW-L1. As discussed above, this boring location displayed PID hits significantly higher than background both in the cuttings and at the borehole. Samples at this location and surrounding upgradient and downgradient locations should be further evaluated to determine potential source and/or migration.

As a general point, however, a PID screening is qualitative in nature. Chlorinated solvents, such as TCE, generally have a higher ionization potential and are more difficult to register on a PID. Therefore, an evaluation of the analytical results for the soil and groundwater samples in this area is needed to accurately assess potential source/migration issues.

So PID hits are not [illegible] to [illegible]

As discussed in Section 2.1 above, several of the borings exhibited differing geologies. The reference monitoring well (MW-L1) was only extended to a depth of 13.4 feet, whereas some of the newer borings were showing the bottom confining layer at depths ranging to 20 feet bgs. Therefore, TechLaw recommends that Dames and Moore plot and create new cross sections for the area to define and illustrate the potential presence of sand lenses and differing confining areas in the localized area around MW-L1.

APPENDIX A

Diagram of TCE Source Identification Boring Locations and Sample Designations

View of select TCE Source Investigation sampling locations and numbering system in the vicinity of SWMU L and MW-L1. Drawing adopted from Figure 3 of Phase III RFI Work Plan.

--Not to Scale--

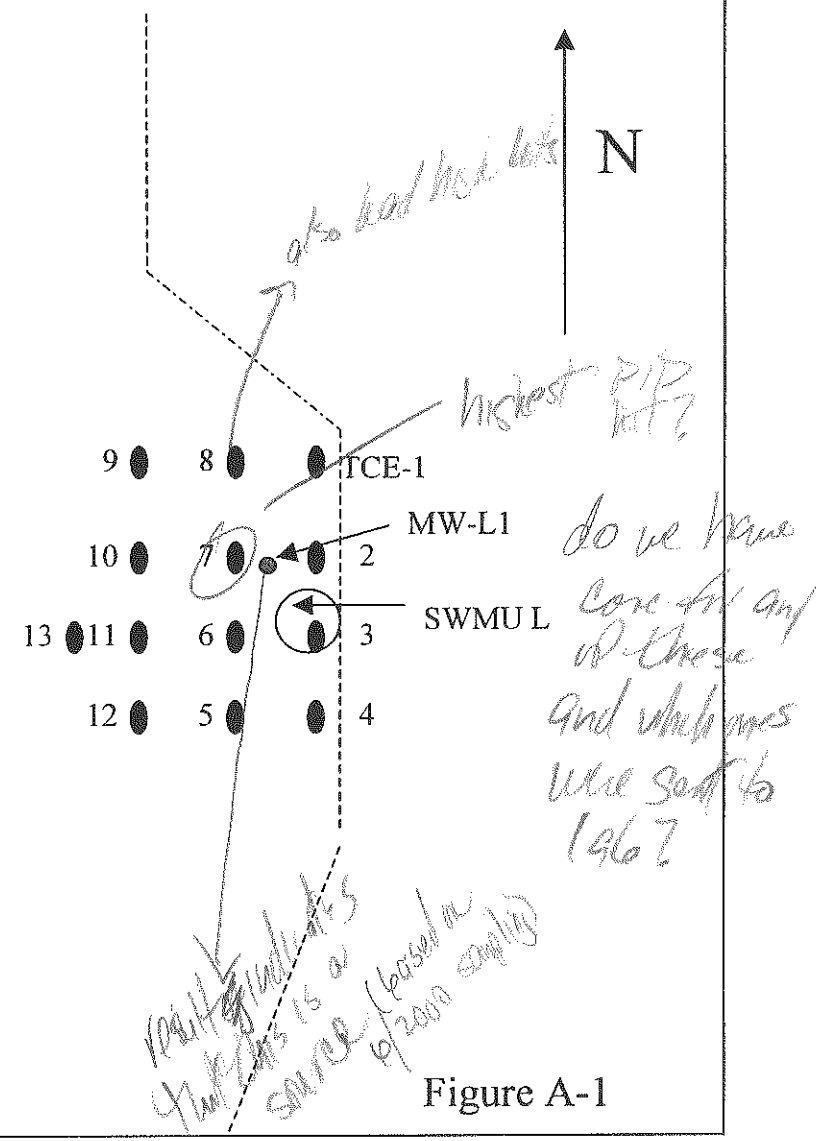


Figure A-1

Johnson Controls - Fowlerville

TechLaw, Inc. - WA R05703,
Contract No. 68-W-99-017

APPENDIX B

PHOTOGRAPH LOG

Photograph No.: 1
Date: 6/20/00

Time: 1250
Direction: SE

Description: View of truck-mounted Geoprobe™ boring at sample location TCE-3. Note Monitoring Well (MW) L1 in foreground.

Photograph No.: 2
Date: 06/20/00

Time: 1305
Direction: N

Description: View of 8 to 12 foot acetate section of boring TCE-3. Note wet sandy clay from 8-10' (left to right) and confining layer of grey clay from 10-12'.

Photograph No.: 3
Date: 06/20/00

Time: 1345
Direction: W

Description: View of water sampling activities at TCE-3 utilizing peristaltic pump.

Photograph No.: 4
Date: 06/20/00

Time: 1347
Direction: N

Description: View of Dames and Moore personnel filling 40 ml VOC bottles with groundwater at TCE-3.

Photograph No.: 5
Date: 06/20/00

Time: 1415
Direction: S

Description: View of Red Cedar River. Field observations confirm elevated water level with poor visibility.

Photograph No.: 6
Date: 06/20/00

Time: 1420
Direction: NE

Description: Additional view of the Red Cedar River.

Photograph No.: 7
Date: 06/20/00

Time: 1425
Direction: N

Description: View through fence line of Closed RCRA surface impoundments (settling ponds).

Photograph No.: 8
Date: 06/20/00

Time: 1430
Direction: NW

Description: View of area of untreated sludge disposal from approximate location of MW-A2. Note that the location is heavily overgrown with brush.

Photograph No.: 9
Date: 06/20/00

Time: 1435
Direction: SW SE?

Description: Panoramic view of site taken from parking lot area. Note TCE source identification sampling underway in distant background.

Photograph No.: 10
Date: 06/20/00

Time: 1435
Direction: SE
?SW?

Description: Additional panoramic view of site from parking lot. Red Cedar River flows from left to right behind blue sheet metal buildings in background.

Photograph No.: 10
Date: 06/20/00

Time: 1435
Direction: SE
?SW?

Description: Additional panoramic view of site from parking lot. Red Cedar River flows from left to right behind blue sheet metal buildings in background.

Photograph No.: 11
Date: 06/20/00

Time: 1445
Direction: E

Description: View of adjacent off-site property to east of TCE source identification sampling area.

Photograph No.: 12
Date: 06/20/00

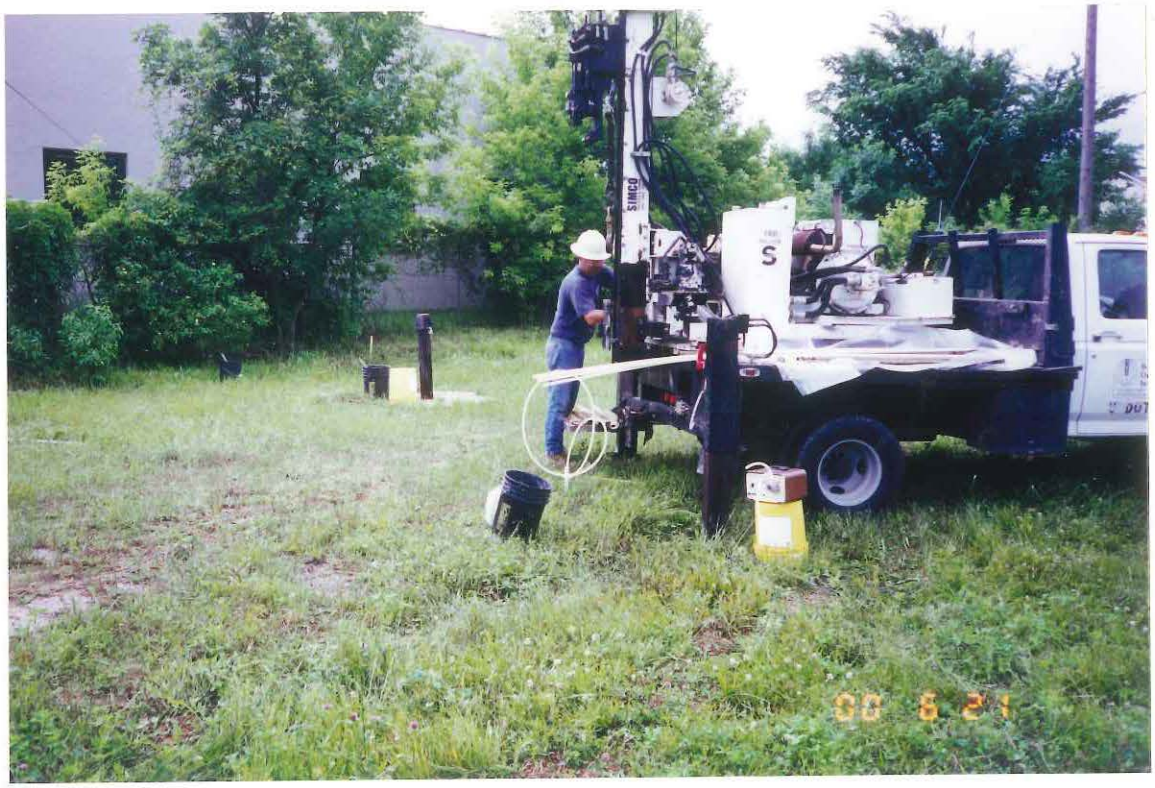
Time: 1615
Direction: S

Description: View of Geoprobe[tm] sampling at TCE-6.

Photograph No.: 13
Date: 06/20/00

Time: 1825
Direction: N

Description: View of decontamination procedures for drilling rods.



Photograph No.: 14
Date: 06/21/00

Time: 1050
Direction: SE

Description: Water sampling at TCE-7 boring location. TCE-7 was the location of highest PID readings. Note MW-LI immediately SE of boring location.

Photograph No.: 15
Date: 06/21/00

Time: 1414
Direction: S

Description: View of soil sampling and boring log preparation for TCE-5 boring. Samples taken using 5 gram EnCore soil samplers.

Photograph No.: 16
Date: 06/21/00

Time: 1420
Direction: E

Description: View of purge water drums from site groundwater sampling conducted during the week of June 12, 2000. Note that TechLaw personnel were not present during groundwater quality assessment.

Photograph No.: 17
Date: 06/21/00

Time: 1440
Direction: S

Description: View of boring activities at TCE-12. Lower confining layer at TCE-12 is approximately 21' BGS. Although difficult to interpret on the photograph, a slight surface depression extends through TCE-12 boring location

Photograph No.: 18
Date: 06/21/00

Time: 1630
Direction: SE

Description: Groundwater sampling at TCE-5. TCE-5 location was a relatively dry well. Three attempts were made to collect water and only 80 out of 120 ml were collected.

APPENDIX C

FIELD LOG

"Rite in the Rain"®

ALL-WEATHER WRITING PAPER

HORIZONTAL LINE

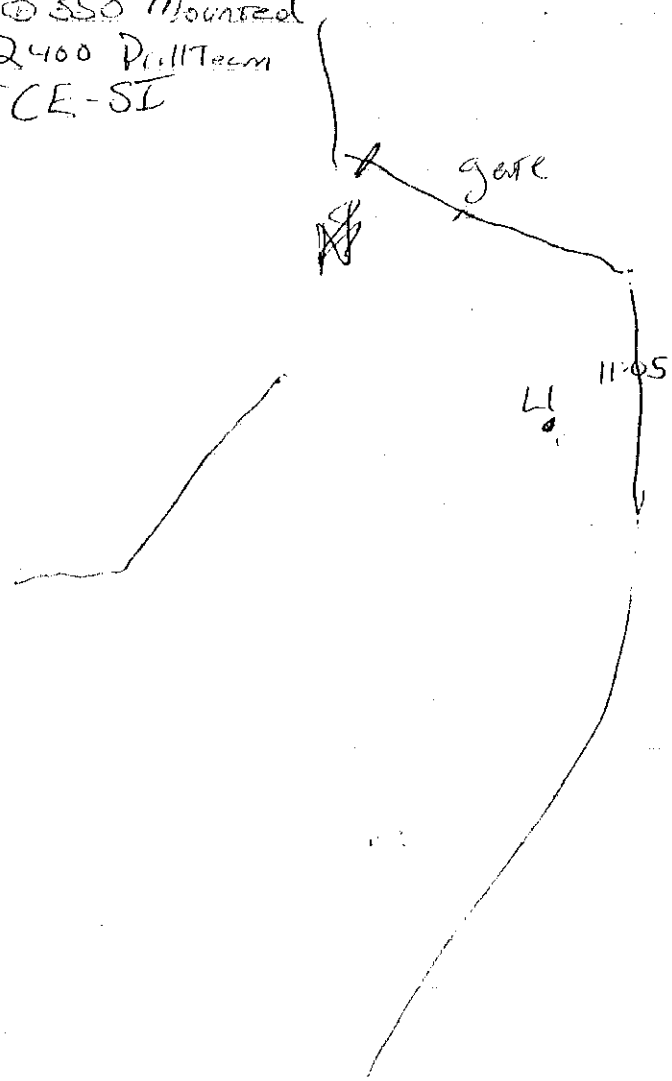
All-Weather Notebook

No. 391

Johnson Controls
Fowlerville, MI

4 5/8" x 7" - 48 Numbered Pages

GP = Belasco Drilling Svcs, Inc.
Columbus, OH
f@ 350 Mounted
Simco 2400 DrillTeam
TCE-SI



6/20/00 -
Travel Chicago - Fowlerville, MI
Arrive JCI, 1100 EST
Meet w/ Stacy Lane / D&M
Geologist & Safety Officer
Chris Spielman / D&M
Geologist
Dave Castle
Driller

Working on GPs S/E Near MW-LI
SL informed me that they advanced
a GP prior to my arrival w/ Encountered
Water at 2 intervals

→ Dennis & Bill - Phone Call
w/ D&M - 12:07
Connair
Probing - Successful =>
- De-Mob

OBJective - Characterize TCE Phase
? was Contling Unit

Conditions / Pt Cloudy - Windy TW

Sampled

SOTCE9- 2-3 ft

" 4

" 7-8

PID - Microtip HL-200

5 gram En Core x3

3 Plugs VOCs

8 oz Soil Jar Geotechnical Properties

Photo 1 12:50

8-12 Facing SE

L1 in Foreground

TCE3-

L1 in Foreground

SL - OBS. Confining Layer

TCE-9 -

Silty Clay 3 ft

" Sand 3-7 - Water - Wet zone

Tight Silty Clay 7-8

Fine Coarse grain 8 - ~~22~~ 16 = ~~Water~~ Heave

Back ground

H & Safety Briefing

SL - Signed / Understood

12:45 EST

TCE 3 - Drilled, Sampled at ~~25~~

SO - TCE3 - 3-4 Above Water Table

Water 4-8

12:50 - Conversation w/ SL

→ No Way to Ensure Deep vs Shallow integrity is kept w/ 2 separate water tables

(* P2) TCE 3 N 1:03

Wet Sand | ~~Dry native grey~~ Clay

~~6~~ 12

4 G Acetate Sleeve 1 1/8
Direct Push

12 Sandy WET water | 16 Tight Clay

Water Sampling

Portable Masterflex Sampling Pump

[P3] 1347 PVC Down hole to 18'
Pumping West
Insert 3/8" Polyethylene tubing, Attach to Pump via

[P4] Sampling North 3X 3.020- 1347
Pulled ~~Sand~~ Sand/Slush
Sand w/water

2nd Attempt, More water, less Sand
Same
3rd Attempt - New PE used at Each Boring

Site Recon / Photos -

P5	River ~~North~~	S	2:15
P6	River	NE	
P7	ADE - Pond	N	
P8	F -	NW	
9	Panorama	SW	
10	"	SE	2:30

P11 - offsite E Over SWMU 2:45

Power too deep & too fast to Safely wade -

Conversation w/ S Lane & C. Spielman - Moral abnormal use of GP - By drillers - Push a pipe down to a depth - Non Cohesive Soils
Secondary Pipe to depth down
Drive a hole down to a Correspoint
Correct Coring Unit for Soil Samples
2 Water Samples above 151

2:50 -
Same TCE-3 hole -
→ Conditions Δ - Rain, Scattered showers
Using PT Internal to Casing
going 16-20
1. Drilled in casing w/Pow / Removed PT -
2 Gr Conbrin

" Inner Rod to take discrete
H2O Sample => "

~~3:45~~ Start TCE 6
4.06 SOTCE6-7-8
Sanding PT => → 1630
"SL
1(no PID hits, take Sample
from Middle confining"

P12 - South -
Drilling TCE 6

0-4' Clay - Sandy brown clay
4-8' Clay - clay 7-8 Sample
8-12' Brown

12-14 - Silty → gravels
14-16 fine Sand - Coarse, fine
Well Sorted -
16-20 - fine Sand - no layers -
Stopped - Hole -

Waterlin 15' TCE6
PT Try 1.8

P13 -- North - Decon Rods.
6:25 = 1825

De-Mob 6:30

Conditions - Cloudy, Wet

Photovac MicroTip HL-2000

URS ~~Varnel~~ New Name for D&M

6/21 - 0630 Arrive on Site
Meet w/ S. Lane, C. Spielman, D. Castle -
Safety Briefing

0740 - Start TCE-2
0-4' - No PID -
Clay
4-8' Water @ 7' No PID
8-10' - Goal - To get a sample of
upper water, Push down 2' - rocks
3.1 PID - Wet Sand - Clay

* Soil Sample - SOTCE2-9-10 0810
- 5 gram EnCore Plug Samples X3
Sc. 8 & 7 P3 VOC 8260

* Shallow Water Sample
GWTCE2-9

10-14' Wet Sand
14'-18' Wet Sand - Continuing 17'

* Deep Water Sample →
GWTCE2-17

High PIDs — ✓ w/health & Safety

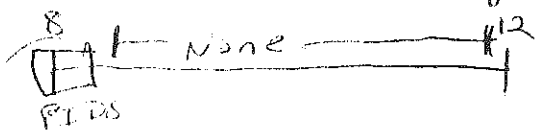
Maximum Breathing Space —

Water — go in — then Back off
12 inches →

* P 13 → 1050
4(B1) Looking SE — None
L1 in Background
high PIDs Δ 150 Back

Still getting Sand in water Sample — discussions w/home office Suggest running a volume of water through pump to clear sand, then collect GW Sample →

Start TCE 7 — 0920
0-4 Clay Some PID Hits — Sand
High PID in Sand — will Sample
SO TCE7 3-4 — SO → 70-80 PPM
4-8 — High PID — Δ 30
1020 But high Background will Also Sample
Weather Δ — warm
SOTCE7 — 6-7
8'
8-12 High PID at hole
Background SO → 120-Δ 70 PPM
195 Δ 150 PPM
Will Take H2O Sample



↓ Water Sample 7'
1100 — Weather Δ again — Re-PID =
Background 0 - Δ 10 f

WP

S. Lane Informed me Samples will be Screened / & highest PID, or Cleared around high hits

Small wet layer 10-11

Sample
SO1CE10-6-7
" 10-11

4-
S.O.1.CE4-5

Still at TCE7
Lunch 1120-1200
1200 Recalibrate PID - 0.3
"Sharpie √ worked" - Hole = 2
Borings . 6-10 - After Lunch -

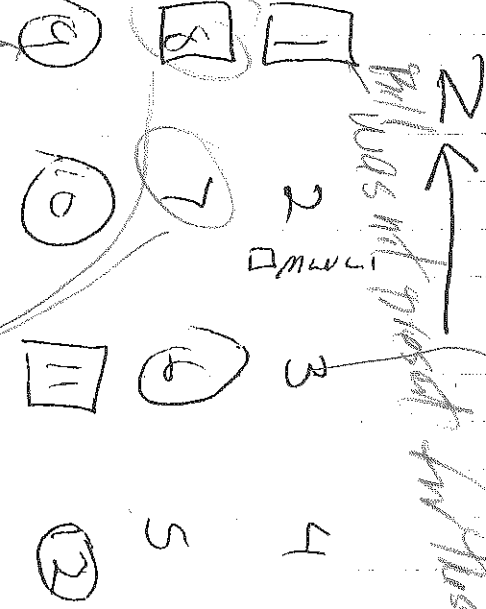
Set-up & Start TCE10 closest 1220
Downgradient to TCE7 A.O.C
PID hits

0-4 - Minimal PID clay
4-8 Minimal " HOLE - ≈10.0
8-12 No PID wet sandy
12-16 GO @ ≈16 - 1:05-2:08
Sandy
Recovered 4' more - PID Hits, lighter
16-20 - Clean like end -, 16-20
came Back clean

1.20 - Start TCE 4
0-4 - Minimal PID at surface
4-8 Minimal @ 4'
8-12 Nice horizon to Confining layer - wanted Sample at Around 10'

Boring Layout - TCE

Seems to correlate w/ Visible ~~Usual~~ Surface Expression (Depression)



Took Water Samples from 10-
4-5 12 BW 3-5:00 P.M
GWTCE10 - 10-11 OK-Dup
GWTCE4 - 10 11 OK
GWTCE 5 - 10.11 - Small Volume
GWTCE 12 - 20
4:30
De Mob - 5.30

P18-P19 Dry Rerry →
OK Rerry →

10
Water Samples Taken
using I Chem 40 ml VOA SOTCES-67

OW TCES - 9-10

P-15 (BH) S.
D & M Extracting
Samples from
TCES
2:14

P 16 (BH) East
2:20
Drums from last weeks
groundwater Sampling

Start
TCES 1:45

0-4 - No PID Clay, Sand
4-8 " " Clay, wet Clay
8-12 - wet clay, dry Clay no PID

TCE12 2:21 - Start
0-4 Minimal - Surface
4-8 no Wet Seams Seen in other
8-12 holes
12-16 - Rock
16-20 wet Sandy clay -
No obvious Confining layer
20-22 - Hit rock -
P 17 (BH) Facing South -
Drilling - TCE12

2:40
Surface Depression

6, 7, + 9 were definitely sent to lab... were sent to
(20 ppm) (15 ppm) (15 ppm)
lab because of proximity to TCE-7 were a high
hit

JOHNSON CONTROLS, INC (THE FORMER STANLEY TOOLS FACILITY OF FOWLERVILLE, MI) DECEMBER 30, 2002 3008 h) STATUS MEETING AGENDA
DECEMBER 17, 2003

ATTENDANCE SHEET

Name	Affiliation	Phone	E-mail
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R

Shelly
(31W) Hooks
902
7482

USEPA AND JOHNSON CONTROLS, INC (THE FORMER STANLEY TOOLS FACILITY OF FOWLERVILLE, MI) DECEMBER 30, 2002 3008 h) STATUS MEETING AGENDA DECEMBER 17, 2003

I. INTRODUCTIONS

II. PURPOSE OF MEETING: December 30, 2002 JCI 3008h) status meeting including submission of Draft Environmental Indicators Reports (EI 725 & 750). As well as to allow the JCI Team to present their accomplishments to date in meeting the terms of the Performance-Based Administrative Order on Consent.

III. DISCUSSION POINTS - Presentation by JCI Team

IV. CLOSING COMMENTS

V. ADJOURN

JOHNSON CONTROLS, INC (THE FORMER STANLEY TOOLS FACILITY OF FOWLERVILLE, MI) DECEMBER 30, 2002 3008 h) STATUS MEETING AGENDA
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GARY CYGAN	"	312 886 5902	cygan.gary@epa.gov

Quarterly Progress Report
Former Stanley Tool Works
Fowlerville, Michigan
October 15, 2003

This quarterly progress report has been prepared in accordance with the Administrative Order on Consent (AOC) for the Stanley Tool Works facility (Docket #RCRA-05-2003-0004). The report presents a summary of completed project activities to date, analytical data received, upcoming schedule of activities, issues encountered and resolutions, and an updated master schedule for the project. Also attached is the groundwater monitoring well location map and the site grading plan.

COMPLETED PROJECT ACTIVITIES TO DATE

USEPA/MDEQ Interaction

- Held quarterly review meeting with USEPA at the site on July 22, 2003
- Representatives from MDEQ visited the site on August 12, 2003
- Regular telephone conference calls with USEPA and project team representatives
- A conference call was held on September 4, 2003 with Juan Thomas, Mario Mangino, Boomha Sundhar, Carolyn Bury, Gary Cygan, Tony Martig of the USEPA and the ENTACT/EarthTech-Weston team to discuss the Red Cedar River sediment and EI Guidance
- TeamLink Website
    - Continuous updates of the website to enable agency access to site information, site drawings, and current and historical laboratory analytical data

Project Plans and Correspondence

- TSCA coordinated approval for the excavation and management of PCB impacted soils and free product was received verbally after submission and subsequent revisions of the PCB Interim Measures Work Plan
- EarthTech/Weston submitted a "Sediment Technical Document" describing the planned approach to addressing sediment in the Red Cedar River. Based on comments received by the USEPA a full sediment evaluation will be performed in preparation for the EI Report
- A revised Right of Entry Agreement was submitted to CSX Railroad to allow excavation in the south ditch adjacent to the rail line

Investigation Activities

- Red Cedar River sediment sampling, data evaluation, and planning
- Geoprobe and monitoring well installation for groundwater investigation on-site
- Geoprobe and monitoring well installation for groundwater sampling east of site
- Groundwater investigation east, west and south of the site

- Test pitting
- Subsurface soil sampling with geoprobe on and off site
- Surface soil sampling on site and under stockpile areas
- Floodplain soil sampling
- Geotechnical testing for hydraulic conductivity to support groundwater flow modeling
- Monitoring with an interface probe to document free product removal

Interim Measures Activities

- Interim Measures for F001 and TCE impacted areas
    - Completed removal of TCE impacted soils in the southern portion of the site
    - Soils characterized as F001 were disposed of at EQ
    - Areas were backfilled upon receipt of verification sample results
- Interim Measures for PCB impacted areas
    - PCB area was characterized prior to excavation by sampling in 50 foot or 25 foot grids in accordance with the approved PCB Work Plan
    - PCB impacted areas were excavated from discrete areas based on pre-excavation characterization sampling and historical data. Soils were managed and disposed of off site based on the pre-excavation characterization.
    - Soils that contained incidental liquids were mixed with a drying agent in the area of excavation until the material passed the paint filter test for off site transportation and disposal
    - Groundwater encountered during soil removal activities was inspected for the presence of free product kerosene. Absorbent booms were used to remove visible sheen and the booms were containerized for off site incineration
    - Areas were backfilled upon receipt of verification sample results
- Interim Measures for metals impacted areas
    - The balance of metals impacted areas was removed during a mass dig effort starting in the northwest corner of the site. Excavations extended to the Red Cedar River bank to the west.
    - Portions of the north ditch were excavated during the mass dig effort. This was the northernmost extent of excavation. The eastern extent of excavation was based on sidewall verification sampling.
    - Clearing and grubbing was done in areas to be excavated and along the riverbank to allow excavations to proceed. The fence running adjacent to the Red Cedar River was removed to allow access.
    - Areas were excavated to groundwater or when verification samples indicated the cleanup criteria was achieved. Verification samples were collected from the sidewalls of the excavation limits and from the excavation floors if no groundwater was encountered.
- Backfilling and site grading
    - Class II Sand was used as backfill to achieve restoration design grade elevations and overlain with a topsoil vegetative layer
    - Approximately 2.5 acres of wetland construction and seeding north and west of SWMU A

    - Clay was used as backfill along the Red Cedar River bank to provide additional structural support during heavy river flows
    - Temporary erosion matting was installed along 450 linear feet of east river bank to ensure vegetative growth and reduce topsoil erosion
    - Final grading elevations were established based on the 100 year floodplain elevations
- Land Surveying
    - Surveying of sampling points, test pit locations, physical features, etc. has been continuous during site work
    - X and Y coordinates are being measured with a GPS unit. Vertical information is not being collected at most locations at this time
    - Location coordinates are being continuously incorporated in site CAD drawings and the site GIS
    - Top of casing elevations survey for newly installed monitoring wells has been completed by a registered land surveyor
- Graphical Information System (GIS)
    - Continuous updates with sample location coordinates and laboratory analytical data from the site are on-going

ANALYTICAL DATA RECEIVED

- Analytical data received during the reporting period has been, or is in the process of being posted on the website
    - Verification sample results in TPH, chromium, and TCE areas
    - Characterization samples collected along the Red Cedar River bank at 15 foot intervals or based on visual presence of chromium
    - Sediment samples from Red Cedar River
    - Confirmation sampling for offsite disposal
    - Backfill characterization samples for imported fill material
    - Soil samples from SWMUs A and G to expand the laboratory analytical suite for cleanup confirmation used during pre-2003 interim measures efforts.
    - Groundwater samples from onsite monitoring wells and GeoProbe locations
    - Groundwater samples from offsite monitoring wells and GeoProbe locations
    - Surface and subsurface soil samples from areas outside of completed excavation

UPCOMING SCHEDULE OF ACTIVITIES

- Quarterly review meeting scheduled at the site on October 23, 2003
- Finish excavation in the south ditch upon approval from CSX Railroad
- Continue vegetative cover placement and grading disturbed areas of the site
- Seed and mulch disturbed areas and complete site restoration activities
- Complete installation of the groundwater monitoring well network
    - Complete additional groundwater sampling as necessary
- Complete additional sediment sample collection
- Complete fish tissue sampling and analysis

- Collect additional water level data to assist in the groundwater flow evaluation
- NPDES joint permit application for potential dredging of the river sediment has been prepared and will be submitted following sediment characterization and evaluation
- Environmental Indicator reports
    - Initial draft of the both reports completed
    - On-going updates of drafts based on completion of IMs and sample analytical data review
- Final Corrective Measures Proposal
    - Interim Measure Completion Report

PROJECT MASTER SCHEDULE

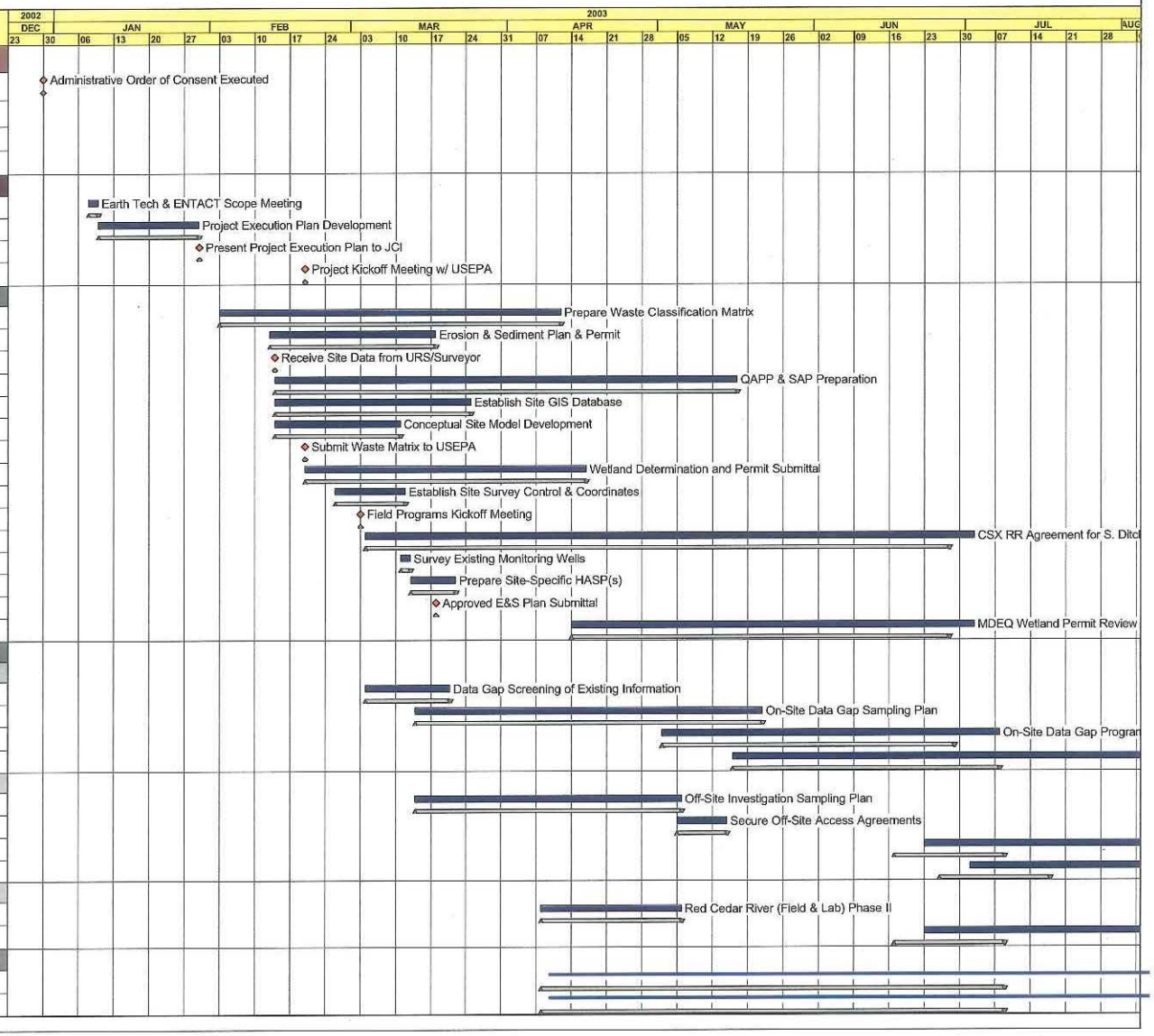
An updated project master schedule is attached

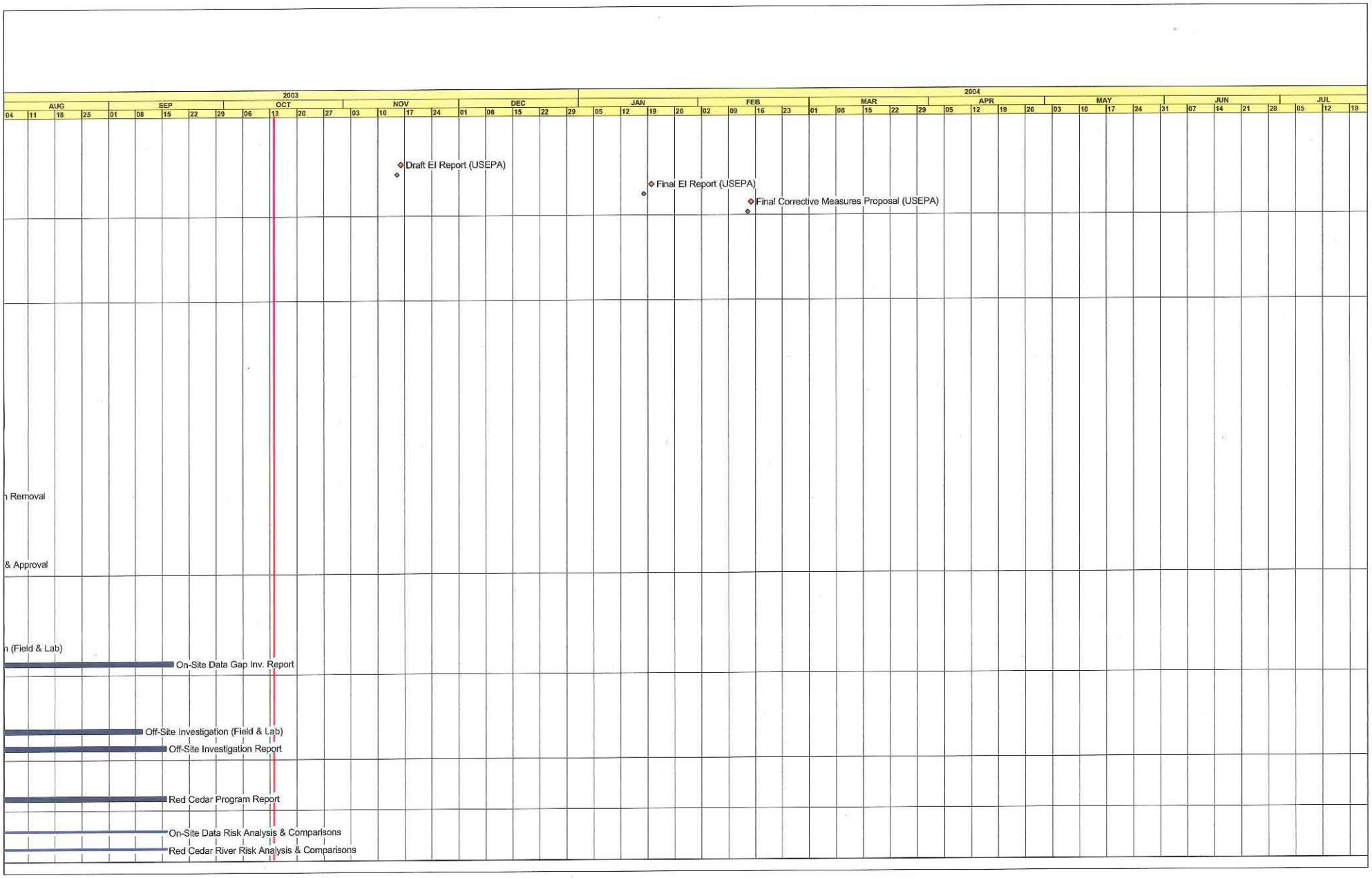
ISSUES AND RESOLUTIONS

- The project team has discussed with the USEPA the possible need to request a 90-day extension to complete groundwater characterization for submission of the EI reports and the Final CMP. The monitoring well installation was delayed because of an increase in projected excavation volumes and sequencing of excavation activities with monitoring well installation. Monitoring well installation and sampling has been accelerated and we will keep the USEPA informed of progress.

Former Stanley Tools Facility - Fowlerville, Michigan
Updated Project Schedule

Description	Orig Dur	Early Start	Early Finish	Log Text 1
Former Stanley Tools Facility				
Administrative Order of Consent Executed	0	30DEC02 A		
Draft EI Report (USEPA)	0		15NOV03 *	
Final EI Report (USEPA)	0		19JAN04 *	
Final Corrective Measures Proposal (USEPA)	0		14FEB04 *	
Consulting/Engineering				
Earth Tech & ENTACT Scope Meeting	2	08JAN03 A	09JAN03 A	
Project Execution Plan Development	14	10JAN03 A	29JAN03 A	
Present Project Execution Plan to JCI	0		29JAN03 A	
Project Kickoff Meeting w/ USEPA	0	20FEB03 A		
Project Plans & Permits				
Prepare Waste Classification Matrix	13	03FEB03 A	11APR03 A	
Erosion & Sediment Plan & Permit	23	13FEB03 A	17MAR03 A	
Receive Site Data from URS/Surveyor	0		13FEB03 A	
QAPP & SAP Preparation	30	14FEB03 A	16MAY03 A	
Establish Site GIS Database	35	14FEB03 A	24MAR03 A	
Conceptual Site Model Development	17	14FEB03 A	10MAR03 A	
Submit Waste Matrix to USEPA	0	20FEB03 A		
Wetland Determination and Permit Submittal	20	20FEB03 A	16APR03 A	
Establish Site Survey Control & Coordinates	10	26FEB03 A	11MAR03 A	
Field Programs Kickoff Meeting	0	03MAR03 A		
CSX RR Agreement for S. Ditch Removal	30	04MAR03 A	02JUL03 A	
Survey Existing Monitoring Wells	2	11MAR03 A	12MAR03 A	
Prepare Site-Specific HASP(s)	7	13MAR03 A	21MAR03 A	
Approved E&S Plan Submittal	0		17MAR03 A	
MDEQ Wetland Permit Review & Approval	30	14APR03 A	02JUL03 A	
Data Gap Analysis & Investigation				
On-Site Investigation				
Data Gap Screening of Existing Information	13	04MAR03 A	20MAR03 A	
On-Site Data Gap Sampling Plan	15	14MAR03 A	21MAY03 A	
On-Site Data Gap Program (Field & Lab)	25	02MAY03 A	07JUL03 A	
On-Site Data Gap Inv. Report	20	16MAY03 A	17SEP03 A	
Off-Site Investigation				
Off-Site Investigation Sampling Plan	15	14MAR03 A	05MAY03 A	
Secure Off-Site Access Agreements	10	05MAY03 A	14MAY03 A	
Off-Site Investigation (Field & Lab)	20	23JUN03 A	09SEP03 A	
Off-Site Investigation Report	20	02JUL03 A	15SEP03 A	
Red Cedar River				
Red Cedar River (Field & Lab) Phase II	30	08APR03 A	05MAY03 A	
Red Cedar Program Report	20	23JUN03 A	15SEP03 A	
Risk Analysis & Control Evaluation				
On-Site Data Risk Analysis & Comparisons	149 *	08APR03 A	15SEP03 A	
Red Cedar River Risk Analysis & Comparisons	149 *	08APR03 A	15SEP03 A	

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Draft EI Report (USEPA)
Final EI Report (USEPA)
Final Corrective Measures Proposal (USEPA)
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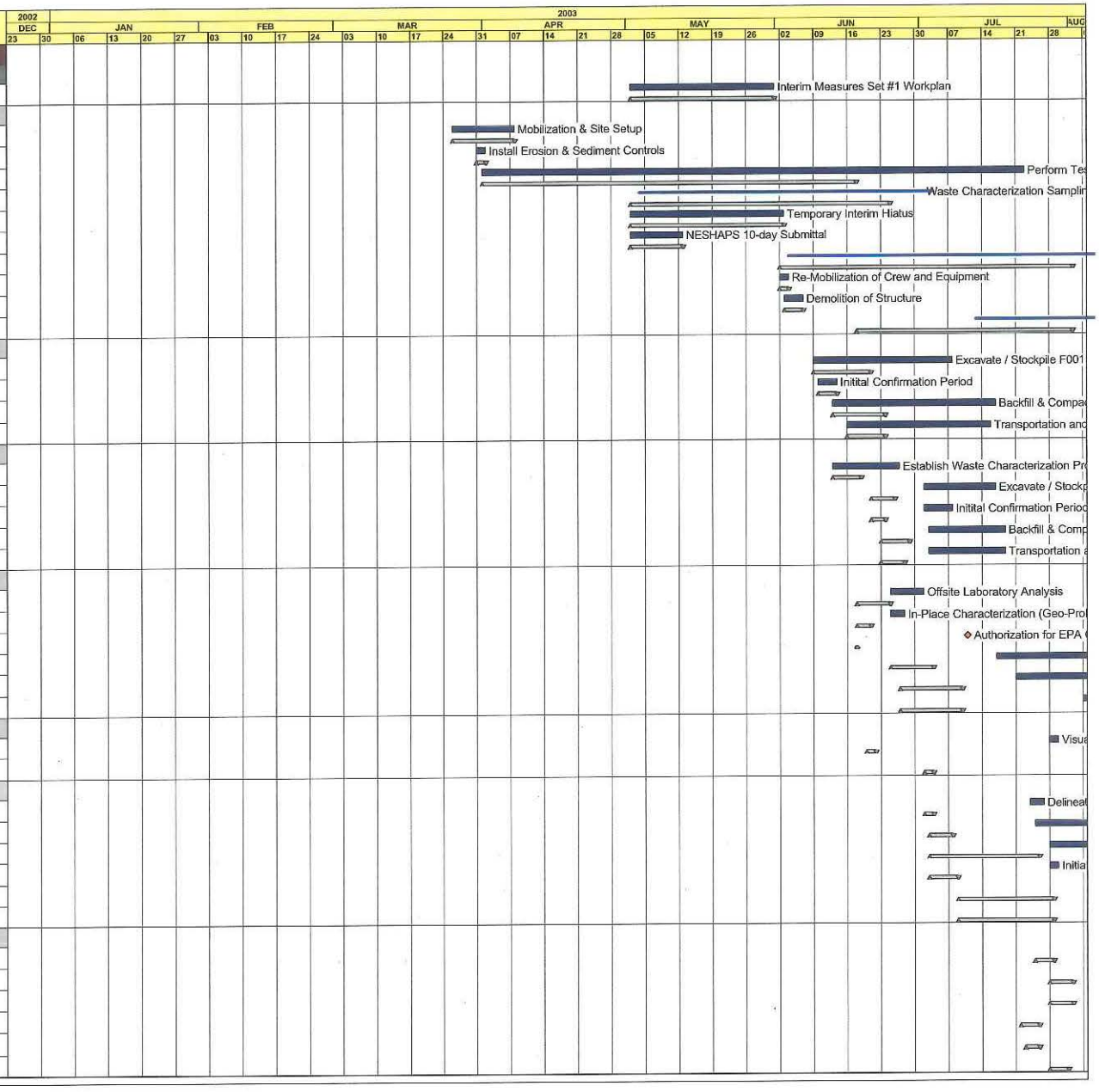
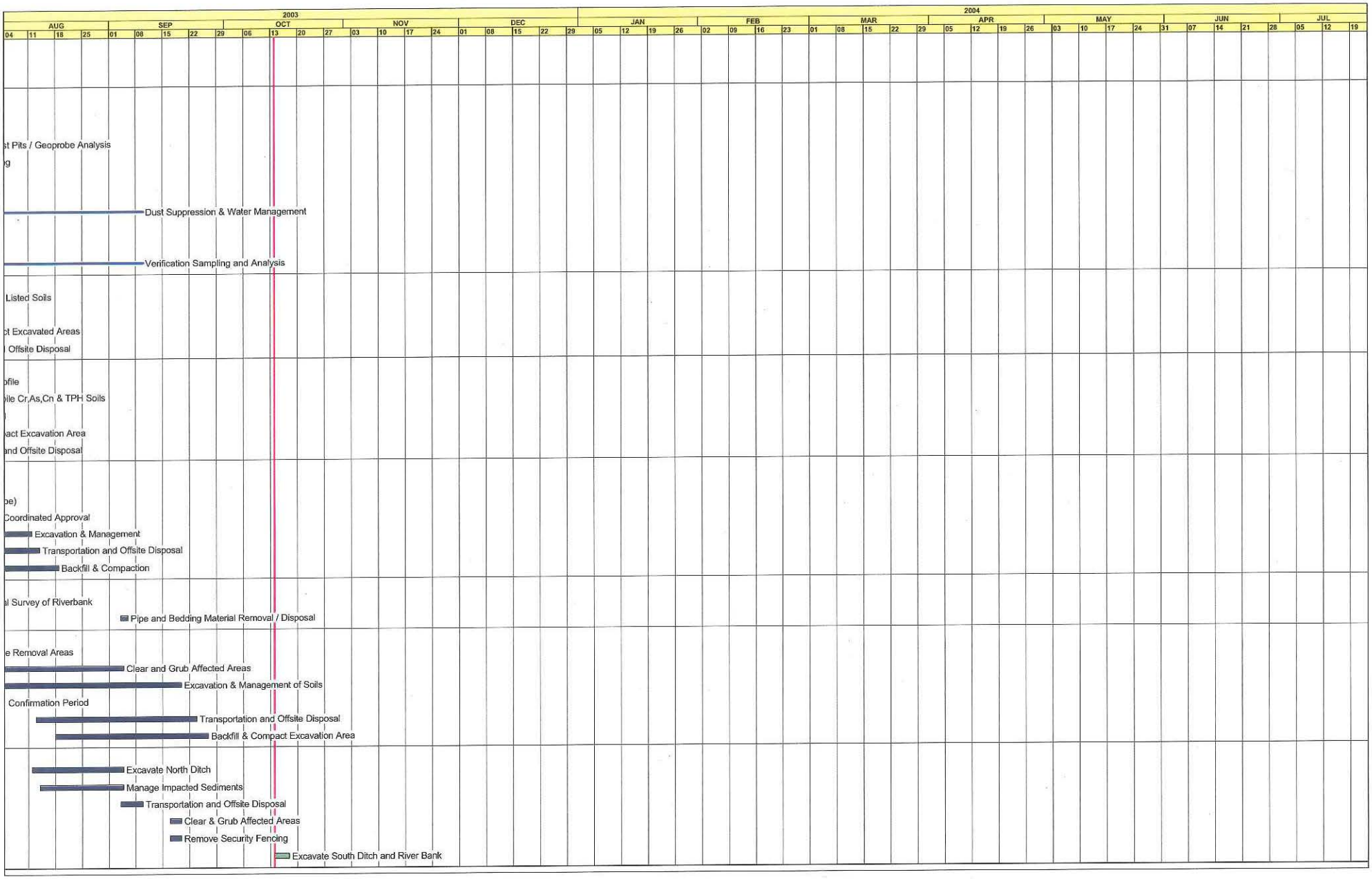
& Approval
n (Field & Lab)
On-Site Data Gap Inv. Report
Off-Site Investigation (Field & Lab)
Off-Site Investigation Report
Red Cedar Program Report
On-Site Data Risk Analysis & Comparisons
Red Cedar River Risk Analysis & Comparisons

Description	Orig Dur	Early Start	Early Finish	Log Text 1
Corrective Measure Implementation				
Interim Measures Set Number 1				
Interim Measures Set #1 Workplan	30	02MAY03 A	31MAY03 A	
Mobilization Activities				
Mobilization & Site Setup	3	26MAR03 A	07APR03 A	
Install Erosion & Sediment Controls	2	31MAR03 A	01APR03 A	
Perform Test Pits / Geoprobe Analysis	107	01APR03 A	22JUL03 A	
Waste Characterization Sampling	59 *	02MAY03 A	01JUL03 A	
Temporary Interim Hiatus	31	02MAY03 A	02JUN03 A	
NESHAPS 10-day Submittal	10	02MAY03 A	12MAY03 A	
Dust Suppression & Water Management	89 *	02JUN03 A	09SEP03 A	
Re-Mobilization of Crew and Equipment	2	02JUN03 A	03JUN03 A	
Demolition of Structure	4	03JUN03 A	06JUN03 A	
Verification Sampling and Analysis	52 *	11JUL03 A	09SEP03 A	
TCE Source Area Removals				
Excavate / Stockpile F001 Listed Soils	27	09JUN03 A	07JUL03 A	3,450 tons
Initital Confirmation Period	4	10JUN03 A	13JUN03 A	
Backfill & Compact Excavated Areas	21	13JUN03 A	16JUL03 A	
Transportation and Offsite Disposal	9	16JUN03 A	15JUL03 A	
SWMU B Remediation				
Establish Waste Characterization Profile	5	13JUN03 A	26JUN03 A	
Excavate / Stockpile Cr,As,Cn & TPH Soils	5	02JUL03 A	16JUL03 A	pending PCB Coordinated
Initital Confirmation Period	2	02JUL03 A	07JUL03 A	
Backfill & Compact Excavation Area	6	03JUL03 A	18JUL03 A	
Transportation and Offsite Disposal	5	03JUL03 A	18JUL03 A	3,000 tons / 750 per day
Free Product Areas				
Offsite Laboratory Analysis	6	25JUN03 A	01JUL03 A	
In-Place Characterization (Geo-Probe)	3	25JUN03 A	27JUN03 A	
Authorization for EPA Coordinated Approval	0	11JUL03 A		
Excavation & Management	9	17JUL03 A	11AUG03 A	3,300 tons / 500 per day
Transportation and Offsite Disposal	9	21JUL03 A	13AUG03 A	
Backfill & Compaction	9	04AUG03 A	18AUG03 A	
Outfall & Piping Removal				
Visual Survey of Riverbank	1	28JUL03 A	29JUL03 A	
Pipe and Bedding Material Removal / Disposal	2	04SEP03 A	05SEP03 A	
Metals Impacted Soils				
Delineate Removal Areas	2	24JUL03 A	26JUL03 A	
Clear and Grub Affected Areas	2	25JUL03 A	04SEP03 A	
Excavation & Management of Soils	19	28JUL03 A	19SEP03 A	12,250 tons / 750 per day
Initial Confirmation Period	2	28JUL03 A	29JUL03 A	
Transportation and Offsite Disposal	17	13AUG03 A	23SEP03 A	
Backfill & Compact Excavation Area	21	18AUG03 A	26SEP03 A	
North & South Ditch Remediation				
Excavate North Ditch	3	12AUG03 A	04SEP03 A	
Manage Impacted Sediments	5	14AUG03 A	04SEP03 A	
Transportation and Offsite Disposal	4	04SEP03 A	09SEP03 A	
Clear & Grub Affected Areas	3	17SEP03 A	19SEP03 A	
Remove Security Fencing	2	17SEP03 A	19SEP03 A	
Excavate South Ditch and River Bank	4	14OCT03	17OCT03	

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Pipe and Bedding Material Removal / Disposal
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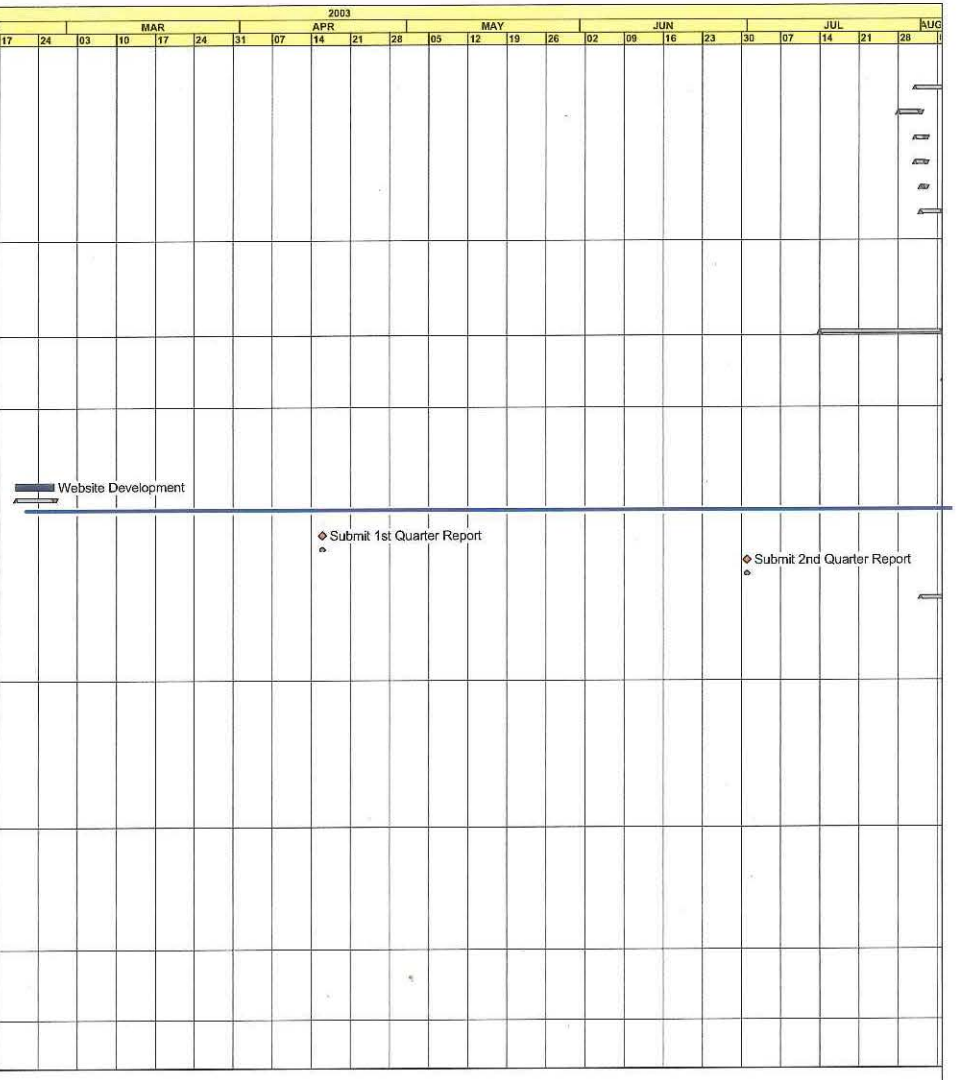
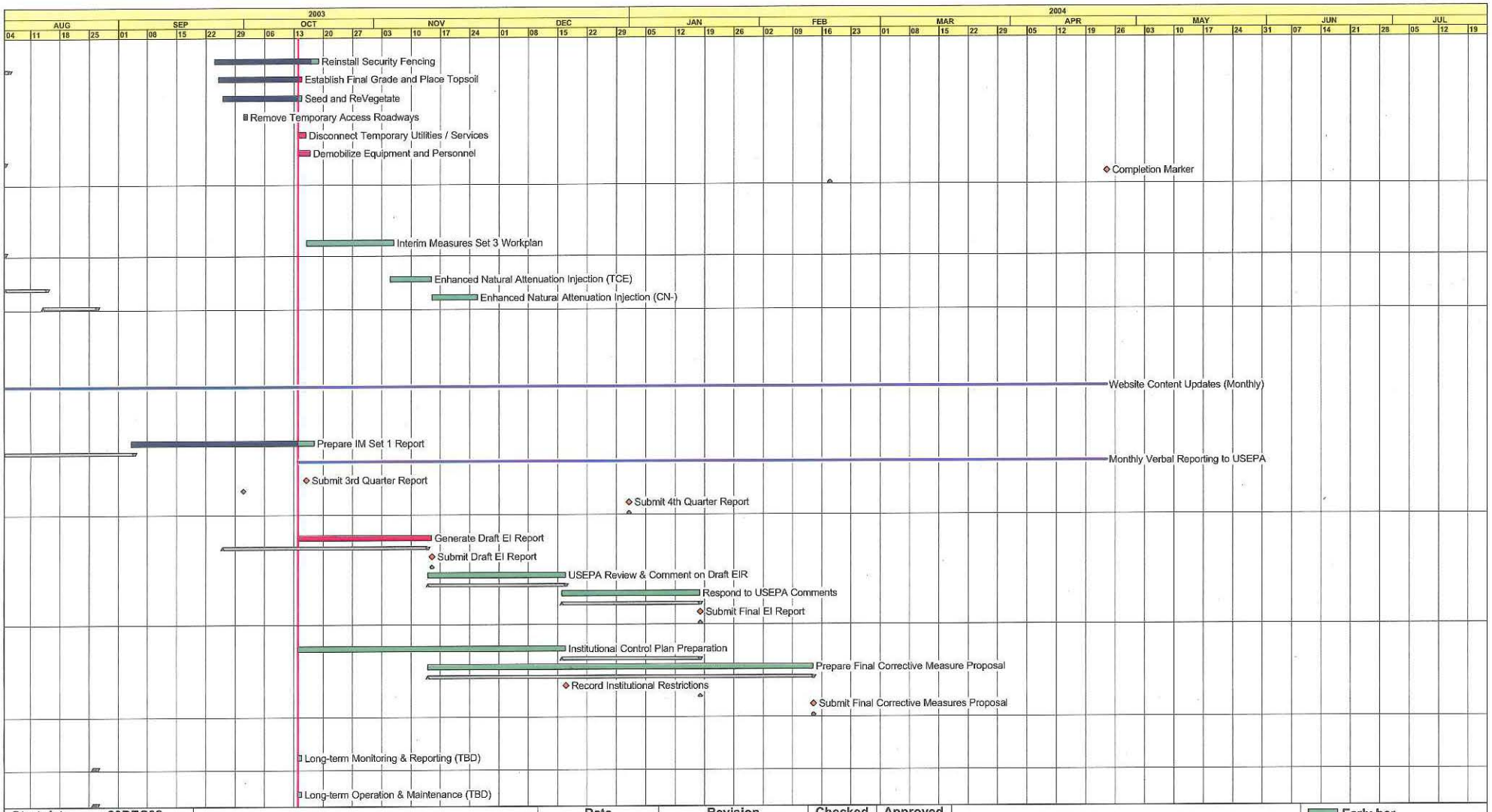
Clear and Grub Affected Areas
Excavation & Management of Soils
Confirmation Period
Transportation and Offsite Disposal
Backfill & Compact Excavation Area
Excavate North Ditch
Manage Impacted Sediments
Transportation and Offsite Disposal
Clear & Grub Affected Areas
Remove Security Fencing
Excavate South Ditch and River Bank

Description	Orig Dur	Early Start	Early Finish	Log Text 1
Restoration and Demobilization				
Reinstall Security Fencing	4	24SEP03 A	18OCT03	
Establish Final Grade and Place Topsoil	5	25SEP03 A	14OCT03	
Seed and ReVegetate	3	26SEP03 A	14OCT03	
Remove Temporary Access Roadways	1	01OCT03 A	01OCT03 A	
Disconnect Temporary Utilities / Services	1	14OCT03	15OCT03	
Demobilize Equipment and Personnel	2	14OCT03	16OCT03	
Completion Marker	0		23APR04	
Interim Measures Set Number 2				
Red Cedar River Sediments				
Interim Measures Set Number 3				
Interim Measures Set 3 Workplan	20	16OCT03	05NOV03 *	
GW Plumes (TCE & CN-)				
Enhanced Natural Attenuation Injection (TCE)	10	05NOV03	14NOV03	
Enhanced Natural Attenuation Injection (CN-)	10	15NOV03	25NOV03	
Free Product Recovery				
Project Reporting & Closeout				
Progress Reporting				
Website Development	5	20FEB03 A	26FEB03 A	
Website Content Updates (Monthly)	416 *	20FEB03 A	23APR04	
Submit 1st Quarter Report	0		15APR03 A	
Submit 2nd Quarter Report	0		30JUN03 A	
Prepare IM Set 1 Report	30	04SEP03 A	17OCT03	
Monthly Verbal Reporting to USEPA	193 *	14OCT03	23APR04	
Submit 3rd Quarter Report	0		15OCT03 *	
Submit 4th Quarter Report	0		31DEC03 *	
Environmental Indicators Report				
Generate Draft EI Report	33	14OCT03	14NOV03	
Submit Draft EI Report	0		14NOV03 *	
USEPA Review & Comment on Draft EIR	30	14NOV03	16DEC03	
Respond to USEPA Comments	30	16DEC03	17JAN04	
Submit Final EI Report	0		17JAN04	
Final Corrective Measures Proposal				
Institutional Control Plan Preparation	63	14OCT03	16DEC03	
Prepare Final Corrective Measure Proposal	89	14NOV03 *	13FEB04	
Record Institutional Restrictions	0		16DEC03	
Submit Final Corrective Measures Proposal	0		13FEB04	
Long Term Operation & Maintenance				
GW Plumes Mgmt (TCE & CN-)				
Long-term Monitoring & Reporting (TBD)	1	14OCT03	14OCT03	
Free Product Recovery				
Long-term Operation & Maintenance (TBD)	1	14OCT03	14OCT03	





Start date	30DEC02
Finish date	23APR04
Data date	14OCT03
Run date	14OCT03
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Date	Revision	Checked	Approved
14APR03	Number 02	bdm	
12MAY03	Number 03	bdm	
17JUN03	Number 04	bdm	
14OCT03	Number 05	bdm	

- Early bar
- Target start point
- Target finish point
- Target bar
- Progress bar
- Critical bar
- Summary bar
- Start milestone point
- Finish milestone point

CORRECTIVE ACTION FOR JOHNSON CONTROLS CONTAMINATION SITE IN FOWLERVILLE, MI. MEETING OF MARCH 14, 2002 SIGN-IN SHEET

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5

INTERNAL MEMO

DATE: September 29, 2003

SUBJECT: Overview of Planned Environmental Indicators Data Evaluation - Red Cedar River (July 2003); Former Stanley Tools (Fowlerville, Michigan)

FROM: Mario Mangino
Toxicologist
WPTD/ Waste Management Branch

TO: Juan Thomas
project Manager
WPTD/ Enforcement and Compliance Assurance Branch

Please find below my comments and recommendations on the paper submitted by Earth Tech, Inc. and Weston Solutions, Inc. (ETWS) for the project named above. As you recall, this paper was also the subject of a conference phone call held on September 4.

Section 2.3 Direct Contact and Ingestion

The ETWS paper presents a value to account for ingestion and dermal Exposure Frequency (EF) of children to sediments. The proposal to use an EF of 4 per week for the warmest months (June, July, August) seems reasonable. However, for the more temperate weather months (May and September), this reviewer believes that an EF of 2 per week would be more appropriate. This would give a conservative accounting for the likelihood that these two months (spring and autumn) could be still be attractive times to visit the water body. This would bring the total EF up to 64 days/year. This is an EF that is appropriately conservative but still reasonable.

Section 2.6 Fish Bioaccumulation and Human Health

Absorption efficiency for PCBs

This reviewer believes that the absorption efficiency for PCBs in the Michigan Part 201 Rules applies to calculating a cleanup criteria for direct contact with contaminated soil. The absorption efficiency is incorporated as the AE_i term in Part 201

R299.5720. Michigan allows the use of this AE_i adjustment to account for the possibility that PCBs adsorbed to soil will not be completely available for absorption after incidental soil ingestion. This is equivalent to an adjustment for bioavailability of PCBs from soil. However, for ingestion of fish as a food source, this reviewer does not believe that the adjustment for bioavailability from soil is appropriate to apply. In the case of PCBs in the diet (where desorption of PCBs from soil is not a factor) the cancer slope factor derived for PCBs (and the RfD for Aroclor 1254) was directly affected by the absorption efficiency of PCBs administered to the test animals. Consequently, the Absorption Efficiency factor value in Table 1 should be changed to 1.0 (100%).

Fish ingestion rate

The ETWS paper proposes that a fish consumption rate of 15 g/day should be used to represent the average consumption rate of fresh water sport caught fish by residents of Great Lakes states based on information from the *Great Lakes Water Quality Initiative* (*GLWQI*). This value is also described in the paper as the 90th percentile consumption rate of sport caught fish for the Great Lakes Region. However, from my review of *GLWQI* document, I interpret the language in the document to mean that this is the 90th percentile value when the fish consumption data for the Great Lakes region are apportioned over the active fishing population and the non-fishing population. When developing conservative cleanup criteria, the EPA prefers that the fish consumption rate should be based on the 90th percentile of the population that catches and consumes sport caught fish so that the consumption rate for the active fisher-consumer will not be underestimated.

From an extensive survey of recreational fishing in the state of Michigan, the 90th percentile of recreational fish intake for persons who caught and consumed fish was reported to be 34 g/day (data from the West et al. study [1989] as summarized in the EPA's Exposure Factors Handbook [1997] <http://www.epa.gov/ncea/pdfs/efh/sect10.pdf>

Consequently, this reviewer believes that the value of 34 g/day should be used to account for the high-end recreational fisher who may frequent the Red Cedar River, and this is the value that should be used for the fish consumption rate when calculating a sediment cleanup criteria.

The assumption that the fraction ingested (FI) of fish from the Red Cedar River is 0.25 (25%) of all fish ingestion does seem

reasonable based on the description of the Red Cedar River in the vicinity of the Former Stanley Tools site.

Other contaminants

Based on the description in Section 1.1.2 of types of contaminants documented in the RFI Report, the additional contaminants that would be a concern for the fish bioaccumulation and consumption pathway would be polycyclic aromatic hydrocarbons (PAHs) and mercury. (Mercury would be concern due the conversion of inorganic mercury to methylmercury and the bioaccumulation of methylmercury through the aquatic food chain.)

Cumulative risk from multiple contaminants

It appears that the ETWS paper is proposing to calculate chemical-specific sediment cleanup criteria and to apply them on an individual chemical basis (i.e., chemical-by-chemical) for comparing measured sediment contaminant concentrations to the cleanup criteria. This would appear to be appropriate for the evaluation of the CA 725 Environmental Indicator (Current Human Exposures under Control). However, for the formal risk assessment evaluation that is needed as part of the site RFI Report and remedial decisions for the site, an accounting of cumulative risks from exposure of the same receptor/person to multiple chemical contaminants will be necessary.

Please feel free to contact me if any clarification is needed for the comments presented above.

cc: Bhooma Sundar (WPTD/ECAB)
Harriet Croke (WPTD/WMB)

CURRENT STATUS REPORT OF THE RCRA CORRECTIVE ACTION FOR JOHNSON CONTROLS, INC FACILITY OF FOWLERVILLE, MI

PREPARED FOR GEORGE HAMPER, SECTION CHIEF RCRA ENFORCEMENT AND COMPLIANCE ASSURANCE BRANCH, CORRECTIVE ACTION SECTION

**PREPARED BY JUAN THOMAS, ENVIRONMENTAL SCIENTIST/PROJECT MANAGER
RCRA ENFORCEMENT AND COMPLIANCE ASSURANCE SECTION, CORRECTIVE ACTION SECTION**

JANUARY 28, 2002

EPA lead

OUTLINE OF
CURRENT STATUS REPORT OF THE RCRA CORRECTIVE ACTION FOR JOHNSON CONTROLS, INC FACILITY OF FOWLERVILLE, MI

- Introduction
  - history
  - order - associated task
- Background
  - summary of investigations
  - findings (issues)
  - impact of contamination to human health and environment

- Completed Interim Measures
  - Sludge Removal
  - Buried Container Removal
  - Impermeable Barrier to mitigate free-product discharge

- Issues Outstanding - Where do we go now
  - Data Needs
  - Study of an appropriate remedy
  - More efficient mechanism to implement remedy
    - Performance-Based Order
    - More specific CMS
    - CMI
    - Human and Ecological Risk Assessment
    - Response to Citizen (Environmental Group) Concerns

Introduction

Johnson Controls, Inc. is currently conducting a RCRA Corrective Action at the former Stanley Tools Manufacturing Facility, located in Fowlerville, MI. The site has been the location of several industrial operations since 1949 with Stanley Tools acquiring the property from Hoover Universal Incorporated, Die Cast Division in1980. Stanley Works operation consisted of the manufacture of plated zinc die cast hand tools. Prior to 1980, the facility was engaged in the manufacture of decorative zinc-based die castings for the automotive and plumbing industries. Stanley Works transferred the property at 425 W. Frank Street, Fowlerville, MI to Johnson Control's Incorporated (JCI) in 1985. Manufacturing operations ceased at the site in 1985. The Johnson Controls facility (formerly the Stanley Tools Division of the Stanley Works) occupies approximately eleven acres of land, in a light industrial/residential area of Fowlerville, Michigan. U.S. EPA and Stanley Tools entered into a Consent Order under Section 3008(h) of RCRA on September 9, 1988. This Consent Order requires the present site owner, Johnson Controls, to conduct a RCRA Facility Investigation (RFI) and a Preliminary Evaluation of Corrective Measures Technologies of the twelve solid waste management units and areas of concern on-site. Work to be performed under the Corrective Measures Study (CMS) and Corrective Measures Implementation (CMI) stages of the RCRA Corrective Action process will be defined in a new Consent Order, to be negotiated and entered into at a later date.

Background

Consistent with provisions of the 1988 Administrative Consent Order, the RCRA Facility Investigations (RFI) have been conducted over three phases, 1991, 1994 and 2000 respectively. EPA completed it review of the Phase I and Phase II RFI report and concluded that the RFI Report adequately summarized the findings of both Phase I and Phase II field investigations. With the exception of fully determining the extent of a volatile organic compound (VOC) plume in the southeastern section of the site, the report succeeded in completing the RFI objectives (completing characterization of the contaminant sources, environmental setting characterization, and characterization of each solid waste management unit). The RFI concluded that there is site wide contamination of the soils, sediments and groundwater on site. More specifically, the RFI showed that volatile organic compound contamination was present in the shallow aquifer in the vicinities of units B, C, and K (and L) . The contaminants of primary concern are trichloroethene (TCE), vinyl chloride and 1,2-dichloroethene. Factors such as the contaminants concentrations detected, relative high mobilities of the constituents of concern in groundwater and the direction of groundwater flow in the surficial aquifer as well as proximity to the Red Cedar River caused the agency concern for potential off-site migration. The RFI also indicated that releases from the facility was impacting the Red Cedar River as evidenced by increases in concentrations of contaminates downstream as compared to upstream. Also, the Phase II investigation concluded that the Red Cedar River was impacted by low levels of PCB's, cyanide and PAH's within 1300 feet of the site. Due to this evidence of environmental impact a preliminary ecological risk assessment (PERA) was suggested to be initiated. As part of the Phase III RFI, additional sediment samples were collected along the Red Cedar River and south

drainage ditch and a screening of the data to evaluate the significance with respect to ecological risk factors was conducted. It was suggested that an eco-risk assessment be conducted concurrently with a human health risk assessment. The agency iterated that the undertaking of the human and ecological risk assessments would constitute finalization of the RFI. It should also be noted that per USEPA request, the U.S. Fish and Wildlife Service of the East Lansing Michigan Office provided information to the USEPA that there were no endangered species or threatened species within the area of the facility

A review of the facility's bi-monthly reports indicated that the last round of groundwater samples were conducted in April (26, and 27) of 1995. Hence, another one of the objectives of the Phase III investigation objectives was to ascertain information as to the current status of groundwater quality at the site. The primary objective of the Phase III RFI was to further delineate the nature and extent of TCE contamination in southeastern corner of the site. Additional sediment samples were recommended also to be taken due to the elapsed time since sediment samples had been taken and the assumption that groundwater discharges have presumably continued to transport organic and inorganic contaminants from the site to the Red Cedar River.

Interim Measures Completed

Three separate Interim Remedial Measures have been completed on the site . They include site soil and sludge removal at units F, G, H, and I and a Buried Container Removal action in the southwestern part of the site (near SWMU B). These interim remedial measures were both performed in April 1995. It should be noted that the interim remedial measures were not intended to provide clean closure of these units. The remaining concentrations of contaminants would need to be addressed during the risk assessment and the areas would need to be revisited during the final resolution as part of the CMS/CMI. An additional interim remedial measure occurred in August 2001. The primary objective of this interim remedial measure was to mitigate an identified oil seepage to the Red Cedar River from two areas believed to be preferential migration pathways originating from area near SWMU's C and J. This was done by constructing an impermeable liner to act as a barrier to prevent migration to the Red Cedar River of a previously identified oil seepage from either associated piping or river bank soil. The results of this most recent interim remedial are included in the Final RFI Report presently under review.

Outstanding Issues

EPA is in completing its review of our Contractor's findings of their review of JCI Final RFI Report. This step is essential in developing the scope of work and findings of fact, to appropriately develop a new Consent Order for the Corrective Measures and Corrective Measures Implementation phases of the Corrective Action Process. Preliminary results of our contractor's review of JCI Final RFI Report indicate that there may still be data gaps associated with fully delineating the nature and extent of contamination associated with the site. It is anticipated that a Human Health and Ecological Risk Assessment (HHRA & ERA) to provide a needed tool in assessing current and potential future environmental risk which can be identified as being

associated with the site will be conducted either prior to or concurrently with the new Consent Order. Additionally, a HHRA and ERA is needed as a tool in selecting a possible remedy that will eliminate identified hazards to human health and the environment., Since Stanley Tools is listed as a Part 201 facility, EPA will coordinate with the State of Michigan DEQ, to ensure that future risk assessments and remedial measures satisfy both RCRA and Michigan Part 201 requirements. Specifically, some of the relevant technical issues pertaining to the Part 201 requirements include past impacts to the Red Cedar River sediment, ***on-going contaminated groundwater discharges to the river*** (the interim measure of 2001 should have some impact on this), and the potential that flooding events could periodically transport contamination from surficial soils and surface impoundment excavation pits to the Red Cedar River. Also direct contact with soil by humans or animals may also be a significant concern at the site depending on future access to and use of the facility. We are also consideration developing a Performance-Based Order for the CMS/CMI as a tool in expediting the corrective action process.

Citizen Concerns

On January 18, we received a report from" Disposal Safety Incorporated"an Environmental Consulting Firm, asserting that their review of JCI Final RFI report has "severe deficiencies" in the report. It is my understanding that a coalition of environment and labor relations organizations have expressed concern that the corrective action is moving slowly and that any measures to mitigate any of the associated hazards associated with the site have not been addressed, particularly as it relates to site related discharges to the Red Cedar River. Upon completion of my review of their report, it is my suggestion that we draft a letter to this citizens groups addressing any concerns that they may have.

ADDENDUM TO THE CURRENT STATUS REPORT OF THE RCRA CORRECTIVE ACTION FOR JOHNSON CONTROLS, INC FACILITY OF FOWLERVILLE, MI

PREPARED FOR GEORGE HAMPER, SECTION CHIEF RCRA ENFORCEMENT AND COMPLIANCE ASSURANCE BRANCH, CORRECTIVE ACTION SECTION

PREPARED BY JUAN THOMAS, ENVIRONMENTAL SCIENTIST/PROJECT MANAGER RCRA ENFORCEMENT AND COMPLIANCE ASSURANCE SECTION, CORRECTIVE ACTION SECTION

JANUARY 28, 2002

Environmental Indicators

I conducted an analysis of a CA 725 and CA 750 for the JCI site to evaluate the status of these GPRA goals. Under the CA 725, conclusions are as follows: a) chemical constituents in groundwater, surface soil, sediment, subsurface soil (and possibly surface water) are contaminated above appropriately risk based levels. The contaminants consist of metals- Cd, Cr, Ni, As, PAH's, chlorinated solvent constituents, e.g. TCE, DCA and petroleum hydrocarbons (kerosene), and PCB's. b) there is a possible complete exposure pathway between contaminants and human receptors under current land use conditions (industrial land use). More specifically, Construction Workers to soil, subsurface soil, Trespassers to soil, sediment, and surface water and Recreational Users to soil, sediment and surface water (the surface water from the Red Cedar River is recharged groundwater from the water table of the uppermost aquifer). Also, at this point I am not aware as to whether the Red Cedar has any recreational purposes like fishing. c) As to whether or not the complete exposure pathways causes an unacceptable exposure, this information is inconclusive because a risk assessment has not been completed, therefore computing an unacceptable exposure based on either default or site specific exposure assumptions for the appropriate potential human receptor populations, has not been completed, hence it is unknown as to whether the exposures to site related contaminants are significant. However, a number of the constituents do exceed some benchmark risk based screening levels for both residential and industrial land use exposure assumption scenarios.

As for the CA 750, the conclusions are as follows: a) groundwater is contaminated with chemicals above appropriately protective risk-based screening levels. The RFI reported that contaminants in groundwater consist of metals- Cd, Cr, Ni, As, PAH's, chlorinated solvent constituents, e.g. TCE, DCA and petroleum hydrocarbons (kerosene), and PCB's. b) the migration of contaminated groundwater has not stabilized such that contamination is expected to remain within the "existing area of contaminated groundwater". This is evident by the migration of contaminants (LNAPL - appears to be a petroleum product) floating on the surface of the Red Cedar River. Furthermore, the full extent of groundwater contamination has not been completely delineated, because each separate investigation has resulted in locating what appeared to be separate plumes/source areas. c) As mentioned in "b" above, contaminated groundwater is migrating to a surface water body, the Red Cedar River. d) It is unknown whether the discharge of contaminated groundwater into surface water is likely to cause an unacceptable exposure to ecological receptors, this information is inconclusive because an ecological risk assessment has not been completed, therefore computing an unacceptable exposure based on either default or site specific exposure assumptions for the appropriate ecological receptor populations, has not been completed, hence it is unknown as to whether the exposures to site related contaminants are significant..

4 Paragraphs (100 words each)

1. One Paragraph describing existing order and ~~the~~ describing the contamination problems

2. One paragraph describing the interim measures

3. One paragraph describing the citizen concerns.

4. One paragraph describing what we are going to do about it.
   - When will the order be ~~signed~~ signed?
   - When will the CMS report be submitted?
   - When will the ~~Sta~~ Statement of Basis be issued + public comment period opened?

Quarterly Progress Report
Former Stanley Tool Works
Fowlerville, Michigan
October 15, 2003

This quarterly progress report has been prepared in accordance with the Administrative Order on Consent (AOC) for the Stanley Tool Works facility (Docket #RCRA-05-2003-0004). The report presents a summary of completed project activities to date, analytical data received, upcoming schedule of activities, issues encountered and resolutions, and an updated master schedule for the project. Also attached is the groundwater monitoring well location map and the site grading plan.

COMPLETED PROJECT ACTIVITIES TO DATE

USEPA/MDEQ Interaction

- Held quarterly review meeting with USEPA at the site on July 22, 2003
- Representatives from MDEQ visited the site on August 12, 2003
- Regular telephone conference calls with USEPA and project team representatives
- A conference call was held on September 4, 2003 with Juan Thomas, Mario Mangino, Boomha Sundhar, Carolyn Bury, Gary Cygan, Tony Martig of the USEPA and the ENTACT/EarthTech-Weston team to discuss the Red Cedar River sediment and EI Guidance
- TeamLink Website
    - Continuous updates of the website to enable agency access to site information, site drawings, and current and historical laboratory analytical data

Project Plans and Correspondence

- TSCA coordinated approval for the excavation and management of PCB impacted soils and free product was received verbally after submission and subsequent revisions of the PCB Interim Measures Work Plan
- EarthTech/Weston submitted a "Sediment Technical Document" describing the planned approach to addressing sediment in the Red Cedar River. Based on comments received by the USEPA a full sediment evaluation will be performed in preparation for the EI Report
- A revised Right of Entry Agreement was submitted to CSX Railroad to allow excavation in the south ditch adjacent to the rail line

Investigation Activities

- Red Cedar River sediment sampling, data evaluation, and planning
- Geoprobe and monitoring well installation for groundwater investigation on-site
- Geoprobe and monitoring well installation for groundwater sampling east of site
- Groundwater investigation east, west and south of the site

- Test pitting
- Subsurface soil sampling with geoprobe on and off site
- Surface soil sampling on site and under stockpile areas
- Floodplain soil sampling
- Geotechnical testing for hydraulic conductivity to support groundwater flow modeling
- Monitoring with an interface probe to document free product removal

Interim Measures Activities

- Interim Measures for F001 and TCE impacted areas
    - Completed removal of TCE impacted soils in the southern portion of the site
    - Soils characterized as F001 were disposed of at EQ
    - Areas were backfilled upon receipt of verification sample results
- Interim Measures for PCB impacted areas
    - PCB area was characterized prior to excavation by sampling in 50 foot or 25 foot grids in accordance with the approved PCB Work Plan
    - PCB impacted areas were excavated from discrete areas based on pre-excavation characterization sampling and historical data. Soils were managed and disposed of off site based on the pre-excavation characterization.
    - Soils that contained incidental liquids were mixed with a drying agent in the area of excavation until the material passed the paint filter test for off site transportation and disposal
    - Groundwater encountered during soil removal activities was inspected for the presence of free product kerosene. Absorbent booms were used to remove visible sheen and the booms were containerized for off site incineration
    - Areas were backfilled upon receipt of verification sample results
- Interim Measures for metals impacted areas
    - The balance of metals impacted areas was removed during a mass dig effort starting in the northwest corner of the site. Excavations extended to the Red Cedar River bank to the west.
    - Portions of the north ditch were excavated during the mass dig effort. This was the northernmost extent of excavation. The eastern extent of excavation was based on sidewall verification sampling.
    - Clearing and grubbing was done in areas to be excavated and along the riverbank to allow excavations to proceed. The fence running adjacent to the Red Cedar River was removed to allow access.
    - Areas were excavated to groundwater or when verification samples indicated the cleanup criteria was achieved. Verification samples were collected from the sidewalls of the excavation limits and from the excavation floors if no groundwater was encountered.
- Backfilling and site grading
    - Class II Sand was used as backfill to achieve restoration design grade elevations and overlain with a topsoil vegetative layer
    - Approximately 2.5 acres of wetland construction and seeding north and west of SWMU A

    - Clay was used as backfill along the Red Cedar River bank to provide additional structural support during heavy river flows
    - Temporary erosion matting was installed along 450 linear feet of east river bank to ensure vegetative growth and reduce topsoil erosion
    - Final grading elevations were established based on the 100 year floodplain elevations
- Land Surveying
    - Surveying of sampling points, test pit locations, physical features, etc. has been continuous during site work
    - X and Y coordinates are being measured with a GPS unit. Vertical information is not being collected at most locations at this time
    - Location coordinates are being continuously incorporated in site CAD drawings and the site GIS
    - Top of casing elevations survey for newly installed monitoring wells has been completed by a registered land surveyor
- Graphical Information System (GIS)
    - Continuous updates with sample location coordinates and laboratory analytical data from the site are on-going

ANALYTICAL DATA RECEIVED

- Analytical data received during the reporting period has been, or is in the process of being posted on the website
    - Verification sample results in TPH, chromium, and TCE areas
    - Characterization samples collected along the Red Cedar River bank at 15 foot intervals or based on visual presence of chromium
    - Sediment samples from Red Cedar River
    - Confirmation sampling for offsite disposal
    - Backfill characterization samples for imported fill material
    - Soil samples from SWMUs A and G to expand the laboratory analytical suite for cleanup confirmation used during pre-2003 interim measures efforts.
    - Groundwater samples from onsite monitoring wells and GeoProbe locations
    - Groundwater samples from offsite monitoring wells and GeoProbe locations
    - Surface and subsurface soil samples from areas outside of completed excavation

UPCOMING SCHEDULE OF ACTIVITIES

- Quarterly review meeting scheduled at the site on October 23, 2003
- Finish excavation in the south ditch upon approval from CSX Railroad
- Continue vegetative cover placement and grading disturbed areas of the site
- Seed and mulch disturbed areas and complete site restoration activities
- Complete installation of the groundwater monitoring well network
    - Complete additional groundwater sampling as necessary
- Complete additional sediment sample collection
- Complete fish tissue sampling and analysis

- Collect additional water level data to assist in the groundwater flow evaluation
- NPDES joint permit application for potential dredging of the river sediment has been prepared and will be submitted following sediment characterization and evaluation
- Environmental Indicator reports
    - Initial draft of the both reports completed
    - On-going updates of drafts based on completion of IMs and sample analytical data review
- Final Corrective Measures Proposal
    - Interim Measure Completion Report

PROJECT MASTER SCHEDULE

An updated project master schedule is attached

ISSUES AND RESOLUTIONS

- The project team has discussed with the USEPA the possible need to request a 90-day extension to complete groundwater characterization for submission of the EI reports and the Final CMP. The monitoring well installation was delayed because of an increase in projected excavation volumes and sequencing of excavation activities with monitoring well installation. Monitoring well installation and sampling has been accelerated and we will keep the USEPA informed of progress.

USEPA AND JOHNSON CONTROLS, INC (THE FORMER STANLEY TOOLS FACILITY OF FOWLERVILLE, MI) DECEMBER 30, 2002 3008 h) STATUS MEETING AGENDA DECEMBER 17, 2003

I. INTRODUCTIONS

II. PURPOSE OF MEETING: December 30, 2002 JCI 3008h) status meeting including submission of Draft Environmental Indicators Reports (EI 725 & 750). As well as to allow the JCI Team to present their accomplishments to date in meeting the terms of the Performance-Based Administrative Order on Consent.

III. DISCUSSION POINTS - Presentation by JCI Team

IV. CLOSING COMMENTS

V. ADJOURN

PROPOSED MEETING SUMMARY
FORMER STANLEY TOOLS PROJECT
FOWLERVILLE, MICHIGAN

USEPA Region V, Chicago, IL
17 December 2003

Meeting Objectives

1. Present overview of 2003 Interim Measure for soil and 2003 investigative work for sediment and groundwater
2. Confirm demonstration of control for Human Health and Groundwater EIs prior to their submission as final on February 15, 2003.
3. Discuss the content of the Final Corrective Measures Proposal prior to submission on February 15, 2003.

2003 IM Summary – Brief Presentation by Project Team

1. IMs completed in 2003 will be fully described in the Final CMP.
2. Excavation to water table and disposal of over 83,900 tons of impacted soil.
3. Free product (kerosene) at the site was also excavated and removed.
4. Confirmation sampling (VSR) was completed to verify cleanup.
5. Michigan Department of Environmental Quality (MDEQ) Part 201 Industrial/Commercial II cleanup criteria were used as cleanup criteria during confirmation sampling.
6. Groundwater-surface water interface protection (GSIP) criteria were used due to Red Cedar River proximity.
7. All excavation areas were backfilled using clean sand fill. The floodplain was expanded to provide wetland habitat.
8. IMs were not necessary to show control for groundwater or river sediments.

2003 Investigation and EI Overview – Brief Presentation by Project Team

1. Response to EPA RFI Report Comments (submitted with EIs).
2. Soil Data Set for EI evaluations consists primarily of IM confirmation samples.

3. Excavation was completed to, or below, the water table over approximately 98% of the soil IM area.

   Sidewall confirmation samples were collected for entire area.

4. Several new perimeter monitoring wells installed in 2003 prior to submission of the EI.

5. Additional wells installed during week of 12 December 2003.

6. Plume Stability Demonstration:

   a. Hydraulic control as demonstrated in Draft EIs is based on existing wells.

   b. Hydraulic control demonstration enhanced with the additional well installations.

   c. EI Determinations strengthened via multiple sampling rounds and the expanded well network.

   d. IM source removal will result in continued overall decreases in groundwater contaminant levels.

   e. Short-term variances in shallow on-site groundwater quality may occur, due to soil IM.

