

## GENERAL SITE INFORMATION, CHARACTERISTICS, AND STATUS

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<b>Project Name</b>	<b><u>VELSICOL CHEMICAL - PROJECT 1 (Pine River)</u></b>	<b>ProjectID:</b> 05-17
<b>Last Updated:</b>	08/17/04	
<b>City:</b>	St. Louis	
<b>County:</b>	Gratiot	
<b>State:</b>	MI	
<b>Country:</b>	USA	
<b>Bodies of Water:</b>	Pine River; St. Louis Impoundment; Chippewa River	
<b>US EPA Region:</b>	V	
<b>Status (Active, Complete, or Monitoring Only):</b>	Active	
<b>Date On NPL:</b>	1983	
<b>ROD/ESD Date:</b>	1999	
<b>Operable Unit:</b>	OU-2	
<b>Areas of Concern (length or acres):</b>	The 25-acre sector of the Pine River between the M-46 bridge and the Mill Street Bridge (part of the St. Louis Impoundment); a time-critical removal action implemented in 1998-1999 targeted a 3-acre hot spot within the 25 acres.	
<b>Other Characteristics of Water Body:</b>	The Pine River flows northeast toward Midland for 20.5 miles where it discharges into the Chippewa River, and then into the Tittabawassee River. The Pine River is impounded in St. Louis, MI. The impoundment, the St. Louis Dam, is immediately downstream of the site. All of the targeted contamination is within this St. Louis Impoundment.	
<b>Contaminants of Concern:</b>	DDT, hexabromobenzene (HBB), polybrominated biphenyl (PBB)	
<b>Source of Contamination:</b>	Runoff from the 52-acre Velsicol Chemical property; majority from discharges of chemicals from the site to the Pine River. The plant site was closed by 1978, and by 1986 was capped.	
<b>Contaminated Area Physical Characteristics:</b>	Contamination is concentrated in about a 32-acre dammed section of river (occupying the full width of the dammed section, ranging from 400-700 feet wide by 2000-3000 ft. long) known as the St. Louis Impoundment. The impoundment typically ranges 3-12 ft. deep. Sediments contain total DDT concentrations as high as 32,600 ppm.	
<b>Type of Regulatory Action:</b>	Superfund. Final.	
<b>Overall Status Summary:</b>	<p>A 1982 Consent Judgment between Velsicol and USEPA and the State of Michigan determined that leaving the sediment in-place was the most appropriate course of action and released Velsicol from further liability for sediments contaminated as a result of past operations. Velsicol retained liability for the upland source area. In 1996 as a result of ongoing concerns about public health resulting from the ingestion of fish from the St. Louis Impoundment, USEPA and the State of Michigan began to reassess the sediments in the impoundment. Sediment cores were collected in 1996 and 1997 and fish samples were collected in 1997 as part of the reassessment. Following review of the reassessment results, in 1998 the agencies determined that sediment removal within the impoundment was necessary to protect public health.</p> <p>USEPA originally recommended the dredging of sediments in the Pine River as a result of persistently high levels of DDT in fish. Contamination was found to be concentrated in a 2,000-3,000 ft. long dammed section of the river, the St. Louis Impoundment. DDT concentrations in carp fillet tissue collected from the impoundment in 1997 averaged 34.5 ppm (maximum of 90 ppm). The maximum DDT concentration measured in carp fillet tissue from below the impoundment was 27 ppm. The initial remedy targeted removal of 260,000 cy of sediment at a cost of \$20.1 to \$34.1 million. The variability in cost was due to the uncertainty in the final volumes requiring disposal at municipal vs. hazardous waste landfills. The target cleanup goal</p>	

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***Project Name***

**VELSICOL CHEMICAL - PROJECT 1 (Pine River)**

***ProjectID:*** 05-17

***Last Updated:***

08/17/04

---

was set at 5 ppm total DDT. EPA presented its recommended remedial plan to the National Remedy Review Board on March 31, 1998. A Proposed Plan for the removal of the 260,000 cy of DDT-contaminated sediment was issued for public comment in early September 1998. The ROD was issued in February 1999.

Prior to implementing the full remedy, EPA targeted a three-acre hot spot adjacent to the former plant property that contained maximum DDT levels in excess of 3,000 ppm (Project ID 05-26). In 1998, EPA issued an Action Memorandum requesting that the hot spot be removed under a time-critical removal action (TCRA). EPA estimated that 21,500 cy of DDT-contaminated sediment would be removed from the hot spot and disposed off-site at a cost of \$6 million. EPA estimated that the three-acre hot spot contained 80% of the DDT mass in the area of the impoundment. Installation of sheetpile around the hot spot commenced in August 1998 and was completed before year end. In-situ stabilization of the targeted sediments followed by removal of the stabilized sediment was performed from April to October 1999 and resulted in the removal of 35,000 cy of in-situ stabilized sediments by dry excavation. A total of 31,625 tons of stabilized sediments were transported to and disposed at the EnviroSAFE Landfill, Oregon, OH. Total cost was \$7.8 million.

Implementation of the final remedy (the full remedy) to remove the remainder of the contaminated bottom material in the impoundment is proceeding. A sheetpile cofferdam was installed in Fall 1999 along the centerline of the Middle Basin portion of the impoundment from the downstream Mill Street Bridge to approximately the upstream-most location of the former plant property (the plant site is located on the south shore of the impoundment). The sheetpile divided the target area into two removal zones, a southern zone of about 11 acres that included the three-acre area targeted during the TCRA and a northern zone of about 14 acres that included the Mill Pond area. The southern removal zone was further divided into four removal cells.

