FINAL DECISION AND

RESPONSE TO COMMENTS

for

Occidental Chemical Corporation
Montague Township, Michigan
EPA I.D. No. MID 006 014 906

July 18, 2001

FINAL DECISION

OCCIDENTAL CHEMICAL CORPORATION
MONTAGUE TOWNSHIP, MICHIGAN
MID 006 014 906

Introduction

This Final Decision and Response to Comments document is presented by the United States Environmental Protection Agency (U.S. EPA) for the Occidental Chemical Corporation (OCC) facility located in Montague Township, Michigan. This document consists of the Final Decision, U.S. EPA's Response to Comments (Attachment I), updated Index to the Administrative Record (Attachment II), and previously issued Statement of Basis (Attachment III).

This Final Decision selects the remedy to be implemented at the OCC facility, based on the Administrative Record and public comments. The Statement of Basis provided the proposed remedy and was available for public review and comment, from March 1, 2001 through May 30, 2001. A 45-day public comment period was initially held from March 1, 2001, through April 15, 2001. It was extended for an additional 45 days through May 30, 2001, upon request from the public. A public meeting was held on March 1, 2001. The Response to Comments addresses public concerns raised at the public meeting and during the 90-day public comment period.

Assessment of the Facility

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

Selected Remedy

U.S. EPA has selected the following remedial components as the final remedy to address contaminated groundwater, soil, and sediment at the OCC facility:

- Continued collection of contaminated groundwater by the purge well system and treatment using carbon filtration before discharge to White Lake;
- Evaluation and implementation of feasible on-site collection/treatment options for contaminated groundwater and residual waste to expedite groundwater cleanup;
- Implementation of a groundwater monitoring program to ensure the long-term integrity of the remedy and protection of human health and the environment;

- Excavation of surface soil exceeding cleanup goals at the Former Small Disposal Pile Exposure Area and off-site treatment/disposal;

- Placement of a soil cover, grading, and seeding of the Former Burn Pit Exposure Area to minimize potential risk to human health and the environment;

- Dredging of sediment in the vicinity of the outfall in White Lake that is contaminated with PCB concentrations greater than 2 ppm and/or hexachlorobenzene concentrations greater than 0.45 ppm. Dredged sediment will be dewatered on-site, and thermally treated on-site and/or sent off-site to be properly treated/disposed;

- Maintenance of site access controls, as necessary, to minimize unacceptable risk associated with human exposure to site contaminants; and

- Implementation of institutional controls to restrict land use (non-residential) and groundwater use.

The remedy selected in this Final Decision has been modified from the proposed remedy in the Statement of Basis, based on additional data and public comments. In particular, bioremediation has been eliminated as a reliable remedial alternative for contaminated soil and sediment, and dredging is the selected remedial alternative for contaminated sediment in White Lake.

The final remedy provides the best balance among the alternatives with respect to the evaluation criteria described in the Statement of Basis, including: 1) technical (performance, reliability, implementability and safety); 2) overall protection of human health; 3) overall protection of environment; and 4) institutional.

Public Participation Activities and Comments

On March 1, 2001, a public meeting was held at the Montague Township Hall located at 8915 Whitbeck Road, in Montague, Michigan to present the Statement of Basis and accept oral comments. Eleven people offered oral comments during the public meeting. Their comments are presented and responded to in Attachment I.

A 90-day public comment period was held from March 1, 2001 through May 30, 2001. Numerous written comments were received from twenty-one (21) local residents, City of Whitehall, White River Township, City of Montague, Michigan Department of Environmental Quality (MDEQ), Glenn Springs Holdings Inc. (OCC),

Technical Outreach Services for Communities (TOSC), Lake Michigan Federation, and White Lake Association. Eighty-seven (87) written comments are presented and responded to in Attachment I.

Administrative Record

The Administrative Record supporting the selected final remedy is available at the Montague Branch Muskegon County Library, White Lake Community Library, and the 7th Floor Records Center at the U.S. EPA, Region 5 office. Attachment II identifies all documents contained within the Administrative Record.

Future Actions

Within 30 days of receipt of this Final Decision and Response to Comments, OCC 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, OCC 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 OCC facility is appropriate and protective of human health and the environment.