7. Sediment sampling was completed at 13 transect locations and several background locations.

Environmental Indicators Reports - Discussion

1. Status of U.S. EPA review of the documents. ✓

2. Planned date for delivery of U.S. EPA comments, if any, on the EI Reports. ✓

3. U.S. EPA concurrence with control demonstration in the Human Health EI. ✓

4. U.S. EPA concurrence with control demonstration in the Groundwater EI. ✓

5. Update on project activities since submission of the EI reports.

Final Corrective Measures Proposal (FCMP) Approach - Discussion

1. Final Corrective Measure Approach for Soil

   a. IM addressed soil to Part 201 Industrial/Commercial II criteria.

   b. No alternatives for further soil CA included in FCMP.

2. Final Corrective Measure Approach for Groundwater
    a. Implement Groundwater Monitoring Program
    b. Submission of Mixing Zone Request to MDEQ to establish groundwater cleanup objectives.
    c. Evaluate data relative to GSI cleanup criteria to finalize in-situ IM for groundwater, if necessary.
    d. Groundwater Monitoring Plan and Contingency Evaluation.
3. Final Corrective Measure Approach for River Sediments
    a. Sediment Technical Memorandum with comparison to preliminary criteria.
4. Discussion of November 6, 2003 letter from U. S. EPA indicating the submission of an RFI Report and a Risk Assessment.

USEPA MEETING WITH JOHNSON CONTROLS, INC. / URS PERTAINING TO THE RCRA CORRECTIVE ACTION AT THE STANLEY WORKS OF FOWLERVILLE, MICHIGAN

MEETING AGENDA MAY 31, 2001

I. **INTRODUCTIONS**

II. **PURPOSE: to have JCI/URS present a summary/overview of their findings to date, resulting from three phases of RFI work at the Fowlerville Site.**

III. **DISCUSSION POINTS**

- A. **JCI/URS assessment of the nature and extent of contamination for the Fowlerville Site**
- B. **Proposed Interim Remedial Measures Work Plan**
- C. **Identification of any Corrective Measure considered at this point**
- D. **PCB issues (PCB identification resulting from fingerprint analysis of free-phase product groundwater sample**

IV. **SUGGESTIONS FOR EXPEDITING THE PROCESS**

V. **CLOSING COMMENTS**

VI. **ADJOURN**

Sign In Sheet For May 31, 2001 Meeting of USEPA and JCI/URS

Johnson Controls
Fowlerville MI

name	affiliation	Phone
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AGENDA

Meeting between EPA Region 5 and Johnson Controls, Inc.
Location - Chicago, Illinois
May 31, 2001

Introductions / Topics of Discussion

Summary of Environmental Activities
- Closure of RCRA Unit A
- Phase I RFI
- Phase II RFI
- Interim Remedial Measures (IRMs)
- Buried Container Removal (BCR)
- Phase III RFI

Summary of Current Site Conditions
- Soil
- Groundwater
- Sediment

Proposed IRM to address Environmental Indicators

Discussion of Supplemental RFI / CMS Activities

Framework for RFI / CMS Completion
- Performance Approach
- New Order

36133 Schoolcraft Road, Livonia, Michigan 48150

May 5, 2003

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RCRA ECAB, DE-9J
77 W. Jackson Blvd
Chicago, IL. 60604

Re: 14-Day Notifications via Website and Conference Call
Former Stanley Tools Facility
Fowlerville, Michigan
EPA ID#: MID099124299

Telephone
734.779.2800
Facsimile
734.779.2860

Dear Mr. Thomas,

As discussed during our April 15, 2003 meeting at the Former Stanley Tools Facility in Fowlerville, Michigan, and during our weekly conference calls, project planning and data collection activities are currently in progress at the site. In addition, interim actions will begin following resolution of outstanding waste management issues.

Because of the accelerated nature of the Corrective Action required by the AOC, the project team proposed that future notifications for planned on-site work be given during our weekly conference calls and on the project website, rather than via a 14-Day Notification letter as required by 20.g. of the AOC. Notifications communicated in this manner were agreeable to you, and as such, we will no longer be submitting the formal 14-Day Notification letters.

Please contact me at (734) 779-2812 if you have questions or require further clarification.

Sincerely,

Andrew J. Lonergan, PG
Project Manager

cc: D. Reis, LLC
C. Preston, ENTACT

DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

Interim Final 2/5/99

RCRA Corrective Action
Environmental Indicator (EI) RCRIS Code (CA 750)

Migration of Contaminated Groundwater Under Control

Facility Name: Johnson Controls
Facility Address: Fowlerville, Michigan
Facility EPA ID#: MID-099-124-299

1.Has **all** available relevant/significant information on known and reasonably suspected releases to the groundwater media, subject to RCRA Corrective Action (e.g., from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), been **considered** in this EI determination?

X If yes – check here and continue with #2 below.

__ If no – re-evaluate existing data, or

__ If data are not available skip to #8 and enter "IN" (more information needed) status code.

BACKGROUND

Definition of Environmental Indicators (for the RCRA Corrective Action)

Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EI developed to-date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.

Definition of "Migration of Contaminated Groundwater Under Control" EI

A positive "Migration of Contaminated Groundwater Under Control" EI determination ("YE" status code) indicates that the migration of "contaminated" groundwater has stabilized, and that monitoring will be conducted to confirm that contaminated groundwater remains within the original "area of contaminated groundwater" (for all groundwater "contamination" subject to RCRA corrective action at or from the identified facility (i.e., site-wide)).

Relationship of EI to Final Remedies

While Final remedies remain the long-term objective of the RCRA Corrective Action program the EI are near-term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993 (GPRA). The "Migration of Contaminated Groundwater Under Control" EI pertains ONLY to the physical migration (i.e., further spread) of contaminated groundwater and contaminants within groundwater (e.g., non-aqueous phase liquids or NAPL's). Achieving this EI does not substitute for achieving other stabilization or final remedy requirements and expectations associated with sources of contamination and the need to restore, where practicable, contaminated groundwater to be suitable for its designated current and future uses.

Duration/Applicability of EI Documentation

EI Determinations status codes should remain in RCRIS national database ONLY as long as they remain true (i.e., RCRIS status codes must be changed when the regulatory authorities become aware of contrary information).

2. Is **groundwater** known or reasonably suspected to be **"contaminated"**[1] above appropriately protective "levels"(i.e., applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action, anywhere at, or from, the facility?

___X___ If yes – continue after identifying key contaminants, citing appropriate "levels," and referencing supporting documentation.

_____ If no - skip to #8 and enter "YE" status code, after citing appropriate "levels," and referencing supporting documentation to demonstrate that groundwater is not "contaminated."

_____ If unknown - skip to #8 and enter an "IN" status code.

Rationale and Reference (s):

Groundwater is known to be contaminated above the National Primary Drinking Water Regulations Maximum Contaminant Levels (MCL's) and the applicable sections of the Michigan Act 451, Part 201 generic cleanup criteria for groundwater. Although there are no present on-site users of groundwater, there are no groundwater use restrictions for the property nor for properties surrounding the site. Hence, the Part 201 Generic Residential Drinking Water Criteria are applicable promulgated standards for on-site groundwater. It should be noted however, that there are no supply wells within 2,500 feet of the site, with the exception of a single house approximately 950 feet due west of the Red Cedar River that has a water well.

Groundwater contaminants exceeding the MCL's based upon groundwater monitoring well samples collected on-site and off-site during November 2003, are comprised of chlorinated volatile organic compounds (VOC's) including trichloroethylene (TCE), cis-1,2-dichloroethene, and vinyl chloride, metals including arsenic, cadmium, and hexavalent chromium, and free cyanide.

Groundwater contaminants exceeding Drinking Water Criteria include vinyl chloride (330 ug/l in November 2003) at monitoring well MW-17 located immediately west of the Red Cedar River, and trichloroethene (3400 ug/l and 2900 ug/l) at monitoring wells MW-02 and MW-01 respectively, located in the southeastern quadrant of the site.

The table below highlights contaminants in the groundwater medium that exceeded Maximum Contaminant Levels (MCL's)

Constituent	Highest Conc. 11/2003 ug/L	Maximum Concentration Level (MCL) ug/L	Well Location with Highest Conc. (11/2003)	Other Well Locations Exceeding MCL (11/2003)	MI Part 201 Drinking Water Criteria ug/L
cis-1,2-dichloroethene (DCE)	600	70	MW-01	MW-02, 03, 05, 06, 08, 17, 25,	70
Trichloroethylene (TCE)	3400	5	MW-02	MW-01, 03, 05, 06, 10, 17, 18, 25, #OE-2, #OE-3	5.0
Vinyl Chloride	330	2	MW-17	MW-02, 12, 08, 09, **0S-3, 10, 11, 18, 19, 23, 26,	2.0
Constituent	Highest Conc. 11/2003 mg/L	Maximum Concentration Level (MCL) mg/L	Well Location with Highest Conc. (11/2003)	Other Well Locations Exceeding MCL (11/2003)	MI Part 201 Drinking Water Criteria mg/L
Arsenic	.131	.010	MW-22	MW-2,	.050
Cadmium	.013*	.005	MW-J2 *		.005
Lead	.0044	.015 ***	MW-28 (12/03)		.004

* indicates that sample was collected 10/2003 ** indicates off-site well (11/2003)
# indicates geoprobe sampling locations (3/2003 – 10/2003)
***Action level concentration given for lead (Pb); no MCL available for Pb. Action level is based on a Treatment Technique that requires public water systems to control the corrosiveness of their water. Action level is not based on groundwater potability.

Reference (s): Summary Report RCRA Facility Investigation, October 2001
Groundwater Environmental Indicators Support Document, Former Stanley Tools, Fowlerville, MI Feb 2004

Footnotes:

"Contamination" and "contaminated" describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriate "levels" (appropriate for the protection of the groundwater resource and its beneficial uses).

3. Has the **migration** of contaminated groundwater **stabilized** (such that contaminated groundwater is expected to remain within "existing area of contaminated groundwater"[2] as defined by the monitoring locations designated at the time of this determination)?

___X__If yes - continue after presenting or referencing the physical evidence (e.g., groundwater sampling/measurement/migration barrier data) and rationale why contaminated groundwater is expected to remain within the (horizontal or vertical) dimensions of the "existing area of groundwater contamination"[2]).

_____If no (contaminated groundwater is observed or expected to migrate beyond the designated locations defining the "existing area of groundwater contamination"[2]) - skip to #8 and enter "NO" status code, after providing an explanation.

_____ If unknown - skip to #8 and enter an "IN" status code.

Rationale and Reference (s):

The migration of groundwater has stabilized as evidenced by a reduction in the size of the plume of VOC constituent concentrations detected in the shallow aquifer. Hydrostratigraphic cross-sections, a top of bedrock contour map, potentiometric surface maps, and groundwater quality data were used to assess groundwater flow and transport conditions and potential groundwater contaminant migration/stabilization. In addition, historical groundwater sampling data was geospatially compared, i.e., in both vertical and horizontal dimensions, to that of more recent groundwater sampling data. Constituents of concern or constituents that exceeded MCL's are cis-1,2-dichloroethene, (cis-1,2-DCE), TCE, vinyl chloride, arsenic, and cadmium. Analysis of these data sets revealed the following: historical TCE, cis-1,2 DCE and vinyl chloride contamination could be geospatially defined by an east-west band extending from the southeastern quadrant of the site to southwestern quadrant of the site extending southwest to the banks of the Red Cedar River. Historical concentrations of TCE in the southeastern quadrant had concentrations of TCE as taken from geoprobe sampling locations of 4800 ug/L (TCE1), to 16000 ug/L (TCE15). Sample location TCE15 was located in the approximate center of the southeast - southwest band. Historical monitoring well and geoprobe groundwater samples for cis-1,2-DCE could also be defined by geoprobe sampling locations TCE-1 (1100 ug/L), TCE-15 (1900 ug/L). In addition, geoprobe groundwater sample locations TCE-16 (1200 ug/L), TCE-37 (8200 ug/L), and TCE-8 (1100 ug/L) all collected in July 2000 exceeded the State of Michigan Part 201 groundwater/surface water interface criteria (GSI), of 620 ppb. More recent groundwater samples collected in November 2003 revealed that the TCE and cis-1,2-DCE plume can be defined by the same well locations (see proceeding table below). TCE samples collected from within this area had concentrations ranging from 1300 ug/L (MW-03), to 3400 ug/L (MW-02) and cis-1,2-DCE ranging from 91 ug/L at MW-06, to 410 ug/L at MW-17. Hence the reduction of concentration as well as the reduction of a geospatial horizontal dimension of TCE and cis-1,2 DCE contaminant distributions appears to indicate that the cis-1,2-DCE plume and TCE plume is shrinking.

Vinyl chloride which is a daughter product of TCE is also shown possibly migrating to the Red Cedar River more specifically, MW-17, and MW-08 had concentrations of 330 ug/L and 130 ug/L, respectively, both collected in November 2003. Monitoring well B-1 collected in October 2003 had a concentration of 250 ug/L. November 2003 groundwater sampling data also indicated that MW-OS3 which is located on the western side of the Red Cedar River had a vinyl chloride concentration of 29 ppb. Because there has not been any data collected from west of the Red Cedar River at MW-OS3 nor from any other monitoring wells west of the Red Cedar River from any historical groundwater sampling events prior to July 2003, (off-site to the west), it is inconclusive whether the plume has migrated beyond its original defined dimensions. The MCL for vinyl chloride is 2 ug/L, hence 10x the MCL is 20 ug/L, and the GSI standard is 15ug/L. The data does not show that there has been any vertical migration of vinyl chloride in any of the monitoring wells because vinyl chloride has been found primarily in the shallow aquifer. There is one deep well (MW-B2) where vinyl chloride was detected in the most recent rounds of sampling, 38 ug/L. However the screening level depth as discerned from well construction diagrams and pieziometric surface map show that the well screen was installed at two distinct geological regions (i.e., shallow and intermediate aquifers).

Groundwater monitoring well sample locations that exceed groundwater quality standards are presented below.

Constituent	Highest Conc. 11/2003 ug/L	Maximum Contaminant Level (MCL) ug/L	Applicable GSI Criteria ug/L	Well Locations exceeding GSI (11/2003)	Well Locations Exceeding MCL (11/2003)
cis-1,2-dichloroethane (DCE)	600 (MW-01)	70	620	---	MW-02, 03, 05, 06, 08, 17, 25,
Trichloroethylene (TCE)	3400 (MW-02)	5	200	MW-01, 02, 03 05, 06, 17, 25,	MW-01, 02, 03, 05, 06, 10, 17, 18, 25,
Vinyl Chloride	330 (MW-17)	2	15	MW-02, 08, OS3, 10,	MW-02, 08, 09, 0S-3, 10, 11, 12, 18, 19, 23, 26,
Constituent	Highest Conc. 11/2003 mg/L	Maximum Contaminant Level (MCL) mg/L	Applicable GSI Criteria mg/L	Well Locations exceeding GSI (11/2003)	Well Locations Exceeding MCL (11/2003)
Arsenic	.131 (MW-22)	.010	.15	None	MW-22, MW-23,
Cadmium	.013* (MW-J2)	.005	.0062	MW-J2	MW-J2
Copper	.148 (MW-08)	1.3	.029	MW-08, 18, 20,	None
Nickel	1.07 (MW-25)	3.6 (PRG)**	.17	MW- 08, 25,	None
Chromium	.02 (MW-08, & 22)	0.1	.011	MW-08, 22	None
Cyanide	.04 (MW-18)	0.2	.005	MW-05, 06, 08, 09, 13, 13C, 14, 14C, 15, 15C, 17, 18, 19, 22, 23, Os1, OS3C ——	None

The groundwater flow conceptual model for the study area is comprised primarily by groundwater flowing towards and discharging to the Red Cedar River. Shallow groundwater from uplands east and west of the Red Cedar River flows toward the Red Cedar River, located on the western site boundary.

There are four significant conditions that can be used to establish and verify the stability of the current area of shallow aquifer groundwater contamination. The first condition is the low permeability soils and resulting aquitard that underlies the shallow aquifer and restricts the downward migration of groundwater contaminants.

The second condition is the westerly groundwater flow direction of the shallow aquifer across the site, with groundwater discharging into the Red Cedar River bordering the western site boundary. The Red Cedar River is a

local groundwater discharge area that functions as a natural hydraulic barrier preventing the westerly migration of contaminants beyond the local discharge area. Contaminants in the lower unconsolidated deposits are less to groundwater transport due to lower hydraulic conductivities, but the ultimate destination for mobile constituents is the river's lowland/floodplain discharge area.

The third condition is the source excavation project that was conducted during the summer and fall of 2003. Approximately 83,900 tons of contaminated soil was excavated across the site to water table depth at approximately 95% of the site. This effort effectively removed all remaining contaminants formerly present within the vadose zone, capillary fringe, and top portion of the saturated zone across the site. Included in this massive excavation was the elimination of phase-separated hydrocarbons beneath SWMU C. The excavated area was backfilled with clean fill material consisting of various grades of sand, some silt, and lenses of clay materials.

The fourth condition is the absence of a dense non-aqueous phase liquid (DNAPL) at the site, which is demonstrated based on several site characteristics. No VOC groundwater concentrations meet or exceed 1% of their respective solubility's in water, a *rule of thumb* benchmark indicating potential DNAPL. Wells with the highest VOC detections are all located within the eastern half of the site, and each of these well screens extends to the aquitard, thereby providing "worst-case" groundwater chemistry data that would indicate whether DNAPL is present along the aquitard surface. The monitoring well network within and adjacent to the VOC plume footprint is comprised of at least 10 wells having screens at or straddling the aquifer-aquitard contact, which provides excellent groundwater and DNAPL monitoring capabilities. Geoprobe sampling depths of up to 17.5 feet have characterized groundwater quality to within two feet of the aquitard surface. The aquitard surface is relatively flat across the majority of the eastern on-site area, with aquitard surface elevations decreasing (i.e. sloping toward) the south and west of MW-01. Further off-site to the east, the aquitard surface elevation decreases toward new monitoring well MW-28, which did not exhibit any VOC detections indicative of DNAPL. Shallow groundwater samples were collected at 8 locations east of the site during 2003. While the clay aquitard surface was not encountered, the highest VOC detection from those samples was 9.2 ppb of TCE, indicating DNAPL (if ever present) has not migrated via gravity flow eastward from the MW-02 area.

In summary, based on groundwater discharge to the Red Cedar River, the aquitard underlying the shallow aquifer, the close proximity of the contaminated groundwater to the discharge area, the removal of contaminant source materials across the site using interim remedial measures, and the lack of a continuing contaminant source due to the demonstrated absence of any DNAPL beneath the site, contaminated groundwater is expected to remain within the current horizontal and vertical dimensions of the existing area of groundwater contamination.

Reference (s): Summary Report RCRA Facility Investigation, October 2001
Groundwater Environmental Indicators Support Document, Former Stanley Tools, Fowlerville, MI Feb 2004
JCI Fowlerville Teamlink Website, https://westonproject.net/

Footnotes:

[2]"existing area of contaminated groundwater" is an area (with horizontal and vertical dimensions) that has been verifiably demonstrated to contain all relevant groundwater contamination for this determination, and is defined by designated (monitoring) locations proximate to the outer perimeter of "contamination" that can and will be sampled/tested in the future to physically verify that all "contaminated" groundwater remains within this area, and that the further migration of "contaminated" groundwater is not occurring. Reasonable allowances in the proximity of the monitoring locations are permissible to incorporate formal remedy decisions (i.e., including public participation) allowing a limited area for natural attenuation.

4. Does "contaminated" groundwater **discharge** into **surface water** bodies?

___X___ If yes - continue after identifying potentially affected surface water bodies.

_____ If no - skip to #7 (and enter a "YE" status code in #8, if #7=yes) after providing an explanation and/or referencing documentation supporting that groundwater "contamination" does not enter surface water bodies.

_____ If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s):

The site is located on the eastern bank of the Red Cedar River. Impacted groundwater from the site discharges to the Red Cedar River.

5. Is the **discharge** of "contaminated" groundwater into surface water likely to be **"insignificant"** (i.e., the maximum concentration[3] of each contaminant discharging into surface water is less than 10 times their appropriate groundwater "level," and there are no other conditions (e.g., the nature, and number, of discharging contaminants, or environmental setting), which significantly increase the potential for unacceptable impacts to surface water, sediments, or eco-systems at these concentrations)?

_____If yes,-skip to #7 (and enter "YE" status code in #8 if #7=yes), after documenting: 1) the maximum known or reasonably suspected concentration[3] of key contaminants discharged above their groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and 2) provide a statement of professional judgment/explanation (or reference documentation) supporting that the discharge of groundwater contaminants into the surface water is not anticipated to have unacceptable impacts to the receiving surface water, sediments, or eco-system.

___X___If no, (the discharge of "contaminated" groundwater into surface water is potentially significant) - continue after documenting: 1) the maximum known or reasonably suspected concentration[3] of each contaminant discharged above its groundwater "level," the value of the appropriate "level(s),"and if there is evidence that the concentrations are increasing; and 2) for any contaminants discharging into surface water in concentrations[3] greater than 100 times their appropriate groundwater "levels," the estimated total amount (mass in kg/yr) of each of these contaminants that are being discharged (loaded) into the surface water body (at the time of the determination), and identify if there is evidence that the amount of discharging contaminants is increasing.

_____If unknown - enter "IN" status code in #8.

Rationale and Reference(s):

The discharge of contaminated groundwater into surface water is of significance due to the detections of three constituents in concentrations greater than ten times their respective maximum contaminant levels. TCE: seven groundwater monitoring installations located primarily in southeastern and southwestern quadrants of the site had detections of trichloroethylene (TCE), greater than 50 ug/L. (Note the MCL for TCE is 5 ug/L). These samples were collected in the November 2003 sampling round and are representative of groundwater quality conditions of the shallow aquifer; Vinyl Chloride: vinyl chloride was detected in six groundwater monitoring wells collected during the November 2003 sampling round. Monitoring well locations, MW-09 to MW-08 form a north-south band extending approximately 250 feet wide from the north central area of the site down to the southwestern quadrant of the site. The concentration of vinyl chloride detected in these six wells range from 28 ug/L to 338 ug/L. The MCL for vinyl chloride is 2 ug/L; Arsenic: only one groundwater monitoring well location (MW-22) exceeded ten times the MCL (As MCL = .010 mg/L). The concentration detected during the November 2003 sampling round was .13 mg/L. MW-22 is located in the upper northwestern quadrant of the site near the Red Cedar River. The table below list well locations that were detected with significant concentrations of contaminants, i.e., ten times the maximum contaminant level.

Constituent	MCL	10X MCL	Location (ug/L)	Aquifer	Date of Sample
TCE	5 ug/L	50 ug/L	MW-02 (3400) MW-01 (2900) MW-05 (2100) MW-03 (1300) MW-17 (300)	Shallow	Nov. 2003
Vinyl Chloride	2 ug/L	20 ug/L	MW-02 (28) MW-08 (130) MW-09 (2.9) MW-OS3 (29) MW-10 (23) MW-11 (2.5) MW-17 (330) MW-18 (14) MW-19 (7.5)	Shallow	Nov. 2003
Arsenic	10 ug/L	100 ug/L	MW-22 (131)	Shallow	Nov. 2003

Reference: Summary Report RCRA Facility Investigation, October 2001
Groundwater Environmental Indicators Support Document, Former Stanley Tools, Fowlerville, MI Feb 2004
JCI Fowlerville Teamlink Website, https://westonproject.net

[3]As measured in groundwater prior to entry to the groundwater-surface water/sediment interaction (e.g., hyporheic) zone.

6. Can the **discharge** of "contaminated" groundwater into surface water be shown to be **"currently acceptable"** (i.e., not cause impacts to surface water, sediments, or eco-systems that should not be allowed to continue until a final remedy decision can be made and implemented[4])?

___X If yes - continue and either: 1) identifying the Final Remedy decision incorporating these conditions, or other site-specific criteria (developed for the protection of the site's surface water, sediments, and eco-system), and referencing supporting documentation demonstrating that these criteria are not exceeded by the discharging groundwater; OR
2) providing or referencing an interim-assessment[5], appropriate to the potential for impact, that shows the discharge of groundwater contaminants into the surface water is (in the opinion of trained specialists, including ecologist) adequately protective of receiving surface water, sediments, and eco-systems, until such time when a full assessment and final remedy decision can be made. Factors which should be considered in the interim-assessment (where appropriate to help identify the impact associated with discharging groundwater) include: surface water body size, flow, use/classification/habitats and contaminant loading limits, other sources of surface water/sediment contamination, surface water and sediment sample results and comparisons to available and appropriate surface water and sediment "levels," as well as any other factors, such as effects on ecological receptors (e.g., via bio-assays/benthic surveys or site-specific ecological Risk Assessments), that the overseeing regulatory agency would deem appropriate for making the EI determination.

_____If no - (the discharge of "contaminated" groundwater cannot be shown to be **"currently acceptable"**) - skip to #8 and enter the "NO" status code, after documenting the currently unacceptable impacts to the surface water body, sediments, and/or eco-systems.

_____If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s):

A Groundwater-surface water mixing zone determination was computed for the three constituents of concern whose concentrations in groundwater were determined to be "significant" based on the constituent's concentrations exceeding "ten times" their respective appropriate groundwater quality level, as indicated in question #5. The constituents are TCE, vinyl chloride and arsenic. Since vinyl chloride represents the worst-case site specific constituent concentration having probability for groundwater-surface water discharge, vinyl chloride in groundwater at MW-17 will be evaluated for its acceptability in discharging into the Red Cedar River. Based on the vinyl chloride concentration calculated in the mixing zone model, the resulting calculated mixing zone concentration i.e., groundwater to surface water discharge, will be compared to the appropriate surface water protection criteria.

Areas of Groundwater Discharge Associated With Current Exceedences in Groundwater

The discharge area is being computed from a horizontal distance of 280', which is the length of the vinyl chloride contamination found in well locations contiguous to the Red Cedar River subsequent to the soil excavation project completed during the summer and fall of 2003. This horizontal plume band can be defined by a northern boundary that extends from 30' north of MW-26, to a southern boundary that extends south to an area just south of the southern drainage ditch. Monitoring well MW-17 located on the northern boundary had a vinyl chloride concentration of 330 ug/L and the south ditch represents an intermediate point between MW-08 and MW-14 (MW-08 had a vinyl chloride concentration of 130 ug/L and MW-14 located on the southern boundary had a concentration of 1.2 ug/.L. Since vinyl chloride was found on both sides of the River, the discharge area will be approximated by a horizontal length of 280' x 8' + 8' or 280' x 16' of wetted perimeter = 4480 ft2

A_{VOC} = 280ft x 16 ft = 4,400 ft^2

State of Michigan Department of Environmental Quality (MDEQ) Flow Measurements and Prescribed Low Flow Discharge (Q_{SW}) For the Red Cedar River

The MDEQ completes mixing zone determinations using conservatively derived stream flow values representing a 90-day once in 10-year flow (90Q10). The mean harmonic flow value for the Red Cedar River based on MDEQ measurements taken at the site boundary is 12 cfs. The MDEQ 90Q10 value is 3.8 cfs. For purposes of this EI 750 Determination, the more conservative MDEQ 90Q10 value of 3.8cfs will be used.

$(Q_{SW}) = (3.8\ ft^2/sec)\ (86{,}400\ sec/day) = 328{,}320\ ft^3/day$

Average Value of Horizontal Hydraulic Gradient for the Shallow Aquifer (i)

i = 0.032 ft/ft (the actual gradient measured from MW-17 to the Red Cedar River)

Hydraulic Conductivity (K) From RFI Permeability Tests

K = 3.17 ft/day (geometric mean of all K measurements)

Calculated Groundwater Flux (Q_{gw})

$Q_{gw} = (K)\ (i)\ (A)$

$Q_{gw} = (3.17\ ft/day)\ (0.032\ ft/ft)\ (4{,}400\ ft^2) = 446\ ft^3/day$

Estimated Surface Water Concentrations (C_{sw}) After Discharge

Concentrations in surface water computed using the following model:

$(C_{gw})\ (Qgw) = (Csw)\ \{(Qgw + (0.1)\ (Qsw)\}$

Cgw = vinyl chloride concentration in groundwater at MW-17 330 ug/L
Qgw = 446 ft^3/day, calculated groundwater flux

Csw = X (concentration of vinyl chloride in surface water body i.e., Red Cedar River)

Qsw = = 328,320 ft^3/day, surface water body flow rate

The table below illustrates the resulting surface water concentrations of the three site-specific constituents of concern using the mixing-zone model. The modeled concentrations are then compared to most recent surface water quality data as well as the State of Michigan, Part 4, Rule 57 Water Quality Values which are the appropriate surface water quality criteria for the JCI site. The State of Michigan, Part 4, Rule 57 Water Quality Standards are calculated surface water quality values to protect human, wildlife and aquatic life.

Constituent	Groundwater Sample (ug/L)	Surface Water Sample ug/L	MI Rule 57 Water Quality Value ug/L	Calculated Groundwater Discharge (Mixing Zone) ug/L	Conc. Acceptable Passes or Fails MI Rule 57 Water Quality Criteria
Vinyl Chloride	330	.62J	13 (HCV non-drink)	4.42 (a)	Passes Criteria
TCE	300	11	550 HNV non-drink)	4.02 (a)	Passes Criteria
Arsenic	131	2.3 – 4.5	280 HNV (non-drink)	1.75 (a)	Passes Criteria

The resulting estimated surface water constituent concentrations computed from the mixing zone model, illustrates that all three constituents of concern, i.e., vinyl chloride, TCE, and As, are all within the State of Michigan Part 4,

Rule 57 Water Quality Criteria. Hence the current groundwater discharge of vinyl chloride can be considered currently acceptable.

In addition, vinyl chloride, TCE and As concentrations are expected to decline over subsequent groundwater sampling events due to the massive excavation of contaminated soil in 2003 that effectively removed the most significant continuing source area of chlorinated solvents to shallow groundwater at the site. In addition, groundwater remediation activities may be implemented in the future, if necessary, should increased concentrations, newly identified Rule 57 exceedences, or plume rebound effects be identified during the groundwater monitoring program.

Reference (s): Summary Report RCRA Facility Investigation, October 2001
Groundwater Environmental Indicators Support Document, Former Stanley Tools, Fowlerville, MI Feb 2004
JCI Fowlerville Teamlink Website, https://westonproject.net

Footnotes:
a - mixing zone calculated using 90 day once in ten year flow (90Q10) of 3.8 ft3/sec
HNV – Human noncancer cancer value, drinking and non-drinking as per Rule 57 Water Quality Values
HCV – Human cancer cancer value, drinking and non-drinking as per State of Michigan Rule 57 Water Quality Values

7. Will groundwater **monitoring**/measurement data (and surface water/sediment/ecological data, as necessary) be collected in the future to verify that contaminated groundwater has remained within the horizontal (or vertical, as necessary) dimensions of the "existing area of contaminated groundwater?"

__X__ If yes - continue after providing or citing documentation for planned activities or future sampling/measurement events. Specifically identify the well/measurement locations which will be tested in the future to verify the expectation (identified in #3) that groundwater contamination will not be migrating horizontally (or vertically, as necessary) beyond the "existing area of groundwater contamination."

_____ If no, enter a "NO" status code in #8.

_____ If unknown - enter an "IN" status code in #8.

Rationale and Reference(s):

Groundwater monitoring/measurement data will be collected in the future to verify that contaminated groundwater has remained within the horizontal and vertical dimensions of the existing area. Future groundwater sampling will be conducted both on-site and off-site to confirm the findings of the 2003 groundwater study and to further characterize the nature and extent of groundwater contamination over time. Long-term groundwater sampling will also allow the assessment of anticipated beneficial effects resulting directly from the massive removal of the contaminated soil from the site during 2003. A groundwater monitoring program consisting of a total of seventeen monitoring wells will be established to monitor the existing contaminated groundwater area. Of the seventeen groundwater monitoring wells, two wells are located upgradient of the facility and the remaining fifteen wells are located to monitor down and side gradients of the former regulated units and solid waste management units (SWMU's).

Future groundwater sampling will be conducted on a semi-annual basis for the next two-year period. Groundwater sample analyses will include metals, including arsenic, cadmium, copper, nickel, chromium and lead, cyanide, polychlorinated biphenyls, semi-volatile organic compounds including cis-1,2-DCE, and VOC's, including TCE and vinyl chloride on selected well samples. Following the two-year sampling period, the frequency of sampling and parameters selected for analysis will be re-evaluated based on an assessment of past water quality data.

Groundwater level measurements will be conducted for the next two-year period on a semi-annual basis. The groundwater level measurements will be evaluated and groundwater flow direction confirmed to verify that contaminated groundwater flow paths remain within the horizontal and vertical dimensions of the existing area of contaminated groundwater. The table below summarizes the groundwater monitoring wells for the proposed groundwater monitoring program and the attached map illustrates their locations.

Monitoring Well Identification	Location
MW-02	Shallow
MW-11	Shallow
MW-14	Shallow
MW-17	Shallow
MW-21	Shallow
MW-22	Shallow
MW-24	Shallow
MW-25	Shallow
MW-26	Shallow
MW-28	Shallow
MW-B1	Shallow
MW-OS3	Shallow
MW-OS3C	Deep
MW-28C	Deep
MW-B2	Deep
MW-J2	Deep
MW-OS1C	Deep

Reference (s): Summary Report RCRA Facility Investigation, October 2001
Groundwater Environmental Indicators Support Document, Former Stanley Tools, Fowlerville, MI Feb 2004
JCI Fowlerville Teamlink Website, https://westonproject.net
Final Corrective Measures Proposal Former Stanley Tools Fowlerville, MI, February 2004

8. Check the appropriate RCRIS status codes for the Migration of Contaminated Groundwater Under Control EI (event code CA750), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (attach appropriate supporting documentation as well as a map of the facility).

___X__ YE - Yes, "Migration of Contaminated Groundwater Under Control" has been verified. Based on a review of the information contained in this EI determination, it has been determined that the "Migration of Contaminated Groundwater" is "Under Control" at the Former Stanley Too facility, EPA ID# MID099124299, located at 425 Frank Street, Fowlerville, Michigan. Specifically, this determination indicates that the migration of "contaminated" groundwater is under control, and that monitoring will be conducted to confirm that contaminated groundwater remains within the "existing area of contaminated groundwater." This determination will be re-evaluated when the Agency becomes aware of significant changes at the facility.

_____ NO - Unacceptable migration of contaminated groundwater is observed or expected.

_____IN - More information is needed to make a determination.

Completed by (signature) Date 9/30/2004

(print) Juan Thomas

(title) Environmental Scientist

Supervisor (signature) Date
(print)
(title)
(EPA Region or State)

Locations where References may be found:

USEPA Region 5
Records Center, 7th Floor
77 W. Jackson
Chicago, IL. 60604

Contact telephone and e-mail numbers:

(name) Juan Thomas
(phone #) 312-886-6010
(e-mail) Thomas.juan@epa.gov

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING

JENNIFER M. GRANHOLM
GOVERNOR

STEVEN E. CHESTER
DIRECTOR

November 18, 2008

Mr. Frank A. Voltolina
Vice President & Treasurer
Johnson Controls, Inc.
5757 North Green Bay Avenue
Milwaukee, Wisconsin 53209

Dear Mr. Voltolina:

SUBJECT: Violation Notice; Corrective Action Financial Test; Johnson Controls, Inc. (JCI); MID 099 124 299

On May 21, 2008, Department of Environmental Quality (DEQ), Waste and Hazardous Materials Division (WHMD), staff performed a record review pertaining to JCI, located at 425 West Frank Street, Fowlerville, Michigan. The purpose of the record review was to evaluate JCI's compliance with the financial capability and liability coverage requirements specified under Part 111, Hazardous Waste Management, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (Act 451); the corresponding requirements under Subtitle C of the federal Resource Conservation and Recovery Act of 1976, as amended; JCI's federal Corrective Action Order issued September 2, 1988; and any administrative rules or regulations promulgated pursuant to these acts.

As a result of the record review, the WHMD determined that JCI violated the following:

1. To demonstrate that he or she meets this test, the owner or operator shall submit all of the following items to the director:

    a. A letter signed by the owner or operator's chief financial officer and worded as specified by the director.
    b. A copy of the independent certified public accountant's report on examination of the owner's or operator's financial statements for the latest completed fiscal year.
    c. A special report from the owner's or operator's independent certified public accountant to the owner or operator on comparison of the data presented in the chief financial officer's letter to the independently audited, year-end financial statements. The special report shall describe the agreed upon procedures performed and related findings, including if there were any discrepancies found.

2. After the initial submission of the items specified in subrule (3) of this rule, the owner or operator shall send updated information to the director within 90 days after the close of each succeeding fiscal year. This information shall consist of all items specified in subrule (3) of this rule.

(Part 111; R 299.9709(3) of the rules promulgated pursuant to Part 111).

Although WHMD staff advised Ms. Jennifer L. Bolger of Gonzales Saggio & Harlan LLP, working on behalf of JCI, on May 21, 2008, by electronic mail, of the requirement to submit a letter from the chief financial officer with original signatures, not a photocopy of the letter, an original letter has still not been submitted. Therefore, WHMD staff has determined that JCI had not submitted the required financial test information by December 29, 2007, 90 days after the close of JCI's fiscal year, as required.

JCI should immediately initiate the actions necessary to correct the cited violations and submit the above-referenced documentation to this office by **December 29, 2008.**

Your response should explain the cause of the violations and what steps are being taken to prevent reoccurrence of the violations. If the violations are not resolved by the date of your response by submittal of the requested documents, your response should include a description of the actions that will be taken and by what dates these actions will take place to resolve the violations. Your response may include additional information relevant to the violations observed for evaluation. The WHMD will evaluate your response, determine JCI's compliance status at the above-referenced location, and notify you of this determination.

We anticipate and appreciate your cooperation in resolving this matter. If you have any questions, please feel free to contact me at the telephone number below or by e-mail at daileyd@michigan.gov.

Sincerely,

Daniel P. Dailey, P.E.
Environmental Engineering Specialist
Hazardous Waste Management Unit
Hazardous Waste Section
Waste and Hazardous Materials Division
517-335-6610

cc: Ms. Jennifer L. Bolger, Gonzales Saggio & Harlan LLP
Mr. Juan Thomas, U.S. Environmental Protection Agency, Region 5
Mr. John Craig, DEQ
Mr. Larry Bean, DEQ
Mr. Steve Buda, DEQ
HWS-C&E File

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING

JENNIFER M. GRANHOLM
GOVERNOR

STEVEN E. CHESTER
DIRECTOR

January 21, 2009

Ms. Jennifer Bolger
Gonzalez Saggio & Harlan LLP
Attorneys at Law
225 East Michigan Street
Fourth Floor
Milwaukee, Wisconsin 53202

Dear Ms. Bolger:

SUBJECT: Violation Notice Dated November 18, 2008; Johnson Controls, Inc. (JCI); MID 099 124 299

This correspondence is written to acknowledge your letter dated December 30, 2008, which itemized the actions taken by JCI, located at 425 Frank Street in Fowlerville, Michigan, to correct a violation of one or more of the following: Part 111, Hazardous Waste Management, and Part 121, Liquid Industrial Wastes, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended; Subtitle C of the federal Resource Conservation and Recovery Act of 1976, as amended; and any administrative rules or regulations promulgated pursuant to these acts. This violation was observed by Department of Environmental Quality (DEQ), Waste and Hazardous Materials Division (WHMD), staff during an evaluation conducted on May 21, 2008. JCI was notified of this violation in an e-mail dated May 21, 2008, and in a letter dated November 18, 2008, by the WHMD.

This is to notify JCI that, based on the information in your letter dated December 30, 2008, WHMD staff has determined that JCI has corrected the violation identified in their letter dated November 18, 2008.

We appreciate your cooperation in resolving this matter. If you have any questions, please feel free to contact me at the telephone number below or by e-mail at daileyd@michigan.gov.

Sincerely,

Daniel P. Dailey, P. E.
Environmental Engineer Specialist
Hazardous Waste Management Unit
Hazardous Waste Section
Waste and Hazardous Materials Division
517-335-6610

cc: Mr. Juan Thomas, U.S. Environmental Protection Agency, Region 5
Mr. John Craig, DEQ
Mr. Larry Bean, DEQ
Mr. Steve Buda, DEQ
HWS-C&E File

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF

DE-9J

February 9, 2001

Mr. Steve Amter
Disposal Safety, Inc.
1701 K St. NW, Suite 510
Washington, DC 20006

Dear Mr. Amter:

I appreciate your interest in the RCRA Corrective Action that's taking place at the Johnson Controls, Inc. Facility located in Fowlerville, Michigan. As per your request, I am providing you with copies of the facility's two most recent "Executive Summaries" completed as a part of the required RCRA Facility Investigation (RFI) that has taken place at the Fowlerville Facility. Hopefully, this information will meet your needs in providing you general information about the site relevant to the RCRA Corrective Action activities. Also, the FOIA contact person is Louise Debrower 312-886-2942. Please feel free to contact me at thomas.juan@epa.gov or 312 -886-6010, if I can be of further assistance.

Sincerely

Juan Thomas
RCRA Corrective Project Manager

Enclosures

Recycled/Recyclable • Printed with Vegetable Oil Based Inks on 50% Recycled Paper (20% Postconsumer)

RCRA CORRECTIVE ACTION FOR JOHNSON CONTROLS, INC.
FOWLERVILLE, MI
MEETING OF DECEMBER 6, 2002

SIGN-IN SHEET

	Name	Affiliation	Phone	email
1.	Juan Thomas	EPA	(312) 886-6010	thomas.juan@epa.gov
2.	Thomas Williams	EPA	312 886 0814	williams.tom@epa.gov
3	George Hamper	EPA	312-886-0987	hamper.george@epa.gov
4.	GERALD W. PHILLIPS	USEPA	312.886.0977	phillips.gerald@epa.gov
5	Dennis Reis	rep Johnson Controls	414-540-1005	dennis.reis@reisllc.com
6.	CHRISTOPHER PRESTON	ENTACT	630-616-2100	cpreston@entact7.com
7.	CHRIS WINKELJOHN	EARTH TECH	734-779-2810	CHRIS.WINKELJOHN@EARTHTECH.COM

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER RESOURCES DIVISION
PERMIT

ISSUED TO:

Johnson Controls, Inc.
49200 Halyard Drive
Plymouth, MI 48170

Permit No.	12-47-0073-P
Issued	February 15, 2013
Extended	
Revised	
Expires	February 15, 2018

This permit is being issued by the Michigan Department of Environmental Quality (MDEQ) under the provisions of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA), and specifically:

- ☒ **Part 301, Inland Lakes and Streams**
- ☐ **Part 325, Great Lakes Submerged Lands**
- ☐ **Part 303, Wetlands Protection**
- ☐ **Part 31, Floodplain/Water Resources Protection**
- ☐ **Part 315, Dam Safety**
- ☐ **Part 323, Shorelands Protection and Management**
- ☐ **Part 353, Sand Dunes Protection and Management**

Permission is hereby granted, based on permittee assurance of adherence to State of Michigan requirements and permit conditions, to:

Permitted Activity:

Install turbidity curtain to isolate ½ the river at a time and dredge approximately 858 cubic yards of contaminated sediment from the riverbed within the contained area, located between the CSX Railroad bridge and Grand River Avenue.

All dredged spoils shall be immediately hauled to an upland site for solidification and stockpiled on a lined mixing pad, with final disposal in the Waste Management, Venice Park Landfill.

No fill is authorized for haul road with all work on existing ground or equipment mats.

Place a temporary bridge as access across the Fowlerville Drain.

Upon completion of dredging, all disturbed areas shall be restored to original condition and seeded with a native seed mix.

Water Course Affected: Red Cedar River
Property Location: Livingston **County,** City of Fowlerville, **Section** 10
Subdivision, Lot **Town/Range** 3N, 3E **Property Tax No.**

Authority granted by this permit is subject to the following limitations:

A. Initiation of any work on the permitted project confirms the permittee's acceptance and agreement to comply with all terms and conditions of this permit.
B. The permittee, in exercising the authority granted by this permit, shall not cause unlawful pollution as defined by Part 31, Water Resources Protection, of the NREPA.
C. This permit shall be kept at the site of the work and available for inspection at all times during the duration of the project or until its date of expiration.
D. All work shall be completed in accordance with the approved plans and specifications submitted with the application and/or plans and specifications attached to this permit.
E. No attempt shall be made by the permittee to forbid the full and free use by the public of public waters at or adjacent to the structure or work approved.
F. It is made a requirement of this permit that the permittee give notice to public utilities in accordance with Act 53 of the Public Act of 1974 and comply with each of the requirements of that Act.

G. This permit does not convey property rights in either real estate or material, nor does it authorize any injury to private property or invasion of public or private rights, nor does it waive the necessity of seeking federal assent, all local permits, or complying with other state statutes.
H. This permit does not prejudice or limit the right of a riparian owner or other person to institute proceedings in any circuit court of this state when necessary to protect his rights.
I. Permittee shall notify the MDEQ within one week after the completion of the activity authorized by this permit, by completing and forwarding the attached preaddressed postcard to the office addressed thereon.
J. This permit shall not be assigned or transferred without the written approval of the MDEQ.
K. Failure to comply with conditions of this permit may subject the permittee to revocation of permit and criminal and/or civil action as cited by the specific state act, federal act, and/or rule under which this permit is granted.
L. All dredged or excavated materials shall be disposed of in an upland site (outside of floodplains, unless exempt under Part 31, and wetland).
M. In issuing this permit, the MDEQ has relied on the information and data that the permittee has provided in connection with the submitted application for permit. If, subsequent to the issuance of a permit, such information and data prove to be false, incomplete, or inaccurate, the MDEQ may modify, revoke, or suspend the permit, in whole or in part, in accordance with the new information.
N. The permittee shall indemnify and hold harmless the State of Michigan and its departments, agencies, officials, employees, agents and representatives for any and all claims or causes of action arising from acts or omissions of the permittee or employees, agents, or representatives of the permittee undertaken in connection with this permit. This permit shall not be construed as an indemnity by the State of Michigan for the benefit of the permittee or any other person.
O. Noncompliance with these terms and conditions and/or the initiation of other regulated activities not specifically authorized shall be cause for the modification, suspension, or revocation of this permit, in whole or in part. Further, the MDEQ may initiate criminal and/or civil proceedings as may be deemed necessary to correct project deficiencies, protect natural resource values, and secure compliance with statutes.
P. If any change or deviation from the permitted activity becomes necessary, the permittee shall request, in writing, a revision of the permitted activity from the MDEQ. Such revision request shall include complete documentation supporting the modification and revised plans detailing the proposed modification. Proposed modifications must be approved, in writing, by the MDEQ prior to being implemented.
Q. This permit may be transferred to another person upon written approval of the MDEQ. The permittee must submit a written request to the MDEQ to transfer the permit to the new owner. The new owner must also submit a written request to the MDEQ to accept transfer. The new owner must agree, in writing, to accept all conditions of the permit. A single letter signed by both parties which includes all the above information may be provided to the MDEQ. The MDEQ will review the request and if approved, will provide written notification to the new owner.
R. Prior to initiating permitted construction, the permittee is required to provide a copy of the permit to the contractor(s) for review. The property owner, contractor(s), and any agent involved in exercising the permit are held responsible to ensure that the project is constructed in accordance with all drawings and specifications. The contractor is required to provide a copy of the permit to all subcontractors doing work authorized by the permit.
S. Construction must be undertaken and completed during the dry period of the wetland. If the area does not dry out, construction shall be done on equipment mats to prevent compaction of the soil.
T. Authority granted by this permit does not waive permit requirements under Part 91, Soil Erosion and Sedimentation Control, of the NREPA, or the need to acquire applicable permits from the County Enforcing Agent.
U. Authority granted by this permit does not waive permit requirements under the authority of Part 305, Natural Rivers, of the NREPA. A Natural Rivers Zoning Permit may be required for construction, land alteration, streambank stabilization, or vegetation removal along or near a natural river.
V. The permittee is cautioned that grade changes resulting in increased runoff onto adjacent property is subject to civil damage litigation.
W. Unless specifically stated in this permit, construction pads, haul roads, temporary structures, or other structural appurtenances to be placed in a wetland or on bottomland of the waterbody are not authorized and shall not be constructed unless authorized by a separate permit or permit revision granted in accordance with the applicable law.
X. For projects with potential impacts to fish spawning or migration, no work shall occur within fish spawning or migration timelines (i.e., windows) unless otherwise approved in writing by the MDNR, Fisheries Division.
Y. Work to be done under authority of this permit is further subject to the following special instructions and specifications:

1. All work shall be completed in accordance with the attached plans, the additional plans prepared by CTI and Associates, Inc., December 2012, and kept on file at the DEQ, WRD, Lansing District Office, and the terms and conditions of this permit.

2. This permit is being issued for the maximum time allowed under Part 301, Inland Lakes and Streams, of the Natural Resources and Environmental Protection Act, PA 451 of 1994, as amended, including all permit extensions allowed under the administrative rule R 281.813. Therefore, no extensions of this permit will be granted. Initiation of the construction work authorized by this permit indicates the permittee's acceptance of this condition. The permit, when signed by the MDEQ, will be for a five-year period beginning at the date of issuance.

3. Prior to initiating construction, authorized by this permit, the permittee is required to provide a copy of the permit to the contractor(s) for review.

4. The property owner, contractor(s), **and any agent involved in exercising this permit** are held responsible to ensure the project is constructed in accordance with all drawings and specifications contained in this permit. The contractor is required to provide a copy of the permit to all subcontractors doing work authorized by this permit.

5. Authority granted by this permit does not waive permit requirements under Part 91, Soil Erosion and Sedimentation Control, of the NREPA, or the need to acquire applicable permits from the County Enforcing Agent (CEA). To locate the Soil Erosion Program Administrator for your county visit www.deq.state.mi.us/sesca/.

6. All raw areas resulting from the permitted construction activity shall be promptly and effectively stabilized with sod and/or seed and mulch (or other technology specified by this permit or project plans) in a sufficient quantity and manner to prevent erosion and any potential siltation to surface waters or wetlands.

7. All raw earth within 100 feet of a lake, stream, or wetland that is not brought to final stabilization by the end of the active growing season shall be temporarily stabilized with mulch blankets in accordance with the following dates: September 20th for the Upper Peninsula, October 1st for the Lower Peninsula north of US-10, and October 10th for the Lower Peninsula south of US-10.

8. No work or dredging authorized by this permit is allowed from April 1, to June 30 due to critical spawning, migration periods.

9. Prior to commencement of any dredging authorized by this permit, the entire dredged area shall be enclosed with a filter fabric sediment curtain to prevent off-site siltation. The sediment curtain shall be installed to extend from the bed of the waterbody to a point above the existing water's surface. The sediment curtain shall be maintained for the duration of the project and shall be left in place after completion of dredging until all disturbed sediments have settled.

10. All dredge/excavated spoils including organic and inorganic soils, vegetation, and other material removed shall be placed on upland (non-wetland, non-floodplain or non-bottomland), prepared for stabilization, and stabilized with sod and/or seed and mulch in such a manner to prevent and ensure against erosion of any material into any waterbody, wetland, or floodplain.

11. Filling is not authorized by this permit.

12. Dewatering of sediment shall be on the lined mixing pad only.

13. If the project, or any portion of the project, is stopped and lies uncompleted for any length of time other than that encountered in a normal work week, every precaution shall be taken to protect the uncompleted work from erosion, including the placement of temporary gravel bag riprap or other acceptable temporary protection.

14. No work shall be done in the stream during periods of above-normal flows except as necessary to prevent erosion.

15. Unless specifically stated under the "Permitted Activity" of this permit, construction pads, haul roads, temporary structures, or other structural appurtenances to be placed in a wetland or on bottomland of the waterbody are not authorized and shall not be constructed unless authorized by a separate permit or permit revision granted in accordance with the applicable law.

17. Prior to the start of construction, all non-work wetland areas shall be bounded by properly trenched filter fabric fence and orange construction fencing to prevent sediment from entering the wetland and to prohibit construction personnel from entering or performing work in these areas. Fence shall be maintained daily throughout the construction process. Upon project completion, the accumulated materials shall be removed and disposed of at an upland site. The erosion barrier shall then be removed in its entirety and the area restored to its original configuration and cover.

18. This permit is limited to authorizing the construction as specified above and carries with it no assurances or implications that associated wetland or floodplain areas can be developed and serviced by the structures authorized by this permit.

19. The temporary bridge over the Fowlerville Drain shall be a clear-span bridge with the lowest bottom of beam elevation at or above the natural ground elevations on each bank. The approach fill shall slope to natural ground elevations within ten (10) feet of either end of the structure.

20. The fill for approaches shall consist of clean rock or washed gravel. The use of pit-run gravel is NOT authorized by this permit.

21. This permit is for one installation of a bridge over a stream. The structure may not be removed and reinstalled at a later date, unless authorized under another permit.

22. The structure shall be removed upon completion of the project activity or by expiration date of the permit, whichever is earlier. The area shall be restored to prior condition and configuration upon removal of the temporary structure.

23. In issuing this permit, the MDEQ has relied on the information and data that the permittee has provided in connection with the permit application. If, subsequent to the issuance of this permit, such information and data prove to be false, incomplete, or inaccurate, the MDEQ may modify, revoke, or suspend the permit, in whole or in part, in accordance with the new information.

24. No work shall commence within the drain easement without authorization from the Livingston County Drain Commissioner.

25. The authority to conduct the activity as authorized by this permit is granted solely under the provisions of the governing act as identified above. This permit does not convey, provide, or otherwise imply approval of any other governing act, ordinance, or regulation, nor does it waive the permittee's obligation to acquire any local, county, state or federal approval or authorization, necessary to conduct the activity.

26. Noncompliance with these terms and conditions, and/or the initiation of other regulated activities not specifically authorized by this permit shall be cause for the modification, suspension, or revocation of this permit, in whole or in part. Further, the MDEQ may initiate criminal and/or civil proceedings as may be deemed necessary to correct project deficiencies, protect natural resource values, and secure compliance with statutes.

27. If any change or deviation from the permitted activity becomes necessary, the permittee shall request, in writing, a revision of the permitted activity and/or mitigation plan from the MDEQ. Such revision requests shall include complete documentation supporting the modification and revised plans detailing the proposed modification. Proposed modifications must be approved, in writing, by the MDEQ prior to being implemented.

28. This permit may be transferred to another person upon written approval of the MDEQ. The permittee must submit a written request to the MDEQ to transfer the permit to the new owner. The new owner must also submit a written request to accept transfer of the permit. The new owner must agree, in writing, to accept all conditions of the permit. A single letter signed by both parties which includes all

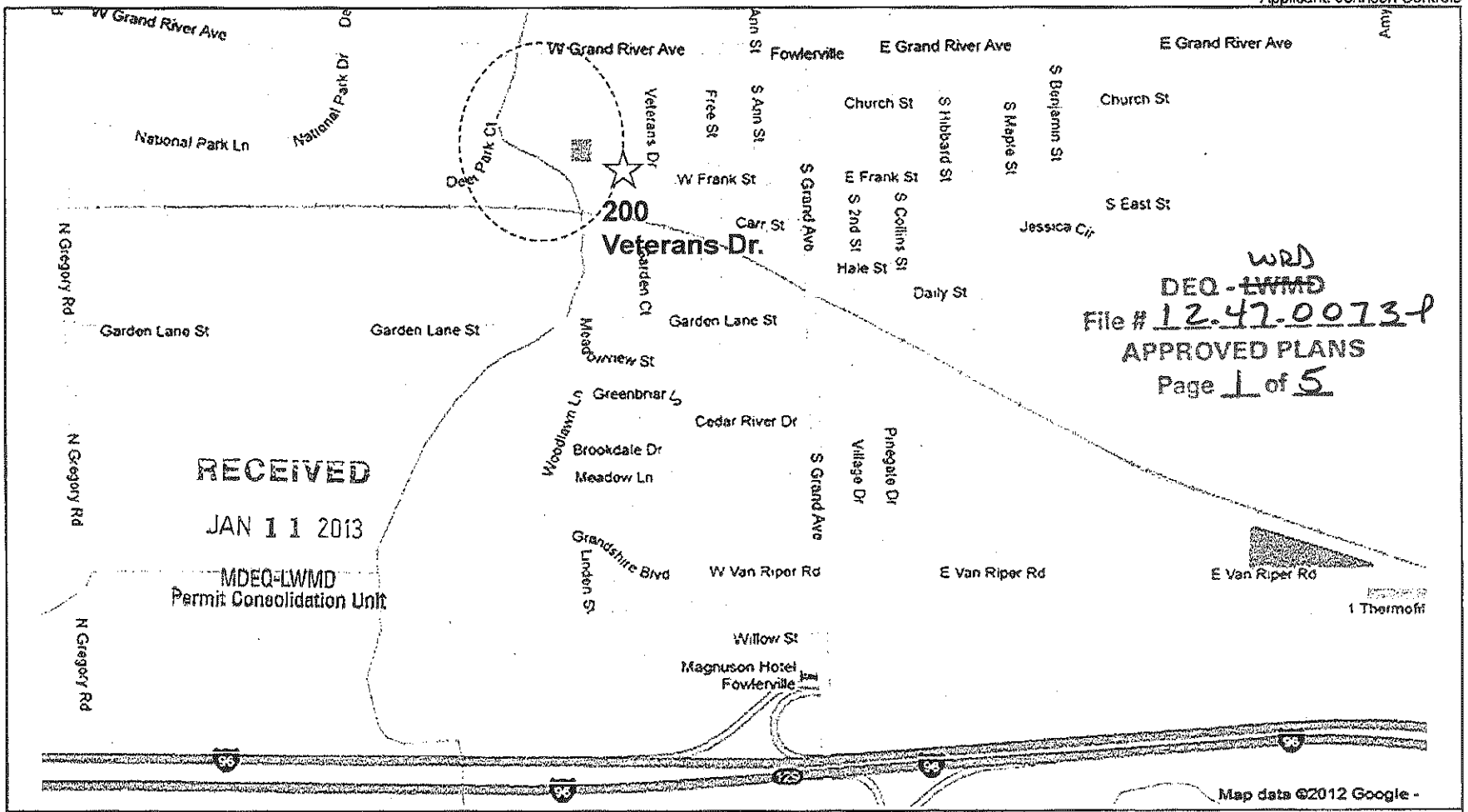
the above information may be provided to the MDEQ. The MDEQ will review the request and if approved, will provide written notification to the new owner.

29. The permittee shall indemnify and hold harmless the State of Michigan and its departments, agencies, officials, employees, agents and representatives for any and all claims or causes of action arising from acts or omissions of the permittee, or employees, agents, or representatives of the permittee, undertaken in connection with this permit. This permit shall not be construed as an indemnity by the State of Michigan for the benefit of the permittee or any other person.

By: Mary Vandalaar for
Thomas Kolhoff
Water Resources Division
517-335-6270

cc: Mr. Brian Jonckheere, Livingston County Drain Commissioner
Mr. Mark Hathaway, Livingston County CEA
City of Fowlerville Clerk
Mr. Drew Lonergan, CTI and Associates, Inc.
Ms. Rebecca Taylor, DEQ
Mr. David Slayton, DEQ

Applicant: Johnson Controls



WRD
DEQ - ~~LWMD~~
File # 12-47-0073-P
APPROVED PLANS
Page 1 of 5

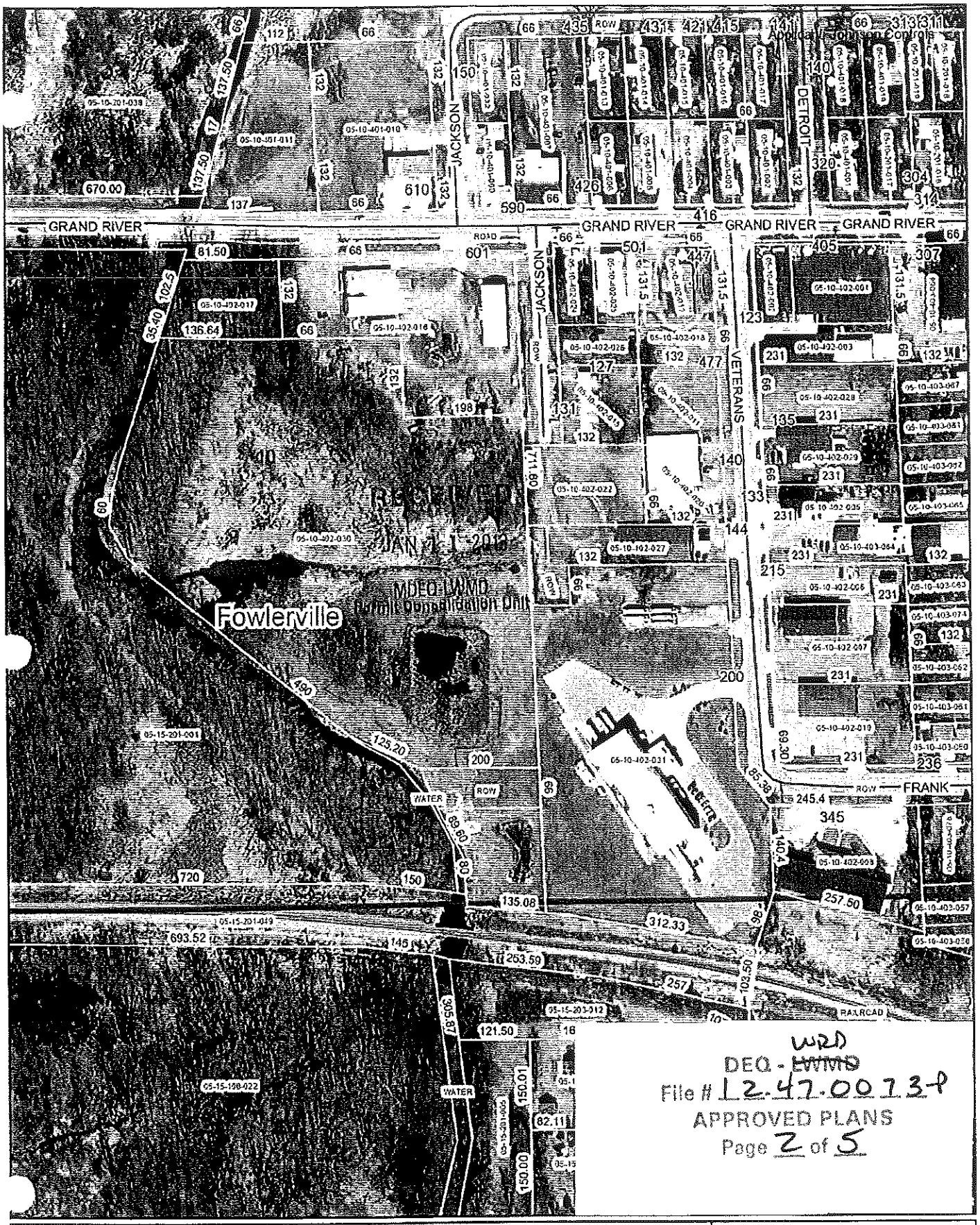
RECEIVED
JAN 11 2013
MDEQ-LWMD
Permit Consolidation Unit

Source: Google Maps

------ Approximate Site Location (Red Cedar River between Grand River Ave and CSX RR)

North

CLIENT: JCI Plymouth, MI	JOINT PERMIT APPLICATION Red Cedar River – Remedial Dredging					FORMER STANLEY TOOLS FACILITY (MID 099 124 299), Fowlerville, MI – Livingston County				
CTI and Associates, Inc.	FIGURE NO. 1	SCALE:	N/A	FILE NAME:	-	Site Location Map	DESIGNED BY:	EH	CHECKED BY:	JD
		PROJECT NO.:	-	DATE:	DECEMBER 2012	-	DRAWN BY:	EH	APPROVED BY:	AL

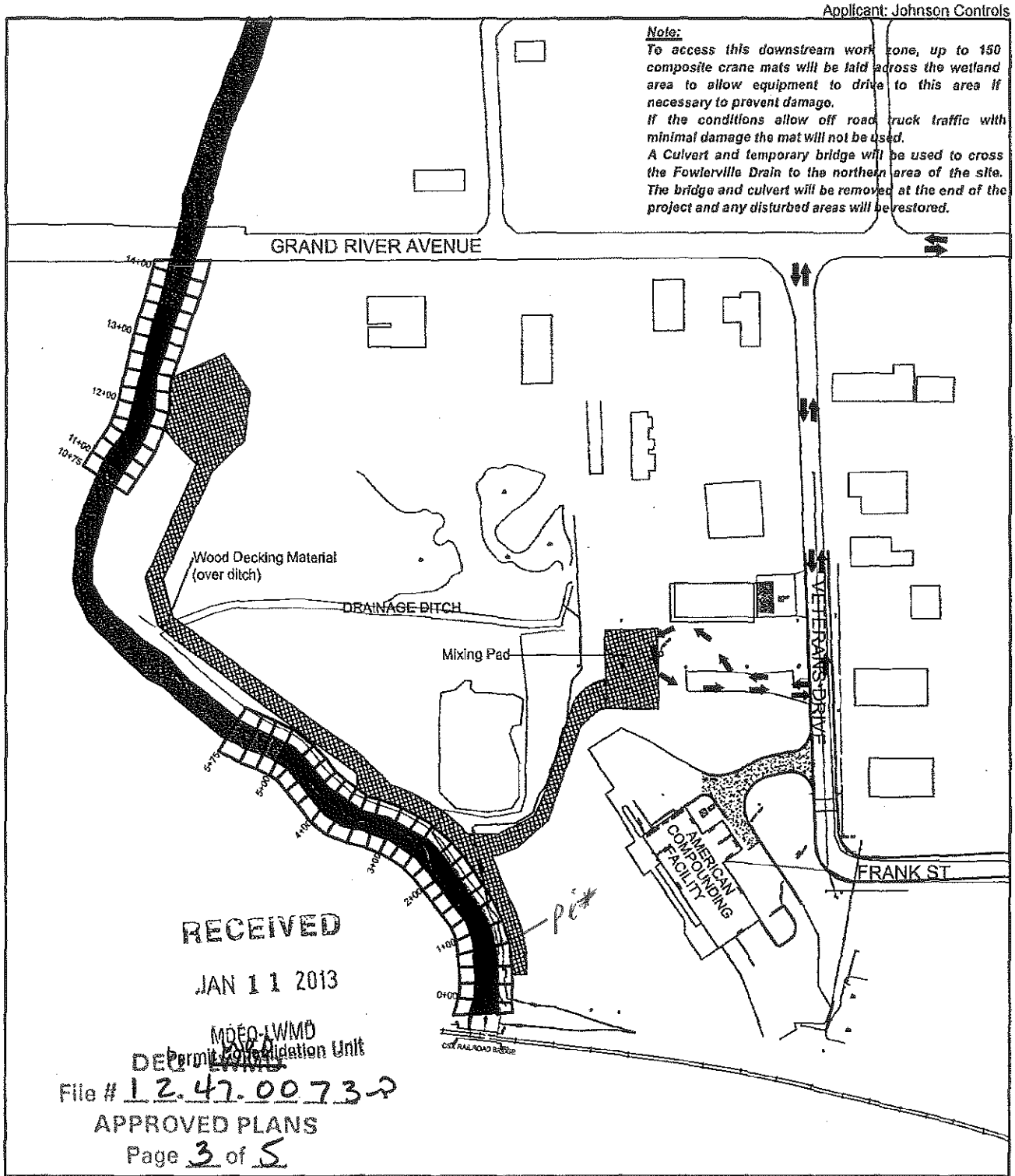


Livingston County, Michigan
Information Technology Department
G.I.S. Division 517.548.3230

Feet
80 40 0 80 160 240

Figure 3: Property Lines

Orthophotos Flown Spring 2010
Printed
Parcel lines are a representation only
Not intended for survey purposes



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DEQ-LWMD
File # 12.47.0073
APPROVED PLANS
Page 3 of 5

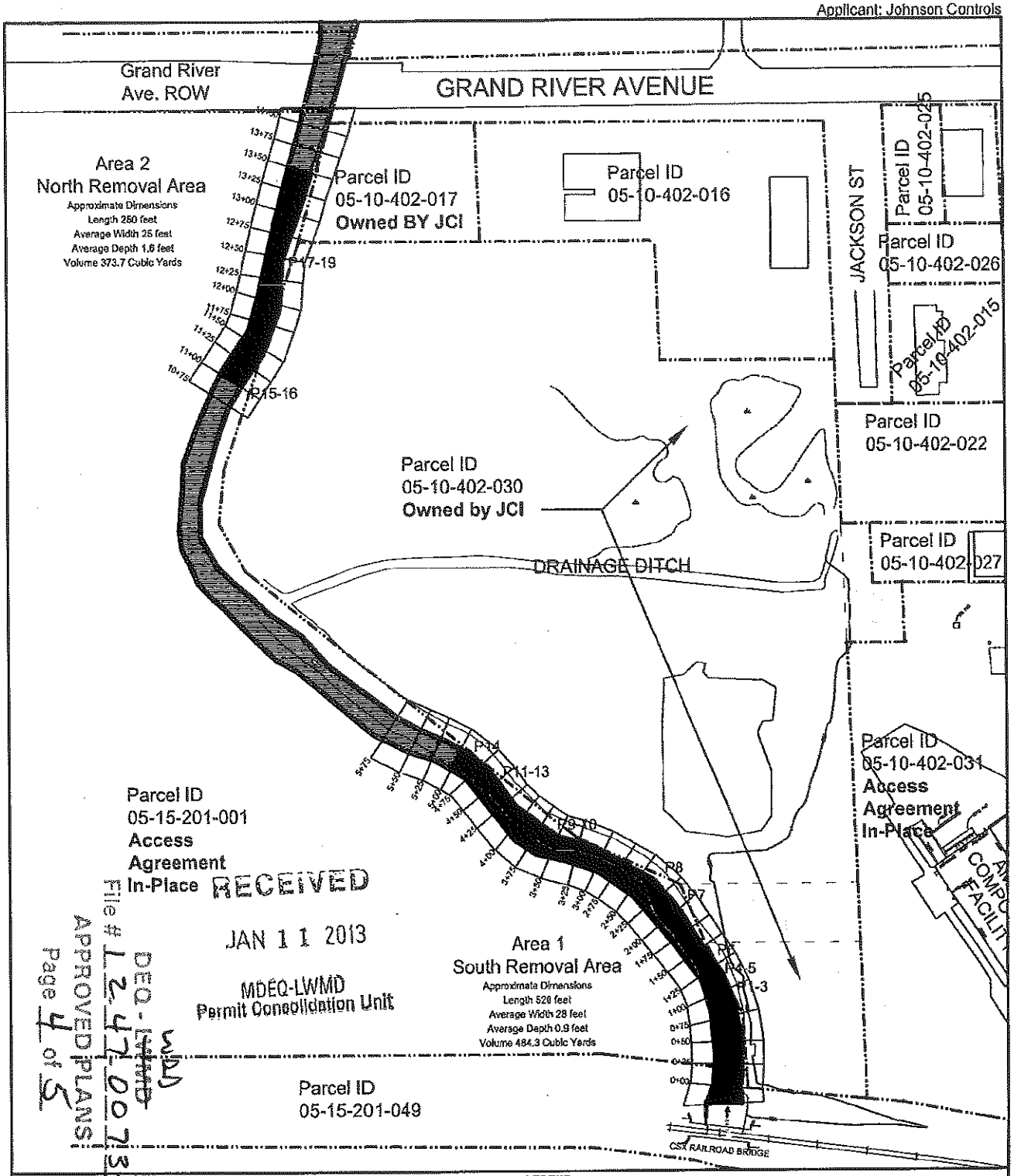
0 100 200
SCALE IN FEET

LEGEND
- Sediment Removal Area
0 + 00 - Station Numbers
- Floodplain Contour (884' NAVD88)
- Approximate Location of Silt Curtain
- Proposed Off-Road Transfer Traffic Area
- Proposed Haul Truck Traffic Routing

FIGURE NO. 5
PROJECT NO. -
DATE Dec 2012
Drawn By: E. HOBBS
Checked By: J.R. DICKSON
Approved By: A.J. LONERGAN
CLIENT: JCI Plymouth, MI

Joint Permit Application
Red Cedar River - Remedial Dredging
FORMER STANLEY TOOLS FACILITY
(MID 099 124 299), Fowlerville, MI - Livingston County
PROPOSED TRAFFIC AND LAYDOWN AREA

CTI and Associates, Inc.



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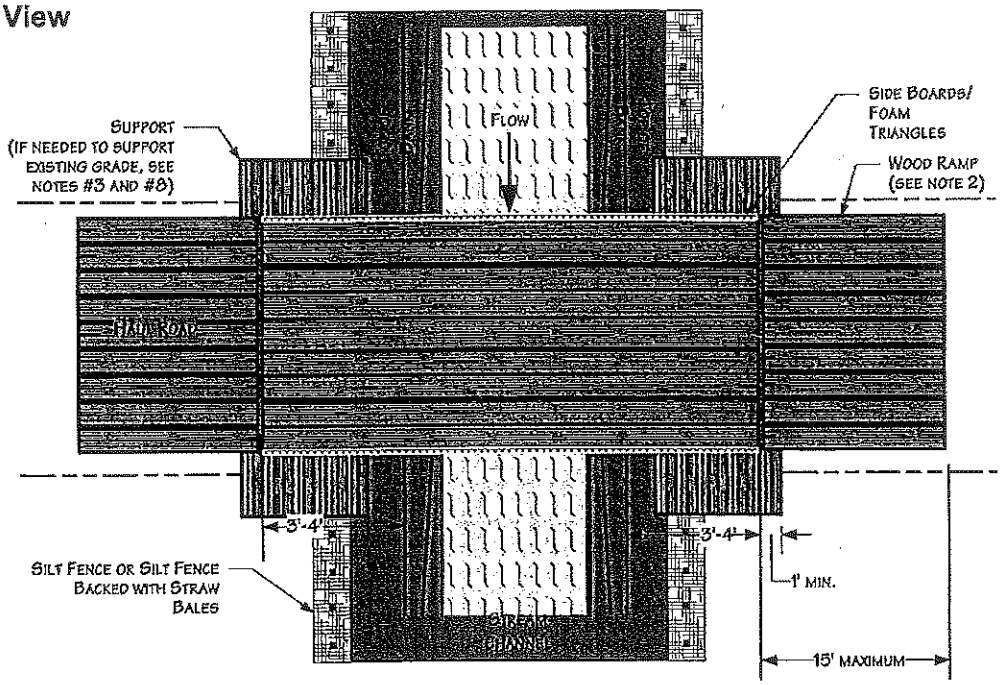
JAN 11 2013
MDEQ-LWMD
Permit Consolidation Unit
DEQ - LWMD
File # L2-47-0073
APPROVED PLANS
Page 4 of 5

FIGURE NO. 6
PROJECT NO. -
DATE Dec 2012
Drawn By: E. HOBBS
Checked By: J.R. DICKSON
Approved By: A.J. LONERGAN
CLIENT: JCI Plymouth, MI

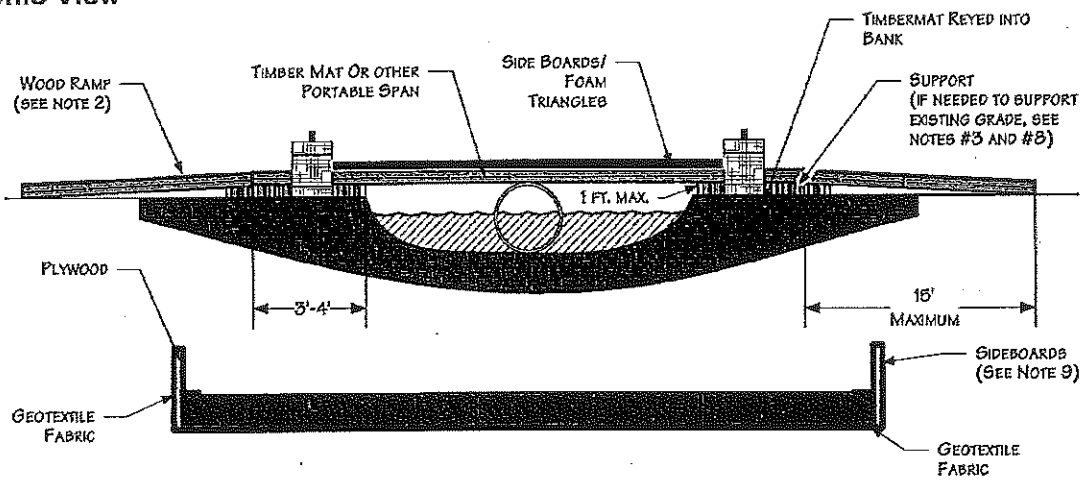
Joint Permit Application
Red Cedar River - Remedial Dredging
FORMER STANLEY TOOLS FACILITY
(MID 099 124 299), Fowlerville, MI - Livingston County
PROJECT SITE PLAN

CTI and Associates, Inc.

Plan View



Profile View



Notes:

1. Inspect bridge opening periodically and following rainfalls of over ½". Remove any debris restricting flow and deposit it at an upland site outside of floodplain.
2. If physical circumstances prohibit wood or metal ramps, earthen ramps may be used as approved.
3. Inspect bridge elevation so bridge remains supported above high bank and does not sink into bank.
4. The culvert support must be anchored to the stream bottom and may not be supported with fill.
5. Earthen ramp cannot be taller than 1' and cannot extend for more than 15' on either side of the crossing.
6. The bridge must span from top of bank to top of bank.
7. Additional support must be added on top of bank and under span if initial support starts to settle.
8. Erosion and sedimentation control measures shall be inspected and maintained in accordance with the company's Environmental Mitigation Plan
9. Sideboards will be installed on temporary bridges to minimize the potential for sediment transport. Sideboards may be constructed out of plywood, or equivalent, and affixed to the outer sides of the bridge. Geo-textile fabric, or equivalent, must also be adequately secured to the underside of the bridge to prevent material from falling through the bridge deck. The geo-textile fabric or an equivalent should be secured to the bottom of the bridge and wrapped around the sideboards in a continuous fashion.

For environmental review purposes only.

Typical Temporary Bridge

DEQ - ~~LWMD~~ WQD
File # 12.47.0073-f
APPROVED PLANS
Page 5 of 5

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MIXING ZONE COMPLIANCE MONITORING PLAN

FORMER STANLEY TOOLS SITE FOWLERVILLE, MICHIGAN

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JOHNSON CONTROLS

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FIGURE 2-1 – MONITORING WELL LOCATIONS

TABLE NO. **TITLE**

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APPENDICES

APPENDIX A – LABORATORY QUALITY ASSURANCE PROJECT PLAN (*AVAILABLE IN ETW PROJECT FILE*)

1. INTRODUCTION

This Mixing Zone Compliance Monitoring Plan was prepared for the Former Stanley Tools (FST) site located at 425 Frank St., in Fowlerville, Michigan. Until recently, Johnson Controls, Inc. (Johnson Controls) owned the entire FST site. Johnson Controls sold the eastern portion located outside of the flood plain to American Compounding Specialties, LLC, but retains responsibility for completing the RCRA corrective action requirements for the entire site. The Earth Tech, Inc. / Weston Solutions, Inc. Team (ETW) has been retained to provide professional services to help Johnson Controls meet these RCRA obligations.

In February 2004, a *Final Corrective Measures Proposal* (Final CMP) (ETW, February 2004) was prepared for the FST site and provided to the United States Environmental Protection Agency (USEPA). In September 2005 a Mixing Zone Determination request was completed by the USEPA and filed with the State of Michigan. The Michigan Department of Environmental Quality (MDEQ) provided responses to the Mixing Zone Determination Request in their correspondence to the USEPA titled, *Final Determination of a Mixing Zone Request; Johnson Controls, Inc. (former Stanley Tools); MID 099 124 299*, dated February 23, 2006. The MDEQ correspondence provided acute mixing zone-based groundwater surface water interface (GSI) values, as determined by the MDEQ, Water Bureau (WB), and requested that this Mixing Zone Compliance Monitoring Plan be prepared. The monitoring plan presents a sampling program intended to demonstrate that groundwater discharges to surface water will remain in compliance with the established mixing zone-based GSI criteria.

A RCRA Groundwater Monitoring Program Plan (GMP) was provided as Appendix E of the Final CMP, and was structured to include the periodic sampling of the same 11 GSI Compliance Wells included in this Mixing Zone Compliance Monitoring Plan. In fact, this monitoring plan is generally a compilation of pertinent sections of the GMP provided in the Final CMP. The objective of this monitoring plan is to summarize the means by which the concentration and migration rate of hazardous constituents in the groundwater will be evaluated for compliance to the mixing zone-based GSI criteria.

2. MONITORING WELL NETWORK

Currently there are a total of 57 monitoring wells located on- and off-site that have been used throughout the completion of the RCRA Facility Investigation (RFI) and the more recent project efforts conducted as part of the December 2002 Administrative Order on Consent (AOC). The AOC was a performance-based directive that emphasized the demonstration of environmental indicator controls and the development of long-term corrective measures. Johnson Controls accomplished applicable objectives of the AOC through the implementation of Interim Measures (IMs), the submittal of two Environmental Indicator Reports (CA 725 and CA 750), and submittal of a Final CMP in February 2004.

This Mixing Zone Compliance Monitoring Plan has been developed as part of the corrective action and monitoring program for the FST site to accomplish the following specific objectives:

- The primary objective is to assess the site's impact on the quality of groundwater pursuant to 40 CFR 265.93(d)(7) and Part 201.
- The short-term objective of the monitoring program will be to establish a new baseline of groundwater flow and contaminant conditions following the 2003 IM excavation, which removed overlying contaminant sources and disturbed the steady state aquifer conditions.
- The long-term objective of the monitoring program will be to assess the concentration and migration rate of hazardous constituents in the groundwater (including mixing zone chemicals) on a regular basis until final closure of the FST site.

Per 40 CFR 265.91, the groundwater monitoring system will be capable of yielding groundwater samples for analysis and will consist of at least one monitoring well installed hydraulically upgradient from the Solid Waste Management Units (SWMUs), and at least three monitoring wells installed hydraulically downgradient at the limits of the SWMUs.

Due to the documented presence of impacted groundwater at the FST site, a total of 17 wells have been selected for annual and semi-annual monitoring, as described in this Mixing Zone Compliance Monitoring Plan. A monitoring well location map is presented as **Figure 2-1**. The selected monitoring well network includes 11 wells designated to serve as GSI Compliance Wells, and six wells to serve as the points necessary to meet the other objectives of this plan.

As more fully described in Section 6.1, selected monitoring well samples will be analyzed for volatile organic compounds (VOCs), Michigan 10 metals plus nickel and hexavalent chromium, and total cyanide. In addition, monitored natural attenuation (MNA) parameters will be analyzed as part of the short- and long-term monitoring plan and corrective action objectives.

ETW evaluated the location and screen depth setting of each of the existing monitoring wells in relation to all SWMUs, potential receptors, property boundaries, the Red Cedar River, and the documented groundwater quality conditions across the study area. Based on that evaluation, a focused monitoring well network comprised of 17 wells has been identified to best accomplish the stated objectives of this monitoring plan. **Table 2-1** presents a detailed description of each selected well, including the well location, purpose, sampling frequency, and analytical parameters.

Of these 17 monitoring wells, two wells are located upgradient and 15 wells are located adjacent to, sidegradient, or downgradient of the regulated units/SWMUs. Eleven of the listed wells will be sampled on a semi-annual basis. Four of the five deep wells, and two wells located within the center of the VOC plume, will be sampled annually. **Table 2-2** summarizes the monitoring well construction details and recent water level elevation data for all wells at the FST site.

Eleven of the 17 monitoring wells in **Table 2-1** are designated as GSI Compliance Wells (points of compliance), as required by the AOC and described in the February 2004 Final CMP. The GSI Compliance Wells were selected based on the most significant groundwater exposure pathway for site contaminants, the Red Cedar River. A variety of selection factors were evaluated to designate which monitoring wells represented optimal points of compliance, including hydrogeological conditions (i.e. groundwater flow parameters in the shallow and deep aquifers), groundwater contaminant distributions and current cleanup criteria comparisons, and most significantly, the consideration of mixing zone and GSI impacts. The GSI Compliance Wells selected will provide the necessary groundwater monitoring capabilities required to demonstrate short- and long-term attainment of corrective action objectives.

3. FIELD SAMPLING PROTOCOLS

3.1 WELL MAINTENANCE PROGRAM

The following sections describe the well maintenance program that applies to all monitoring wells on- and off-site. All wells/protective casings were labeled in 2003 to increase well designation visibility and all wells were provided new, keyed-alike locks.

3.1.1 Well Inspection

The routine inspection of the monitoring system is important to ensure that the wells are in good condition and that no damage or other problems have occurred that might affect the monitoring program.

During each sampling event, all monitoring wells will be inspected for damage and/or security of the well covers. The inspection will include an assessment of cracking or splitting of the well apron, physical damage to the well cover, documentation of any evidence indicative of well tampering, operation of the locks on the wells, and all other tasks described in the Monitoring Well Inspection Checklist shown in **Table 3-1**. The inspection will also include recording the depth to the bottom of the well (to check for sedimentation inside the well) and the purge rate used for low flow sampling. This checklist will be completed for each well during each sampling event. In the event any well conditions are identified that require repair, the repair(s) will be completed as soon as practical. Copies of the checklists will be kept in the project file for the duration of the mixing zone compliance monitoring program.

3.1.2 Corrective Action

Table 3-2 lists the corrective actions to be performed if damage or other adverse conditions are observed at a monitoring well during a well inspection. When feasible, all corrective measures will be completed prior to the next sampling event.

3.2 WATER LEVEL MEASUREMENTS

Water level measurements will be collected from all monitoring wells at the FST site, including those not part of the mixing zone compliance monitoring program, in order to best characterize

site-wide groundwater flow conditions (**Table 2-1**). All readings will be collected within 24-hours of each other in order to obtain accurate information on aquifer conditions. The following protocols will be used during water level measurements:

- The water level probe and cable will be decontaminated prior to each use as indicated in Section 5.
- Wells caps/covers will be opened for a minimum of 15 minutes before water elevations are taken to allow water levels to equilibrate.
- Depth to water will be measured with an electrical sounding device (accuracy ±0.01 feet). The reference point for this measurement will be the north side of the inner casing.
- The depth to water and the time will be recorded in the field notebook.
- Water levels will be obtained prior to initiating any monitoring well sampling activities.

3.3 GROUNDWATER PURGING AND SAMPLING

Groundwater samples will be collected from the 17 selected monitoring wells using low-flow sampling procedures. Sampling equipment will be decontaminated pursuant to protocols presented in Section 5. Each well will be purged and sampled using the following methodology:

- Note the existing condition of the well and wellhead. If the well designation is not visible on the outside of the riser or protective casing, add the designation as appropriate.
- Monitor the headspace of the well per the Health and Safety Plan as the well cap is removed.
- Measure the depth to water from the north edge of the inner casing.
- Slowly lower an appropriate length of clean tubing used with the peristaltic pump to the approximate mid-point of the screened interval.
- Immediately prior to purging, measure and record the depth to water. Start purging the well at a flow rate that maintains drawdown to 3 inches or less. Water-level measurements will be made continuously to document the stabilization. Every attempt will be made to have a maximum drawdown of 3 inches. If the recharge rate of the well is less than the minimum pumping rate, every attempt will be made so that drawdown does not proceed to the level below the intake of the tubing. All field issues will be documented, in detail, in the field logbook.
- Measure the pH, specific conductance, Eh, temperature, turbidity, and dissolved oxygen (D.O.) of the purge water from an in-line flow-through cell(s) every 5 minutes. There should be no air bubbles observed in the tubing.

- Continue purging until stabilization is achieved. Stabilization is defined as three consecutive readings that are within the following criteria:

  - pH: ±0.1 unit
  - Specific conductivity: ±3%
  - Temperature: ±3 degrees C
  - Eh: ±10 mV
  - D.O.: ±10%
  - Turbidity: ±10 NTU

- Continue pumping once purging is completed and reduce the flow rate to its lowest level and disconnect the tubing from the in-line flow-through cell.

- Collect groundwater samples directly from the end of the tubing into clean laboratory-prepared labeled bottles.

- Handle and ship the samples according to the procedures outlined in the remainder of this document.

- Metal analysis will be for total metals unless the last turbidity reading is greater than 10 NTU, then both filtered and non-filtered samples will be collected. A 0.45 micron filter will be used.

- After sample collection is complete, remove the pump and the tubing. Tubing will be properly disposed after the well is sampled.

- Measure the total depth of the well.

- Return all purge water, containerized in a bucket, back into the well at the completion of sampling.