Disagreement between EPA and Michigan DEQ over allowable DDT discharge limits from the water treatment system delayed the start of the project. Following extensive negotiation, the agencies agreed on a water discharge limit of nondetect (ND), 0.001 ppb, for DDT. (Note: Reportedly the regulating agencies were prepared to consider a variance to the discharge limit if ND could not be obtained by the existing water treatment system). Dewatering of the southern zone began on June 29, 2000 and finished about one and one-half weeks later. As was done during the TCRA, existing water was removed from the southern removal zone by pumping to a sheetpile settling basin (the same settling basin used for the TCRA). The water was then treated prior to discharge back to the river. Sediment removal began the last week of July 2000 starting in Cell 4, the most upstream cell, and in Cell 1. The exposed sediments are being stabilized in-situ by addition of approximately 15% (by volume) of pelletized lime for very wet sediment and sugar beet lime for moderately wet sediment prior to being loaded onto articulating dump trucks using conventional excavation equipment. The sediment is then placed on a holding pad to allow for further drying prior to offsite disposal.

By October 12, 2000, approximately 60,000 tons of solidified sediment had been transported off-site by truck for disposal at up to four non-TSCA landfills owned by Waste Management, located in Upper Michigan. Removal from the southern work zone was originally targeted for completion in Fall 2001. However, inadvertent flooding of the work area resulting from repair work being performed on the downstream Mill Pond dam forced postponement of the completion of the southern work zone to 2002. The volume of sediment removed from the southern removal zone during 2001 is estimated at 300,000 cy, a volume that already exceeds the original estimated removal volume of 260,000 cy for both removal zones combined.

## **GENERAL SITE INFORMATION, CHARACTERISTICS, AND STATUS**

**Project Name** **VELSICOL CHEMICAL - PROJECT 1 (Pine River)**

**ProjectID:** 05-17

**Last Updated:** 08/17/04

Verification samples are being collected in 40 ft. x 40 ft. grids. Many of the verification samples collected at original target depths exhibited DDT levels exceeding the 5 ppm target level. Continued removal of sediment to achieve the 5 ppm or less target level reportedly is the primary reason for the increase in removal volume. Additionally, work in Cell 4 took longer than anticipated. A small peninsula located within the working cell, and previously considered uncontaminated, was found contaminated. Sheetpile installed around the peninsula had not been anchored into the bottom sediment as deeply as sheetpile in other areas. This required that work progress more slowly in this area to minimize disturbance of the sheetpile base. Reportedly, the water treatment system has consistently met the discharge limit of 1 ppt DDT for treated water. The water source being treated is water that continually infiltrates into the work zone. Additionally, in 2001, sediment samples were collected in the northern removal zone to better characterize sediment DDT levels at depth and to provide a better estimate of the volume of sediment to be removed from this zone.

In 2002, mobilization to the site began in April. Sediment removal in the southern removal zone was anticipated to last about two months and the remainder of the construction season was to involve restoration of the southern removal zone and installation of sheetpile to isolate the northern removal zone. Instead, DNAPL was discovered migrating from the plant site around the slurry wall enclosing the plant site and into glacial till that underlies the sediment. Approximately 1,200 feet of interceptor trench was installed that resulted in the collection of about 3,000 gallons of DNAPL. A clay cap was constructed over the trench and areas of residual DNAPL.

In 2003, an additional removal cell was constructed to allow access to the remainder of the sediment requiring removal from the southern area. Sediment removal was completed from this area, bringing the project total to about 350,000 cy of treated sediment removed. Work was also completed on the sheetpile wall around the northern removal zone to allow dredging to begin in the northern area in 2004. As of 2003, the water treatment system was able to consistently meet the 1 ppt DDT discharge limit. DDT is the discharge driver, but other constituents are being monitored and their limits are being consistently met as well. The water treatment system comprises two treatment trains, each one consisting of, in order of operation: influent intake; flocculant addition; dissolved air flotation; oil/water separator; 5 µm bag filter; 4 carbon units; and 0.5 µm bag filter. The average flow being treated is 0.5 to 2 million gpd.

At this time, insufficient funds are available for a full construction season for any year until the project is completed. To date, the project has cost an estimated \$50 million and it is estimated that another \$50 million will be required to complete the project. EPA is now targeting completion of the project in 2009.

**Remedial Action Planned:** ☒

**Risk Assessment:** ☒

**Remedial Action Implemented:** ☐

**Status of Dredging** ☐

**PRPs:** ☒

**Contacts:** ☒

**References:** ☒

**Modeling:** ☐

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***Project Name***                      **VELSICOL CHEMICAL - PROJECT 1 (Pine River)**                      ***ProjectID:*** 05-17  
***Last Updated:***                      08/17/04

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***Fishing Advisory:***                      ☒