Joseph M. Boyle

Joseph M. Boyle, Chief
Enforcement & Compliance Assurance Branch
U.S. EPA, Region 5

July 18, 2001
Date

Attachments (3)

IN THE MATTER OF:

Occidental Chemical Corporation
Montague Township, Michigan
U.S. EPA I.D. No. MID 006 014 906

ATTACHMENT I

U.S. EPA Response to Comments

ATTACHMENT I

U.S. EPA RESPONSE TO COMMENTS

Overview

The U.S. EPA Statement of Basis, containing the proposed remedy for the Occidental Chemical Corporation (OCC) facility, was made available for public review and comment on March 1, 2001. A public meeting was held on March 1, 2001, at the Montague Township Hall located at 8915 Whitbeck Road, Montague, Michigan to accept oral comments on the proposed remedy. A 45-day public comment period was initially held from March 1, 2001, through April 15, 2001, and was extended an additional 45 days through May 30, 2001, to accommodate written requests for a time extension from the public.

The purpose of this document is to provide U.S. EPA's response to comments received during the 90-day public comment period. All comments received by U.S. EPA are summarized and responses are included below. The transcript of the public meeting held on March 1, 2001, and all public comments received through May 30, 2001, are provided in Attachment II, Index to Administrative Record (see OCC-112 through OCC-154).

Community Involvement and Concerns

Many oral and written comments were received during the public comment period. The main concerns expressed by the local community were the reliability of bioremediating contaminated soil and sediment, and the need to properly clean up contamination at and from the OCC facility. Residents near the OCC facility, along Old Channel Trail, were also concerned about possible contamination of their soil and well water.

The commentors contributed to the RCRA Corrective Action process by helping to assure the remedial alternatives for the OCC facility were reviewed and analyzed from as many viewpoints and aspects as possible, in a reasoned manner. As a result, the proposed remedy was modified by U.S. EPA to eliminate bioremediation as a viable remedial alternative. OCC did not adequately demonstrate that bioremediation of soil and sediment would be effective. The reliability of bioremediating sediment was not demonstrated and the public overwhelmingly preferred dredging as the appropriate remedial alternative for contaminated sediment.

U.S. EPA Response to Comments

Oral Comments

The following narrative summarizes the 11 oral comments presented by the local community at the March 1, 2001, public meeting (see OCC-115) and provides our response to each comment. Each oral comment is numbered and presented in italicized capital type. Commentors included:

- Six local residents (Hughes, Cousino, Lathrop, Vermuelen, Ruck, and Benson)
- U.S. Congressman Hoekstra's office (Bill Huizenga)
- State Senator Leon Stille's office (Jane Ruiter)
- Lake Michigan Federation (Tanya Cabala)
- State Representative Gerald VanWoerkom
- Mayor of Whitehall Norman Ullman

1. *DARAMEND® BIOREMEDIATION HAS NOT BEEN SHOWN TO WORK*

Daramend® bioremediation has been shown to be an effective technology for treating soil contaminated with resistant organic compounds (OCC-100). However, a bench-scale study provided by OCC on May 11, 2001, does not conclusively demonstrate that Daramend® treatment significantly reduced the concentration of hexachlorobenzene and mirex in on-site soil (OCC-136).

The contaminants required to be remediated in soil at the OCC facility are the C-series compounds hexachlorocyclopentadiene and octachlorocyclopentene. No studies have been provided by OCC to demonstrate whether Daramend® bioremediation is capable of treating these C-series compounds. In order to expedite the clean up of contaminated soil and meet the soil cleanup goals at the OCC facility, we are modifying the proposed remedy and requiring OCC to excavate contaminated soil at the Former Small Disposal Pile Exposure Area and treat/dispose the soil at an off-site facility. Thus, a demonstration is no longer needed.

2. *NO-MANS LAND SHOULD BE CLEANED UP AS SOON AS POSSIBLE*

The selected remedy requires OCC to investigate the extent of contamination of residual waste in subsurface soil at the facility, including "No-Mans Land". OCC must then determine and implement the technology feasible for treating the residual waste to expedite the clean up of groundwater. The selected remedy may result in the clean up of "No-Mans Land", provided that a significant amount of waste is present and a feasible technology to treat the waste is available.