- Secure the well by replacing the cap/cover/J-plug and locking the protective casing.

The above procedures will be used for collecting all types of samples including investigative and quality control (QC) samples. **Table 3-3** presents the well purging and sampling field data sheet to be used during all well sampling efforts.

3.4 SAMPLE IDENTIFICATION

A unique field sample identification code will be assigned to each sample collected. For water samples, the identification code will consist of the following three parts separated by hyphens:

Part 1		Part 2		Part 3
MW01	-	110303	-	01
Location Identification Code	-	Collection Date Identification Code (03 Nov 2003)	-	Sample Type Identification Code

3.4.1 Location Identification

The *Location Identification Code* will not exceed six characters in length. Location identification codes will be unique identifiers consisting of character codes that describe the sample type [i.e. well sample or Quality Assurance/Quality Control (QA/QC) sample] and location. Note that numbers 1-9 shall be written as two-digit numbers (i.e., 01-09).

3.4.2 Collection Date

The *Collection Date* portion of the sample identification code will not exceed six characters in length. The six-character date code will be:

MMDDYY

-MM—signifies a two-digit numeric code representing the month the sample was collected (01=January, 02=February, 03=March, 04=April, 05=May, 06=June, 07=July, 08=August, 09=September, 10=October, 11=November, 12=December).

-DD—signifies a two-digit numeric code representing the day the sample was collected. Valid values will include numbers from 01 to 31.

-YY—signifies a two-digit numeric code representing the year the sample was collected.

3.4.3 Sample Type

The *Sample Type* will be a two-digit number representing the sample QC type. The table below lists and describes the possible QC types.

QC Code	Description
01	Normal Sample
02	Field Duplicate Sample
03	Equipment Blank Sample
04	Trip Blank Sample

4. FIELD MEASURED PARAMETERS

This section describes the procedures for conducting field measurements of water level, turbidity, pH, Eh, D.O., temperature, and specific conductivity. This section also describes the procedures for maintaining the accuracy of all the instruments that will be used for conducting field measurements during the monitoring program.

4.1 FIELD MEASURED PARAMETERS

Seven parameters will be measured at each well location prior to collecting the groundwater samples. These parameters will include water level, turbidity, pH, Eh, DO, temperature, and specific conductivity.

A groundwater level measurement will be obtained at each monitoring well prior to purging using an electronic water level meter. Once purging has started, field parameters for turbidity, pH, Eh, D.O., temperature, and specific conductivity will be recorded every five minutes. The groundwater will be monitored until the parameters have equalized. Equalization is defined as three consecutive readings within the ranges specified in Section 3.3.

4.2 CALIBRATION PROCEDURES AND FREQUENCY

Instruments and equipment used to gather, generate, or measure environmental data will be calibrated with sufficient frequency and in such a manner that the accuracy and reproducibility of results are consistent with the manufacturer's specifications. All field instruments will be calibrated and maintained by trained personnel.

Equipment to be used during the field sampling will be examined to certify that it is in good operating condition. This includes checking the manufacturer's operating manual and the instructions for each instrument to ensure that all maintenance requirements are being observed. Field notes from previous sampling trips will be reviewed so that any prior equipment problem is not overlooked and all necessary repairs to equipment have been made.

Field instruments to be used at the site include:

- pH meter.
- Turbidity meter.

- Eh meter.
- D.O. meter.
- Thermometer.
- Specific conductance meter.
- Water level indicator/electronic sounding device.

The calibration and checkout of all field instruments will be performed prior to use each day. All calibration performed in the field will be documented in the field logbook. A master calibration/maintenance file will be maintained for each measuring instrument and will include, minimum, the following information:

- Name of device or instrument calibrated.
- Results of calibration.
- Name of person performing the calibration.
- Identification of the calibration media (e.g., pH buffer solutions).

5. DECONTAMINATION PROCEDURES

Field equipment used during field purging and sampling will be decontaminated prior to use to reduce contamination and cross-contamination in accordance with the guidelines and procedures set forth in this document. These procedures are necessary to ensure QC in decontamination of field equipment and to serve as a means to identify potential errors in the sample collection and sample handling procedures.

After the collection of the required samples, decontamination of all field sampling equipment, and field instruments will be conducted in a thorough and step-wise manner as described below. New disposable latex gloves will be worn when handling clean sampling equipment to ensure that the equipment is not contaminated. Decontamination procedures shall be documented in the field logbook.

All reusable sampling and monitoring equipment will be decontaminated between uses as follows:

- Rinse thoroughly with potable water.
- Scrub with Alconox and water wash to remove any visible residue.
- Rinse with deionized water.

After each sample container is filled and capped, it will be cleaned by wiping the outside surface thoroughly to remove dirt or other visible signs of potential contamination.

The exterior of each shipping container used to transport samples to the laboratory will be decontaminated in accordance with the following procedures:

- Place all the sample containers into the approved shipping container
- Wipe all outside surfaces of the cooler thoroughly to remove dirt or other visible signs of potential contamination.

All disposable field equipment will be disposed into a licensed sanitary landfill. The minimal volume of decontamination fluid will be disposed onto the ground surface at each well location.

6. SAMPLE ANALYSIS

A total of 17 monitoring wells will be sampled on an annual or semi-annual schedule, as part of this monitoring plan. Groundwater samples will be collected from 11 specified monitoring wells on a semi-annual basis (including 6 shallow GSI Compliance Wells MW-14, MW-17, MW-21, MW-22, MW-24, MW-26, and monitoring wells MW-11, MW-28, MW-28C, MW-B1, MW-0S3 for other purposes). Groundwater samples will be collected from six specified monitoring wells on an annual basis (including deep GSI Compliance Wells MW-B2, MW-J2, MW-OS1C, MW-OS3C, and monitoring wells MW-2 and MW-25 for other purposes). All groundwater samples will be analyzed by TriMatrix Laboratories, located in Grand Rapids, Michigan.

6.1 SITE-RELATED CHEMICALS

As described in **Table 2-1**, the monitoring well samples will be analyzed for VOCs, and/or Michigan 10 total and dissolved (if needed) metals, nickel, hexavalent chromium, and total cyanide. VOC samples will be collected in two 40 mL glass containers and preserved with hydrochloric acid to a pH less than 2. Analysis and detection limits will be in accordance with USEPA Method SW-846/8260. Non-filtered samples for total metals will be collected in a 500 mL HDPE container and preserved with nitric acid (HNO_3) to a pH of less than 2. Following the last turbidity reading, a field filtered sample for dissolved metals will be taken only if the turbidity is above 10 NTU, replaced in a 500 mL HDPE container, and preserved with HNO_3 to a pH of less than 2. All total and dissolved metal samples will be analyzed using USEPA Method SW-846/7000/6010. The hexavalent chromium sample will be containerized in a 250 ml HDPE bottle and cooled to 4 degrees Celsius. The total cyanide sample will be collected in an amber 500 mL container and preserved with sodium hydroxide (NaOH) to a pH of greater than 12. Selected cyanide samples will also be analyzed for free/amenable cyanide on a regular basis, if the detected total cyanide concentrations are greater than the Final Acute Value (FAV) of 44 ug/L. The holding time for preserved VOC samples is 14 days. The holding time for preserved metals samples is 6 months (13 days for mercury). The holding time for cyanide samples is 14 days. The holding time for hexavalent chromium is 24 hours. All analytical detection limits will meet the requirements set forth in MDEQ-RRD Operational Memorandum #2, Attachment 1.

6.2 NATURAL ATTENUATION ANALYSES

A MNA assessment will be made as part of the short-term groundwater monitoring program to aid in the determination of ongoing VOC breakdown processes already taking place within the shallow and deep aquifers at the FST site, and to provide an indication of the effectiveness of the 2003 IM source removal activities. In addition, the acquired MNA data can be used as needed to assess potential fate and transport conditions on- and off-site as an added safeguard to the conservative risk-based corrective measures program. Selected monitoring wells will be sampled for a variety of MNA parameters, including but not limited to:

- Oxidation-Reduction Potential (ORP)
- Sulfates/Sulfites
- Nitrates/Nitrites
- Ferrous/Ferric Iron
- Alkalinity
- Hardness
- Manganese
- Chemical Oxygen Demand (COD)
- Ethane and Ethene

During the first year of groundwater monitoring, shallow and deep groundwater will be tested at up to eight locations upgradient, within the center of the contaminant plume(s), and at the margins of the plume(s).

6.3 FINAL ACUTE MIXING ZONE-BASED GSI VALUES

The February 23, 2006 MDEQ correspondence letter provided final acute values for the mixing zone-based GSI criteria, as follows:

Parameter	Final Acute Value (µg/L)	Chronic Value (µg/L)	Reported Worst Case Maximum Site Concentration (µg/L)
Trichloroethylene	3,500	N/A	4,200
Arsenic	680	N/A	161
Cadmium	77	N/A	13

Parameter	Final Acute Value (µg/L)	Chronic Value (µg/L)	Reported Worst Case Maximum Site Concentration (µg/L)
Chromium, Hexavalent	32	N/A	20
Copper	144	N/A	103
Nickel	5,800	N/A	1,180
Cyanide, Free	44	N/A	10

The chemicals listed above are those that have been determined to have a reasonable potential to exceed the acute mixing zone-based GSI criteria, based on information provided in the MDEQ Mixing Zone Determination Request. The analytical results from the groundwater monitoring activities will be reviewed for exceedance of these values for the parameters listed above and to the generic GSI criteria for other chemicals not specifically identified as mixing zone-based chemicals. If exceedances are observed during the monitoring program, then contingency corrective measures will be taken as described in Section 6.4.

6.4 CONTINGENCY CORRECTIVE MEASURES

As excerpted from the Final CMP, based on the groundwater quality data collected during the short- and long-term monitoring program, contingency corrective measures will be implemented should the following "triggers" be observed and verified:

- A FAV for any site contaminant is exceeded in two consecutive monitoring events adjacent to the Red Cedar River.
- A seasonal exceedance of a FAV is determined over time.
- Detected concentrations of one or more site contaminants at a GSI Compliance Well exceed the mixing zone allowance for two consecutive monitoring events.
- A seasonal exceedance of one or more Mixing Zone Determination values (site-specific GSI criteria) is determined over time.

Contingency-based corrective measures will be implemented that include the following components:

- A general evaluation of the data collected to date;
- A human health and ecological risk screening of the data collected to date, with the "trigger" exceedances evaluated;
- If the risk screening indicates that a more thorough risk evaluation is required, and that acceptable results are achievable, then that risk assessment will be performed;
- Additional data collection efforts will be completed if they are required to complete the risk assessment;
- If risk assessment findings determine that the exceedance(s) are unacceptable, then, targeted corrective measures focused on in-situ technologies will be designed and implemented per USEPA and MDEQ approvals.

7. QUALITY ASSURANCE/QUALITY CONTROL PROGRAM

The following section contains the QA/QC program for the Mixing Zone Compliance Monitoring Plan. The scope of the monitoring program includes field testing and measurement, as well as the collection and analysis of environmental samples. All tasks that include monitoring and measurement activities, and those that generate or process environmental data, will adhere to the QA/QC requirements described in this section.

7.1 SAMPLE HANDLING

All samples collected will be handled in a manner that maintains the integrity of samples and meets the regulatory requirements. In order for the sample to be representative, the following procedures will be used before, during, and after sample collection.

- Sample containers used for collecting samples will be certified clean.
- Sample containers will be pre-preserved under laboratory conditions. This technique will minimize the sources of contamination in the field.
- Sampling containers will be opened just before sample collection. The pre-preserved 40-ml containers will be immediately closed without any sample headspace after the sample has been collected to minimize the loss of VOCs. The pre-preserved metals and cyanide containers will be tested with pH paper after they have been filled to verify that they have been preserved to a pH of <2 and >12 for metals and cyanide analyses, respectively.
- To prevent contamination, the inside of the container will not be touched.
- To ensure VOC sample integrity, all gasoline or diesel engines will be turned off near and upwind of the sample locations. This precaution will prevent the introduction of VOCs into the sample.
- Samples will be collected in a manner that will minimize the introduction of foreign material such as rain, snow, and dust.
- Holding times, containers and preservatives as discussed in Section 6 will be strictly adhered to, in order to maintain sample integrity and meet regulatory requirements.
- Immediately upon collection, samples will be stored in an ice-filled cooler. Samples will be stored and shipped in a manner to keep temperatures at 4 degrees Celsius or less.
- Analytical methods discussed in Section 6 will be used. These analytical methods will most accurately and precisely represent the true concentration of the parameter of interest.

- Decontamination procedures as discussed in Section 5 will be used before and between sample collection to prevent contamination and cross-contamination of samples.

7.2 FIELD QUALITY CONTROL SAMPLES

Any contamination of samples resulting from sampling equipment, sample handling, and sampling techniques can be identified through the collection and analysis of field QC samples. The laboratory will be kept from using these samples for internal QC samples by indicating which samples are to be used for internal QC on the chain-of-custody record. The following subsections detail the type and number of field QC samples that will be collected during the monitoring program.

7.2.1 Field Blanks

Field blank samples are collected and analyzed to check for procedures at the site that may cause sample contamination. A common type of field blank sample is the field equipment blank. One field equipment blank will be collected during each sampling event.

Field equipment blanks will be obtained by transferring ultra-pure water through clean sample tubing into a sample container. Each field equipment blank will be analyzed for the same parameters as the investigative samples and in accordance with the same analytical methodologies. When collecting a field blank, the sample for VOCs will be collected first, followed by other parameters. All field blanks will be identified as such on all sample documentation.

7.2.2 Trip Blanks

Trip blanks are used to assess the potential for contamination of samples due to contaminant migration during sample shipment and storage. Trip blanks generally pertain to VOC samples only and are prepared prior to the sampling event by the laboratory in 40 mL vials and are kept with the investigative VOC samples throughout the sampling event. They are then packaged for shipment with the other VOC samples and sent for analysis.

One trip blank will accompany every shipment containing VOC samples. Trip blanks will be analyzed only for VOCs in accordance with the analytical methodologies of investigative VOC samples.

7.2.3 Field Duplicate Samples

Field duplicate samples will be collected from selected monitoring wells at a frequency of 1-per-10 investigative samples, using procedures identical to those used for the investigative samples. Duplicate samples will be analyzed for the same parameters as the investigative samples. Duplicate samples will be collected by alternately filling two sets of sample bottles from the same sampling equipment. The VOC fraction for each duplicate sample will be collected immediately after the VOC fraction for the investigative sample to minimize the possibility of loss of VOCs during sample collection.

7.2.4 Matrix Spike/Matrix Spike Duplicate Samples

Matrix Spike/Matrix Spike Duplicate (MS/MSD) samples will be collected from selected monitoring wells at a frequency of 1-per-20-investigative samples, using procedures identical to those used for the investigative samples. MS/MSD samples will be analyzed for the same parameters as the investigative samples. MS/MSD samples will be collected by alternately filling two sets of sample bottles from the same sampling equipment. The VOC fraction for each duplicate sample will be collected immediately after the VOC fraction for the investigative sample to minimize the possibility of loss of VOCs during sample collection.

7.3 LABORATORY QUALITY CONTROL PROGRAM

The overall QC objectives for laboratory analyses are to produce data of known and sufficient quality. Appropriate procedures and quality control checks will be used so that known and acceptable levels of accuracy and precision are maintained for each data set. This section defines the objectives for accuracy, precision, and completeness, for measurement data. How the accuracy, precision, and completeness results will be assessed is also discussed in the following subsections.

7.3.1 Accuracy

Accuracy of measurement data is defined as the degree of agreement between a measurement, X, with an accepted reference or true value, T. It is usually expressed as the difference between the two

values, X-T, the difference as a percentage of the reference of true value 100(X-T)/T, and sometimes expressed as a ratio, X/T. These expressions give a measure of the bias in a system.

7.3.1.1 Accuracy Goals for Laboratory Measurement

Accuracy of laboratory analyses will be assessed using the following quality control checks: calibration standards, surrogate spikes of all samples, laboratory control samples (LCS), and matrix spikes of selected samples collected in the field. Surrogate spike, LCS, and matrix spike results will be expressed as a recovery of an analyte added to the sample at a known concentration:

Percent Recovery = SSR - SR / SA x 100 *Percent*

Where:

SSR	=	spiked sample result
SR	=	sample results (not applicable for surrogate recovery)
SA	=	amount of spike added

Calibration check standards are expressed as a percent difference from the true value, i.e., 100 (X-T)/T. The frequency and acceptance criteria for the accuracy quality control checks for groundwater analyses will be in accordance with the laboratory Quality Assurance Project Plan (QAPP) in **Appendix A** of this monitoring plan.

7.3.1.2 Accuracy Assessment

Results of quality control checks which monitor accuracy will be evaluated against the acceptance criteria and advisory limits shown. If the results are outside the criteria, then data validators will determine if the associated data is 1) left unqualified and identified as usable; 2) qualified as "J", estimated; or 3) qualified as "R", unusable. If feasible, an estimated amount of bias in the "J" results and unqualified results will be made and taken into account in using the data. Data qualified as "R" will not be used.

7.3.2 Precision

Precision is a measure of mutual agreement among individual measurements of the same property, usually under prescribed similar conditions. Precision is expressed as a standard

deviation among a group of measurements or as a relative percent difference between two measurements.

7.3.2.1 Precision Goals for Laboratory Measurements

Precision of laboratory analysis will be assessed by analyzing duplicate samples or matrix spike duplicates, blank spike duplicates, and/or by analyzing aliquots (sample replicates) of one sample. Analysis of duplicate samples measures the precision of both the sampling and analysis, whereas a sample replicate, generally measures only the analytical precision. Precision of the duplicate and replicate analyses will be expressed as a relative percent deviation (RPD) for evaluation of two results, and relative standard deviation (RSD) for evaluation of three or more results. The frequency, acceptance criteria, and corrective actions for duplicate and replicate samples will be in accordance with the laboratory QAPP (**Appendix A**).

7.3.2.2 Precision Assessment

Results of QC results which monitor precision will be evaluated against the goals, indicated in the laboratory QAPP (**Appendix A**). The results of laboratory duplicates and replicates in the field will indicate the amount of variability in the measurement process. Those percent RPDs which are outside the criteria will be taken into account as data is evaluated. The results of collected samples duplicates will indicate the amount of variability in 1) the sample matrix, 2) sampling technique, and 3) analytical technique. Since the three sources of variability cannot be distinguished in the results and the sample matrix may not be altered to improve the variability, the percent RPD results will be noted. The variability in one sample may not represent variability for all investigative samples, but will serve as a general indicator of sample variability. Sample conditions, constituents, and location will be taken into account in this assessment.

7.3.3 Completeness

Completeness is a measure of the amount of data obtained from a measurement system that achieves the project goals, compared to the amount expected under normal conditions. Completeness is affected by unexpected conditions that may occur during the data collection process. Occurrences that reduce the amount of data collected include events such as a dry

well, an instrument breakdown, or a loss of sample extract. All reasonable attempts will be made to minimize loss of data (e.g., through regular maintenance of instruments, and replacing/repairing instruments that have broken down and to recover lost data.

7.3.3.1 Completeness Goals for Laboratory Measurements

Completeness goals for this program have been established for laboratory analyses. The completeness goal for each individual laboratory analyses is 90 percent. For critical data points, consisting of one upgradient data point, the completeness goal for sample collection and analysis is 100 percent. The following equation will be used for calculating completeness of laboratory analyses:

Completeness = Number of valid data points / Number of data points collected x 100 *Percent*

Difficulties encountered during the sampling handling in the laboratory, as well as unforeseen complications regarding analysis methods may affect completeness during sample analysis. For example, the analytical methods proposed for use (particularly for the organic analyses) are intended for analysis of "environmental samples" (low- and medium-level), and the applicability of these methods to unknown or hazardous-level samples may result in poor method performance and would, therefore, have an adverse impact on achieving the data completeness goal. Valid data points are defined as those results identified as usable for the intended purpose.

7.3.3.2 Completeness Assessment

Completeness will be monitored and assessed by the following guidelines:

1. Completeness of laboratory results will be monitored as data are validated. Those results identified by the validators as unusable due to laboratory performance and those results identified by the data users as unusable due to the amount of bias in the results are considered not valid. The necessity for re-sampling to retrieve valid data points will be assessed on a case-by-case basis and will be based on:

   - Whether the incomplete data point is a critical data point;

- Whether the invalid analyte(s) is a parameter of concern at the site; and
- Whether there are enough data points to accomplish the purpose of the investigation.

2. Completeness of the samples collected will be monitored during sample collection to ensure that all planned locations and depths are completed. If a sample location is not obtained, the field manager will ensure that every reasonable attempt is made to collect the sample(s). If conditions do not allow the sample(s) to be collected, then the appropriate project managers will be notified and the deviation documented for the files.

3. Completeness of field measurements will be monitored during field activities to ensure that all field measurements and associated QC checks are performed. Field measurements taken without the required QC checks will be considered incomplete.

7.4 FIELD DATA DOCUMENTATION

Field logbooks will be assigned to individual field personnel for the duration of their stay in the field, but will be stored at an appropriate document management area when not in use. Field data sheets, sampling sheets, notebooks, and records will be marked with the project work order number. This number will allow for data generated during the monitoring program to be traced back to the project. Identification of paperwork with this number will help prevent loss of data during its use and assimilation by allowing misfiled or misplaced documents that are found to be traced to the appropriate file.

All data collection activities performed at a site will be documented in a bound field logbook with numbered pages. The entries will be as detailed and descriptive as possible so that a particular situation can be recalled without reliance on the collector's memory. All field logbook entries will be dated.

The cover of each logbook will contain the following information:

- Logbook number.
- Project name.

- Project work or control number.

To ensure the most useful, organized, and complete field notes, the following procedures for setting up and using a field logbook will be followed:

- Field logbooks will be issued only to field personnel actively involved in a task.
- Each book will be identified by the project-specific work number.
- The title page of each logbook will contain:

    1. Person and name of organization to which the book is assigned.
    2. Book number.
    3. Project work or control number.
    4. Location and activity for logbooks designated to specific tasks.
    5. Start date.
    6. End date.

- Entries into the logbook will contain a variety of information. Each entry will include some or all of the following, as appropriate:

    1. Date and time.
    2. Name of individual making the entry.
    3. Description of test/activity.
    4. Quantities of any materials used.
    5. Drawings and information related to activity as necessary.
    6. Conditions that might adversely affect the test/activity.
    7. Names of witnesses, observers, or others present.
    8. Samples collected, received, or released, including description of sample, sample number, and sample collection time.
    9. Deviations from the approved procedures for that activity.
    10. Data that are not recorded by automatic methods.
    11. Level of personnel protection equipment (PPE) being used.
    12. Description of the sample location, including distance to grid nodes or other permanent features.
    13. Numerical designation for any photographs taken.
    14. Listing of equipment used to make field measurements.
    15. Calibration data for field instrumentation.

16. Calculations performed.
17. Date and reason for downtime or delays.
18. Visitors and purposes of the visit.
19. Weather conditions.

- The log will be closed at the end of each day's activity, with the time and signature of the person making the last entry.
- Log openings and closings will have no open lines in between so that no unauthorized entries can be made.
- All entries will be described in as much detail as possible so that reconstruction of events does not depend on memory. (Examples of such detail include locations, samples, descriptions, depths, containers, measurements, equipment, dates of calibration, photographs, etc.)
- All entries will be made in waterproof, black or blue indelible ink, with no erasures.
- Corrections to entries will be made by crossing out the error with one line, dating and initialing the error, and entering the correction above or beside the error. Each page entered on in the logbook will be signed and dated by the individual. Once an entry has been signed and dated, changes, deletions, or additions are made only as a new entry and refer back to the original entry rather than crossing it out. A new page in the field notebook will be started when the previous page is full or when the previous page has been marked, dated, and signed so that no entries can be made. Pages shall not be removed from the bound notebook.

7.5 CHAIN-OF-CUSTODY PROCEDURES

Sample custody procedures to be followed during the groundwater monitoring field activities require that the possession and handling of each sample from the moment of its collection through analysis be documented by written record. A sample is in someone's custody when one of the criteria listed below has been satisfied:

1. The sample is in one's actual possession.
2. The sample is in one's view after being in one's physical possession.
3. The sample is in one's physical possession and is then locked up so that no one can tamper with it.
4. The sample is kept in one's possession and is then sorted in a secured area that is restricted to authorized personnel only.

Samples will consist of material collected in the field, such as water, and any reagents added for

the purpose of sample preservation.

7.5.1 Sample Labels

All samples will be identified with a label attached directly to the container. Sample label information will be completed prior to filling the container with the sample using waterproof blue or black ink. The labels will contain the following information:

- Sample number.
- Date of collection.
- Installation name.
- Parameters to be determined.
- Preservative (if any).
- Sample source/location depth.

7.5.2 Chain-of-Custody Record

To maintain a record of sample collection, transfer between personnel, shipment, and receipt by the laboratory, a chain-of-custody form will be filled out for each sample as it is collected by the field sampler. Each time the samples are transferred, the signatures of the persons relinquishing and receiving the samples, as well as the date and time of transfer, will be documented.

Chain-of-custody seals will be used to determine if any tampering has occurred during shipment of samples. These signed and dated seals or other tamper-evident locking device will be placed on all shipment containers by the person responsible for packaging. If the chain-of-custody seals are not intact at the time the shipping containers are received by the laboratory, the laboratory project manager will notify the field manager within 24 hours of container receipt.

7.5.3 Transfer of Custody and Shipment

Prior to shipment of samples, the chain-of-custody record will be signed and dated by the field sample custodian who has verified that those samples indicated on the record are indeed being shipped. A copy of each chain-of-custody form will be retained in the project files, and the original will be sent with the samples (sealed inside the shipping container). After packaging has been completed, custody seals, signed and dated by a member of the field team, will be placed on the shipping container.

Samples collected will be handled and shipped in a manner that will protect against any detrimental effects on the samples or the environment due to breakage, leakage, or spoilage. Sample handling procedures will be closely supervised and recorded to minimize the potential for loss, modification, or tampering during shipment to the analytical laboratory. Package labeling specifications will depend on the type of materials being sent, and will be in accordance with Department of Transportation (DOT) regulations (49 CFR, Parts 171 through 177) and International Air Transport Authority (IATA) guidelines. Samples of hazardous materials will be stored and handled in accordance with all applicable Federal and State requirements.

7.5.4 Laboratory Custody Procedures

Sample custody procedures in the laboratory include the procedures for general security, sample receipt, storage, preparation and analysis. The following subsections describe the minimum general requirements that will be followed by the laboratory.

7.5.4.1 Sample and Hardcopy Data Custody and Control

For a sample or for hardcopy data generated from analyzing a sample to be handled according to legal COC requirements, it must be:

- in the physical possession of an authorized field or laboratory staff member, or authorized transferee, or
- after physical possession of an authorized staff member, in the staff member's view, or
- secured (after physical possession) to prevent tampering, or
- placed in a designated secure area with restricted access.

Any change of possession or custody is documented on a COC form, and must include the names of the individuals relinquishing and receiving the sample or data. The date and time of transfer is also noted. Any correction to COC information is made by drawing a single horizontal line through the incorrect entry, and printing the correct entry adjacent to the original entry. All corrections are initialed and dated.

The person responsible for initiating COC in the laboratory is the receiving clerk. The receiving clerk signs and dates the COC form. The samples are then assigned unique, sequential six-digit identification numbers by the Laboratory Information Management System (LIMS).

Once the receiving clerk has logged in and documented the receipt of the sample, the sample is relinquished to the sample custodian on duty. The sample custodians and the supervisor of the Sample Control department have keys that unlock the sample storage coolers. Samples are filed in walk-in coolers until laboratory staff request specific samples by completing internal COC forms or batch sheets. The internal COCs are completed the same way, and the sample custodian relinquishes the samples to the laboratory staff member. The internal COC form is used to document the sample's movement from the custodian to the analyst to final disposition.

The sample custodian is responsible for purging raw samples from cold storage at the prescribed time. Unused raw samples are stored in a controlled temperature environment for 60 days after data submission to the client. Sample report dates are documented in the LIMS. Sample labels are color coded and placed in the cooler by date of receipt, allowing bottles to be easily retrievable from the storage unit shelves, once segregated by the sample custodian, the hazardous waste technician completes the preparation for discarding the identified samples for hazardous waste disposal.

Each laboratory area has it own planner from the Production Planning and Control (PP&C) department. Daily worklists are generated from the LIMS to assist PP&C staff in scheduling samples for preparation or analysis. The person who prepares or analyzes the sample accepts possession of the sample. Samples are transferred by cart, under COC, from the walk-in cooler to the laboratory area in which the samples are needed.

The LIMS schedules the appropriate analyses for samples and automatically tracks the progress of samples through the laboratory. The custody of a sample may be determined at any time by reviewing the scheduling details within the LIMS. Signatures and employee ID numbers on the internal COCs, sample preparation and analytical worksheets, and sequence run logs are used as a paper trail to document the physical transfer of the samples, and to document exactly who handled the samples at each stage of processing.

Hardcopy reports are stored and numbered to maintain strict document control. The document control clerk maintains an inventory of all hardcopy data stored. Hardcopy data are filed according to case and sample deliver group (SDG) member. The data are stored both at an off-site warehouse and in the laboratory in a secured area accessible by authorized entry only.

7.5.4.2 Electronic Data Custody and Control

The mainframe and minicomputer systems at TriMatrix Laboratories are secured by using assigned log-on accounts and individual passwords. Menu options are available to authorized users only, and are controlled by software that uses local attributes. These local attributes are created and maintained by the computer operations analyst. Users are allowed access only to those portions of the systems that are necessary for them to do their jobs.

Numerous forms, worksheets, and sequence run logs are generated from the computer systems and include analytical worksheets and the sample record. Individual laboratory non-analytical Standard Operating Procedures (SOPs) contain examples of these forms with instructions for completing them. Analytical results are reported on certain form templates either through direct electronic transfer from the instrument, indirect transfer via a local area network (LAN) linked to the instrument, or through manual data entry. All three mechanisms have specific security and QC features.

7.5.4.3 Logging in Samples

Bench Procedures

The following steps are completed for all samples as they are received by TriMatrix Laboratories.

Each sample container is inspected before it is opened to make sure that it has not been damaged or opened during shipment. Any padlocks, sealing tape, or custody seals on the samples are inspected to make sure that they are intact, and any observations are recorded on the COC form. If the custody seals, tapes, or padlocks are broken, the commercial client is contacted through Customer Service for permission to continue processing.

Vials containing samples to be analyzed for VOCs are checked to ensure that there is no headspace or air bubbles. Sample identification information on the bottles is compared to the Traffic Reports (TRs), packing lists, and COC form included in the container. Any discrepancies are noted on the COC by the receiving clerk. The Customer Service department notifies commercial clients if there are discrepancies.

Sample Control department personnel accept custody of samples by signing and dating the COC form. Samples are logged onto a Commercial Receiving Log Sheet. The following items, where applicable, are noted on the sheet:

- case number
- matrix
- TriMatrix ID number
- temperature
- client name or order number
- analysis codes
- field ID (sample ID)
- volume received
- receiving date (RD)
- pH (inorganics only)*
- sampling date (SD)
- SampleSaver number

*Aqueous volatile sample pH is taken after analysis and documented in the data report.

The condition of the refrigerant (whether any ice remains or whether the cooling packs are solid) is checked and the temperature of a representative sample (liquid samples only) is ascertained by wrapping a temperature strip around the outside of the container. When it is apparent through these checks that a sample was not properly preserved, the client is notified and a standard QA Notice is completed and placed in the sample file.

On each COC that is complete and correct, the statement Received in Good Condition is written or stamped, initialed, and dated by the receiving clerk. This statement indicates that the sample or group of samples were received intact with correct sample tags or custody seals (if applicable), pH (applicable to inorganic samples), and corresponding documentation.

Each log sheet and COC is reviewed by the Sample Control department supervisor who ensures that all information is properly documented. Each is stamped as having been reviewed, initialed, and dated.

8. GROUNDWATER MONITORING REPORTS

8.1 SEMI-ANNUAL REPORT

The first semi-annual sampling event of each year, conducted in accordance with this monitoring plan, will be documented through the preparation of a Semi-Annual Groundwater Monitoring Report for submittal to the USEPA (and MDEQ as required). These reports will provide the following information:

- Copies of laboratory analytical data sheets.
- Field log sheets.
- A text description of the field effort and analytical QA/QC results.
- A tabular summary of analytical results.

Semi-Annual Groundwater Monitoring Reports will be submitted to the agencies within 45 calendar days after the end of the first half of each calendar year.

8.2 ANNUAL REPORTS

By March 1st of each year an Annual Groundwater Monitoring Report will be submitted to the USEPA (and MDEQ as required) in accordance with 40 CFR 265.94. The Annual Report will contain all of the information cited for the Semi-Annual Report, with the addition of the following information:

- A text description of groundwater flow conditions, groundwater chemistry results and observed trends, and any maintenance activities conducted on the groundwater monitoring system.
- Site maps illustrating the potentiometric surface contours for the two sampling events and the locations of observed Part 201 groundwater cleanup criteria exceedances.
- Text summaries of MNA findings.
- Text summaries of MDEQ Mixing Zone-required analyses.

Each Annual Groundwater Monitoring Report will also include a Conclusions and Recommendations Section to specifically document Johnson Controls assessment of the GMP effectiveness based on historical and newly gathered site data, and to identify if needed,

modifications to this Mixing Zone Compliance Monitoring Plan or corrective measures strategies. The effectiveness assessment will consider a variety of factors, including:

- Regulatory changes such as cleanup criteria and analytical methods modifications.
- The emergence of new/improved sample collection and field measurement methods.
- Observable changes in groundwater quality conditions such as localized contaminant concentration spikes or conversely, verifiable reductions in plume dimensions.
- FAV exceedances or other specific "triggers" to the contingency-based corrective measures program.
- The level and significance of observed natural attenuation processes.
- Mixing zone considerations.
- Monitoring well conditions and locations.

Based on this evaluation of the Mixing Zone Compliance Monitoring Plan effectiveness, recommendations will be presented for USEPA concurrence (and MDEQ as required) to modify the monitoring plan, such as:

- Add or remove wells from the Mixing Zone Compliance Monitoring Plan.
- Add or remove analytical parameters, including site contaminants and MNA parameters (especially organics, based on slight GSI exceedances observed to date and the beneficial effects of the 2003 IM source removals).
- Modify the sampling frequency for some or all of the GSI Compliance/monitoring wells.
- Change components of the corrective action program for groundwater, based on the contingency-based parameters cited in the Final CMP. Appropriate reporting requirements would also be identified.

FIGURES

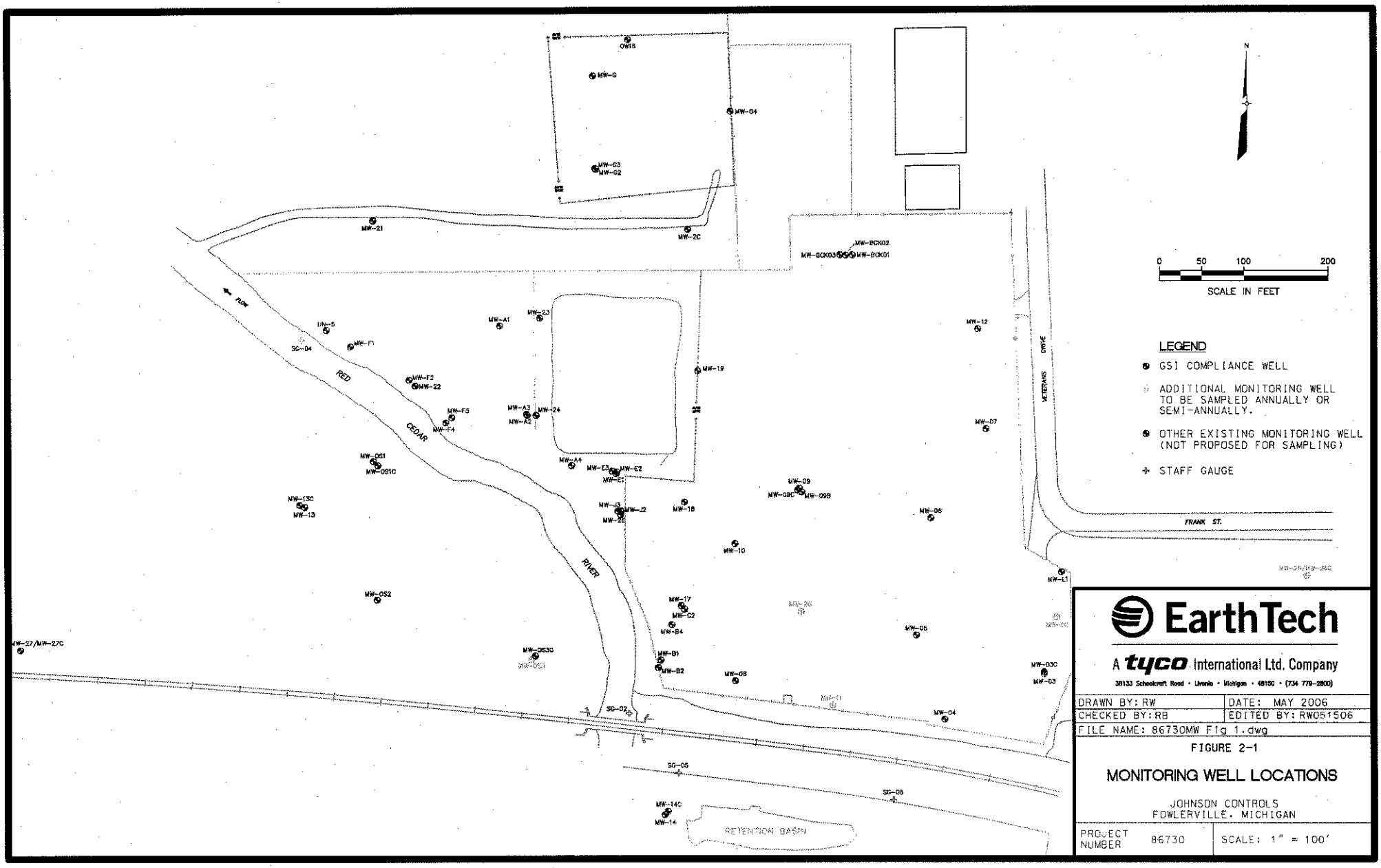

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FIGURE 2-1

MONITORING WELL LOCATIONS

JOHNSON CONTROLS
FOWLERVILLE, MICHIGAN

PROJECT NUMBER 86730	SCALE: 1" = 100'

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TABLES

Table 2-1
Summary of Groundwater Monitoring Program
Well Selection Rationale and Sampling Description

Former Stanley Tools
Fowlerville, Michigan

	Monitoring Well ID	Aquifer	Location	Monitoring Objective	Sampling Frequency	Analytical Parameters*
1	MW-02	Shallow	Plume Interior	Performance/Attenuation Monitoring	Annual	VOC
2	MW-11	Shallow	S Plume Margin	Onsite Plume Boundary	Semi-Annual	VOC, CN-, METALS
3	MW-14	Shallow	SW Margin at River-Offsite	GSI Compliance Well and Offsite Plume Boundary Monitoring	Semi-Annual	VOC
4	MW-17	Shallow	Plume Interior at River	GSI Compliance Well and Performance/Attenuation Monitoring	Semi-Annual	VOC, CN-, METALS
5	MW-21	Shallow	NW Margin Near River	GSI Compliance Well	Semi-Annual	VOC, CN-, METALS
6	MW-22	Shallow	NW Margin at River	GSI Compliance Well	Semi-Annual	VOC, CN-, METALS
7	MW-24	Shallow	NW Margin Near River	GSI Compliance Well	Semi-Annual	VOC, CN-, METALS
8	MW-25	Shallow	Plume Interior	Performance/Attenuation Monitoring	Annual	VOC
9	MW-26	Shallow	W Margin at River	GSI Compliance Well	Semi-Annual	VOC, CN-, METALS
10	MW-28	Shallow	Upgradient/Background-Offsite	Background Groundwater Quality	Semi-Annual	METALS
11	MW-B1	Shallow	SW Margin at River	GSI Compliance Well, Performance/Attenuation Monitoring, and LNAPL Rebound Testing	Semi-Annual	VOC, CN-, METALS
12	MW-OS3	Shallow	West Side of River	Offsite Plume Boundary Monitoring	Semi-Annual	VOC, CN-, METALS
13	MW-OS3C	Deep	West Side of River	GSI Compliance Well and Offsite Plume Boundary Monitoring	Annual	VOC, CN-, METALS
14	MW-28C	Deep	Upgradient/Background-Offsite	Background Groundwater Quality	Semi-Annual	METALS
15	MW-B2	Deep	SW Margin at River	GSI Complicance Well and Vertical Plume Monitoring	Annual	VOC, CN-, METALS
16	MW-J2	Deep	W Margin at River	GSI Compliance Well and Vertical Plume Monitoring	Annual	VOC, CN-, METALS
17	MW-OS1C	Deep	W Margin at River	GSI Compliance Well and Offsite Vertical Plume Monitoring	Annual	VOC, CN-, METALS

* Note: MNA parameters will be analyzed from selected well samples as described in Section 6.2

Table 2-2
Monitoring Well Construction and Water Level Elevation Summary
Former Stanley Tools Site
Fowlerville, Michigan

Well ID#	Original Ground Surface(ft) pre4M	Present Ground Surface(ft) as of 12/03	TOC (ft)	Well TD from Original GS	Boring TD from Original GS	Screen Length (ft)	Top of Screen Elevation (ft)	Bottom of Screen Elevation (ft)	October 6, 2003 Depth to Water (ft)	October 6, 2003 Water Elevation (ft)	October 9, 2003 Depth to Water (ft)	October 9, 2003 Water Elevation (ft)	October 13, 2003 Depth to Water (ft)	October 13, 2003 Water Elevation (ft)	October 17, 2003 Depth to Water (ft)	October 17, 2003 Water Elevation (ft)	October 27, 2003 Depth to Water (ft)	October 27, 2003 Water Elevation (ft)	November 3, 2003 Depth to Water (ft)	November 3, 2003 Water Elevation (ft)	December 3, 2003 Depth to Water (ft)	December 3, 2003 Water Elevation (ft)	December 3, 2003 Depth to Water (ft)	December 3, 2003 Water Elevation (ft)	December 18, 2003 Depth to Water (ft)	December 18, 2003 Water Elevation (ft)
MW-01	888.96	888.24	891.91	13.00	15.00	5.00	880.96	875.96	9.08	882.83	9.13	882.78	9.21	882.70	8.65	883.36	8.93	882.98	8.09	883.82	8.23	883.68	8.23	883.68	8.49	883.42
MW-02	888.69	888.19	890.38	14.00	30.00	2.50	876.59	874.09	8.01	882.37	8.02	882.36	8.02	882.36	7.89	882.49	7.94	882.44	7.56	882.82	7.48	882.90	7.48	882.90	7.59	882.79
MW-03	888.14	888.48	890.70	15.00	15.00	5.00	878.14	873.14	8.26	882.44	8.28	882.42	8.27	882.43	8.10	882.60	8.19	882.51	7.72	882.98	7.69	883.02	7.68	883.02	7.79	882.91
MW-03C	889.17	888.07	890.11	47.00	48.00	10.00	851.17	841.17	7.63	882.48	7.68	882.43	7.65	882.46	7.50	882.61	7.56	882.55	7.79	882.32	7.10	883.01	7.10	883.01	7.18	882.93
MW-04	887.91	887.97	889.84	14.00	15.00	10.00	863.91	873.91	7.59	882.25	7.62	882.22	7.61	882.23	7.44	882.40	7.57	882.27	6.90	882.94	6.88	882.96	6.88	882.96	7.01	882.83
MW-05	888.53	889.73	891.14	14.00	15.00	5.00	879.53	874.53	8.96	882.18	8.97	882.17	8.96	882.18	8.82	882.32	8.48	882.26	8.52	882.62	8.48	882.66	8.48	882.66	8.56	882.58
MW-06	887.88	888.09	890.72	15.00	15.00	5.00	877.88	872.88	8.41	882.31	8.42	882.30	8.41	882.31	8.30	882.42	8.35	882.37	8.05	882.67	7.93	882.79	7.93	882.79	8.02	882.70
MW-07	890.27	888.27	885.95	18.50	30.00	7.50	875.27	867.77	3.50	882.45	3.51	882.44	3.56	882.39	3.42	882.53	3.46	882.50	-	-	3.10	882.85	3.10	882.85	3.15	882.80
MW-08	887.27	886.81	890.19	10.00	12.00	5.00	882.27	877.27	9.18	881.01	9.12	881.07	9.10	881.09	9.05	881.14	9.11	881.08	8.58	881.61	8.68	881.51	8.68	881.51	8.81	881.38
MW-09	887.93	887.27	889.81	11.00	13.00	5.00	881.95	876.95	7.90	881.91	7.89	881.92	7.85	881.96	8.42	881.39	7.78	882.03	7.48	882.33	7.38	882.43	7.38	882.43	7.50	882.31
MW-09B	887.41	887.47	890.42	35.00	37.00	5.00	857.41	852.41	8.55	881.87	8.55	881.87	8.50	881.92	7.74	882.68	8.47	881.95	8.12	882.30	8.07	882.35	8.07	882.35	8.16	882.26
MW-09C	887.86	887.20	890.49	53.00	55.00	5.00	839.85	834.85	8.57	881.92	8.71	881.78	8.50	881.99	8.52	881.97	8.55	881.94	-	-	8.08	882.41	8.08	882.41	8.17	882.32
MW-10	887.18	887.20	889.95	12.00	14.00	5.00	880.18	875.18	8.85	881.10	8.71	881.24	8.66	881.29	8.59	881.36	8.64	881.31	8.30	881.65	8.22	881.73	8.22	881.73	8.35	881.60
MW-11	887.92	887.52	890.93	14.00	34.50	10.00	883.92	873.92	9.61	881.32	9.58	881.35	9.57	881.36	9.42	881.51	9.57	881.36	8.92	882.01	9.15	881.78	9.15	881.78	9.30	881.63
MW-12	885.68	885.68	885.33	20.00	20.00	7.50	873.18	865.68	2.79	882.54	2.81	882.52	2.82	882.51	2.75	882.58	2.76	882.57	-	-	2.41	882.92	2.41	882.92	-	-
MW-13	880.72	880.72	882.56	10.00	10.00	5.00	875.72	870.72	4.03	878.53	4.13	878.43	4.13	878.43	3.54	879.02	3.64	878.92	2.51	880.05	2.68	879.88	2.68	879.88	2.80	879.76
MW-13C	880.73	880.73	882.81	38.00	38.00	5.00	847.73	842.73	4.01	878.80	4.07	878.74	4.13	878.68	3.59	879.22	3.71	879.10	2.69	880.12	2.88	879.93	2.88	879.93	2.99	879.82
MW-14	883.54	883.54	883.14	14.00	14.00	5.00	874.54	869.54	4.26	878.88	4.38	878.76	4.41	878.73	3.43	879.71	4.04	879.10	2.82	880.32	3.53	879.61	3.53	879.61	3.56	879.58
MW-14C	883.33	883.33	882.91	40.00	41.00	5.00	848.33	843.33	3.82	879.09	3.91	879.00	3.93	878.98	3.64	879.07	3.80	879.31	2.51	880.40	3.03	879.88	3.03	879.88	3.13	879.78
MW-15	881.74	881.74	884.37	10.00	10.00	5.00	876.74	871.74	5.74	878.63	5.84	878.53	5.85	878.52	5.32	879.05	5.49	878.88	4.26	880.11	4.78	879.59	4.78	879.59	4.85	879.52
MW-15C	881.58	881.58	883.50	29.00	29.00	5.00	857.58	852.58	4.31	879.19	4.37	879.13	4.39	879.11	3.95	879.55	4.08	879.42	3.09	880.41	3.39	880.11	3.39	880.11	3.46	880.04
MW-17	886.99	886.09	888.46	9.00	12.00	5.00	881.99	876.99	7.45	881.01	7.45	881.01	7.48	881.00	7.34	881.12	7.41	881.05	6.98	881.48	6.97	881.49	6.97	881.49	7.09	881.37
MW-18	883.95	886.17	889.14	9.00	10.00	5.00	879.95	874.95	8.33	880.81	8.10	881.04	8.03	881.11	7.94	881.20	8.00	881.14	7.64	881.50	7.57	881.57	7.57	881.57	7.68	881.46
MW-19	883.90	883.21	886.88	10.00	12.00	5.00	878.90	873.90	4.87	882.01	4.83	882.05	4.85	882.03	4.76	882.12	4.78	882.10	4.50	882.38	4.30	882.58	4.30	882.58	4.45	882.43
MW-20	882.46	882.55	884.86	9.00	12.00	5.00	878.46	873.46	4.59	880.27	3.94	880.92	5.27	879.59	4.91	879.95	5.03	879.83	3.99	880.87	4.95	879.91	4.95	879.91	4.56	880.30
MW-21	881.93	881.93	884.93	12.00	12.00	5.00	874.93	869.93	Not Installed	-	Not Installed	-	Not Installed	-	Not Installed	-	Not Installed	-	Not Installed	-	Not Installed	-	Not Installed	-	5.11	879.82
MW-22	881.21	881.56	883.32	10.00	17.00	5.00	876.21	871.21	4.78	878.54	4.78	878.54	5.00	878.32	4.59	878.82	4.76	878.56	3.70	879.62	4.44	878.88	4.44	878.88	4.35	878.97
MW-23	880.26	880.55	882.91	10.00	11.00	5.00	875.26	870.26	3.73	879.18	3.74	879.17	4.08	878.83	3.43	879.48	3.63	879.28	2.87	880.24	3.01	879.90	3.01	879.90	3.04	879.87
MW-24	881.10	881.14	883.72	10.00	10.00	5.00	876.10	871.10	Not Installed	-	Not Installed	-	Not Installed	-	Not Installed	-	Not Installed	-	3.64	880.08	4.05	879.67	4.05	879.67	4.07	879.65
MW-25	887.51	887.35	889.22	11.00	13.00	5.00	881.51	876.51	7.96	881.26	7.89	881.33	7.87	881.35	7.79	881.43	7.84	881.38	7.43	881.79	7.44	881.78	7.44	881.78	7.58	881.64
MW-26	884.29	885.80	888.93	9.50	12.00	5.00	879.79	874.79	8.59	880.34	8.12	880.81	8.09	880.84	8.95	879.98	8.02	880.91	7.57	881.36	7.59	881.34	7.59	881.34	7.69	881.25
MW-27	885.30	885.30	884.92	15.00	15.00	5.00	875.30	870.30	Not Installed	-	Not Installed	-	Not Installed	-	Not Installed	-	Not Installed	-	Not Installed	-	Not Installed	-	Not Installed	-	2.98	881.94
MW-27C	885.34	885.34	884.96	35.00	38.00	5.00	855.34	850.34	Not Installed	-	Not Installed	-	Not Installed	-	Not Installed	-	Not Installed	-	Not Installed	-	Not Installed	-	Not Installed	-	2.97	881.99
MW-28	889.45	889.45	888.94	22.00	22.00	5.00	872.45	867.45	Not Installed	-	Not Installed	-	Not Installed	-	Not Installed	-	Not Installed	-	Not Installed	-	Not Installed	-	Not Installed	-	5.13	883.81
MW-28C	889.32	889.32	888.87	50.00	50.00	5.00	844.32	839.32	Not Installed	-	Not Installed	-	Not Installed	-	Not Installed	-	Not Installed	-	Not Installed	-	Not Installed	-	Not Installed	-	4.73	884.14
MW-29	884.34	884.34	886.78	11.00	11.00	5.00	878.34	873.34	Not Installed	-	Not Installed	-	Not Installed	-	Not Installed	-	Not Installed	-	Not Installed	-	Not Installed	-	Not Installed	-	4.53	882.25
MW-29C	884.20	884.20	886.62	33.00	33.00	5.00	856.20	851.20	Not Installed	-	Not Installed	-	Not Installed	-	Not Installed	-	Not Installed	-	Not Installed	-	Not Installed	-	Not Installed	-	4.41	882.21
MW-A2	881.10	881.10	884.59	33.00	33.50	10.00	858.10	848.10	5.53	879.06	5.56	879.03	5.78	878.81	5.19	879.40	5.38	879.21	4.41	880.18	4.81	879.78	4.81	879.78	4.83	879.76
MW-B1	880.90	880.09	889.48	18.00	18.50	10.00	878.99	868.99	10.70	878.78	10.76	878.72	10.81	878.67	10.34	879.14	10.55	878.93	9.51	879.97	9.96	879.52	9.96	879.52	9.08	880.40
MW-B2	886.35	886.35	889.65	40.00	40.00	5.00	851.35	846.35	10.02	879.63	9.96	879.69	10.04	879.61	9.67	879.98	9.81	879.84	8.95	880.70	9.33	880.32	9.33	880.32	9.39	880.26
MW-B4	886.38	886.38	889.54	29.00	29.00	5.00	862.38	857.38	9.37	880.17	9.24	880.30	9.32	880.22	9.08	880.46	9.17	880.37	8.52	881.02	8.74	880.80	8.74	880.80	8.80	880.74
MW-BCK1	884.67	884.67	887.11	13.00	13.00	10.00	881.67	871.67	4.78	882.33	4.80	882.31	4.80	882.31	4.71	882.40	4.75	882.36	4.52	882.59	4.39	882.72	4.39	882.72	4.45	882.66
MW-BCK2	885.27	885.27	887.25	40.00	41.00	5.00	850.27	845.27	5.34	881.91	5.34	881.91	5.38	881.87	4.85	882.40	5.33	881.92	4.66	882.59	4.95	882.30	4.95	882.30	5.01	882.24
MW-BCK3	885.58	885.58	887.64	29.00	29.00	5.00	861.58	856.58	4.91	882.73	4.94	882.70	4.93	882.71	5.30	882.34	4.88	882.76	5.09	882.55	4.51	883.13	4.51	883.13	4.59	883.05
MW-C2	886.43	886.43	889.54	44.00	44.00	5.00	847.43	842.43	8.94	880.60	8.82	880.72	5.78	883.76	8.64	880.90	8.73	880.81	8.19	881.35	8.30	881.24	8.30	881.24	8.40	881.14
MW-E2	885.13	885.13	888.73	39.00	40.00	5.00	851.13	846.13	9.22	879.51	9.15	879.57	10.81	877.92	8.84	879.89	9.01	879.72	8.19	880.54	8.45	880.28	8.45	880.28	8.47	880.26
MW-F2	882.56	882.56	884.33	45.00	45.00	5.00	842.56	837.56	5.24	879.09	5.27	879.06	10.04	874.29	4.89	879.44	5.04	879.29	4.19	880.14	4.37	879.96	4.37	879.96	4.46	879.87
MW-F5	884.81	884.81	886.88	30.00	30.00	5.00	859.81	854.81	5.69	881.19	5.76	881.12	9.32	877.56	5.33	881.55	5.53	881.35	4.53	882.35	4.94	881.94	4.94	881.94	4.98	881.90
MW-G1	883.61	883.61	885.28	17.50	17.50	10.00	876.11	866.11	-	-	5.64	879.64	8.85	876.43	5.01	880.27	5.28	880.00	4.26	881.02	4.81	880.47	4.81	880.47	4.95	880.33
MW-G2	881.60	881.60	883.92	45.00	45.00	5.00	841.60	836.60	-	-	3.71	880.21	9.32	874.60	3.41	880.51	3.51	880.41	2.96	880.96	2.95	880.97	2.95	880.97	3.05	880.87
MW-G4	885.07	885.07	886.89	18.00	19.00	10.00	877.07	867.07	-	-	4.70	882.19	5.40	881.49	4.31	882.88	4.65	882.24	4.41	882.48	4.30	882.59	4.30	882.59	4.36	882.53
MW-J2	885.31	885.31	888.66	38.00	39.50	5.00	852.31	847.31	9.18	879.48	9.12	879.54	5.91	882.75	9.05	879.61	8.97	879.69	8.15	880.51	8.41	880.25	8.41	880.25	8.44	880.22
MW-J3	884.81	884.81	888.94	28.00	28.00	5.00	861.81	856.81	9.48	879.46	9.41	879.53	5.84	883.10	8.81	880.13	9.22	879.72	8.39	880.55	8.67	880.27	8.67	880.27	8.72	880.22
MW-OS1	880.72	880.72	882.92	10.00	10.00	5.00	875.72	870.72	4.41	878.51	4.57	878.35	3.85	879.07	3.98	878.94	4.16	878.76	3.08	879.86	3.49	879.43	3.49	879.43	3.55	879.37
MW-OS1C	880.25	880.25	882.19	32.00	44.50	5.00	853.25	848.25	3.29	878.96	3.32	878.87	4.71	877.48	2.89	879.30	3.05	879.14	2.08	880.11	2.42	879.77	2.42	879.77	2.48	879.71
MW-OS3	881.30	881.30	884.31	10.00	10.00	5.00	876.30	871.30	5.75	878.56	5.87	878.44	9.27	875.04	5.29	879.02	5.44	878.87	4.22	880.09	4.63	879.68	4.63	879.68	4.73	879.58
MW-OS3C	881.48	881.48	882.78	38.00	38.00	5.00	848.48	843.48	4.10	878.68	4.19	878.59	9.50	873.28	3.65	879.13	3.80	878.98	2.68	880.10	3.08	879.70	3.08	879.70	3.14	879.64
OW-16	883.00	883.00	885.53	11.72	NA	NA	NA	871.28	-	-	5.98	879.55	5.93	879.60	Sampled 10-17-03	Dry	11.20	874.33	8.90	876.63	7.17	878.36	7.17	878.36	6.36	879.17
SG-2	NA	NA	880.81	NA	NA	NA	NA	NA	-	-	2.35	878.46	2.43	878.38	1.95	878.86	2.14	878.67	0.95	879.86	2.92	877.89	2.92	877.89	1.75	879.06
SG-4	NA	NA	878.83	NA	NA	NA	NA	NA	-	-	1.88	876.95	1.94	876.89	1.45	877.38	NA	-	0.54	878.29	1.43	877.40	1.43	877.40	Under Water	878.83
SG-5	NA	NA	883.32	NA	NA	NA	NA	NA	Not Installed	-	Not Installed	-	Not Installed	-	Not Installed	-	Not Installed	-	Not Installed	-	Not Installed	-	4.21	879.11	4.26	879.06
SG-6	NA	NA	884.99	NA	NA	NA	NA	NA	Not Installed	-	Not Installed	-	Not Installed	-	Not Installed	-	Not Installed	-	Not Installed	-	Not Installed	-	3.73	881.26	3.73	881.26	3.82	881.17

Note: NA - Not Available
- - Measurement not recorded
TOC - Top of Casing
TD - Total Depth
GS - Ground Surface
SG - Staff Gauge

Table 3-1
Monitoring Well Inspection Checklist
Former Stanley Tools Site
Fowlerville, Michigan

Well Number: _____ Inspector: _____ Date: _____

A. Is the access route to the well passable? _____

B. Is the vicinity of the well clear of brush debris? _____

Runoff Diversion Apron

A. Is the grout in good condition? _____

B. Approximate diameter of apron: _____

C. Does apron completely surround well casing? _____

D. Does apron promote fluid drainage away from well bore? _____

E. Are fluids being funneled into annular space around well casing? _____

Well Riser

A. Is well riser intact? _____

B. Is the well riser cracked, broken or bent? _____

C. Is the well riser lifted? _____

D. Is the survey mark visible for water level measurement reference? _____

E. Is the riser cap in place and in good condition? _____

Protective Well Casing

A. Describe the condition of the protective casing (intact, cracked, broken, bent, or lifted?) _____

B. Is protective well casing lid equipped with a working lock? _____

C. Are the drainage or weep holes clear? _____

D. Is the well designation clearly visible on the outside of the protective casing? _____

Well Siltation

A. Is the measured total depth of the well consistent with construction records? _____

B. Does silt or sand exceed 6 inches in thickness on the well bottom? _____

Additional Observations and Remarks: _____

_____

_____

_____

_____

_____

_____

Table 3-2
Monitoring Well Corrective Actions
Former Stanley Tools Site
Fowlerville, Michigan

Negative Finding	Corrective Action
General	
Inaccessible well	Notify appropriate site contact to remove obstructions
Runoff Diversion Apron	
Poor Grout Condition	Replace Grout
Diameter of Apron < 6 inches	Replace Apron
Broken Apron	Replace Apron
Sunken Apron	Replace Apron
Well Riser	
Broken Riser	Determine Cause and Replace Riser
Lifted Riser	Determine Cause and Replace Riser
Unclear Survey Mark	Resurvey New Mark
Missing or Damaged Riser Cap	Replace Riser Cap
Protective Well Casing	
Broken Casing	Repair or Replace Casing
Casing Lid Missing Lock or Lock Inoperable	Replace Lock
Obstructed Drainage Holes	Clear Obstruction
Poorly Visible Well Designation	Relabel Well with Correct Designation
Well Siltation	
Difference of Measured Total Depth of Well and Historical Total Depth > 6 Inches	Remove siltation from well bottom.

Table 3-3
Well Purging and Sampling Field Data Sheet
Former Stanley Tools Site
Fowlerville, Michigan

Date	Sample Time	Well ID	Total Depth	Water Level	Purge Rate	Purged Volume	Turbidity	Eh	Dissolved Oxygen	pH	Conductivity	Temperature	Comments
													color:
													sheen: yes no
													odor: yes no
													color:
													sheen: yes no
													odor: yes no
													color:
													sheen: yes no
													odor: yes no
													color:
													sheen: yes no
													odor: yes no
													color:
													sheen: yes no
													odor: yes no
													color:
													sheen: yes no
													odor: yes no

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APPENDIX A
LABORATORY QUALITY ASSURANCE PROJECT PLAN

Available upon request

BASELINE ECOLOGICAL RISK ASSESSMENT
JCI FORMER STANLEY TOOL WORKS
FOWLERVILLE, MICHIGAN

Prepared by

ENTACT Environmental Services, LLC

March 2008

Baseline Ecological Risk Assessment
JCI Former Stanley Tool Works
Fowlerville, Michigan

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Baseline Ecological Risk Assessment
JCI Former Stanley Tool Works
Fowlerville, Michigan

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TABLE 4-1
SUMMARY OF SEDIMENT SAMPLE LOCATIONS

Sample Designation	Sample Location
SD-J2-001	Approximately 50 stream-feet downstream of North Ditch confluence
SE/RC 9/1-002	Approximately 5 stream-feet downstream the North Ditch confluence
SD—E2-003	Approximately 440 stream-feet upstream of North Ditch confluence.
SE/RE 3/3-004	Approximately 480 stream-feet upstream of North Ditch confluence.
SD—C1-005	Approximately 110 stream-feet downstream of CSX Rail Bridge
SD-A1-006	Approximately 60 stream-feet downstream of CSX Rail Bridge.
SD-007	Approximately 1,700 stream-feet downstream of sample point SD-SE/RC 13/1-008.
SD-SE/RC 13/1-008	Approximately 15 stream-feet downstream of north edge of culvert beneath Interstate I-96.

TABLE 4-2
SUMMARY OF RIVER MEASUREMENTS

Station	River Width (feet)	River Depth (feet)		
		A (east)	B (mid-stream)	C (west)
01	28.5	0.9	1.2	1.5
02	23	1.2	1.8	1.8
03	24	2.4	2.2	1.7
04	26	1.8	1.7	1.2
05	26	1.3	2.3	2.1
06	27	2.2	3.7	2.0
07	25.5	0.7	0.8	0.8
08	20	1.3	1.6	1.3

TABLE 4-3
SUMMARY OF FIELD WATER CHEMISTRY PARAMETERS

Station	Temperature (Celsius)	Alkalinity (mg/L as $CaCO_3$)	pH	Dissolved Oxygen (mg/L)	Chlorides (mg/L Cl^-)
02	19	320	8.0	7.0	100
07	20	360	8.0	6.0	80

5.0 CHARACTERIZATION OF EXPOSURE AND EFFECTS

The extent of ecological exposure and effects are characterized in this section. Exposure is the situation where a contaminant (stressor) is present at the same place and time as, or is in contact with, a plant or animal. Both an exposure-response analysis, which describes the relationship between size, frequency, or duration of a chemical contaminant and the size of the response, and evidence of causality, which provides evidence for this relationship from multiple sources and not just the exposure-response analysis, will be used in determining how likely it is that the contaminant found in the Red Cedar River sediments actually cause the effects on the measurement and assessment endpoints.

5.1 CHARACTERIZATION OF EXPOSURE (DATA ANALYSIS)

The results of the ecological field investigations are provided in this subsection. For the sediment chemistry, EPA Region 5 RCRA Corrective Action ecological screening levels (ESLs), available at http://www.epa.gov/Region5/rcraca/edql.htm, are first used to determine chemicals of potential ecological concern (COPECs) in these media. The ESLs are Region 5 media-specific values for Resource Conservation and Recovery Act Appendix IX hazardous constituents. ESLs are initial screening levels with which the sediments concentrations were compared to helping to focus the investigation on those areas and chemicals that are most likely to pose an unacceptable risk to the environment. ESLs alone are not intended to serve as cleanup levels. The Region 5 RCRA ESL is equivalent to the Consensus based threshold effect concentrations (TEC) as presented in MacDonald *et al.* (2000).

5.1.1 Sediment Chemistry

Sediments encountered at each sampling location consisted largely of silty sands and gravel with some localized fine sandy silts. A thin layer of detritus and organics were generally present. At sample location SD-E2-003, the sediments possessed a distinct oily odor, and an oily sheen was noted atop the water after these sediments had been disturbed (Appendix A, photograph 13).

The results of the chemical analyses of the sediment samples are presented in **Tables 5-1** for sediment. Historic sediment data is provided in **Appendix B**. Sediments were analyzed for metals (i.e., arsenic, cadmium, chromium, copper, lead, nickel, and zinc), PCBs (as Aroclors), and PAHs (priority pollutants). Of the organic compounds, PCBs and cadmium were not detected in sediment. Of the PAHs, only benzo(a)pyrene was detected in four samples at concentrations below the ESL. Arsenic, chromium, copper, lead, nickel, and/or zinc exceeded the ESL in at least one sample at four locations

(SE/RC-9/1-002, SD-E2-003, SD-C1-005, and SD-A1-006.

5.1.2 Bioassays

Benthic organisms were exposed to sediment in order to evaluate the effects of contamination on the survival and growth of these organisms. The results of the benthic bioassays are summarized in **Table 5-2.** The complete bioassay report is provided in **Appendix C.** The laboratory negative control survival was 94%. One sample location (SD-E2-003) had no survival; survival for all other investigative locations (91% at SD-A1-006, 96% at SE/RE 3/3-004, 91% at SE/RC 9/1-002, 79% at SD-C1-005 and 95% at SD-J2-001) and the reference locations (95% in SE/SRC 12/1-008, and 94% in SD-007) was not significantly different from the laboratory control survival rate of 94%. Results from sample SD-C1-005 showed a markedly lower survival rate of 79%, though the difference was not significant. Results from sample SD-E2-003 showed a zero percent survival rate. Growth at SD-C1-005 and reference site SE/RC-13/1-008 was significantly different ($p=0.005$) from reference site SD-007. Growth in all treatments was significantly lower than in the laboratory control group.

5.1.3 Community Studies

The ecological investigation included collection of aquatic macroinvertebrates for analysis of community health. The complete macroinvertebrate a community study report is provided in **Appendix D.**

Several variables in combination are effective in characterizing benthic community structure (EPA, 1992b): numbers of taxa, numerical dominance, total abundance, and percentage composition of major taxonomic groups (e.g., oligochaetes, chironomids, and other major insect groups). Aquatic macroinvertebrates for community assessment analysis were generally identified to the family level in the field. Twenty-one taxa were identified for the area. The results of the benthic community study performed by ILM are summarized in **Tables 5-3 and 5-4.**

5.2 CHARACTERIZATION OF EFFECTS

Sometimes more than one line of evidence is needed to reasonably show that contaminants from a Site are likely to cause adverse effects on the assessment endpoint(s). The BERA Work Plan identified the triad approach (i.e., toxicity test, benthic invertebrate community survey, and sediment chemistry) for collecting data for the BERA to assess the potential for adverse ecological effects on the aquatic ecosystem present in the Red Cedar River in the vicinity of the site.

5.2.1 Sediment Chemistry

One line of evidence used to assess impacts to transient aquatic receptors is the comparison of chemical data to sediment guidelines. To predict the toxicity for mixtures of various contaminants in sediments, mean probable effect concentration quotients (PEC-Q) were determined for each sample location. Consensus-based sediment quality guidelines (SQGs) (MacDonald *et al.* 2000) have been developed that represent the geometric mean of published SQGs from a variety of sources. These SQGs are called PECs and TECs. PECs are intended to identify contaminant concentrations above which harmful effects on sediment-dwelling organisms are expected to occur more often than not. TECs are intended to identify contaminant concentrations below which harmful effects on sediment-dwelling organisms are not expected. Mean PEC-Q for mixtures of metals) were determined using methods adopted from Ingersoll *et al.* (2000, 2001). The mean PEC-Q is a calculated value which provides a method for evaluating the significance of the mixture of chemicals (with PECs) in a sample instead of a chemical by chemical evaluation which is a more restrictive screening evaluation and addresses the EPA's concern of evaluating cumulative effects. Based on existing databases, the reliability to predict toxicity is greatest for the metals arsenic, cadmium, chromium, copper, lead, nickel, and zinc. In the case of metals, a mean PEC-Q_{metals} is calculated by summing the PEC-Q for the individual metals and dividing by the total number of metals. Ingersoll *et al.* (2000) observed an overall increase in the incidence of toxicity with an increase in the mean quotients in toxicity tests, and that there is a consistent increase in the toxicity at a mean quotient of > 0.5. The overall incidence of toxicity was greater in long-term tests (28 days) using the amphipod *Hyalella azteca* compared to short-term tests.

5.2.2 Bioassays

Toxicity tests or bioassays are used to directly evaluate the bioavailability and toxicity of sediment contaminants to selected test organisms (EPA, 1997). Sediments having ≤24% mortality are considered nontoxic as defined by Berry et al. (1996, and cited in EPA 2005b). As described in EPA (2000), the performance of bioassay test organisms in the negative control is used to judge the acceptability of the test, and both a negative control and reference sediment were used to evaluate performance of the organisms in the investigative sediments. Testing of a reference sediment provides a site-specific basis for evaluating toxicity while the negative control is used as a measure of test acceptability, evidence of test organism health, and a basis for interpreting data obtained from the test sediments. If the organisms in the negative control do not meet performance criteria, the results of investigative sediments are considered questionable because it suggests that adverse factors affected the test organisms.

5.2.4 Community Studies

Population/community evaluations, or biological field surveys, can be useful for evaluating the potential for adverse ecological effects from both contaminants that are harmful to organisms through direct exposure to the contaminated medium (sediment) and contaminants that bioaccumulate in food chains.

The benthic macroinvertebrate family-level data collected from the Red Cedar River site is useful to assess the benthic communities of the investigated locations. The taxa lists were developed based on qualitative sampling, with a frequency of occurrence estimated for the sampled taxa at the time of collection. This information is appropriate for developing qualitative assessments of the benthic communities. ILM developed Macroinvertebrate Biotic Index (MBI) values for the sampled locations associated with the site as a measure of organic, oxygen-depriving pollution in stream environments. The MBI is a refinement of the Hilsenhoff Biotic Index (HBI, Hilsenhoff, 1982, 1987, 1988), which has been refined for use on the taxonomic family level. This procedure, developed by Hilsenhoff (1982, 1988) for Wisconsin streams, is a semi-quantitative assessment of organic, oxygen-depleting pollution of flowing waters. The HBI system assigns a tolerance value (of low oxygen and high organic waste levels) to aquatic arthropod species found in flowing waters. A higher HBI value, on a scale of 0 to 10, indicates a higher tolerance of low dissolved oxygen and high organic pollution conditions.

Implementing the HBI system initially required counting organisms to a 100-count, a semi-quantitative analysis. The HBI count has since been modified to count a maximum of 10 organisms of each encountered taxon. This approach limits bias

due to dominance effects of one or two species in a sample (Hilsenhoff, 1998). Using the maximum 10-count per taxon, ILM developed MBI values for all of the benthic sampling locations associated with the Site. The MBI values developed for the Site can be used to compare the sampling locations with each other. This table also shows the results of applying the MBI tolerance values for aquatic macroinvertebrate families based solely on organism presence. This approach is a qualitative assessment, resulting in Tolerance Biotic Index (TBI) values, used by the Wisconsin Department of Natural Resources (Lillie and Schlesser, 1994). The TBI is the average tolerance value for the taxa-assigned tolerance values in a sample.

Other metrics were also applied to the project's benthic community data (as presented in MDEQ *Qualitative Biological and Habitat Survey Protocols for Wadable Streams and Rivers* (Procedure 51, Revised May 2002), including:

Metric 1. Total Number of Taxa. This is the total number of taxa identified. Taxa richness has historically been a key component in most all evaluations of macroinvertebrate community integrity. The underlying reason is the basic ecological principle that healthy, stable biological communities have high species diversity. Increases in number of taxa are well documented to correspond with increasing water quality and habitat suitability. Small, pristine headwater streams may, however, be exceptions and show low taxa richness.

Metric 2. Total Number of Mayfly Taxa. This is the number of taxa in the order Ephemeroptera. Mayflies are an important component of a high quality stream biota. As a group, they are decidedly pollution sensitive and are often the first group to disappear with the onset of perturbation. Thus, the number of taxa present is a good indicator of environmental conditions.

Metric 3. Total Number of Caddisfly Taxa. This is the number of taxa in the order Trichoptera. Caddisflies are often a predominant component of the macroinvertebrate fauna in larger, relatively unimpacted streams and rivers but are also important in small headwater streams. Though tending to be slightly more pollution tolerant as a group than mayflies, caddisflies display a wide range of tolerance and habitat selection among species. However, few species are extremely pollution tolerant and, as such, the number of taxa present can be a good indicator of environmental conditions.

Metric 4. Total Number of Stonefly Taxa. This is the number of taxa in the order Plecoptera. Stoneflies are one of the most sensitive groups of aquatic insects. The presence of one or more taxa is often used to indicate very good environmental quality. Small increases or small declines in overall numbers of different stonefly taxa is thus very critical for correct evaluation of stream quality.

Metric 5. Percent Mayfly Composition. This is the ratio of the number of individuals in the order Ephemeroptera to the total number of organisms collected. As with the number of mayfly taxa, the percent abundance of mayflies in the total invertebrate sample can change dramatically and rapidly to minor environmental disturbances or fluctuations.

Metric 6. Percent Caddisfly Composition. This is the ratio of the number of individuals in the order Trichoptera to the total number of organisms collected. As with the number of caddisfly taxa, percent abundance of caddisflies

is strongly related to stream size with greater proportions found in larger order streams. Optimal habitat and availability of appropriate food type seem to be the main constraints for large populations of caddisflies.

Metric 7. Percent Contribution of the Dominant Taxon. This is the ratio of the number of individuals in the most abundant taxon to the total number of organisms collected. The abundance of the numerically dominant taxon is an indication of community balance. A community dominated by relatively few taxa for example, would indicate environmental stress, as would a community composed of several taxa but numerically dominated by only one or two taxa.

Metric 8. Percent Isopods, Snails, and Leeches. This is the ratio of the sum of the number of individuals in the order Isopoda, class Gastropoda, and class Hirudinea to the total number of organisms collected. These three taxa, when compared as a combined percentage of the invertebrate community, can give an indication of the severity of environmental perturbation present. These organisms show a high tolerance to a variety of physical and chemical parameters. High percentages of these organisms at a sample site are very good evidence for stream degradation.

Metric 9. Percent Surface Dependent. This metric is the ratio of the number of macroinvertebrates which obtain oxygen via a generally direct atmospheric exchange, usually at the air/water interface, to the total number of organisms collected. High numbers or percentages of surface breathers may indicate large diurnal dissolved oxygen shifts or other biological or chemical oxygen demanding constraints. Areas subject to elevated temperatures, low or erratic flows may also show disproportionately high percentages of surface dependent macroinvertebrates.

investigative samples (**Table 5-1**). Thus, site-related risks to aquatic receptors may be over-estimated because background levels of COEC are contributing to the risk.

6.3 RISK DESCRIPTION

The risk description provides information important for interpreting the risk results and for identifying a level for harmful effects on the assessment endpoints. The risk description also provides information to help the risk manager judge the likelihood and ecological significance of the estimated risks. At the completion of the risk characterization, a Scientific Management Decision Point (SMDP) occurs. Decisions are made by the risk manager concerning what future actions, if any, are to be undertaken.

The objective of this BERA is to support the implementation of the selected remedy for sediments in the Middle Fork o the Red Cedar River, which is forms the western boundary or the site. Areas of river sediments that are contaminated at levels considered unsafe for aquatic animals would be removed from the river. The degree of cleanup in the river sediments is based on the goal of protecting that animals that live part or all of their lives in the sediment (benthic organisms), which are important in the food chain of the river's ecosystem. Cleaning up sediments to protect benthic organisms is expected to benefit the fish, birds, and mammals that inhabit or feed in the river. This will also keep the surface water clean. To meet this objective, the BERA:

- Evaluated contaminant levels in sediment.
- Assessed the potential for adverse impact to ecological receptors, focusing on exposures to aquatic invertebrate communities, using sediment sampling, laboratory bioassays, and community studies.
- Utilizes results of the BERA and previous site investigation data to isolate the areas of sediment that will be removed and to establish site-specific cleanup goals

Sometimes more than one line of evidence is needed to reasonably show that contaminants from a Site are likely to cause adverse effects on the assessment endpoint(s). Lines of evidence that were used to characterize risk in this BERA and to site-specific cleanup levels include:

- Comparing estimated or measured exposure levels for a particular chemical in sediment against screening levels that are known from the literature to be toxic to the benthic invertebrates which were selected as assessment endpoints;
- Comparing laboratory tests (bioassays) with sediment from the Site and from a reference site and from the laboratory control; and

- Comparing observed effects in the benthic invertebrate communities associated with the Site with benthic invertebrate communities at a reference site.

Table 6-5 presents the lines of evidence used in assessing impacts on the aquatic ecosystems in the Red Cedar River in the vicinity of the site. Impacts on the aquatic ecosystem are highly likely due to lead at SD-E2-003 and nickel and zinc at SD-C1-005.

7.0 DEVELOPMENT OF SITE-SPECIFIC CLEANUP LEVEL

Based on the results of the sediment toxicity and benthic macroinvertebrate community studies, site-specific aquatic life protection criteria were developed for select chemicals of concern (COCs) in sediment. These site-specific criteria will be used in conjunction with additional bulk sediment sampling to better define impacted areas of Red Cedar River. As part of the sediment cleanup level development, chemicals of concern (COCs) are identified, background threshold values (BTVs) are developed, and cleanup levels are proposed based on the results the BERA.

7.1 Chemicals of Concern in Sediment

Sediment samples collected for chemical analysis as part of the BERA were analyzed for select metals (i.e., arsenic, cadmium, chromium, copper, lead, nickel, and zinc), PAHs, and PCBs. These analytes were considered to be chemicals of concern (COC) based on the FCMP (*Final Corrective Measures Proposal, Former Stanley Tool Works, Fowlerville, Michigan, Earth Tech/Weston, February, 2004*) and the FCMP Appendix D - *Technical Memorandum: Preliminary Sediment Cleanup Criteria and Data Evaluation, Red Cedar River, Former Stanley Tool* (ET/W, 2004).

The samples collected as part of the BERA contained no detectable PCBs in any of the investigative samples or the field duplicate samples. PCBs were detected in historic samples (ET/W, 2004) at concentrations ranging from 5.2 ug/kg to 9,180 ug/kg. A surface weighted average concentration of 152.6 ug/kg total PCBs was calculated in the FCMP (ET/W 2004), which does not exceed the PEC of 676 ug/kg.

Benzo(a)pyrene was detected in two BERA sediment samples, at concentrations below the TEC. PAHs were detected in historic samples (ET/W2004) at concentrations ranging from 6.3 ug/kg to 8,590 ug/kg. The sum of surface weighted averages of individual PAHs based on values calculated in the RCMP (ET/W, 2004) is 1,788.5 ug/kg, which slightly exceeds the PEC of 1610 ug/kg.

Arsenic was detected in six of the eight samples collected for the BERA, at concentrations ranging from 5.04 mg/kg to 12.8 mg/kg. Although the calculated Upper Confidence Limit (UCL) for the arsenic data set (at a 95%confidence level) is slightly greater than the TEC (10.25 v. 9.79 mg/kg), the arsenic data are normally distributed and exhibit a relatively low standard deviation, suggesting the data are from the same population (i.e., there has been no significant contribution to sediment concentrations of arsenic attributable to the Site). To test this hypothesis, the Extreme Values (Dixons Test) was utilized to determine if the maximum and minimum values of (12.8 mg/kg at sample SE/RC 9/1-002, and 1.675 [1/2 the

reporting limit] at sample SE/RE 3/3-004) are statistical outliers. The results of this test, presented in **Table 7-1**, indicate that neither the minimum or maximum values are outliers, suggesting that the observed values of arsenic are from the same population, and are not indicative of impacts resulting from the site. Arsenic was detected in historic samples (ET/W2004) at concentrations ranging from 0.84 mg/kg to 65 mg/kg. The surface weighted average of arsenic calculated in the RCMP (ET/W, 2004) is 14.3 mg/kg, which slightly exceeds the TEC of 9.79 mg/kg.

While cadmium did not exceed its PEC, cadmium is included because it is a component of PEC quotient approach and it did exceed its TEC at a few historic sample locations. Cadmium was not detected in ay sample collected during the BERA. The reporting limits for cadmium were all below the TEC of 0.99 mg/kg. Cadmium concentrations in the historic samples ranged from 0.027 mg/kg to 1.9 mg/kg. The surface weighted average of cadmium calculated in the RCMP (ET/W, 2004) is 0.3 mg/kg, which does not exceed the TEC.

Table 7-2 presents a statistical summary and results of distribution testing on each of the remaining metals (i.e., chromium, copper, lead, nickel, and zinc). For statistical analysis, a value of one-half of the reporting limits was used for non-detect results. Where a field duplicate was collected, the higher of the two values reported between the investigative sample and the associated field duplicate sample was utilized. The data presented in **Table 7-2** reveal a marked increase in the concentrations of chromium, copper, nickel, and zinc within samples SD-E2-003, SD-C1-005 and SD-A1-006, as compared to the rest of the investigative samples and the two reference samples. In all cases, the average concentration from these three samples exceeded the average of the remainder of the sample set by at least one order-of-magnitude. The concentration of lead at sample SD-E2-003 showed a marked increase over the rest of the investigative samples and the two reference samples, however, concentrations of lead in samples SD-C1-005 and SD-A1-006, although still higher than the remainder of the data set, do not show the order-of-magnitude level of increase as exhibited by sample SD-E2-003.

7.2 Background Threshold Values

Site-specific background threshold values (BTVs) were developed for the COCs in sediment using background samples summarized in the Final Corrective Measures Proposal (ET/W, 2004) for the Former Stanley Tools, Fowlerville, MI and two reference samples collected as part of this BERA. Individual point-by-point site observations are compared with BTVs to determine the presence or absence of contamination due to site related activities. Appendix E (**Table E-1**) provides the background/reference dataset. As part of BTV development, Dixon's outlier test was performed on each dataset and boxplots were made; these results are provided in the appendix (**Table E-2**). Upper outliers were excluded

from the datasets; lower outliers were not excluded. BTVs were developed using ProUCL version 4.0. Following the recommendation of ProUCL, the 95% upper prediction limit UPL or upper percentile for gamma distributed data represents the preferred estimate of BTV. For data that appear to follow one or more distribution (i.e., appear normal, lognormal, and/or gamma distributed at 5% significance level), the higher value of the normal 95% UPL, the lognormal 95% UPL, and the 95% percentile following a gamma distribution was selected as the BTV. If the UPL or upper percentile exceeded the maximum in the dataset, the maximum was selected as the BTV. The ProUCL output is provided in **Table E-3**. The BTVs are summarized in **Table 7-3.**

The BTVs for all chemicals were exceeded, though only slightly for arsenic and cadmium. Two-sample hypothesis testing was performed for these metals using ProUCL. The use of parametric and nonparametric two-sample hypotheses testing approaches is quite common in many environmental applications including site versus background comparison studies. The Mann-Whitney (or Wilcoxon-Mann-Whitney) test is a nonparametric test used for determining whether a difference exists between the site and the background population distributions. The two data sets are not required to be from a known type of distribution. The WMW test does not assume that the data are normally distributed, although a normal distribution approximation is used to determine the critical value of the test for large sample sizes (EPA, 2007). Based on this hypothesis testing, it was demonstrated that the site data is less than background for arsenic and cadmium (**Table E-4**). As these metals were found to be at background levels, they are not evaluated as further as COCs.

7.3 Proposed Cleanup Levels

Sediment cleanup levels are proposed for chemicals that pose a potential risk to the aquatic ecosystem of the Red Cedar River adjacent to the former Stanley Tools facility. The Final Decision reflects the recommendations presented within the *Technical Memorandum* (ET/W, 2004) for additional ecological testing to ensure that contaminants were not present in the stream at levels deemed harmful to aquatic life, and to define the areas with exceedences falling between preliminary screening criteria, specifically the Threshold Effect Concentrations (TECs), defined as concentrations below which adverse effects are not expected to occur ,and Probable Effect Concentrations (PECs), defined as concentrations above which adverse effects probably would occur. The TEC and PEC criteria are literature-based values for freshwater ecosystems and are used by the MDEQ Water Quality Division as screening criteria. These adverse effects are typically determined by exposure by the most sensitive of ecological receptors in high-quality freshwater ecosystems, unlike the Red Cedar River which has been determined to be a shallow, warm water stream which is too small to be navigated safely, and to shallow to support a sports fishery or attract recreational activities. Therefore they represent worst-case conservative values, which can then be refined with site-specific calculated values stemming from a BERA.

Of the COCs, PCBs and PAHs were not detected or detected infrequently in the BERA dataset. As such, a site-specific cleanup level cannot be determined from the BERA dataset for these COCs. As presented in the FCMP (ET/W, 2004), an ecological-based sediment cleanup value of 1 mg/kg is proposed for PCBs, using a surface weighted average concentration. The surface weighted average concentration of PCBs (0.1526 mg/kg) does not exceed the proposed cleanup level. For the total PAHs, the mid-point of the TEC and PEC is proposed as the cleanup level (12.205 ug/kg-total PAH at 1% organic carbon). The maximum normalized total PAH concentration in the historic dataset (ET/W, 2004) is 5.470 ug total PAH/kg, and does not exceed the proposed cleanup level.

For the remaining COCs, the following concentrations are proposed as the cleanup level for chromium, copper, lead, nickel, and zinc in sediments of the Red Cedar River:

Chromium - 133 mg/kg
Copper - 150 mg/kg
Lead – 130 mg/kg
Nickel – 58 mg/kg
Zinc – 527 mg/kg

The selection of these cleanup levels are supported by the sediment chemistry data, bioassay results, and community survey results for samples SD-E2-003, SD-C1-005, and SC-A1-006. Concentrations of chromium, lead, nickel and/or zinc exceeded published PEC concentrations in these three samples. However, toxic effects on benthic organisms were observed in the bioassays results only for locations SD-E2-003 and SD-C1-005. At SD-E2-003, lead is clearly the risk driver; at SD-C1-005, nickel and zinc are the risk drivers.

Although the concentrations of chromium, nickel and zinc at SD-A1-006 exceeded their respective PEC values, no toxic effects were found in the bioassay. In addition, MBI values for this location were the lowest observed at any of the community survey locations. Therefore, the observed concentrations of these contaminants at SD-A1-006 are proposed as their clean-up objectives.

The concentration of lead found in sediments at SD-E2-003 (789 mg/kg) is well above published TEC and PEC levels. It is notable however, that lead has not been detected at highly elevated concentrations within any other investigative sediment sample collected in the River at or near the Site. Specifically, of the 133 historic (ET/W, 2004) and BERA-related sediment samples collected and analyzed for lead excluding sample SD-E2-003, the maximum and mean

concentrations observed, were 97 mg/kg (at SD-L1), and 13.3 mg/kg, respectively. These values are below the published PEC value (130 mg/kg) for this contaminant. Because of the lack of data between the extreme value detected at SD-E2-003 and the remaining sample population from which inferences may be drawn regarding observable toxic effects, the published PEC value for lead is considered appropriate as a clean-up objective.

Elevated concentrations of copper in sediments in the Red Cedar River are co-located with similar elevated concentrations of chromium, nickel and/or zinc. Although the concentrations of copper in the BERA sediment samples are somewhat elevated in samples SD-E2-003, SD-C1-005, and SC-A1-006, copper does not appear to drive risk in any samples. Thus, the published PEC value for copper is considered appropriate as a clean-up objective.