***Key Conditions:***                      commercial landfill, solidification/stabilization, water handling limitations

## REMEDIAL ACTION PLANNED

<b>Project Name</b>	<b><u>VELSICOL CHEMICAL - PROJECT 1 (Pine River)</u></b>	<b>ProjectID:</b> 05-17
<b>Last Updated:</b>	03/17/99	
<b>Target Sediment Cleanup Standards (TSCS):</b>	5 ppm DDT	
<b>How TSCS Established:</b>	<p>A site-specific biota-sediment accumulation factor (BSAF) was used to back calculate acceptable levels of contamination in sediments from levels in fish determined to be protective of human health. A level of 1.7 ppm DDT was determined protective of human health. The BSAF was used to back calculate a corresponding sediment concentration of 5 ppm. As further explained in the action memorandum (Reference A-302) and repeated in the ROD: "EPA Region V intends to meet 5 ppm total DDT as the cleanup goal. Based on the June 1998 Draft Remedial Investigation Report, EPA considers that a 5 ppm cleanup goal would result in protective risk levels. At 5 ppm, the concentration in smallmouth bass would be reduced from 12.5 ppm to 0.8 ppm and levels in carp would be reduced from 42.5 ppm to 1.7 ppm. Risk associated with eating smallmouth bass would go from approximately 3 in 10,000 people to approximately 2 in 100,000 people. Risk associated with eating carp would go from 1 in 1,000 people to approximately 4 in 100,000 people. This would result in the fish being clean enough to eat. To attain a 5 ppm level in sediments, an approximate volume of 260,000 cubic yards of sediment would be removed from the impoundment, an average dredging depth of 5 feet"</p> <p>"Cleanup scenarios were evaluated at 1000, 500, 100, 50, 25, 10, 5 and 1 ppm DDT levels. The result was that fish tissue levels would not start to appreciably decrease from current levels until DDT was less than 10 ppm. However, there is essentially no difference in volume between a 10 ppm cleanup versus a 5 ppm because of the way DDT is distributed at the site. Therefore, a 5 ppm cleanup was selected as the optimum remediation goal."</p> <p>"Removing sediment with DDT at or above 5 ppm will reduce levels of DDT in fish tissue by over 95% from current levels of 12.5 to 0.8 ppm in bass and 42.5 to 1.7 ppm in carp. A 1 ppm cleanup doubles the total volume of sediment to be removed while providing only an additional 0.3 ppm reduction in fish tissue levels (12.2 to 0.5 ppm)."</p>	
<b>Target Bank and Floodplain Cleanup Levels (if applicable):</b>	N/A	
<b>Other Target:</b>	N/A	
<b>Environmental Sample Data References:</b>	<ul style="list-style-type: none"><li>• <b>Sediment:</b></li><li>• <b>Water:</b></li><li>• <b>Fish:</b> G-54</li></ul>	
<b>Estimated Target Volume:</b>	260,000 cy overall at 5 ppm DDT (~4,600 pounds of DDT)	
<b>Planned Disposal Method:</b>	<p>Off-site commercial landfills. Reportedly, US EPA has had some difficulty finding a landfill which is willing to accept the contaminated sediment, which US EPA interprets to be a nonhazardous waste. Also, reportedly there was considerable disagreement between US EPA headquarters and Region 5 over the issue of whether the contaminated sediment was a hazardous waste, with Region 5's interpretation prevailing. Region 5's interpretation is that the DDT was not a RCRA hazardous waste, because it was deposited into the river through an NPDES discharge, and became subject to an exclusion to the definition of solid waste at the point of discharge. In the ARAR section of the ROD, US EPA Region 5 states:</p>	

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<b>Project Name</b>	<b><u>VELSICOL CHEMICAL - PROJECT 1 (Pine River)</u></b>	<b>ProjectID:</b> 05-17
<b>Last Updated:</b>	03/17/99	
	<p>"Contaminated sediments were tested by the TCLP (Toxicity Characteristic Leaching Procedure) and determined not to be RCRA characteristic. US EPA will continuously characterize the stockpiled sediments prior to disposal, typically every 200 cubic yards. The contaminated sediments are not considered to be RCRA listed waste because the contamination occurred primarily from the direct discharge of DDT process wastewaters to the Pine River. See 40 CFR Section 261.33 (d) comment."</p>	
<b>Estimated Calendar Time to Implement Remedy:</b>	Not defined in ROD.	
<b>Estimated Time to Implement Remedy:</b>	Not defined in ROD. However, the cost estimates in the ROD are based upon 340 work days.	
<b>Estimated Cost to Implement Remedy:</b>	\$20.1 - 34.1 million for 260,000 cy	
<b>Stated Remedial Action Objectives (and Source):</b>	<p>Remove contaminated sediments from river to reduce levels in carp to 1.7 ppm DDT, the concentration in carp fillet considered acceptable to human health. As stated in the Action Memorandum: "The primary purpose of cleaning up DDT contaminated sediment in Pine River is to reduce the maximum amount of risk (mainly cancer) to human health and the environment that is practicably achievable." The time critical removal action. "... will prevent the further downstream movement and uptake of highly contaminated DDT sediment."</p> <p>As stated in the ROD (Reference A-426), the Remedial Action Objectives are as follows:</p> <ul style="list-style-type: none"><li>• "Reduce DDT concentrations in fish and sediments in the St. Louis Impoundment to levels that would not present an unacceptable human-health or ecological risk and would allow eventual elimination of existing fish consumption advisories;</li><li>• Prevent direct human contact with contaminated sediments;</li><li>• Prevent significant down river migration of contaminated sediments;</li><li>• Achieve compliance consistent with federal and state ARARs for the Site; and</li><li>• Comply with risk-based objectives defined by the risk assessment."</li></ul>	
<b>Measures of Success to be Used:</b>	Following removal, the exposed clay layer will be sampled to ensure the cleanup goal is attained. Confirmation samples will be analyzed for DDT, and also PBB, HBB, and tris (2,3-dibromopropyl) phosphate (TRIS). (It is not clear what levels of PBB, HBB, and TRIS will be considered acceptable.)	
<b>Planned Monitoring and Restoration:</b>	Not defined	
<b>Agency Position on Sediment Removal (and Source):</b>	<p>From the ROD (Reference A-426):</p> <p>"US EPA Region 5 is selecting Alternatives 4, 5 and 6: Hydraulic Modification of the Pine River, Excavation of Sediments, Dewatering and Water Treatment, and disposal of contaminated sediments in either a RCRA Subtitle D or C landfill. Alternatives 4, 5 and 6 represent the best balance of the nine criteria. US EPA recognizes that installation of temporary cofferdams may not be implementable in all locations in the St. Louis Impoundment and therefore some of the sediment removal may need to be completed using mechanical or hydraulic dredging (Alternatives 2A or 3A)."</p>	