3. *CONTAMINATED SEDIMENT SHOULD BE IMMEDIATELY REMOVED FROM WHITE LAKE*

Bioremediation of contaminated sediment using BioGeoChe Mix™ has been eliminated as a feasible treatment alternative. There is not enough currently known about this technology to address concerns regarding its effectiveness. Additional studies to demonstrate its effectiveness, if possible, would result in an unacceptable time-frame for implementing the final remedy.

In the alternative, we believe that dredging of sediment contaminated with PCB and hexachlorobenzene concentrations greater than 2 ppm and 0.45 ppm, respectively, best meets the evaluation criteria and is the selected remedy.

4. *THE VAULT WAS CONSTRUCTED WITH A BREAK-THROUGH LIFE SPAN OF ABOUT 100 YEARS WHEN 40,000 GALLONS A MONTH OF FLOW-THROUGH WILL ENTER THE GROUNDWATER (Calculations Hand-Delivered)*

The vault was constructed with MDEQ oversight pursuant to a Michigan Consent Judgment. A 30-year post-closure groundwater monitoring plan for the vault was approved by EPA. MDEQ monitors the integrity of the vault by assessing potential leakage of hazardous constituents into groundwater. Three upgradient and ten downgradient monitoring wells are sampled quarterly for site-related constituents. Inspections are conducted by MDEQ to determine compliance with the approved groundwater quality assessment program. No releases have occurred. Any leakage evident in the monitoring program would be addressed under MDEQ authority or, in the alternative, a corrective measure could be imposed pursuant to RCRA 3008(h) authority.

Leachate generated within the landfill is also collected, analyzed, and treated on-site at the groundwater treatment system. The collection of leachate minimizes potential leakage of hazardous constituents to groundwater by lowering the hydraulic head within the landfill and removing mobile contaminants.

5. *PUBLIC COMMENTS NEED TO BE ADDRESSED AND A PROPER BALANCE STRUCK BETWEEN DOING THE CLEANUP RIGHT, HAVING THE PROPER STUDIES DONE, AND DOING THINGS QUICKLY*

U.S. EPA guidance on public involvement promotes local community involvement. The proposed remedy was presented at a public meeting and comments were requested. All comments are addressed in this document and the selected remedy incorporates necessary changes based on the comments.

In proposing a remedy and determining a final remedy, we have strived to strike a balance by using remedy evaluation criteria such as performance, reliability, implementability, safety, overall protection of human health, overall protection of environment, and institutional needs.

6. *THE SITUATION WILL CONTINUE TO BE MONITORED AS COMMENTS ARE COLLECTED AND THE REMEDY CHOSEN*

The Final Decision and Response to Comments will be provided to all interested parties. All comments and our response to comments are presented here. Changes to the proposed remedy resulting from public comments are noted.

7. *THE RESIDENTS SHOULD HAVE A CHOICE IN HAVING THEIR SOIL OR AIR TESTED*

In response to community concerns presented during the public comment period, soil and groundwater were sampled by U.S. EPA on private property along Old Channel Trail to confirm the conclusions of the investigation and ensure that all nearby residents are protected. Results will be available in July 2001.

The RFI identified the nature and extent of contamination (OCC-053 and OCC-070). Soil contamination was confined to the identified exposure areas on-site. The exposure areas investigated are based on historical aerial photographs and known waste management activities. Releases to air were investigated in the exposure areas and no unacceptable risk to human health was found.

8. *THE RESIDENTS SHOULD BE NOTIFIED WHEN SOIL IS MOVED OR OPERATIONS ARE IN PLACE SO CHILDREN COULD BE KEPT INSIDE ON THOSE DAYS*

We agree with this comment and will ensure that any on-site activities conducted to implement the final remedy will be performed using an EPA-approved health and safety plan that requires appropriate public notice.

9. *THE STUDY OF HOOKER WORKERS SHOULD BE LOOKED AT FOR HEALTH ISSUES*

We have contacted the Agency for Toxic Substances and Disease Registry (ATSDR) regarding the Health Assessment for exposures related to Occidental Chemical. We will pursue the possibility of continuing the Assessment and will provide information as it becomes available.

10. *THE COMMUNITY NEEDS TO BE INVOLVED*

We believe the community has been involved and we appreciate the input provided by the local community. Modifications to the proposed remedy based on public involvement are presented in the Final Decision and Response to Comments.