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Table 5-1
Sediment Chemistry Results

Field Sample ID		BTV	SD-J2-001	SD-J2-001/FD	SE/RC-9/1-002	SD-E2-003	SE-RE-3/3-004	SD-C1-005	SD-A1-006	SD-007	SE/RC-13/1-008
Sample Date			7/24/2007	7/24/2007	7/24/2007	7/24/2007	7/24/2007	7/24/2007	7/24/2007	7/25/2007	7/25/2007
Location ID			J2	J2	RC-9/1	E2	SE-RE-3/3	SD-C1	A1	SD-007	SE/RC-13/1
Depth (IN)			0-12	0-12	0-12	0-12	0-12	0-12	0-12	0-12	0-12
Parameter	**Units**										
Percent Solids	%	--	**66**	**70.9**	**73.6**	**60.9**	**74.7**	**61**	**58.9**	**73.2**	**73.8**
Total Organic Carbon	mg/kg	--	**11,900**	**12,000**	**10,200**				**20,800**		
METALS											
Arsenic, Total	mg/kg	13.7	**5.04**	**6.28**	**12.8**	**10.7**	<3.35 U	**10.9**	**8.64**	<3.42 U	**7.11**
Cadmium, Total	mg/kg	0.513	<0.757 U	<0.706 U	<0.679 U	<0.821 U	<0.669 U	<0.820 U	<0.848 U	<0.683 U	<0.678 U
Chromium, Total	mg/kg	13.87	**11.3**	**13.5**	**13.2**	**112**	**7.27**	**77.2**	**133**	**3.27**	**6.61**
Copper, Total	mg/kg	20.39	**14.7**	**12.5**	**11.7**	**133**	**9.17**	**107**	**97**	<3.42 U	**9.29**
Lead, Total	mg/kg	16.19	**4.16**	**4.18**	**9.18**	**789**	**4.03**	**11.2**	**15.1**	<3.42 U	**4.64**
Nickel, Total	mg/kg	11.6	**8.04**	**8.62**	**6.56**	**43.5**	**6.64**	**267**	**57.9**	<3.42 U	**9.16**
Zinc, Total	mg/kg	88.36	**29.7**	**31.4**	**29.6**	**158**	**27.3**	**675**	**527**	**10.1**	**21.7**
PCBS											
PCB-1016	ug/kg	0.097*	<0.045 U	<31.1 U	<30.9 U	<29.9 U	<26.3 U	<29.2 U	<29.6 U	<42.2 U	<28.9 U
PCB-1221	ug/kg	0.097*	<0.045 U	<31.1 U	<30.9 U	<29.9 U	<26.3 U	<29.2 U	<29.6 U	<42.2 U	<28.9 U
PCB-1232	ug/kg	0.097*	<0.045 U	<31.1 U	<30.9 U	<29.9 U	<26.3 U	<29.2 U	<29.6 U	<42.2 U	<28.9 U
PCB-1248	ug/kg	0.097*	<0.045 U	<31.1 U	<30.9 U	<29.9 U	<26.3 U	<29.2 U	<29.6 U	<42.2 U	<28.9 U
PCB-1254	ug/kg	0.097*	<0.045 U	<31.1 U	<30.9 U	<29.9 U	<26.3 U	<29.2 U	<29.6 U	<42.2 U	<28.9 U
PCB-1260	ug/kg	0.097*	<0.045 U	<31.1 U	<30.9 U	<29.9 U	<26.3 U	<29.2 U	<29.6 U	<42.2 U	<28.9 U
SVOCS											
Acenaphthene	ug/kg	1.453*	<1320 U	<1410 U	<1990 U	<1640 U	<1200 U	<1640 U	<1360 U	<1220 U	<1220 U
Acenaphthylene	ug/kg	1.453*	<2650 U	<2820 U	<2370 U	<3280 U	<2410 U	<3280 U	<2730 U	<2440 U	<2440 U
Anthracene	ug/kg	1.453*	<1320 U	<1410 U	<1990 U	<1640 U	<1200 U	<1640 U	<1360 U	<1220 U	<1220 U
Benz(a)anthracene	ug/kg	1.453*	<661 U	<706 U	<593 U	<821 U	<602 U	<820 U	<682 U	<610 U	<610 U
Benzo(a)pyrene	ug/kg	1.453*	<66.1 U	<70.6 U	**78.7**	**82.5**	<60.2 U	<82.0 U	**111**	**155**	<61.0 U
Benzo(b)fluoranthene	ug/kg	1.453*	<661 U	<706 U	<593 U	<821 U	<602 U	<820 U	<682 U	<610 U	<610 U
Benzo(g,h,i)perylene	ug/kg	1.453*	<1320 U	<1410 U	<1190 U	<1640 U	<1200 U	<1640 U	<1360 U	<1220 U	<1220 U
Benzo(k)fluoranthene	ug/kg	1.453*	<1320 U	<1410 U	<1190 U	<1640 U	<1200 U	<1640 U	<1360 U	<1220 U	<1220 U
Chrysene	ug/kg	1.453*	<1320 U	<1410 U	<1190 U	<1640 U	<1200 U	<1640 U	<1360 U	<1220 U	<1220 U
Dibenz(ah)anthracene	ug/kg	1.453*	<66.1 U	<70.6 U	<59.3 U	<82.1 U	<60.2 U	<82 U	<68.2 U	<61.0 U	<61.0 U
Fluoranthene	ug/kg	1.453*	<1320 U	<1410 U	<1190 U	<1640 U	<1200 U	<1640 U	<1360 U	<1220 U	<1220 U
Fluorene	ug/kg	1.453*	<1320 U	<1410 U	<1190 U	<1640 U	<1200 U	<1640 U	<1360 U	<1220 U	<1220 U
Indeno(1,2,3-cd)pyrene	ug/kg	1.453*	<661 U	<706 U	<593 U	<821 U	<602 U	<820 U	<682 U	<610 U	<610 U
Naphthelene	ug/kg	1.453*	<1320 U	<1410 U	<1190 U	<1640 U	<1200 U	<1640 U	<1360 U	<1220 U	<1220 U
Phenanthrene	ug/kg	1.453*	<1320 U	<1410 U	<1190 U	<1640 U	<1200 U	<1640 U	<1360 U	<1220 U	<1220 U
Pyrene	ug/kg	1.453*	<1320 U	<1410 U	<1190 U	<1640 U	<1200 U	<1640 U	<1360 U	<1220 U	<1220 U

* Based on total PNAs; total PCBs

BTV = Background threshold value; see Appendix D.

NOTE:

< [Value] U: Value not detected at or above the stated reporting limit

why are the numbers bolded?

.001 mg
1000 kg

1) how was the BTV derived?

TABLES

Table 5-2
Bioassay Results

Field Sample ID		SD-J2-001	SD-J2-001/FD	SE/RC-9/1-002	SD-E2-003	SE-RE-3/3-004	SD-C1-005	SD-A1-006	SD-007 REFERENCE	SE/RC-13/1-008 REFERENCE
Sample Date		7/24/2007	7/24/2007	7/24/2007	7/24/2007	7/24/2007	7/24/2007	7/24/2007	7/25/2007	7/25/2007
Location ID		J2	J2	RC-9/1	E2	SE-RE-3/3	SD-C1	A1	SD-007	SE/RC-13/1
Depth (IN)		0-12	0-12	0-12	0-12	0-12	0-12	0-12	0-12	0-12
Parameter	Units									
Toxicity[a]										
Survival	%	95	--	91	0	96	79	91	94	95
Weight	mg	0.365	--	0.437	NA	0.372	0.293*	0.405	0.417	0.343*

NOTE:

[a] Lab control sample had 94% survival and weighted 0.543 mg

* Significantly different (p=0.005) from reference site SD-007. Growth in all treatments was significantly lower than in the laboratory control group. Survival in sediment SD-E2-003 was significantly depressed compared to both reference site (SD007 and S

Table 5-3
Benthic Macroinvertebrate Sample Composition

Location	Family Name	Common Name	Trophic Status
SD-J2-001	Tubificidae	Tubifex	Collector-Gatherer
	Cambaridae	Freshwater Crawfishes	Predator
	Chironomidae	Non-Biting Midges	Gatherer
	Heptageniidae	Flat-Headed Mayflies	Predator
	Dytiscidae	Water Beetles	Predator
	Ephemerellidae	Spiny Crawler Mayflies	Gatherer
	Baetidae	Small Minnow Mayfly	Collector-Gatherer/ Scraper
	Gyrinidae	Whirligig Beetles	Predator
	Libellulidae	Skimmer Dragonflies	Predator
	Palaemonetes	Freshwater Shrimp	Gatherer
	Psephenidae	Water Pennies	Gatherer
SE/RC-9/1-002	Chironomidae	Non-Biting Midges	Gatherer
	Clam	Clam	Gatherer
	Dytiscidae	Water Beetles	Predator
SD-E2-003	Chironomidae	Non-Biting Midges	Gatherer
	Perlidae	Common Stoneflies	Predator
SE/RE-3-3-004	Chironomidae	Non-Biting Midges	Gatherer
	Clam	Clams	Gatherer
SD-C1-005	Amphipoda	Scuds	Scavenger
	Chironomidae	Non-Biting Midges	Gatherer
	Corixidae	Water Boatmen	Gatherer
	Dytiscidae	Water Beetles	Predator
SD-A1-006	Ceratopogonidae	Biting Midges	Predator
	Chironomidae	Non-Biting Midges	Gatherer
	Corixidae	Water Boatmen	Gatherer
	Elmidae	Riffle Beetles	Gatherer
SD-007	Chironomidae	Non-Biting Midges	Gatherer
	Clam	Clams	Gatherer
	Elmidae	Riffle Beetles	Gatherer
	Heptageniidae	Flat-Headed Mayflies	Predator
	Hydropsychidae	Net-Spinning Caddisflies	Gatherer or Predator
	Leptoceridae	Long-Horned Caddisflies	Gatherer or Predator
SD-008	Chironomidae	Non-Biting Midges	Gatherer
	Culicidae	Mosquitos	Predator
	Dytiscidae	Water Beetles	Predator
	Gyrinidae	Whirligig Beetles	Predator
	Heptageniidae	Flat-Headed Mayflies	Predator
	Leptoceridae	Long-Horned Caddisflies	Gatherer or Predator
	Limnephilidae	Northern Caddisflies	Gatherer or Predator
Between SE/RE-3-3-004 and SD-C1-005	Chironomidae	Non-Biting Midges	Gatherer
	Heptageniidae	Flat-Headed Mayflies	Predator
	Leptoceridae	Long-Horned Caddisflies	Gatherer or Predator
	Limnephilidae	Northern Caddisflies	Gatherer or Predator

Table 6-1
Comparison to Sediment Quality Benchmarks

Field Sample ID		Sediment Benchmarks[b]		SD-J2-001	SD-J2-001/FD	SE/RC-9/1-002	SD-E2-003	SE-RE-3/3-004	SD-C1-005	SD-A1-006	SD-007 REFERENCE	SE/RC-13/1-008 REFERENCE
Sample Date				7/24/2007	7/24/2007	7/24/2007	7/24/2007	7/24/2007	7/24/2007	7/24/2007	7/25/2007	7/25/2007
Location ID				J2	J2	RC-9/1	E2	SE-RE-3/3	SD-C1	A1	SD-007	SE/RC-13/1
Depth (IN)		TEC[d]	PEC	0-12	0-12	0-12	0-12	0-12	0-12	0-12	0-12	0-12
Parameter	Units											
Toxicity[a]												
Survival	%			95	--	91	**0**	96	79	91	94	95
Weight	mg			0.365	--	0.437	**NA**	0.372	**0.293***	0.405	0.417	**0.343***
Physical Properties												
Percent Solids	%			66	70.9	73.6	60.9	74.7	61	58.9	73.2	73.8
Total Organic Carbon	mg/kg			11,900	12,000	10,200				20,800		
Total Organic Carbon	%			1.19	1.20	1.02				2.08		
METALS												
Arsenic, Total	mg/kg	9.8	33	5.04	6.28	**12.8**	**10.7**	<3.35 U	**10.9**	8.64	<3.42 U	7.11
Cadmium, Total	mg/kg	0.99	5	<0.757 U	<0.706 U	<0.679 U	<0.821 U	<0.669 U	<0.820 U	<0.848 U	<0.683 U	<0.678 U
Chromium, Total	mg/kg	43	110	11.3	13.5	13.2	**112**	7.27	**77.2**	**133**	3.27	6.61
Copper, Total	mg/kg	32	150	14.7	12.5	11.7	**133**	9.17	**107**	**97**	<3.42 U	9.29
Lead, Total	mg/kg	36	130	4.16	4.18	9.18	**789**	4.03	**11.2**	15.1	<3.42 U	4.64
Nickel, Total	mg/kg	23	49	8.04	8.62	6.56	**43.5**	6.64	**267**	**57.9**	<3.42 U	9.16
Zinc, Total	mg/kg	120	460	29.7	31.4	29.6	**158**	27.3	**675**	**527**	10.1	21.7
PCBS												
PCB-1016	ug/kg			<0.045 U	<31.1 U	<30.9 U	<29.9 U	<26.3 U	<29.2 U	<29.6 U	<42.2 U	<28.9 U
PCB-1221	ug/kg			<0.045 U	<31.1 U	<30.9 U	<29.9 U	<26.3 U	<29.2 U	<29.6 U	<42.2 U	<28.9 U
PCB-1232	ug/kg			<0.045 U	<31.1 U	<30.9 U	<29.9 U	<26.3 U	<29.2 U	<29.6 U	<42.2 U	<28.9 U
PCB-1248	ug/kg			<0.045 U	<31.1 U	<30.9 U	<29.9 U	<26.3 U	<29.2 U	<29.6 U	<42.2 U	<28.9 U
PCB-1254	ug/kg			<0.045 U	<31.1 U	<30.9 U	<29.9 U	<26.3 U	<29.2 U	<29.6 U	<42.2 U	<28.9 U
PCB-1260	ug/kg			<0.045 U	<31.1 U	<30.9 U	<29.9 U	<26.3 U	<29.2 U	<29.6 U	<42.2 U	<28.9 U

highlights indicate exceedances of ~~beach~~ benchmark

Table 5-4 Benthic Macroinvertebrate Community Survey Results

Macroinvertebrate Community		Sample Number								
		SD-J2-001	SE/RC-9/1-002	SD-E2-003	SE/RE-3-3-004	SD-C1-005	SD-A1-006	SD-007	SD-008	Between SE/RE-3-3-004 and SD-C1-005*
		Sample Data								
Taxon	**Common Name**									
Tubificidae	Tubifex	5								
Cambaridae	Freshwater Crawfishes	2								
Ceratopogonidae	Biting Midges						2			
Chironomidae	Non-Biting Midges	33	42	47	67	37	14	23	34	8
Clam	Clams		1		1			3		
Corixidae	Water Boatmen					10	1			
Culicidae	Mosquitos								1	
Dytiscidae	Water Beetles	3	2			1			2	
Elmidae	Riffle Beetles						14	1		
Ephemerellidae	Spiny Crawler Mayflies	1								
Baetidae	Small Minnow Myflies	1								
Gyrinidae	Whirligig Beetles	1							1	
Heptageniidae	Flat-Headed Mayflies	3						2	1	11
Hyalella	Scuds					1				
Hydropsychidae	Net-Spinning Caddisflies							3		
Leptoceridae	Long-Horned Caddisflies							1	4	1
Libellulidae	Skimmer Dragonflies	1								
Limnephilidae	Northern Caddisflies								4	3
Palaemonetes	Freshwater Shrimp	1								
Perlidae	Common Stoneflies			1						
Psephenidae	Water Pennies	4								

1*Sample collected from an emerged cinderblock; not representative of sediment conditions, but provides information on the presence of these species within the waterbody.

Table 6-1
Comparison to Sediment Quality Benchmarks

Field Sample ID		Sediment Benchmarks[b]		SD-J2-001	SD-J2-001/FD	SE/RC-9/1-002	SD-E2-003	SE-RE-3/3-004	SD-C1-005	SD-A1-006	SD-007 REFERENCE	SE/RC-13/1-008 REFERENCE
Sample Date				7/24/2007	7/24/2007	7/24/2007	7/24/2007	7/24/2007	7/24/2007	7/24/2007	7/25/2007	7/25/2007
Location ID				J2	J2	RC-9/1	E2	SE-RE-3/3	SD-C1	A1	SD-007	SE/RC-13/1
Depth (IN)		TEC[d]	PEC	0-12	0-12	0-12	0-12	0-12	0-12	0-12	0-12	0-12
Parameter	Units											
SVOCS												
Acenaphthene	ug/kg			<1320 U	<1410 U	<1990 U	<1640 U	<1200 U	<1640 U	<1360 U	<1220 U	<1220 U
Acenaphthylene	ug/kg			<2650 U	<2820 U	<2370 U	<3280 U	<2410 U	<3280 U	<2730 U	<2440 U	<2440 U
Anthracene	ug/kg			<1320 U	<1410 U	<1990 U	<1640 U	<1200 U	<1640 U	<1360 U	<1220 U	<1220 U
Benz(a)anthracene	ug/kg			<661 U	<706 U	<593 U	<821 U	<602 U	<820 U	<682 U	<610 U	<610 U
Benzo(a)pyrene	ug/kg	206[c]	1987[c]	<66.1 U	<70.6 U	78.7	82.5	<60.2 U	<82.0 U	111	155	<61.0 U
Benzo(b)fluoranthene	ug/kg			<661 U	<706 U	<593 U	<821 U	<602 U	<820 U	<682 U	<610 U	<610 U
Benzo(g,h,i)perylene	ug/kg			<1320 U	<1410 U	<1190 U	<1640 U	<1200 U	<1640 U	<1360 U	<1220 U	<1220 U
Benzo(k)fluoranthene	ug/kg			<1320 U	<1410 U	<1190 U	<1640 U	<1200 U	<1640 U	<1360 U	<1220 U	<1220 U
Chrysene	ug/kg			<1320 U	<1410 U	<1190 U	<1640 U	<1200 U	<1640 U	<1360 U	<1220 U	<1220 U
Dibenz(ah)anthracene	ug/kg			<66.1 U	<70.6 U	<59.3 U	<82.1 U	<60.2 U	<82 U	<68.2 U	<61.0 U	<61.0 U
Fluoranthene	ug/kg			<1320 U	<1410 U	<1190 U	<1640 U	<1200 U	<1640 U	<1360 U	<1220 U	<1220 U
Fluorene	ug/kg			<1320 U	<1410 U	<1190 U	<1640 U	<1200 U	<1640 U	<1360 U	<1220 U	<1220 U
Indeno(1,2,3-cd)pyrene	ug/kg			<661 U	<706 U	<593 U	<821 U	<602 U	<820 U	<682 U	<610 U	<610 U
Naphthelene	ug/kg			<1320 U	<1410 U	<1190 U	<1640 U	<1200 U	<1640 U	<1360 U	<1220 U	<1220 U
Phenanthrene	ug/kg			<1320 U	<1410 U	<1190 U	<1640 U	<1200 U	<1640 U	<1360 U	<1220 U	<1220 U
Pyrene	ug/kg			<1320 U	<1410 U	<1190 U	<1640 U	<1200 U	<1640 U	<1360 U	<1220 U	<1220 U

Is there a TEC or PEC for total PAHs? What about the detection limits?

NOTE:

< [Value] U: Value not detected at or above the stated reporting limit

[a] Lab control sample had 94% survival and weighted 0.543 mg

[b] PEC and TEC values not presented for chemicals that were not positively detected in sediment.

[c] Adjusted to average TOC in sediments of 1.37% or 13,725 mg/kg.

[d] The Region 5 RCRA ecological screening level (ESL) is equivalent to the Consensus based threshold effect concentrations (TEC) as presented in MacDonald et. al. 2000. Development and evaluation of consensus-based sediment quality guidelines for freshwater ecosystems. Arch Environ Contam Toxicol 39:20-31 (see Table 2).

* Significantly different (p=0.005) from reference site SD-007. Growth in all treatments was significantly lower than in the laboratory control group. Survival in sediment SD-E2-003 was significantly depressed compared to both reference site (SD007 and SE/RC-13/1-008) and lab control.

Bold indicates exceeds TEC; shading indicates exceeds PEC.

Table 6-2
Mean Probable Effect Concentration Quotients (PEC-Q) for Metals (mg/kg)
JCI - Former Stanely Tools
Fowlerville, MI

Field Sample ID	Arsenic		Chromium		Copper		Lead		Nickel		Zinc			Probability of Toxicity[a]
PEC	33	PEC-Q	110	PEC-Q	150	PEC-Q	130	PEC-Q	49	PEC-Q	460	PEC-Q	Mean PEC-Q	Y = 101.48-(1-0.36^X)
SD-J2-001	5.04	0.15	11.3	0.10	14.7	0.10	4.16	0.03	8.04	0.16	29.7	0.06	0.10	10.1
SD-J2-001/FD	6.28	0.19	13.5	0.12	12.5	0.08	4.18	0.03	8.62	0.18	31.4	0.07	0.11	11.0
SE/RC-9/1-002	**12.8**	0.39	13.2	0.12	11.7	0.08	9.18	0.07	6.56	0.13	29.6	0.06	0.14	13.7
SD-E2-003	**10.7**	0.32	**112**	1.02	**133**	0.89	**789**	6.07	**43.5**	0.89	**158**	0.34	**1.59**	**81**
SE-RE-3/3-004	<3.35	--	7.27	0.07	9.17	0.06	4.03	0.03	6.64	0.14	27.3	0.06	0.07	7.1
SD-C1-005	**10.9**	0.33	**77.2**	0.70	**107**	0.71	11.2	0.09	**267**	5.45	**675**	1.47	**1.46**	**79**
SD-A1-006	8.64	0.26	**133**	1.21	**97**	0.65	15.1	0.12	**57.9**	1.18	**527**	1.15	**0.76**	**55**
SD-007 REFERENCE	<3.42	--	3.27	0.03	<3.42	--	<3.42	--	<3.42	--	10.1	0.02	0.026	2.6
SE/RC-13/1-008 REFERENCE	7.11	0.22	6.61	0.06	9.29	0.06	4.64	0.04	9.16	0.19	21.7	0.05	0.10	10.0

Note: Cadmium was not detected in any sample.
-- PEC-Q not calculated for non-detect concentration.
Bold indicates exceeds TEC; shading indicates exceeds PEC.
Mean PEC-Q = Sum PEC/total number of chemicals.

a MacDonald et al.(2000) found that subsequent curve-fitting indicated that the mean PEC-quotient is highly correlated with incidence of toxicity ($r^2 = 0.98$), with the relationship being an exponential function. The resulting equation ($Y = 101.48 (1-0.36^X)$) can be used to estimate the probability of observing sediment toxicity at any mean PEC quotient.

? I am confused.. how do you have a probability >1? Refer to last column and how JCI explain?

Table 6-3
Benthic Macroinvertebrate Community Analysis

Macroinvertebrate Community		Family MBI Tolerance Value[1]	Sample Number								
			SD-J2-001	SE/RC-9/1-002	SD-E2-003	SE/RE-3-3-004	SD-C1-005	SD-A1-006	SD-007 Reference	SD-008 Reference	Between SE/RE-3-3-004 and SD-C1-005*
			Sample Data								
Taxon	**Common Name**										
Tubificidae	Tubifex	9	5								
Cambaridae	Freshwater Crawfishes	6	2								
Ceratopogonidae	Biting Midges	6						2			
Chironomidae	Non-Biting Midges	8	33	42	47	67	37	14	23	34	8
Clam	Clams	8		1		1			3		
Corixidae	Water Boatmen	5					10	1			
Culicidae	Mosquitos	8								1	
Dytiscidae	Water Beetles	5	3	2			1			2	
Elmidae	Riffle Beetles	4						14	1		
Ephemerellidae	Spiny Crawler Mayflies	1	1								
Baetidae	Small Minnow Myflies	3	1								
Gyrinidae	Whirligig Beetles	4	1							1	
Heptageniidae	Flat-Headed Mayflies	3	3						2	1	11
Hyalella	Scuds	8					1				
Hydropsychidae	Net-Spinning Caddisflies	4							3		
Leptoceridae	Long-Horned Caddisflies	4							1	4	1
Libellulidae	Skimmer Dragonflies	2	1								
Limnephilidae	Northern Caddisflies	3								4	3
Palaemonetes	Freshwater Shrimp	6	1								
Perlidae	Common Stoneflies	2			1						
Psephenidae	Water Pennies	4	4								
No. MBI Organisms Counted[2]			**55**	**45**	**48**	**68**	**49**	**31**	**33**	**47**	**23**
MBI[3,5]			**6.85**	**7.87**	**7.88**	**8.00**	**7.33**	**5.97**	**7.09**	**6.91**	**4.78**
TBI[4,5]			**4.64**	**7.00**	**5.00**	**8.00**	**6.50**	**5.75**	**5.17**	**5.00**	**4.50**
Total Number of Taxa			**11**	**3**	**2**	**2**	**4**	**4**	**6**	**7**	**4**

Notes:

1. Family MBI tolerance values (t_i) are from http://www.epa.gov/owow/monitoring/rbp/index.html , 2006.
2. A Maximum of 10 organisms was used for MBI calculations, according to Hilsenhoff, 1988.
3. Macroinvertebrate Biotic Index (MBI) = $\Sigma n_i t_i)/N$ where n_i = no. individuals in each listed taxon, t_i = tolerance rating for each listed taxon, and N = total no. of listed organisms counted (IEPA, 2002).
4. Mean tolerance value (TBI) = $\Sigma t_i/T$ where t_i=tolerance value for each listed taxon and T = no, of listed taxon in the sample (from Lillie and Schlesser, 1994).
5. Biotic Index (MBI and TBI) Interpretation (from Hilsenhoff, 1987).

*Sample collected from an emerged cinderblock; not representative of sediment conditions, but provides information on the presence of these species within the waterbody.

Value	Water Quality	Degree of Organic Pollution
0.00-3.50	Excellent	No apparent organic pollution
3.51-4.50	Very Good	Possible slight organic pollution
4.51-5.50	Good	Some organic pollution
5.51-6.50	Fair	Fairly significant organic pollution
6.51-7.50	Fairly Poor	Significant organic pollution
7.50-8.50	Poor	Very significant organic pollution
8.51-10.00	Very Poor	Severe organic pollution

Compare this scale (legend) with MBI scores above.

Table 6-4
Benthic Macroinvertebrate Community Metrics

			Sample Location								
			SD-J2-001	SE/RC-9/1-002	SD-E2-003	SE/RE-3-3-004	SD-C1-005	SD-A1-006	SD-007	SD-008	Between SE/RE-3-3-004 and SD-C1-005 [1]
Macroinvertebrate Community			Sample Data (Number of Organisms Collected per Taxa)								
Taxon	Common Name	Order									
Tubificidae	Tubifex	Clitellata	5								
Cambaridae	Freshwater Crawfishes	Decapoda	2								
Palaemonetes	Freshwater Shrimp	Decapoda	1								
Hyalella	Scuds	Amphipoda					1				
Culicidae	Mosquitos	Diptera								1	
Ceratopogonidae	Biting Midges	Diptera						2			
Chironomidae	Non-Biting Midges	Diptera	33	42	47	67	37	14	23	34	8
Clam	Clams	Veneroida		1		1			3		
Corixidae	Water Boatmen	Hemiptera					10	1			
Dytiscidae	Water Beetles	Coleoptera	3	2			1			2	
Psephenidae	Water Pennies	Coleoptera	4								
Gyrinidae	Whirligig Beetles	Coleoptera	1							1	
Elmidae	Riffle Beetles	Coleoptera						14	1		
Ephemerellidae	Spiny Crawler Mayflies	Ephemeroptera	1								
Baetidae	Small Minnow Mayflies	Ephemeroptera	1								
Heptageniidae	Flat-Headed Mayflies	Ephemeroptera	3						2	1	11
Hydropsychidae	Net-Spinning Caddisflies	Trichoptera							3		
Leptoceridae	Long-Horned Caddisflies	Trichoptera							1	4	1
Limnephilidae	Northern Caddisflies	Trichoptera								4	3
Perlidae	Common Stoneflies	Plecoptera			1						
Libellulidae	Skimmer Dragonflies	Odonata	1								
Total Number of Organisms Counted			55	45	48	68	49	31	33	47	23
Total number of taxa			11	3	2	2	4	4	6	7	4
Total number of mayfly (Ephemeroptera) taxa present (N)			3	0	0	0	0	0	1	1	1
Percent Mayfly Composition (%)			9.09	0.00	0.00	0.00	0.00	0.00	6.06	2.13	47.83
Total number of caddisfly (Trichoptera) taxa present (N)			0	0	0	0	0	0	2	1	1
Percent Caddisfly Composition (%)			0.00	0.00	0.00	0.00	0.00	0.00	3.03	17.02	17.39
Total number of stonefly (Plecoptera) taxa present			0	0	1	0	0	0	0	0	0
Percent Stonefly Composition (%) [2]			0.00	0.00	2.08	0.00	0.00	0.00	0.00	0.00	0.00
Percent Contribution of the Dominant Taxon (%)			60.00	93.33	97.92	98.53	75.51	45.16	69.70	72.34	47.83
Percent Isopods, Snails, and Leeches (%)			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Percent Surface Dependent (hemiptera, diptera, coleoptera) (%) [3]			14.55	4%	0%	0%	22%	3%	0%	9%	0%

1 - Sample collected from an emerged cinderblock; not representative of sediment conditions, but provides information on the presence of these species within the waterbody.
2 - Not a listed Metric in MDEQ Procedure #51.
3 - Surface Dependent Taxa highlighted in Blue - See Appendix I, MDEQ Procedure #51.

Table 6-5
Lines of Evidence for Assessing Impacts on Aquatic Ecosystems at Measured Sediment Concentrations

Line of Evidence	Sample Location					
	SD-J2-001	SE/RC-9/1-002	SD-E2-003	SE-RE-3/3-004	SD-C1-005	SD-A1-006
Sediment Chemistry	PEC-Q<0.5 threshold; No impact	PEC-Q<0.5 threshold; No impact	81% probability of observing sediment toxicity at any mean PEC quotient; lead and chromium (slightly) above PEC	PEC-Q<0.5 threshold; No impact	79% probability of observing sediment toxicity at any mean PEC quotient; Nickel and zinc above PEC	55% probability of observing sediment toxicity at any mean PEC quotient; chromium, nickel and zinc slightly above PEC.
Bioassay	No impact on survival/growth in comparison to reference	No impact on survival/growth in comparison to reference	100% Mortality	No impact on survival/growth in comparison to reference	21% Mortality (not significant); Significant decrease in growth	No impact on survival/growth in comparison to reference
Benthic Community*	Biotic index - significant organic pollution; intolerant taxa present	Biotic index - very significant pollution	Biotic index - very significant pollution; senstive taxa present	Biotic index - very significant pollution	Biotic index - significant organic pollution; intolerant taxa present	Biotic index - fairly signficant organic pollution
Overall Conclusion	Impact unlikely	Impact possible; other sources contributing to impacts	Impact highly likely based on toxicity test and PEC-Q	Impact possible; other sources contributing to impacts	Impact likely based on toxicity test and PEC-Q	Impact possible; other source may be contributing

* Reference locations biotic index showed significant organic pollution; intolerant taxa present.

Table 7-1
Arsenic Statistical Evaluation

	As		
SE/RE 3/3-004	1.675	U	X1
SD-007	1.71	U	X2
SD-J2-001/FD	**6.28**		
SE/RC 13/1-008	**7.11**		
SD-A1-006	**8.64**		
SD—E2-003	**10.7**		
SD—C1-005	**10.9**		Xn-1
SE/RC 9/1-002	**12.8**		Xn

Null hypothesis = There are no outliers in the data
Alternative hypothesis - Xn is an outlier
Compute test statistic C = X(n) - X (n-1) / X (n) - X(2)

C = 0.171326
$d_{0.05}$ = 0.554
Conclusion: C > d, reject the null hypothesis

Null hypothesis = There are no outliers in the data
Alternative hypothesis - X1 is an outlier
Compute test statistic C = X(2) - X (1) / X (n-1) - X(2)

C = 0.003808
$d_{0.05}$ = 0.554
Conclusion: C > d, reject the null hypothesis

Table 7-2
Statistical Evaluation of BERA Sediment Data

	As		Cr		Cu	
SE/RE 3/3-004	1.675	U	SD-007	**3.27**	SD-007	1.71 U
SD-007	1.71	U	SE/RC 13/1-008	**6.61**	SE/RE 3/3-004	**9.17**
SD-J2-001/FD	**6.28**		SE/RE 3/3-004	**7.27**	SE/RC 13/1-008	**9.29**
SE/RC 13/1-008	**7.11**		SE/RC 9/1-002	**13.2**	SE/RC 9/1-002	**11.7**
SD-A1-006	**8.64**		SD-J2-001/FD	**13.5**	SD-J2-001	**14.7**
SD—E2-003	**10.7**		SD—C1-005	**77.2**	SD-A1-006	**97**
SD—C1-005	**10.9**		SD—E2-003	**112**	SD—C1-005	**107**
SE/RC 9/1-002	**12.8**		SD-A1-006	**133**	SD—E2-003	**133**
Number of Non Detects	2		0		1	
Percent Non-Detects	25		0		12.5	
Minimum	1.675		3.27		1.71	
Maximum	12.8		133		133	
Mean	7.48		45.76		47.95	
Standard Deviation	4.15		53.33		54.36	
Distribution	Normal		LogNormal		LogNormal	
UCL	Student's-t (95%)	10.25	Approximate gamma UCL (95%)	125.35	Approximate gamma UCL (95%)	134.33
Mean of samples 3, 5, and 6				107.4		112.3
Mean of remainder of samples				8.8		9.3

	Pb		Ni		Zn
SD-007	1.71	U	SD-007	1.71 U	SD-007	**10.1**
SE/RE 3/3-004	**4.03**		SE/RC 9/1-002	**6.56**	SE/RC 13/1-008	**21.7**
SD-J2-001	**4.16**		SE/RE 3/3-004	**6.64**	SE/RE 3/3-004	**27.3**
SE/RC 13/1-008	**4.64**		SD-J2-001/FD	**8.62**	SE/RC 9/1-002	**29.6**
SE/RC 9/1-002	**9.18**		SE/RC 13/1-008	**9.16**	SD-J2-001/FD	**31.4**
SD—C1-005	**11.2**		SD—E2-003	**43.5**	SD—E2-003	**158**
SD-A1-006	**15.1**		SD-A1-006	**57.9**	SD-A1-006	**527**
SD—E2-003	**789**		SD—C1-005	**267**	SD—C1-005	**675**
Number of Non Detects	1		1		0	
Percent Non-Detects	12.5		12.5		0	
Minimum	1.71		1.71		10.1	
Maximum	789		267		675	
Mean	104.88		50.14		185.01	
Standard Deviation	276.46		89.98		263.94	
Distribution	Non-Parametric		Log-Normal		Log-Normal	
UCL	95% Chebyshev (Mean,Sd) UCL	530.93	Approximate gamma UCL (95%)	165.93	95% Chebyshev (MVUE) UCL	586.92
Mean of samples 3, 5, and 6				122.8		453.3
Mean of remainder of samples				6.5		24.0

Note: Cadmium is not evaluated because all samples were non-detect.

Table 7-3
Background Threshold Values

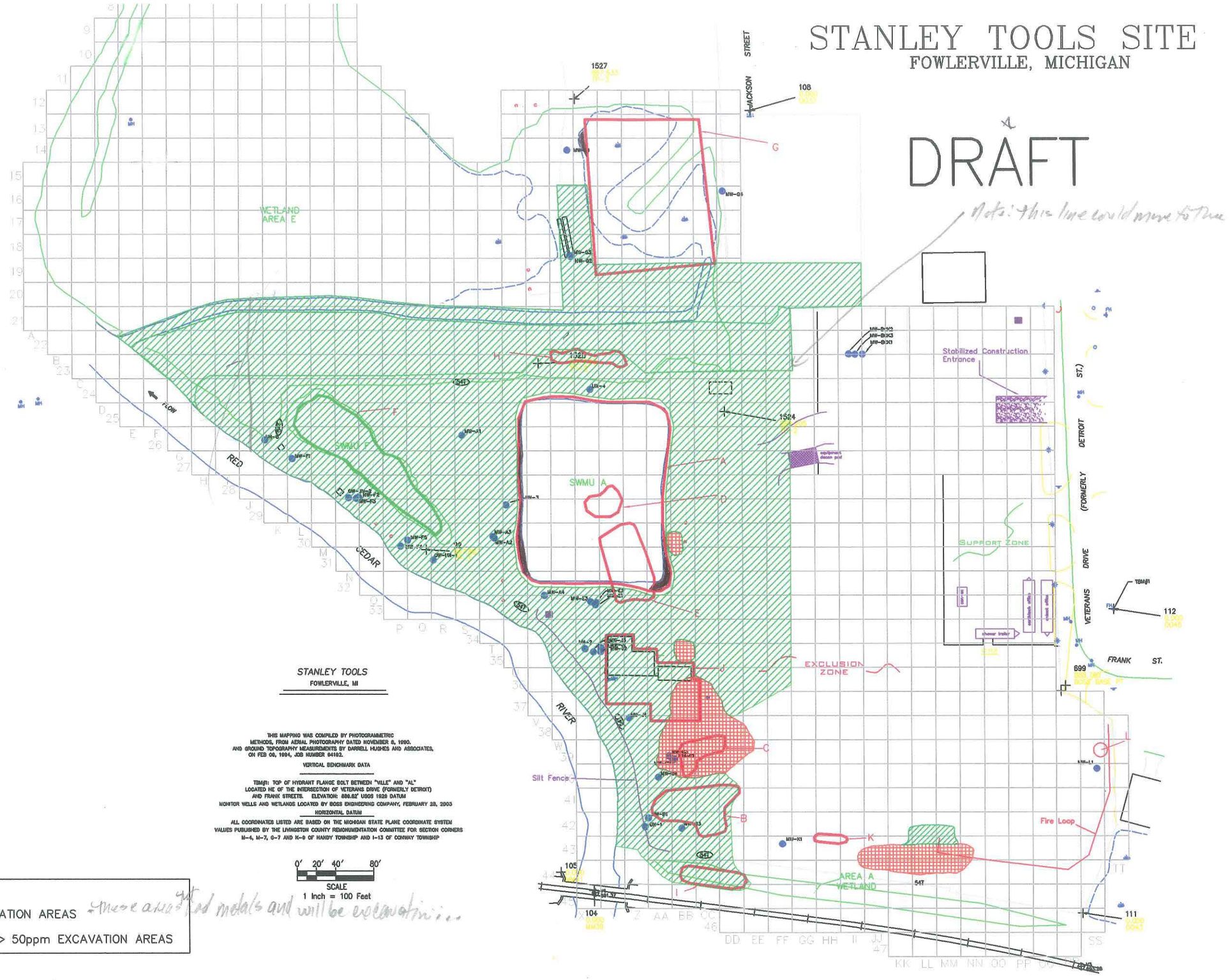
	Maximum	Distribution	Normal 95 UPL	Lognormal UPL	Gamma Upper 95th Percentile	BTV	Basis	Maximum Investigative Concentration
Total PCBs	0.097	Insufficient data				0.097	Maximum	9.18
Total PNAs	1.463	N;LN;G	1.453	2.518	1.645	1.453	Normal UPL	8.59
Arsenic*	13.7	N;LN;G	14.34	18.79	15.77	13.7	Maximum	65
Cadmium*	0.52	N;LN;G	0.513	0.576	0.537	0.513	Normal UPL	2.5
Chromium*	14	N;LN;G	12.74	13.87	13.04	13.87	Lognormal UPL	1760
Copper	21.7	N;LN;G	20.39	30.34	22.97	20.39	Normal UPL	1370
Lead	17	N;LN;G	15.04	18.87	16.19	16.19	Gamma upper percentile	789
Nickel *	11.6	N;G	11.72	--	13.13	11.6	Maximum	432
Zinc	96	LN;G	--	103.8	88.36	88.36	Gamma upper percentile	2120

All concentrations in mg/kg.
N = Normal; LN = lognormal; G = Gamma
UPL = Upper prediction limit
* Outliers Removed from Dataset
As - 35.8 mg/kg and 27 mg/kg
Ba - 178 mg/kg
Cd - 2 mg/kg
Cr - 18 mg/kg
Ni - 15 mg/kg

STANLEY TOOLS SITE
FOWLERVILLE, MICHIGAN

DRAFT

Note: this line could move to here



STANLEY TOOLS
FOWLERVILLE, MI

THIS MAPPING WAS COMPILED BY PHOTOGRAMMETRIC METHODS, FROM AERIAL PHOTOGRAPHY DATED NOVEMBER 8, 1990. AND GROUND TOPOGRAPHY MEASUREMENTS BY DARNELL HUGHES AND ASSOCIATES, ON FEB 06, 1994, JOB NUMBER 94102.

VERTICAL BENCHMARK DATA

TBM#1: TOP OF HYDRANT FLANGE BOLT BETWEEN "VILLE" AND "AL" LOCATED NE OF THE INTERSECTION OF VETERANS DRIVE (FORMERLY DETROIT) AND FRANK STREETS. ELEVATION: 886.62' USGS 1929 DATUM
MONITOR WELLS AND WETLANDS LOCATED BY BOSS ENGINEERING COMPANY, FEBRUARY 28, 2003

HORIZONTAL DATUM

ALL COORDINATES LISTED ARE BASED ON THE MICHIGAN STATE PLANE COORDINATE SYSTEM VALUES PUBLISHED BY THE LIVINGSTON COUNTY REMONUMENTATION COMMITTEE FOR SECTION CORNERS M-4, M-7, O-7 AND K-9 OF HANDY TOWNSHIP AND I-13 OF CONWAY TOWNSHIP

0' 20' 40' 80'
SCALE
1 Inch = 100 Feet

LEGEND
= EXCAVATION AREAS
= PCBs > 50ppm EXCAVATION AREAS

these areas had metals and will be excavation...

NO	REVISIONS	DRN	CHK	DATE

ENTACT & Associates, LLC.
1360 North Wood Dale Road Suite A
Wood Dale, IL 60191
P: 630-616-2100 F: 630-616-9203

DRN
DES
CHK
APP

ENTACT
environmental tactics in waste management

Johnson Controls, Inc.
Former Stanley Tool Site
Fowlerville, Michigan

PLANNED EXCAVATION AREAS

DATE: July 22, 2003
PROJECT NUMBER: C818
FILE NAME: Stanley
FIGURE NUMBER: 1a

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5

INTERNAL MEMO

DATE: September 29, 2003

SUBJECT: Overview of Planned Environmental Indicators Data Evaluation - Red Cedar River (July 2003); Former Stanley Tools (Fowlerville, Michigan)

FROM: Mario Mangino
Toxicologist
WPTD/ Waste Management Branch

TO: Juan Thomas
project Manager
WPTD/ Enforcement and Compliance Assurance Branch

Please find below my comments and recommendations on the paper submitted by Earth Tech, Inc. and Weston Solutions, Inc. (ETWS) for the project named above. As you recall, this paper was also the subject of a conference phone call held on September 4.

Section 2.3 Direct Contact and Ingestion

The ETWS paper presents a value to account for ingestion and dermal Exposure Frequency (EF) of children to sediments. The proposal to use an EF of 4 per week for the warmest months (June, July, August) seems reasonable. However, for the more temperate weather months (May and September), this reviewer believes that an EF of 2 per week would be more appropriate. This would give a conservative accounting for the likelihood that these two months (spring and autumn) could be still be attractive times to visit the water body. This would bring the total EF up to 64 days/year. This is an EF that is appropriately conservative but still reasonable.

Section 2.6 Fish Bioaccumulation and Human Health

Absorption efficiency for PCBs

This reviewer believes that the absorption efficiency for PCBs in the Michigan Part 201 Rules applies to calculating a cleanup

criteria for direct contact with contaminated soil. The absorption efficiency is incorporated as the AE_i term in Part 201 R299.5720. Michigan allows the use of this AE_i adjustment to account for the possibility that PCBs adsorbed to soil will not be completely available for absorption after incidental soil ingestion. This is equivalent to an adjustment for bioavailability of PCBs from soil. However, for ingestion of fish as a food source, this reviewer does not believe that the adjustment for bioavailability from soil is appropriate to apply. In the case of PCBs in the diet (where desorption of PCBs from soil is not a factor) the cancer slope factor derived for PCBs (and the RfD for Aroclor 1254) was directly affected by the absorption efficiency of PCBs administered to the test animals. Consequently, the Absorption Efficiency factor value in Table 1 should be changed to 1.0 (100%).

Fish ingestion rate

The ETWS paper proposes that a fish consumption rate of 15 g/day should be used to represent the average consumption rate of fresh water sport caught fish by residents of Great Lakes states based on information from the *Great Lakes Water Quality Initiative* (*GLWQI*). This value is also described in the paper as the 90th percentile consumption rate of sport caught fish for the Great Lakes Region. However, from my review of *GLWQI* document, I interpret the language in the document to mean that this is the 90th percentile value when the fish consumption data for the Great Lakes region are apportioned over the active fishing population and the non-fishing population. When developing conservative cleanup criteria, the EPA prefers that the fish consumption rate should be based on the 90th percentile of the population that catches and consumes sport caught fish so that the consumption rate for the active fisher-consumer will not be underestimated.

From an extensive survey of recreational fishing in the state of Michigan, the 90th percentile of recreational fish intake for persons who caught and consumed fish was reported to be 34 g/day (data from the West et al. study [1989] as summarized in the EPA's Exposure Factors Handbook [1997] <http://www.epa.gov/ncea/pdfs/efh/sect10.pdf>

Consequently, this reviewer believes that the value of 34 g/day should be used to account for the high-end recreational fisher who may frequent the Red Cedar River, and this is the value that should be used for the fish consumption rate when calculating a

sediment cleanup criteria.

The assumption that the fraction ingested (FI) of fish from the Red Cedar River is 0.25 (25%) of all fish ingestion does seem reasonable based on the description of the Red Cedar River in the vicinity of the Former Stanley Tools site.

Other contaminants

Based on the description in Section 1.1.2 of types of contaminants documented in the RFI Report, the additional contaminants that would be a concern for the fish bioaccumulation and consumption pathway would be polycyclic aromatic hydrocarbons (PAHs) and mercury. (Mercury would be concern due the conversion of inorganic mercury to methylmercury and the bioaccumulation of methylmercury through the aquatic food chain.)

Cumulative risk from multiple contaminants

It appears that the ETWS paper is proposing to calculate chemical-specific sediment cleanup criteria and to apply them on an individual chemical basis (i.e., chemical-by-chemical) for comparing measured sediment contaminant concentrations to the cleanup criteria. This would appear to be appropriate for the evaluation of the CA 725 Environmental Indicator (Current Human Exposures under Control). However, for the formal risk assessment evaluation that is needed as part of the site RFI Report and remedial decisions for the site, an accounting of cumulative risks from exposure of the same receptor/person to multiple chemical contaminants will be necessary.

Please feel free to contact me if any clarification is needed for the comments presented above.

cc: Bhooma Sundar (WPTD/ECAB)

 DRAFT - INTERNAL REVIEW ONLY

J. Thomas

TechLaw
Quality & Integrity
Twenty Years 2003

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RZ2.R05902.07.ID.565

May 28, 2004

Mr. Allen Wojtas
U.S. Environmental Protection Agency
Region 5 DM-7J
77 West Jackson Boulevard
Chicago, Illinois 60604

Reference: EPA Contract No. 68-W-02-019; Work Assignment No. R05902; Corrective Action Support; Johnson Controls, Inc., Fowlerville, Michigan; U.S. EPA ID No. MID099124299; Review of Final Corrective Measures Proposal, dated February 2004; Task 02 Deliverable

Dear Mr. Wojtas:

Please find enclosed TechLaw's Review of the Final Corrective Measures Proposal (FCMP) submitted by Johnson Controls, Inc. (JCI) in Fowlerville, Michigan. For your convenience, this deliverable was also E-mailed directly to you and Mr. Juan Thomas in WordPerfect for Windows format.

Based on our review, it is TechLaw's opinion that the proposals of final corrective measures for groundwater and sediment should be considered preliminary due to several factors. For groundwater, the soil interim measures resulted in a large excavation which was filled in with material which is much more permeable than the contaminated native soils that were removed. JCI acknowledges in the FCMP that these interim measures "changed the overall steady state conditions for shallow groundwater across much of the site." Until these changes can be monitored and fully understood, it may be too soon to define an adequate final corrective measure. In addition, JCI indicates that more sampling and analysis of sediments are necessary. Therefore, until an adequate amount of data is gathered, deciding on an appropriate final corrective measure does not appear appropriate.

Please note, it appears that additional information needs to be collected at the site to make a truly informed decision regarding corrective measures. It is TechLaw's belief that these investigative activities can and should be expedited. It is also noted in the FCMP that additional monitoring was expected to occur around the time the FCMP was submitted and thus additional data may be available now or at some point in the near future. The collection and assessment of these data in the near term is important to ensure that any necessary corrective measures are identified and implemented as soon as possible.

TechLaw
Quality & Integrity

JCI is also in the process of obtaining information on a groundwater-surface water interface (GSI) mixing zone determination from the Michigan Department of Environmental Quality (MDEQ). At this time, TechLaw has made no comments or determinations with respect to the GSI mixing zone determination. However, this information may be of value in defining corrective measures or during future assessments of risk.

In addition, based on the nature of the technical support requested from TechLaw at this time (i.e., review FCMP and for background, the Interim Measures Report) and TechLaw's gap in project involvement over the last year, TechLaw requested and reviewed a significant volume of technical correspondence related to the JCI site. These correspondence include E-mails, letters, meeting summaries, status reports and other related information prepared by U.S. EPA, JCI or JCI's consultants (Earth Tech, Weston and/or ENTACT). As a result, it was noted that several U.S. EPA personnel have been involved in recent site activities and have provided direction on many technical issues, including PCB contaminated media management, Human Health and Ecological Risk issues and on varied aspects of the Environmental Indicators determinations. While TechLaw reviewed these historical correspondence to garner a better understanding of the requirements that may apply to our review of the FCMP, TechLaw has not assessed any of the historical activities at the site or technical agreements which have been overseen by varied U.S. EPA staff, except where needed to provide a better understanding of the FCMP document.

Thus, TechLaw's deliverable does not include any comments or requests associated with these other issues, but rather focuses on the need to use an adequate data set which is necessary to recommend viable corrective measures for the site. U.S. EPA may wish to ensure that all other aspects of site remedial operations are still in concurrence with prior agreements.

If you have any questions, please contact me at (312) 345-8938 the TechLaw Technical lead for this site at (734) 426-1984, or Ms. Kristi Pawski the Work Assignment Manager, who can be reached at (312) 345-8963.

Sincerely,

John Koehnen

John G. Koehnen
Regional Project Manager

cc: F. Norling, U.S. EPA Region 5, w/o attachments
B. Smith, Central Files
J. Surfus
J. Thomas, U.S. EPA Region 5
K. Pawski
Chicago Central Files

REVIEW OF FINAL CORRECTIVE MEASURES PROPOSAL
DATED FEBRUARY 2004

JOHNSON CONTROLS, INC.
FOWLERVILLE, MICHIGAN
EPA ID NO. MID099124299

Submitted to:

Mr. Allen Wojtas
U.S. Environmental Protection Agency
Region 5 DM-7J
77 West Jackson Boulevard
Chicago, Illinois 60604

Submitted by:

TechLaw, Inc.
105 W. Madison
Suite 900
Chicago, Illinois 60602

EPA Work Assignment No.	R05902
Contract No.	68-W-02-019
EPA WAM	Allen Wojtas
Telephone No.	(312) 886-6194
EPA Technical Advisor	Juan Thomas
Telephone No.	(312) 886-6010
TechLaw WAM	Kristi Pawski
Telephone No.	(312) 345-8963

May 28, 2004

REVIEW OF FINAL CORRECTIVE MEASURES PROPOSAL
DATED FEBRUARY 2004

JOHNSON CONTROLS, INC.
FOWLERVILLE, MICHIGAN
EPA ID NO. MID099124299

GENERAL COMMENTS

1. Section 3 and Appendix D of the Final Corrective Measures Proposal (FCMP) lacks adequate detail regarding the extent and effectiveness of the interim measures. Further, soil contamination remains in place in some areas. Section 7.0 of Appendix D indicates that soil removal took place for trichloroethylene (TCE), polychlorinated biphenyls (PCB), and metals impacted areas. These are depicted on Figure 1a and an unnumbered figure in Appendix D. The Summary Reports of Excavation, included in Appendix A of Appendix D, describe excavation and sampling activities within a number of sub-areas presumably depicted somewhere on Figure 1a.

   The following is a list of each of the sub-areas, the presumed location, and any concerns associated with each subarea:

   TCE Area A: Presumably the green cross-hatched area immediately south of the intersections of Frank Street and Veterans Drive. Verification sample TA8, listed as "along the fence line," contained chromium VI above the Groundwater/Surface Water Interface (GSI) criterion. However, no further excavation was apparently conducted in the area of this sample, meaning contamination above the GSI criterion likely remains in place at this subarea.

   TCE Area B: Presumably the right side of the green cross-hatched area in the south central portion of the site. It appears that all verification samples were below appropriate levels or the contamination may have been excavated as part of another excavation (Area Between TCE Areas B and C).

   TCE Area C: Presumably the left side of the green cross-hatched area in the south central portion of the site. It appears that while all sidewall samples yielded results above GSI criteria, the walls may have been excavated as part of this and other excavation activities.

   Area Between TCE Areas B and C: Presumably located between the left and right sides of the green cross-hatched area in the south central portion of the site. It appears that while some north and south sidewall samples yielded results above GSI criteria, the walls may have been excavated as part of this and other excavation activities.

Metal Area: Former location of solid waste management unit (SWMU) B in the southwestern portion of the site. It appears that while all sidewall samples yielded results above GSI criteria, the walls may have been excavated as part of this and other excavation activities.

TPH/Fire Loop Area: Located "near the southern boundary" of the site. It appears that while sidewall samples yielded results above GSI criteria, the walls may have been excavated as part of this and other excavation activities.

Cyanide Area: Located "east of SWMUs B and C near the western margin" of the site. It appears that while sidewall samples yielded results above GSI criteria, the walls may have been excavated as part of this and other excavation activities.

PCB Areas: Three distinct areas on Figure 1a. It appears that all contaminated areas were excavated as part of this and other excavation areas.

Mass Metal Excavation Area: The large excavation area across much of the site on Figure 1a. This area was further divided into four sections: riverbank, north wall, east wall, and product area. It appears that contamination exceeding GSI criteria for various contaminants remains in place in the areas of the following sidewall samples from the north wall area: MD14, MD106, MD107, MD7 through MD9, MD109 through MD111, MD14 through MD16, MD112, MD113, MD29 through MD31, MD70, and MD71. It appears that contamination exceeding GSI criteria for various contaminants remains in place in the areas of the following sidewall samples from the east wall area: MD77, MD88, MD90 through MD92, and MD94. It appears that contamination exceeding GSI criteria for various contaminants remains in place in the areas of the following sidewall samples from the product area: MD54 and MD57.

South Drain Area: Located "immediately south" of the site. All 12 samples collected (MS01 through MS12) exceeded GSI criteria. At 10 sample locations compounds exceeded the direct contact criterion. At seven sample locations compounds exceeded the residential drinking water criterion. For all these locations, no apparent additional excavation took place. At one location (MS05), the excavation was extended, but contamination remained above the drinking water criterion.

Riverbank Area: The "eastern riverbank of the Red Cedar River located immediately west" of the site. At three locations (MD53, MD81, and MD82), compounds exceeded GSI criteria but no apparent additional excavation took place.

Area North of North Drain: Located "north of the North Drain and west of SWMU G." The text refers to areas of sidewall sampling but only discusses the results of hand auger sampling.

SWMU A: Located as depicted on Figure 1a. It appears that cyanide levels exceeded GSI criteria at three sample locations: MD40 through MD42.

SWMU G: Located within the Mass Metal Excavation Area. It appears that all contaminated areas may have been excavated as part of this and other excavation activities.

Off-Site East Area: Located off-site to the east of on-site TCE contamination. No actual interim measures were apparently conducted here. TCE groundwater contamination above the residential drinking water criteria was found from two geoprobe locations: OE2 and OE3.

Area West of Red Cedar River: No actual interim measures were apparently conducted here. No samples exceeded reporting limits for PCBs.

While general figures are provided showing the entire areas of excavation (Figure 1a) and the locations of confirmatory samples (unnumbered figure at end of Appendix D, Appendix A), these figures are lacking adequate detail for each of the specific areas listed above. For each of the above areas, provide a more detailed figure, at an appropriate scale, which indicates the specific location where the interim measure took place, including all confirmation samples and locations where contamination remains in place above cleanup criteria.

In addition, for each area where contamination above the various criteria remains in place, based on confirmatory sample results, provide the rationale for not extending the excavation in the areas of these samples and taking additional confirmatory samples. This is particularly important in light of the conclusions drawn in Section 4.4 of the Final Corrective Measures Proposal which states that the interim measures have "effectively addressed all areas of the FST site that contained impacted soil above applicable Part 201 cleanup criteria."

2. The combination of interim measures conducted along the facility boundary with the Red Cedar River has left a multi-acre (filled in) excavated area which likely comes in contact with TCE-contaminated groundwater as shown on Figure 3 of the FCMP. This fill material was made up of clean sand which replaced the less permeable silty/clayey soils originally in the excavation. While it is understood that the interim measures removed these soils because they were acting as source areas for the groundwater contamination, this permeable fill material may be acting as a conduit for groundwater contamination to travel towards the Red Cedar River. The 2003 consent order requires that JCI "stabilize the migration of contaminated groundwater." Adding this fill to the excavation has not helped to stabilize the contamination, but may actually provide a less restricted path directly to the Red Cedar River. This concern needs to be addressed and factored into any assessment of corrective measures for the site. Revise the FCMP to address this issue.

3. Given the uncertainty of the short-term effects the interim measures has had on the groundwater contamination, it may be difficult to recommend a final corrective measure for groundwater at this time. As is acknowledged in Section 5.1 of the FCMP, the interim measures have "changed the overall steady state conditions for shallow groundwater across much of the site." Until these changed conditions can be effectively monitored and evaluated, deciding on a final corrective measure may not be warranted. Revise the FCMP to address this issue, taking into consideration the groundwater quality data that has been gathered since the preparation of the draft FCMP, as discussed in Specific Comment No. 1.

4. As is indicated in Section 6.3 of the FCMP, "further sediment sampling will be conducted to support a risk assessment and cleanup criteria." Given this additional sampling, it does not appear appropriate to identify a proposed corrective measure at this time. Until the results from the further monitoring can be gathered and evaluated, all corrective measure options should be considered. Revise the FCMP to indicate that the corrective measure options for sediment will be re-evaluated after completion of the additional sediment characterization activities.

5. The general comments above clearly define a set of data gaps that need to be filled before specific corrective measures can be fully defined. However, as a result of the need to ensure adequate protection of human health and the environment on and around the site, it is important that the resulting investigative (i.e., data gap assessment) activities be conducted in the immediate future. For groundwater, some of these data gaps may have already been addressed through the additional groundwater monitoring that has and will take place after soil interim measures were completed, but which was not addressed in the FCMP. At this time it is hoped that acquiring these additional data will clearly define the site conditions such that the most effective long term corrective measure can be chosen and implemented. However, without this commitment to expedite these activities, it may be necessary to further evaluate or implement interim measures to ensure protection of human health and the environment. Revise the FCMP to include greater detail and commitments in this regard and/or propose a plan to fulfill these data collection needs in the near future.

SPECIFIC COMMENTS

1. **Section 2.2 GROUNDWATER, Page 2-3:** The first paragraph indicates that groundwater was collected from monitoring wells between March 2003 and January 2004. Given that the interim measures took place primarily during the summer of 2003, an analysis of the trends of groundwater concentrations in the monitoring wells over this time period could be useful in assessing how the permeable fill material within and around the large excavation area is affecting the flow of contaminants. Revise the FCMP to provide an analysis of the groundwater analytical results over this time period for each

well, discussing the relative contaminant levels before and after excavation activities and where possible presenting information on overall flow paths noted as a result of groundwater depth measurements.

2. **Section 2.2 GROUNDWATER, <u>VOCs</u>, Page 2-3:** The last sentence of the first paragraph of this subsection states that "based on historical concentrations, VOC concentrations are generally stable or decreasing over time." However, no historical data for any wells have been provided in the FCMP or the interim measures report, or otherwise referenced to substantiate this conclusion. Revise the FCMP to provide the data to substantiate the statement in the form of tables or specific references.

3. **Section 2.3, SEDIMENT, <u>Nature and Extent Discussion</u>, Pages 2-5 through 2-6:** The text refers to samples that were collected from transects across the river. These transects are not identified on a FCMP figure or in the Sediment Technical Memorandum, located in Appendix C of the FCMP. Revise the FCMP to include a figure which specifically shows the thirteen transects and the associated sample locations.

4. **Section 2.3, SEDIMENT, <u>General Sediment Characterization Conclusions</u>, Page 2-7:** It is inappropriate to make conclusions based on average concentrations of PCBs rather than on specific PCB concentrations at specific locations. As indicated in Conclusion 3, apparently there is no concern because the "sediment quality overall" meets the human health criterion. However, the 7.68 mg/kg risk-based sediment criteria was exceeded at two locations. As indicated in Section 14.c. of the AOC, unacceptable current human exposures must be controlled. Revise the FCMP to identify how these potential exposures will be controlled.

5. **Appendix E, Groundwater Monitoring Program Plan, Section 2, MONITORING WELL NETWORK, Page 2-2:** As is indicated in the last paragraph of this section and on Table 2-1, five deep monitoring wells are part of the monitoring well network. The four downgradient wells are to be monitored annually and the background well is to be monitored semi-annually. The rationale for this schedule has not been presented. Revise the FCMP to provide adequate rationale for this schedule or to indicate that all deep wells will be monitored semi-annually.

Automotive Experience
49200 Halyard Drive, Plymouth, MI 48170
Tel (734) 254-5657 Fax (734) 254-6914

Johnson Controls

November 17, 2009

Mr. Juan Thomas
USEPA Region 5
RCRA ECAB, DE-9J
77 W. Jackson Blvd.
Chicago, IL 60604

RE: Final Corrective Measures Implementation
Response to USEPA's November 4, 2009 Letter
Former Stanley Tools Work Site (MID-099-124-299)

Dear Mr. Thomas,

Johnson Controls, Inc. and CTI and Associates, Inc. (CTI) appreciate the time you spent with us during our telephone call on November 5, 2009. Our telephone conversation focused on your letter, dated November 4, 2009, and the actions Johnson Controls has taken toward corrective measures for sediments since June 2009. This letter was prepared to summarize our telephone discussion, and to update you on our plans for implementation of sediment Corrective Measures at the site.

In the five months since receipt of your letter dated June 11, 2009, in which final sediment remedial objectives (ROs) were established and a Remedial Design Plan was requested, Johnson Controls has been actively preparing for remediation of sediments in the Red Cedar River adjacent to the site.

Johnson Controls' goal for the sediment corrective measure is to prepare a Remedial Design Plan that addresses sediment concerns in a single effort and eliminates the need for additional sediment corrective measures in the future. Delays associated with submittal of the Remedial Design Plan have been due to completing necessary activities focused on obtaining additional information that supports this goal. The following is a summary of these actions.

- Upon receipt of the June 11, 2009 letter, all sediment data collected prior to 2003 was removed from the site sediment data set and a data evaluation was completed.
    a. A new surface-weighted area concentration (SWAC) calculation as performed for the river between the CSX railroad bridge and Grand River Avenue. The SWAC results showed that no RO exceedences were present.
    b. The sediment data was compared to ROs on a point by point basis and exceedences were observed at selected sampling transects adjacent to the site and at one transect (transect L) downstream of the site.

c. The sediment data was compared to Michigan Department of Environmental Quality (MDEQ) Remediation and Redevelopment Division's (RRD) Interim Final Operational Memorandum No. 4, Attachment 3 – Sediments (Aug, 2006), which contains published sediment cleanup criteria. This data comparison indicated that exceedences were observed for additional constituents, beyond the USEPA's ROs.
d. Removal of pre-2003 sediment results from the data set removed all sample data from north of Grand River Avenue.
e. The sediment data set did not contain sufficient information to characterize the potential for contaminants in bank and overbank sediments.

- The data analysis indicated that the Remedial Design Plan should layout a sediment corrective measure based on targeted hot-spot removal if necessary, but that the absence of (i) bank and overbank data, and (ii) data from north of Grand River Avenue had the potential to re-open the need for sediment corrective measures after a hot spot removal was completed.
- Treatability testing should be completed on sediment from the hot spot areas so that pre-disposal stabilization considerations could be addressed, if necessary, in the design plan.
- TCLP analysis of sediments from hot spot areas should be completed to support sediment disposal considerations, if necessary, in the design plan.
- In consideration of the above information, Johnson Controls directed CTI to complete additional characterization, including:
  - in-channel sediments downgradient of Grand River Avenue;
  - in-channel sediments from adjacent to transect L;
  - in-channel sediment from hot spot areas for TCLP analysis and treatability testing; and
  - bank and overbank deposits adjacent to all sampling transects.
- Preparation for the collection of additional samples as described above has been completed, with the exception of one access agreement. The sample collection should be completed by November 25, 2009, pending finalization of the last access agreement.

Following the collection of samples, laboratory analysis, and treatability testing as described above, a subsequent data analysis will be completed. It is anticipated that following this data analysis, the Remedial Design Plan will be prepared and submitted to the USEPA by the end of January 2010. Following receipt of concurrence on the Remedial Design Plan, Johnson Controls will begin implementation of the corrective measure. Implementation will consist of following items:

- National Pollutant Discharge Elimination System (NPDES) permit application for the discharge of de-watering waters from the sediment removal;
- permit application for the MDEQ/US Army Corps of Engineers Joint Permit for dredging;
- contractor procurement;
- sediment remediation, if necessary, following receipt of applicable permits;
- post-removal cleanup confirmation sampling;
- site restoration; and

- submission of a Final Remedy Construction Completion Report.

The anticipated schedule for planned activities through submission of the Final Remedy Construction Completion Report is provided below. Please note that durations have been included for some items because of uncertainties in the time required for permit approval.

- Sample collection complete: Nov 25, 2009 (pending access approval)
- Remedial Design Plan submission to USEPA: January 29, 2010
- Corrective Measures Implementation (as described above): 45 days after receipt of regulatory concurrence on Remedial Design Plan
- Sediment remediation, if necessary: begins 30 days after receipt of applicable permits
- Submission of the Final Remedy Construction Completion Report: 60 days after sediment remediation is complete

The USEPA's letter dated November 4, 2009 indicates that stipulated penalties will be assessed per the Administrative Order on Consent (AOC) if the Johnson Controls does not submit the Remedial Design Plan with 60 days of November 4, 2009 and begin implementation of the corrective measure within 45 days after the Plan is received by USEPA. Johnson Controls requests that the USEPA set aside stipulated penalties specified in November 4, 2009 letter due to the on-going characterization and planning activities described above.

The information provided above summarizes actions taken by Johnson Controls toward implementation of the corrective measure for sediments in the Red Cedar River. As we progress toward completion of the work described above, Johnson Controls will communicate more frequently with USEPA regarding the status of the project.

If you have any questions, please do not hesitate to contact me via telephone at (734) 254-5657, or Drew Lonergan/CTI at (248) 264-4015.

Sincerely,

Johnson Controls, Inc.

Michael L. Stoelton /cjf

Michael L. Stoelton
Environmental Executive
Automotive Experience

cc: Andrew Lonergan, CTI and Associates, Inc.
N. Witte, Gonzalez, Saggio & Harlan LLP

EPA, MDEQ and Johnson Controls Representatives

RCRA Corrective Action Meeting
Final Sediment Remedial Design Plan Overview for the Johnson Controls, Inc. Site, of Fowlerville, MI
By JCI with CTI and Associates, March 7, 2013

Sign-In Sheet

Name	Affiliation	Phone	Email
[illegible]	EPA	312-886-6010	thomas.juan@epa.gov
Mike Stoelton	Johnson Controls	734-254-5657	Michael.L.Stoelton@jci.com
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DAN MAZUR	EPA	312-353-7997	MAZUR.DANIEL@EPA.gov

Former Stanley Tools Facility
Fowlerville Michigan

Sediment Remedial Design Plan Meeting

March 7, 2013

Chicago, Illinois

Meeting Objectives

- Provide a status update on all site activities
- Discuss primary elements of the Sediment Remedial Design Plan (RDP)
- Expedite approval of the Sediment RDP
- Discuss actions to be completed after 2013 dredging effort

Status Update

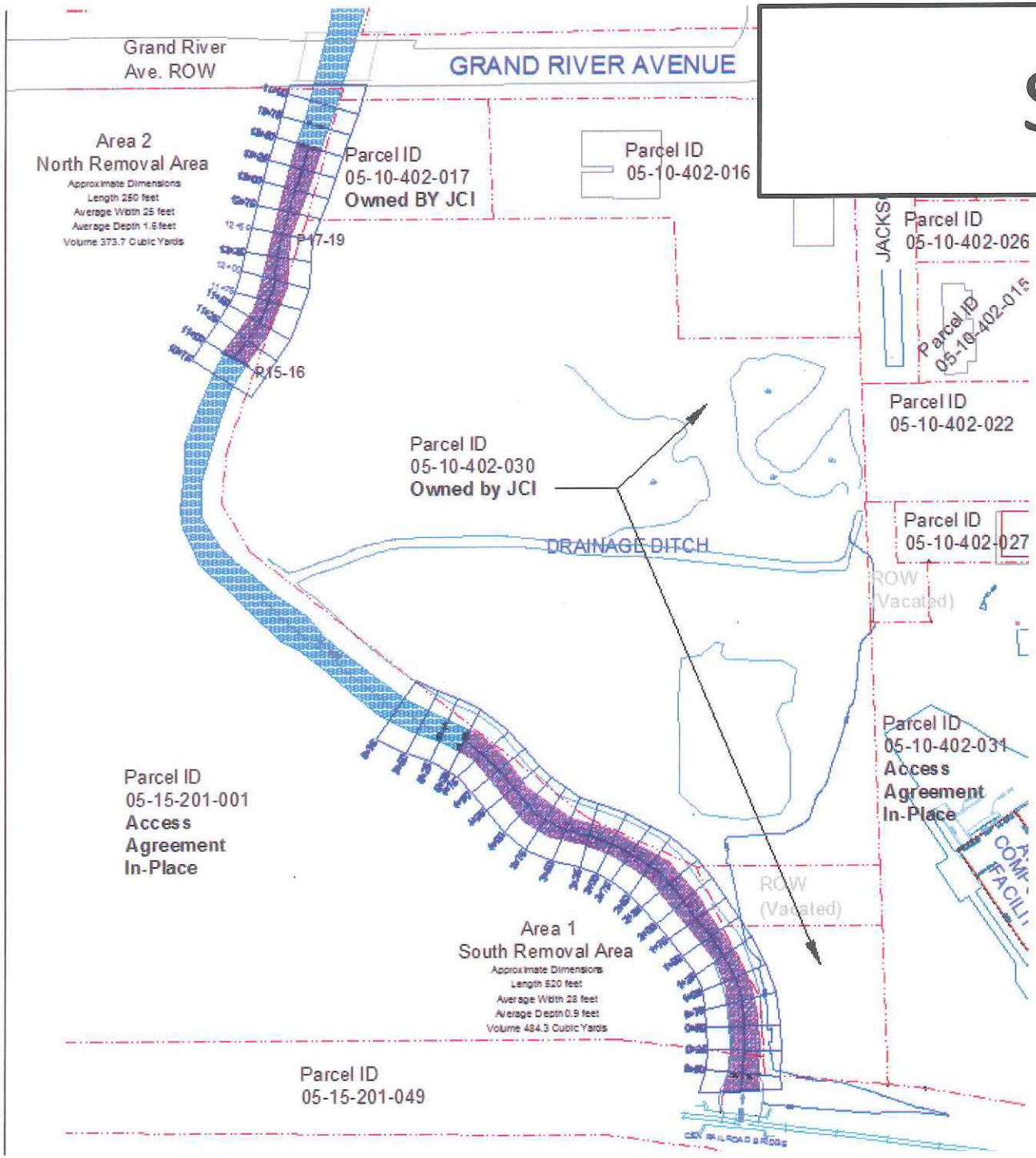
- BERA Addendum – submission June 2012,
  - Approval letter from EPA
- Dredging Contract – in progress with Terra Contracting
- Sediment RDP submission – 15 Jan 2013
- Joint Permit – approved 15 Feb 2013 approval from Army Corps of Engineers + MDEQ Water Division Dir Drew
- Tree Removal – planned for March 2013
- Access Status
  - CSX Railroad – ROE agreement in progress
  - American Compounding property
- Schedule update: start after June 2013 per permit

(April 1, 2013 to June 30) is fish migration so dredging can't begin until after June 2013

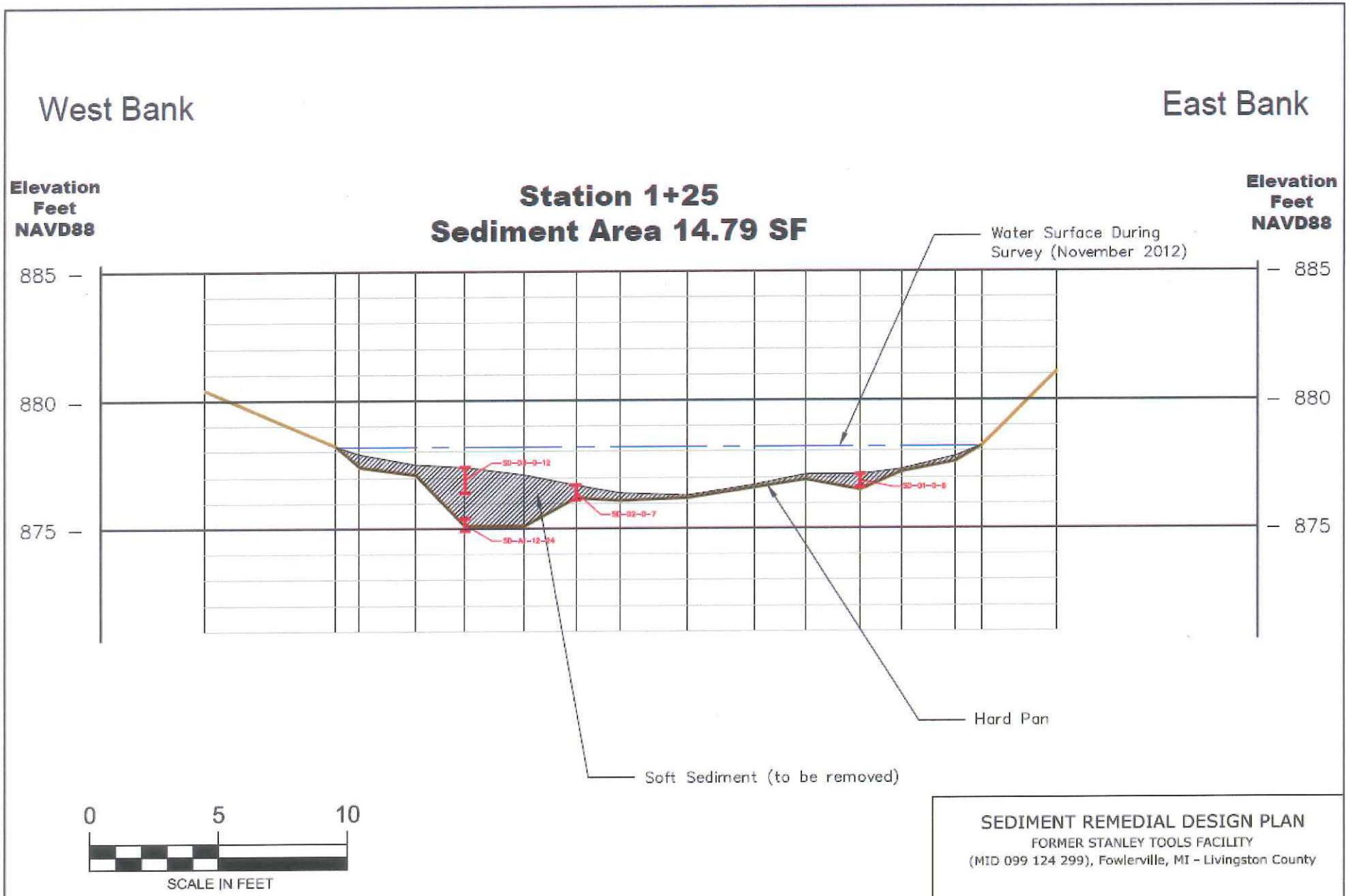
Sediment RDP - Surveying

- Surveying completed
  - Site stationing
  - Soft sediment hardpan interface
  - 3D coordinates for dredger

Survey



- Establish Stations Shown
- Every 25 feet:
  - Top of Soft Sediment
  - Top of Hard Pan



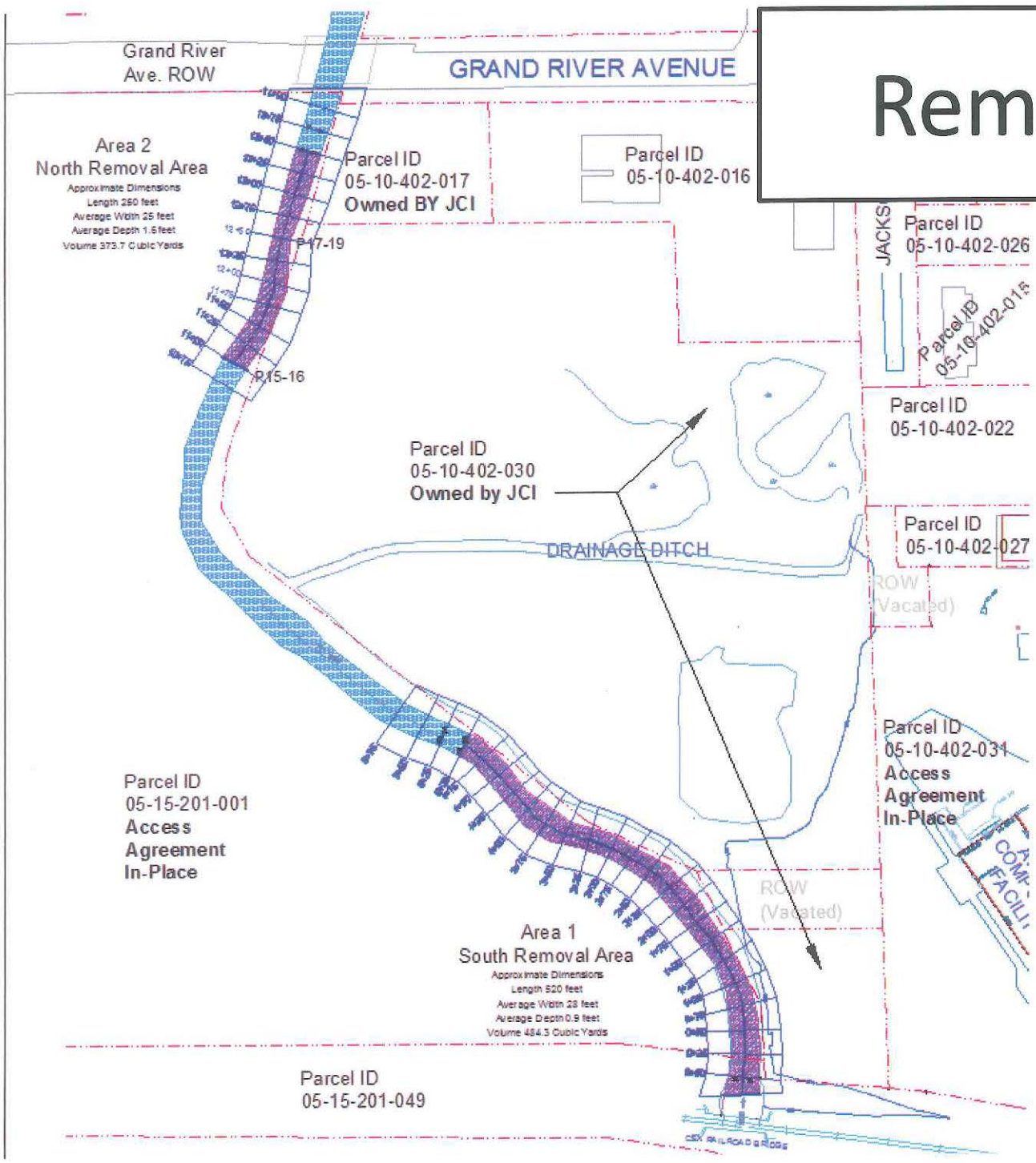
SEDIMENT REMEDIAL DESIGN PLAN
FORMER STANLEY TOOLS FACILITY
(MID 099 124 299), Fowlerville, MI - Livingston County

FIGURE 4-7	DATE Dec 2012	Cross-Section Station 1+25	CLIENT: JCI Plymouth, MI	CTI and Associates, Inc. page 6

Dredging Overview

- Planned dredging
  - Removal Areas ←
  - Silt Curtains
  - Turbidity monitoring
  - Haul road layout
  - Sediment stabilization
  - T&D
  - Site restoration

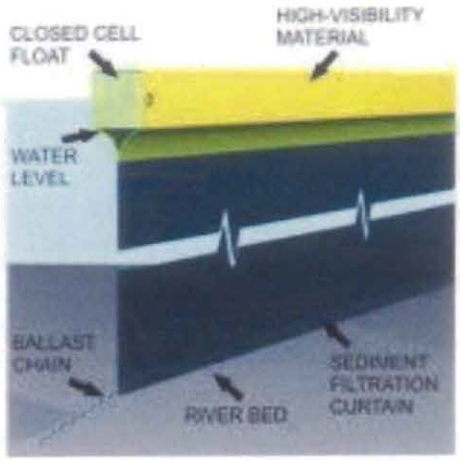
Removal Areas

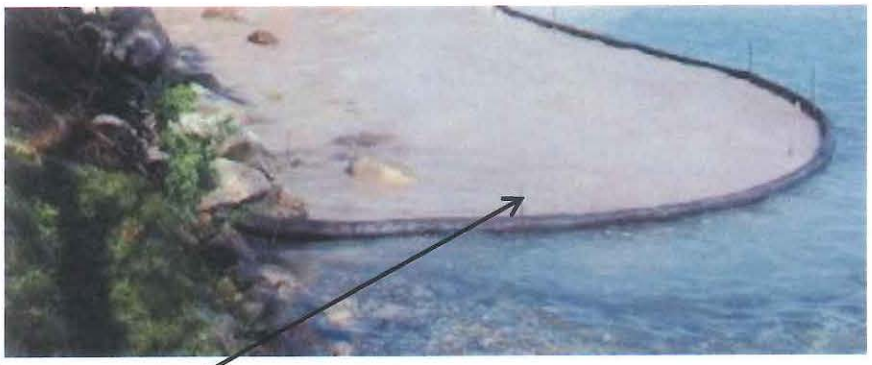


Dredging Overview

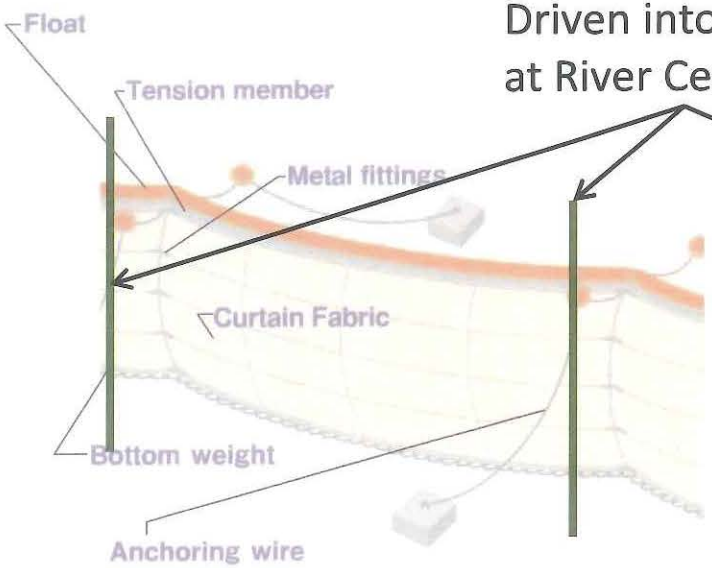
- Planned dredging
  - Removal Areas
  - Silt Curtains ←
  - Turbidity monitoring
  - Haul road layout
  - Sediment stabilization
  - T&D
  - Site restoration

Silt Curtains





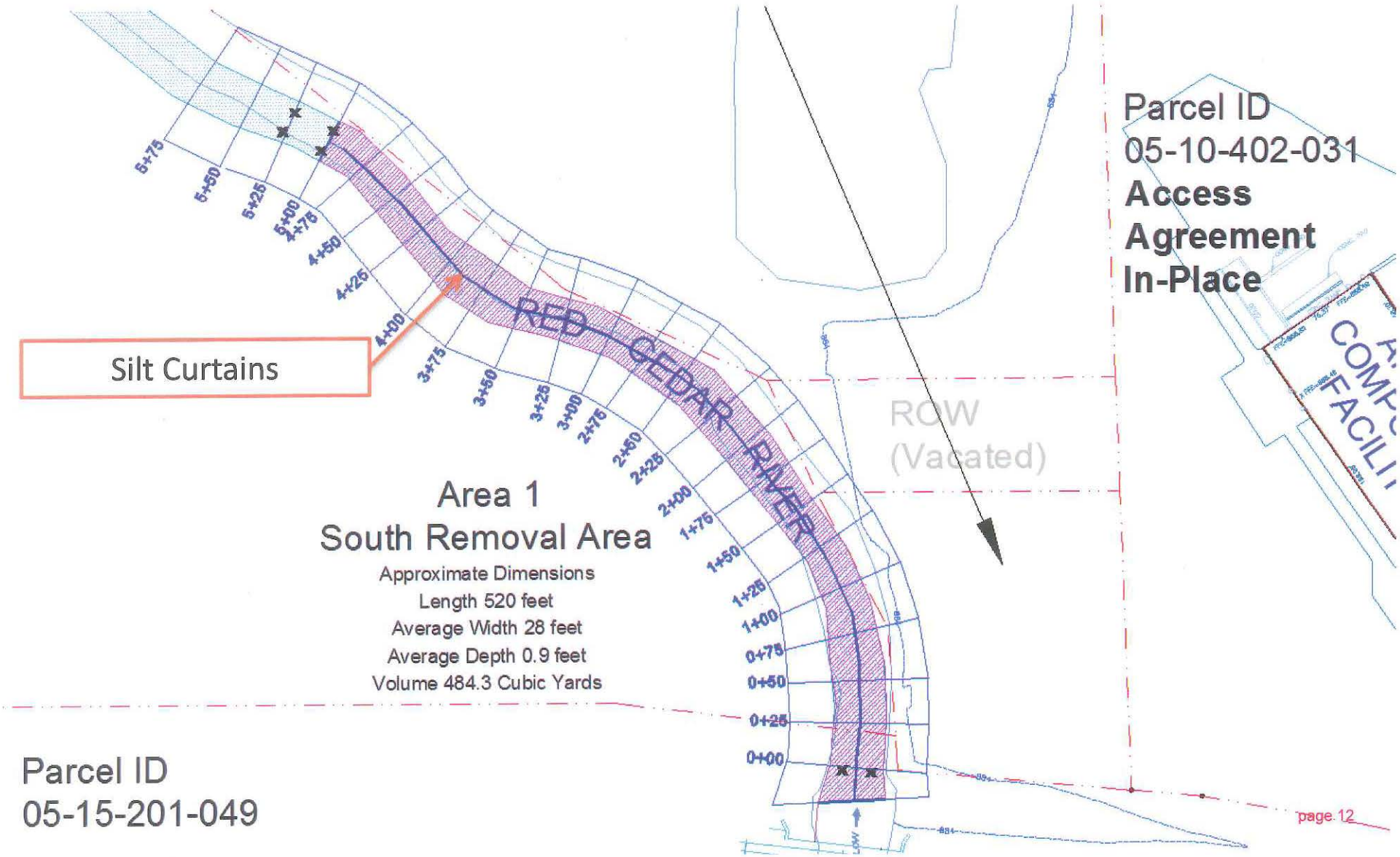
Anchor with Stakes Driven into Hard Pan at River Center.