## REMEDIAL ACTION PLANNED

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**Project Name**

**VELSICOL CHEMICAL - PROJECT 1 (Pine River)**

**ProjectID:** 05-17

**Last Updated:**

03/17/99

---

"Alternative 4 contemplates the use of temporary cofferdams and excavation of sediments. The temporary cofferdams will be placed in the St. Louis Impoundment, water will be pumped from the cofferdam, the sediments will be excavated, a stabilizing/drying agent will be added and wastewater will be treated prior to discharge to the Pine River. The water treatment will be designed to meet surface water discharge requirements and will probably consist of clarification, sand filtration, carbon filters and one micron bag filters. During excavation operations, monitoring will be conducted to ensure protection of workers and the community. Monitoring of resuspension will be done directly downstream of the excavation operations. Air monitoring will be conducted. After completion of the dredging project, sediment samples will be collected to ensure the clean-up standard has been met. The State of Michigan will continue to monitor fish tissue levels."

From the Responsiveness Summary in the ROD:

- "Most of the sediment removal will be completed down to the bottom of the river, which is clay, so there will be no need for polish dredging or capping of residuals in place. The clay will be sampled and if it exceeds 5 ppm total DDT EPA will dredge some of the clay also. Therefore, residual concentrations at the dredged surface will not exceed the pre-dredged surface."

"The sediment data show that deposition of clean material over the contaminated material is not adequately occurring, therefore EPA does not intend to rely on clean material covering contaminated material, since this has proven not to be effective as evidenced by the fish tissue data."

- "EPA's proposed hydraulic dredging alternative assumed the use of two dredges to produce an estimated flow rate of 6,500 gallons per minute (gpm) and a volume of 1,062 in situ yd<sup>3</sup> of slurry per day. At US EPA's Manistique Harbor site 500 yd<sup>3</sup> of sediments per day were dredged from depths of 15 to 20 feet and transported by barge. The Velsicol project has improved upon equipment and material handling areas and would utilize two dredges to dredge at a depth of 2 to 3 feet and a slurry pipeline to transport sediments which will meet the given production rate. The shallow depth and pipeline transport will increase rates of sediment production."

- "Regarding downtime, EPA estimated a 30% overall project downtime as part of the estimate. This project is planned to minimize overall downtime by using two hydraulic dredges simultaneously, thereby not requiring a complete shut down of operations if one of the dredges fails to operate. In addition, both the dewatering and water treatment units were to meet the estimated daily production requirements. Multiple units of dewatering and water treatment units will be available to minimize complete shutdown periods because of equipment failures. During short periods (1 to 2 hours) of complete shutdown, the dredged material would be stored in settling tanks, inclined plate clarifiers, and the storage tank. When needed, the dewatering and water treatment units can be used during extended work shifts to treat material and to maintain the anticipated daily production rate."

- "The cost estimates for this project, irrespective of the alternative selected, were based on meeting preset production rates. Hence, for the mechanical dredging alternative, two mechanical dredges would be used. The production rates of these dredges were obtained from Cable Arm, Inc., and a contingency factor of 12% was used to compensate for equipment efficiency due to varying site conditions. The two mechanical dredges would produce a combined dredge rate of approximately 1,300 yd<sup>3</sup> of in situ sediments per day."

- "EPA assumed that one yd<sup>3</sup> in situ volume of sediments translates approximately to 0.65 tons



## REMEDIAL ACTION PLANNED

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**Project Name**

**VELSICOL CHEMICAL - PROJECT 1 (Pine River)**

**ProjectID:** 05-17

**Last Updated:**

03/17/99

---

of processed ex situ sediments for disposal based on our experience at the Manistique, Michigan dredging project. This translates to approximately 161,250 tons of sediments prior to the addition of a drying agent. The added mass due to the addition of a drying agent at 10% is accounted for in the disposal estimates. The combined total of sediments and drying agent is 178,750 tons ..."

"However, if a literature value (one unit volume of in situ sediments approximates to one-third unit volume of sediments) is used for the drying agent, the weight increases to 260,625 tons. EPA elected to base the estimate on our experience at Manistique, Michigan rather than on the literature value."

- "All costs are based on disposal as nonhazardous waste (\$65 per cy). Disposal costs at a subtitle D landfill are lower than at a subtitle C landfill. The quote obtained for this project is based on the waste being classified as nonhazardous with no additional treatment being completed at the disposal facility."