11. *THE LAKE MICHIGAN FEDERATION WILL HOLD A MEETING TO DISCUSS THE TECHNICAL REVIEW OF THE REMEDY AND PROVIDE TECHNICAL ASSISTANCE*

We support meetings that allow for a better understanding of the remedy and that clarify technical issues. The public comment period was extended until May 30, 2001, to accommodate this technical assistance meeting. It was held on May 15, 2001, by the Lake Michigan Federation and Technical Outreach Services for Communities (TOSC).

12. *THE LAKE MICHIGAN FEDERATION WILL HAVE PUBLIC HEALTH EXPERTS LOOK AT PUBLIC HEALTH RISKS FROM THE SITE*

We support technical review of the proposed remedy and comments on public health risks. The public comment period was extended until May 30, 2001, to allow for Lake Michigan Federation's input on public health risks. The written comments were received and are addressed below (OCC-147).

13. *THE SITE SHOULD BE HELD TO A HIGHER STANDARD THAN INDUSTRIAL USE*

U.S. EPA risk assessment guidance (OCC-063) and institutional control guidance (OCC-083) allows a facility to consider current use and reasonably anticipated future land use of the property. Residential use is considered unrestricted land use and carries the greatest potential for exposure and the most conservative exposure assessments.

Consideration of non-residential use is appropriate at some facilities. In that case, institutional controls are a viable component of the remedy. Institutional controls are non-engineered instruments, such as administrative and/or legal controls, that minimize the potential for human exposure to contamination by limiting land or resource use.

The majority of OCC property is proposed for unrestricted land use (see Figure 4, OCC-104). However due to extensive subsurface soil and groundwater contamination, the former manufacturing area is proposed for restricted land use (non-residential) and

restricted groundwater use. Institutional controls will be implemented as part of the final remedy to limit exposure.

14. *RISK REDUCTION RELIES TOO MUCH ON INSTITUTIONAL CONTROLS*

At the OCC facility, risk reduction is mainly achieved by engineered controls which are supplemented by institutional controls.

U.S. EPA guidance does allow the use of institutional controls to limit exposure and reduce risk as necessary to protect human health and the environment (OCC-083). However when source areas are present that contribute to ongoing contamination (e.g., contaminated subsurface soil), risk reduction is not solely based on institutional controls. Instead, institutional controls such as water and land use restrictions are used to supplement engineered controls for short and long-term management to prevent or limit exposure to hazardous waste.

15. *THE FINAL DECISION SHOULD INCLUDE A GOOD EXPLANATION OF WHY IT CREATES THE LEAST RISK FOR PEOPLE*

The Statement of Basis (Attachment III) discusses the risk from contamination at the OCC facility. Remedial alternatives were evaluated in terms of the extent that each alternative mitigates short and long-term potential exposure to any residual contamination and how it protects human health during and after implementation.

We believe the selected remedy creates the least risk for people in various ways. Contaminated groundwater will be further investigated and additional remediation will be performed to minimize the sources that continue to contaminate groundwater. This will expedite the clean up of groundwater and reduce risk in a more timely manner. In the meantime, the purge well system will continue to collect and treat the contamination before it can discharge to White Lake and water well restrictions will be imposed to eliminate exposure.

Contaminated soil at the Former Small Disposal Pile Exposure Area will be removed and sent off-site for disposal. Potential risk to people will be eliminated quicker and more effectively than bioremediation.

Contaminated sediment in White Lake will be dredged, dewatered, and treated/disposed. No residual contamination will be left in place that poses a long-term potential risk.

16. *CONTAMINATED SEDIMENT SHOULD BE REMOVED FROM WHITE LAKE*

The selected remedy requires OCC to dredge an area of sediment contaminated with PCB and hexachlorobenzene concentrations greater than 2 ppm and 0.45 ppm, respectively.

17. *A JOINT EFFORT TO CLEAN UP WHITE LAKE FROM IMPACTS OF THE TANNERY AND HOOKER SHOULD BE CONSIDERED*

The cleanup at OCC is proceeding under an EPA Order and the cleanup at the tannery is under MDEQ jurisdiction. EPA and MDEQ have been sharing information on the findings and proceedings at each site. The main contaminant of concern in White Lake from the tannery is chromium, while OCC has discharged PCBs and C-series compounds.