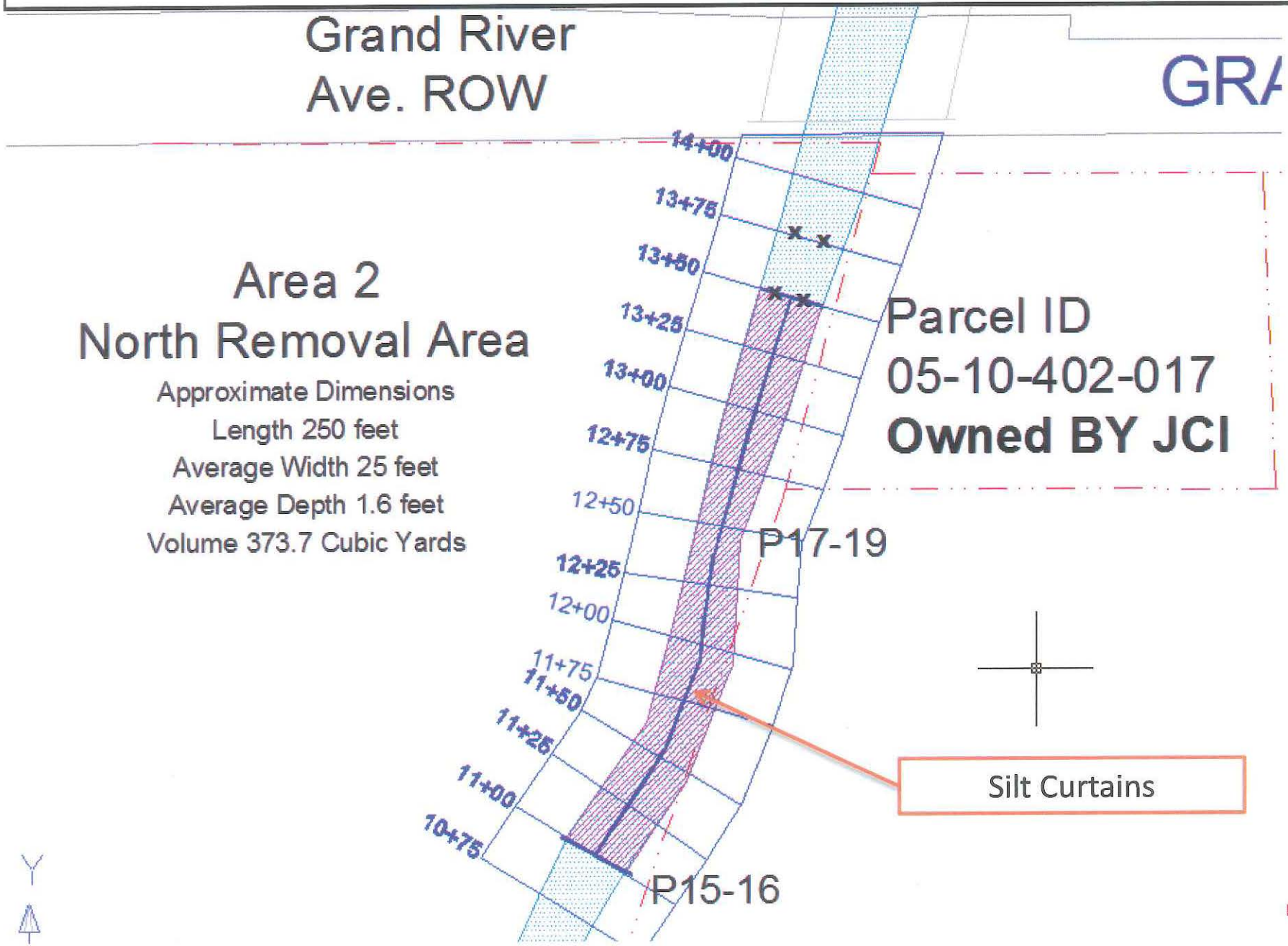
Silt Curtain

- The curtain will enclose ½ of the River at a time and enclose the working area.
  - Once curtain for Area 1 and Once Curtain for Area 2.
- The curtain will be tied to one back allowing the river to flow down the other side.
- Upon completion of the first half of the river before moving the silt curtain:
  - The verification measurements will be completed.
  - The turbidity value within the curtain will be monitored to ensure it is below the action level and near background results in addition to visual confirmation.

Silt Curtains Removal Area 1



Silt Curtains Removal Area 2



Dredging Overview

- Planned dredging
  - Removal Areas
  - Silt Curtains
  - Turbidity monitoring ←
  - Haul road layout
  - Sediment stabilization
  - T&D
  - Site restoration

Turbidity Monitoring

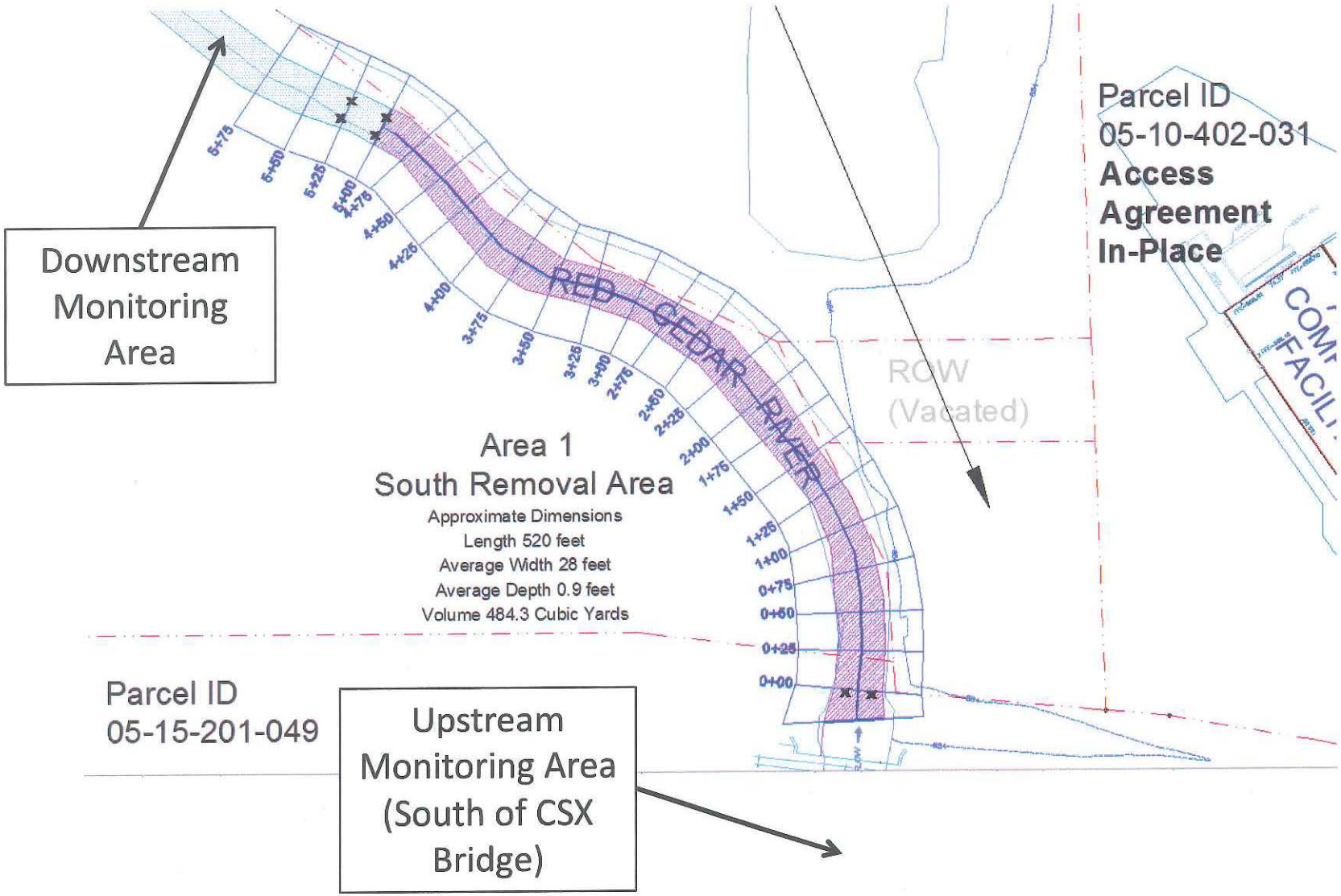
- Daily Baseline
  - Before the start of dredging operations the daily baseline shall be established by an average of the following:
    - 5 samples collected 100 feet upstream of the active dredging area
    - 5 samples within active dredging area silt curtain
    - 5 samples 100 feet downstream of the active dredging area.
  - If within 10 NTU of each other the upstream average value will be used if not the down stream average value will be used.
- Daily Turbidity Monitoring
  - Every 30 minutes from 100 feet downstream of active dredging area while actively dredging.
  - Recorded

This slide will change based on NTU discussion @ mtg tomm 12.15

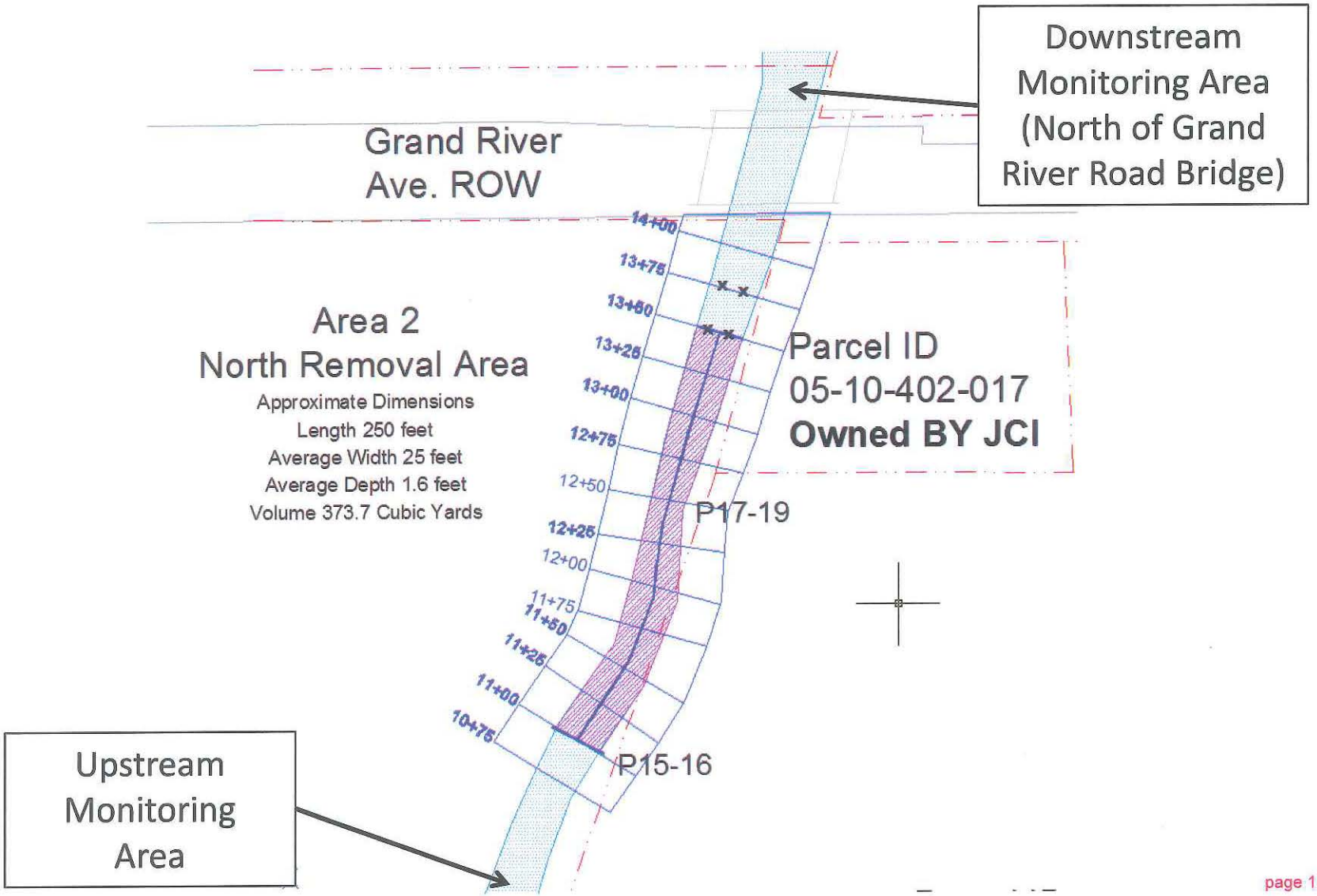
Turbidity Monitoring (Cont.)

- Action Levels
  - 50 NTU above baseline
- Actions if exceeded
  - Increase monitoring frequency (10-20 minutes)
  - Adjust turbidity curtains
  - Modify or change dredging equipment or rates
  - Halt dredging to assess if alterations need to be made.

Turbidity Monitoring (Cont.)



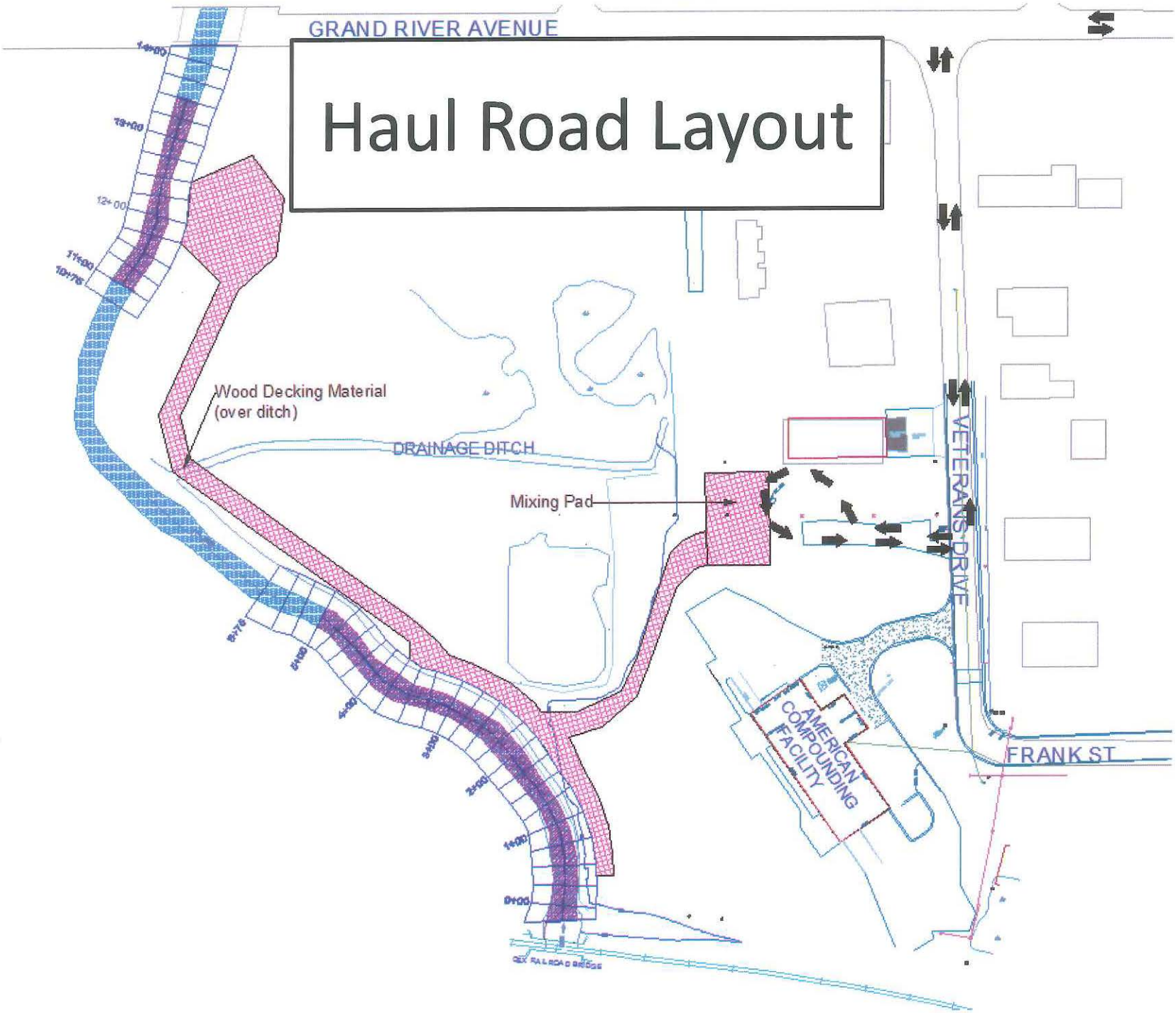
Turbidity Monitoring (Cont.)



Dredging Overview

- Planned dredging
  - Removal Areas
  - Silt Curtains
  - Turbidity monitoring
  - Haul road layout ←
  - Sediment stabilization
  - T&D
  - Site restoration

Haul Road Layout



Dredging Overview

- Planned dredging
  - Removal Areas
  - Silt Curtains
  - Turbidity monitoring
  - Haul road layout
  - Sediment stabilization ←
  - T&D
  - Site restoration

Sediment Stabilization

- Haul with Off Road Trucks from dredge area to stabilization area.
- Dumped in Rock Boxes on lined stabilization pad.
  - * Quick Lime will be used for stabilization in boxes
  - – Mixed sediment moved to pad to cure and store
  - – Cured sediment loaded onto gravel trains for transport to landfill

*will use Quick Lime instead of Calcium as described in RDR (remedial design plan)

Dredging Overview

- Planned dredging
  - Removal Areas
  - Silt Curtains
  - Turbidity monitoring
  - Haul road layout
  - Sediment stabilization
  - T&D ←
  - Site restoration ←

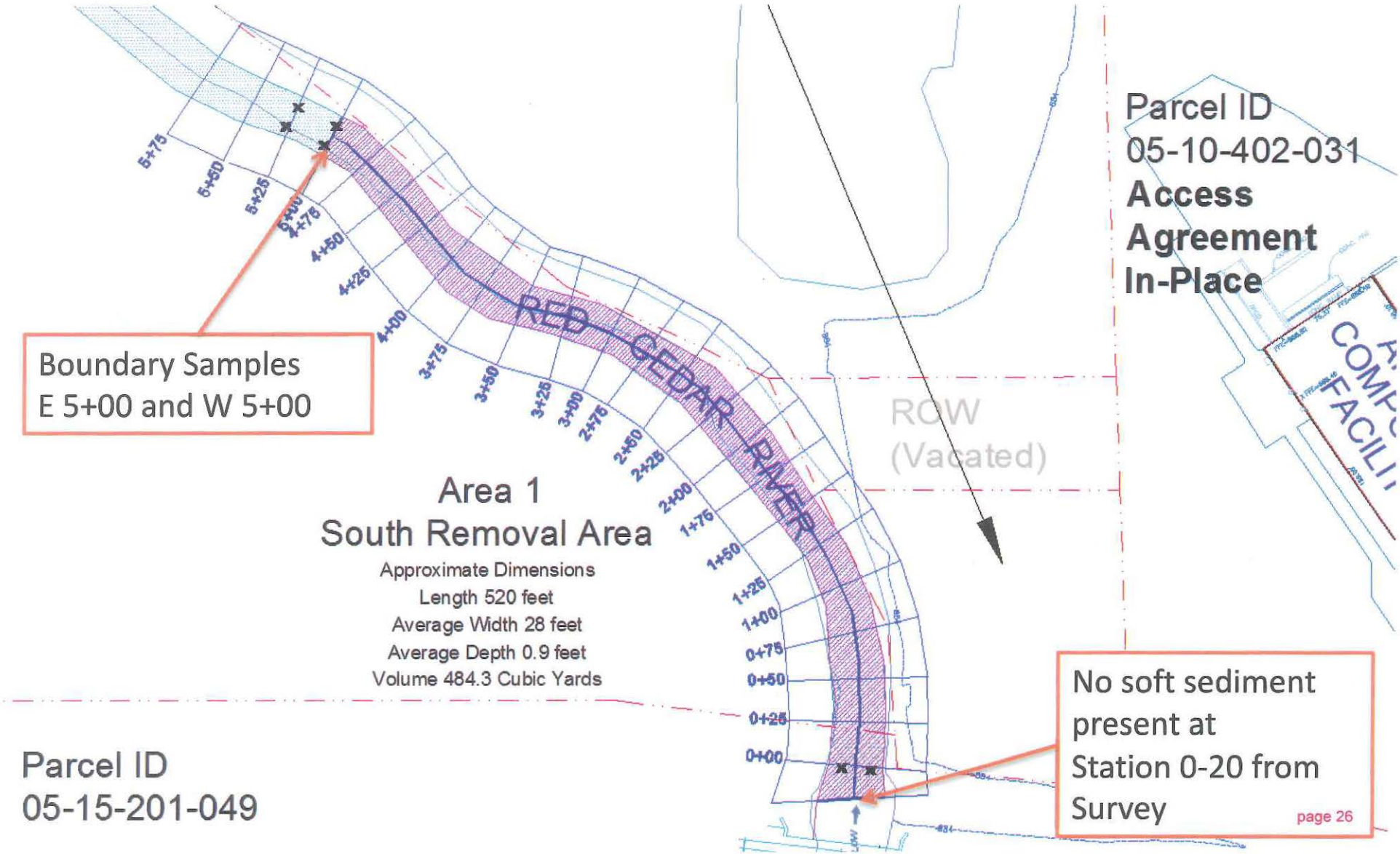
Dredging Overview

- Stabilized sediment will be transported and disposed of at Waste Management's Venice Park Landfill Facility
  - Approval is in-progress
- Site Restoration
  - Designed for minimal impact
  - Restoration in compliance with Permit

Dredge Boundary Samples

- Objective: present boundary data in Sediment RDP
- Sampling letter and DQOs submitted on Nov 1, 2013
- Sampling performed in November 2012
- Additional step out samples collected as contingency.
- No soft sediment found at CSX bridge

Removal Area 1 – Boundary Samples



Removal Area 2 Boundary Samples

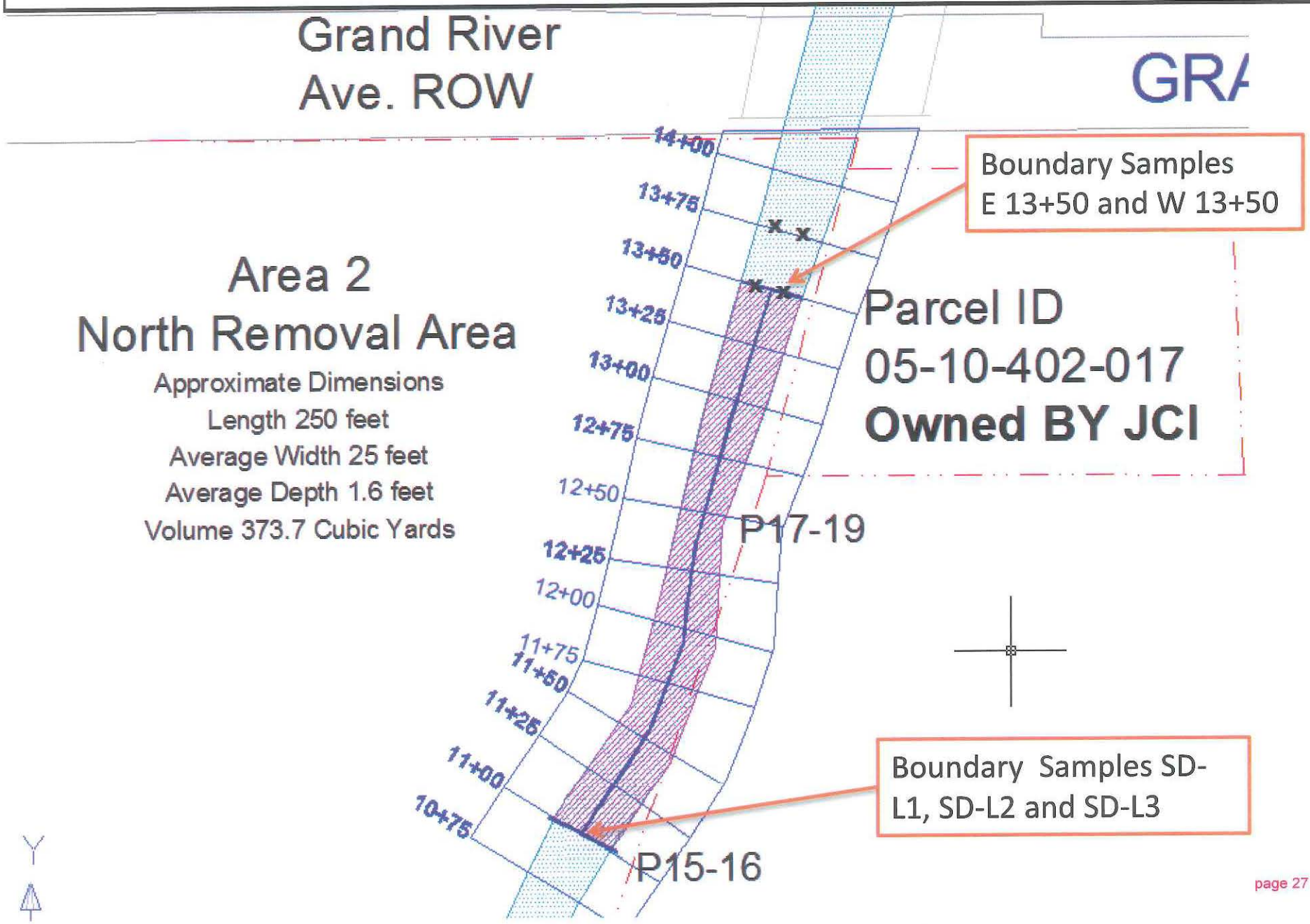


Table 3
Mean PEC Q Calculation
Summary of Boundary Samples and Hardpan Samples
Former Stanley Tools Facility
Fowlerville Michigan

Area 1

	Hardpan	Hardpan	Hardpan	Hardpan	Hardpan	Hardpan	Hardpan	Hardpan
	E 0+00 (12-24)	W 0+00 (12-24)	SD-A1 (12 - 24)	SD-A2 (12 - 24)	SD-B3* (36 - 42)	SD-C1 (12 - 24)	SD-C3 (42 - 48)	SD-E3* (12 - 24)
PAHs								
Calculated Mean PEC-Qpah	0.05	0.13	0.02	0.11	0.10	0.26	0.11	0.13
Mean PEC-Qpah	0.01	0.04	0.02	0.11	0.16	0.27	0.11	0.13
Metals								
Mean PEC-Qmetals	0.14	0.07	0.11	0.06	0.09	0.12	0.21	0.05
Overall								
Mean PEC-Q overall (PAH Calculated)	0.09	0.10	0.06	0.08	0.10	0.19	0.16	0.09
Mean PEC-Q overall	0.08	0.06	0.06	0.08	0.12	0.19	0.16	0.09

Area 1 (Cont.)

	Hardpan	Hardpan	Hardpan	Boundary	Hardpan	Boundary	Hardpan
	SD-F1 (12 - 24)	SD-G2 (12 - 27)	SD-H1 (24 - 36)	E 5+00 (0 - 12)	E 5+00 (12 - 24)	W 5+00 (0 - 12)	W 5+00 (12 - 24)
PAHs							
Calculated Mean PEC-Qpah	0.11	0.11	0.11	0.27	0.16	0.09	0.15
Mean PEC-Qpah	0.11	0.11	0.11	0.26	0.16	0.09	0.15
Metals							
Mean PEC-Qmetals	0.04	0.05	0.09	0.05	0.06	0.05	0.06
Overall							
Mean PEC-Q overall (PAH Calculated)	0.07	0.08	0.10	0.16	0.11	0.07	0.11
Mean PEC-Q overall	0.07	0.08	0.10	0.16	0.11	0.07	0.11

Note:
<0.5 is considered acceptable risk

Table 3
Mean PEC Q Calculation
Summary of Boundary Samples and Hardpan Samples
Former Stanley Tools Facility
Fowlerville Michigan

Area 2	Boundary	Boundary	Boundary	Boundary	Boundary	Boundary	Boundary
	SD-L1 (0 - 10)	SD-L2 (0 - 15)	SD-L3 (0 - 15)	E 13+50 (0-12)	E 13+50 (12-24)	W 13+50 (0-12)	W 13+50 (12-24)
PAHs							
Calculated Mean PEC-Qpah	0.10	0.08	0.13	0.04	0.07	0.05	0.10
Mean PEC-Qpah	0.09	0.12	0.18	0.05	0.07	0.06	0.10
Metals							
Mean PEC-Qmetals	0.03	0.10	0.06	0.14	0.09	0.12	0.11
Overall							
Mean PEC-Q overall (PAH Calculated)	0.07	0.09	0.10	0.09	0.08	0.08	0.11
Mean PEC-Q overall	0.06	0.11	0.12	0.09	0.08	0.09	0.10

Note:
<0.5 is considered acceptable risk

No Soft Sediment Present

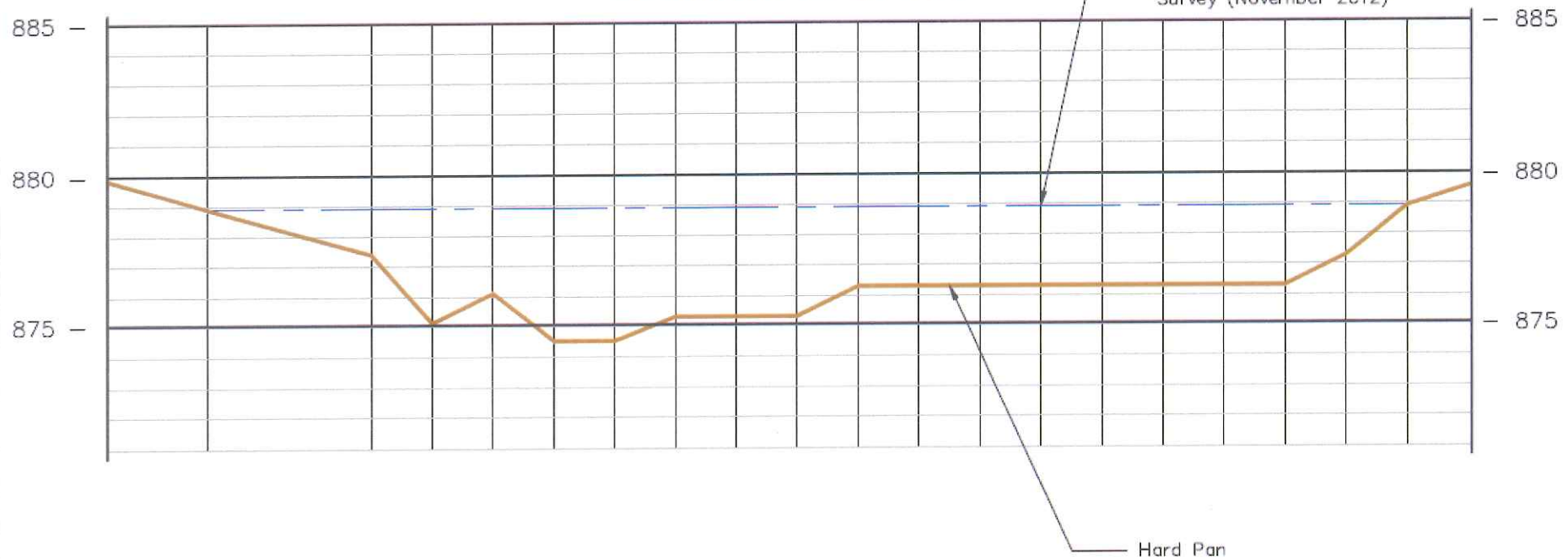
West Bank

East Bank

Elevation Feet NAVD88

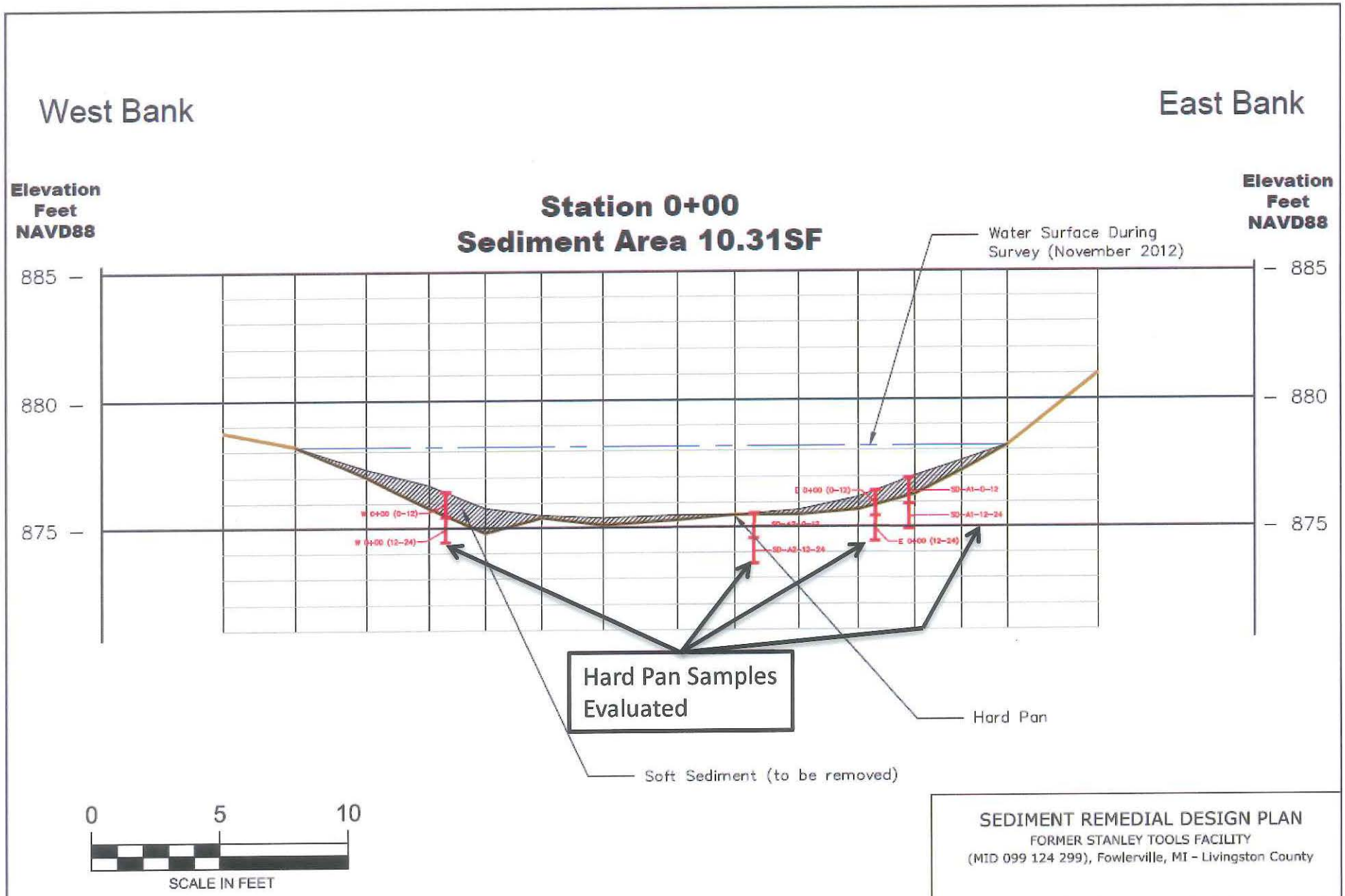
Station 0-20
Sediment Area 0 SF

Elevation Feet NAVD88



SEDIMENT REMEDIAL DESIGN PLAN
FORMER STANLEY TOOLS FACILITY
(MID 099 124 299), Fowlerville, MI - Livingston County

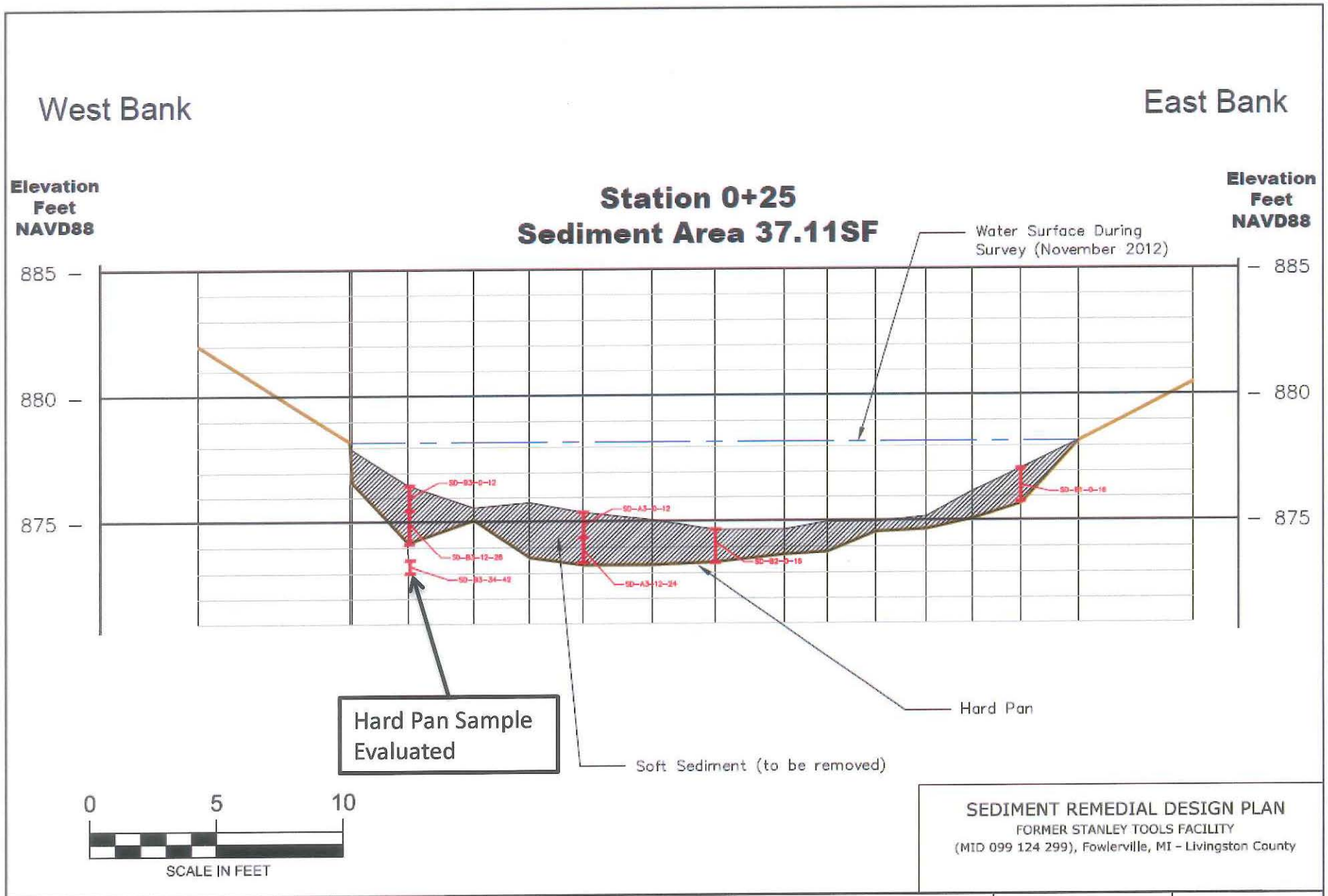
FIGURE 4-1	DATE Dec 2012	Cross-Section Station 0-20	CLIENT: JCI Plymouth, MI	CTI and Associates, Inc.



SEDIMENT REMEDIAL DESIGN PLAN
FORMER STANLEY TOOLS FACILITY
(MID 099 124 299), Fowlerville, MI - Livingston County

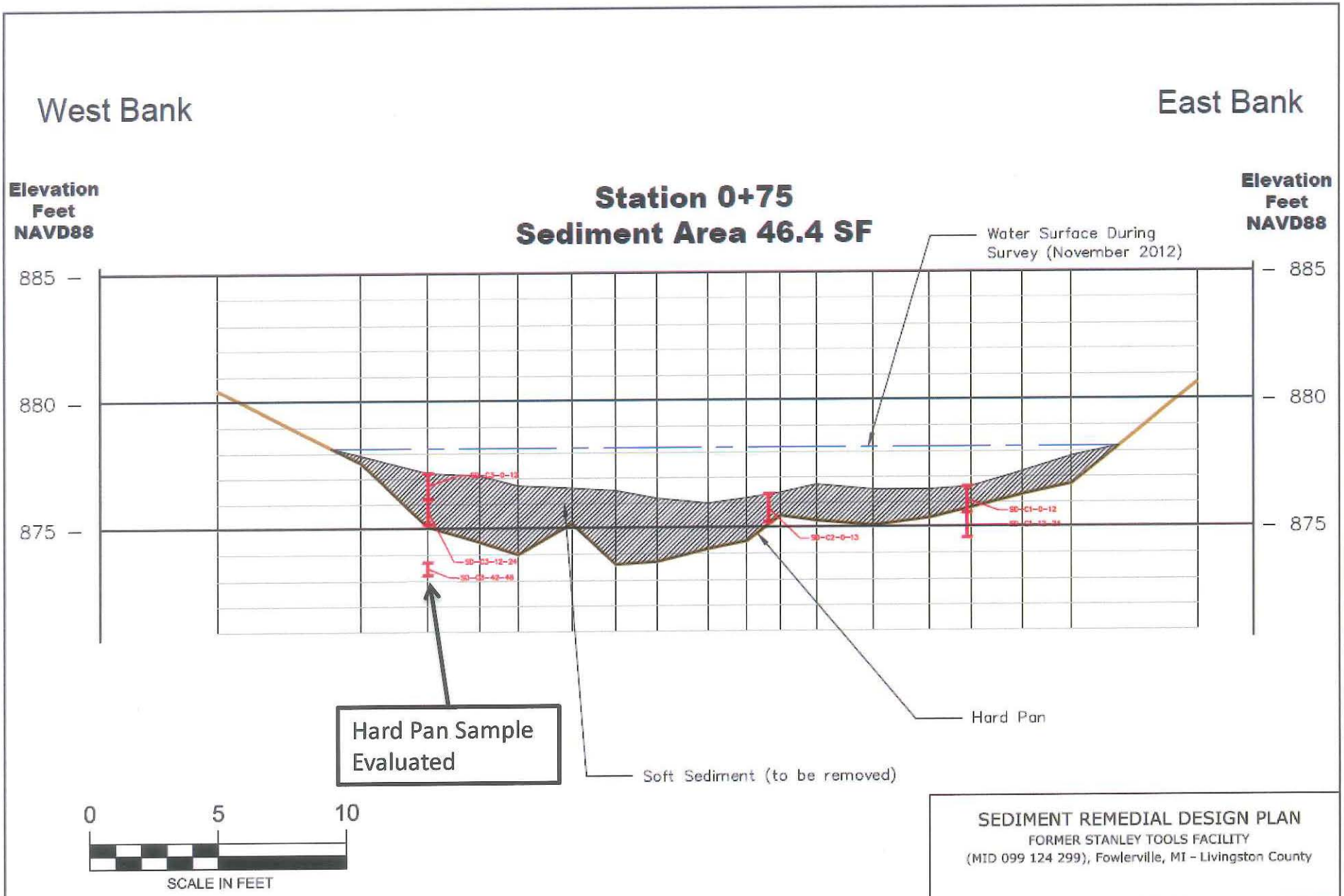
FIGURE 4-2	DATE Dec 2012	Cross-Section Station 0+00	CLIENT: JCI Plymouth, MI	CTI and Associates, Inc.

red bars are sampling intervals from previous samples



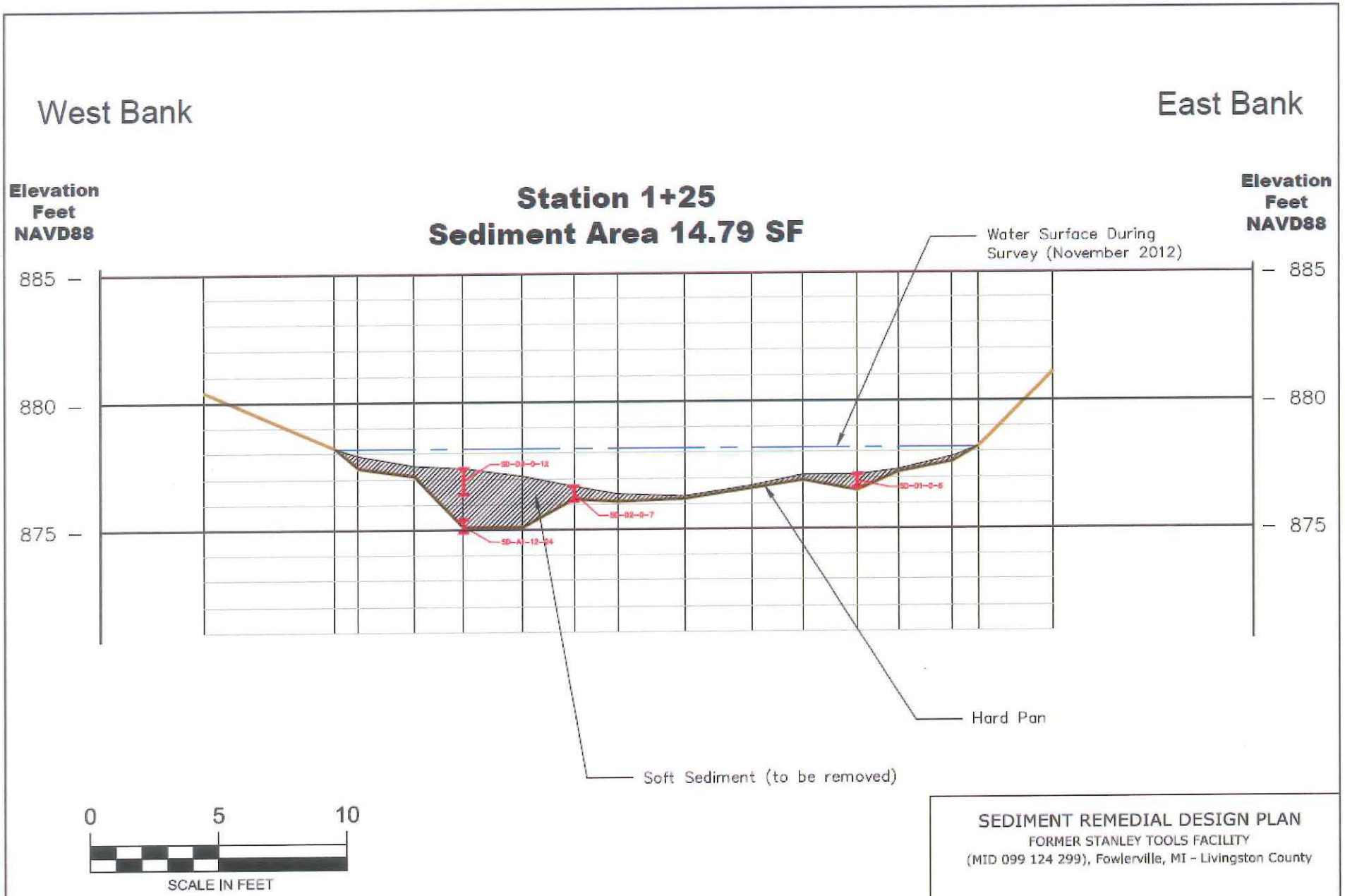
SEDIMENT REMEDIAL DESIGN PLAN
FORMER STANLEY TOOLS FACILITY
(MID 099 124 299), Fowlerville, MI - Livingston County

FIGURE 4-3	DATE Dec 2012	Cross-Section Station 0+25	CLIENT: JCI Plymouth, MI	CTI and Associates, Inc.



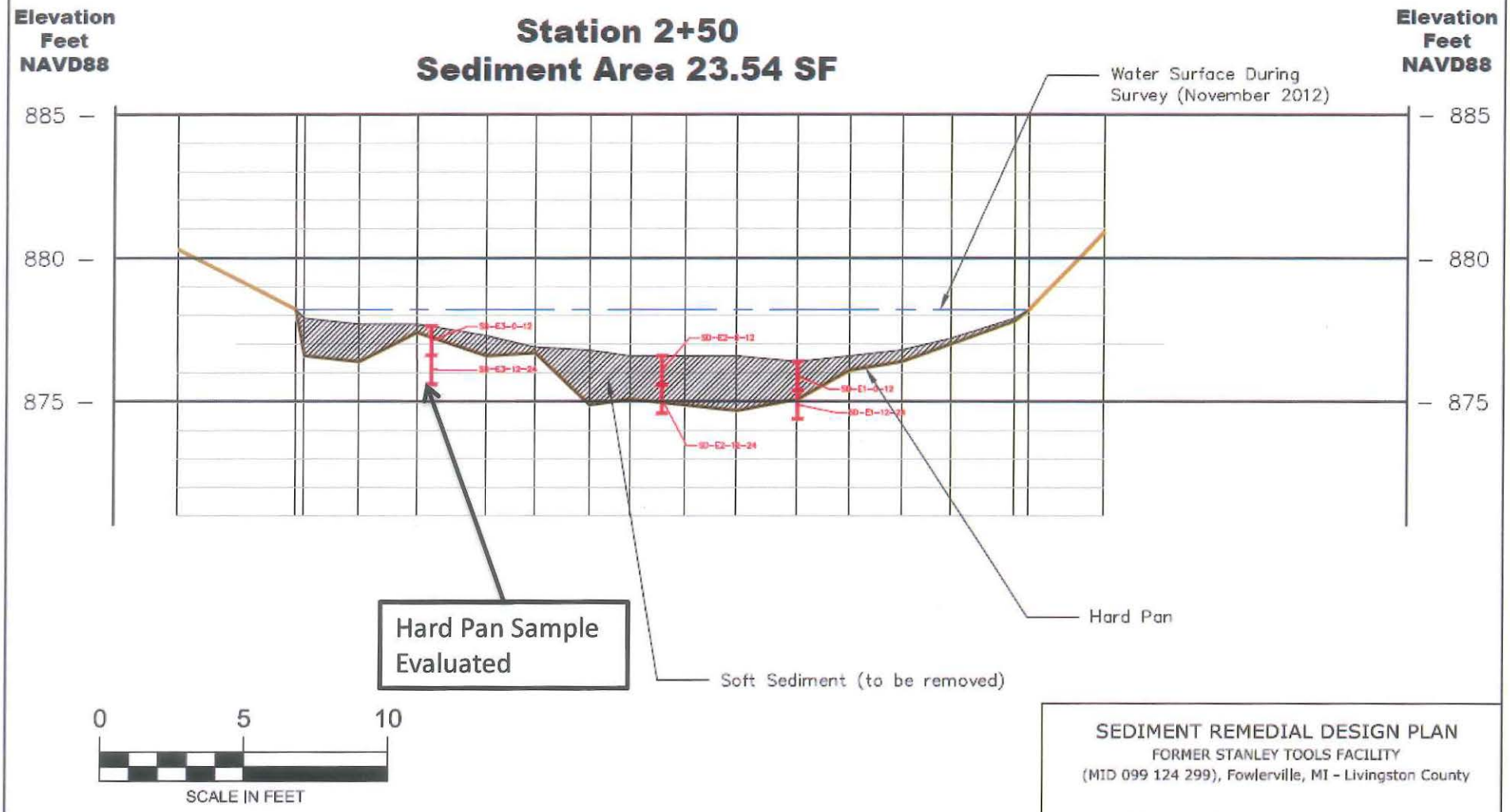
SEDIMENT REMEDIAL DESIGN PLAN
FORMER STANLEY TOOLS FACILITY
(MID 099 124 299), Fowlerville, MI - Livingston County

FIGURE 4-5	DATE Dec 2012	Cross-Section Station 0+75	CLIENT: JCI Plymouth, MI	CTI and Associates, Inc.



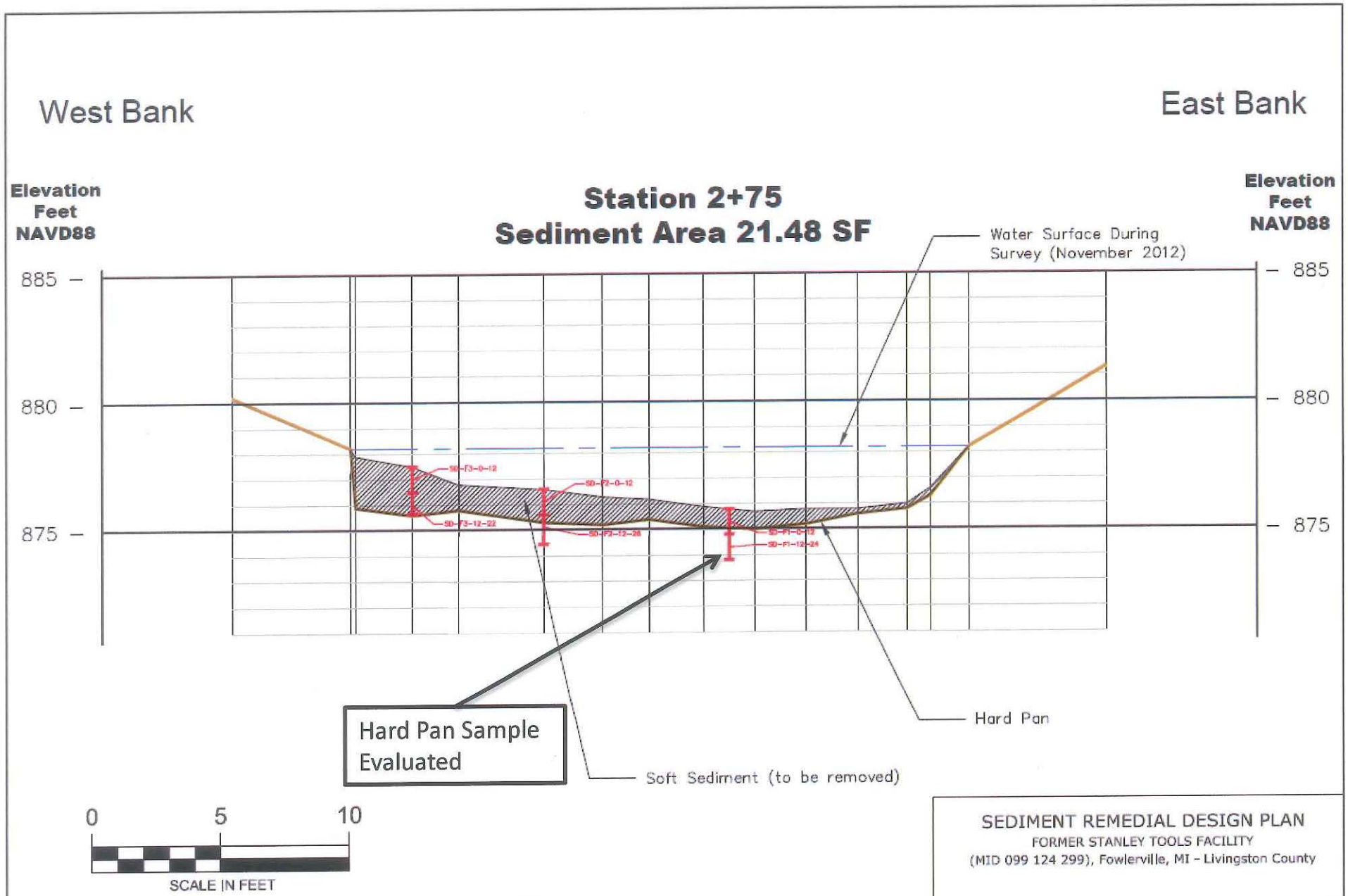
SEDIMENT REMEDIAL DESIGN PLAN
FORMER STANLEY TOOLS FACILITY
(MID 099 124 299), Fowlerville, MI - Livingston County

FIGURE 4-7	DATE Dec 2012	Cross-Section Station 1+25	CLIENT: JCI Plymouth, MI	CTI and Associates, Inc.



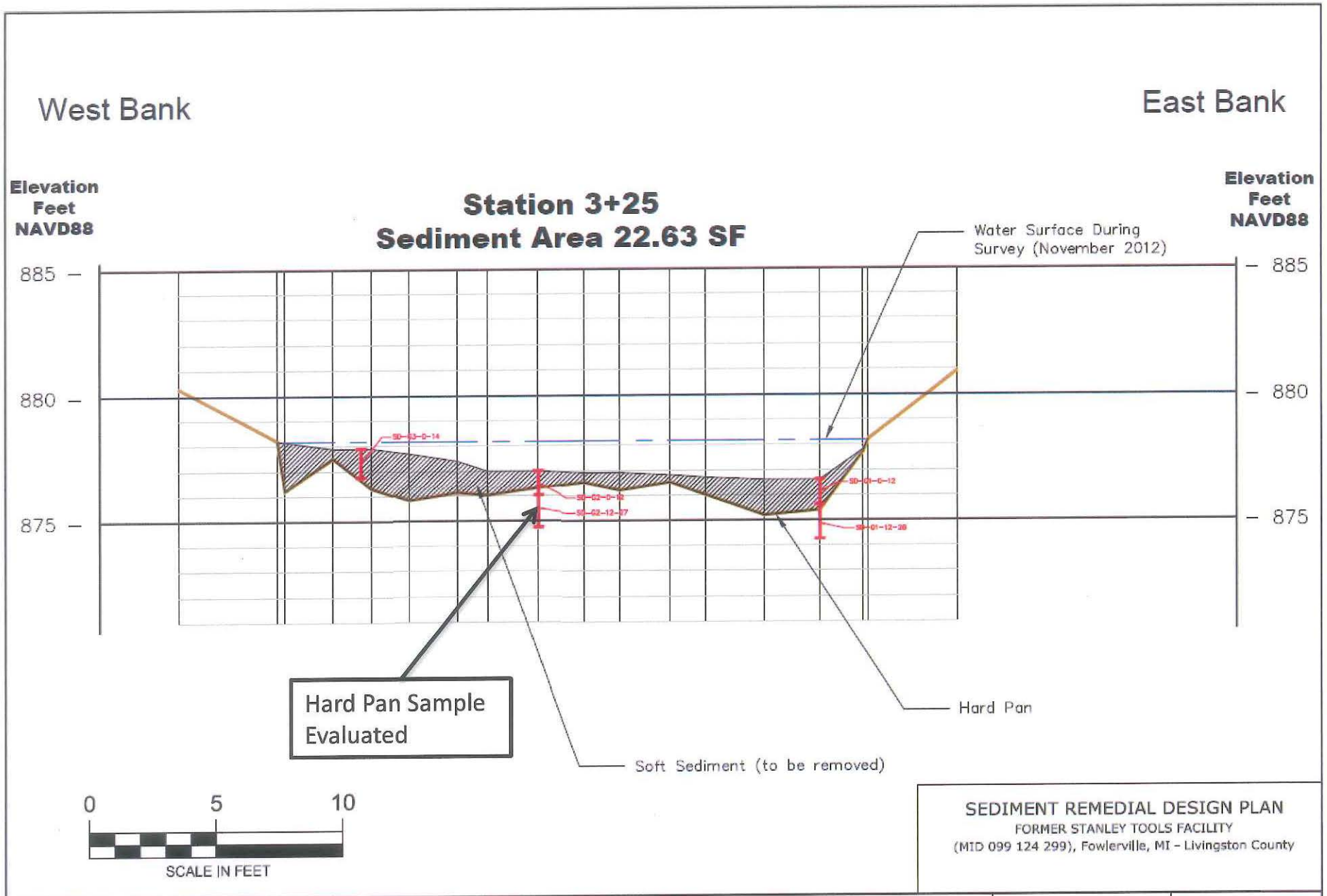
SEDIMENT REMEDIAL DESIGN PLAN
FORMER STANLEY TOOLS FACILITY
(MID 099 124 299), Fowlerville, MI - Livingston County

FIGURE 4-12	DATE Dec 2012	Cross-Section Station 2+50	CLIENT: JCI Plymouth, MI	CTI and Associates, Inc.



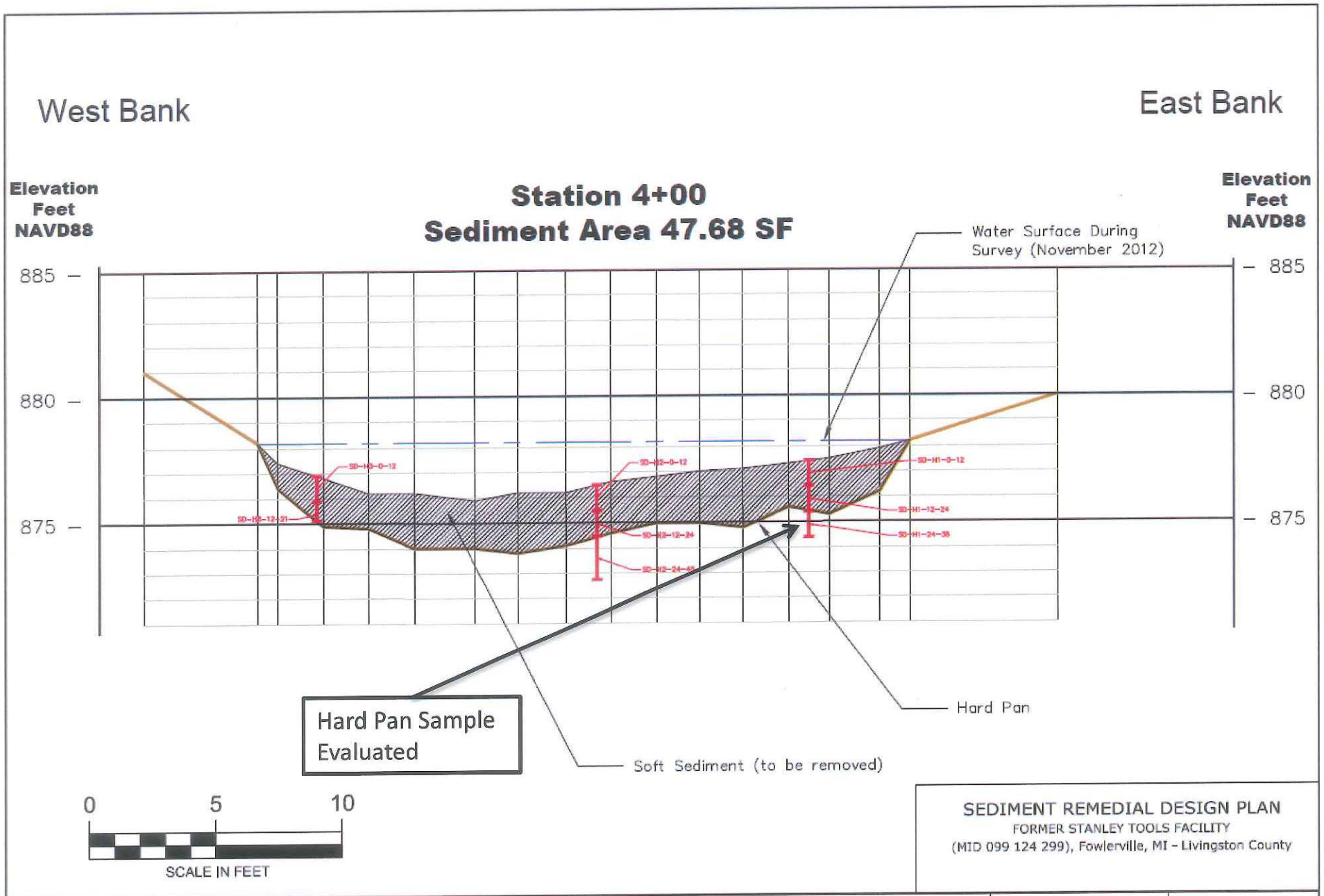
SEDIMENT REMEDIAL DESIGN PLAN
FORMER STANLEY TOOLS FACILITY
(MID 099 124 299), Fowlerville, MI - Livingston County

FIGURE 4-13	DATE Dec 2012	Cross-Section Station 2+75	CLIENT: JCI Plymouth, MI	CTI and Associates, Inc.



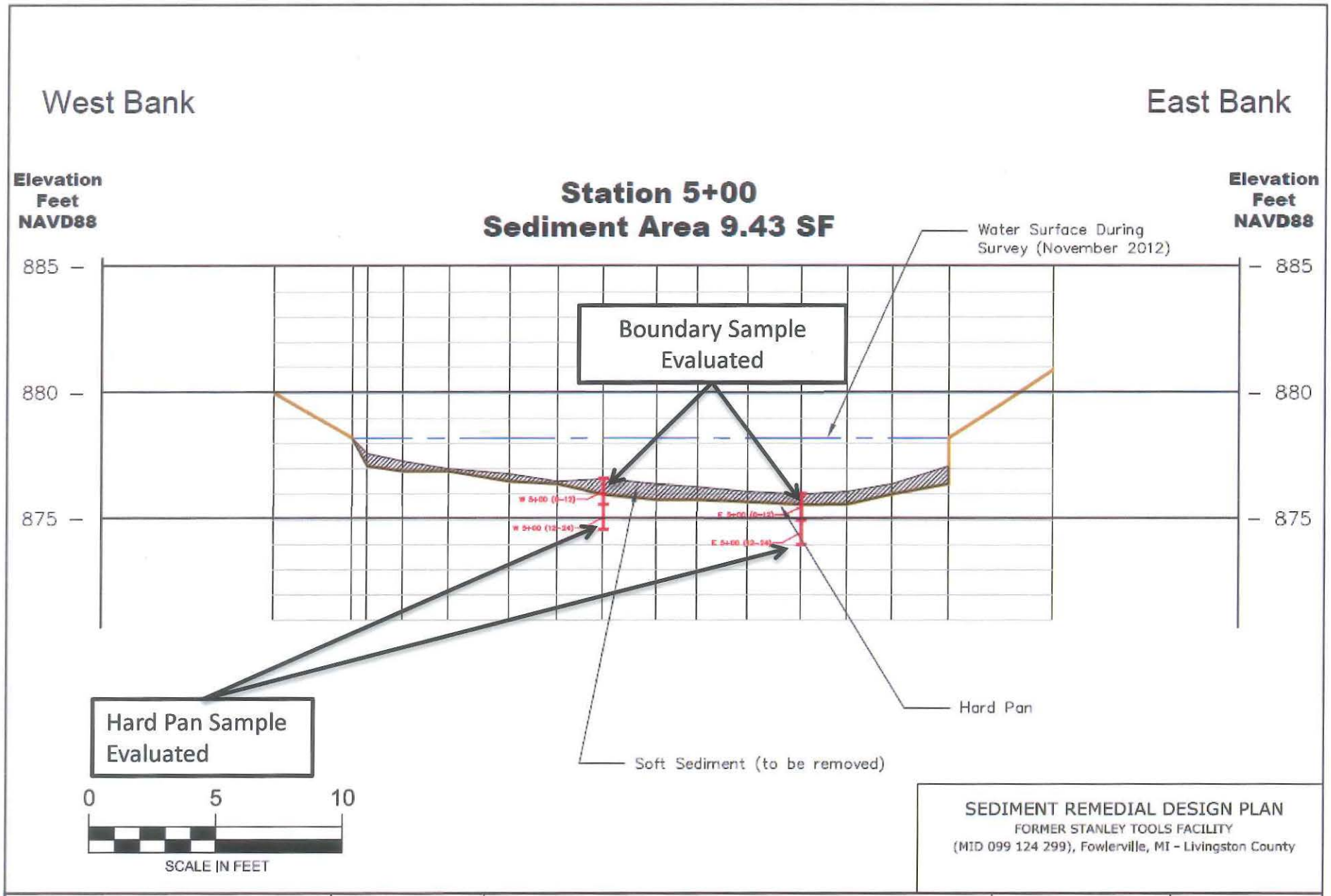
SEDIMENT REMEDIAL DESIGN PLAN
FORMER STANLEY TOOLS FACILITY
(MID 099 124 299), Fowlerville, MI - Livingston County

FIGURE 4-15	DATE Dec 2012	Cross-Section Station 3+25	CLIENT: JCI Plymouth, MI	CTI and Associates, Inc.



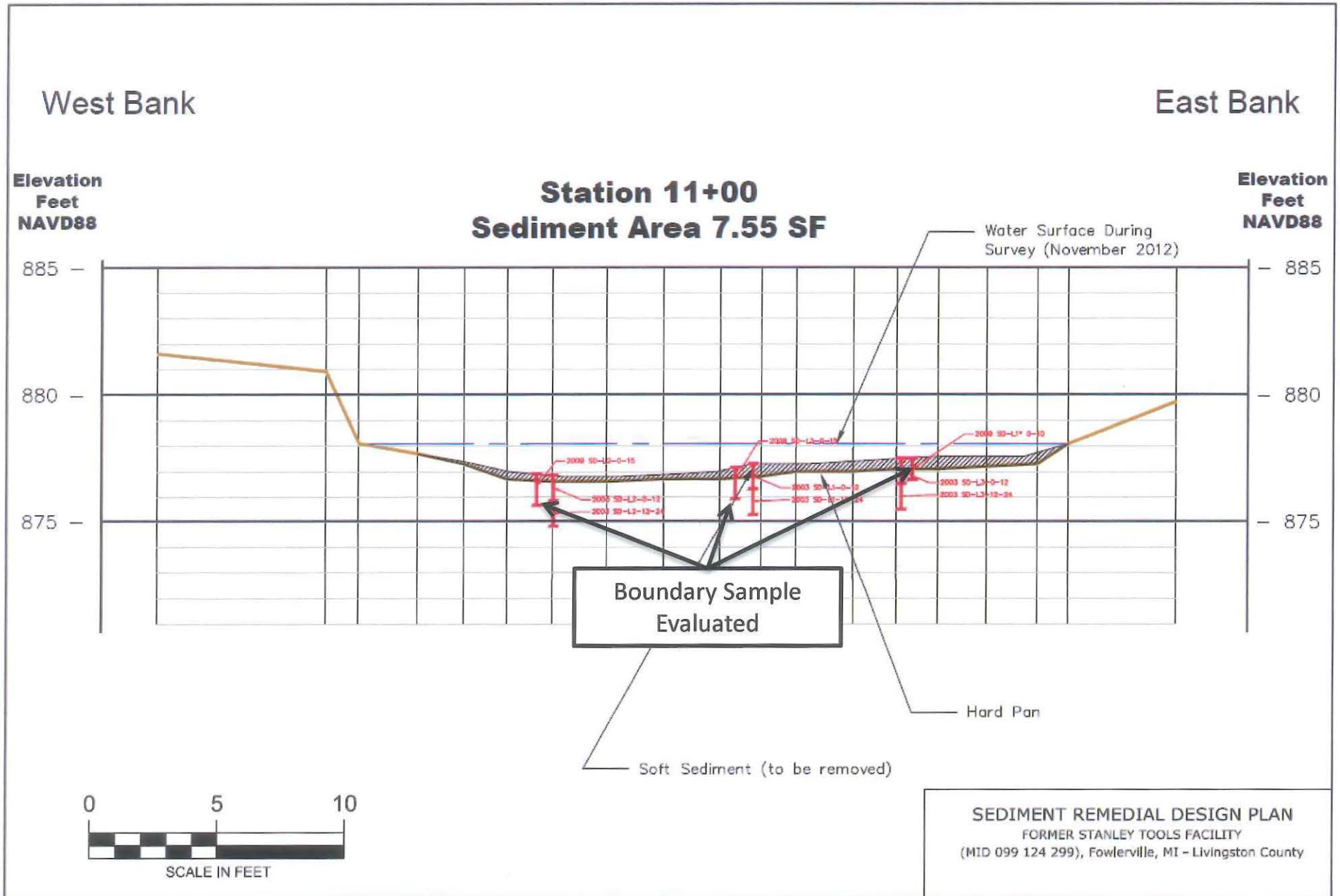
SEDIMENT REMEDIAL DESIGN PLAN
FORMER STANLEY TOOLS FACILITY
(MID 099 124 299), Fowlerville, MI - Livingston County

FIGURE 4-18	DATE Dec 2012	Cross-Section Station 4+00	CLIENT: JCI Plymouth, MI	CTI and Associates, Inc.



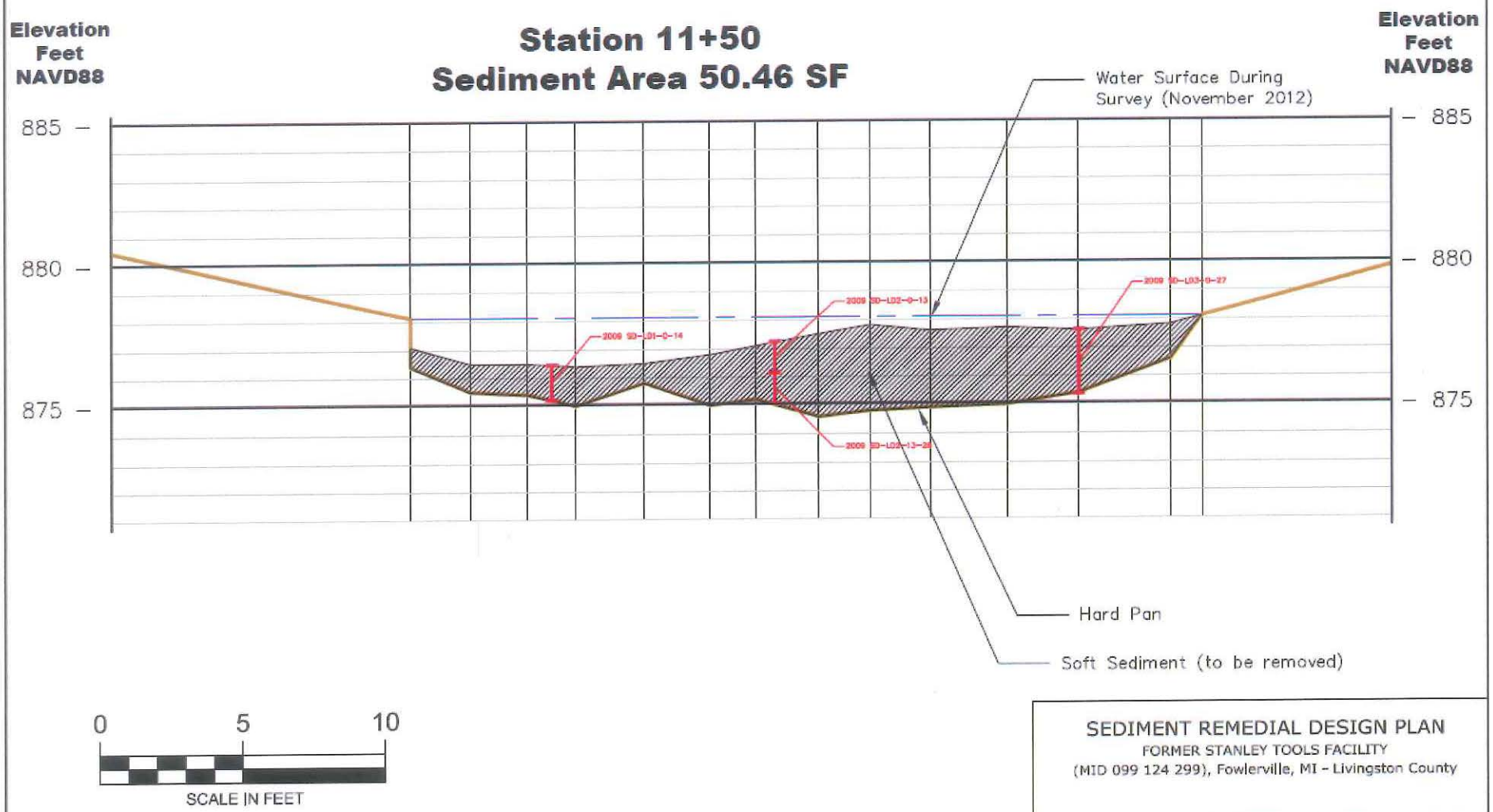
SEDIMENT REMEDIAL DESIGN PLAN
FORMER STANLEY TOOLS FACILITY
(MID 099 124 299), Fowlerville, MI - Livingston County

FIGURE 4-22	DATE Dec 2012	Cross-Section Station 5+00	CLIENT: JCI Plymouth, MI	CTI and Associates, Inc.



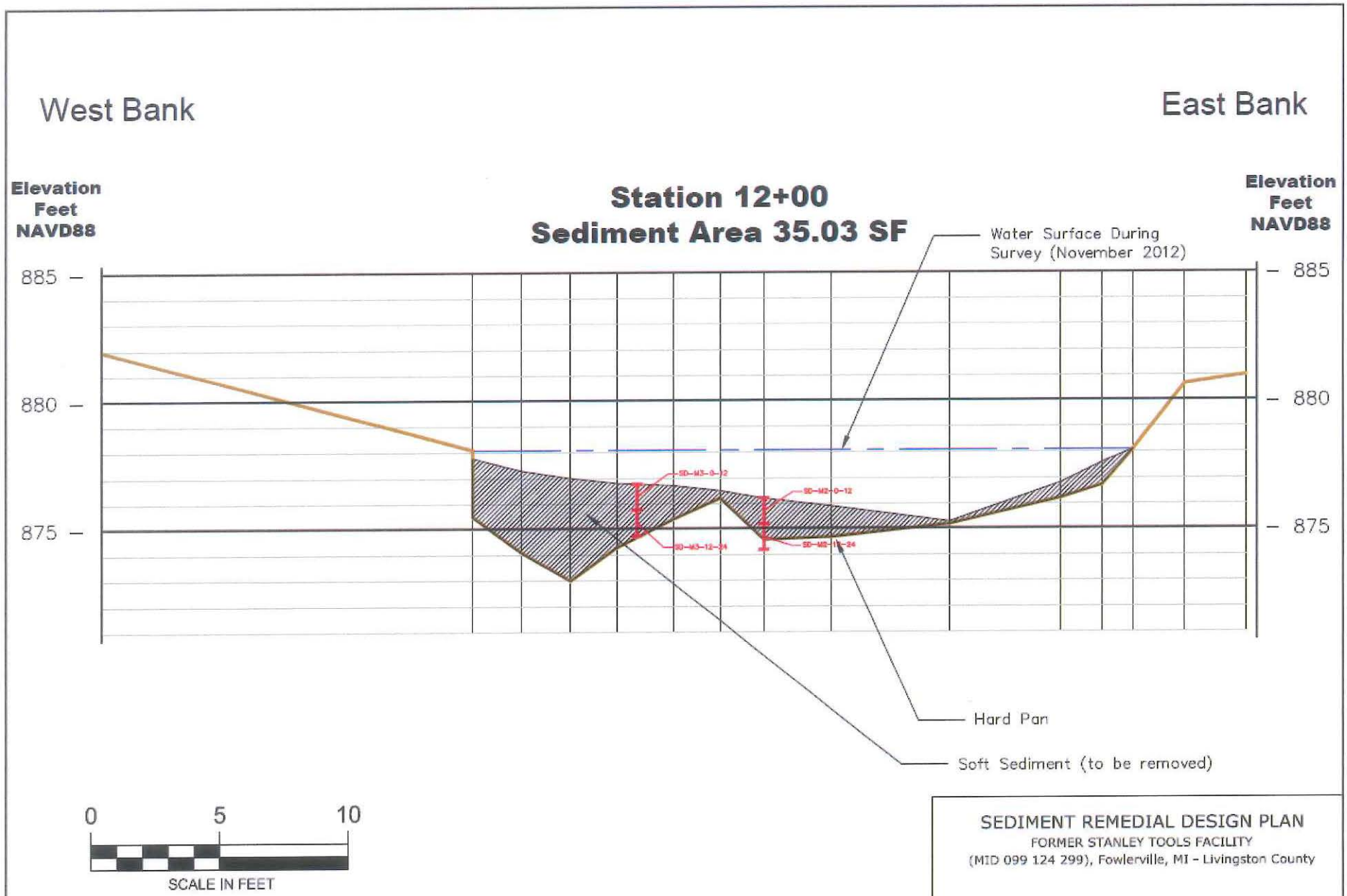
SEDIMENT REMEDIAL DESIGN PLAN
FORMER STANLEY TOOLS FACILITY
(MID 099 124 299), Fowlerville, MI - Livingston County

FIGURE 4-23	DATE Dec 2012	Cross-Section Station 11+00	CLIENT: JCI Plymouth, MI	CTI and Associates, Inc.



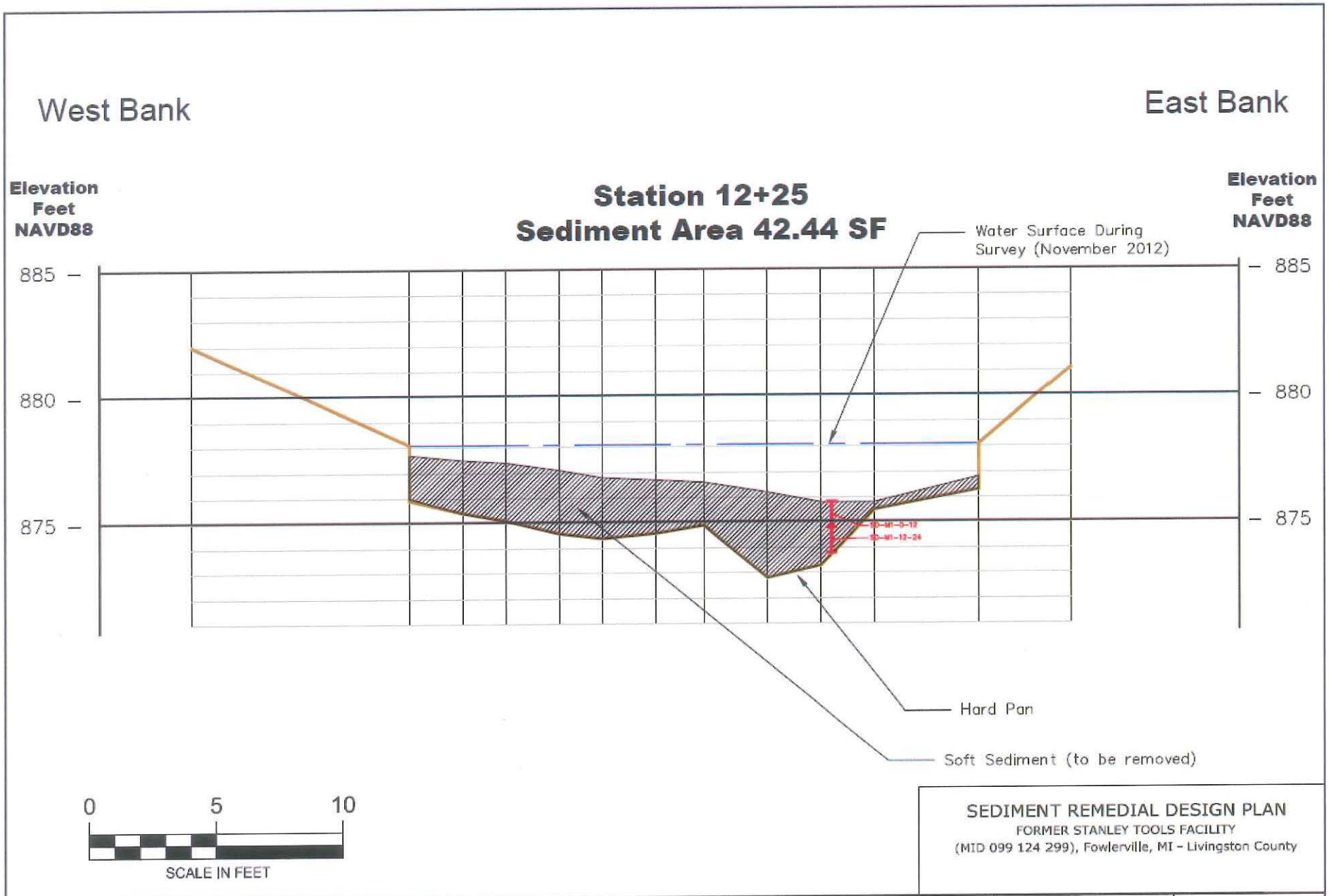
SEDIMENT REMEDIAL DESIGN PLAN
FORMER STANLEY TOOLS FACILITY
(MID 099 124 299), Fowlerville, MI - Livingston County

FIGURE 4-25	DATE Dec 2012	Cross-Section Station 11+50	CLIENT: JCI Plymouth, MI	CTI and Associates, Inc.



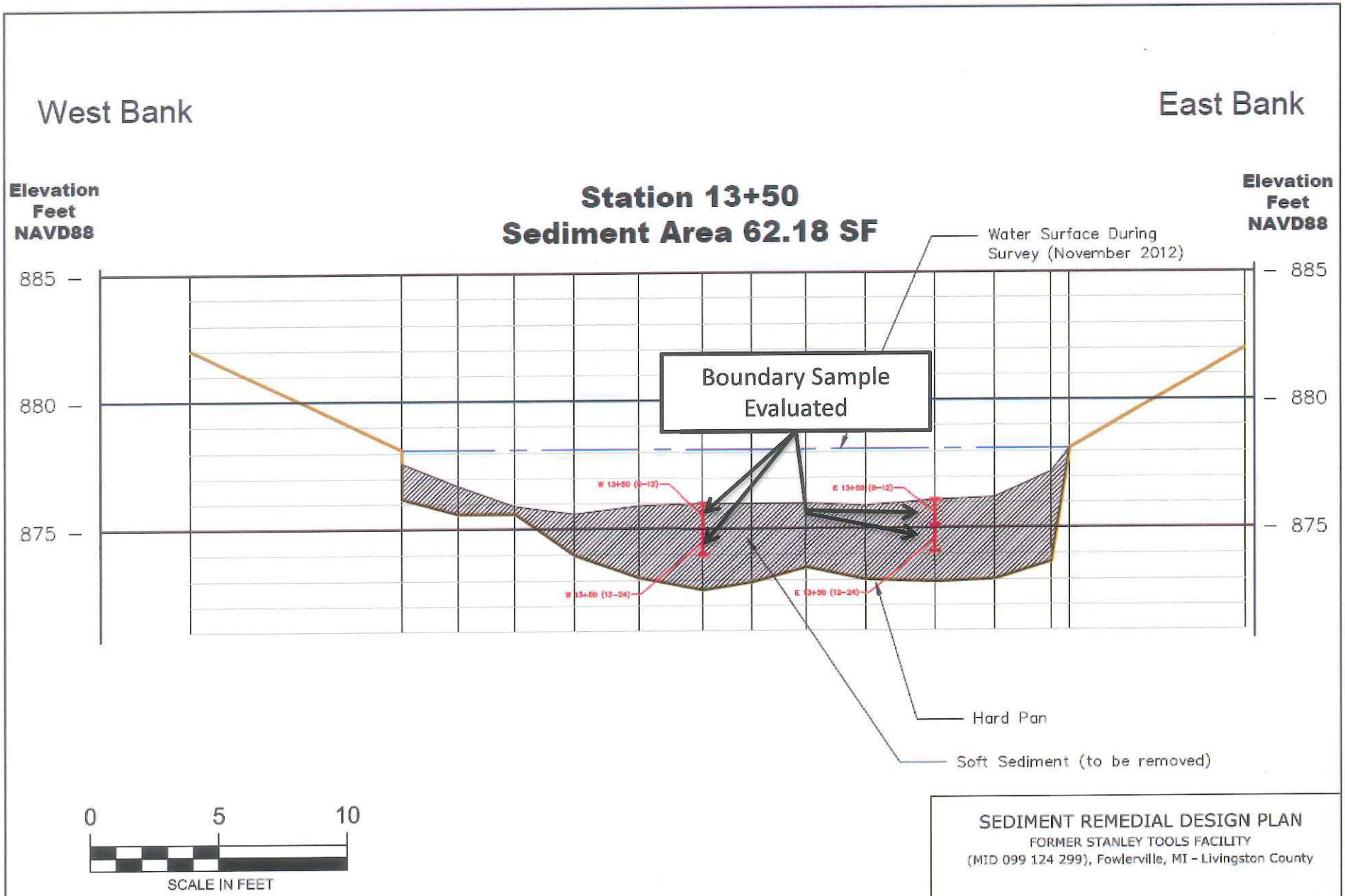
SEDIMENT REMEDIAL DESIGN PLAN
FORMER STANLEY TOOLS FACILITY
(MID 099 124 299), Fowlerville, MI - Livingston County

FIGURE 4-27	DATE Dec 2012	Cross-Section Station 12+00	CLIENT: JCI Plymouth, MI	CTI and Associates, Inc.



SEDIMENT REMEDIAL DESIGN PLAN
FORMER STANLEY TOOLS FACILITY
(MID 099 124 299), Fowlerville, MI - Livingston County

FIGURE 4-28	DATE Dec 2012	Cross-Section Station 12+25	CLIENT: JCI Plymouth, MI	CTI and Associates, Inc.