## ***RISK ASSESSMENT***

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***Project Name***      ***VELSICOL CHEMICAL - PROJECT 1 (Pine River)***

***ProjectID:*** 05-17

***Last Updated:*** 03/17/99

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***RA Type:***

***RA Status:***

***RA Objectives:***

***Company***

***Performing RA:***

***RA Reference Report:***

***RA Summary and Conclusions:***      Source: Action Memorandum (Reference A-302), and repeated in the ROD:

"A draft RI conducted by U.S. EPA evaluated risks to human health by ingestion of contaminated fish and through dermal contact with the sediments. Risks to human health were estimated by using 1997 smallmouth bass and carp data. For a reasonable maximum exposure scenario the increased cancer risk from eating smallmouth bass was calculated to be  $3 \times 10^{-4}$  and the risk from eating carp is  $1 \times 10^{-3}$ . The hazard index was calculated to be 1.7 for smallmouth bass and 6 for carp"

"U.S. EPA concludes that dermal contact does occur to some degree given the close proximity of many homes to the River. . . Risk of cancer via dermal contact with the sediments was estimated for a typical exposure using concentrations in the top 6 inches of sediment and a reasonable maximum exposure, using the maximum concentration of sediment at subsurface levels," and resulted in risk levels of  $2 \times 10^{-5}$  and  $2 \times 10^{-2}$ , respectively.

"The ecological risk is to fish-eating birds, as represented by great blue heron, who consume fish from the St. Louis Impoundment (SLI). Fish-eating birds are at risk for reproductive impairment related to eggshell thinning and other adverse effects caused by DDE. The calculated dose of DDE to heron is 3 times greater than the DDE lowest observed adverse effect level and 30 times greater than the no observed adverse effect. Adverse reproductive effects are expected in herons that obtain one-third or more of their diet from the SLI."

"The preliminary remedial goal for sediments is 1 ppm DDT which would be fully protective of reproduction in fish-eating birds. This sediment concentration should result in 0.5 mg DDE/kg whole fish, the dietary concentration that corresponds to the no observed adverse effect level. Adverse reproductive effects may be expected when mean sediment levels exceed 8 to 12 ppm DDT, which should result in about 5 mg DDE/kg whole fish, the lowest observed adverse effect level. These levels are based solely on the adverse effects associated with DDE, and do not consider the potential additive effects associated with DDD or unmetabolized DDT."

"DDT contaminated sediments also present an ecological risk for potential adverse effects on benthic invertebrates. . . Two-thirds of the surface sediment samples exceed the severe effect level for adverse effects on the majority of benthic organisms. This level is the sediment concentration that could potentially impact the majority of freshwater benthic organisms. Forty percent of the surface sediment samples exceed the threshold benchmark for effect on benthic populations. Three samples from the middle basin exceed the median lethal concentration determined in sediment toxicity tests at another site."

"Although these comparisons do not prove that the contamination in the SLI are adversely affecting benthic invertebrates (because site-specific studies have not been performed), they indicate that adverse effects are likely and support that the SLI represents a significant ecological risk to fish-eating birds."

## ***RISK ASSESSMENT***

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***Project Name***      ***VELSICOL CHEMICAL - PROJECT 1 (Pine River)***

***ProjectID:*** 05-17

***Last Updated:*** 03/17/99

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With regard to risk from contaminants other than DDT, such as PBB and HBB, the following is from the ROD Responsiveness Summary:

"US EPA and MDEQ focused on contamination in fish tissue to guide us in setting cleanup levels for sediments. This is because risk at the site is associated with eating contaminated fish. Our goal is to clean up fish. To do this EPA has to remove the sediments. Chemicals detected in fish in 1997 above the detection limit were mercury, DDT and its metabolites, chlordane congeners, PBB, hexachlorobenzene and octachlorostyrene. The DDT concentration in most of the fish collected exceeded the Michigan Department of Community Health (MDCH) Level of Concern of 5 ppm total DDT (maximum level in a carp file was 90 ppm). PBB was not detected in carp, but was found at low levels in smallmouth bass (maximum concentration 0.3 ppm). The mercury and chlordane concentrations did not exceed the MDCH Levels of Concern. MDCH has no official Level of Concern for the other chemicals detected. So the chemical of most concern found in fish was DDT and its metabolites (DDD and DDE). Therefore EPA focused on total DDT in sediments."

"In addition, US EPA's analysis of sediment data shows that to achieve the cleanup goal of 5 ppm total DDT in the area to be dredged all sediments would need to be removed (approximately 260,000 cubic yards). This would require an estimated average dredging depth of 5 feet to the river bottom, which is clay. Since all sediment will be removed, all other contaminants of concern would be removed also. The clay will then be sampled to ensure the cleanup goal is attained. In addition to total DDT, the confirmation samples will also be analyzed for PBB, HBB and TRIS."

**POTENTIALLY RESPONSIBLE PARTIES**

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**Project Name** VELSICOL CHEMICAL - PROJECT 1 (Pine River)

**ProjectID:** 05-17

**PRP Name:** PRP INFORMATION NOT RELEASED

**PRPID:**

**Street Address:**

**City:**

**State:**

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## **KEY CONTACTS**

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***Project Name*** **VELSICOL CHEMICAL - PROJECT 1 (Pine River)**

***ProjectID:*** 05-17

***Last Name:*** KEY CONTACT INFORMATION NOT RELEASED

***Contact ID:***

***First Name:***

***Title:***

***Company:***

***Address:***

***City:***

***State:***

***Postal Code:***

***Work Phone # :***

***Other Phone #:***

***Fax # :***

***Email Address:***

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## REFERENCES

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**Project Name** VELSICOL CHEMICAL - PROJECT 1 (Pine River)

**ProjectID:** 05-17

**Reference Type:** A  
**Title:** *Proposed Plan: Velsicol Chemical Superfund Site*  
**Location:** AEM  
**Category:** ROD/Proposed Plan/Action Memo/Decision Document  
**Prepared by/Author:** US EPA Region V  
**Preparer/Author Address:** Chicago, IL  
**Prepared For:** General Public  
**Date Published:** September 1998  
**Key Words and Phrases:**

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**ReferenceID:** 350

**Reference Type:** A  
**Title:** *Streamlined Remedial Investigation/Feasibility Study Report (Final)  
(Electronic Version on CD ROM -- Reference A-796)*  
**Location:** AEM  
**Category:** RI/FS  
**Prepared by/Author:** US EPA Region V  
**Preparer/Author Address:** Chicago, IL  
**Prepared For:** General Public  
**Date Published:** August 1998  
**Key Words and Phrases:**

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**ReferenceID:** 375

**Reference Type:** A  
**Title:** *Final Containment System Assessment Report: Former Michigan Chemical Plant Site: St. Louis, Michigan (summary and introduction pages only)*  
**Location:** AEM  
**Category:** RI/FS  
**Prepared by/Author:** Memphis Environmental Center, Inc.  
**Preparer/Author Address:**  
**Prepared For:** Velsicol Chemical Corporation  
**Date Published:** October 1, 1997  
**Key Words and Phrases:**

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**ReferenceID:** 394

## REFERENCES

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**Project Name** VELSICOL CHEMICAL - PROJECT 1 (Pine River)

**ProjectID:** 05-17

**Reference Type:** A

**ReferenceID:** 426

**Title:** **Record of Decision: Velsicol Chemical Superfund Site: St Louis, MI - Operable Unit 2 - Pine River:**

**Location:** AEM

**Category:** ROD/Proposed Plan/Action Memo/Decision Document

**Prepared by/Author:** US EPA Region V

**Preparer/Author Address:** Chicago, IL

**Prepared For:** General Public

**Date Published:** February 12, 1999

**Key Words and Phrases:**

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**Reference Type:** A

**ReferenceID:** 796

**Title:** **Administrative Records Remedial Documents (to February 1998) (CD-ROM)**

**Location:** AEM

**Category:** Multiple

**Prepared by/Author:** US EPA Region V

**Preparer/Author Address:**

**Prepared For:** Distribution

**Date Published:** April 24, 2000

**Key Words and Phrases:**

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**Reference Type:** B

**ReferenceID:** 97

**Title:** **Sediment Sampling Near Velsicol Superfund Site to Begin Next Week**

**Location:** AEM

**Category:** Site Update

**Prepared by/Author:** US EPA Region V (News Release No. 96-OPA101)

**Preparer/Author Address:** <http://www.epa.gov/Region5/news/96opa101.htm>

**Prepared For:** General Public

**Date Published:** May 17, 1996

**Key Words and Phrases:**

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## REFERENCES

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**Project Name** **VELSICOL CHEMICAL - PROJECT 1 (Pine River)**

**ProjectID:** 05-17

**Reference Type:** B

**ReferenceID:** 365

**Title:** *Administrative Record (Index): Velsicol Chemical Company Site*

**Location:** AEM

**Category:** Miscellaneous

**Prepared by/Author:** US EPA Region V

**Preparer/Author  
Address:**

**Prepared For:** General Public

**Date Published:** June 8, 1998

**Key Words and  
Phrases:**

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**Reference Type:** B

**ReferenceID:** 682

**Title:** *State of the Great Lakes - Annual Report 2001 (Partial)*

**Location:** AEM

**Category:** Site Update

**Prepared by/Author:** Russell Harding

**Preparer/Author  
Address:** Michigan DEQ

**Prepared For:** Distribution

**Date Published:** 2002

**Key Words and  
Phrases:**

---

**Reference Type:** B

**ReferenceID:** 787

**Title:** *Realizing Remediation I - Great Lakes Contaminated Sediments  
Pine River - Velsicol Chemical  
(see Reference A-905)*

**Location:** AEM

**Category:** Dredging: Remedial (Contaminated Sediments)

**Prepared by/Author:** US EPA Great Lakes National Program Office (GLNPO)

**Preparer/Author  
Address:** 77 West Jackson Boulevard (G-17J)  
Chicago, IL 60604

**Prepared For:** General Public

**Date Published:** August 1, 2002

**Key Words and  
Phrases:**

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## REFERENCES

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**Project Name** **VELSICOL CHEMICAL - PROJECT 1 (Pine River)**