SEDIMENT REMEDIAL DESIGN PLAN
FORMER STANLEY TOOLS FACILITY
(MID 099 124 299), Fowlerville, MI - Livingston County

FIGURE 4-33	DATE Dec 2012	Cross-Section Station 13+50	CLIENT: JCI Plymouth, MI	CTI and Associates, Inc.

Verification and Monitoring

- Soft sediment removal verification - JCI wants EPH+MBEQ during this phase to actually witness physical monitoring of presence or removal of soft sediment above hardpan!
  - Physically measure and document removal of soft sediments to the hard pan
- Hard pan sampling
  - No laboratory confirmation sampling planned
- Re-establishment of soft sediment in dredge areas
  - No Fill in accordance with the permit
    - Migration and deposition of sediments from up stream only
  - No long-term monitoring planned

Relevant Permit Restrictions

- No work shall be done in the stream during periods of above-normal flows
- No work is allowed from April 1 to June 30 due to critical spawning, migration periods
- No work shall commence within the drain easement without authorization from the Livingston County Drain Commissioner.

Monitoring Well Re-Installation

- Several wells abandoned in 2009
  - Expansion of the plant was planned
  - American Compounding decided to move
  - Plant expansion did not occur
- Well Re-Installation Plan
  - Submitted on 17 Jan 2013
  - Review and approval schedule
  - Schedule for well re-installation

Post-Dredging Site Actions

- Statement of Basis and Final Decision
  - Interim action for sediments
  - Site Closure
- Long-term GW monitoring
  - Mixing Zone Determination Reauthorized through 2016
  - Renew every 5 years

MEMORANDUM

TO: Juan Thomas - U.S. EPA

FROM: John Koehnen - TechLaw

SUBJECT: Meeting Minutes/Summary for March 14, 2002 Meeting with Public Group regarding Johnson Controls, Inc. (JCI) Fowlerville Site

DATE: March 18, 2002

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cc: T. Manning

Juan, as discussed, below is a brief summary of the March 14, 2002 meeting between U.S. EPA and the Environmental/Public Group interested in Corrective Actions at the JCI Site in Fowlerville, MI. I have used my notes, as well as those provided to me by Ms. Carolyn Bury of U.S. EPA in generating this summary. Please make any edits you feel are needed to accurately reflect the discussions of March 14, 2002.

The meeting was held on March 14, 2002 from approximately 1:00 PM to 3:00 PM. The participants and their respective affiliations include:

Andrew Comai, UAW International
Dan Smith, Cons Chair UAW Local 602
James Clift, Michigan Environmental Council
Cindy Roper, Clean Water Action (phone)
Juan Thomas, U.S. EPA
Tony Martig, U.S. EPA
Carolyn Bury, U.S. EPA
Steve Amter, Disposal Safety Inc.
Albert Ettinger, Sierra Club
Mike Garfield, Ecology Center
George Hamper, U.S. EPA
Tom Williams, U.S. EPA Legal
Karen Thompson, U.S. EPA PR
John Koehnen, TechLaw, Inc.

The meeting was initiated with a series of introductions by all participants. After the introductions, Mr. Hamper provided a summary of the overall RCRA Corrective Action process, including the interconnection with CERCLA as well as the broader authorities provided under HSWA in 1984. As well, Mr. Hamper discussed the specifics of the current JCI Order on Consent, which is essentially limited to the RFI phases and does not include provisions for the conduct of required Corrective Measures. Mr. Hamper further discussed the options that U.S. EPA has in proceeding with the action. This includes working to fully complete the RFI (i.e., full nature and extent of contamination defined) under the current order while negotiating a supplemental (new) order to cover the corrective measures.

Following the summary of the RCRA process, and the current status of the Consent Orders with JCI, Mr. Thomas presented a brief discussion on his interpretation of the current problems at the JCI site. Mr. Thomas also discussed the historical Interim Measures (IM) which have been conducted at the site. These included: the sludge and soil removal from SWMUs, tank removal and the recent IM along the banks of the Red Cedar River to control the ongoing release of contamination to the River through buried pipelines. In addition, Mr. Thomas discussed the rationale for requiring JCI to consolidate and submit an RFI Summary. Mr. Thomas indicated that U.S. EPA was still reviewing the RFI Summary Report and that the U.S. EPA certainly has noted data gaps that still exist.

At this time, Mr. Comai discussed whether these actions were adequate to protect the public and the environment, more specifically whether the recent IM was an adequate step. In response, Mr. Hamper provided a brief discussion of the IM and the means to which this would control any releases to the Red Cedar River. Mr. Comai and others again questioned whether this action was enough. Mr. Koehnen reiterated the specific rationale for the IM, noting that the goal was to address an immediate need to control and eliminate the ongoing releases to the Red Cedar River through the buried pipelines. The IM was not designed to be a final Corrective Measure, but rather a means to control these ongoing concerns until such time as longer term Corrective Measures can be put into place. Mr. Koehnen more specifically discussed the installation of the IM and that U.S. EPA/TechLaw still see residual concerns related to the IM action.

At this time, Mr. Amter provided a summary of the Disposal Safety Inc. Report which included an evaluation of several historical documents, including each of the Phased RFI Reports and the RFI Summary Report. Mr. Amter noted several key concerns that appear to be inadequately, or inaccurately, defined in the varied RFI-related submittals. These include, but are not limited to:

- Data provided in these documents does not support the conclusions presented.
- Extent of PCBs in the sediment and River banks has not been adequately defined.
- Extent of "Petroleum" contamination not well defined.
- Tone of Report tends to deflect concern and appears to incorrectly indicate the concentrations and contaminants are not problematic.
- TCE plume does not appear to be three separate plumes as presented, is not likely attenuating as presented, and the term "Offsite" as used in the RFI Summary Report is misleading and likely inaccurate.
- A local well user may be located within ½ mile of the facility.
- Sediment information in RFI Summary does not appear accurate in that the statistical issues are not well defined, the upstream concentrations were used in the SLERA and the arsenic and cyanide concentrations are too high as compared to other background values
- Finally, DSI, and the Group strongly suggest that U.S. EPA conduct future risk assessments to ensure that no biases are introduced into process by JCI.

In response to Mr. Amters' discussion of the concerns related to the RFI at the JCI site, Mr Koehnen stated that U.S. EPA and TechLaw share many of the same concerns. However, since the technical review of these RFI-related submittals is not completed and has not been presented to JCI, U.S. EPA was not at liberty to fully discuss them at this time. It was noted however, that

the next steps at the site are not clear at this time. The noted data gaps would make it difficult to progress to the CMS phase, as the nature and extent needs to be fully delineated to allow for an accurate evaluation of Risk, which is a natural precursor to moving into the Corrective Measures phases. With that, it is noted that there are more immediate concerns at the site, and if the progression does not lend itself to getting into the CMS phase, that additional IMs may potentially be warranted.

In response the discussions on the RFI and the potential time line, Mr. Ettinger and Mr. Garfield questioned whether there are current discharges of contaminants to the Red Cedar River. As well, it was questioned whether we have enough data/data points to determine this. Mr. Koehnen responded that this is uncertain at this time, but the potential exists that there are ongoing releases to the River. It was not yet determined whether additional monitoring points would be needed to assess these conditions. The potential exists that the site, and the contamination could be considered holistically in that any future corrective measures could control any release to the river in general, and not specifically within an area or from a specific unit. This approach has not been discussed with JCI, as the anticipated future uses of the site have not been communicated to U.S. EPA. The group as a whole also expressed concern over the general environmental conditions at the site and stated that the site is within the flood plain and the potential exists that contaminants would be released should a moderate flood occur. In addition, the group provided relevant information on the population in this area and the uses of the Red Cedar River for both fishing and other recreation, noting that carp and pike are likely to be some of the species of fish located in the area around the JCI site. Mr. Comai also discussed the recent development of the property immediately south of the facility. This area is now a housing subdivision and is was noted that children play near the JCI site on a regular basis. Of particular concern, was the location of SWMU I. The SWMU is located within the drainage ditch to the south of the JCI Site, outside of the fence line with no noted warning signs to inform the public of the potential concerns associated with the site. U.S. EPA took note of these concerns.

Mr. Hamper and Mr. Thomas then discussed the next phase of the process and what could be expected. Mr. Hamper indicated that the first step would be for U.S. EPA to complete its review the RFI Summary Report and provide this information to JCI. Mr. Hamper indicated that he expected that step could be completed within a month. Mr. Hamper also indicated that it was U.S. EPA's hope that work on a new or amended Order could be conducted contemporaneously with other RFI or CMS activities. Mr. Hamper also reiterated the potential time lines and other options that could be used to compel corrective measures at the JCI Site. At this time, Mr. Williams described the process from the legal perspective, noting that it is not certain that JCI will be cooperative in moving into, or approving, a new or amended Order to conduct a CMS. As well, due to liability reasons, the process does not typically include the actual implementation of the defined corrective measures. Due to the requirement that multiple Orders be developed, the process could take several months to well over a year to complete. Mr. Hamper stated that it was U.S. EPA's hope that the facility would be amenable to these actions and that at a minimum, U.S. EPA felt it could be possible to be working on both completing the RFI and moving the process into the CMS phase by generating an Order at the same time. The Public Group asked several questions regarding the process outlined above, with the primary goal of determining whether this process would hamper any efforts to prevent current or future releases.

Lastly, before the meeting concluded, the Public Group asked whether the possibility existed that they could form a citizens committee related to the JCI Site. Mr. Hamper indicated that there was certainly nothing to stop them from doing that, and that U.S. EPA could neither prohibit that or sanction it. Mr. Hamper noted that he personally felt it was a good idea and he urged the group to get JCI involved as well, and that JCI's resources may make it easier to function. Ms. Thompson then discussed some of U.S. EPA's programs in this regard. Ms. Thompson stated that the personnel in her section (U.S. EPA Community Relations) were being used on RCRA-related projects more frequently of late since the CERCLA program is slowing down as the numbers of facilities with active operations are reduced. Ms. Thompson also noted that a Liaison will be assigned to the JCI site and would be available to help coordinate some of the activities that the group was interested in conducting. Mr. Comai volunteered to be the point of contact for the U.S. EPA Community Relations Liaison. All parties thought that this was an acceptable resolution.

Additional side-bar discussions were held and the meeting adjourned at approximately 3:00 PM.

J. Thomas

105 WEST MADISON, SUITE 900 CHICAGO, IL 60602
PHONE: (312) 345-8990
FAX: (312) 345-8979

TECHLAW INC.

RZ2.R05902.08.ID.022

June 28, 2002

Mr. Allen Wojtas
U.S. Environmental Protection Agency
Region 5 DE-9J
77 West Jackson Boulevard
Chicago, Illinois 60604

Reference: EPA Contract No. 68-W-02-019; EPA Work Assignment No. R05902; Corrective Action Support; Johnson Controls Inc. - Fowlerville, Michigan; EPA ID No. MID099124299; Review Comments on the RCRA Interim Remedial Measures Report and Facility Investigation Report (RFI Report) dated October 2001; Notice of Deficiency Comments; Task 02 Deliverable

Dear Mr. Wojtas:

Please find enclosed TechLaw's evaluation of the above-referenced documents. For your convenience, this deliverable was e-mailed directly to you and Juan Thomas in WordPerfect for Windows format.

TechLaw has prepared this deliverable based on the specific needs outlined in the Amended Technical Direction Memorandum (TDM), dated May 29, 2002 (TechLaw Project No. 8 under R05902). Additional refinement and clarification of the TDM was discussed with you and Mr. Thomas, as documented in TechLaw's Cost Estimate, submitted to EPA on June 4, 2002.

As you are aware, a technical evaluation of the RFI Report and Interim Remedial Measures (IRM) Report was originally submitted to EPA on December 11, 2001. Since that time, TechLaw was informed that EPA made an internal decision to proceed to the Corrective Measures Study (CMS) phase of the investigation. Therefore, comprehensive comments were prepared based on the assumption that the facility will proceed conditionally to the CMS.

Following this approach, TechLaw has reformatted the December 11, 2001, deliverable to specifically address deficiencies in the definition of the nature and extent of contamination, human health and ecological risk characterization, and other data gaps. Therefore, the attached deliverable is organized by first outlining various data needs for soils, sediment, surface water, and groundwater. The deliverable next outlines problems with the human health and ecological

risk characterization and provides recommendations for refinement. In addition, comments are also provided for the IRM, which was included as Appendix J to the RFI Report. These comments focus on the IRM's relationship to the overall data needs of the site.

Please note that, while it is not unusual to proceed to the CMS stage with data gaps, the magnitude of additional data potentially required, coupled with the need for a more rigorous human health and ecological risk assessment, will likely require cooperation from Johnson Controls, Inc. (JCI). Therefore, a meeting with JCI and EPA representatives is strongly encouraged. While the attached deliverable is designed to summarize TechLaw's concerns, due to the complexity of the issues and other timing considerations, a meeting may be a more suitable vehicle to reach a consensus and effectively proceed to the CMS stage.

If you have any questions, please contact me at (312) 345-8938 or Terry Uecker, TechLaw's Work Assignment Manager, at (312) 345-8974.

Sincerely,

John Koehnen

John G. Koehnen
Regional Manager

cc: F. Norling, U.S. EPA Region 5, w/o attachments
J. Thomas, U.S. EPA Region 5
W. Jordan, Central Files
T. Uecker
Chicago Central Files

REVIEW COMMENTS ON THE RCRA INTERIM REMEDIAL MEASURES REPORT AND FACILITY INVESTIGATION REPORT (RFI REPORT) DATED OCTOBER 2001

JOHNSON CONTROLS, INC.
FOWLERVILLE, MICHIGAN
EPA ID NO. MID099124299

Submitted to:

Mr. Allen Wojtas
U.S. Environmental Protection Agency
Region 5 DE-9J
77 West Jackson Boulevard
Chicago, Illinois 60604

Submitted by:

TechLaw, Inc.
105 West Madison
Suite 900
Chicago, Illinois 60602

EPA Work Assignment No.	R05902
Contract No.	68-W-02-019
EPA WAM	Allen Wojtas
Telephone No.	(312) 886-6194
EPA Technical Advisor	Juan Thomas
Telephone No.	(312) 886-6010
TechLaw WAM	Terry Uecker
Telephone No.	(312) 345-8974

June 28, 2002

REVIEW COMMENTS ON THE RCRA INTERIM REMEDIAL MEASURES REPORT AND FACILITY INVESTIGATION REPORT (RFI REPORT) DATED OCTOBER 2001

JOHNSON CONTROLS, INC.
FOWLERVILLE, MICHIGAN
EPA ID NO. MID099124299

The following comments were generated based upon a completeness and technical adequacy review of the RCRA Interim Remedial Measures Report (IRM Report) and Facility Investigation Report (RFI Report), dated October 2001. The IRM Report was included as Appendix J to the RFI Report.

It is the intent of EPA to work with Johnson Controls, Inc. (JCI) to proceed to the Corrective Measures Study (CMS) phase of the investigation. However, a review of the RFI Report revealed deficiencies in the definition of the nature and extent of contamination, human health and ecological risk characterization, and other data gaps.

The following comments outline various data needs, as well as proposed approaches for proceeding to the CMS stage. A step-wise approach may be necessary due to the interdependence of some of the components. For example, a more rigorous evaluation of human health and ecological risk is critical in developing potential corrective measures. However, a meaningful evaluation of these risks is not possible until additional soil, surface water, sediment and groundwater data needs are met. Following this approach, the comments are broken down into the following categories:

1. Soil, Surface Water, Sediment Investigation
2. Facility-wide Groundwater
3. Human Health and Ecological Risk Assessment
4. Interim Remedial Measures (IRM)

Please note that comments applied to the IRM focus on the IRM's relationship with the overall data needs of the site.

REVIEW COMMENTS ON THE RCRA INTERIM REMEDIAL MEASURES REPORT AND FACILITY INVESTIGATION REPORT (RFI REPORT) DATED OCTOBER 2001

JOHNSON CONTROLS, INC.
FOWLERVILLE, MICHIGAN
EPA ID NO. MID099124299

SOIL, SURFACE WATER, SEDIMENT INVESTIGATION

GENERAL COMMENT

1. Sampling for hexavalent chromium has not been conducted during any phase of the RCRA Facility Investigation (RFI). Plating facilities with chromium in their waste material should evaluate the potential for hexavalent chromium during investigative activities. Although several remedial efforts have occurred to remove sludges within certain facility units, it is possible that hexavalent chromium may exist at other on-site and off-site locations. For example, test pit B-TP-1 was installed in August 2001 as part of the IRM. B-TP-1 is located directly west of soil sampling location GB-89. The boring log in Appendix F of the RFI Report described the soil as a "pocket of light green soft silty clay-like material." This description is consistent with the descriptions of hexavalent chromium. Due to the recent observation of this material, it would be prudent to sample soil and sediment in areas with known high chromium concentrations. The CMS work plan should address this issue.

SPECIFIC COMMENTS

1. Section 5.3.1 Soil Background/Groundwater Background. There was a very limited amount of background data generated during the RFI. Soil background levels were established in 1985 for Solid Waste Management Unit (SWMU) A clean-closure activities, and Monitoring Well OW-7 was installed on-site in an upgradient area of the facility. Additional background soil data was collected during Phase II activities. However, it appears that the on-site location chosen for soil background sampling is not an actual background sampling location since it has been impacted by facility operations. Zinc was detected in soil at 3 to 5 feet below ground surface (bgs) at a concentration of 557 milligrams/kilogram (mg/kg) in sampling location BG3. The statewide default value for zinc specified in Michigan Part 201 is 47 mg/kg. Arsenic was detected in soil at 3 to 5 feet bgs at a concentration of 23.4 mg/kg in sampling location BCK-3/2. The statewide default value for arsenic specified in Michigan Part 201 is 5.8 mg/kg. Therefore, the facility has not defined the extent of contamination (qualitative/quantitative) relative to background levels, as required in the Administrative Consent Order. Additional sampling must be addressed in the CMS work plan for determining background soil levels.

2. Section 6.1.4 Chlorinated Solvents. The second paragraph of this section of the RFI Report indicates that chlorinated solvents, such as trichloroethylene (TCE), were used on-site "in small quantities during much of the plant history." This paragraph suggests three potential source areas for the TCE contamination, including the western truck dock and/or the area of the former cyanide treatment tanks for the hot spot at soil boring TCE-37. Table 6-3 of the RFI Report indicates that TCE was not detected at TCE-37, however, soil boring TCE-38 had a concentration of 1,200 micrograms/kilogram (µg/kg); therefore, it is assumed that the western hot spot should have been identified at TCE-38 (also see Figure 5-18 in the RFI Report). This correction should be reflected in the CMS work plan.

3. Section 6.2 Soil Character. Figures 5-2, 5-3, and 5-4 of the RFI Report present concentration contours for total chromium, total copper, and total nickel, respectively, in soil. Due to the exceedances of residential and industrial Preliminary Remediation Goals (PRGs) for these metals in the area of SWMU H and to the north of SWMU F, additional soil borings are suggested along the northern bank of the North Ditch. This sampling is necessary to define the northern boundary of inorganic contamination in soil.

   Similarly, additional soil sampling should be conducted between soil borings GB-69, GB-70, and GB-91 and the Red Cedar River, since chromium concentrations detected at these locations were 676, 223, and 1,130 mg/kg, respectively (Table 6-2B of the RFI Report). All three soil borings exceed the irrespective residential PRG, while GB-69 and GB-91 also exceed the industrial PRG. This sampling is necessary to confirm whether chromium contamination continues further west to the bank of the Red Cedar River.

   As indicated on Figure 5-1 of the RFI Report, soil boring GB-5 is located along the perimeter of SWMU G. Because the residential PRG for cyanide was exceeded at GB-5, further soil sampling is recommended to the west and northwest of this boring to determine the extent of contamination. The CMS work plan should include additional soil sampling in this and the previously mentioned areas.

4. Section 6.2 Soil Character. The installation of soil borings included the collection of continuous 4-foot lengths of soil cores. Only small amounts of soil were collected for laboratory analysis since photoionization detector (PID) readings were used to screen samples for analysis. This screening methodology is inconclusive, though, since: (1) it assumes that contaminants in the soil core will volatilize immediately upon opening the sample sleeve; (2) the PID was used to detect volatiles directly from the soil core rather than through headspace analysis; and (3) a PID is designed for gross detection purposes and cannot be assumed to provide data of sufficient analytical quality to support a nature and extent investigation. As a result, a minimal number of soil core sections were sent to the laboratory for analysis; certainly an insufficient number to demonstrate the vertical and horizontal extent of TCE contamination at all three TCE hot spots. Based on this information, the CMS work plan should include an investigation to further define the extent of TCE soil contamination in the southeast corner of the site, as well as evaluating the off-site extent of TCE contamination.

5. Section 6.2 Soil Character. It is apparent that a number of the soil borings were advanced beneath the water table and, hence, any soil samples collected within the aquifer will be influenced by the groundwater contamination. Therefore, the data presented in Tables 6-2A and 6-2B of the RFI Report do not clearly represent the contamination present in the soil above the water table, but rather a mixture of data for dry soil and saturated soil. Hence, the horizontal and vertical extent of contamination can only be understood by considering the soil and groundwater contamination as a whole. This should be considered when preparing the CMS work plan.

6. Section 6.4 Surface Water Character. Surface water samples were collected at five Phase I sampling stations (RC-1 through RC-5). However, it is not clear that the Phase I sample locations adequately represent potential contamination emanating from the site. Page 4-5 and Figure 4-4 of the RFI Report describe former discharges and surface water drainage patterns at the facility. It is not evident that the Phase I sample locations adequately document the former drainage patterns and surface runoff discharge locations to determine if sample locations are representative of contaminant migration pathways from the site.

7. Section 6.4 Surface Water Character. This section of the RFI Report indicates that quarterly surface water sampling at an "upstream and downstream station have shown no impact from the site." However, it is not clear whether the detection or reporting limit were appropriately sensitive (i.e., below water quality criteria). Also, the quarterly monitoring results appear to represent only a subset of the chemicals of potential concern at the site. The summary table for surface water (Table 5-17 of the RFI Report) does not present detection limits and does not include all chemicals of concern at the site. An evaluation of the raw data for all surface water is necessary to determine whether surface water was impacted. The CMS work plan should address this concern.

8. Section 6.5 Sediment Character. The vertical extent of sediment contamination along the Red Cedar River has not been adequately defined. At several locations, constituents were detected at higher levels in the samples collected at depth (6 to 12 inches bgs) than in the shallow samples (0 to 3 inches bgs). For example, at sample locations RC-22A, RC-19, and RC-15, the deeper samples indicated higher concentrations of arsenic, barium, chromium, lead, mercury, and Aroclor 1248. The deeper sample at RC-19 indicated a higher concentration of total cyanide, and the deeper sample at RC-22A indicated a higher concentration of total cyanide and dissociable cyanide. In addition, deep and shallow samples were not collected at each location. Approximately 46 percent of the sediment samples collected from the Red Cedar River during Phase III activities were collected at only one depth.

   Similarly, the extent of sediment contamination in the drainage ditches does not appear to be adequately defined. All four of the sediment samples collected in the northern ditch and six of the seven samples collected from the southern ditch were collected at only one depth. At only one sample location (SD-6) were samples collected at two depths. These

analytical results indicated a higher arsenic concentration in the sample collected at depth when compared to the results from the shallow sample. The RFI Report concludes that because the sample at depth was collected from the furthest upstream location and showed generally lower concentrations than in the shallow sample, the impact in the southern ditch is shallow in extent. This conclusion cannot be made since other locations indicated higher concentrations than the shallow sample at the furthest upstream location.

The vertical extent of sediment contamination in the Red Cedar River, the Northern Drainage Ditch, and the Southern Drainage has not been adequately defined. The CMS work plan should include provisions to further delineate the extent of sediment contamination.

9. Section 6.5 Sediment Character. The extent of copper, nickel, and zinc contamination in sediment in the Red Cedar River and the drainage ditches has not been adequately defined. Phase II analytical results indicated elevated levels of copper, nickel, and zinc at several sample locations above statewide default background levels, as established by the Michigan Part 201 Generic Cleanup Criteria and Screening Levels. Analysis of these constituents was not performed during the Phase III investigation.

   Phase II analytical results indicated elevated levels in the southern ditch as high as 5,120 mg/kg for copper, which exceeds the statewide default background level of 32 mg/kg; 3,090 mg/kg for nickel, which exceeds the background level of 20 mg/kg; and 32,400 mg/kg for zinc, which exceeds the background level of 47 mg/kg. Also, the furthest downstream sediment sample collected during Phase II sampling activities showed an exceedance of the background level for zinc. This would indicate that the extent of zinc contamination in the Red Cedar River has not been defined.

   Since analysis of copper, nickel, and zinc was not performed during the Phase III investigation in either the southern ditch or the Red Cedar River, the extent of contamination cannot be defined. The CMS work plan should address these concerns.

REVIEW COMMENTS ON THE RCRA INTERIM REMEDIAL MEASURES REPORT AND FACILITY INVESTIGATION REPORT (RFI REPORT) DATED OCTOBER 2001

JOHNSON CONTROLS, INC.
FOWLERVILLE, MICHIGAN
EPA ID NO. MID099124299

FACILITY-WIDE GROUNDWATER

GENERAL COMMENTS

1. Nature and Extent: The nature and extent of groundwater contamination at the facility defined during the three phases of the RFI, Pre-Phase I (prior to 1990), Phase I (1990), Phase II (1994), and Phase III (2000) investigations, is reportedly attributable to historical manufacturing activities. Contaminants exceeding Michigan Part 201 Groundwater Residential and Commercial I Drinking Water Criteria (GRCDWC) and/or PRGs and U.S. EPA Maximum Contaminant Levels (MCLs) throughout the site include a variety of metals, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), and free-product kerosene. However, both the quality and quantity of data are not sufficient to thoroughly describe the full extent of contamination.

   In general, groundwater impacted by various metals has been identified across the facility. However, the most recent metals analysis conducted as part of the Phase II groundwater investigation was limited to dissolved metals. A review of the Phase I groundwater investigation results suggests that many of the total metals concentrations exceeding current PRGs, GRCDWCs and/or MCLs did not exceed the same criteria for dissolved metals analysis. Also, since the Phase III samples collected from the monitoring well network were only intended to update Phase II data, a limited number of previously sampled wells were sampled. In addition, metals were eliminated from the list of analytes. As a result, all evaluations on the extent of metals groundwater contamination prior to Phase II are based on total metals and, therefore, not comparable to subsequent results.

   In addition, PCB Aroclor 1248 was detected in two Phase II groundwater samples at concentrations of 98 μg/liter (μg/L) and 1.2 μg/L, above the PRG, GRCDWC, and MCL criteria. However, PCB analysis was conducted on only eight of the 29 Phase II groundwater samples. Also, the six non-detections were recorded at sample quantitation limits of 1.0 μg/L, above PRG, GRCDWC, and MCL criteria. As a result, there is a potential for concentrations of PCBs to exist above regulatory limits at these six locations.

Further, numerous nature and extent data gaps are present in the area formerly occupied by the manufacturing building. Due to the nature of historical manufacturing activities, the groundwater underlying this area may have been impacted. However, this area was not included in any previous groundwater investigations.

As a result of these data gaps, installation of additional groundwater monitoring wells in the area formerly occupied by the manufacturing building appears necessary. In addition, it is recommended that all 29 Phase II sampling locations be sampled and analyzed for PCBs, including all locations previously sampled for PCBs and that all sample quantitation limits fall below regulatory standards. It is also recommended that a comprehensive facility-wide groundwater sampling round be conducted to provide results which are comparable both spatially and temporal across the facility. It is further recommended that future samples be analyzed for comparable analytes (i.e., all samples should be analyzed for both total and dissolved metals). The CMS work plan should include a detailed discussion of the rationale supporting the location of additional monitoring wells, monitoring well construction, facility-wide groundwater sampling activities, recollection of groundwater samples for PCB analysis from the Phase II sample collection locations, and all other applicable activities necessary to obtain a clear and comprehensive determination of the nature and extent of groundwater contamination. Refer to Facility-wide Groundwater General Comment No. 4 for additional data quality concerns.

2. Contaminant Source Areas: Several source areas, including settling ponds and sludge spill and/or disposal areas, have been identified and, in some cases, subject to interim removal activities. However, available data suggest the potential for additional source areas requiring further evaluation. Although extent of contamination has yet to be clearly defined, the existence of at least two areas of free-product weathered kerosene/PCB contamination, a large TCE plume, and potential large-scale metals impacts have been confirmed.

   The extent of the free-product weathered kerosene/PCB plume identified beneath SWMU C has yet to be adequately defined. During the Phase II groundwater investigation, free product was noted in MW-C3. During Phase III sampling activities, weathered kerosene commingled with PCBs was recorded at a thickness of 2.13 feet in MW-C1, and a thickness of 0.48 feet in MW-C3. Subsequent fingerprint analysis of the free product encountered at MW-C3 suggests the properties of the material are consistent with those of weathered kerosene. PCB analysis resulted in an Aroclor 1248 concentration of 630 mg/kg, exceeding PRGs, GRCDWCs, and MCLs. Although free product was not noted in adjacent cross-gradient wells, there is no groundwater data upgradient of this area.

   During the closure of SWMU A, free product was observed along the southern extent of the excavation. This information combined with other free product observations, analytical results, and previous manufacturing operations suggests that the former

kerosene settling ponds are likely source areas. In addition, it appears that the kerosene may be acting as a carrier and allowing commingling of PCBs. Based on these results, it is likely that a localized plume of PCB-containing free-product contamination was present in and around SWMU C, extending north to SWMU J.

Based on a review of the TCE groundwater investigation results, three potential source areas have been identified. As presented in Section 6.3.2 of the RFI Report, the eastern-most source area was identified in the vicinity of SWMU L. Although the RFI Report suggests that the source area may be located off-site to the east, available data is insufficient to make a definitive conclusion.

A second potential TCE source area was identified in the vicinity of boring TCE-15. As suggested in Section 6.1.4 of the RFI Report, a former degreasing process likely operated within the former manufacturing building around 1968 near the location of boring TCE-15. Based on groundwater contaminant speciation and the presence of higher soil VOC concentrations from the same sample collection interval, the conclusion that a source area was located in close proximity to boring TCE-15 appears valid.

A third potential TCE source area was identified further west, in the vicinity of boring TCE-37. The RFI Report suggests that the former cyanide treatment system is a likely source of this contamination due to its proximity to the boring. Regardless of the potential source, TCE results at boring TCE-37 are a clear departure from upgradient values and are indicative of an additional source area.

Additionally, the laboratory reported having received several Phase III VOC samples containing 1-15 mm of headspace. Of the 21 groundwater monitoring wells samples for VOCs in Phase III, samples from 11 of these wells were noted to contain headspace. Therefore, the groundwater sampling data should be considered suspect for VOCs, which has the potential to directly impact the nature and extent determination. This issue is further evaluated in Facility-wide Groundwater General Comment No. 4.

To eliminate data gaps associated with the extent of free product weathered kerosene/PCBs, it will be necessary to collect additional groundwater samples from the area upgradient of MW-C1 and MW-C3. In addition, although three potential TCE source areas have been presented, the extent of contamination for the two eastern areas with the highest TCE concentrations, and the source of the easternmost plume have yet to be adequately defined. To resolve these data gaps, it may be necessary to install additional monitoring wells to the south and east of the high TCE concentration areas, potentially at off-site locations. It is recommended that groundwater samples be collected from both the upper and lower facies. The CMS work plan should include a detailed discussion of activities planned to eliminate all of the data gaps discussed above,

including additional sample collection locations, analytical protocol, and all other applicable activities necessary to obtain a clear and comprehensive determination of the extent of groundwater contamination.

3. Groundwater Contaminant Migration: Based on a review of Figures 4-8 through 4-12 and supporting data of the RFI Report, it is evident that data gaps exist in the area west of SWMU A, in the area formerly occupied by the manufacturing building and the areas south and east of the facility boundaries. Also, localized impacts on groundwater flow in the vicinity of the north and south ditches does not appear to have been adequately evaluated. In addition, groundwater flow to the west is evident, but northern and southern components of groundwater flow are unclear, and no data is presented to address potential seasonal impacts. Further, Phase I and II aquifer tests resulted in a wide range of hydraulic conductivities typical of glacial soils. As a result, there is a strong potential for localized variations in groundwater flow and the potential for unidentified preferential groundwater migration pathways. The CMS work plan should include a detailed discussion of activities planned to address these data gaps, including the collection of facility-wide groundwater elevation data, which may necessitate installing additional groundwater monitoring wells.

4. Data Quality: Based on the laboratory receipt checklist, several of the VOC vials contained 1-15 millimeters (mm) of headspace. Of the 21 groundwater monitoring wells sampled for VOCs in Phase III, samples from 11 of these wells (MW-A1, MW-A2, MW-A3, MW-F1, MW-F3, MW-F4, MW-F5, MW-G1, MW-G3, MW-G4, and MW-J1) contained headspace. Upon inspection of the analytical data in Table 6-6 of the RFI Report, it was noted that wells which contained VOC concentrations in excess of applicable screening criteria (i.e., MW-A1, MW-A2, MW-A3, and MW-F3) did not exhibit any VOC concentrations above analytical detection limits. This evaluation suggests that the groundwater sampling data should be considered suspect for VOCs. It is recommended that an additional comprehensive round of sampling be collected to assess the site-wide VOC groundwater contamination.

   In addition, analytical protocol from the various phases of the groundwater investigation are inconsistent and cannot be accurately compared. The initial groundwater investigation relied upon total metals analyses, Phase I activities relied on total metals and some dissolved metals, and Phases II and III used only dissolved metals analyses. Also, regulatory standards typically apply to total metals. Therefore, results from Phases II and III can neither be compared for previous results nor considered entirely protective of or comparable to regulatory standards.

   Further, detections of several metals in samples collected at shallow, intermediate, and deep monitoring wells, including background wells, at concentrations exceeding PRGs and/or GRCDWCs suggest a potential facility-wide impact. However, virtually no data points are present in and around the former manufacturing building and IRM areas. The

CMS Work Plan should include a detailed discussion of activities planned to eliminate each of the data quality concerns presented above, which may necessitate the installation of additional groundwater monitoring wells.

5. Background: An evaluation of the analytical results for monitoring wells MW-BCK-1, -2 and -3 (Table 5-10 of the RFI Report) revealed detections of arsenic and cyanide at concentrations exceeding current PRGs, GRCDWCs, and MCLs. It is therefore, unclear whether a reliable background data set was obtained or whether the background groundwater monitoring location was/is located within an area of contaminated groundwater. As a result, it appears that the on-site location chosen for groundwater background sampling may not be representative of actual background conditions. Therefore, the facility has not defined the extent of contamination (qualitative/quantitative) in relation to background levels, as required in the Administrative Consent Order. The CMS work plan should include a detailed discussion for the installation of additional background groundwater monitoring wells. This discussion should include an evaluation of suitable monitoring well locations, proposed screened intervals, and all other activities planned to provide reliable background data.

6. September 1988, Administrative Consent Order, 1994 RCRA Corrective Action Plan, and other appropriate and relevant guidance documents: Section VI of the Administrative Consent Order states that "Stanley [JCI] shall perform a RCRA Facility Investigation Study of hazardous waste constituents...as set forth in the RFI Scope of Work (Attachment I)..." Attachment I, Task 10 defines the investigation objectives required to complete the RFI. Following is a description of each objective and an assessment of whether or not the RFI Report has completely fulfilled that objective.

Data Analysis Objective: This objective requires JCI to analyze the data and prepare a report on the type and extent of contamination, including sources and migration pathways. Furthermore, this objective states "The report will describe the extent of contamination (qualitative/quantitative) in relation to background levels indicative for the area."

The amount of background data generated during the RFI was very limited. Groundwater background conditions were established with the installation of monitoring well OW-7 on-site in an upgradient area of the facility. Additional background groundwater data was collected during Phase II activities. However, for the following reasons it does not appear that this well is located in an area representing background conditions:

- According to Figure 5-10, arsenic was detected in groundwater at a concentration of 0.043 μg/L in MW-BCK1, which was one of the highest arsenic groundwater concentrations found on-site.

- 1,4-dichlorobenzene was detected at a concentration of 0.81 μg/L in MW-BCK-2 (see Table 5-10).

- Cyanide is a prevalent site-specific contaminant which was detected in OW-7 from 1989 through 1991. It should be noted that this well has not been sampled since 1991.

Based on this evaluation of the RFI data, it appears that the on-site location chosen for background groundwater sampling is not truly representative of background conditions since it has been impacted by facility operations. Therefore, the facility has not defined the extent of contamination (qualitative/quantitative) in relation to background levels, as required in the Administrative Consent Order.

Protection Standards Objective: This objective requires the facility to supply information to support development of groundwater protection standards for all Appendix IX constituents found in groundwater at all regulated units. This requires the facility to compare constituents found in groundwater to MCLs, background concentrations, or alternate concentration limits (ACLs). In addition, the facility should provide comparisons to other relevant protection standards such as GRCDWCs.

The facility has complied with all tasks outlined in this objective with the exception of comparing the facility groundwater concentrations to background concentrations. As noted above, it does not appear that the on-site background location is acceptable. Therefore, this evaluation has not been performed.

The CMS work plan should satisfactorily address each of the concerns stated above and all other outstanding RFI objectives.

REVIEW COMMENTS ON THE RCRA INTERIM REMEDIAL MEASURES REPORT AND FACILITY INVESTIGATION REPORT (RFI REPORT) DATED OCTOBER 2001

JOHNSON CONTROLS, INC.
FOWLERVILLE, MICHIGAN
EPA ID NO. MID099124299

HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

GENERAL COMMENTS

1. The RFI Report does not include an adequate evaluation of the potential threat to human health and the environment. The report includes an initial screening level evaluation of ecological risks from sediment contamination, however, standard EPA guidance. *[Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments*, Office of Solid Waste and Emergency Response, EPA/540/R-97/006, June 1997; and Risk Assessment Guidance for Superfund Volume I, Human Health Evaluation Manual (Part A), EPA/540/1-89-002, December 1989] for assessing potential exposures and risk have not been followed. Although a screening has been presented using the EPA Ecological Data Quality Levels (EDQLs), the results are not presented in terms of potential toxicological effects to wildlife. For example, concentrations of chromium, copper, lead, nickel, zinc, and PCBs, in sediment, are all above EDQLs. However, a generalized conclusion indicating that impacts from the site are "significantly reduced" is made, prior to any meaningful assessment of the potential for ecotoxicological effects. The presentation and evaluation of results related to the potential for impacts is considered highly speculative, does not follow EPA recommended guidelines for conducting ecological risk assessments, and the conclusions are not supported by the current presentation. While strict adherence to EPA guidelines is not necessary, the current assessment is not considered adequate to determine if risk is unacceptable or if significant data gaps are present. A significant data gap exists in that the screening results indicate the potential for adverse effects to occur (i.e., exceedences of human and ecological benchmarks), which indicates a baseline risk assessment should be performed to evaluate potential site-specific receptors and exposures. An adequate evaluation of the potential threat to human health and the environment should be conducted through a risk assessment during the CMS.

2. The RFI Report has not presented an indication of potential exposures or risks to human and ecological receptors. The RFI Report includes a screening level comparison of the sediment concentrations to EDQLs. However, this does not represent an adequate evaluation of other site-specific human and ecological exposures. In addition, exposure

to other contaminated media (i.e., soil and surface water) have not been evaluated. The risk assessment conducted during the CMS should include an evaluation of all potential site-specific human and ecological exposures for all contaminated media.

3. The determination for removing soils or source areas is based on site-specific conditions and an estimate of the potential for risk. Estimates of the volumes of soil or other media cannot be determined without the results of the site-specific baseline risk assessment. This is considered a serious data gap preventing completion of the CMS and should be addressed when preparing the CMS work plan.

SPECIFIC COMMENTS

1. Section 4.7.5 Ecology. A specific description related to the current ecological status of the site (terrestrial and aquatic) must be used as the basis for selecting representative species that may be using the site or exposed to contamination at the site. The RFI Report includes only a general discussion of common species in the representative forest communities for the State of Michigan. The information does not appear to be related to, or used in, the screening level ecological risk assessment. The risk assessment should include the appropriate representative species for the site.

2. Section 4.7.6 Endangered Species. Section 4.7.6 and Table 4-9 provide a listing of threatened or endangered species that occur in Livingston County. However, there is no mention as to whether any of the species may exist on or near the site. In particular, the list includes six geographic features (e.g., blue heron rookery) that may be considered sensitive ecosystems. The type of ecosystem and receptors specific to the site should be identified and considered when conducting the risk assessment.

3. Section 6.5.2 Screening Results. The initial screening was conducted using only the most recent data collected (i.e., Phase III), which eliminated any evaluation of several potential contaminants of concern that were detected in Phases I and II, but not detected in Phase III results. However, this is not appropriate unless justification exist that the detected concentrations from Phases I and II are no longer indicative of site conditions. In addition, the screening is not considered complete since the nature and extent of contamination has not been adequately defined. After the nature and extent of sediment contamination has been adequately defined, the risk assessment should evaluate all sediment data collected through all investigative phases.

RECOMMENDATIONS

1. Based on EPA risk assessment guidance and protocol, a conceptual site model should be prepared to identify site-specific exposure pathways for human and ecological receptors. The conceptual site model and exposure pathways should be based on site-specific conditions and include a description of the current and future uses by both human and ecological receptors.

Standard human health default parameters and ecological exposure factors should be used to then evaluate all potential exposures and receptors to determine the primary risk pathways and chemicals that would be expected, based on site-specific conditions. For example, uptake of PCBs by waterfowl (e.g., herons) through ingestion of benthic invertebrates may be indicated as the primary pathway, based on modeling of PCBs (i.e., tropic transfer) through the food chain. Results of food-chain modeling will be necessary to determine whether an area may be considered an unacceptable risk, and thus require remediation. Similarly, based on the risk assessment results, it may be determined that the nature and extent of contamination has not been adequately defined.

The specific elements required for an adequate baseline risk assessment include:

- Conceptual Site Model
- Identification of site-specific Human Exposure Pathways and exposures to Ecological Receptors of Concern
- Determination of the Potential Presence or Use of the Site/Adjacent Areas by Sensitive or Species or Special Concern
- Exposure Assessment to Identify Exposure Point Concentrations and Potential Dose Ingested by Receptors
- Toxicity Assessment for Exposure Pathways and Specific Species for Chemicals of Potential Concern Identified in Risk Assessment
- Risk Characterization Resulting from Baseline Risk Assessment

2. It should be noted that significantly elevated concentrations of PCBs have been detected at the site. PCBs are considered persistent, bioaccumulative, and toxic (PBT) chemicals and may be transferred through the food chain through contaminated plant and animal tissue. Moreover, exposure to PCBs due to their commingling with kerosene may make them more bioavailable. If the conceptual site model indicates that there are relevant ecological exposure pathways, analysis of plant and animal tissue or toxicity testing may be considered necessary to determine whether site concentrations are at levels of concern.

REVIEW COMMENTS ON THE RCRA INTERIM REMEDIAL MEASURES REPORT AND FACILITY INVESTIGATION REPORT (RFI REPORT) DATED OCTOBER 2001

JOHNSON CONTROLS, INC.
FOWLERVILLE, MICHIGAN
EPA ID NO. MID099124299

INTERIM REMEDIAL MEASURES

GENERAL COMMENTS

1. Following excavation activities, two test pits were installed in the vicinity of the North Seepage Area (E-TP-1 and E-TP-2). A total of two soil samples were then collected from E-TP-2. However, analytical results for these samples do not demonstrate that the excavation was successful in removing all impacted soils, nor does the data define the limits of the impacted soils. The test pit VOC analytical data had significantly elevated detection limits, while the SVOC and PCB data had somewhat elevated detections limits. Significantly elevated levels of PCBs were also detected in test pit sample E-TP-2.

2. Following excavation activities, six test pits were installed in the vicinity of the South Seepage Area (C-TP-1, C-TP-2, B-TP-1, B-TP-2, B-TP-3, and B-TP-4). Two soil samples were then collected from two depths within B-TP-3. However, the analytical results for the two samples do not demonstrate that the excavation was successful in removing all impacted soils, nor does the data define the limits of the impacted soils. The soil sample contained elevated levels of arsenic, chromium, mercury, polycyclic aromatic hydrocarbons [PAHs (phenanthrene)], and PCBs (Aroclor 1248) and had significantly elevated detection limits for VOCs. Additionally, the excavation samples detected elevated levels of VOCs. One sample (collected from B-TP-3) had elevated detection limits for several compounds (arsenic, cadmium, VOCs, SVOCs, and PCBs). In addition, the sediment collected from the 18-inch diameter pipe exhibited elevated concentrations of VOCs, SVOCs, and PCBs. In addition, significantly elevated levels of PAHs and PCBs were detected in test pit sample E-TP-3 (5 feet bgs). Therefore, it is not possible to evaluate contaminant concentrations for these IRM samples. However, it appears that the short-term objective of mitigating "oil seepage" into the Red Cedar River has been addressed by the IRM.

3. The IRM was also intended to gather additional information regarding the nature and extent of the constituents associated with the oil seepage along the Red Cedar River, to allow for an appropriate consideration during the remaining RFI activities. The IRM did not meet the objective of assessing the nature and extent of contamination associated with the remediated seeps or for assessing the source of the seeps. Based on the identification of seeps, which were the impetus for the IRM, the length of the Red Cedar River adjacent

to and downstream of the facility should be the subject of a seep evaluation to ensure that additional seepage points do not exist. This migration pathway (groundwater surfacing) has not been addressed by the RFI and needs to be addressed as a separate area.

4. Insufficient data quality objectives were established, and in many cases "visual" evidence of contamination was used as a decision point in the IRM. Visual evidence of contamination is not acceptable data for decision making purposes. Development of appropriate data quality objectives is addressed in *Guidance for the Data Quality Objectives (DQO) Process,* EPA/600/R-96/055, August 2000. This document specifies the level of data necessary for decision making purposes. The IRM conclusions and investigation discussions need to be revised in light of the DQO process outlined in the above-referenced document.

5. In addition to the issues presented above, the following data gaps should be addressed in the CMS work plan:

   - Neither the horizontal nor vertical extent of contamination associated with the seep IRM along the Red Cedar River was fully defined.
   - The source of the contamination identified during the seep IRM was not identified.
   - Given that the IRM does not represent a final remedial action for this area, further investigation of this area should be conducted in association with the RFI activities.
   - The RFI should address the IRM seep area as an additional area of concern (AOC).
   - Copper, nickel and zinc were not analyzed during the IRM sediment sampling, which is a data gap.

RCRA ADMINISTRATIVE ~~COMPLAINT~~ 3008(h) Consent Agreement
CONCURRENCE/ROUTING FORM

PART I. Background

FACILITY NAME Johnson Controls EPA ID# MID 099 124 299

ECAB ASSIGNEE Juan Thomas ASST. REG. COUNSEL Tom Williams

PHONE 6-6010 PHONE 6-0814

~~Date of referral, if any, by State~~ _____
~~Small Business per SBREFA(Y/N), if yes, date of letter~~ _____
Date of Letter of Notice to the State _____

PART II. Proposed Complaint — Concurrences

The proposed ~~Complaint~~ 3008h Consent Agreement package must include the following documents:

Tab 1. Transmittal letter ✓
~~Tab 2. Complaint, including penalty table~~ Proposed Consent Agreement under 3008(h)
Tab 3. Transmittal letter attachments - Photocopy of
~~(A) Current version of 40 CFR Part 22~~
~~(B) RCRA Civil Penalty Policy (optional)~~
(C) Any other attachments referenced ✓
~~Tab 4. Certificate of Service~~
~~Tab 5. Supporting documents~~
~~(A) Penalty calculation worksheets~~
~~(B) BEN reports~~
~~(C) Draft press release~~
~~(D) RCRAinfo form~~
~~(E) Weekly report~~
Tab 6. Addressed envelopes.

	INITIALS	DATE	CONCUR	CONCUR WITH MODIFICATIONS
1. ECAB ASSIGNEE	[illegible]	9-9-02	✓	
2. ECAB SEC. CHIEF	[illegible]	9-6-02	✓	
3. ASSOC. REG. COUNSEL	TMW	9/30/02	✓	Please note changes to letter and on order
4. ORC SECTION CHIEF	DSL	10/1/02	✓	
5. ECAB CHIEF	[illegible] JMB	10-11-02	✓	

The ECAB Chief returns it to the ECAB Assignee for corrections, if necessary, or to the Administrative Program Assistant, if signed.

PART III. Filing and Distribution

Date filed with Regional Hearing Clerk _____ Initials _____ (Administrative Program Assistant or, if needed, Section Secretary)

Date mailed _____ Initials _____ (The Section Secretary makes copies and mails and distributes the copies.)

The Section Secretary returns the remaining portion of the Complaint package to the ECAB Assignee along with a true copy of what was filed with the Regional Hearing Clerk.

UNITED STATES POSTAL SERVICE

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Postage & Fees Paid
USPS
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• Sender: Please print your name, address, and ZIP+4 in this box •

U.S. EPA
77 W. Jackson Blvd
Chicago, IL 60604

Attn: Juan Thomas

DE-9J

SENDER: *COMPLETE THIS SECTION*

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

MR John P. Kennedy
Johnson Controls, Inc.
P.O. Box 591, X-32
Milwaukee, WI 53201

COMPLETE THIS SECTION ON DELIVERY

A. Received by *(Please Print Clearly)* JEFF WEIDE

B. Date of Delivery

C. Signature

X Jeff Weide

☐ Agent
☐ Addressee

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

MILWAUKEE, WI 53202 JUN 2 2003

3. Service Type
☒ Certified Mail ☐ Express Mail
☐ Registered ☒ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? *(Extra Fee)* ☐ Yes

2. Article Number *(Copy from service label)* 7001 0320 0006 4565 4093

PS Form 3811, July 1999 Domestic Return Receipt 102595-99-M-1789

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF
DE-9J

MAY 29 2003

Mr. John P. Kennedy
Johnson Controls, Inc.
P.O. Box 591, X-32
Milwaukee, WI. 53201

Re: Characterization of Remediation Waste
F006 and F001 Hazardous Waste Determination
Former Stanley Tools Facility - Fowlerville, MI
MID099124299

Dear Mr. Kennedy:

This letter is in response to your letters dated April 11, 2003 and May 15, 2003 submitted by your Consultant's ENTACT on your behalf, concerning the intended characterization of remediation wastes generated from activities conducted pursuant to the 3008(h) Administrative Order on Consent for Johnson Controls, Inc.(JCI) to complete the RCRA Corrective Action work at the Fowlerville, Michigan site. As we discussed during yesterday's conference call meeting between representatives from EPA, Earth Tech, ENTACT and Weston Solutions, JCI must comply with the requirements of 40CFR 262.11 and 262.40. JCI must use its best judgement in complying with these requirements, and our concurrence is not necessary.

As you are aware, the primary objective of the December 30, 2002 Administrative Order on Consent, RCRA-05-2003-004, was to provide a performance-based mechanism to implementing corrective action work at the Fowlerville, MI., site that would allow flexibility needed in completing the corrective action work both effectively and expeditiously. We are committed to continue the frequent and informal communications between our organizations.

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EPA appreciates your bringing this matter to our attention and look forward to our continued cooperative effort in completing the remaining corrective action work at the Fowlerville, MI site.

With Thanks,

Juan Thomas, MPH
Environmental Scientist

cc: Dennis Reis - Dennis Reis, LLC
Drew Lonergan - Earth Tech
Thad Slaughter - ENTACT
Caroline Panico - ENTACT
Chris Preston - ENTACT
David Slayton - MDEQ
Tom Williams - ORC

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:

DE-9J

January 02, 2002

Mr. Steve Amter
Disposal Safety, Inc.
1701 K. St., NW, Suite 510
Washington, DC 20006

COPY

Dear Mr. Amter:

I appreciate your interest in the RCRA Corrective Action that's taking place at the Johnson Controls, Inc., site located in Fowlerville, Michigan. As per your request, I am providing you with a copy of the facility's most recent "Introduction Section" from their "Summary Report RCRA Facility Investigation, Task 10 RFI Report", dated October 2001. Hopefully, this information will meet your needs in providing you general information about the site concerning the RCRA Corrective Action taking place at the Fowlerville, Michigan location. Should you wish to request additional documents, the Freedom of Information Act contact person is Louise Debrower 312-886-2942.

Please feel free to contact me at thomas.juan@epa.gov or 312-886-6010, if I can be of further assistance.

Sincerely,

Juan Thomas
RCRA Corrective Project Manager

Enclosures

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1.0 INTRODUCTION

1.1 GENERAL

The following report was prepared as requested by U. S. Environmental Protection Agency (U.S. EPA) Region 5 in their letter of July 5, 2001 to Johnson Controls, Inc. (JCI). The letter requested a final Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) report to summarize and analyze the three phases of RFI conducted at the former Stanley Tools (Stanley) manufacturing facility in Fowlerville, Michigan (Figure 1-1). In addition to summarizing the RFI activities and findings, the report summarizes the interim stabilization measures and interim remedial measures conducted at the site to stabilize and reduce the presence of impact.

The U.S. EPA requested that the former facility undergo an environmental investigation pursuant to the Hazardous and Solid Waste Amendments (HSWA) to RCRA, specifically, Section 3008(h). Dames & Moore on behalf of Stanley conducted the first two phases of investigation in accordance with an Administrative Order by Consent (Consent Order), U.S. EPA Docket No. V-W-88R-032, entered into by U.S. EPA and Stanley September 6, 1988 for the Stanley facility (see Appendix A). The third phase of the RFI was conducted by URS on behalf of JCI. JCI and Stanley reached an agreement that leaves JCI as the lead party in executing assessment orders.

The common objectives of the RFI phases were to describe the nature and extent of environmental impact in both the horizontal and vertical dimensions, address the potential threat to human health and/or the environment, and support a subsequent Corrective Measures Study (CMS).

Phase I primarily involved characterization of waste still present in some of the solid waste management units (SWMUs) and the evaluation of the presence or absence of contamination in the environmental media (soil, sediment, surface water, and groundwater). The second, Phase II, evaluated the vertical and horizontal extent of releases, where appropriate. Phase II also included a grid-sampling program in certain areas of the facility to ascertain the presence or absence soil contamination in those areas.

The scope of work covered by the Phase III RFI involved an update of the assessment of groundwater quality by sampling select existing monitoring wells on site; a focused investigation of potential source areas for trichloroethene (TCE) impact identified during Phase II; an update of sediment characterization in the Red Cedar River; and a screening level evaluation of ecological risk of the sediment contamination.

1.2 SITE LOCATION

The former Stanley facility is located at 425 Frank Street on the southwestern side of Fowlerville. A site layout map is presented as Figure 1-2. A zoning map for Fowlerville, including water supply well locations, is presented as Figure 1-3.

As shown in Figure 1-2, much of the property is bounded by a chain-link fence. The southern property boundary follows the Chesapeake and Ohio Railroad (formerly the Pere Marquette Railroad) west to the Red Cedar River. A ditch that drains to the river is located between the property boundary and the railroad right-of-way. The western property boundary follows close to the east bank of the Red Cedar River. Access to the parcel north of the former surface impoundments is through property owned by Copeland Construction because there is no access through the chain-link fence that surrounds the northwestern and southern portion of the site.

The legal description of the former Stanley property refers to the following lots, shown in Figure 1-3: "Lots 16, 17, 18, 19, 20, 21, 38, 39, 40, 41, 42, 43, 51, 52, and the north 344.5 feet of lot 44 and the south 267.3 feet of lot 44, except the north 132 feet of the east 198 feet, of "Assessor's Plat of Commercial Addition," Village of Fowlerville, Livingston County, Michigan. Part of the southeast quarter (SE 1/4) of Section 10 and part of the northeast quarter (NE 1/4) of Section 15, Town 3 North, Range 3 East, Michigan, as recorded in Liber 5 of Plats, page 22, Livingston County Records."

The following rights-of-way are included in the legal description:

- Right-of-way given to Consumers Power Company over portion of lots 20 and 39 as set forth in document recorded in Liber 283, page 53, Livingston County Records

- A right-of-way for utilities given to The Detroit Edison Company over part of lot 16, as set forth in document recorded in Liber 531, page 597, Livingston County Records

- A right-of-way for utilities given to The Detroit Edison Company over part of lot 20, as set forth in instrument recorded in Liber 916, page 635, Livingston County Records

- Reservation of right-of-way and easement for access to Pere Marquette Railroad right-of-way from Frank Street over lot 16, as set forth in Liber 323, page 477, Livingston County Records

- Twelve-foot-wide transmission line to The Detroit Edison Company across subject property on a route described in the instrument recorded in Liber 866, page 581, Livingston County Records, as to lots 21 and 38

1.3 FACILITY HISTORY

1.3.1 Ownership and Production History

Utilex Manufacturing Company (Utilex), a subsidiary of Universal Die Casting and Manufacturing Corporation, built the Fowlerville plant in 1949 and began zinc die casting production (personal communication, 1987). In 1952, the plant expanded to include an electroplating department that began operations by early 1953 (letter from Michigan Water Resources Commission [MWRC] to Utilex dated August 13, 1952). By 1968, the plant was operating as the Utilex Division of Hoover Ball and Bearing Company. In 1978, the plant changed its name to Hoover Universal Incorporated, Die Cast Division (letter from Hoover to Michigan Department of Natural Resources [MDNR] dated February 28, 1978). In 1980, the plant was bought by Stanley and was operated by its Stanley Tools Division until it ceased manufacturing in December 1985.

Prior to 1980 the facility was engaged in the manufacture of decorative zinc-base die-castings for the automotive and plumbing industries. The process involved casting molten zinc, followed by trimming, machining, polishing, buffing, plating, assembling, and packaging the zinc die castings. The plating process involved a series of acid and alkaline cleaning baths, and nickel, chrome, and brass plating baths, depending on the

specific product. Kerosene emulsion cleaner was used to remove die cast mold release compound and buffing residue until 1970 (letter from Utilex to Bureau of Water Management, dated June 17, 1970). The zinc die casting production was run on a three-shift basis, 5 days a week; the plating process was run on a two-shift basis, also 5 days a week.

It appears that in the early years of operations, a plastic mold injection machine was part of the Hoover manufacturing process (MDNR, 1974).

When Stanley bought the plant in 1980, production switched to the manufacture of plated, zinc die cast hand tools. The general production process was similar to Hoover's, described above. However, Stanley did not perform brass plating or use kerosene. The zinc die casting operation ran 24 hours a day, 5 days a week; the plating operation ran 8 hours a day, 5 days a week.

1.3.2 Waste Generation and Disposal History

Information on the waste generation and disposal practices for the approximately 35-year production history of the plant was collected from plant correspondence, records from the State of Michigan, maps, aerial photographs, investigation and study reports, and interviews with a former plant engineer. Much of the information is summarized on Figure 1-4, which is a geographic information system (GIS)-based illustration portraying information derived from a 1990 aerial photograph, a property survey based on the 1990 aerial, and a site plan from 1968 depicting waste management units and plant operational areas.

The following discussion is a chronological compilation of this information, with letter designations made to specific areas or units that have been established for clarification in this project. The specific units and areas are discussed in more detail in Section 2 of this report, *Characterization of Potential Contaminant Sources.*

During the mid-1950s, treated, plating-process wastewaters flowed through a retention tank prior to entering the primary waste pond (Pond B) as shown on Figure 1-2. Cyanide

was treated with sodium hypochlorite; chromium by precipitation with lime. Metal sludges were precipitated as hydroxides, and oils were separated with phosphoric acid (letter from Utilex to MWRC, June 15, 1955). Pond B also received cooling water from the die cast area (Shannon, 1956).

Pond B effluent discharged into the drainage ditch adjacent to the railroad, which in turn drained to the Red Cedar River. Sludge from Pond B and the retention tank apparently was periodically removed and spread over the ground surface in the northeastern portion of the area later occupied by ponds in Unit A (personal communication, 1987). The activity of sludge spreading is supported by disturbance in this area that is visible on 1955 and 1963 aerial photographs and is known to have happened in 1968 (personal communication, 1987). When the sludge spreading took place in 1968, the area was diked. This area may correlate with an area mentioned in an early wastewater survey conducted by the MWRC (March 27 and 28, 1956) that refers to "sludge from the tanks and ponds...confined to a diked lagoon near the retention pond." Alternatively, this reference may be to Pond C, discussed below, which was closer to Pond B than Unit A.

Settling Pond C (Figure 1-2) was in operation by 1961 (personal communication, 1987), but is not visible on a 1955 aerial photograph. Pond C was used as a settling pond for waste cleaning solutions from the kerosene emulsion bath and possibly other oils discarded by the plant (map from Capital Consultants, Inc., June 1968, and personal communication, 1987). Ponds D and E were constructed between 1963 and 1968 to store waste when Pond C had filled and extra storage capacity was needed (personal communication, 1987). Overflow from the cyanide treatment tanks (discussed below) also was directed to Ponds C, D, and E (personal communication, 1987). A plant map from 1968 (Capital Consultants, Inc., 1968) shows Pond C labeled as "Existing Kerosene and Sludge Pond." The use of kerosene was eliminated at the plant by 1970 (letter from Utilex to Bureau of Water Management, June 17, 1970).

Two cyanide treatment tanks were apparently added sometime between 1963 and 1968. These tanks are visible on a 1970 aerial photograph. The tanks were reportedly constructed as a corrective action in response to a fish kill in the Red Cedar River (personal communication, 1987). A third treatment tank was added between 1976 and 1977 (MDNR, 1977). The location of the former tanks is referenced in Section 3.3.1.

Most of the plant's hydraulic and cutting oils were drummed (two to three drums daily) and shipped offsite during the 1960s (personal communication, 1987). It is not known what practice was followed in the 1950s.

A new wastewater treatment plant and settling pond system were constructed in 1969 and 1970 (Units A and J in Figure 1-2). In 1970, untreated sludge from Pond B was excavated and spread in a diked strip parallel to the river (Unit F). Sludge was excavated and transported to Unit F by bulldozing it along the western property boundary (personal communication, 1987).

The new pond system contained four ponds. The system operated according to the following treatment scheme during the 1970s, as described in an industrial wastewater survey (MDNR, 1974):

> Cooling water is utilized within the plant for cooling heat exchangers used to cool the dies and air compressors. These cooling waters are discharged to the 3rd settling pond. . . . Process wastewaters are generated from the rinses and spills on the four plating lines along with the discharge from the roto-finishers. . . . Process wastewaters from the plating lines can be categorized into four groups:
>
> - Chromium-contaminated wastewaters
> - Cyanide-contaminated wastewaters
> - Nickel-contaminated wastewaters
> - Acid-alkaline wastewaters
>
> The chromium-contaminated wastewaters from the flowing rinses and containment can either be sent through the chromium recovery unit for reuse or the chromium destruction unit for discharge. The plant's chromium recovery unit . . . utilizes ion exchange and evaporation. The resulting concentrated chromium is returned to the plating tank while the condensate is returned to the line's cascading rinses. Chromium destruction is performed in the plant through the continuous addition of sulfuric acid followed by sodium bisulfite. The reduced chromium is further treated through the wastewater treatment facility.
>
> Cyanide wastewaters are batch-treated in either of two 25,000 gallon treatment tanks located at the wastewater treatment facility. Caustic is added to these tanks to increase pH while sodium hypochlorite is

> introduced as the oxidizing agent. Sodium orthosilicate is also added to these cyanide wastewaters to reduce the copper ions. About 20,000 gallons was batch-treated during each day during the survey and discharged through the remainder of the treatment system after a positive analysis that all cyanide had been oxidized.
>
> The treatment process continues for the pre-treated chromium and cyanide wastewaters in the clarifier. . . . Along with these pre-treated wastewaters, nickel-contaminated wastewaters enter the clarifier. A lime slurry and polymer feed to the clarifier optimizes settling to the metal hydroxides.
>
> The clarifier effluent is discharged to the mixing, neutralization tank where the acid-alkaline wastewaters from the plating lines is added to it. The combined wastewater is pH adjusted with caustic or acid and pumped to the settling pond system.
>
> The first two of the four settling ponds at Utilex are used for sludge containment. The first pond receives both the clarifier sludge and the solids discharged from the roto-finisher's sump. Supernatant from the first pond flows to the second and then to the third pond where it combines with the treated process effluent and cooling waters. The third pond overflows to the fourth, which discharges to the Red Cedar River through Outfall #470011.

In 1971, Hoover had the sludge pumped out of Unit A and chemically treated by the Chem-Fix Corporation (personal communication, 1987). The treated sludge was placed in an area north of the plant (Unit G in Figure 1-2) that had been prepared by excavating approximately 3 feet deep and lining with a thin (5- to 6-mil) plastic membrane to collect leachate. Leachate was collected in a sump and analysis of the leachate indicated that metals were still being released from the Chemfixed sludge (personal communication, 1987). The Chemfix process was used on sludge from the pond system again in 1972. After 1972, sludge from the pond system was dredged twice yearly and disposed offsite by Chem-Met Services (personal communication, 1987; MDNR, 1974).

An MDNR industrial survey report from July 15, 1976, makes reference to the removal of one-half barrel per week of sludge from the cyanide batch tank, in addition to waste oil in the die cast quench pits by approved industrial waste haulers.

When Stanley purchased the plant in 1980, it used the existing wastewater treatment system (Unit J and Unit A). The use of the polymer Aldoa 1223 with other treatment chemicals in the clarifier and neutralizer tanks was identified as part of the treatment process (MDNR, 1980).

During late summer and fall of 1985, a new aboveground wastewater treatment facility was used.

1.3.2.1 Spills and Uncontrolled Releases-Hoover

During a plant inspection in October 1970, the MDNR observed the untreated sludge disposal area west of the pond system (Unit F). The MDNR collected a sample that revealed high concentrations of heavy metals. The MDNR letter that presented the analytical results to Hoover (dated December 1, 1970) requested that the material be removed from the area. Hoover apparently evaluated a removal action (correspondence from Capital Consultants, Inc., March 10, 1971), but available records do not indicate whether Hoover performed the removal action.

Prior to plant expansion in 1958, a county storm sewer ran beneath Frank Street and west to the Red Cedar River. When the sewer was discovered during plant expansion, Livingston County disconnected the sewer at Frank Street and ran it north beneath Detroit Street to a ditch north of Hoover property. Hoover made use of the disconnected section of sewer underneath the plant by tying in the roof downspouts and cooling water from the die cast area. The sewer was referred to as the "Frank Street drain."

In an MDNR biological study report dated January 4, 1971, reference is made to two discharges in addition to the primary plant effluent outfall. One discharge was described as being located 1 foot upstream from the outfall, which would likely be the Frank Street drain. The other discharge was described as a tile drain located approximately 30 yards upstream from the outfall. Subsequent correspondence indicates that the tile drain may have been from the truck dock on the west side of the plant. This is believed to be the pipe that was the subject of interim stabilization measures in August 2001 as discussed in Section 3.4, although it is unclear how the pipe could have been sampled as it is submerged in the river in all but the lowest river conditions.

Samples collected from both additional discharges revealed heavy metals. One of the report conclusions was that "heavy metal sampling at Utilex's two additional discharges indicate waste concentrations that could be detrimental to aquatic organisms," but the report did not indicate whether the agency recommended any corrective or enforcement action.

In 1973, cyanide was detected in the discharged water from the portion of the Frank Street drain. Hoover determined the source of contamination to be a cyanide exhaust system that was allowing cyanide particles to settle onto the roof of the plant. Rainwater then apparently drained contaminants from the roof into the Frank Street drain. In October of 1973, Hoover installed a fume scrubber that removed cyanide from the exhaust system. The washwater from the scrubber was then directed into the waste treatment system for processing and disposal.

Use of a plastic mold injection machine was referenced in a June 1974 industrial wastewater survey report (MDNR, 1974), within a reference to the Frank Street drain: "The plastic mold injection machine is no longer in use. Therefore, the plant's discharge to the Frank Street storm sewer has ceased. Analysis of grab samples collected from the 1 gallon per minute (gpm) flow of this storm sewer revealed the presence of all heavy metals."

In November 1975, Hoover plugged the Frank Street drain at the river and constructed a catch basin to intercept effluent in the closed drain. The water was pumped into the plant's existing cyanide treatment tanks for standard treatment with the process wastewater. Cyanide and metal concentrations and the volume of flow in the drain were subsequently monitored on a monthly basis.

The MDNR and Region V, U.S. EPA conducted a joint industrial wastewater survey in June 1974. During the survey, several unregulated releases were observed. One release was sludge from the roto-finishing area in the southern drainage ditch (Unit I) near the railroad. Apparently the sump at the southwest corner of the plant that pumped sludge to

the ponds (Unit A) had overflowed at some time prior to the survey (MDNR, 1974).[1] Hoover responded by building a retaining wall around the sump. The U.S. EPA also recommended that the sludge material be removed and properly disposed of. No reference to that disposal was found in the available records.

Another release documented in the survey was the presence of several (at least four) out-of-service plating tanks filled with liquids located near the river. Hoover reportedly removed and properly disposed of the liquids in the tank (undated note).

The untreated sludge disposal area (Unit F) near the river was also mentioned in the June 1974 joint survey. The U.S. EPA recommended that the sludge be removed and an investigation to determine the effect of the sludge on groundwater be performed by the MDNR or Hoover. The MDNR's report on the survey did not mention the sludge area (MDNR, 1974).

On June 22, 1977, Hoover discovered that 150 gallons of sulfuric acid had spilled from an acid tank on the south side of the plant and leaked through its retaining wall. A report of the incident was filed with the MDNR on June 25, 1977. The spill was reportedly caused by a failure in a pipe fitting between the acid tank and a valve. The retaining wall failed because of cracks formed during the previous winter. Acid spilled onto a cement slab and the surrounding ground. The spill was contained with sand and gathered into drums and the residues disposed. In a follow-up letter to the MDNR (July 13, 1977), Hoover expressed its intent to reinforce the retaining wall and install an acid-resistant lining to prevent a similar occurrence. Hoover also stated that the acid tank would be replaced in the future.

A suspended sediment study was conducted from July 10 to August 21, 1978, by the MDNR in the Red Cedar River below the Hoover plant outfall. Analysis of the samples revealed high concentrations of cyanide, total metals, and polychlorinated biphenyls (PCBs). During the sediment study, Hoover had removed cattails and sludges from the lagoons to improve the lagoons' ability to remove suspended solids from the waste stream. The cleaning operation was suggested by the MDNR to be the cause of the

---

1 According to a former Hoover employee (personal communication, 1987), the ditch was used as a discharge point for the roto-finishing wastewater for some time.

effluent excursions, although it was believed that no PCBs were being used at the plant or discharged from effluent at that time. The MDNR suggested that PCBs may have been present in the sludges from earlier waste handling practices. Hoover was asked to test the lagoon sludges for PCB contamination. Subsequent analyses reported to the MDNR in January 1979 indicated very low (<10 parts per billion [ppb]) PCB levels.

On June 3, 1979, Hoover discovered that 15 gallons of chromic acid had leaked from two drums that apparently had been shot with a 22-caliber rifle or pistol. The incident was reported to the MDNR on the same day. Cleanup procedures were immediately implemented and included: containment of the contaminated area with sand; transfer of the remains of the drums to secure drums; disposal of contaminated soils into lined drums to be transported to a certified treatment facility; and application of sodium bisulfate to the local area to oxidize the chromic acid. It was estimated that less than 20 pounds of acid had to be neutralized.

1.3.3 Permits

In January of 1953, the MWRC approved an Order of Determination that regulated electroplating process wastewater discharged into the Red Cedar River by Utilex. An upper limit of 20,000 gallons per hour was set for process wastewater within specified concentrations of total solids, pH, cyanide, and heavy metals, as shown in Table 1-1.

Hoover submitted an application for an National Pollution Discharge Elimination System (NPDES) permit to the MWRC in January of 1974 for a permit to discharge treated wastewater and cooling water from Outfall No. 470011, (also referred to as "001"), into the Red Cedar River. The permit (No. MI0003727) was issued on February 28, 1974. The permit limitations were subsequently revised numerous times, as discussed in industrial wastewater surveys that were conducted on an approximately annual basis.

Sometime between 1976 and 1977, a separate outfall for non-contact cooling water was added to the permit. The first reference to this outfall (470147 or "002") was made in a MDNR industrial wastewater survey dated December 6, 1977. The 002 outfall was shown in a process flow diagram to discharge non-contact cooling water directly to the

Red Cedar River, by-passing the treatment system. The survey indicated permit limitations for 002 consisted of flow, oil and grease, temperature, and pH.

In 1980, Stanley continued use of NPDES Permit No. MI0003727 after purchasing the plant from Hoover. The final permit discharge limitations are presented on Table 1-2. The permit was terminated on April 16, 1987 by the MWRC at the request of Stanley because the outfalls were no longer being used.

To provide some background information on discharges to the river, Dames & Moore compiled analytical data from MDNR effluent compliance inspection reports. Available data included reports for Outfall No. 001 (final effluent) from 1975 through 1980, and 1982, and reports for Outfall No. 002 (non-contact cooling water) from 1979, 1980, and 1982. The analytical data for cyanide, metals, semivolatile organic compounds (SVOCs), and PCBs from the 24-hour composite samples taken during the compliance inspections is summarized in Table 1-3.

As shown in Table 1-3, the effluent from Outfall No. 001 at times contained trivalent and hexavalent chromium, copper, nickel, and zinc. The effluent from Outfall No. 002 contained zinc in the samples collected in May 1979, January 1980, and March 1982. In addition, the Outfall No. 002 effluent sample collected in March 1982 contained nickel.

Cyanide was detected in the Outfall No. 001 effluent samples collected in June 1975, May 1978, May 1979, and October 1982, and in the Outfall No. 002 effluent sample collected in May 1979. As noted above, wastes containing cyanide were treated in batches, which were not necessarily processed preceding or during the compliance inspections and sampling events. Therefore, the analytical results from the compliance inspections are not necessarily representative of prevailing conditions.

From June 8 to approximately June 23, 1983, Stanley exceeded its NPDES permit limitations for copper and cyanide. This was caused by a mechanical failure of a heat exchanger that serviced the copper plating bath. A leak in the device contaminated the condensate that was discharged directly to the wastewater stream. The unit was shut down upon discovery of the leak and taken out of service. The U.S. EPA was notified of

the incident on June 14, 1983. Monitoring of wastewater at Outfall No. 001 continued until copper and cyanide concentrations decreased below NPDES permit limitations.

In June of 1981, Stanley Tools submitted a RCRA Part A application to the U.S. EPA for generation and storage of electroplating wastes (F006). A delisting petition for the pond sludges was submitted in October 1983. Additional delisting information was provided up to April 1984 when the petition was withdrawn.

An RCRA Part B permit application was submitted in July 1984. Response to a September 1984 notice of deficiency was submitted in October 1984. A second notice of deficiency was issued in December 1984. Stanley withdrew the permit application in February 1985 and notified the U.S. EPA of its intent to close the impoundments.

The Unit A surface impoundments were excavated under an approved RCRA Interim Status Closure Plan. Final closure activities were suspended pending completion of the RFI. Additional details of the closure are given in Section 2.1.1.

TABLE 1-1

UTILEX MANUFACTURING CORPORATION
1953 EFFLUENT LIMITATIONS

JOHNSON CONTROLS, INC.
FORMER STANLEY TOOLS - FOWLERVILLE, MICHIGAN

Parameter	Allowable Concentrations
Bacteria (coliform group)	None
Total solids	500 parts per million (ppm)
pH	7.0 <pH <10.5
Cyanide	0.6 ppm
Copper	1.0 ppm
Nickel	1.0 ppm
Chromium (hexavalent)	2.0 ppm
Zinc	0.5 ppm
Discharge	20,000 gallons/hour

Source: Michigan Water Resources Commission Order of Determination, January 28, 1953.

TABLE 1-2

FINAL LIMTATIONS

NPDES PERMIT NO. 0003727

JOHNSON CONTROLS, INC.
FORMER STANLEY TOOLS - FOWLERVILLE, MICHIGAN

Parameter (units)		NPDES Permit Final Limitations	
		Daily Average	Daily Maximum
Flow (m^3/day)		-	-
Suspended solids	(mg/L)	35	50
	(kg/day)	54	77
Oil and grease	(mg/L)	-	10
Total chromium	(mg/L)	-	1
	(lbs/day)	-	1.53
Total nickel	(mg/L)	0.600	2.000
	(lbs/day)	0.92	3.00
Total copper	(mg/L)	-	0.200
	(lbs/day)	-	0.31
Total zinc	(mg/L)	0.400	1
	(lbs/day)	0.61	1.53
Cyanide	(mg/L)	-	0.05
Residual chlorine, total	(mg/L)	-	0.024
pH	(S.U.)	not <6.5 nor >10.0	

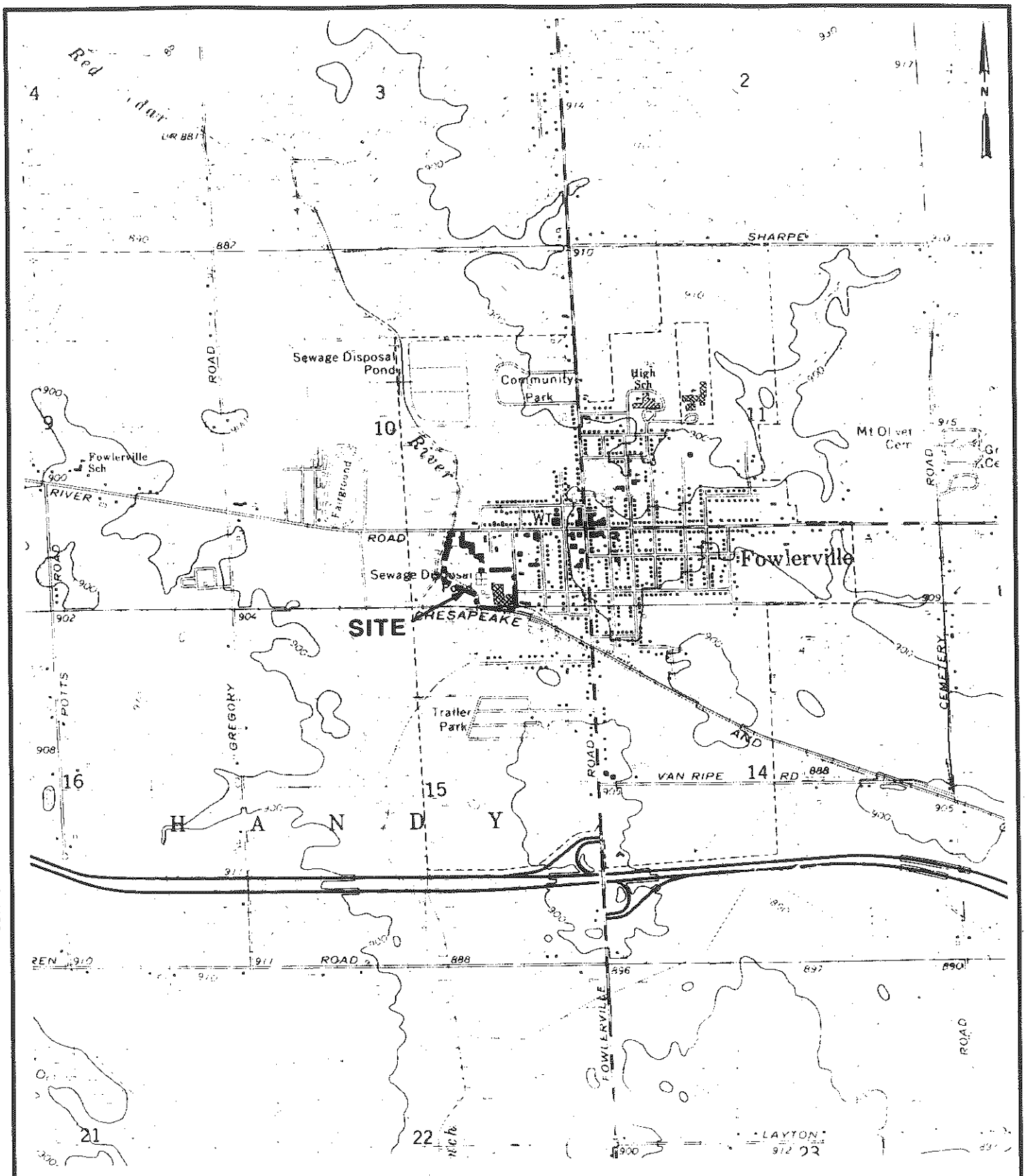
Note: Final limitations issued to Stanley for outfall No. 470011 (001).
Source: Industrial Wastewater Survey, August 5, 1985.

TABLE 1-3

SUMMARY OF EFFLUENT ANALYSES
24-HOUR COMPOSITE SAMPLES
JOHNSON CONTROLS, INC.
FORMER STANLEY TOOLS - FOWLERVILLE, MICHIGAN

Sampling Date	6/23/75	5/24/76	9/13/77	5/22/78	5/15/79		1/22/80		9/22/80	3/29/82		10/5/82	
Outfall	001	001	001	001	001	002	001	002	001	001	002	001	002
Parameter (mg/L)													
Flow (M3/day)	1,147	1,234	470	243	504	314	327	377	0.12	388	489	310	712
TSS	48	24	8	11	13	3	15	<1	22	11	4	5	<4
TDS	NA	1,000	1,800	1,900	1,410	NA	1,360	456	966	1,600	520	1,600	500
Cyanide, total	0.39	NA	<0.01	0.19	<0.02	0.02	<0.01	<0.01	<0.005	0.044	<0.005	<0.005	
Cyanide, free	NA	NA	<0.01	0.13	NA	NA	<0.05	<0.05	NA	<0.044	<0.005	NA	NA
Nitrite & Nitrate	1.1	0.33	NA	5.6	9.4	0.07	11.4	0.017	NA	5.6	0.04	6.3	6.4
Sulfides	NA	NA	NA	NA	NA	NA	<0.02	<0.02	NA	NA	NA	<0.02 PA	<0.02 PA
Cadmium, total	<0.01	NA	NA	NA	NA	NA	NA	NA	NA	<0.002	<0.002	<0.002	<0.002
Chromium, total	NA	NA	0.31	0.47	0.6	<0.01	0.05	<0.05	NA	0.44	<0.050	0.31	0.49
Chromium, hexavalent	<0.01	<0.01	0.03	<0.01	0.056	NA	<0.01	<0.01	NA	0.04	<0.002 PS	0.025	0.009
Chromium, trivalent	0.24	0.14	0.20	NA	NA	NA	NA	NA	0.053	NA	NA	NA	NA
Copper, total	15.0	0.16	0.31	1.2	1.4	<0.01	0.47	<0.02	NA	0.31	<0.020	0.18	0.13
Nickel, total	4.90	0.85	0.38	0.87	2.6	<0.05	0.94	<0.05	NA	0.19	0.05	0.17	0.31
Lead, total	NA	NA	NA	NA	<0.05	NA	<0.05	<0.05	NA	<0.050	<0.050	<0.050	<0.050
Zinc, total	0.90	0.8	0.42	1.3	0.8	0.04	2.5	0.08	NA	0.8	0.33	0.84	0.91
Chromium, dissolved	NA	0.11	0.08	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper, dissolved	NA	0.04	0.16	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel, dissolved	NA	0.49	0.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead, dissolved	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc, dissolved	NA	0.22	0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibutyl phthalate	NA	NA	NA	NA	NA	NA	<0.001	<0.001	NA	NA	NA	NA	NA
Butlybenzyl phthalate	NA	NA	NA	NA	NA	NA	<0.001	<0.001	NA	NA	NA	NA	NA
bis(2-Ethylhexyl)phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.067	0.035	0.009	NA
Di-n-octyl phthalate	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.088	0.048	0.004	0.001
Diethylhexyl phthalate	NA	NA	NA	NA	NA	NA	0.0024	0.122	NA	NA	NA	NA	NA
PCB 1242	NA	NA	NA	NA	NA	NA	<0.0001	<0.0001	NA	NA	NA	NA	NA
PCB 1245	NA	NA	NA	NA	NA	NA	<0.0001	<0.0001	NA	NA	NA	NA	NA
PCB 1260	NA	NA	NA	NA	NA	NA	<0.0001	<0.0001	NA	NA	NA	NA	NA

PA = High absorbance of the sample reagent blank may have affected the precision of the reported result
PS = Possible interference may have affected the accuracy of the laboratory result
Sources: MDNR and U.S. EPA Industrial Wastewater Surveys and NPDES Compliance Inspection Reports
NA = Not analyzed



0 2000 4000

SCALE IN FEET

BASE MAP SOURCE: USGS 7 1/2 minute topographic quadrangle map Fowlerville, Michigan 1973.

Quadrangle Location

Johnson Controls, Inc.

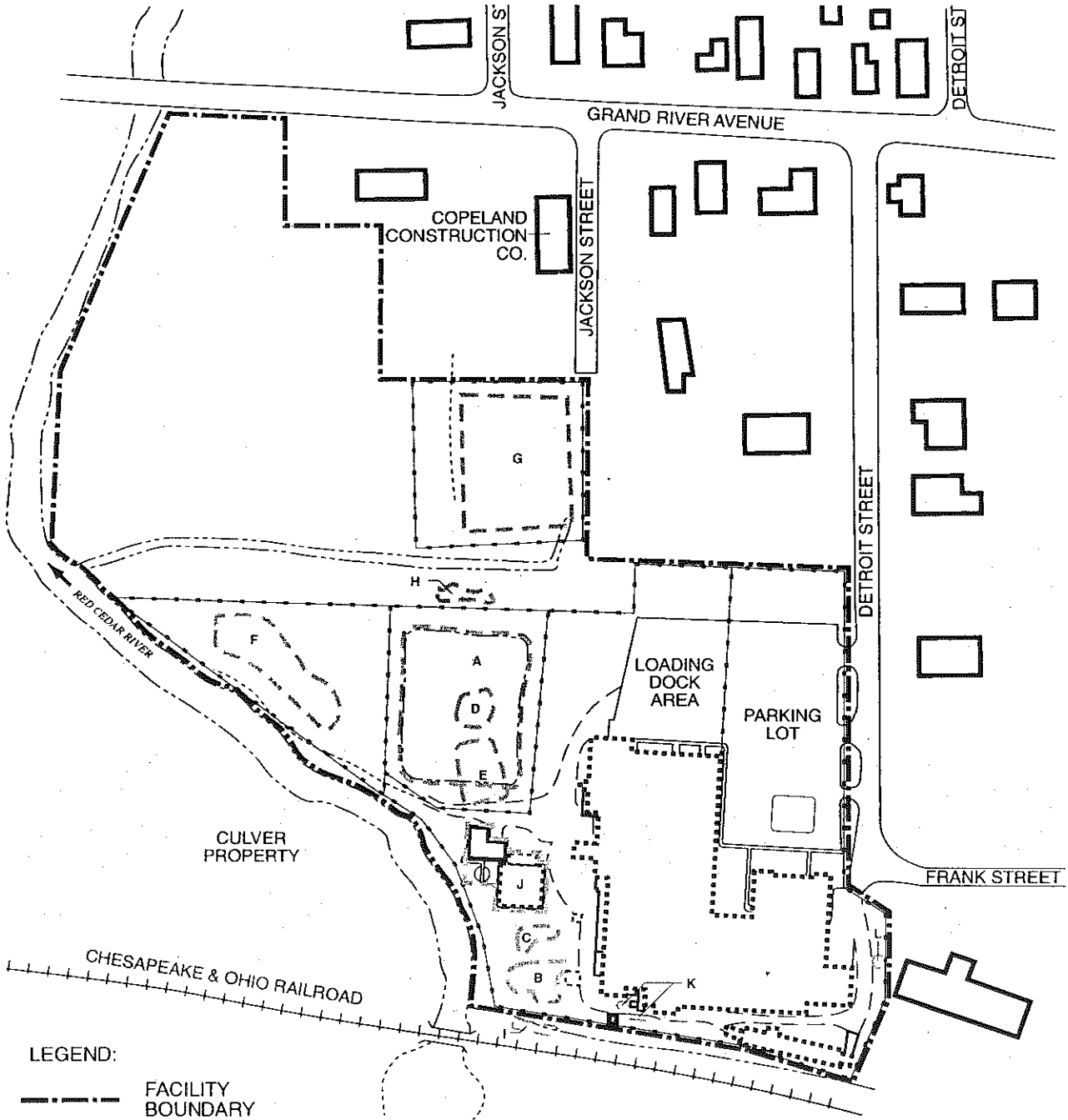
Former Stanley Tools Facility
Fowlerville, Michigan

FIGURE 1-1
SITE VICINITY MAP

JOB NO. 20209-020-121

URS

JOHNSON CONTROLS – 20209-0 .05-121 – FOWLERVILLE, MICHIGAN



LEGEND:

- FACILITY BOUNDARY
- FENCELINE
- ROADWAY
- PATHWAY
- RAILROAD TRACK
- FORMER BUILDING
- SURFACE WATER BODY
- SOLID WASTE MANAGEMENT UNIT BOUNDARY
- A — AREA OF CLOSED RCRA SURFACE IMPOUNDMENTS
- B — ORIGINAL EFFLUENT POND
- C — FORMER SETTLING POND
- D — FORMER SETTLING POND
- E — FORMER SETTLING POND
- F — AREA OF UNTREATED SLUDGE DISPOSAL
- G — AREA OF CHEMFIXED SLUDGE DISPOSAL
- H — CHEMFIXED SLUDGE SPILL
- I — DRAINAGE DITCH
- J — WASTE WATER TREATMENT PLANT
- K — FORMER TANKS A AND B AREA
- L — FORMER TANK C AREA

0 100 200

APPROXIMATE SCALE IN FEET

NOTE: SWMU locations are approximate.