**ProjectID:** 05-17

**Reference Type:** B

**ReferenceID:** 1057

**Title:** ***NPL Fact Sheets for Michigan: Velsicol Chemical  
EPA ID# MID000722439***

**Location:** AEM

**Category:** Site Update

**Prepared by/Author:** US EPA Region V  
<http://www.epa.gov/region5superfund/npl/michigan/MID000722439.htm>

**Preparer/Author  
Address:**

**Prepared For:** General Public

**Date Published:** December 8, 2003

**Key Words and  
Phrases:**

---

**Reference Type:** C

**ReferenceID:** 43

**Title:** ***RI/FS gears up at Velsicol***

**Location:** AEM

**Category:** Site Update

**Prepared by/Author:**

**Preparer/Author  
Address:**

**Prepared For:** Superfund Week

**Date Published:** December 12, 1997

**Key Words and  
Phrases:**

---

**Reference Type:** C

**ReferenceID:** 452

**Title:** ***CH2M Hill May Get \$16.9M Sediment Excavation at Velsicol  
Chemical Site***

**Location:** AEM

**Category:** Site Update

**Prepared by/Author:**

**Preparer/Author  
Address:**

**Prepared For:** Superfund Week

**Date Published:** March 12, 1999

**Key Words and  
Phrases:**

---

## REFERENCES

---

**Project Name** VELSICOL CHEMICAL - PROJECT 1 (Pine River)

**ProjectID:** 05-17

**Reference Type:** C

**ReferenceID:** 556

**Title:** ***Removal Action Initiated on Pine River to Address DDT Contamination***

**Location:** AEM

**Category:** Site Update

**Prepared by/Author:**

**Preparer/Author Address:**

**Prepared For:** Contaminated Sediment News (CSN), No. 23

**Date Published:** 1999 Spring

**Key Words and Phrases:**

---

**Reference Type:** C

**ReferenceID:** 568

**Title:** ***TPI Petroleum's \$9.9M Penalty to Fund Environmental Cleanups in Michigan***

**Location:** AEM

**Category:** Site Update

**Prepared by/Author:**

**Preparer/Author Address:**

**Prepared For:** Superfund Week

**Date Published:** May 5, 2000

**Key Words and Phrases:**

---

**Reference Type:** E

**ReferenceID:** 255

**Title:** ***Poster Presentation: Velsicol/Pine River Sediment Remedial Action Case Study - Work in Progress***

**Location:** AEM

**Category:** Site Update

**Prepared by/Author:** (1) Stephanie Ball; (2) Rob Stryker; (3) Gina Bayer

**Preparer/Author Address:** (1) US EPA Region V  
(2) CH2M Hill - Milwaukee, WI  
(3) CH2M Hill - Neenah, WI

**Prepared For:** The Annual International Conference on Contaminated Soils, Sediments, and Water

**Date Published:** 2003

**Key Words and Phrases:**

---

## REFERENCES

---

**Project Name** VELSICOL CHEMICAL - PROJECT 1 (Pine River)

**ProjectID:** 05-17

**Reference Type:**

G

**ReferenceID:** 33

**Title:**

**Poster Session: Sediment Removal at the Pine River Superfund Site, St. Louis, Michigan**

**Location:**

AEM

**Category:**

Site Update

**Prepared by/Author:**

Stu Messur and Eric Anderson

**Preparer/Author Address:**

Blasland, Bouck & Lee, Inc.

**Prepared For:**

BBL Sediment Management Seminar 2002

**Date Published:**

February 2002

**Key Words and Phrases:**

---

**Reference Type:**

G

**ReferenceID:** 54

**Title:**

**Pine River DDT Sediment Site - A Nonattenuation Site (for complete presentation see Reference G-41)**

**Location:**

AEM

**Category:**

Monitored Natural Attenuation

**Prepared by/Author:**

James Chapman

**Preparer/Author Address:**

US EPA Region V

**Prepared For:**

EPA Forum on Managing Contaminated Sediments at Hazardous Waste Sites

**Date Published:**

May 30 - June 1, 2001

**Key Words and Phrases:**

---

**Reference Type:**

L

**ReferenceID:** 24

**Title:**

**Memo re: Questions/Answers re Pine River**

**Location:**

AEM

**Category:**

Site Update

**Prepared by/Author:**

AEM, Inc.

**Preparer/Author Address:**

Malvern, PA 19355

**Prepared For:**

Distribution

**Date Published:**

April 3, 1997

**Key Words and Phrases:**

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## REFERENCES

---

**Project Name** VELSICOL CHEMICAL - PROJECT 1 (Pine River)

**ProjectID:** 05-17

**Reference Type:** L

**ReferenceID:** 142

**Title:** *Maximum Baseline Cancer Risks for Contaminated Sediment Sites*

**Location:** AEM

**Category:** Risk Assessment

**Prepared by/Author:** AEM, Inc.

**Preparer/Author  
Address:**

**Prepared For:** Distribution

**Date Published:** October 22, 2001

**Key Words and  
Phrases:**

---

**Reference Type:** M

**ReferenceID:** 115

**Title:** *Review Summary for Final Streamlined Remedial  
Investigation/Feasibility Study Report*

**Location:** AEM

**Category:** RI/FS

**Prepared by/Author:** Blasland, Bouck & Lee, Inc.

**Preparer/Author  
Address:** 6723 Towpath Road  
P.O. Box 66  
Syracuse, NY 13214

**Prepared For:** Memphis Environmental Center (a subsidiary of Velsicol)

**Date Published:** October 1998

**Key Words and  
Phrases:**

---

**Reference Type:** M

**ReferenceID:** 172

**Title:** *Memo re: ROD for Pine River (Michigan) Superfund Site*

**Location:** AEM

**Category:** Site Update

**Prepared by/Author:** Edward P. Kenney

**Preparer/Author  
Address:** Sidley & Austin  
Chicago, IL

**Prepared For:** Internal Distribution

**Date Published:** March 11, 1999

**Key Words and  
Phrases:**

---

## REFERENCES

---

**Project Name** VELSICOL CHEMICAL - PROJECT 1 (Pine River)

**ProjectID:** 05-17

**Reference Type:** N

**ReferenceID:** 53

**Title:** *memo re: Phone conversation with US EPA RPM*

**Location:** AEM

**Category:** Site Update

**Prepared by/Author:** AEM, Inc.

**Preparer/Author  
Address:**

**Prepared For:**

**Date Published:** June 3, 2004

**Key Words and  
Phrases:**

---

**Reference Type:** N

**ReferenceID:** 54

**Title:** *e-mail re: Velsicol Chemical - Pine River, MI*

**Location:** AEM

**Category:** Site Update

**Prepared by/Author:** Stephanie Ball, US EPA RPM

**Preparer/Author  
Address:**

**Prepared For:** AEM, Inc.

**Date Published:** June 3, 2004

**Key Words and  
Phrases:**

---

**Reference Type:** N

**ReferenceID:** 55

**Title:** *e-mail re: Velsicol Chemical - Pine River, MI*

**Location:** AEM

**Category:** Site Update

**Prepared by/Author:** Stephanie Ball, US EPA RPM

**Preparer/Author  
Address:**

**Prepared For:** AEM, Inc.

**Date Published:** July 22, 2004

**Key Words and  
Phrases:**

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## **REFERENCES**

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***Project Name*** **VELSICOL CHEMICAL - PROJECT 1 (Pine River)**

***ProjectID:*** 05-17

***Reference Type:*** S

***ReferenceID:*** 2

***Title:*** ***Consent Judgment: USA and Michigan vs Velsicol Chemical Corporation***

***Location:*** AEM

***Category:*** Legal

***Prepared by/Author:***

***Preparer/Author  
Address:***

***Prepared For:*** US District Court for the Eastern District of Michigan

***Date Published:*** December 27, 1982

***Key Words and  
Phrases:***

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## ***FISH ADVISORIES***

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***Project Name*** **VELSICOL CHEMICAL - PROJECT 1 (Pine River)**

***ProjectID:*** 05-17

<b><i>Advisory:</i></b>	Pine River	<b><i>AdvisoryID:</i></b> 897
<b><i>Extent:</i></b>	St. Louis impoundment and downstream	
<b><i>Pollutant:</i></b>	DDT	
<b><i>Species:</i></b>	all fish	
<b><i>Population:</i></b>	NCSP	
<b><i>Population Definition:</i></b>	No Consumption-Subpopulation(s): Advises against consumption for populations that are potentially at greater risk, e.g., pregnant or nursing women, and small children.	
<b><i>Advisory Type:</i></b>	River	<b><i>Advisory Number:</i></b> 283
<b><i>Status (Active or Rescinded):</i></b>	Active	<b><i>Date Rescinded:</i></b>
<b><i>Contact Name:</i></b>	David R. Wade	<b><i>Contact Number:</i></b> 939-335-8834
<hr/>		
<b><i>Advisory:</i></b>	Pine River	<b><i>AdvisoryID:</i></b> 898
<b><i>Extent:</i></b>	St. Louis impoundment and downstream	
<b><i>Pollutant:</i></b>	PBB	
<b><i>Species:</i></b>	all fish	
<b><i>Population:</i></b>	NCSP	
<b><i>Population Definition:</i></b>	No Consumption-Subpopulation(s): Advises against consumption for populations that are potentially at greater risk, e.g., pregnant or nursing women, and small children.	
<b><i>Advisory Type:</i></b>	River	<b><i>Advisory Number:</i></b> 283
<b><i>Status (Active or Rescinded):</i></b>	Active	<b><i>Date Rescinded:</i></b>
<b><i>Contact Name:</i></b>	David R. Wade	<b><i>Contact Number:</i></b> 939-335-8834
<hr/>		
<b><i>Advisory:</i></b>	Pine River	<b><i>AdvisoryID:</i></b> 307
<b><i>Extent:</i></b>	St. Louis impoundment and downstream	
<b><i>Pollutant:</i></b>	DDT	
<b><i>Species:</i></b>	all fish	
<b><i>Population:</i></b>	NCGP	
<b><i>Population Definition:</i></b>	No Consumption-General Population: Advise against consumption by the general population.	
<b><i>Advisory Type:</i></b>	River	<b><i>Advisory Number:</i></b> 283
<b><i>Status (Active or Rescinded):</i></b>	Active	<b><i>Date Rescinded:</i></b>
<b><i>Contact Name:</i></b>	David R. Wade	<b><i>Contact Number:</i></b> 939-335-8834

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## ***FISH ADVISORIES***

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***Project Name*** **VELSICOL CHEMICAL - PROJECT 1 (Pine River)**

***ProjectID:*** 05-17

***Advisory:*** Pine River

***AdvisoryID:*** 308

***Extent:*** St. Louis impoundment and downstream

***Pollutant:*** PBB

***Species:*** all fish

***Population:*** NCGP

***Population Definition:*** No Consumption-General Population: Advise against consumption by the general population.

***Advisory Type:*** River

***Advisory Number:*** 283

***Status (Active or Rescinded):*** Active

***Date Rescinded:***

***Contact Name:*** David R. Wade

***Contact Number:*** 939-335-8834

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