BASE MAP SOURCE: Modified from Advanced Mapping Technologies, compiled by photogrammetric methods from aerial photography dated November 8, 1990.

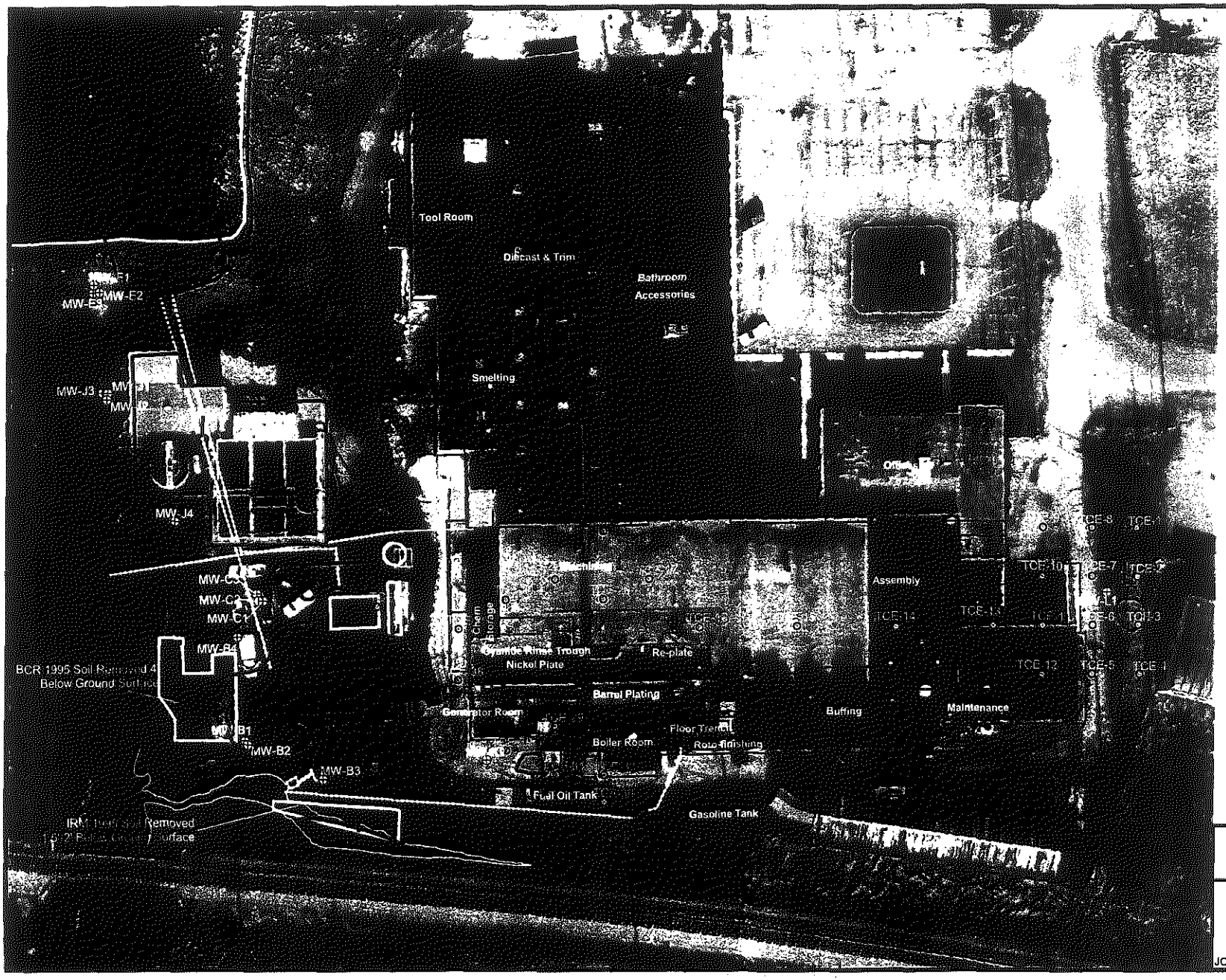
Johnson Controls, Inc.
Former Stanley Tools Facility
Fowlerville, Michigan

FIGURE 1-2
SITE LAYOUT MAP

JOB NO. 20209-020-121

URS

JOHNSON CONTROLS – 20209- – J205-121 – FOWLERVILLE, MICHIGAN



LEGEND:

- ○ TCE SAMPLING WELL LOCATION
- ⊕ MONITORING WELL LOCATION
- ▭ SOLID WASTE MANAGEMENT UNIT BOUNDARY (SEE FIGURE 1-2 FOR LETTER DESIGNATIONS)
- BCR OR IRM LOCATION

HISTORIC SITE COMPONTENTS DURING HOOVER OPERATIONS DERIVED FROM PLANT LAYOUT DATED 1968

- OPERATIONAL AREAS CIRCA 1968
- APPROXIMATE FORMER PIPE LOCATION
- FORMER CYANIDE TREATMENT SYSTEM LOCATION
- FORMER BUILDING WALL
- DITCH CHANNEL

0 50 100
SCALE IN FEET

SOURCE: Digital Aerial Photograph, Advanced Mapping Technologies, November 1990.

Johnson Controls, Inc.
FORMER STANLEY TOOLS FACILITY
FOWLERVILLE, MICHIGAN

FIGURE 1-4
HOOVER OPERATIONS LAYOUT WITH TCE AND MONITORING WELL LOCATIONS

JOB NO. 20209-020-121

URS

MICHIGAN Environmental Council

MID-MICHIGAN ENVIRONMENTAL ACTION COUNCIL MID-MEAC

Mid-Michigan Environmental Action Council

ecology center

UAW

For Immediate Release: January 17, 2002

Advisory to environmental and business reporters

ENVIRONMENTAL, LABOR GROUPS SAY JOHNSON CONTROLS FAILED TO CLEANUP CONTAMINATED FACTORY SITE

A coalition of environmental and labor organizations will hold a press conference in Lansing, Michigan on Friday, January 18 to release a report documenting the failure of Johnson Controls, Inc. to clean up a contaminated factory site in Fowlerville, Michigan.

The report, prepared by Disposal Safety Incorporated, a Washington-DC based environmental consulting firm, shows that waste from the JCI site has resulted in contaminated soil and ground water at the site, and contaminated sediment in the Red Cedar River. The toxic chemicals present include trichloroethylene (TCE) and polychlorinated biphenyls (PCBs).

The press conference will take place at 10:30 am in the Governor's Room of the Lansing Center, located at 333 E. Michigan Ave., two blocks from the state capitol. The press conference will be followed at 12 noon by a tour of the abandoned JCI site, located at 425 Frank Street in Fowlerville.

Speakers at the press conference will include:

Missy Luyk, Program Director, Mid-Michigan Environmental Action Council
Ben Ross, Disposal Safety Incorporated
Dave Dempsey, Michigan Environmental Council
Sam Warren, Chairman, Conservation and Recreation Committee, UAW Local 602.

For more information: James Clift, Michigan Environmental Council, 517-487-9539

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF

November 5, 2003
DE-9J

CERTIFIED MAIL
RETURN RECEIPT REQUESTED
Mr. Andrew J. Lonergan
Program Director
Earth Tech, Inc.
36133 Schoolcraft Rd.
Livonia, MI. 48150

Dear Mr. Lonergan:

This letter serves as a follow-up to our discussions taken place during our Quarterly Meeting of October 23, 2003 held at the Johnson Controls, Inc/Former Stanley Tools Facility located in Fowlerville, Michigan. In addition to the discussions outlined in your meeting agenda, we also discussed some of the concerns raised from our review of your paper entitled "Overview of Planned Environmental Indicator Data Evaluation Red Cedar River" (hereinafter referred to as the "White Paper"), that we previously discussed during a teleconference meeting held on September 4, 2003. As promised, I am providing you with our written comments relative to the two meeting. The first section will address our comments as it relates to your strategy presented in the "White Paper " relative to the evaluation of the achievement of the "Current Human Exposures Under Control Environmental Indicator or EI 725. The last section will address our comments relative to the evaluation of the achievement of the " Migration of Contaminated Groundwater Under Control Environmental Indicator" or EI 750.

Comments: Current Human Health Exposures Under Control - EI 725

Section 2.3 Direct Contact and Ingestion

The ETWS paper presents a value to account for ingestion and dermal Exposure Frequency (EF) of children to sediments. The proposal to use an EF of 4 per week for the warmest months (June, July, August) seems reasonable. However, for the more temperate weather months (May and September), this reviewer believes that an EF of 2 per week would be more appropriate. This would give a conservative accounting for the likelihood that these two months (spring and autumn) could be still be attractive times to visit the water body. This would bring the total EF up to 64 days/year. This is an EF that is appropriately conservative but still reasonable.

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Section 2.6 Fish Bioaccumulation and Human Health

Absorption efficiency for PCBs

This reviewer believes that the absorption efficiency for PCBs in the Michigan Part 201 Rules applies to calculating a cleanup criteria for direct contact with contaminated soil. The absorption efficiency is incorporated as the AE_i term in Part 201 R299.5720. Michigan allows the use of this AE_i adjustment to account for the possibility that PCBs adsorbed to soil will not be completely available for absorption after incidental soil ingestion. This is equivalent to an adjustment for bioavailability of PCBs from soil. However, for ingestion of fish as a food source, this reviewer does not believe that the adjustment for bioavailability from soil is appropriate to apply. In the case of PCBs in the diet (where desorption of PCBs from soil is not a factor) the cancer slope factor derived for PCBs (and the RfD for Aroclor 1254) was directly affected by the absorption efficiency of PCBs administered to the test animals. Consequently, the Absorption Efficiency factor value in Table 1 should be changed to 1.0 (100%).

Fish ingestion rate

The ETWS paper proposes that a fish consumption rate of 15 g/day should be used to represent the average consumption rate of fresh water sport caught fish by residents of Great Lakes states based on information from the *Great Lakes Water Quality Initiative* (*GLWQI*). This value is also described in the paper as the 90th percentile consumption rate of sport caught fish for the Great Lakes Region. However, from my review of *GLWQI* document, I interpret the language in the document to mean that this is the 90th percentile value when the fish consumption data for the Great Lakes region are apportioned over the active fishing population and the non-fishing population. When developing conservative cleanup criteria, the EPA prefers that the fish consumption rate should be based on the 90th percentile of the population that catches and consumes sport caught fish so that the consumption rate for the active fisher-consumer will not be underestimated.

From an extensive survey of recreational fishing in the state of Michigan, the 90th percentile of recreational fish intake for persons who caught and consumed fish was reported to be 34 g/day (data from the West et al. study [1989] as summarized in the EPA's Exposure Factors Handbook [1997] <http://www.epa.gov/ncea/pdfs/efh/sect10.pdf>

Consequently, this reviewer believes that the value of 34 g/day should be used to account for the high-end recreational fisher who may frequent the Red Cedar River, and this is the value that should be used for the fish consumption rate when calculating a sediment cleanup criteria.

The assumption that the fraction ingested (FI) of fish from the Red Cedar River is 0.25 (25%) of all fish ingestion does seem reasonable based on the description of the Red Cedar River in the vicinity of the Former Stanley Tools site.

Other contaminants

Based on the description in Section 1.1.2 of types of contaminants documented in the RFI Report, the additional contaminants that would be a concern for the fish bioaccumulation and consumption pathway would be polycyclic aromatic hydrocarbons (PAHs) and mercury. (Mercury would be of concern due to the conversion of inorganic mercury to methylmercury and the bioaccumulation of methylmercury through the aquatic food chain.)

Cumulative risk from multiple contaminants

It appears that the ETWS paper is proposing to calculate chemical-specific sediment cleanup criteria and to apply them on an individual chemical basis (i.e., chemical-by-chemical) for comparing measured sediment contaminant concentrations to the cleanup criteria. This would appear to be appropriate for the evaluation of the CA 725 Environmental Indicator (Current Human Exposures under Control). However, for the formal risk assessment evaluation that is needed as part of the site RFI Report and remedial decisions for the site, an accounting of cumulative risks from exposure of the same receptor/person to multiple chemical contaminants will be necessary.

Migration of Contaminated Groundwater Under Control - EI 750

The U.S. EPA, Corrective Action section is striving for continuity and quality in attaining Environmental Indicators. To this end, where sites under corrective action have contaminated ground-water that is entering surface water bodies the following should apply:

- Question 4 of the EI 750 should be answered "YES"

- Question 5 requires a calculation of a mixing zone to address whether the discharge of contaminated ground-water is likely to be insignificant. The EI750 uses the most recent data available to compute the mixing zone. Values such as river gauging data, typically available from the USGS in real time and an estimate of ground-water flux to the surface-water body must be presented. It is preferable to measure the flux into the surface-water body since it may be quite variable. In all cases, the most conservative values should be chosen for the calculation.

- For sites in Michigan, the U.S. EPA Corrective Action section is using a mixing zone definition of an area defined by a measured flux cross-section extending 8 feet into the surface-water body.

- Once the above are computed, the recent ground-water quality data used to answer "YES" to Question 4 should be used to compute a mass loading to the surface- water body.

- All calculations should be clearly presented as well as all assumptions used, if any.

These results should then be applied to answer Question 5, an subsequent questions.

Hopefully, this information clarifies our position as it pertains to conducting an Environmental Indicator 725 and 750 analysis for the Johnson Controls, Inc./Former Stanley Tools Facility. It is my expectation that you will consider the above comments when performing the EI analysis as required under the December 30, 2002 Administrative Order on Consent. Should you have any questions or concerns, please call me at 312-886-6010.

Sincerely,

Juan Thomas

TABLE 5-1

ANALYTICAL PARAMETERS AND METHODS
PHASE III RFI

JOHNSON CONTROLS, INC.
FORMER STANLEY TOOLS FACILITY - FOWLERVILLE, MICHIGAN

Groundwater Sampling, from monitoring wells

Volatile Organic Compounds — **Method No. 8260B (SW846)**

Acetone
Acrolein
Acrylonitrile
Benzene
Bromodichloromethane
Bromoform
Bromomethane
2-Butanone (MEK)
Carbon disulfide
Carbon tetrachloride
Chlorobenzene
Chloroethane
2-Chloroethyl vinyl ether
Chloroform
Chloromethane
Dibromochloromethane
Dibromomethane
1,2-Dibromoethane (EDB)
1,2-Dichlorobenzene
1,3-Dichlorobenzene
1,43-Dichlorobenzene
Dichlorodifluoromethane
1,1-Dichloroethane
1,2-Dichloroethane
1,1-Dichloroethene
cis-1,2-Dichloroethene
trans-1,2-Dichloroethene
1,2-Dichloroethene (total)
1,2-Dichloropropane
cis-1,3-Dichloropropene
trans-1,3-Dichloropropene
trans-1,3-Dichloropropene
trans-1,4-Dichloro-2-butene
1,4-Dioxane
Ethanol
Ethylbenzene
Ethyl methacrylate
Hexane
2-Hedanone
Iodomethane
Methylene chloride
4-Methyl-2-pentanone
Methyl tert-butyul ether
Styrene
1,1,2,2-Tetrachloroethane
tert-Butyl alcohol
Tetrachloroethene
Tetrahydrofuran
Toluene
1,1,1-Trichloroethane
1,1,2-Trichloroethane
Trichloroethene
Trichlorofluoromethane
1,2,3-Trichloropropane
Trichlorotrifluoroethane
Vinyl acetate
Vinyl chloride
Xylenes (total)
Dichlorofluoromethane
Ethyl ether
Acetonitrile
3-Chloropropene
Chloroprene
Isopropyl ether
Propionitrile
Ethyl acetate
Methacrylonitrile
Isobutyl alcohol
Methyl methacrylate
n-Butanol
2-Nitropropane
1,1,1,2-Tetrachloroethane
Cyclohexanone
Isopropylbenzene
1,2-Dibromo 3-chloropropane (DBCP)

TABLE 5-1 (Continued)

Groundwater Sampling, from Monitoring Wells (continued)

General Chemistry	Method No. (SW846)
Dissociable cyanide	SM18 4500-CN-I
Total cyanide	SW846 9012

Groundwater Sampling, from Soil Borings

Volatile Organic Compounds	Method No. 8260B (SW846)
Acetone	Hexane
Acrolein	2-Hedanone
Acrylonitrile	Iodomethane
Benzene	Methylene chloride
Bromodichloromethane	4-Methyl-2-pentanone
Bromoform	Methyl tert-butyul ether
Bromomethane	Styrene
2-Butanone (MEK)	1,1,2,2-Tetrachloroethane
Carbon disulfide	tert-Butyl alcohol
Carbon tetrachloride	Tetrachloroethene
Chlorobenzene	Tetrahydrofuran
Chloroethane	Toluene
2-Chloroethyl vinyl ether	1,1,1-Trichloroethane
Chloroform	1,1,2-Trichloroethane
Chloromethane	Trichloroethene
Dibromochloromethane	Trichlorofluoromethane
Dibromomethane	1,2,3-Trichloropropane
1,2-Dibromoethane (EDB)	Trichlorotrifluoroethane
1,2-Dichlorobenzene	Vinyl acetate
1,3-Dichlorobenzene	Vinyl chloride
1,43-Dichlorobenzene	Xylenes (total)
Dichlorodifluoromethane	Dichlorofluoromethane
1,1-Dichloroethane	Ethyl ether
1,2-Dichloroethane	Acetonitrile
1,1-Dichloroethene	3-Chloropropene
cis-1,2-Dichloroethene	Chloroprene
trans-1,2-Dichloroethene	Isopropyl ether
1,2-Dichloroethene (total)	Propionitrile
1,2-Dichloropropane	Ethyl acetate
cis-1,3-Dichloropropene	Methacrylonitrile
trans-1,3-Dichloropropene	Isobutyl alcohol
trans-1,3-Dichloropropene	Methyl methacrylate
trans-1,4-Dichloro-2-butene	n-Butanol
1,4-Dioxane	2-Nitropropane
Ethanol	1,1,1,2-Tetrachloroethane
Ethylbenzene	Cyclohexanone
Ethyl methacrylate	Isopropylbenzene
	1,2-Dibromo 3-chloropropane (DBCP)

Soil Sampling, from Soil Borings

Volatile Organic Compounds	Method No. 8260B (SW846)
Acetone	Hexane
Acrolein	2-Hedanone
Acrylonitrile	Iodomethane
Benzene	Methylene chloride
Bromodichloromethane	4-Methyl-2-pentanone
Bromoform	Methyl tert-butyul ether
Bromomethane	Styrene
2-Butanone (MEK)	1,1,2,2-Tetrachloroethane
Carbon disulfide	tert-Butyl alcohol
Carbon tetrachloride	Tetrachloroethene
Chlorobenzene	Tetrahydrofuran
Chloroethane	Toluene
2-Chloroethyl vinyl ether	1,1,1-Trichloroethane
Chloroform	1,1,2-Trichloroethane
Chloromethane	Trichloroethene
Dibromochloromethane	Trichlorofluoromethane
Dibromomethane	1,2,3-Trichloropropane
1,2-Dibromoethane (EDB)	Trichlorotrifluoroethane
1,2-Dichlorobenzene	Vinyl acetate
1,3-Dichlorobenzene	Vinyl chloride
1,43-Dichlorobenzene	Xylenes (total)
Dichlorodifluoromethane	Dichlorofluoromethane
1,1-Dichloroethane	Ethyl ether
1,2-Dichloroethane	Acetonitrile
1,1-Dichloroethene	3-Chloropropene
cis-1,2-Dichloroethene	Chloroprene
trans-1,2-Dichloroethene	Isopropyl ether
1,2-Dichloroethene (total)	Propionitrile
1,2-Dichloropropane	Ethyl acetate
cis-1,3-Dichloropropene	Methacrylonitrile
trans-1,3-Dichloropropene	Isobutyl alcohol
trans-1,3-Dichloropropene	Methyl methacrylate
trans-1,4-Dichloro-2-butene	n-Butanol
1,4-Dioxane	2-Nitropropane
Ethanol	1,1,1,2-Tetrachloroethane
Ethylbenzene	Cyclohexanone
Ethyl methacrylate	Isopropylbenzene
	1,2-Dibromo 3-chloropropane (DBCP)

TABLE 5-1 (Continued)

Sediment Sampling, from Red Cedar River

Semivolatile Organic Compounds	Method No. 8270C (SW846)
Anthracene	Fluoranthene
Acenaphthene	Fluorene
Acenaphthylene	Phenanthrene
Benzo (a) anthracene	Pyrene
Benzo (a) pyrene	Indeno (1,2,3-cd) pyrene
Chrysene	Naphthalene
Dibenz (a,h) anthracene	
Benzo (b) fluoranthene	
Benzo (ghi) perylene	
Benzo (k) fluoranthene	

Polychlorinated Biphenyls (PCBs)	Method No. 8082 (SW846)
Aroclor 1016	Aroclor 1248
Aroclor 1221	Aroclor 1254
Aroclor 1232	Aroclor 1260
Aroclor 1242	

General Chemistry	Method No. (SW846)
Dissociable cyanide	SM18 4500-CN-I
Percent Moisture	MCAWW 160.3 MOD
Total cyanide	SW846 9012

Metals (total)	Method No. (SW846)
Arsenic	6010B
Barium	6010B
Cadmium	6010B
Chromium	6010B
Lead	6010B
Mercury	7471A
Selenium	6010B
Silver	6010B

RCRA CORRECTIVE ACTION FOR JOHNSON CONTROLS, INC.
FOWLERVILLE, MI
MEETING OF DECEMBER 6, 2002

SIGN-IN SHEET

Name	Affiliation	Phone	email
1. Juan Thomas	EPA	(312) 886-6010	thomas.juan@epa.gov
2. Thomas Williams	EPA	312 886 0814	williams.tom@epa.gov
3. George Hamper	EPA	312-886-0987	hamper.george@epa.gov
4. GERALD W. PHILLIPS	USEPA	312.886.0977	phillips.gerald@epa.gov
5. Dennis Reis	rep Johnson Controls	414-570-1005	dennis.reis@reisllc.com
6. CHRISTOPHER PRESTON	ENTACT	630-616-2100	cpreston@entactinc.com
7. CHRIS WINKELJOHN	EARTH TECH	734-779-2810	CHRIS.WINKELJOHN@EARTHTECH.COM

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING

JENNIFER M. GRANHOLM
GOVERNOR

STEVEN E. CHESTER
DIRECTOR

February 23, 2006

Mr. Juan Thomas
U.S. Environmental Protection Agency, Region 5
77 West Jackson Boulevard
Chicago, Illinois 60604-3507

Dear Mr. Thomas:

Subject: Final Determination of a Mixing Zone Request; Johnson Controls, Inc. (JCI) (former Stanley Tools); MID 099 124 299

The Michigan Department of Environmental Quality (MDEQ), Waste and Hazardous Materials Division (WHMD), has reviewed your request for a Mixing Zone Determination for venting groundwater to the Red Cedar River from JCI, in Fowlerville, Michigan. Your request was forwarded to the MDEQ, Water Bureau (WB). The WB's response to that request for a mixing zone determination is enclosed. The response the WB provided identifies the acceptable concentration limits for discharge of the various chemicals characterized in your mixing zone request to the Red Cedar River.

Based on the information provided, it is determined that there is a reasonable potential for the discharge of some chemicals to cause or contribute to water quality standards (WQS) being exceeded.

Recommended acute mixing zone-based groundwater surface water interface (GSI) values are summarized in the table below:

Table 1: Plume Venting to the Red Cedar River

Parameter	Final Acute Value (ug/L)	Chronic Value (ug/L)	Reported Worst Case Maximum Site Concentration (ug/L)
Trichloroethylene	3500	N/A	4200
Arsenic	680	N/A	161
Cadmium	77	N/A	13
Chromium, Hexavalent	32	N/A	20
Copper	144	N/A	103
Nickel	5800	N/A	1180
Cyanide, Free	44	N/A	10

General Comments

1. The final acute values listed above are the mixing zone-based GSI criteria. These limits are provided for chemicals determined to have a reasonable potential to exceed the acute mixing zone-based GSI criteria. These values, as well as the generic GSI criteria for other chemicals not specifically identified in the mixing zone request, must not be exceeded at the GSI compliance monitoring wells; if they are, further remedial action will be required. The facility has the following options in regards to parameters that exceed the acute mixing zone-based GSI criteria in on-site monitoring wells:

   a. If exceedances are upgradient of the compliance monitoring wells, JCI must demonstrate that data from a final approved GSI compliance monitoring well system are, and will be, in compliance with acute mixing zone-based GSI criteria for those parameters. Averaging of groundwater data is not allowed for comparison to generic GSI or acute mixing zone-based GSI criteria, nor is it allowed for bioaccumulative contaminants of concern (BCCs). Acute mixing zoned-based or generic GSI criteria may not be exceeded in any individual GSI compliance monitoring well.

   b. The effluent limits for trichloroethylene are based upon Tier II water quality values. The facility does have the option to submit additional aquatic toxicity testing data that may allow for the development of less restrictive criteria, i.e., Tier I, for this parameter. The facility should contact the WB for guidance prior to conducting any additional testing.

   c. Prevent the discharge of all parameters that exceed the acute mixing zone-based GSI criteria in the GSI compliance monitoring wells. This option would require the focus of subsequent site investigations to hydrogeologically define remediation designs for capturing the groundwater discharge, further plume characterization, and identification of sources for source control measures.

2. It has been determined that any other parameter not given a recommended mixing zone based GSI criteria in the table above, or in the enclosure, will not cause or contribute to WQS being exceeded at this time. This determination is based upon the reported maximum values in JCI's mixing zone request which was submitted to the WB by the WHMD.

In order to demonstrate the groundwater discharge long-term compliance with the mixing zone-based GSI criteria, JCI will need to submit a Mixing Zone Compliance Monitoring Plan for review and approval. The Mixing Zone Compliance Monitoring Plan should include a Sampling and Analysis Plan, to address both mixing zone chemicals and other chemicals reported in the mixing zone request, identification of the wells that JCI proposes to sample to show compliance with the mixing zone-based GSI criteria (both along the GSI and within the appropriate portions of the plume), and provide an

explanation of the monitoring schedule and reporting process. Please submit the Mixing Zone Compliance Monitoring Plan to this office, within 60 days of receipt of this letter.

In addition to the specific Mixing Zone Compliance Monitoring Program, if any GSI compliance monitoring data show exceedances of the maximum value reported to the WB in the mixing zone determination request i.e., for chemicals reported in the mixing zone request but were shown to be meeting the GSI criteria, the data must be promptly evaluated by JCI to determine the significance and whether a new mixing zone determination request should be submitted to the WB. If there is an exceedance of the prior reported maximum value for any parameter of concern, please contact this office for further direction.

Should you have any questions regarding this letter or the Mixing Zone Determination, please contact me at slaytond@michigan.gov or by telephone.

Sincerely,

/s/

David Slayton
Hazardous Waste Technical Support Unit
Hazardous Waste Section
Waste and Hazardous Materials Division
517-373-8012

Enclosure
cc: Mr. Lee Carter, MDEQ
Mr. Steve Buda, MDEQ
Mr. Ron Stone/Mr. John McCabe/Mr. David Slayton/Reporting, MDEQ
HWS-CA File

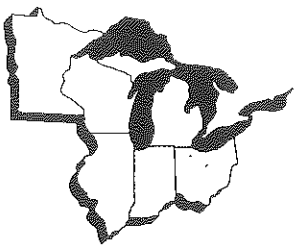
United States
Environmental Protection
Agency

Region 5
77 West Jackson Blvd.
Chicago, Illinois 60604

Illinois, Indiana,
Michigan, Minnesota,
Ohio, Wisconsin

EPA

Environmental NEWS RELEASE



CONTACT: Kären Thompson, (312) 353-8547

JOHNSON CONTROLS AGREES TO CLEAN UP HAZARDOUS WASTE; EPA SETS DEADLINES

FOR IMMEDIATE RELEASE No.03-OPA012

CHICAGO (Jan. 28, 2003)—Johnson Controls Inc. has agreed to investigate and clean up pollution at the former Stanley Tool Works manufacturing facility in Fowlerville, Mich. The agreement with U.S. Environmental Protection Agency Region 5 is part of an "administrative order on consent."

Johnson Controls must report to EPA by Feb. 15, 2003, the nature and extent of soil and ground water contamination and final remedies for cleaning up hazardous waste at the site. It also must stabilize migration of contaminated ground water into the Red Cedar River and control human exposures during 2003. Hazardous wastes at issue include trichlorethylene (TCE) and PCBs.

EPA issued the order under the Resource Conservation and Recovery Act that regulates hazardous waste from production to final disposal.

About EPA

Founded in 1970, EPA is responsible for protecting the environment and human health. The Agency enforces air, water, and land laws and ensures that designated health standards are met. EPA Region 5 includes six Great Lakes states: Illinois, Indiana, Michigan, Minnesota, Ohio and Wisconsin.

# # #

GONZALEZ
SAGGIO
HARLAN

May 12, 2008

VIA OVERNIGHT MAIL

Mr. Juan Thomas
United States Environmental Protection Agency
Enforcement & Compliance Assurance Branch
Region 5
77 West Boulevard
Chicago, IL 60604-3590

Mr. David Slayton
Michigan Department of Environmental Quality
Hazardous Waste Management Unit, Hazardous Waste Section
Constitutional Hall
525 W. Allegan Street
Lansing, MI 48909-7741

Dear Juan and David:

On behalf of Johnson Controls, Inc. ("JCI"), Patricia Thomson of Entact recently provided you with a Technical Report, titled "Evaluation of the 1008 1st Semi-annual Groundwater Sampling Results and Baseline Ecological Risk Assessment (BERA) for the former Johnson Controls Inc. (JCI) Stanley Tool Site." Appendix A of the Report contained a proposed floodplain fill and mitigation plan from American Compounding Specialties, Inc. ("ACS") related to its plans to construct an addition to its facility in Fowlerville, Michigan.

Recently, ACS provided us with a revised version of the floodplain fill and mitigation plan. A copy of which is enclosed for your review. ACS's revised plan will not affect monitoring wells that are located in limited floodplain fill areas, Floodplain Mitigation Area C, or Floodplain Mitigation Area D. Moreover, ACS's revised plan will not affect our proposal for the removal and replacement of certain monitoring wells in the RCRA Groundwater Monitoring Well Program ("Program"), or the abandonment of monitoring wells that are not in the Program, as explained in the Report.

Thus, JCI is submitting the enclosed, revised to replace the original Appendix A. Please refer to the enclosed Appendix A when reviewing Entact's above referenced Technical report. If you have any questions, please feel encouraged to contact me.

Yours Very Truly,

Jesse Padilla

JP/mn
Enclosure

ENTACT
environmental services

June 6, 2008

rec'd
6/17/08
CAB

Carolyn Bury
Environmental Scientist
RCRA Corrective Action Program
Land and Chemicals Division
U.S. EPA Region Five
77 W. Jackson Blvd. DE-9J
Chicago, IL 60604

RE: Stanley Tools BERA

Ms. Bury,

Please find enclosed the revised hard copies of the spreadsheets for replacement into the Stanley Tools BERA.

Thank you,

Rhonda Regester

Rhonda Regester

1010 Executive Court • Suite 280 • Westmont, Illinois 60559 • p.630.986.2900 • f.630.986.0653
www.entact.com

where used?

App E Summary of BG DATA
"BG Thold Data"

How were these values used?

~~2003~~

1994, 2000, 03, 2007

(which was for [illegible] resolution &
which treated 1994
there are two [illegible] to use

Resolution

no - use the 2007 sample
not [illegible] the Highway

other words samples included in table "samples used"
illustrated on graph

A1

But App E not used in table 6-1

6-5 other sources?

FIGURES

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TABLE E-1
SUMMARY OF SEDIMENT BACKGROUND DATA
JCI - FOWLERVILLE

		Location	SDBG1	SDBG2	SDBG3	SDBG4	SDBG5	SE/RC-24-1	SE/RC-25-1	SD-007	SE/RC-13/1-008
		Field ID:	SDBG1012-041803-01	SDBG2012-041803-01	SDBG3012-042103-01	SDBG4012-042103-01	SDBG5012-042103-01	SRC-24/136787	SRC-25/136787	7/25/2007	7/25/2007
		Date Sampled:	4/18/2003	4/18/2003	4/21/2003	4/21/2003	4/21/2003	9/18/2000	9/18/2000	SD-007	SE/RC-13/1
		Depth (ft):	0 - 12	0 - 12	0 - 12	0 - 12	0 - 12	0 - 0	0 - 0	0-12	0-12
Volatile Organic Compounds											
2-Methylnaphthalene	91-57-6	ug/kg	430 U	330 U	330 U	330 U	330 U	NA	NA	NA	NA
Acenaphthene	83-32-9	ug/kg	430 U	330 U	330 U	330 U	330 U	54 U	47 U	<1220 U	<1220 U
Acenaphthylene	208-96-8	ug/kg	430 U	330 U	330 U	330 U	330 U	57 U	49 U	<2440 U	<2440 U
Anthracene	120-12-7	ug/kg	430 U	330 U	330 U	330 U	330 U	83 U	71 U	<1220 U	<1220 U
Benz(a)anthracene	56-55-3	ug/kg	38 J	30 J	330 U	86 J	120 J	97 J	57 U	<610 U	<610 U
Benzo(a)pyrene	50-32-8	ug/kg	54 J	37 J	330 U	84 J	110 J	76 J	66 J	**155**	<61.0 U
Benzo(b)fluoranthene	205-99-2	ug/kg	98 J	64 J	330 U	110 J	110 J	75 J	54 J	<610 U	<610 U
Benzo(g,h,i)perylene	191-24-2	ug/kg	430 U	330 U	330 U	35 J	47 J	67 U	58 U	<1220 U	<1220 U
Benzo(k)fluoranthene	207-08-9	ug/kg	430 U	330 U	330 U	69 J	92 J	120 U	110 U	<1220 U	<1220 U
Chrysene	218-01-9	ug/kg	56 J	42 J	330 U	110 J	140 J	NA	NA	<1220 U	<1220 U
Dibenz(a,h)anthracene	53-70-3	ug/kg	430 U	330 U	330 U	330 U	330 U	81 U	70 U	<61.0 U	<61.0 U
Fluoranthene	206-44-0	ug/kg	130 J	97 J	31 J	260 J	300 J	170 J	110 J	<1220 U	<1220 U
Fluorene	86-73-7	ug/kg	430 U	330 U	330 U	330 U	330 U	64 U	55 U	<1220 U	<1220 U
Indeno(1,2,3-cd)pyrene	193-39-5	ug/kg	430 U	330 U	330 U	32 J	46 J	83 U	71 U	<610 U	<610 U
Naphthalene	91-20-3	ug/kg	430 U	330 U	330 U	330 U	330 U	80 U	68 U	<1220 U	<1220 U
Phenanthrene	85-01-8	ug/kg	59 J	40 J	330 U	120 J	110 J	65 U	56 U	<1220 U	<1220 U
Pyrene	129-00-0	ug/kg	100 J	73 J	27 J	200 J	240 J	150 J	120 J	<1220 U	<1220 U
PNAs, Total	TPNA	ug/kg	535	383	58	1106	1315	568	350	155	ND
Polychlorinated Biphenyls (PCBs):											
PCB, Total	TPCB	ug/kg	NA	NA	NA	NA	NA	NA	NA	ND	ND
Total Metals:											
Aluminum, Total	7429-90-5	mg/kg	NA	2400	1830	1780	2970	NA	NA	NA	NA
Arsenic, Total	7440-38-2	mg/kg	27	3.5	6.1	2.8	9.2	11.1	4.8	<3.42 U	**7.11**
Barium, Total	7440-39-3	mg/kg	178	20	24	15	56	58.7	38.4	NA	NA
Cadmium, Total	7440-43-9	mg/kg	1.1	0.17	0.25	0.16	0.36	0.52 B	0.26 B	<0.683 U	<0.678 U
Chromium, Total	7440-47-3	mg/kg	14	4.1	4.6	3.9	6.4	6.7	5.6	**3.27**	**6.61**
Copper, Total	7440-50-8	mg/kg	16	2.7	3.9	4.4	9.3	NA	NA	<3.42 U	**9.29**
Lead, Total	7439-92-1	mg/kg	17	5	3.2	3.4	10	8.7	11	<3.42 U	**4.64**
Mercury, Total	7439-97-6	mg/kg	0.12	0.047 J	0.016 J	0.03 J	0.055 J	0.038 B	0.032 B	NA	NA
Nickel, Total	7440-02-0	mg/kg	15	5.3	6.9	4.3	6.3	NA	NA	<3.42 U	**9.16**
Selenium, Total	7782-49-2	mg/kg	1.1	0.28 U	0.37	0.26 U	0.36	0.92 B	0.61 U	NA	NA
Silver, Total	7440-22-4	mg/kg	0.13 J	0.026 J	0.033 J	0.02 J	0.05 J	0.72 U	0.62 U	NA	NA
Zinc, Total	7440-66-6	mg/kg	96	20	18	16	34	NA	NA	**10.1**	**21.7**
Chromium(VI)	18540-29-9	mg/kg	60 U	15 U	11 U	2 U	29 U	NA	NA		
Miscellaneous Parameters:											
Fractional Organic Carbon	FOC	%	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Organic Carbon	TOC	%	16	3.1	1.7	0.9	5	NA	NA	NA	NA

NOTES:
U = Non-detect, value is reporting limit
J = Estimated value below reporting limit
NA = Parameter not analyzed
B = Blank qualified result
— = Parameter not analyzed

? Sent 6/6/08 to replace BCVA JAN 2008 TABLE

Table E-2

General Background Statistics for Data Sets with Non-Detects

Cr

General Statistics			
Total Number of Samples	9	Number of Unique Samples	9
Raw Statistics		Log-Transformed Statistics	
Minimum	3.27	Minimum	1.185
Maximum	14	Maximum	2.639
Second Largest	6.7	Second Largest	1.902
First Quartile	4	First Quartile	1.386
Median	5.6	Median	1.723
Third Quartile	6.655	Third Quartile	1.895
Mean	6.131	Mean	1.721
SD	3.211	SD	0.429
Coefficient of Variation	0.524		
Skewness	2.141		
Background Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.755	Shapiro Wilk Test Statistic	0.909
Shapiro Wilk Critical Value	0.829	Shapiro Wilk Critical Value	0.829
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% UTL with 90% Coverage	14.01	95% UTL with 90% Coverage	16.03
95% UPL (t)	12.42	95% UPL (t)	12.97
90% Percentile (z)	10.25	90% Percentile (z)	9.692
95% Percentile (z)	11.41	95% Percentile (z)	11.33
99% Percentile (z)	13.6	99% Percentile (z)	15.17
Gamma Distribution Test		Data Distribution Test	
k star	3.802	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	1.613		
nu star	68.43		
A-D Test Statistic	0.526	Nonparametric Statistics	
5% A-D Critical Value	0.723	90% Percentile	14
K-S Test Statistic	0.251	95% Percentile	14
5% K-S Critical Value	0.28	99% Percentile	14
Data appear Gamma Distributed at 5% Significance Level			
Assuming Gamma Distribution		95% UTL with 90% Coverage	14
90% Percentile	10.35	95% Percentile Bootstrap UTL with 90% Coverage	14
95% Percentile	**12.05**	95% BCA Bootstrap UTL with 90% Coverage	14
99% Percentile	15.69	95% UPL	14
		95% Chebyshev UPL	20.88
		Upper Threshold Limit Based upon IQR	10.64

Note: UPL (or upper percentile for gamma distributed data) represents a preferred estimate of BTV

Table E-2
General Background Statistics for Data Sets with Non-Detects

Cu

General Statistics			
Number of Valid Samples	7	Number of Detected Data	6
Number of Unique Samples	6	Number of Non-Detect Data	1
		Percent Non-Detects	14.29%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	2.7	Minimum Detected	0.993
Maximum Detected	16	Maximum Detected	2.773
Mean of Detected	7.598	Mean of Detected	1.845
SD of Detected	4.985	SD of Detected	0.671
Minimum Non-Detect	3.42	Minimum Non-Detect	1.23
Maximum Non-Detect	3.42	Maximum Non-Detect	1.23
Background Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.887	Shapiro Wilk Test Statistic	0.94
5% Shapiro Wilk Critical Value	0.788	5% Shapiro Wilk Critical Value	0.788
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	6.757	Mean (Log Scale)	1.658
SD	5.066	SD (Log Scale)	0.787
95% UTL 90% Coverage	20.71	95% UTL 90% Coverage	45.85
95% UPL (t)	17.28	95% UPL (t)	26.9
90% Percentile (z)	13.25	90% Percentile (z)	14.38
95% Percentile (z)	15.09	95% Percentile (z)	19.14
99% Percentile (z)	18.54	99% Percentile (z)	32.72
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	6.05	Mean in Original Scale	6.841
SD	5.668	SD in Original Scale	4.972
95% UTL with 90% Coverage	21.67	95% UTL with 90% Coverage	40.01
		95% BCA UTL with 90% Coverage	16
		95% Bootstrap (%) UTL with 90% Coverage	16
95% UPL (t)	17.83	95% UPL (t)	24.53
90% Percentile (z)	13.31	90% Percentile (z)	13.81
95% Percentile (z)	15.37	95% Percentile (z)	17.95
99% Percentile (z)	19.24	99% Percentile (z)	29.36
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	1.552	Data appear Normal at 5% Significance Level	
Theta Star	4.894		
nu star	18.63		
A-D Test Statistic	0.339	Nonparametric Statistics	
5% A-D Critical Value	0.702	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.241	Mean	6.899
5% K-S Critical Value	0.335	SD	4.548
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	1.883
		95% KM UTL with 90% Coverage	19.43
Assuming Gamma Distribution		95% KM Chebyshev UPL	28.09
Gamma ROS Statistics with extrapolated Data		95% KM UPL (t)	16.35
Mean	6.848	90% Percentile (z)	12.73
Median	4.4	95% Percentile (z)	14.38
SD	4.964	99% Percentile (z)	17.48
k star	1.476		
Theta star	4.64		
Nu star	20.66		
95% Percentile of Chisquare (2k)	7.731		
90% Percentile	14.33		
95% Percentile	**17.94**		
99% Percentile	26.1		

Note: UPL (or upper percentile for gamma distributed data) represents a preferred estimate of BTV
For an Example: KM-UPL may be used when multiple detection limits are present
Note: DL/2 is not a recommended method.

Table E-2
General Background Statistics for Data Sets with Non-Detects

Pb

General Statistics			
Number of Valid Samples	9	Number of Detected Data	8
Number of Unique Samples	8	Number of Non-Detect Data	1
		Percent Non-Detects	11.11%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	3.2	Minimum Detected	1.163
Maximum Detected	17	Maximum Detected	2.833
Mean of Detected	7.868	Mean of Detected	1.904
SD of Detected	4.764	SD of Detected	0.606
Minimum Non-Detect	3.42	Minimum Non-Detect	1.23
Maximum Non-Detect	3.42	Maximum Non-Detect	1.23
Background Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.891	Shapiro Wilk Test Statistic	0.932
5% Shapiro Wilk Critical Value	0.818	5% Shapiro Wilk Critical Value	0.818
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	7.183	Mean (Log Scale)	1.752
SD	4.906	SD (Log Scale)	0.727
95% UTL 90% Coverage	19.22	95% UTL 90% Coverage	34.33
95% UPL (t)	16.8	95% UPL (t)	23.97
90% Percentile (z)	13.47	90% Percentile (z)	14.64
95% Percentile (z)	15.25	95% Percentile (z)	19.06
99% Percentile (z)	18.6	99% Percentile (z)	31.28
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	6.062	Mean in Original Scale	7.342
SD	6.088	SD in Original Scale	4.727
95% UTL with 90% Coverage	21	95% UTL with 90% Coverage	28.28
		95% BCA UTL with 90% Coverage	17
		95% Bootstrap (%) UTL with 90% Coverage	17
95% UPL (t)	18	95% UPL (t)	20.82
90% Percentile (z)	13.86	90% Percentile (z)	13.66
95% Percentile (z)	16.08	95% Percentile (z)	17.12
99% Percentile (z)	20.23	99% Percentile (z)	26.13
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	2.144	Data appear Normal at 5% Significance Level	
Theta Star	3.669		
nu star	34.31		
A-D Test Statistic	0.336	Nonparametric Statistics	
5% A-D Critical Value	0.721	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.217	Mean	7.36
5% K-S Critical Value	0.296	SD	4.44
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	1.582
		95% KM UTL with 90% Coverage	18.25
Assuming Gamma Distribution		95% KM Chebyshev UPL	27.76
Gamma ROS Statistics with extrapolated Data		95% KM UPL (t)	16.06
Mean	7.348	90% Percentile (z)	13.05
Median	5	95% Percentile (z)	14.66
SD	4.72	99% Percentile (z)	17.69
k star	2.101		
Theta star	3.498		
Nu star	37.82		
95% Percentile of Chisquare (2k)	9.814		
90% Percentile	14.13		
95% Percentile	**17.16**		
99% Percentile	23.87		

Note: UPL (or upper percentile for gamma distributed data) represents a preferred estimate of BTV
For an Example: KM-UPL may be used when multiple detection limits are present
Note: DL/2 is not a recommended method.

Table E-2

General Background Statistics for Data Sets with Non-Detects

Ni

General Statistics			
Number of Valid Samples	7	Number of Detected Data	6
Number of Unique Samples	6	Number of Non-Detect Data	1
		Percent Non-Detects	14.29%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	4.3	Minimum Detected	1.459
Maximum Detected	15	Maximum Detected	2.708
Mean of Detected	7.827	Mean of Detected	1.97
SD of Detected	3.879	SD of Detected	0.442
Minimum Non-Detect	3.42	Minimum Non-Detect	1.23
Maximum Non-Detect	3.42	Maximum Non-Detect	1.23
Background Statistics			
Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.854	Shapiro Wilk Test Statistic	0.954
5% Shapiro Wilk Critical Value	0.788	5% Shapiro Wilk Critical Value	0.788
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	6.953	Mean (Log Scale)	1.765
SD	4.229	SD (Log Scale)	0.675
95% UTL 90% Coverage	18.6	95% UTL 90% Coverage	37.58
95% UPL (t)	15.74	95% UPL (t)	23.77
90% Percentile (z)	12.37	90% Percentile (z)	13.89
95% Percentile (z)	13.91	95% Percentile (z)	17.75
99% Percentile (z)	16.79	99% Percentile (z)	28.13
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	6.871	Mean in Original Scale	7.044
SD	4.093	SD in Original Scale	4.103
95% UTL with 90% Coverage	18.15	95% UTL with 90% Coverage	30.55
		95% BCA UTL with 90% Coverage	15
		95% Bootstrap (%) UTL with 90% Coverage	15
95% UPL (t)	15.37	95% UPL (t)	20.57
90% Percentile (z)	12.12	90% Percentile (z)	12.92
95% Percentile (z)	13.6	95% Percentile (z)	15.98
99% Percentile (z)	16.39	99% Percentile (z)	23.78
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	3.055	Data appear Normal at 5% Significance Level	
Theta Star	2.562		
nu star	36.66		
A-D Test Statistic	0.315	Nonparametric Statistics	
5% A-D Critical Value	0.698	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.23	Mean	7.323
5% K-S Critical Value	0.333	SD	3.503
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	1.45
		95% KM UTL with 90% Coverage	16.97
Assuming Gamma Distribution		95% KM Chebyshev UPL	23.65
Gamma ROS Statistics with extrapolated Data		95% KM UPL (t)	14.6
Mean	7.07	90% Percentile (z)	11.81
Median	6.3	95% Percentile (z)	13.09
SD	4.068	99% Percentile (z)	15.47
k star	2.31		
Theta star	3.06		
Nu star	32.34		
95% Percentile of Chisquare (2k)	10.48		
90% Percentile	13.3		
95% Percentile	**16.03**		
99% Percentile	22.05		

Note: UPL (or upper percentile for gamma distributed data) represents a preferred estimate of BTV
For an Example: KM-UPL may be used when multiple detection limits are present
Note: DL/2 is not a recommended method.

Table E-2
General Background Statistics for Data Sets with Non-Detects

Zn

General Statistics			
Total Number of Samples	7	Number of Unique Samples	7
Raw Statistics		Log-Transformed Statistics	
Minimum	10.1	Minimum	2.313
Maximum	96	Maximum	4.564
Second Largest	34	Second Largest	3.526
First Quartile	16	First Quartile	2.773
Median	20	Median	2.996
Third Quartile	34	Third Quartile	3.526
Mean	30.83	Mean	3.163
SD	29.64	SD	0.717
Coefficient of Variation	0.962		
Skewness	2.334		
Background Statistics			
Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.672	Shapiro Wilk Test Statistic	0.892
Shapiro Wilk Critical Value	0.803	Shapiro Wilk Critical Value	0.803
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% UTL with 90% Coverage	112.5	95% UTL with 90% Coverage	170.2
95% UPL (t)	92.41	95% UPL (t)	104.7
90% Percentile (z)	68.82	90% Percentile (z)	59.21
95% Percentile (z)	79.59	95% Percentile (z)	76.82
99% Percentile (z)	99.79	99% Percentile (z)	125.2
Gamma Distribution Test		Data Distribution Test	
k star	1.257	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	24.53		
nu star	17.6		
A-D Test Statistic	0.677	Nonparametric Statistics	
5% A-D Critical Value	0.715	90% Percentile	96
K-S Test Statistic	0.306	95% Percentile	96
5% K-S Critical Value	0.315	99% Percentile	96
Data appear Gamma Distributed at 5% Significance Level			
Assuming Gamma Distribution		95% UTL with 90% Coverage	96
90% Percentile	67.09	95% Percentile Bootstrap UTL with 90% Coverage	96
95% Percentile	**85.27**	95% BCA Bootstrap UTL with 90% Coverage	96
99% Percentile	126.8	95% UPL	96
		95% Chebyshev UPL	169
		Upper Threshold Limit Based upon IQR	61

Note: UPL (or upper percentile for gamma distributed data) represents a preferred estimate of BTV

Table E-3
Two Sample Hypothesis Testing: Arsenic and Cadmium - ProUCL output

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	WorkSheet.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: As-INV
Background Data: As-BKG

Raw Statistics

	Site	Background
Number of Valid Samples	60	9
Number of Non-Detect Data	0	1
Number of Detect Data	60	8
Minimum Non-Detect	N/A	3.42
Maximum Non-Detect	N/A	3.42
Percent Non detects	0.00%	11.11%
Minimum Detected	2.1	2.8
Maximum Detected	65	27
Mean of Detected Data	9.088	8.951
Median of Detected Data	6.95	6.605
SD of Detected Data	9.772	7.808

Site vs Background Gehan Test

H0: Mean/Median of Site or AOC <= Mean/Median of background

Gehan z Test Value	0.517
Critical z (0.95)	1.645
P-Value	0.303

Conclusion with Alpha = 0.05
Do Not Reject H0, Conclude Site <= Background
P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Data Sets with Non-Detects

User Selected Options	
From File	WorkSheet.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: As-INV
Background Data: As-BKG

Raw Statistics

	Site	Background
Number of Valid Samples	60	9
Number of Non-Detect Data	0	1
Number of Detect Data	60	8
Minimum Non-Detect	N/A	3.42
Maximum Non-Detect	N/A	3.42
Percent Non detects	0.00%	11.11%
Minimum Detected	2.1	2.8
Maximum Detected	65	27
Mean of Detected Data	9.088	8.951
Median of Detected Data	6.95	6.605
SD of Detected Data	9.772	7.808

Wilcoxon-Mann-Whitney Site vs Background Test
All observations <= 3.42 (Max DL) are ranked the same
Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC <= Mean/Median of Background

Site Rank Sum W-Stat	2130
WMW Test U-Stat	299.5
WMW Critical Value (0.050)	485
Approximate P-Value	0.303

Conclusion with Alpha = 0.05
Do Not Reject H0, Conclude Site <= Background

Table E-3
Two Sample Hypothesis Testing: Arsenic and Cadmium - ProUCL output

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	WorkSheet.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: As-INV
Background Data: As-BKG

Raw Statistics

	Site	Background
Number of Valid Samples	60	9
Number of Non-Detect Data	0	1
Number of Detect Data	60	8
Minimum Non-Detect	N/A	3.42
Maximum Non-Detect	N/A	3.42
Percent Non detects	0.00%	11.11%
Minimum Detected	2.1	2.8
Maximum Detected	65	27
Mean of Detected Data	9.088	8.951
Median of Detected Data	6.95	6.605
SD of Detected Data	9.772	7.808

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.049)	17
Approximate K Value (0.049)	17
Number of Site Observations in 'R' Largest	14
Calculated Alpha	0.0649

Conclusion with Alpha = 0.049
Do Not Reject H0, Perform Wilcoxon-Mann-Whitney or Gehan Test

Gehan Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	WorkSheet.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference	0
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Area of Concern Data: Cd-INV
Background Data: Cd-BKG

Raw Statistics

	Site	Background
Number of Valid Samples	60	9
Number of Non-Detect Data	15	2
Number of Detect Data	45	7
Minimum Non-Detect	0.11	0.678
Maximum Non-Detect	0.34	0.683
Percent Non detects	25.00%	22.22%
Minimum Detected	0.031	0.16
Maximum Detected	0.87	1.1
Mean of Detected Data	0.285	0.403
Median of Detected Data	0.23	0.26
SD of Detected Data	0.201	0.331

Site vs Background Gehan Test

H0: Mean/Median of Site or AOC <= Mean/Median of background

Gehan z Test Value	-1.577
Critical z (0.95)	1.645
P-Value	0.943

Conclusion with Alpha = 0.05
Do Not Reject H0, Conclude Site <= Background
P-Value >= alpha (0.05)

Wilcoxon-Mann-Whitney Site vs Background Comparison Test for Data Sets with Non-Detects

User Selected Options	
From File	WorkSheet.wst
Full Precision	OFF
Confidence Coefficient	95%
Substantial Difference (S)	0
Selected Null Hypothesis	Site or AOC Mean/Median Less Than or Equal to Background Mean/Median (Form 1)
Alternative Hypothesis	Site or AOC Mean/Median Greater Than Background Mean/Median

Table E-3
Two Sample Hypothesis Testing: Arsenic and Cadmium - ProUCL output
Area of Concern Data: Cd-INV
Background Data: Cd-BKG

Raw Statistics

	Site	Background
Number of Valid Samples	60	9
Number of Non-Detect Data	15	2
Number of Detect Data	45	7
Minimum Non-Detect	0.11	0.678
Maximum Non-Detect	0.34	0.683
Percent Non detects	25.00%	22.22%
Minimum Detected	0.031	0.16
Maximum Detected	0.87	1.1
Mean of Detected Data	0.285	0.403
Median of Detected Data	0.23	0.26
SD of Detected Data	0.201	0.331

Wilcoxon-Mann-Whitney Site vs Background Test
All observations <= 0.683 (Max DL) are ranked the same
Wilcoxon-Mann-Whitney (WMW) Test

H0: Mean/Median of Site or AOC <= Mean/Median of Background

Site Rank Sum W-Stat	2082
WMW Test U-Stat	252
WMW Critical Value (0.050)	485
Approximate P-Value	0.629

Conclusion with Alpha = 0.05
Do Not Reject H0, Conclude Site <= Background

Quantile Site vs Background Comparison Hypothesis Test for Data Sets with Non-Detects

User Selected Options	
From File	WorkSheet.wst
Full Precision	OFF
Confidence Coefficient	95%
Null Hypothesis	Site or AOC Concentration Less Than or Equal to Background Concentration (Form 1)
Alternative Hypothesis	Site or AOC Concentration Greater Than Background Concentration

Area of Concern Data: Cd-INV
Background Data: Cd-BKG

Raw Statistics

	Site	Background
Number of Valid Samples	60	9
Number of Non-Detect Data	15	2
Number of Detect Data	45	7
Minimum Non-Detect	0.11	0.678
Maximum Non-Detect	0.34	0.683
Percent Non detects	25.00%	22.22%
Minimum Detected	0.031	0.16
Maximum Detected	0.87	1.1
Mean of Detected Data	0.285	0.403
Median of Detected Data	0.23	0.26
SD of Detected Data	0.201	0.331

Quantile Test

H0: Site Concentration <= Background Concentration (Form 1)

Approximate R Value (0.049)	17
Approximate K Value (0.049)	17
R Value Adjusted for Ties in Data	18
K Value Adjusted for Ties in Data	18
Number of Site Observations in 'R' Largest	14

Non-Detect Values in the 'R' Largest - Cannot complete Quantile Test

ENTACT
environmental services

Date: April 3, 2008

To: Juan Thomas, U. S. EPA

From: Patricia Thomson, P.G., ENTACT

Cc: Jesse Padilla, Gonzalez, Saggio & Harlan LLP
Edward (Ned) Witte, Gonzalez, Saggio & Harlan LLP

Re: Evaluation of the 2008 1st Semi-annual Groundwater Sampling Results and Baseline Ecological Risk Assessment (BERA) for the former Johnson Controls Inc. (JCI) Stanley Tool Site, Fowlerville, MI and Proposed Well Relocation/Abandonment Plan

Dear Mr. Thomas:

This technical report presents the results of the 1st Semi-annual 2008 groundwater sampling event conducted between March 4 and March 8, 2008, and the Baseline Ecological Risk Assessment (BERA) for the former JCI Stanley Tool Site in Fowlerville, Michigan (Site) (Figure 1). This report also presents our recommendation for the removal and replacement of certain monitoring wells in the Groundwater Monitoring Program (GWMP), as well as the abandonment of non-GWMP monitoring wells. Our findings and recommendations are as follows.

Introduction

A teleconference was held on February 26, 2008 between the United States Environmental Protection Agency (U.S.EPA), the outside legal counsel for Johnson Controls Inc. (JCI)'s, and ENTACT to discuss proposed plans by the current Property Owner, American Compounding Specialties, Inc. (American Compounding), to begin significant building expansion and flood plain filling activities in late April or early May, 2008. Previous construction activities by American Compounding associated with construction of the initial facility had resulted in damage to two monitoring wells in the approved GWMP (MW-08 and MW-25), and three additional monitoring wells not included in the GWMP which were found to be covered or removed during the July 2007 well survey (MW-06, MW-07, MW-12). The proposed 2008 expansion and filling activities will further impact existing monitoring wells at the Site based on the American Compounding proposed expansion and fill plans presented in Attachment 1. The proposed construction activities will necessitate relocation and replacement of certain monitoring wells currently in the GWMP that have already been damaged or are at risk of being damaged, and proper decommissioning and removal of those monitoring wells not included in the approved GWMP that fall within the proposed expansion or fill footprint.

Pursuant to that discussion, the March 2008 groundwater sampling results along with the

completed BERA results are presented in this Technical Report along with the proposed well relocation and abandonment plan for review and comment by the to the U.S.EPA. Following U.S.EPA review and approval, monitoring wells that currently fall within the planned construction footprint will either be relocated and replaced, or properly decommissioned in accordance with state regulations. American Compounding has been advised that no construction or filling activities should be initiated until the U.S.EPA has reviewed and approved the proposed well relocation or abandonment plan for wells that will be affected by the proposed facility expansion. As American Compounding was looking to start the proposed construction activities in late April or early May, JCI agreed to conduct the 2nd round of groundwater sampling earlier than planned in order to submit the results along with the BERA results as early as possible to allow the U.S.EPA time to review and approve this information before construction activities begin.

1ST SEMI-ANNUAL 2008 GROUNDWATER SAMPLING EVENT

The 1st semi-annual 2008 sampling event was conducted between March 4 and March 6, 2008 in accordance with the approved *June 2007 Modified Corrective Measures Implementation Program Work Plan (CMIP Work Plan)* and the *U.S.EPA Final Decision and Response to Comments - Selection of Remedial Alternatives for the Site*, with the omission of two previously-damaged wells (MW-08 and MW-25). Eleven of the 17 remaining wells in the approved groundwater monitoring program (GWMP) were sampled at this time including MW-02, MW-11, MW-14, MW-17, MW-22, MW-24, MW-26, MW-A2, MW-B-1, MW-B2, and MW-J2. The remaining six monitoring wells in the GWMP could not be accessed due to site conditions (heavy snow and high water levels). These include background wells MW-28 and MW-28C, on-Site MW-21, and off-Site wells MW-OS1, MW-OS3 and MW-OS3C. Well locations are presented in Figure 2. As soon as the water levels fall to a point where the field crew can reach these wells, the six remaining wells will be sampled and results submitted to the U.S.EPA as an Addendum to this April 4, 2008 Technical Report. It is believed that the data from the 11 monitoring wells that were sampled will provide sufficient information to allow for reaching a decision on the proposed relocation/abandonment plan.

Prior to sample collection, static water level (SWL) measurements were collected. The SWLs and calculated groundwater elevations were used to determine groundwater flow direction in the shallow saturated horizon, which correlated with previous findings that shallow flow is toward the Red Cedar River, with a westerly flow direction across the Site on the east side of the river, and a northeasterly direction of flow from the properties west of the river. The groundwater flow potentiometric map, presented in Figure 3, shows that the groundwater flow direction remains consistent with previous sampling events.

The wells were sampled by CTI & Associates, of Brighton, Michigan, as part of the GWMP for the listed parameters shown in the following table:

Well Location	Horizon	Purpose	Frequency	Parameters
MW-02	Shallow	Performance/MNA	Semi-annual	VOCs
MW-08	Shallow	GSI Compliance	Semi-annual	DAMAGED – not sampled

Well Location	Horizon	Purpose	Frequency	Parameters
MW-11	Shallow	On-Site Plume boundary	Semi-annual	VOCs, total CN-, 10 MI metals [2]
MW-14	Shallow	GSI Compliance/Off-Site Plume boundary	Semi-annual	VOCs, total CN-
MW-17	Shallow	GSI Compliance/ Performance/MNA	Semi-annual	VOCs, total CN-, 10 MI metals, Ni, Cr+6, MNA parameters [1]
MW-21	Shallow	GSI Compliance	Semi-annual	To be sampled in April 2008: VOCs, CN-, 10 MI metals, Ni, Cr+6,
MW-22	Shallow	GSI Compliance	Semi-annual	VOCs, total CN-, 10 MI metals, Ni, Cr+6,
MW-24	Shallow	GSI Compliance	Semi-annual	VOCs, total and available CN-, 10 MI metals, Ni, Cr+6,
MW-25	Shallow	Performance/MNA	Semi-annual	DAMAGED – not sampled
MW-26	Shallow	GSI Compliance	Semi-annual	VOCs, total CN-, 10 MI metals, Ni, Cr+6
MW-28	Shallow	Background GW Quality	Semi-annual	To be sampled in April 2008: VOCs, 10 MI Metals, Ni, CN-
MW-28C	Deep	Background GW Quality	Semi-annual	To be sampled in April 2008: 10 MI Metals
MW-A2	Deep	GSI Compliance	Semi-annual	VOCs, total CN-, 10 MI metals, Ni, Cr+6,
MW-B1	Shallow	GSI Compliance	Semi-annual	VOCs, total CN-, 10 MI metals, Ni, Cr+6, MNA parameters [1]
MW-B2	Deep	Vertical Plume Monitoring	Semi-annual	VOCs, total CN-, 10 MI metals
MW-J2	Deep	Vertical Plume Monitoring	Semi-annual	VOCs, total and available CN-, 10 MI metals
MW-OS1C	Deep	Off-site Vertical Plume Monitoring	Semi-annual	To be sampled in April 2008: VOCs, CN-, 10 MI metals
MW-OS3	Shallow	Off-site plume monitoring	Semi-annual	To be sampled in April 2008: VOCs, CN-, 10 MI metals
MW-OS3C	Deep	Off-site plume monitoring	Semi-annual	To be sampled in April 2008: VOCs, CN-, 10 MI metals

Green shading indicates the well found damaged during the 2007 well survey
Blue shading indicates wells which could not be accessed due to heavy snow and high water conditions – these wells are slated for sampling as soon as conditions permit – estimate early April 2008
[1]: MNA: monitored natural attenuation parameters include sulfates/sulfides, nitrates/nitrites, ferrous/ferric iron, alkalinity, hardness, manganese, chemical oxygen demand, ethane/ethane
[2]: The 10 MI metals include: arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, copper, and zinc.

The groundwater samples were collected using low-flow minimal drawdown sampling methodology in accordance with the U.S.EPA *Ground Water Issue Paper – Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures, EPA/540/S-95/504 (April 1996)*. The samples were submitted to Trimatrix Laboratories of Grand Rapids, Michigan for analysis in accordance with the approved 2003 Quality Assurance Project Plan (QAPP) prepared by Earth Tech/Weston (ETW) and the Work Plan. The complete analytical results are provided in Attachment 2.

A summary of the analytical results in comparison to the MDEQ Generic Groundwater-Surface Water Interface (GSI) cleanup criteria, Worst Case Maximum Site Concentration values, and the MDEQ Mixing Zone Final Acute Values (FAVs) and in comparison to the July 2007 results are summarized in Table 1.

Metals

Total and dissolved chromium were detected in MW-B2 at levels of 5.7 µg/L and 1.9 µg/L respectively, below the Michigan Department of Environmental Quality (MDEQ) generic groundwater-surface water interface (GSI) criterion of 230 µg/L. As shown in Table 1, the previous July 2007 results showed no detectable levels of total or dissolved chromium at this location. No other dissolved metal exceedences of the calculated GSI criteria, MDEQ-determined Final Acute Values (FAVs) or Reported Worst Case Maximum Site Concentrations were found in any of the 11 wells that were sampled.

Total copper was detected in MW-11 at 4.8 µg/L, lower than the level of 44 µg/L found during the 2007 semi-annual sampling event, and falling below the Part 201 GSI criterion of 29 µg/L. Total cadmium continues to be detected in MW-J2 at levels over the Part 201 criterion, but the corresponding dissolved cadmium results fell below the GSI criterion. This indicates that copper and cadmium are more likely associated with suspended fines in the sample rather than actual groundwater quality, minimizing the potential for migration to the Red Cedar River. Both the total copper and total cadmium values were below the Worst Case Maximum Site Concentrations and the Final Acute Values (FAVs).

Total cyanide was analyzed for all 11 of the groundwater samples. At two location (MW-J2 and MW-24), available (amenable) cyanide (upon which the GSI, FAV and worst case concentration values are based) was also analyzed since the 2007 total cyanide levels at these locations were above the GSI and/or FAV criteria applicable to available cyanide. This would determine if available cyanide was present at levels above the GSI criterion of 5.2 µg/L or the FAV criterion of 44 µg/L. Total cyanide was detected at MW-J2 at 45 µg/L with a corresponding available cyanide concentration of < 2 µg/L, which is below the GSI criterion. Total cyanide was detected in MW-24 at 48 µg/L, with a corresponding available cyanide concentration of <2 µg/L, below the GSI criterion. The results support historical sampling results for the Site, which showed the concentrations of free cyanide (when detected) were always less than 30 percent of the measured total cyanide concentration. Therefore the total cyanide concentration of 11 µg/L at MW-26 and 14 2 µg/L at MW-17 are considered to represent an associated available cyanide value below the GSI criterion of 5.2 2 µg/L.

Volatile Organic Compounds

A summary of the analytical results for volatile organic compounds (VOCs) in comparison to the MDEQ Generic GSI cleanup criteria, Worst Case Maximum Site Concentration values, and the MDEQ Mixing Zone FAVs is presented in Table 1.

Exceedences of the GSI values continued to be detected in monitoring well MW-02 which shows the highest levels of residual VOCs at the Site. Cis-1,2-dichloroethene (cis-1,2-DCE) was found

at 600 µg/L, a decrease from the level found in 2007 and dropping below the GSI criterion of 620 µg/L. Trichloroethene (TCE) was detected at 3,600 µg/L above the GSI criterion of 200 µg/L), slightly higher than the 2007 concentration and rising just above the FAV of 3,500 µg/L. The TCE concentration remains below the worst case concentration of 4,200 µg/L upon which the FAV was determined. MW-02 is located along the eastern Site boundary in the vicinity of former SWMU L, and is an upgradient Site well based on the determined shallow westerly groundwater flow direction. The TCE levels at MW-02 have remained relatively constant since 2003, while monitoring wells downgradient of this area show more significant declines from the TCE levels as shown in Table 1. Downgradient well results from MW-24, MW-17, MW-B1 and MW-11 show that levels are significantly lower, ranging between 0.60 µg/L to 11 µg/L, below the GSI criterion. This indicates that though there remains residual source material in the vicinity of MW-02, migration of contaminants from this location is limited by effective and on-going natural attenuation processes.

TCE degradation products cis-1,2-dichloroethene (cis-1,2-DCE), vinyl chloride and ethene and ethane have been detected in the downgradient wells. Cis-1,2-DCE was detected in five downgradient wells (MW-26, MW-17, MW-B1, MW-14 and MW-11) at levels ranging from 0.77 J µg/L to 300 µg/L, below the GSI criterion. Vinyl chloride continues to be detected in MW-B1 (56 µg/L) and MW-17 (26 µg/L) at levels above the GSI criterion of 15 µg/L. Though Mixing Zone FAVs were not developed for vinyl chloride, the maximum concentration of vinyl chloride detected on Site was 330 µg/L detected at MW-17 in November 2003. This maximum value was used by the MDEQ in modeling the estimated surface water concentration at the discharge point and comparison to GSI criteria using the MDEQ 90Q10 flow value for the Red Cedar River of 3.8 cubic feet per second. The predicted concentration at the surface water discharge point was considered within acceptable limits. Therefore the detected vinyl chloride values of 26 to 56 µg/L, which are an order of magnitude below the 2003 maximum concentration used in the modeling, are considered to be within acceptable limits.

No other VOC compounds were detected in any of the wells in excess of the generic GSI criteria.

MNA Parameters

The analytical results for MNA parameters for the two wells (MW-B1 and MW-17) are summarized in Table 2 in comparison to the 2007 values. The results indicate that degradation is continuing to occur in downgradient locations. Specifically, the analytical data show the presence of TCE degradation by-products at higher levels than the parent compound TCE in downgradient wells. As shown on Table 3, endpoint daughter product, ethane and ethylene, were detected in both MW-17 (0.83 J µg/L and 1.3 µg/L) and in MW-B1 (2.3 µg/L and 1.4 µg/L) indicating that degradation processes are effectively reducing TCE by-products to the endpoint product ethylene which poses no risk.

BASELINE ECOLOGICAL RISK ASSESSMENT

A BERA was conducted in response to the U.S.EPA December 1, 2006 Final Decision for the JCI Former Stanley Tool Facility, Fowlerville, Michigan which recommended that additional ecological testing be conducted to:

- Ensure contaminants were not present in the stream at levels deemed harmful to aquatic life; and

- Define areas with exceedences falling between preliminary screening criteria, specifically the Threshold Effect Concentrations (TECs) and Probable Effects Concentrations (PECs).

- Utilizes results of the BERA and previous site investigation data to isolate the areas of sediment that will be removed and to establish site-specific cleanup goals

The TECs and PECs are literature-based values for freshwater ecosystems used by the MDEQ as screening criteria. TEC values are defined as threshold concentrations below which adverse effects to the most sensitive of ecological receptors are not expected to occur. PECs are defined as concentrations above which adverse effects to the most sensitive of ecological receptors probably would occur. These adverse effects are typically determined by exposure by the most sensitive of ecological receptors in high-quality, freshwater ecosystems. The Middle Fork of the Red Cedar River is not considered to be a high-quality, freshwater ecosystem but rather a shallow, warm water stream which is too small to be navigated safely and too shallow to support a sports fishery or attract recreational activities. Therefore the TECs and PECs represent worst-case values which were refined using information gathered during the BERA to develop site-specific cleanup levels that are more applicable to the actual stream conditions.

The BERA utilized the Triad Approach as defined in the *Sediment Classification Methods Compendium (*EPA, 1992b), to further investigate potential ecological risks. The Triad Approach incorporates measures of sediment chemistry (chemical contamination), sediment bioassays (toxicity) and benthic communities (changes in benthic community structure) to support the establishment of site-specific sediment clean-up levels. The complete BERA is presented Attachment 3 and includes sediment sampling, bioassay testing and community survey results, as well as associated risk calculations and assumptions.

BERA Proposed Cleanup Objectives Summary

The BERA addressed the following contaminants of potential concern (COPCs) that have been detected in the sediments of the Red Cedar River; polychlorinated biphenyls (PCBs), polynuclear aromatic hydrocarbons (PAHs), and select heavy metals.

PCBs and PAHs were not detected or detected infrequently in the BERA sediment samples. As such, a site-specific cleanup level cannot be determined from the BERA dataset for these contaminants.

As presented in the FCMP (ET/W, 2004), an ecological-based, sediment cleanup value of 1 mg/kg, as a surface weighted average concentration (SWAC) was proposed for PCBs. The site-wide SWAC concentration for PCBs calculated from historical site data (0.1526 mg/kg) does not exceed this proposed cleanup level.

For the total PAHs, the mid-point of the TEC and PEC is proposed as the cleanup level (12.205 µg/kg-total PAH at 1% organic carbon). The maximum normalized total PAH concentration in the historic dataset (ET/W, 2004) is 5.470 µg total PAH/kg, and does not exceed the proposed cleanup level.

For the remaining COCs in sediments of the Red Cedar River, the calculated BERA cleanup objectives are summarized below along with the literature-based TEC and PEC values cleanup levels:

Total Metals	Chromium	Copper	Lead	Nickel	Zinc
Threshold Effects Concentration (mg/Kg)	43.4	31.6	35.8	22.7	121
Probable Effects Concentration (mg/Kg)	110	150	130	48.6	459
Proposed BERA Cleanup Objectives (mg/Kg)	133	150	130	58	527

The BERA data indicate that those metal concentrations identified in the *February 2004 Earth Tech Technical Memorandum: Sediment Quality Survey, Preliminary Sediment Cleanup Criteria and Data Evaluation for the Red Cedar River, Former Stanley Tools, Fowlerville, MI*, which fell between the literature-based screening TEC and PEC values are not considered to pose a risk to aquatic life in the Middle Fork of the Red Cedar.

The selection of these cleanup levels are supported by the sediment chemistry data, bioassay results, and community survey results for samples SD-E2-003, SD-C1-005, and SC-A1-006. Concentrations of chromium, lead, nickel and/or zinc exceeded published PEC concentrations in these three samples. However, toxic effects to benthic organisms were observed in the bioassays results only for locations SD-E2-003 and SD-C1-005. At SD-E2-003, lead is clearly the risk driver; at SD-C1-005, nickel and zinc are the risk drivers.

Although the concentrations of chromium, nickel and zinc at SD-A1-006 exceeded their respective PEC values, no toxic effects were found in the bioassay. In addition, MBI values for this location were the lowest observed at any of the community survey locations. Therefore, the observed concentrations of these contaminants at SD-A1-006 are proposed as their clean-up objectives.

The concentration of lead found in sediments at SD-E2-003 (789 mg/kg) is well above published TEC and PEC levels. It is notable however, that lead has not been detected at highly elevated concentrations within any other investigative sediment sample collected in the River at or near the Site. Specifically, of the 133 historic (ET/W, 2004) and BERA-related sediment samples collected and analyzed for lead excluding sample SD-E2-003, the maximum and mean concentrations observed, were 97 mg/kg (at SD-L1), and 13.3 mg/kg, respectively. These values are below the published PEC value (130 mg/kg) for this contaminant. Because of the lack of data between the extreme value detected at SD-E2-003 and the remaining sample population from which inferences may be drawn regarding observable toxic effects, the published PEC value for lead is considered appropriate as a clean-up objective.

Elevated concentrations of copper in sediments in the Red Cedar River are co-located with similar elevated concentrations of chromium, nickel and/or zinc. Although the concentrations of copper in the BERA sediment samples are somewhat elevated in samples SD-E2-003, SD-C1-005, and SC-A1-006, copper does not appear to drive risk in any samples. Thus, the published PEC value for copper is considered appropriate as a clean-up objective.

A comparison of the proposed BERA cleanup objectives to previous sediment sample results shows the following sample locations with one or more metals above the BERA-determined values:

Sample ID	Sample Date	Depth (in)	Total Cr (mg/Kg)	Total Cu (mg/Kg)	Total Ni (mg/Kg)	Total Zn (mg/Kg)
SD-A1	2003	0 - 12	97	85	**71**	372
SD-C1-005	2007	0 - 6	77.2	107	**267**	**675**
SD-E1	2003	0 - 12	**181**	**230**	**87**	289
SD-E2	2003	0 - 12	**1760**	**1370**	**189**	**1930**
SD-E2	2003	12 - 24	**396**	**513**	**165**	**721**
SD-E2-003	2007	0 - 6	112	133	43.5	158
SD-H1	2003	0 - 12	**771**	**563**	**150**	**784**
SE/RC-1/3	1991	0 - 3	**1420**	**769**	**374**	**1590**
SE/RC-2/3	1991	0 - 3	**240**	**227**	**133**	232
SE/RC-3/3	1991	0 - 3	74.8	114	**77.9**	**658**
SE/RC-3/12	1991	6 - 12	**252**	421	**349**	**921**
SE/RC-5/3	1991	0 - 3	**451**	302	**87.9**	425
SE/RC-6/2	1991	6 - 12	**448**	713	**432**	**2120**
SE/RC-7/1	1994	0 - 3	**200**	**175**	**62.2**	163
SE/RC-7/2	1994	6 - 12	**690**	**622**	**267**	466
SE/RC-9/1	1994	0 - 3	**170**	108	**67.1**	152
SE/RC-9/2	1994	6 - 12	**558**	**293**	**117**	463
SRC-17	2000	0 – 0	**404**	NA	NA	NA
BERA Clean-Up Objective (mg/Kg)			133	150	58	527

Bold value indicate an exceedence of the clean-up objective

The estimated volume of sediments listed above that will be removed as part of the Final Corrective Measures (assuming a 1 to 2 foot removal depth) is approximately 900 to 1,700 cubic yards. Upon sediment removal, confirmation samples (0-6 inch depth) will be collected from each dredge area. A representative average concentration of residual COCs will be calculated to demonstrate compliance with the proposed cleanup objectives.

PROPOSED WELL RELOCATION/ABANDONMENT PLAN

The groundwater monitoring results indicate that conditions of the Site are stable following the soil removal action. Migration of contaminated groundwater to Red Cedar River continues to be under control and groundwater flow directions remain constant. The BERA has allowed the identification and isolation of areas of sediment that will be removed and has established site-specific cleanup goals to ensure protection of ecological receptors over the long term.

The approved groundwater monitoring program was designed to provide sufficient rounds of data to satisfy the Agency that groundwater contaminant migration is, and will remain, under control while natural attenuation mechanisms degrade residual contaminants in shallow groundwater over the long term. The approved GWMP even without sample results for damaged wells MW-25 and MW-08 has effectively accomplished this. As indicated in Section 6.2.1, following two years of semi-annual groundwater sampling (4 sampling events), the GWMP will be assessed to determine whether the program an be modified, reduced or terminated. This GWMP assessment will be performed after the 1st semi-annual event in 2009.

The proposed well relocation and replacement plan has been designed to replace the wells currently in the approved program which either have been damaged or are at risk of being damaged as part of the upcoming facility expansion construction. There are five wells currently in the GWMP that have been or are at risk of being damaged: MW-08, MW-11, MW-25, MW-26 and MW-J2. Based on the proposed expansion footprint provided in Attachment A, MW-11 along the west wall of the facility is considered at risk of being damaged and is proposed for removal and replacement. MW-11 will be relocated approximately 70 feet west of damaged well MW-25 at the base of the bermed area shown in Figure 4. Damaged well MW-25 will then be properly abandoned and not replaced since MW-11 will provide sufficient data in this area of the Site. Damaged well MW-08 will be properly abandoned and replaced in the same proximity at the base of the bermed area as it will be used in lieu of MW-11 in providing information along the Site's south boundary.

MW-26 and MW-J2 are located in the proposed floodplain mitigation area. These wells will be properly abandoned as this area is expected to be prone to flooding under the proposed floodplain filling and mitigation plan currently under review by the MDEQ. MW-26 and MW-J2 will be relocated outside the proposed flood mitigation boundary approximately 100 feet to the south, along the river edge to continue to monitor groundwater at the river boundary. Based on the map, the proposed floodplain mitigation boundary abuts the existing SWMU A to the north which prevents moving the wells in that direction. The west perimeter of the Site nearest the river is then be monitored by MW-22, MW-A2, MW-24, MW-B1 and MW-B2 as well as relocated MW-26 and MW-J2 which is more than adequate to properly monitor groundwater flow to the river

All remaining wells not in the GWMP that are located in either the proposed facility expansion footprint or in the proposed floodplain fill or mitigation areas will be properly abandoned. This includes the following twelve wells: MW-03, MW-04, MW-05, MW-09, MW-10, MW-18, MW-19, MW-E2, MW-JC and MW-BKC1, BKC2 and BKC3.

Three wells not in the GWMP (MW-06, MW-07, and MW-12) located in or adjacent to the existing American Compounding facility were found to have been either covered over or removed as a result of previous construction activities during the 2007 well survey. Therefore these wells cannot be properly abandoned.

An additional three wells located in the fenced area north of the facility (MW-G1, MW-G2 and OW-16) and off-Site well MW-26C, located on approximately 600 feet west of the river could not be found during the well survey. If these wells are found and not at risk of being

compromised as part of the upcoming construction they will be left in place until such time as the GWMP can be terminated.

CONCLUSION

The first year of semi-annual sampling results show that groundwater migration continues to remain under control at the Site following the soil removal action. In the vicinity of upgradient well, MW-02, VOC levels have remained similar to those found in 2003, but there is no significant migration from this location, as shown by downgradient well results. Downgradient wells MW-24, MW-17, MW-B1 and MW-11 show that total VOC levels are significantly lower than detected in 2003 and the concentrations have remained well below the total VOC levels observed in MW-02 since 2003. This indicates that though there remains residual source material in the vicinity of MW-02, migration of contaminants from this location is limited by effective and on-going natural attenuation processes.

Site-specific cleanup objectives determined in the BERA were exceeded in defined areas for chromium, copper, nickel and zinc which will be addressed as part of a sediment removal action. No additional contaminants were present in sediments at levels above the defined risk-based levels

Based on the BERA and groundwater sampling results, the current GWMP, without the two damaged wells (MW-08 and MW-25) has effectively monitored the existing groundwater plume and no significant groundwater migration has been found. This information along with the MNA results shows that natural attenuation mechanisms are effectively controlling contaminant migration in shallow groundwater at the Site. Therefore it is recommended that existing monitoring wells currently not in the GWMP that fall within the proposed expansion or floodplain filling footprints along with damaged well MW-25 be properly abandoned as these wells are not necessary in ensuring the effectiveness of the corrective action conducted at the Site nor the long-term protection of the Red Cedar River. There are five wells currently in the GWMP that have been or are at risk of being damaged by American Compounding's previous and proposed construction activities: MW-08, MW-11, MW-25, MW-26 and MW-J2. These wells will be relocated and replaced to ensure they can be effectively sampled for the next year.

Carolyn Bury/R5/USEPA/US
04/15/2009 06:20 AM

To "Pat Thomson" <pthomson@entact.com>
cc Juan Thomas/R5/USEPA/US@EPA, "Jennifer Bolger" <Jennifer_Bolger@gshllp.com>, "Lou Pieh" <Lou_Pieh@gshllp.com>
bcc
Subject RE: FW: JCI - BERA Report

Pat,
Here are the draft comments. Please let me know if you have any questions in advance of the call.
Carolyn

Carolyn Bury
Environmental Scientist
RCRA Corrective Action Program
Land and Chemicals Division
U.S. EPA Region Five
77 W. Jackson Blvd. DE-9J
Chicago, IL 60604
312-886-3020
bury.carolyn@epa.gov

-----"Pat Thomson" <pthomson@entact.com> wrote: -----

To: Juan Thomas/R5/USEPA/US@EPA
From: "Pat Thomson" <pthomson@entact.com>
Date: 04/14/2009 05:23PM
cc: "Jennifer Bolger" <Jennifer_Bolger@gshllp.com>, "Lou Pieh" <Lou_Pieh@gshllp.com>, Carolyn Bury/R5/USEPA/US@EPA
Subject: RE: FW: JCI - BERA Report

Juan or Carolyn,

Can you please resend the comments from Carolyn - we had our email system go down last Friday and I did not get her email though I see Carolyn sent it to the correct address. Next Tuesday will work for me and JCI has indicated that next Tuesday should work for them as well. I just need to check with Terry Bosko, our eco risk assessor, and I will get back to you, asap.

Thanks Juan.

Pat

Patricia Thomson, P.G.

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From: Thomas.Juan@epamail.epa.gov [mailto:Thomas.Juan@epamail.epa.gov]
Sent: Friday, April 10, 2009 9:05 AM
To: Pat Thomson
Cc: Jennifer Bolger; Lou Pieh; Bury.Carolyn@epamail.epa.gov
Subject: Re: FW: JCI - BERA Report

Pat,

I will be providing you with our draft comments pertaining to the BERA Report prior to our call. Carolyn Bury is finalizing her comments. As such, let's postpone our call from Monday 4/13. I will propose some new dates and times later when I send you our draft comments. My apologies for any inconvenience.

Thank you.

Juan Thomas

-----"Pat Thomson" <pthomson@entact.com> wrote: -----

To: Juan Thomas/R5/USEPA/US@EPA
From: "Pat Thomson" <pthomson@entact.com>
Date: 04/08/2009 08:59AM
Subject: FW: JCI - BERA Report

Juan,

Our eoclogical risk assessor is available on the following dates next week:

Final DRAFT

Draft March 23, 2009

Revised April 10, 2009 per April 9, 2009 meeting with Juan Thomas

Subject: **Proposed Cleanup Objectives for Red Cedar River Sediments** JCI, former Stanley Tools Works, Fowlerville, Michigan

Review of March 2008 *Groundwater Monitoring Program Results and Baseline Ecological Risk Assessment* submitted April 2008 and the Transmittal Letter with Summary and Conclusions dated April 23, 2008 from Patricia Thompson

USEPA ID No. MID 099 124 299

The reviewed documents present JCI's proposed remedial objectives (ROs) for metals contamination in the Red Cedar River sediments, and identify the sampling *points* (recent and historic) where these objectives are exceeded. JCI identifies this list of sampling points as being subject to remediation. It is not clear whether JCI is including the excavation of the areas between the sampling points as part of its excavation proposal as a map showing stream reaches subject to excavation was not included in the submitted documents. It may be that JCI intends to complete pre-design sampling before the stream reaches are identified; this should be clarified.

The documents also present the results of two field studies which JCI completed to support the RO development, as well as the abbreviated Baseline Ecological Risk Assessment (BERA) developed to assess potential impacts to the benthic macroinvertebrate community in the Red Cedar River.

The field studies included:

1) bulk sediment toxicity testing
2) benthic macroinvertebrate community surveys.

The BERA investigation addresses the assessment endpoint of protection of the survival, growth, and reproductive success of the benthic community.

Review Summary

The approved CMS work plan indicated that three lines of evidence would be used to develop the ROs for individual site constituents: bulk sediment toxicity tests, sediment chemistry compared to screening levels, and benthic community surveys. However, JCI's proposed ROs are based predominantly on the results of one set of toxicity tests. It appears, therefore, that JCI did not completely integrate the three lines of evidence available for RO development.

EPA has developed alternative ROs which are based more broadly on the available lines of evidence, are more conservative, and are therefore considered to be more protective of the environment. EPA's ROs are qualitatively based on the three lines of evidence developed for the TRIAD approach as described in the CMS work plan. EPA does not expect that the more conservative ROs will greatly increase the amount of excavation proposed by JCI in the Red Cedar River.

Review

Incomplete Use of Lines of Evidence to Develop ROs

In the approved June 2007 *Modified Corrective Measures Implementation Program Work Plan*, JCI proposed the Superfund Triad approach to analyzing sediment toxicity using these lines of evidence:

A. Comparing observed effects in the benthic macroinvertebrate communities associated with the site with benthic macroinvertebrate communities at a reference area (i.e., community surveys)

B. Comparing estimated or measured exposure levels for a particular chemical against screening levels that are known from the literature to be toxic, i.e., MacDonald Ingersoll consensus-based values ("toxicity benchmarks")

C. Comparing laboratory test (bioassays) results using sediment from the site and from a reference site.

However, while the Triad Approach was to have been used to develop the ROs, it appears that JCI primarily used the line of evidence described in C, above, and to some extent, in B, above, to develop the *Proposed BERA Cleanup Objectives.* The objectives (ROs) are reported in the table on page 7 of the transmittal letter (April 3, 2008 from Patricia Thompson), and beginning on page 35 of the BERA. JCI's proposed ROs (copied to Table 1, below) were based mainly on the results of the bulk toxicity testing and not by integrating the other two lines of evidence as is done in the Triad approach. The consensus-based screening values and the benthic community survey should have had more weight in the RO development.

Screening Criteria

In a reversal of its earlier practice, JCI asserted that the MacDonald -Ingersoll Consensus-Based Sediment Quality Guidelines (consensus-based guidelines) are inappropriate for use in a warm-water stream and apply only to high-quality water bodies (page 35 of the BERA and page 6 of the transmittal letter). The authors did not provide any reference for their position that the guidelines do not apply to the subject water body, nor were alternative effects-based guidelines

proposed. Further, although JCI stated that the guidelines were not appropriate for the river, they continued to refer to them in the BERA and in the transmittal letter.

EPA considers the consensus-based guidelines to broadly apply to surface water bodies; they are used to screen sediment quality in a range of surface water types for a variety of projects. The guidelines have been adopted by a number of States. Because the consensus-based guidelines were developed by combining several studies through averaging toxicity testing results and have been field-tested, they are generally considered to reliably predict toxicity (WDNR 2003).

*Probable Effects Concentrations*_Additionally, in correspondence dated May 1, 2006, EPA stated that Probable Effects Concentrations (PECs) were not acceptable goals for the river, and requested that the midpoint level between TECs and PECs be identified. Median effects concentrations (MECs) therefore, should have been considered target ROs for the river. JCI did select the MEC for total PAH concentrations in the *Proposed BERA Cleanup Objectives*. However, for copper and lead, JCI proposes the PECs.

As a line of evidence to develop the ROs, the consensus-based guidelines should have been consulted to modify the ROs which were based on toxicity testing, some of which were greater than PECs. When concentrations are greater than PECs, adverse effects are highly probably or frequently seen (WDNR 2003).

Benthic Community Survey

It is unclear whether the benthic community survey was used to develop the proposed ROs. In Section 6.1.4, Community Studies, the BERA states that there is risk to the benthic community at three survey locations: 002, 003, and 004. However, per Table 6.5 of the BERA, all of the sample locations where the benthic community was evaluated showed communities "tolerant of pollution." Notations in the table suggest that a source other than the site may be contributing to contamination in the river. However, this topic is not discussed in either document. Neither document contains a discussion of how the surveys were integrated as a line of evidence to develop the ROs; it appears to EPA that the degraded status of the benthic community was not integrated into the RO development.

Bulk Sediment Toxicity Testing

The ROs appear to have been based primarily on the sediment toxicity test results. The reliance on one-time laboratory toxicity tests involves a degree of uncertainty. For example, if the toxicity tests would have run for longer than the 28 days it is expected that toxic effects would have been more clearly

demonstrated, particularly for the less contaminated the sampling locations. Also, the limited data set is not considered to be statistically powerful.

EPA Remedial Objectives

Integrating the lines of evidence in a TRIAD approach is a qualitative exercise. EPA has developed ROs which qualitatively incorporate the three lines of evidence from the BERA to a greater degree than appears to have been done by JCI, and which incorporate the established MEC target. EPA integrated the results of the toxicity studies, the consensus-based guidelines, and the community surveys to develop ROs for the river. See Table 2, *EPA's Remedial Objectives for Red River Sediments.*

Screening Criteria

EPA weighted the line of evidence provided by the consensus-based guidelines consistent with the following widely applied principle as stated in WDNR 2003:

> *A somewhat conservative but still realistic interpretation that can be applied to contaminant concentrations that fall in the gradient of concentrations between the consensus-based TEC and PEC concentrations is that as the concentrations of a contaminant increase, toxicity and effects to benthic macroinvertebrate species related to reductions in survival, reproduction, and growth, bioaccumulation, and benthic community alterations correspondingly increase and/or are increasingly more probable.*

Therefore, considering that the likelihood for adverse effects to the benthos increases with increasing contaminant levels, the ROs should not exceed the consensus-based guideline PEC levels. The measure of conservatism afforded by not exceeding the PECs also considers potential effects to upper trophic level receptors which were not included in the BERA risk analyses.

Bulk Sediment Toxicity Testing

An adjustment was made to JCI's ROs (see Table 7 of the transmittal letter) to qualitatively account for the uncertainty in bioassay approaches, and to incorporate the line of evidence provided by the screening criteria. While the toxicity testing showed acceptable results above PECs (i.e., effects < 20 %) for some constituents, the results must be adjusted to consider the uncertainties such as laboratory conditions versus field conditions, bioavailability, using one species of test organism, and the lack of statistical variability by using results from only a single set of tests. An adjustment was made so that no RO exceeded the PEC. That is, for constituents which showed acceptable growth and survival in the toxicity test at concentrations above the PEC, the JCI RO was adjusted to the lowered concentration of the PEC.

Lead and Copper: Because lead was erratically distributed in the samples and there was less certainty in the toxicity testing results, JCI proposed the PEC as the RO. JCI selected the PEC for copper because it does not appear to drive risk in the BERA samples where it appears to be associated with chromium, nickel and or zinc. However, it cannot be assumed that copper is associated with these other constituents everywhere else in the river. Rather than the PEC, a midpoint between the TEC and the PEC should be selected for lead and copper.

Therefore, for copper and lead, the ROs are 91 ppm and 81 ppm, respectively. The MEC is calculated as TEC + PEC/2 = MEC. See WDNR 2003.

Benthic Community Surveys

The benthic community surveys confirm highly contaminated conditions at all of the sample locations. Per Table 6-5 of the BERA "Lines of Evidence for Assessing Impacts on Aquatic Ecosystems at Measured Sediment Concentrations," the benthic communities are representative of "significant pollution." The table appears to attribute the quality of the benthic community assemblage, in part, to "other sources." However, since the Site is known to be a source of metals contamination to the river, the benthic community must also be assumed to have been affected by Site-related impacts. Therefore, EPA considers that while the toxicity testing may show "acceptable" growth and survival at some sampling locations , the benthic community is nonetheless impaired. The impaired community downgradient of JCI is further justification for lowering the JCI ROs to MEC and PEC levels.

Other

BERA Section 7.1 Chemicals of Concern in the Sediment

This section identifies COCs based on the FCMP dated 2004. In this document, detected analyses were compared to PECs to identify them as COCs. Please clarify whether chemicals were re-screened against TECs as requested in the May 1, 2006 comments on the FCMP.

This section discusses COC concentration in terms of PEC. As stated above, a MEC is the target concentration for the river.

Summary

As stated above, it is not anticipated that the alternative ROs will greatly increase the amount of sediment to be excavated from the river. For the next step, JCI must submit a preliminary remedial design document for excavation of the Red Cedar River based on EPA's ROs. Sediments should be excavated to a "clean sediment" depth as identified by the EPA ROs. The document must include a

revised table showing results of sediment samples compared to EPA's ROs, similar to the table on page 8 of the April 23, 2008 transmittal letter. The design document must also include an updated base map showing the stream reaches proposed for remediation. The current base map is confusing and outdated, and contains relic information from earlier mapping efforts; EPA had previously requested a revised base map.

Additionally, the pre-design document should include an analysis of absence or presence of any isolated areas of high concentrations of constituents ("hot-spots") of constituents which were eliminated from further consideration based on the surface weighted average concentration exercise.

Table 1. JCI's Proposed Remedial Objectives for Red River Sediments

Constituent	Chromium	Nickel	Zinc	Copper	Lead
Remedial Objective mg/kg	133	58	527	150	130
PEC mg/kg	110	49	460	150	130

Table 2. EPA's Remedial Objectives for Red River Sediments

Constituent	Chromium	Nickel	Zinc	Copper	Lead
Remedial Objective mg/kg	110	49	460	91	83
PEC mg/kg	110	49	460	150	130
MEC mg/kg	76.5	36	290	91	83

PECs and MECs from Wisconsin Department of Natural Resources, 2003.

References

Wisconsin Department of Natural Resources, December 2003. *Consensus-Based Sediment Quality Guidelines, Recommendations for Use and Application Interim Guidance.* WT-732 2003.

JCI - Final Corrective Measures Implementation

Juan Thomas to: Michael.L.Stoelton 06/12/2009 10:32 AM

Cc: "Jennifer Bolger", "Lou Pieh", "Pat Thomson", "Drew Lonergan", "Slayton, David (DEQ)", Tom Williams, Carolyn Bury, George Hamper

---

Mike,

The attached letter addresses the remaining task associated with remediation of contaminated sediments for the Red Cedar River pursuant to the December 1, 2006 Final Decision and Response to Comments Selection of Remedial Alternatives for the former Johnson Controls, Inc. site. We look forward to you continued cooperation.

Juan Thomas
Environmental Scientist, CA Project Manager
U.S. EPA Region 5, Land and Chemicals Division
Remediation and Reuse Branch
Corrective Action Section II
312-886-6010
(312) 353-4342 (fax)

JCISedRemedLtr0509edit.pdf

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:
LU-9J

June 11, 2009

CERTIFIED MAIL
RETURNED RECEIPT REQUESTED

Mr. Michael L. Stoelton
Johnson Controls, Inc.
Automotive Experience
49200 Halyard Drive
Plymouth, Michigan 48170

Re: Final Corrective Measures Implementation
(Sediments)

Dear Mr. Stoelton:

The United States Environmental Protection Agency (U.S.EPA) has completed its review of Johnson Controls, Inc. (JCI), Baseline Ecological Risk Assessment (BERA), dated March 2008. This document was submitted as a component of JCI's Technical Report dated April 2008. JCI completed the BERA in response to the U.S.EPA Region 5, December 1, 2006 Final Decision and Response to Comments, Selection of Remedial Alternative for Johnson Controls, Inc. (Former Stanley Tools Facility) Fowlerville, Michigan (FD&RTC). The Final Decision and Response to Comments Document presented among other remedial measures, excavation of the Red Cedar River Sediments as a remedial measure. An outcome of the BERA was the establishment of site-specific cleanup levels that are to be implemented as target cleanup goals of the river sediments. EPA did not agree with all of JCI's proposed remedial objectives (ROs). As such, this letter summarizes EPA's proposed remedial cleanup objectives to be implemented as part of the JCI Final Corrective Measures of the Red Cedar River Sediments, as determined from our review of JCI's Baseline Ecological Risk Assessment Report, JCI Final Corrective Measures Proposal and EPA Final Decision and Response to Comments Selection of Remedial Alternatives for Johnson Controls, Inc.

U.S.EPA Region 5 has established that the degree of cleanup in the river sediments is based on the goal of protecting the animals that live part or all of their lives in the sediment (benthic organisms). They are important in the food chain of the river's ecosystem. Areas of river sediments that are contaminated at levels considered unsafe for aquatic animals would be removed from the river. EPA's proposed remedial cleanup objectives have been developed by

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Work Plan. The Triad uses these three lines of evidence, as summarized in the Work Plan. The three lines of evidence used to analyze sediment toxicity are as follows:

A. Comparing observed effects in the benthic macroinvertebrate communities associated with the site with benthic macroinvertebrate communities at a reference area (i.e., community surveys)

B. Comparing estimated or measured exposure levels for a particular chemical against screening levels that are known from the literature to be toxic, i.e., MacDonald Ingersoll consensus-based values ("toxicity benchmarks")

C. Comparing laboratory test (bioassays) results using sediment from the site and from a reference site.

Based upon EPA's review of JCI's BERA, JCI did not equally weigh consideration of all three lines of evidence in its development of proposed remedial objectives. Hence, EPA has modified JCI proposed sediment remedial cleanup objectives as illustrated in Table 1.

Table 1. EPA's Remedial Objectives for Red River Sediments

Constituent	Chromium	Nickel	Zinc	Copper	**Lead**
Remedial Objective mg/kg	110	49	460	91	**83**
PEC mg/kg	110	49	460	150	**130**
MEC mg/kg	76.5	36	290	91	**83**

PECs and MECs from Wisconsin Department of Natural Resources, 2003.
PECs – probable effect concentration
MECs - median effects concentration

References

Wisconsin Department of Natural Resources, December 2003. *Consensus-Based Sediment Quality Guidelines, Recommendations for Use and Application Interim Guidance.* WT-732 2003.

JCI in its approved CMP Work Plan indicated that three lines of evidence would be used to develop ROs for individual constituents, i.e., bulk sediment toxicity tests, sediment chemistry compared to screening levels, and benthic community surveys. However, JCI proposed ROs are based predominantly on the results of one set of toxicity tests. EPA cleanup objectives are modified from JCI's proposed remedial cleanup objectives and are based more broadly on the available lines of evidence, are more conservative, and are therefore considered to be more protective of the environment. Implementation of these proposed cleanup objectives, hence excavation of Red Cedar River Sediments, will be based upon sampling data from 2003 and

2007. It should be noted here that JCI will contact the U.S.EPA Project Manager to discuss the RO for lead at any downstream locations where there could be possible confounding sources of lead contamination. ROs for theses locations may be modified from the EPA proposed RO on a case by case basis.

JCI is now required to develop a *Remedial Design Plan* which will describe areas subject to excavation. EPA expects that areas planned for excavation will be of such volume that contamination will be removed from and between targeted sampling points such that they are below remedial objectives to be established by verification sampling. It is recommended that JCI allow U.S.EPA Region 5 collaborative input into its planned *Remedial Design Plan* such that JCI can maintain its proposed schedule for sediment corrective measures implementation. It is also expected that remediation will occur this summer or early fall.

Upon completion of the sediment excavation, JCI is required in accordance with the December 2002, 3008(h) Administrative Order on Consent, to complete a *Final Remedy Construction Completion Report* documenting all work that it has performed. *The Final Remedy Construction Completion Report* will be submitted by JCI within sixty days after sediment remediation is completed.

U.S.EPA looks forward to your continued cooperation. Please feel free to contact me at 312-886-6010 at your discretion.

Sincerely,

Juan Thomas, Project Manager,
Environmental Scientist

Cc. Jennifer Bolger, Gonzalez Saggio & Harlan LLP (electronic copy)
Lou Pieh, Saggio & Harlan LLP (electronic copy)
Andrew Lonergan, CTI & Associates (electronic copy)
Patricia A. Thomson, Entact & Associates (electronic copy)
David Slayton, MDEQ (electronic copy)
Tom Williams, U.S.EPA, ORC (electronic copy)
Carolyn Bury, U.S.EPA, RRB (electronic copy)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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CHICAGO, IL 60604-3590

June 19, 2009

REPLY TO THE ATTENTION OF:
LU-9J

CERTIFIED MAIL
RETURNED RECEIPT REQUESTED

Mr. Michael L. Stoelton
Johnson Controls, Inc.
Automotive Experience
49200 Halyard Drive
Plymouth, Michigan 48170

Re: Final Corrective Measures Implementation
(Sediments)

Dear Mr. Stoelton:

The United States Environmental Protection Agency (U.S.EPA) has completed its review of Johnson Controls, Inc. (JCI), Baseline Ecological Risk Assessment (BERA), dated March 2008. This document was submitted as a component of JCI's Technical Report dated April 2008. JCI completed the BERA in response to the U.S.EPA Region 5, December 1, 2006 Final Decision and Response to Comments, Selection of Remedial Alternative for Johnson Controls, Inc. (Former Stanley Tools Facility) Fowlerville, Michigan (FD&RTC). The Final Decision and Response to Comments Document presented among other remedial measures, excavation of the Red Cedar River Sediments as a remedial measure. An outcome of the BERA was the establishment of site-specific cleanup levels that are to be implemented as target cleanup goals of the river sediments. EPA did not agree with all of JCI's proposed remedial objectives (ROs). As such, this letter summarizes EPA's proposed remedial cleanup objectives to be implemented as part of the JCI Final Corrective Measures of the Red Cedar River Sediments, as determined from our review of JCI's Baseline Ecological Risk Assessment Report, JCI Final Corrective Measures Proposal and EPA Final Decision and Response to Comments Selection of Remedial Alternatives for Johnson Controls, Inc.

U.S.EPA Region 5 has established that the degree of cleanup in the river sediments is based on the goal of protecting the animals that live part or all of their lives in the sediment (benthic organisms). They are important in the food chain of the river's ecosystem. Areas of river sediments that are contaminated at levels considered unsafe for aquatic animals would be removed from the river. EPA's proposed remedial cleanup objectives have been developed by application of the Superfund Program's Triad Approach to assessing sediment conditions. EPA had accepted application of this Triad approach from JCI in its Corrective Measures Proposal

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Work Plan. The Triad uses these three lines of evidence, as summarized in the Work Plan. The three lines of evidence used to analyze sediment toxicity are as follows:

A. Comparing observed effects in the benthic macroinvertebrate communities associated with the site with benthic macroinvertebrate communities at a reference area (i.e., community surveys)

B. Comparing estimated or measured exposure levels for a particular chemical against screening levels that are known from the literature to be toxic, i.e., MacDonald Ingersoll consensus-based values ("toxicity benchmarks")

C. Comparing laboratory test (bioassays) results using sediment from the site and from a reference site.

Based upon EPA's review of JCI's BERA, JCI did not equally weigh consideration of all three lines of evidence in its development of proposed remedial objectives. Hence, EPA has modified JCI proposed sediment remedial cleanup objectives as illustrated in Table 1.

Table 1. EPA's Remedial Objectives for Red River Sediments

Constituent	Chromium	Nickel	Zinc	Copper	**Lead**
Remedial Objective mg/kg	110	49	460	91	**83**
PEC mg/kg	110	49	460	150	**130**
MEC mg/kg	76.5	36	290	91	**83**

PECs and MECs from Wisconsin Department of Natural Resources, 2003.
PECs – probable effect concentration
MECs - median effects concentration

References

Wisconsin Department of Natural Resources, December 2003. *Consensus-Based Sediment Quality Guidelines, Recommendations for Use and Application Interim Guidance.* WT-732 2003.

JCI in its approved CMP Work Plan indicated that three lines of evidence would be used to develop ROs for individual constituents, i.e., bulk sediment toxicity tests, sediment chemistry compared to screening levels, and benthic community surveys. However, JCI proposed ROs are based predominantly on the results of one set of toxicity tests. EPA cleanup objectives are modified from JCI's proposed remedial cleanup objectives and are based more broadly on the available lines of evidence, are more conservative, and are therefore considered to be more protective of the environment. Implementation of these proposed cleanup objectives, hence excavation of Red Cedar River Sediments, will be based upon sampling data from 2003 and 2007. It should be noted here that JCI will contact the U.S.EPA Project Manager to discuss the

RO for lead at any downstream locations where there could be possible confounding sources of lead contamination. ROs for theses locations may be modified from the EPA proposed RO on a case by case basis.

JCI is now required to develop a *Remedial Design Plan* which will describe areas subject to excavation. EPA expects that areas planned for excavation will be of such volume that contamination will be removed from and between targeted sampling points such that they are below remedial objectives to be established by verification sampling. It is recommended that JCI allow U.S.EPA Region 5 collaborative input into its planned *Remedial Design Plan* such that JCI can maintain its proposed schedule for sediment corrective measures implementation. It is also expected that remediation will occur this summer or early fall.

Upon completion of the sediment excavation, JCI is required in accordance with the December 2002, 3008(h) Administrative Order on Consent, to complete a *Final Remedy Construction Completion Report* documenting all work that it has performed. *The Final Remedy Construction Completion Report* will be submitted by JCI within sixty days after sediment remediation is completed.

U.S.EPA looks forward to your continued cooperation. Please feel free to contact me at 312-886-6010 at your discretion.

Sincerely,

Juan Thomas, Project Manager,
Environmental Scientist

Cc. Jennifer Bolger, Gonzalez Saggio & Harlan LLP (electronic copy)
Lou Pieh, Saggio & Harlan LLP (electronic copy)
Andrew Lonergan, CTI & Associates (electronic copy)
Patricia A. Thomson, Entact & Associates (electronic copy)
David Slayton, MDEQ (electronic copy)
Tom Williams, U.S.EPA, ORC (electronic copy)
Carolyn Bury, U.S.EPA, RRB (electronic copy)

Former Stanley Tools site - Fowlerville MI
Drew Lonergan to: Juan Thomas 08/20/2009 12:55 PM
Cc: "Michael.L.Stoelton@jci.com", "Rena M. Pomaville"

History: This message has been replied to.

Juan,
I appreciate your time on the phone yesterday regarding the well abandonment plan currently under review for the Former Stanley Tool site.

After our discussion, I spoke with Rena Pomaville (of American Compounding) regarding your questions on their planned meeting and construction schedule. Rena provided the note below, and a news article on their planned expansion.

During our call, I had also suggested that EPA could consider approving the "well abandonment" portion of our plan at this time. The partial approval of the plan would enable proper abandonment of the wells and open the way for American Compounding's planned build-out. While the construction is going on, Johnson Controls can address any comments you may have on the "well re-installation" portion of the plan, and we can be ready for well re-installation after the build-out is completed.

Thanks
Drew

Andrew J. Lonergan, PG
CTI and Associates, Inc.
direct (248) 264-4015
mobile (248) 770-5998

From: Rena M. Pomaville [mailto:rmpomaville@americancompounding.net]
Sent: Thursday, August 20, 2009 12:12 PM
To: Drew Lonergan
Subject: RE: on the other line

Dear Drew,

Here is our schedule as we know it:

Fowlerville Planning Commission Approval - September 8, 2009
Groundbreaking – October 1, 2009

Attached is our news announcement about the expansion.

Rena M. Pomaville, Ph.D.
American Compounding Specialties, Inc.
200 Veterans Drive, Fowlerville, MI. 48836
rmpomaville@americancompounding.net
517-223-4300 x230 (Office)
810-599-8662 (Cell)
517-223-4449 (Fax)

http://www.americancompounding.net/

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Mich. toll compounder expands site, capacity

By Frank Esposito
PLASTICS NEWS STAFF

FOWLERVILLE, MICH. — Strong toll compounding volume is leading American Compounding Specialties LLC to build a major addition to its plant in Fowlerville.

Fowlerville-based ACS will begin work on the 45,000-square-foot addition by year's end. A new extrusion line with 50 million pounds of capacity will start production in the expanded space by early 2010. The firm currently operates 60 million pounds of annual capacity on two lines in a 17,500-square-foot space.

ACS also plans to add two 50 million-pound-capacity lines, one each in 2011 and 2012. Each new line will create 10 jobs at the site, which now employs 20.

"We've taken a more sophisticated approach to toll compounding," ACS co-owner Randy Rudisill said in a recent interview at Fowlerville.

Rudisill and Dave Donie founded ACS in 2005 after each ended careers of 20-plus years at Fowlerville-based compounder Thermofil Inc. Thermofil was founded by plastics veteran Ron Woods in 1967 and later was owned by Nippon Steel Chemical Co. Ltd. and then by Asahi Kasei Corp., its current owner.

ACS toll compounds polypropylene, nylon, polycarbonate and ethylene vinyl acetate, mainly for large resin makers. Customers provide the resin to be compounded, and sometimes the additives. Runs range from 40,000 pounds to 1 million pounds.

"We can do quick and easy changeovers and can handle loadings of 60 percent or higher," Donie said. A recent compound made for a thin magnetic film had iron content of more than 80 percent.

Rudisill and Donie said they have no plans to make proprietary compounds, even though noncompete agreements they signed with Asahi Kasei have expired.

"If we got into proprietary, there would be huge raw material costs and we could only do business with certain customers," Rudisill said. "We've got no interest in doing that."

ACS' services include a detailed computer readout of every run the firm produces. The firm promises a 90 percent yield rate, and often delivers 95 percent or higher, according to the company. A recent run of a complicated nylon compound produced a yield rate of 98.5 percent.

Toll compounders often produce yield rates of only 85 percent, according to ACS director Rena Pomaville.

"A lot of tollers don't want to be accountable for the material they use," said Pomaville, who joined ACS in 2007 after a long career at Thermofil. "Our customers love getting this amount of detail from us. It's their money and they want to know what's going on."

ACS' high yield rates allow it to charge higher hourly rates for tolling work. High yields and low scrap rates also increase the value of its services as material prices escalate.

"Randy [Rudisill] used to tell us leaving resin pellets on the floor of the plant was like leaving pennies," Pomaville said. "Now those pennies are dimes."

Rudisill and Donie — who co-own the firm — decided to enter the toll compounding market based on an experience they had in 1998, when a fire at Thermofil's Brighton, Mich., plant led that firm to work with toll compounders until a new plant was built.

Plastics News photo by Frank Esposito

Randy Rudisill, left, and Dave Donie, right, co-founded American Compounding Specialties in 2005. Director Rena Pomaville joined in 2007.

The men saw opportunities that many toll compounders were not using to their advantage.

In some cases, ACS is replacing compounding work that resin makers had done for themselves; in other cases it complements ongoing compounding operations.

"We can make these materials at a lower total cost than what [resin makers] can do on their own," Rudisill said.

STATE OF MICHIGAN
DEPARTMENT OF NATURAL RESOURCES & ENVIRONMENT
LANSING

JENNIFER M. GRANHOLM
GOVERNOR

REBECCA A. HUMPHRIES
DIRECTOR

January 27, 2010

Mr. R. Bruce McDonald
Executive Vice President and Chief Financial Officer
Johnson Controls, Inc.
5757 North Green Bay Avenue
P.O. Box 591
Milwaukee, Wisconsin 53201-0591

Dear Mr. McDonald:

SUBJECT: Violation Notice; Financial Test for the Former Johnson Controls, Inc., Stanley/Fowlerville Facility (JCI); MID 099 124 299

On January 11, 2010, Department of Natural Resources and Environment (DNRE), Waste and Hazardous Materials Division (WHMD), staff performed a financial record review pertaining to JCI, located at 425 West Frank Street in Fowlerville, Michigan. The purpose of the record review was to evaluate JCI's compliance with the financial capability requirements for corrective action specified under Part 111, Hazardous Waste Management, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended; and its administrative rules. JCI uses a financial test to provide the required coverage.

As a result of the record review, the WHMD determined that JCI is in violation of R 299.9709(3)(b) of the Part 111 Rules:

1. An owner or operator may satisfy the requirements of this part by demonstrating that he or she passes a financial test as specified in this rule. ...(3) To demonstrate that he or she meets this test, the owner or operator shall submit all of the following items to the director: ...(b) A copy of the independent certified public accountant's report on examination of the owner's or operator's financial statements for the latest completed fiscal year.

This is a repeat violation of this requirement from the financial test information that was provided in 2008. WHMD staff advised JCI on May 1, 2008, and November 18, 2008, of the requirement to submit the required report with the financial test information. The WHMD has determined that JCI did not submit the required report with the financial test information for the 2009 fiscal year.

JCI should immediately initiate the actions necessary to correct the cited violation and submit the above-referenced documentation to the WHMD by February 18, 2010.

The response should explain the cause of the violation and what steps are being taken to prevent the reoccurrence of the violation. If the violation is not resolved by the date of your submittal of the requested documents, your response should include a description of the actions that will be taken and by what dates these actions will take place to resolve the violation. The response may include additional information relevant to the violation for evaluation. The WHMD will evaluate your response, determine the JCI compliance status, and notify you of this determination.

This violation notice does not preclude, nor limit, the DNRE's ability to initiate any other enforcement action under state or federal law, as deemed appropriate.

We anticipate and appreciate your cooperation in resolving this matter.

If you have any questions, please feel free to contact me by telephone at the number below or via e-mail at daileyd@michigan.gov.

Sincerely,

Daniel P. Dailey, PE
Environmental Engineer Specialist
Hazardous Waste Management Unit
Hazardous Waste Section
Waste and Hazardous Materials Division
517-335-6610

cc: Mr. Michael L. Stoelton, JCI
Mr. Juan Thomas, U.S. Environmental Protection Agency, Region 5
Mr. Larry Bean, DNRE
Ms. De Montgomery, DNRE
Mr. Steve Buda, DNRE
Mr. David Slayton, DNRE
HWS-C&E File

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:

November 4, 2009 LU-9J

VIA CERTIFIED MAIL
RETURN RECEIPT REQUEST

Mr. Michael L. Stoelton
Johnson Controls, Inc.
Automotive Experience
49200 Halyard Drive
Plymouth, Michigan 48170

Re: Final Corrective Measures Implementation
Remedial Design Plan - Sediments

Dear Mr. Stoelton:

Our letter dated June 19, 2009, outlined site-specific cleanup levels that are to be implemented as target cleanup goals for the Red Cedar River Sediments (remedial objectives). This letter also specified that Johnson Controls, Inc. (JCI) was to submit a *Remedial Design Plan* which would describe the areas subject to excavation. It was also expected that remediation would occur during the summer or early fall of 2009. Since EPA has not received a *Remedial Design Plan to date*, this letter is requesting that JCI submit a *Remedial Design Plan* for the excavation/remediation of contaminated sediments of the Red Cedar River consistent with EPA imposed remedial objectives outlined in our June 19, 2009 letter, within sixty days from the date of this letter.

If JCI does not comply with the above mentioned submission of a *Remedial Design Plan and begin implementation of this corrective measure within forty five days after received by EPA, JCI will be sanctioned with stipulated penalties as specified in Section IX), 28), e), of the December 2002 3008(h), Administrative Order on Consent (AOC).* Upon completion of the sediment excavation, JCI is also required in accordance with the December 2002, 3008(h) AOC, to complete a *Final Remedy Construction Completion Report,* documenting all work that has been performed. *The Final Remedy Construction Completion Report* will be submitted by JCI within sixty days after sediment remediation is completed.

EPA looks forward to your continued cooperation. Please feel free to contact me at 312-886-6010 at your discretion.

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Sincerely,

Juan Thomas, Project Manager
Environmental Scientist

Cc: Jennifer Bolger, Gonzalez Saggio & Harlan LLP (electronic copy)
Lou Pieh, Saggio & Harlan LLP (electronic copy)
Andrew Lonergan, CTI & Associates (electronic copy)
Patricia A. Thomson, Entact & Associates (electronic copy)
David Slayton, MDEQ (electronic copy)
Tom Williams, U.S.EPA, ORC (electronic copy)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:

September 3, 2009

Via Certified Mail 7001 0320 0006 0192 8221
Return Receipt Request

LU-9J

Mr. Andrew J. Lonergan
CTI and Associates, Inc.
12482 Emerson Drive
Brighton, Michigan 48116

Dear Mr. Lonergan:

Re: Partial Approval - December 5, 2008, Monitoring Well Abandonment and Replacement Work, Former Stanley Tools Work Site (MID099-124-299) Fowlerville, Michigan

The United States Environmental Protection Agency (EPA) has reviewed your plan to either replace and or abandon existing groundwater monitoring wells constructed at the Johnson Controls, Incorporated site located in Fowlerville, Michigan (JCI). This Work Plan submission was a result of recent activities at the Site by American Compounding Services (ACS), the current owner of part of the Site. Their on-site activities has had an impact on the method and schedule of the semi-annual groundwater monitoring collection effort prescribed as a part of JCI's on-going RCRA Corrective Action obligations as documented in the EPA, *Final Decision and Response to Comments Selection of Remedial Alternative* for JCI, dated December 1, 2006.

The objectives of your Work Plan for Well Abandonment and Replacement are to: (i) abandon all monitoring wells that could be potentially damaged during ACS's planned construction activities; (ii) replace or relocate monitoring wells included in the Groundwater Surface-Water Interface (GSI) and Groundwater Monitoring Program Plan (GMPP) compliance monitoring network after all ACS construction activities are complete and; (iii) replace or relocate selected other wells (not included in the GSI and GMPP compliance monitoring program) as necessary to enable verification of the groundwater flow direction after all construction activities are complete. As such, EPA hereby approves objective (i) of the December 5, 2008 proposed work plan at this time. Our decision for an approval of objectives (ii) and (iii) will be deferred until all construction activities for the expansion, scheduled to begin October 2009, will be completed by American Compounding Services.

EPA will reserve its approval of the "Well Relocation and Replacement "components of the Work Plan at this time. EPA will continue to review these components of the Work Plan during the construction phase of American Compounds Services proposed expansion activities.

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CTI and Associates (CTI) on behalf of ACS recommends the abandonment of the following 20 monitoring wells MW-03, -03C, -04, -05, -08, -09, 09B, 09C, -10, -11, -18, -19, -25, -26, -BCK1, -BCK2, -BCK3, -E2, -J2, and -J3. EPA accepts ACS recommendation of the selected wells and expects that abandonment will be performed in a manner consistent with applicable federal and state laws for proper and legal well abandonment. It is recommended that JCI contact the Michigan Department of Environmental Quality (MDEQ) to ensure compliance with all applicable state regulations. Additionally, it is expected that groundwater monitoring activities as part of JCI's on-going RCRA Corrective Action obligations, as documented in the EPA, *Final Decision and Response to Comments Selection of Remedial Alternative* for JCI, dated December 1, 2006, monitoring will continue during construction activities. These activities include: groundwater sample collection, water level measurement, and groundwater flow direction mapping and reporting.

As part of EPA's goal of restoration of previously contaminated properties to productive land use, ACS's proposed expansion of approximately 64,330 sq ft, to new factory space, we believe that this endeavor is consistent with this goal.

EPA looks forward to your continued cooperation. Please feel free to contact me at 312-886-6010 should you have any questions.

Sincerely,

for Juan Thomas, Project Manager
Environmental Scientist

cc: Rena Pomaville, American compounding Services (electronic copy)
Michael Stoelton, JCI (electronic copy)
Jennifer Bolger, Gonzalez Saggio & Harlan LLP (electronic copy)
Lou Pieh, Gonzalez Saggio & Harlan LLP (electronic copy)
David Slayton, MDEQ (electronic copy)
Tom Williams, U.S. EPA, ORC (electronic copy)

CTI and Associates, Inc.
51331 W. Pontiac Trail, Wixom, MI 48393 248.486.5100 Main 248.486.5050 Fax

November 10, 2010

Mr. Juan Thomas
USEPA Region 5
DE-9J77 W. Jackson BLVD
Chicago, IL 60604

RE: Addendum to Sediment Remedial Design Plan
Former Stanley Tools Work Site (MID-099-124-299)
425 Frank Street, Fowlerville, Michigan

Dear Mr. Thomas,

Johnson Controls (JCI) and CTI and Associates, Inc (CTI) appreciated the meeting with you and your colleagues at Region V EPA to discuss the Sediment Remedial Design Plan (RDP) held on April 13, 2010. During this meeting, several items regarding the sediment design for the site were discussed. The Sediment RDP recommends Option 2 as the preferred sediment removal alternative for the reasons listed in Section 3.4.3 of the plan.

During discussion of Option 2 in the April 2010 project meeting, Johnson Controls requested that USEPA (a) concur with the recommendation for implementation of Option 2, and (b) agree that no action is needed for the remaining in-channel, bank, and overbank areas (i.e., areas not included in Option 2) based on data presented in the Sediment RDP. The outcome of this discussion was a request from the USEPA that further screening of site data be completed and presented in an addendum to the Sediment RDP. This Addendum contains the results of the requested screening.

The key points and additional screening requested during the meeting were as follows:

1. The USEPA requested that Johnson Controls (a) disregard the surface weighted average concentration (SWAC) results in the Sediment RDP that take into account Bank and Overbank soils re-entering the stream channel with attenuation factors applied; and (b) use only the in-channel SWAC values when making decisions regarding areas for sediment removal.

   Johnson Controls agrees with this request. The recommended alternative, Option 2, does not change.

2. The USPEA requested that Johnson Controls provide a point by point screening of overbank samples, not bank samples, to the most restrictive terrestrial Eco-SSL value available. If no Eco-SSL is available for a particular constituent, then that constituent should be screened against the USEPA, Region V, Soil Ecological Screening Levels. The USEPA requested that the additional screening results be presented on tables and drawings, and, for results that exceed the screening levels, indicate on the drawings the amount by which a particular result exceeds the screening level.

a. The following Addendum attachments address this request:

i. Attached Table 1: OVERBANK ANALYTICAL RESULTS Ecological Soil Screening- 2003 to 2009

- This table presents the ecological screening of all overbank soil data.

ii. Attached Table 2: OVERBANK ANALYTICAL RESULTS Ecological Soil Screening Exceedance Only- 2003 to 2009

- This table presents only parameters that exceed the screening levels.

iii. Attached Figures 2-5

- These figures show the location of overbank soil samples, what parameter was exceeded, if any, and by how much.

3. As supplement to the screening requested above in point #2, Johnson Controls also completed an assessment of the site. The purpose was to assess plant communities in and near the site, determine whether potential ecological receptors were present. The assessment, entitled "Field Assessment Memorandum" is attached to the Addendum. The assessment concluded that complete ecological pathways do exist for the site.

4. The USPEA requested that Johnson Controls provide a point by point screening of in-channel sediments against the TECs/MECs/PECs for all sediments that would <u>not</u> be removed during Option 2. The USEPA requested that (a) the additional screening results be presented on tables and drawings, (b) that the amount by which a particular result exceeds the screening level be indicated on the drawings, and (c) that a screening of total PAHs against TEC/MEC/PEC be completed. Also, if a parameter does not have a TEC/MEC/PEC, it should be screened against the USEPA Region V, Sediment Ecological Screening Level (ESL).

a. The following Addendum attachments address this request:

i. Attached Table 3: IN-CHANNEL SEDIMENT ANALYTICAL RESULTS - 2003 to 2009, PROPOSED TO BE LEFT POST REMOVAL

- This table screens all of the parameters against the TEC/MEC/PEC or the Sediment ESL for sediments proposed to be left in place.

ii. Attached Table 4: IN-CHANNEL SEDIMENT ANALYTICAL RESULTS - 2003 to 2009 PROPOSED TO BE LEFT POST REMOVAL EXCEDANCES ONLY

- This table presents only parameters that exceed the screening levels.

iii. Figures 6-9

- These figures show the post-removal exceedence locations, indicate which parameters exceed screening criteria, and by how much.

5. As requested by the Michigan Department of Natural Resources and Environmental, all references in the Sediment RDP to Op Memo 4 are hereby changed to indicate that the source of the criteria presented in Op Memo 4 is the USEPA.

Data Evaluation

Overbank Data: The screening of overbank sample data based on terrestrial benchmarks has been completed as requested by USEPA. These data are presented on Tables 1 and 2 and Figures 2 - 5. The point by point screening indicates that exceedences are observed (see Table 2).

Although there are exceedances, it must be noted that terrestrial benchmarks are not appropriate for all of the habitats mapped during our recent field assessment (See Figure 2 of the attachment). The soil in all the areas except the Mowed Lawn, Old Field, and Upland Woods are likely to be saturated through most of the growing season and therefore exhibit reduced conditions where sediment criteria would be more appropriate for comparison purposes. The majority of overbank samples were collected from areas where sediment criteria would be most appropriate. In addition, the application of the screening values on a point-by-point basis is overly conservative and not representative of biological exposures given the mobility of most receptors. Table 5 has been added to this Addendum to provide additional evaluation of the overbank data.

Table 5 presents a summary of the overbank data on a per constituent basis. Surface weighted average concentration (SWAC) results are presented for two sets of overbank data, transects A-M and transects A-P (transect locations are shown on Figure 1). Transects A-M are sampling locations south of the Grand River Bridge and Transects N-P are locations north of the bridge. Table 5 also includes an arithmetic average for transects A-M and transects A-P. The average and SWAC values are compared to the most restrictive Eco-SSL, Michigan's State-wide Soil Default background values, site-specific sediment background values, and the site sediment Remedial Objectives (ROs). The following bullets summarize the criteria comparisons presented on Table 5.

- For all inorganic parameters, inclusion of data from transects north of Grand River Avenue raises the SWAC and average values. This downstream increase for overbank results is similar to that observed for the in-channel sediments (i.e., there is a different contaminant signature likely resulting from municipal/road runoff).
- Transect A-M values for Aluminum, Copper, and Lead are below the Michigan's Statewide Default Background.
- Transect A-M values for Chromium and Zinc exceed the Eco SSL, but are below the site sediment RO.
- Transect A-M values for Total PCBs exceed the Region 5 Ecological Screening Levels (ESL) for Soils, but are below the Region 5 ESL for Sediments.

In-Channel Data: As requested by USEPA, in-channel sediment data from locations that would not be removed during implementation of Option 2 were evaluated against TECs/MECs/PECs. These data are presented on Tables 3 and 4 and Figures 6-9. The evaluation indicates that Option 2 removes the majority of exceedences south of the Grand River Avenue bridge, and that the majority of MEC and

PEC exceedences occur downstream of the Grand River Avenue. The in-channel evaluation supports the Sediment RDP's finding that sediments north of the Grand River Avenue bridge show a different contaminant signature and have been impacted by municipal/road runoff.

In summary, the removal areas identified in Option 2 of the Sediment RDP remain acceptable based the screening presented and Johnson Controls does not propose any additional soil/sediment removal beyond that proposed in Option 2. As indicated during our meeting in April 2010, and during recent telephone conversations, Johnson Controls seeks Agency concurrence (a) with the recommendation for implementation of Option 2, and (b) with on our conclusion that no action is needed for the remaining in-channel, bank, and overbank areas (i.e., areas not included in Option 2).

Johnson Controls is prepared to initiate permitting for the proposed sediment removal action (Option 2) upon receipt of Agency concurrence as stated above. If additional information is required or a meeting to discuss this Addendum would be helpful, please let us know.

If you have any questions please feel free to contact me at (248) 560-0715, or Michael Stoelton of Johnson Controls at (734) 254-5657.

Sincerely,
CTI and Associates, Inc.

Andrew J. Lonergan, PG
Director, Remediation Services

cc: Mike Stoelton, JCI

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING

RICK SNYDER
GOVERNOR

DAN WYANT
DIRECTOR

November 29, 2011

Mr. Juan Thomas
U.S. Environmental Protection Agency, Region 5
77 West Jackson Boulevard
Chicago, Illinois 60604-3507

Dear Mr. Thomas:

SUBJECT: Final Determination of Mixing Zone Reauthorization Request; Johnson Controls, Inc. (JCI) (former Stanley Tools); MID 099 124 299

The Department of Environmental Quality (DEQ), Resource Management Division (RMD), has reviewed the request for a Mixing Zone Determination for venting groundwater to the Red Cedar River from JCI, in Fowlerville, Michigan and forwarded that request to the DEQ, Water Resources Division (WRD). The response WRD provided identifies the acceptable concentration limits for discharge of the various chemicals characterized in the mixing zone request to the Red Cedar River.

Based on the information the WRD provided, it is determined that there is a reasonable potential for the discharge of some chemicals to cause or contribute to water quality standards (WQS) being exceeded.

Recommended mixing zone-based groundwater surface water interface (GSI) values are summarized in the table below:

Table 1: Plume Venting to the Red Cedar River

Parameter	Final Acute Value (µg/L)	Reported Worst Case Maximum Site Concentration (µg/L)
Trichloroethylene	3,500	5,200
Arsenic	680	161
Hexavalent Chromium	32	20
Copper	154	103
Nickel	3,434	1,180
Cyanide	44	10

General Comments

1. The final acute values listed above are the acute mixing zone-based GSI criteria. These limits are provided for chemicals determined to have a reasonable potential to exceed the acute mixing zone-based GSI criteria. These values (as well as the generic GSI criteria for other chemicals not specifically identified in the mixing zone request) must not be

exceeded at the GSI compliance monitoring wells; if they are, further remedial action will be required. The facility has the following options in regards to parameters that exceed the acute mixing zone-based GSI criteria in site monitoring wells:

a. If any existing exceedances are upgradient of the compliance monitoring wells, JCI must demonstrate that data from all of the compliance monitoring wells in the Mixing Zone Compliance Monitoring Plan are, and will be, in compliance with acute mixing zone-based GSI criteria for those parameters. Averaging of groundwater data is not allowed for comparison to generic GSI or acute mixing zone-based GSI criteria, nor is it allowed for bioaccumulative contaminants of concern (BCCs). Acute mixing zoned-based or generic GSI criteria may not be exceeded in any individual GSI compliance monitoring well.

b. Prevent the discharge of all parameters that exceed the acute mixing zone-based GSI criteria in the GSI compliance monitoring wells. This option would require the focus of subsequent site hydrogeological investigations to define remediation designs for capturing the groundwater discharge, further plume characterization, and identification of sources for source control measures.

2. It has been determined that any other parameter on the mixing zone request form, not given a recommended mixing zone-based GSI criteria in the table above, or in the attached memorandum, will not cause or contribute to WQS being exceeded at this time. This determination is based upon the reported maximum values in the mixing zone request that was submitted to the WRD by the RMD.

In order to demonstrate the groundwater discharge long-term compliance with the mixing zone-based GSI criteria, JCI will need to continue the Mixing Zone Compliance Monitoring Plan, or submit revisions for review and approval. The Mixing Zone Compliance Monitoring Plan should include a Sampling and Analysis Plan (to address both mixing zone chemicals and other chemicals reported in the mixing zone request), identification of the wells that JCI proposes to sample to show compliance with the mixing zone-based GSI criteria (along the GSI at the GSI point of compliance) and any sentinel wells within the appropriate portions of the plume, and provide an explanation of the monitoring schedule and reporting process.

In addition to the specific Mixing Zone Compliance Monitoring Program, if any GSI compliance monitoring data show exceedances of the maximum value reported to the WRD in the mixing zone determination request (shown in the table below),

Chemical or General Chemistry Parameter	CAS #	Worst Case Maximum GSI Discharge Concentration
cis-1,2-Dichloroethene	156-59-2	1,300 µg/l
Vinyl Chloride	75-01-4	110 µg/l
Cadmium	7440-43-9	13 µg/l

the data must be promptly evaluated by JCI to determine the significance and whether a new mixing zone determination request should be submitted to the WRD, and that information is

included in the Mixing Zone Compliance Monitoring Report. If there is an exceedance of twice the prior reported maximum value for any parameter of concern, please contact this office for further direction.

Should you require further information, please contact me by telephone; at slaytond@michigan.gov; or DEQ, P.O. Box 30241, Lansing, Michigan 48909-7741.

Sincerely,

David Slayton

David Slayton, Geologist Specialist
Permits and Corrective Action Unit
Hazardous Waste Section
Resource Management Division
517-373-8012

cc: Ms. Bethel Skinker, DEQ
Ms. Virginia Himich, DEQ
Mr. Dale Bridgford/Mr. John McCabe/Mr. David Slayton
Corrective Action File

Meeting Minutes: *Minutes from the call are presented in blue, italics type. The list of discussion items for the meeting are presented in black text and not italicized.*
Meeting Date: *22 March 2012, 10:30 AM Central*
Attendees: *J. Thomas and D. Mazur (USEPA), M. Stoelton (JCI), J. Dickson and D. Lonergan (CTI)*
Minutes Date *28 March 2012*

Former Stanley Tools – discussion items for USEPA call
Date: 6 March 2012

Juan,
Since our meeting in February with you, Dan Mazur, and MDEQ representatives, CTI has continued to work on the BERA Addendum. We've updated all of the BERA tables (sent in my email from 2 March 2012). The items below are a list of topics we would like to discuss with USEPA before the BERA Addendum is issues as a draft.

IN-CHANNEL

- Site Specific Background. Per June 19, 2009 letter data used for evaluation was limited to data collected in 2003 and later. Development of site-specific background includes pre-2003 samples.
  Discussion: It was agreed that the pre-2003 samples will remain in the background data set.

- Acetone, and MEK, Benz(a)anthracene, Benzo(a)pyrene , Chrysene, Pyrene, Fluoranthene, have values above R5 RCRA ESL, but below site specific background
  Discussion: During the 2 February 2012 meeting with MDEQ, CTI stated that sediment background was not used to screen out contaminants. This statement was incorrect and was clarified for the compounds listed above. It was agreed that Mean PEC quotients would be calculated for areas that are outside the removal area south of Grand River Avenue Bridge. In addition, language was to be added stating that an analysis of the mean PEC Quotient was done and it was below 0.5 which renders it non-toxic

- 1,2,4-Trimethylbenzene, Chloromethane, Aluminum Total, Barium Total, Selenium Total – Do not have a RO, R5 RCRA Sediment ESL, TEC/MEC/PEC. The only criteria available for these compounds are the site-specific background.
  Discussion: During the 2 February 2012 meeting with MDEQ, CTI stated that sediment background was not used to screen out contaminants. This statement was incorrect and was clarified for the compounds listed above. It was agreed that screening against background was appropriate for these compounds. EPA states that since there are no screening values for the constituents listed, an alternative method of determining it disposition should be determined. However, these constituents are listed in areas to be dredged; no further risk evaluation is needed.

BANK

- Prior to the November 10, 2010 Addendum to Sediment Remedial Design Plan the USEPA requested that bank and overbank samples be excluded from in-channel sediment removal considerations. Bank samples were also excluded from the terrestrial screening for overbanks.
  - Confirm: Banks should be evaluated as sediment

  Discussion: The group re-visited discussions held during the April 2010 meeting in Chicago regarding bank samples – that they were not to be considered as "overbank samples." It was agreed that the bank samples would be treated as sediment because the samples were collected on the channel's banks and are routinely submerged (without the channel leaving its banks).
  Action item: CTI to send drawings showing all bank sample locations. Drawings (Figures 5-8 excerpted from the 2010 Design Plan) were emailed on 23 March 2012.

- (Table 5) The bank at transect "L" exceeds the RO for Chromium and Copper. Transect "L" is not currently planned for removal.
    - Discuss use the Mean PEC Quotient on banks

- (Table 5): Bank – Transect "LD" east bank had RO exceedences for chromium copper, and nickel. Transect "LD" is slated for in-channel sediment removal.
    - Discuss use the Mean PEC Quotient on banks

    Discussion: The group discussed bank exceedences in general and the use of Mean PEC quotients for bank locations. It was noted that these locations are at, or adjacent to, transect slated for dredging.
    Action item: The USEPA will further consider the issue after the meeting and discuss the issue with other USEPA representatives.
    Action item: Johnson Controls will also consider the issue after the meeting, and reply to USEPA via email with a preferred means of addressing bank RO exceedences south of the Grand River Avenue Bridge. Johnson Controls replied via email on 22 Mar 2012 that RO exceedences in banks south of the Grand River Avenue Bridge will be treated the same way as in-channel sediment exceedences.

- (Table 5) Banks at transects N and O had RO exceedences for chromium, copper, and nickel. N and O are located north of Grand River Avenue and have additional source from road/municipal runoff.
    - Discuss use the Mean PEC Quotient on banks

    Discussion: The group discussed bank exceedences for transect N, O, and P located north of the Grand River Avenue Bridge. It was decided that Mean PEC quotients would be prepared for bank samples north of bridge and included in the BERA Addendum.

OVERBANK

- During discussions in 2011 with regarding terrestrial screening of overbank sampling data, USEPA stated that locations covered with clean fill (during 2003 soil remediation) did not need to be considered during screening. Because there was a fair amount of clean fill places on top, we need to know how much clean fill is over the areas of contamination residuals.

- (Table 9 & Table 11) treatment of covered soils in SWAC and Average concentrations
    - "All Data Used" – Includes all sampling points covered with clean fill. All data that is a hit is evaluated as such, all non-detect data is evaluated as ½ MDL (5 µg/kg).
    - "Covered Data ND" – Includes all sampling points covered with clean fill. All results for covered locations are treated as non-detect with value entered as ½ MDL. A minimum depth of cover is to be established; must be at least one foot with two feet being most acceptable.
    - "Covered Data Removed" – Eliminates all sampling points covered with clean fill from the SWAC and Average concentrations.

    Discussion: The group discussed treatment of data from overbank locations on the site proper (where the locations were subsequently covered with clean fill during the 2003 CA). Tables 9 and 11 from the 2 Mar 2012 email were a discussed. It was agreed that covered locations on the site proper should be removed completely from the overbank data set and that SWAC values for overbanks would be used.

    Action item: CTI will email a written summary of the SWAC overbank calculations and drawings showing overbank SWAC polygons for the site with the covered locations removed. Drawings and a written summary were emailed on 23 March 2012.

- (Table 7-Table 9) Criteria for PCB's – Currently R5 RCRA Soil ESL 0.332 µg/kg
    - All hits are "J" values.
    - For non-detects ½ MDL (5 µg/kg) is over R5 RCRA Soil ESL.
    - Other ecological screening criteria from http://rais.ornl.gov/tools/eco_search.php#51
        - Dutch Intervention Soil Screening Benchmark – 1 mg/kg 1000 µg/kg

- Dutch Target Soil Screening Benchmark – .02 mg/kg 20 µg/kg
- EPA R6 Plants Surface Soil Screening Benchmark – 40 mg/kg 40000 µg/kg
- ORNL Plants Screening Benchmark – 40 mg/kg 40,000 µg/kg
- SO EPA R4 Soil Screening Benchmark – .02 mg/kg 20 µg/kg
- SO EPA R5 ESL Soil Screening Benchmark – .000332 mg/kg 0.332 µg/kg
- R9 PRG residential soil
    1. 1260 220 µg/kg and
    2. 1248 220 µg/kg
- R9 PRG – protection of ground SSL
    1. 1260 24 µg/kg and
    2. 1248 5.2 µg/kg

Discussion: It was agreed that Region 5's upper bound clean up number of 600 µg/kg would be used in the BERA Addendum to evaluate locations that exceed the Region 5 RCRA Soil ESL value of 0.332 µg/kg.

- Per the EPA letter issued December 5, 2011, states that use of the saturated soil Eco SSL is appropriate for Copper and Zinc.
    - Confirm that a saturated soil Eco SSL is appropriate for chromium and lead
    - Chromium:
        - Most Restrictive Eco SSL (26 mg/kg Avian Insectivore)
        - Saturated Soil Eco-SSL (78 mg/kg Avian Herbivore Dove)
    - Lead:
        - Most Restrictive Eco SSL (11 mg/kg Avian Insectivore)
        - State Wide Default Background Level (21 mg/kg)
        - Saturated Soil Eco-SSL (46 mg/kg Avian Herbivore Dove)

Discussion: It was agreed ~~that application of the~~ saturated soils are unlikely to support soil invertebrates (e.g., earthworms) and the *Eco SSL (Avian herbivore dove) was appropriate for Chromium and Lead.*

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

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REPLY TO THE ATTENTION OF:
LU-9J

December 6, 2011

Mr. Michael L. Stoelton
Johnson Controls, Inc.
Automotive Experience
49200 Halyard Drive
Plymouth, Michigan 48170

RE: Sediment Remedial Design Plan and Addendum to Sediment Remedial Design Plan
Former Stanley Tools Work Site, 425 Frank Street, Fowlerville, Michigan (MID 099 124 299),
Revisions to EPA Letter of April 26, 2011

Dear Mr. Stoelton:

The United States Environmental Protection Agency has completed its review of the documentation submitted by Johnson Controls, Inc. (JCI), to EPA, in email correspondences dated May 20, 2011 and July 22, 2011. This information was submitted subsequent to our conference call meetings held on May 17, 2011 and July 22, 2011 respectively, concerning our conditional approval of the JCI Sediment Remedial Design Plan and Addendum to Sediment Remedial Design Plan Documents. These documents were submitted to EPA in January 2010, and November 2010, respectively. Based upon this supplemental data, EPA still concurs with the selection of Option 2 as the preferred sediment removal alternative for contaminated sediments of the Red Cedar River. According to the Design Plan, Option 2 will remove an estimated 1,019 cubic yards of contaminated sediment. Sediments will be excavated in accordance with EPA specified remedial objectives, R5 RCRA Ecological Screening Levels and where appropriate, Consensus Based Sediment Quality Guidelines (CBSQG) Probable Effect Concentrations (PEC).

This letter rescinds selected statements from the USEPA's April 26, 2011 letter.

a. The additional areas previously identified as, "hotspot areas" (on page 1 in the April 26, 2011 letter) located along the stretch of river beginning from transect H northward to transect L ***do not*** have to be included in the design plan as target removal areas because analytical results are below the Remedial Objectives (RO) listed in USEPA's letter dated June 19, 2009. Additionally, our Ecologist evaluated location I3 (0-12 inches) for metal toxicity using the mean PEC quotient calculation and obtained a mean PEC-Q for metals of 0.424 which is also less than 0.5 and subsequently predicted to be non toxic.

b. EPA reference to solid waste management units (SWMU) units north of Grand River Avenue (on page 2 in the April 26, 2011 letter) in reference to transects N, O and P is

rescinded based on a map of solid waste management units (SWMUs) provided by JCI that superimposed sediment sampling locations and SWMUs.

c. In the November 2010 Addendum to the Design Plan, JCI concluded that impacts north of Grand River Avenue were (a) not attributable to the site and (b) based on the different contaminant signature observed in this area, are likely attributable to storm water runoff from the Grand River Avenue transportation corridor. Following discussion of the locations north of Grand River Avenue during the May 17, 2011 conference call and as suggested by EPA, mean PEC quotients were calculated for locations N3, O2 and P3 by JCI and reviewed by EPA.

    1. EPA reference to needed sediment remediation at locations N3, O2 and P3 (on pages 1and 2 in the April 26, 2011 letter) is rescinded because the mean PEC quotients were less than 0.5 at each location and are therefore predicted to be non toxic.

During the May 17, 2011 conference call it was agreed that the M1 location would be included in the dredging program because of arsenic concentrations at 44 parts per million (ppm). It was also agreed that the planned excavation at the L transect would be extended to include the M1 area.

The Addendum to Sediment Remedial Design Plan (November 2010) submitted by JCI concluded that remediation of the overbanks at the site was not required. In response to the EPA letter dated April 26, 2011, JCI requested a determination be made regarding remediation of the overbanks. This request was discussed during the May 17, 2011 conference call and a variety of further communication and analyses of the overbanks followed. With respect to the overbank sampling data, EPA has concluded the following:

a) Exposure can be modified for the screening ecological risk assessment (SERA) to exclude birds and mammals that consume earthworms.

    Since the water table is at or close to the soil surface (within six inches), it's reasonable to conclude these soils are unlikely to support habitat for earthworms which eliminates the exposure (food web) pathway to birds and mammals (i.e., robin and shrew) that consume soil invertebrates (earthworms). By eliminating the earthworm exposure pathway, a less conservative soil screening benchmark based on an avian herbivore (dove) can be used for both copper (76 mg/kg) and zinc (950 mg/kg). Applying the revised copper and zinc benchmarks against the soil data in Table 1 - Overbank Soil 2003-2009, (November 10, 2010, Addendum to Sediment Remedial Design Plan), shows copper is only exceeded at 3 sampling locations (A, E & F) and zinc is eliminated as a Constituent Of Potential Ecological Concern (COPEC). When a screening benchmark (e.g., copper), is exceeded, a Baseline Ecological Risk Assessment (BERA) should be considered.

b) A food web ingestion model (abbreviated BERA) was evaluated by EPA Region 5 using a sensitive receptor and a low dose not expected to result in chronic adverse effects.

Since only one contaminant exceeded the soil screening benchmark for one ecological receptor, an abbreviated BERA will be considered. This BERA evaluated exposure (food web) to a sensitive receptor (e.g., dove) based on a lowest adverse effect level (LOAEL) toxicity reference value (TRV). This LOAEL TRV will serve as an upper bound clean-up criteria. An upper bound clean-up criteria for copper in soil protective of a dove is estimated at 535 mg/kg using the equations from the Eco-SSL Guidance where a median food ingestion rate is 0.137 g/g-day, incidental soil ingestion rate (median) is 0.061 and the avian LOAEL TRV is 4.68 mg/kg-day. Use of this upper bound clean-up criteria of 535 mg/kg eliminates the 3 sampling locations (A @ 86ppm, E @ 100ppm & F @ 150ppm) noted above for copper.

c) Cleanup below background levels not required, and wetland soil pH not expected to be lower than 5.5.

Since EPA will not require a cleanup below background levels (6900 mg/kg for aluminum in soil), this will eliminate all but 3 sampling locations (E @ 9500ppm, F @ 11000ppm & K @ 7200ppm) for aluminum. The Eco-SSL soil screening benchmark for aluminum is a pH of 5.5. A study by Gambrell 1994 (J. Environ. Qual. 23: 883-891) reports the pH of natural wetland soils generally ranges from around 6.5 to 7.5 with a few exceptions. In low pH soils, many aluminum compounds react with available phosphorus and form new compounds that can be stable in soils. Also the crystalline lattice of clay minerals, bind metals which then become unavailable (see University of Florida IFAS Extension Publication #SL 297 available at http://edis.ifas.ufl.edu/ss510). Based on the above information, aluminum is not expected to be bio-available in these overbank (wetland) soils and EPA recommends aluminum be eliminated as a COPEC. This is because collection of new soil pH data, to be collected by JCI, will likely support the SERA, but will not confirm if aluminum is unstable and in a toxic form.

d) Based on the above consideration of overbank soil sampling data, EPA concludes that remediation of the overbanks is not required. EPA recommends the above information be presented in an addendum to the ecological risk assessment report.

e) EPA recommends that JCI submit a revised Addendum to the Design Plan.

JCI and or its Consultant will modify the Design Plan Documents to include: 1) verification that language in the Design Plan accurately explains how soil confirmation samples from the soil excavation area were used as overbank data; 2) provide a map showing which samples from the soil excavation area were used as overbank data; and 3) evaluate data from locations covered with clean fill differently for locations where clean fill was not placed. Johnson Controls will issue a revised Design Plan Addendum (or similar Document) to memorialize all agreements and modifications, including sediment remediation at location M1, to the original Design Plan.

EPA is expecting that JCI will begin permitting for sediment remediation following submission and approval of the above referenced revised Design Plan Addendum and Addendum to the Baseline Ecological Risk Assessment. As outlined in the proposed schedule of the January 2010 Sediment Remedial Design Plan, it is EPA's goal to have permitting for the corrective measures begin no later than the Spring 2012. In addition, EPA is also requesting that JCI submit a revised schedule for sediment removal listing major milestones to be included in the modified design Plan Document. Both Documents are to be submitted within forty five days from the date of this letter.

Upon completion the sediment excavation, JCI is required in accordance with the December 2002, 3008(h) Administrative Order on Consent, to complete a Final Remedy Construction Complete Report within sixty days after sediment remediation has been completed.

EPA is looking forward to your continued cooperation. Please feel free to contact me at your discretion.

Sincerely,

Juan Thomas
Project Manager

cc: Jennifer Bolger, Gonzales, Saggio and Harlan LLP (electronic copy)
Andrew Lonergan, CTI and Associates (electronic copy)
Dave Slayton, MDNRE (electronic copy)
Tom Williams, ORC (electronic copy)
Dan Mazur, LCD (electronic copy

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

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REPLY TO THE ATTENTION OF:
LU-9J

December 6, 2011

Mr. Michael L. Stoelton
Johnson Controls, Inc.
Automotive Experience
49200 Halyard Drive
Plymouth, Michigan 48170

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d) Based on the above consideration of overbank soil sampling data, EPA concludes that remediation of the overbanks is not required. EPA recommends the above information be presented in an addendum to the ecological risk assessment report.

e) EPA recommends that JCI submit a revised Addendum to the Design Plan.

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EPA is looking forward to your continued cooperation. Please feel free to contact me at your discretion.

Sincerely,

Juan Thomas
Project Manager

cc: Jennifer Bolger, Gonzales, Saggio and Harlan LLP (electronic copy)
Andrew Lonergan, CTI and Associates (electronic copy)
Dave Slayton, MDNRE (electronic copy)
Tom Williams, ORC (electronic copy)
Dan Mazur, LCD (electronic copy

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING

RICK SNYDER
GOVERNOR

DAN WYANT
DIRECTOR

March 8, 2012

Mr. Juan Thomas
Project Manager
U.S. Environmental Protection Agency, Region 5
Land and Chemicals Division
77 West Jackson Boulevard LU-9J
Chicago, Illinois 60604-3590

Subject: Sediment Remedial Design Plan and Baseline Environmental Risk Assessment (BERA); Johnson Controls, Inc., Formerly Stanley Tools Work Site, Fowlerville, Michigan; MID 099 124 299

Dear Mr. Thomas:

Thank you for the opportunity to participate in the February 2, 2012 conference call between yourself and Mr. Dan Mazur of the Region 5 staff and representatives of Johnson Controls, Inc. and CTI and Associates, Inc., who met with me for the call, concerning the Resource Conservation and Recovery Act of 1976 corrective action currently being conducted at the subject facility.

Based on the printed material provided as background for the conference call, the review of documents contained in the facility file in our office, and the subject matter covered in the conference call, the Michigan Department of Environmental Quality (MDEQ) is satisfied that corrective action at the facility is proceeding consistently with the requirements of Part 111, Hazardous Waste, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended, and with the conditions of the November 2, 2000, Memorandum of Understanding between the MDEQ and Region 5. In particular, we support the proposed removal of sediments from the Red Cedar River to meet remedial objectives and agree that sediment contamination north of the Grand River Avenue Bridge appears to have been caused by a source other than the facility.

Regarding the U.S. Environmental Protection Agency (U.S. EPA) letter dated December 5, 2011, to Johnson Controls, Inc., the MDEQ concurs with the assessments and conclusions. In addition, based on the February 2, 2012 discussions and follow-up correspondence, the MDEQ understands that the BERA Addendum will address comments that MDEQ has presented in the emails from David Slayton dated February 6, February 13 and February 16, 2012.

Should you require further information, please contact me by telephone; at slaytond@michigan.gov; or MDEQ, P.O. Box 30241, Lansing, Michigan 48909-7741.

Sincerely,

Virginia L. Hemert (for D. Slayton)

David Slayton, Acting Chief
Permits and Corrective Action Unit
Hazardous Waste Section
Resource Management Division
517-373-8012

cc: Mr. Michael Stoelton, Johnson Controls, Inc.
Mr. Andrew Lonergon, CTI and Associates, Inc.
Mr. Daniel Mazur, U.S. EPA Region 5
Corrective Action File

CTI and Associates, Inc.

51331 W. Pontiac Trail, Wixom, MI 48393 248.486.5100 Main 248.486.5050 Fax

January 15, 2013

Juan Thomas
USEPA Region V
RCRA ECAB, DE-9J
77 W. Jackson Blvd.
Chicago, Illinois 60604

RE: Final Sediment Remedial Design Plan
Former Stanley Tools Facility (MID 099 124 299)
Fowlerville, Michigan

Dear Mr. Thomas:

On behalf of Johnson Controls, Inc., two hard copies of the Final Sediment Remedial Design Plan (RDP) for the Former Stanley Tools Facility (MID 099 124 299) site in Fowlerville, Michigan are attached. The hard copy version of the report is the same as the electronic version submitted via email on 11 January 2013.

As we previously discussed, the report is presented as a stand-alone document, rather than as an addendum to the Jan 2010 RDP. This is because the 2010 version of the RDP contained risk-related information that was superseded by the BERA Addendum submittal and our methodology for dredging has changed.

The Joint Permit Application was submitted to the MDEQ Surface Water Division on 11 January 2013. The updated schedule for dredging is presented in Appendix H and shows dredging starting in July 2013. This date is permit-dependent.

We would like to have a meeting with you and the MDEQ to go over the RDP and discuss the main elements of the project. We appreciate you working with us to establish a date for the meeting.

If you have questions, don't hesitate to contact Michael L. Stoelton, Johnson Controls, Inc. at (734) 254-5657, or me at (248) 560-0715.

Sincerely,

CTI and ASSOCIATES, INC.

Andrew J. Lonergan, PG
Project Manager

cc: M. Stoelton, Johnson Controls, Inc.
D. Slayton, MDEQ

CTI and Associates, Inc.

51331 W. Pontiac Trail, Wixom, MI 48393 248.486.5100 Main 248.486.5050 Fax

1 November 2012

Juan Thomas
USEPA Region V, RCRA ECAB, DE-9J
77 W. Jackson Blvd.
Chicago, Illinois 60604

RE: Dredge Area Boundary Sampling
Former Stanley Tools Facility (MID 099 124 299)

Dear Mr. Thomas:

Dredging areas for the Former Stanley Tools site have been established in the Addendum to the Baseline Ecological Risk Assessment (BERA Addendum, June, 2012) as updated from the areas presented in the Draft Sediment Remedial Design Plan (January, 2012). As requested in the USEPA's letter dated December 5, 2011, preparation of (a) the Joint Permit Application is in-progress and an on-site meeting with the Michigan DEQ Surface Water Division is schedule for 13 November 2012; and (b) the Final Sediment Remedial Design Plan for the dredging effort is in-progress and will be submitted for review following receipt of the MDEQ's findings letter from the 13 November 2012 on-site meeting.

As a follow-up to our telephone conversation today, CTI has prepared this letter to summarize the dredge area boundary sampling effort. Dredge area boundary samples are being collected now so that the data can be presented in the Sediment Remedial Design Plan. We do not anticipate that collection of the samples will change the planned project schedule.

The dredge area boundary samples are being collected to supplement the information presented in the upcoming Sediment Remedial Design Plan. All sediment within the proposed dredge area will be removed down to the hard pan horizon as document in the Draft Sediment Remedial Design (January 2010). As indicated on the attached drawing, the dredge areas approved in the BERA Addendum (Figure 10, BERA Addendum) do not end at previously sampled transects. Sediment samples will be collected *outside of the proposed dredge areas* to document sediment quality for presentation in the Sediment Remedial Design Plan.

Sediment samples will be collected from a total of 10 locations as shown in the attached drawing. At each location, a sediment sample will be collected from the 0-1 foot interval and from the 1-2 foot interval. Depending on the depth of the hard pan at each location, the depth interval of the deeper sample may be modified in the field. Samples from locations adjacent to the dredge areas will be analyzed immediately by the laboratory. The laboratory will be instructed to hold samples off-set from the dredge areas (i.e. two locations closest to Transect I and the two locations closest to the Grand River Avenue). A decision on whether or not to analysis of held samples will be made following review of data from the samples analyzed immediately.

Two duplicate samples will be collected. The sediment samples will be transported to Trimatrix Laboratories under the chain of custody and analyzed for the same laboratory suite used during the 2009 sediment sampling effort. The laboratory suite is presented in the following table.

Analytical Parameter	Analytical Method
VOCs	SW-846 5035/8260B
SVOCs	SW-846 8270C
PCBs	SW-846 8082A
Metals	SW-846 6020A, 7471A
Chromium, Hexavalent	SW-846 3060A/7196A
Cyanide, Total	SW-846 9014
Cyanide, Available	SW-846 9013/OIA-1677
Total Organic Carbon	Walkley-Black
Fractional Organic Carbon	ASTM D2979-87
Percent Solids	SM 2540B

At each sampling location, the total thickness of sediment above the hard pan will be determined with a probe. Sediment for VOC analyses will be immediately transferred to the laboratory-provided container and methanol preserved. The remaining sample will be mixed in a stainless steel bowl and thoroughly homogenized. The soil will then be placed in a laboratory-provided sample container. A written description of the sediment will also be prepared.

A new pair of disposable nitrile gloves will be worn at each sampling location. Sampling equipment will be decontamined prior to first use and after each use by scraping adhered soil from the equipment, spraying with Alconox soap water solution, and rinsing with dionized water.

Per your request, Data Quality Objectives for the dredge area boundary sampling effort are attached to this letter.

If you have questions, don't hesitate to contact Michael L. Stoelton, Johnson Controls, Inc. at (734) 254-5657, or me at (248) 560-0715.

Sincerely,

CTI and ASSOCIATES, INC.

Andrew J. Lonergan, PG
Project Manager

cc: M. Stoelton, Johnson Controls, Inc.
J. Dickson, CTI

attachments

The boundaries for the southern area are as follows:

North boundary – transect I
South boundary – CSX railroad line

5. Develop a Decision Rule

The sediment sampling results will be evaluated using the same as that presented in the BERA Addendum. The sediment data will be compared to ROs and a mean PEC quotient will be calculated. The Decision Rule is summarized below.

a. If an RO exceedence is observed the dredge area boundary is not appropriate and will be relocated.
b. If no RO exceedence is observed, but the mean PEC quotient indicates that the sediments are toxic, the dredge area boundary is not appropriate and will be relocated.
c. If ROs are not exceeded and the mean PEC quotient indicates that the sediments are not toxic, the dredge area boundary is appropriate and will not need to be relocated.

6. Specify Tolerable Limits on Decision Errors

Duplicate samples will be obtained at a frequency of 10% (i.e., one duplicate per ten samples). The results of the duplicate and original sample will be compared to evaluate the percent relative difference. If the percent relative difference is 20% or lower, then the results of all samples will be interpreted as valid. At duplicate sample areas, the highest value detected will be used for the analysis to be conservative.

7. Optimize the Design for Obtaining Data

Sediment sampling completed at the site since 2003 (including additional sample collected in 2007, 2009, and 2012) has been evaluated and dredging areas have been established in the BERA Addendum. Sediment samples will be collected from a total of 10 locations as shown in the attached drawing. At each location, a sediment sample will be collected from the 0-1 foot interval and from the 1-2 foot interval. Depending on the depth of the hard pan at each location, the depth interval of the deeper sample may be modified in the field.

The design for obtaining data during the boundary sampling effort will be optimized by collecting additional samples while in the field and holding analysis of those samples until the data area evaluated per Item 5 (above) and a decision is made. In the event that a dredge area boundary must be relocated, the samples held by the laboratory will be analyzed and then evaluated per Item 5 without requiring a separate mobilization.

Samples from locations adjacent to the dredge areas will be analyzed immediately by the laboratory. The laboratory will be instructed to hold samples off-set from the dredge areas (i.e. two locations closest to Transect I and the two locations closest to the Grand River Avenue). A decision on whether or not to analysis of held samples will be made following review of data from the samples analyzed immediately.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:

LU-9J

September 27, 2016

Mr. Michael L. Stoelton
Johnson Controls, Inc.
Automotive Experience
49200 Halyard Drive
Plymouth, Michigan 48170

RE: Remedy Construction (CA550), Engineering Controls Established (CA770), and Institutional Controls Established (CA772), Johnson Controls, Inc. (JCI), 425 Frank Street, Fowlerville, Michigan, MID099124299

Dear Mr. Stoelton,

The December 2002 Administrative Order on Consent with Johnson Controls, Inc. (JCI), required that JCI must propose to EPA, final corrective measures necessary to protect human health and the environment as a part of its RCRA Corrective Action obligations. EPA's "Final Decision and Response to Comments Selection of Remedial Alternatives for Johnson Controls, Inc., 2006 Document", (FDRC Document), required JCI to implement those final corrective measures.

The remediation of river sediments represented the final component of site remediation in accordance with the FDRC Document. In this document, areas of Red Cedar River sediments that were contaminated at levels considered unsafe for aquatic animals would be removed from the river. Additionally, consistent with requirements of the FDRC Document, ongoing groundwater monitoring would be conducted at the JCI site. The subsequent reinstallation of seven groundwater monitoring wells represents completion of all required construction activities that were implemented and necessary in continuing achievement of protecting human health and the environment.

As a result of these actions, the U.S. EPA would like to acknowledge that Johnson Controls, Inc. (The former Stanley Tools) of Fowlerville, Michigan, has achieved three major milestones in the Corrective Action Program. The three milestones are represented by the following RCRA Corrective Action Program Event Codes: Remedy Construction (CA550); Engineering Controls Established (CA770); and Institutional Controls Established (CA772).

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The CA550-Remedy Construction event code demonstrates that the Site has completed construction of its remedy that was designed to achieve long term protection of human health and the environment, and that the remedy is fully functional as designed, whether or not final cleanup levels or other requirements have been achieved. JCI's final remedial action was implemented in the form of engineering controls that consisted of the excavation and removal of all soft sediments of the Red Cedar River and subsequent reinstallation of seven groundwater monitoring wells completed November 2014. With respect to national reporting of the RCRA Corrective Action Program, an event and status code of 550-RC will be reported for the JCI Site. The date entered for the CA 550-RC will be the effective date of this letter, September 27, 2016.

In addition, the Johnson Controls, Inc., Site has achieved the event codes CA770- Engineering Controls Established, and CA772 - Institutional Controls Established. These two event codes signify the establishment of Engineering and Institutional controls at the Site, respectively. The event codes will also be entered into our national reporting database. The CA 770 Event Code consists of engineering measures (e.g. caps, treatment systems, etc.,) designed to minimize the potential for human exposure to contamination by either limiting direct contact with contaminated areas or controlling migration of contaminants through environmental media. Engineering Controls were implemented in the form of the construction completed for the excavation of the contaminated sediments of the Red Cedar River as well as continued long groundwater monitoring and monitored natural attenuation.

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Lastly, a CA 772 Event Code: Institutional Controls established has been achieved. This event signifies the establishment of institutional controls (ICs) as part of, or to augment, an interim or final corrective action. ICs are defined as non-engineered and/or legal controls that minimize the potential for human exposures to contamination by limiting land or resource use. The status codes: GC (Governmental Controls) are implemented and enforced by State or local governments; excluding permits, orders and other enforceable agreements. The PR (Proprietary Control) relies on legal instruments placed in the chain of title for the property. Both of these event and status codes will be entered into our national reporting database. The effective date of the event codes will be the effective of this letter, September 27, 2016.

JCI must continue the groundwater monitoring program as specified in the "Final Decision and Response to Comments Selection of Remedial Alternatives for Johnson Controls, Inc., 2006 Document", as well as the June 2007 Modified Corrective Measures Implementation Program Work Program Plan. Furthermore, JCI must also continue to maintain institutional controls that were selected in the FDRC Document

If you have any questions or concerns regarding this letter, please contact me at (312) 886-6010 or through email at thomas.juan@epa.gov.

Sincerely,

Juan Thomas,
Project Manager

cc: Andrew Lonergan, CTI & Associates
Tom Williams, ORC
Tammy Moore, LCD
Dave Slayton, MDEQ

March 8, 2000

VIA FAX AND FIRST CLASS MAIL DE-9J

Mr. George Mileskiy
Director of Environment
Johnson Controls, Inc.
49200 Halyard Drive
Plymouth, MI 48170

Mr. Michael Stoelton
Environmental Engineer
Johnson Controls, Inc.
49200 Halyard Drive
Plymouth, MI 48170

RE: Johnson Controls Facility, Fowlerville, MI
MID 099 124 299
Revised Phase III RCRA Facility Investigation (RFI)
Work Plan - Agency Review & Comments

Dear Mr. Mileskiy and Mr. Stoelton:

The United States Environmental Protection Agency ("U.S. EPA", "the Agency"), has completed its review of the Revised Phase III Resource Conservation and Recovery Act ("RCRA") Facility Investigation ("RFI") Work Plan for the Johnson Controls site in Fowlerville, Michigan (Dames & Moore, December 1999). The United States Environmental Protection Agency finds that the revisions made to the RFI Phase III Work Plan of December, 1999 are generally consistent with the Agency's comments raised in our letter of September 15, 1999 addressed to you. The U.S. EPA hereby approves the Revised RCRA RFI Phase III Work Plan contingent upon incorporating and implementing the following responses that are provided in the enclosed comments that pertain to either strategies as proposed in the Revised Phase III Work Plan or other relevant historical issues that the Agency believes should be addressed as part of the required planned investigatory activities to be conducted on-site.

We would anticipate that upon agreement with the modifications as discussed in the attached responses, you could begin implementation of this phase of the RFI process within 30 days of the date of this letter. As the new RCRA Corrective Action Project Manger, I am looking forward to

both an amicable and effective relationship with you and all principals involved or who might have subsequent involvement in this corrective action process. Should you need any assistance, please do not hesitate to call me at 312-886-6010 or via electronic mail at: thomas.juan@epa.gov. Thank you.

Sincerely,

Juan Thomas
Corrective Action Project Manager

cc: David Slayton, MDEQ
Michael Wagner, Dames & Moore

ENFORCEMENT AND COMPLIANCE ASSURANCE BRANCH

SECRETARY	SECRETARY	SECRETARY	SECRETARY	SECRETARY	SECRETARY
AUTHOR/ TYPIST	COMPLIANCE SECTION 1 SECTION CHIEF	COMPLIANCE SECTION 2 SECTION CHIEF	CA SECTION SECTION CHIEF	ECAB BRANCH CHIEF	WPTD DIVISION DIRECTOR

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

DEC 16 2002

REPLY TO THE ATTENTION OF:

C-14J

BY FEDERAL EXPRESS
FOR OVERNIGHT DELIVERY
Dennis Reis, Esq.
7000 N. Green Bay Avenue
Glendale, Wisconsin 53209

Re: Matter of Johnson Controls, Inc.
Former Stanley Tool Works, Fowlerville, MI

Dear Mr. Reis:

Enclosed are two originals of the "performance-based" consent order we discussed in the above-referenced matter. I am sending it for overnight delivery to facilitate your client's execution on December 18th, if that is still possible. You may then mail them back to me, and I will arrange for them both to be executed here, and for one of them to be returned to you for your files. As always, our agreement is subject to final managerial approval.

Thank you for your courtesy. If you have any additional questions or concerns, do not hesitate to call me. I can be reached at (312) 886-0814.

Sincerely yours,

Thomas M. Williams
Associate Regional Counsel

Enclosure

ec: George Hamper
Juan Thomas

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FINAL DECISION AND RESPONSE TO COMMENTS
SELECTION OF REMEDIAL ALTERNATIVE
FOR
JOHNSON CONTROLS, INC.
(FORMER STANLEY TOOLS FACILITY)
FOWLERVILLE, MICHIGAN
MID 099 124 299

Introduction

This RCRA Response to Comments (RTC) and Final Decision (FD) is presented by the United States Environmental Protection Agency (U.S. EPA) for the Johnsons Controls, Inc. site located in Fowlerville, Michigan. The purpose of this document is to identify the selected remedy, present concerns and issues raised during the public comment period, and provide responses. It consists of the previously issued Statement of Basis (Attachment I), and the Administrative Record (Attachment II). All of the comments received were carefully reviewed during the selection of the remedy, and have been answered in this RTC. The Statement of Basis provided the proposed remedy and was made available for public review and comment on August 31, 2006 through October 24, 2006. This FD supports the proposed remedy based on the Administrative Record (Attachment II). No additional alternatives were raised that were not considered in the Corrective Measures Study Report (CMS) and the proposed remedy was not altered as a result of public comments.

Assessment of the Facility

The response action documented in this Final Decision is necessary to protect human health and the environment.

Selected Remedies

The selected remedies for the site address past releases of chemical contaminants to soil, groundwater and sediments from manufacturing operations conducted from 1949 until 1985 when manufacturing operations at the facility ceased. The proposed remedies focus on reducing human and ecological exposure to contaminated media through removal of contaminated soils and sediments, the use of institutional controls, and monitoring the attenuation of contaminant concentrations in groundwater over time. Johnson Controls, Inc. (JCI), conducted Interim Remedial Measures in 2003 that consisted of removing and disposing of 83,900 tons of soil contaminated with volatile organic compounds (VOC's), metals, polychlorinated biphenyls (PCBs) and polycyclic aromatic hydrocarbons (PAH's). Contaminated soil was excavated to the beginning of groundwater depth from areas across the facility property and from two areas referred to as the North Ditch and South Ditch, which feed into the Red

Cedar River. The excavated soil material was disposed off-site in an approved landfill. Clean soil used to replace contaminated soil was backfilled in the excavated areas to original grade.

- Implement Institutional Controls for Contaminated Soils.
  Institutional controls will restrict future facility uses to industrial purposes. Institutional controls would consist of deed restrictions, local ordinances and/or zoning that would limit the future use of the property and ensure that any direct human exposure to on-site soils would be so incidental as to pose little or no health threat . To the extent future conveyances of the facility property or any portion of it are planned, the institutional controls would ensure that the transferees were aware of, and bound by, the restriction.

- Implement Institutional Controls, Deed Restrictions and Long-Term Monitoring for Groundwater
  Institutional controls will consist of deed restrictions, and/or zoning or other local ordinances devised to prohibit the extraction of groundwater for consumptive or irrigation purposes in areas affected by the contaminant plume. Such controls would be implemented to prohibit the placement of potable or irrigation wells, limit excavations below the water table, and/or limit land uses to commercial and industrial development. Future redevelopment would be limited to industrial uses, disclosure of potential hazards would be provided to current and future on-site construction workers through a Health and Safety Plan, and any use of groundwater would be prohibited. Periodic review of institutional controls will ensure that future facility use is limited to activities that do not pose an unacceptable human health risk

- Monitored Natural Attenuation (MNA), and Mixing Zone Determination for Groundwater
  MNA consist of routine monitoring of the contaminant plume in accordance with an approved RCRA Groundwater Monitoring Program Plan. The Michigan Department of Environmental Quality (MDEQ) has completed a Mixing Zone Determination that has established maximum allowable contaminant concentrations in groundwater at compliance well locations specified near the Red Cedar River. Monitoring would continue until attenuation achieves groundwater cleanup goals. The applicable groundwater cleanup goals for on-site groundwater are the Michigan Department of Environmental Quality (MDEQ), Final Acute Values and the Part 201 Generic Groundwater/Surface Water Interface (GSI) Criteria. The MDEQ has established "Final Acute Values" which are maximum allowable chemical concentrations in groundwater that are protective of the environment. Selected monitoring wells will be analyzed for VOC's, Michigan 10 metals (plus nickel and hexavalent chromium), cyanide and Monitored Natural Attenuation (MNA) parameters.

The proposed monitoring program would protect human and ecological health in the future by assessing the concentration, migration and attenuation of hazardous constituents in groundwater.

- Excavation of Red Cedar River Sediments
  Areas of river sediments that are contaminated at levels considered unsafe for aquatic animals would be removed from the river. The degree of cleanup in the river sediments are based on the goal of protecting the animals that live part or all of their lives in the sediment ("benthic organisms"), which are important in the food chain of the river's ecosystem. Cleaning up sediments to protect the benthic organisms is expected to benefit the fish, birds, and mammals that inhabit or feed in the river; this will also help to keep the surface water clean.
  Red Cedar River sediments will be tested in a laboratory to further evaluate their level of toxicity, in order to isolate the areas of sediment that will be removed and to establish site-specific cleanup goals. Interim Measures completed in 2003 included the excavation and backfilling of the North Ditch and South Ditch, which drain into the Red Cedar River. EPA believes that the removal of contaminated ditch sediments has eliminated the inflow of contaminated sediments to the river.

Public Participation Activities

The public comment period was announced through a newspaper advertisement, radio advertisements and online at the EPA website located at, http://www.epa.gov/reg5rcra/wptdiv/permits/index.htm. The public comment period ran from August 31, 2006, through October 24, 2006. The Statement of Basis (SB) and the supporting Administrative Record were placed in the Fowlerville District Public Library in Fowlerville, Michigan, and the U.S. EPA, Region 5, Waste, Pesticides, and Toxics Division Records Center for public review at the start of the public comment period.

Public Comments and Concerns

Public comment was received from company representatives during the comment period. The public comments received addressed a couple of historical inaccuracies as presented in the Statement of Basis Document and are noted below.

Comment: "Buildings at the facility were demolished in 1993, and no structures of any type remain. The facility currently consists of a relatively flat grassy field. Johnson Controls, Inc. ("JCI") currently owns the facility." However, in 2005 Johnson Controls sold the eastern approximately 5 acres (the portion which lies outside the approximate floodplain) to American Compounding Specialties, LLC, which has constructed a plastics manufacturing plant on the property. EPA received notification of the transaction pursuant to the consent order.

Response: Comment Noted.

Comment: In the first paragraph of section 3.0, the text states: "JCI purchased the facility in 1985." Actually, JCI purchased the facility from Stanley in 1996.....

Response: Comment Noted.

Administrative Record

The Administrative Record upon which the final remedy was selected is available at the Fowlerville District Public Library in Fowlerville, Michigan, and the Waste, Pesticides and Toxics Division Records Center of the U.S. EPA, Region 5 offices. Attachment II identifies the documents contained within the Administrative Record.

Future Actions

Within 45 days of receipt of this Final Decision and Response to Comments, Johnsons Controls, Inc., must submit a Corrective Measures Implementation Program Workplan for U.S. EPA's approval. Within 30 days of U.S. EPA's approval of the workplan, Johnsons Controls, Inc. must commence the work. During the remedy implementation period, U.S. EPA will provide information to the public by updating the Administrative Record and conducting meetings, as requested.

Declarations

Based on the Administrative Record compiled for this corrective action, U.S. EPA has determined that the selected remedy for the Johnsons Controls, Inc, site is appropriate and protective of human health and the environment.

Date: 12/1/06

for

Margaret M. Guerriero, Division Director
Waste, Pesticides and Toxics Division
U.S. EPA, Region 5

Attachments