The clean up of White Lake below the OCC discharge can proceed independently since it occurs in an area distant and isolated from the tannery. Likewise, the cleanup at the tannery can proceed independently since the area requiring remediation does not extend to the area of the OCC discharge.

18. *WHAT HAPPENED TO THE CHEMICALS BEING HAULED OUT OF WHITE LAKE FROM THE DOCKS*

The Description of Current Conditions (OCC-013) states that OCC manufactured caustic soda (50% sodium hydroxide and 73% sodium hydroxide) in the caustic building from 1954 to 1982. The caustic soda was shipped from the Montague facility in tank cars, tank trailers, and by barge (OCC-013). The OCC barge dock in White Lake is present in historical aerial photographs from October 11, 1955 (OCC-013). We have requested additional information from OCC on their barge operations.

Written Comments

The following narrative summarizes 87 written comments on the proposed remedy, including their corresponding Administrative Record document number (OCC-112 through OCC-154), and our response to each comment. The written comments are presented in the order they were received during the initial public comment period from March 1 through April 15, 2001, and extended public comment period through May 30, 2001. Each written comment is numbered and presented in italicized capital type. Commentors included:

- Twenty-one (21) local residents (Lathrop, Kurland, Herman, Melichar, Kauranen, Jancek-Anderson, Price, Dahlstrom, C. Johnson, Korthase, Cousino, Witham, Bevans, Lamoreaux, Youngquist, Benovic, Baxter, Munro, Dake, Hanner, and B. Johnson)
- City of Whitehall (Mayor Norman Ullman)
- White River Township (Joy Ann Lehman, Clerk)
- City of Montague (Melinda O'Connell, Clerk)
- Surface Water Quality Division, MDEQ (Roger Jones)
- Occidental Chemical Corporation (Ken Price, Director, Operations, Glenn Springs Holdings Inc.)
- Technical Outreach Services for Communities (TOSC) (Kirk Riley, TOSC Program Coordinator)
- Lake Michigan Federation (Tanya Cabala, Director)
- White Lake Association (Tom Thompson, President)

1. *I LIVE NEXT TO OCC AND FEEL THAT MY PROPERTY IS CONTAMINATED AND WOULD LIKE MY SOIL TESTED* (OCC-112)

In response to this comment and others received during the public comment period, we conducted soil sampling in the vicinity of OCC on June 5 and 6, 2001. Surface soil collected at 11 sample locations on private property located along Old Channel Trail was analyzed for C-series compounds and mirex. Results are expected in July 2001.

2. *IT IS NOT SAFE LIVING IN THE AREA UNTIL THE CLEANUP IS DONE AND CLEANUP WILL DISTURB THE AREA AND POSE A RISK TO HUMAN HEALTH* (OCC-112)

Risk to human health and the environment was assessed at the site (OCC-105 and OCC-109). Unacceptable risk was associated with the potential consumption of on-site groundwater, ingestion of soil in certain on-site areas, residential development in certain on-site areas due to contaminated soil, and fish consumption in the area of the OCC discharge. The extent of areas posing risk was

defined. There is no current evidence of off-site contamination that poses an unacceptable risk, other than sediment in White Lake. Off-site soil and groundwater sampling performed on June 5 and 6, 2001, will provide additional data to further address this comment.

We agree that during remediation, potential short-term risks may be present. Controls will be required during remediation that minimize the short-term risks to workers and the community. Work plans describing the remedial activities and controls are subject to review and approval. Public notice of on-site remedial activities will be provided so that the local community is aware of what is happening on-site and when it is occurring. Permits from State and Federal agencies for certain remedial activities are also required and will specify the monitoring necessary to minimize risk to human health.

3. *WATER WELLS ALONG OLD CHANNEL TRAIL SHOULD BE TESTED FOR CONTAMINATION* (OCC-116 and OCC-117)

In response to this comment and others received during the public comment period, we conducted private well sampling in the vicinity of OCC on June 5 and 6, 2001. Well water collected at eight sample locations on private property along Old Channel Trail was analyzed for volatile organic and C-series compounds. Results are expected in July 2001.

4. *AN IMMEDIATE CLEANUP MUST BEGIN THAT IS THOROUGH AND TOTAL; ALL CONTAMINATED SEDIMENT MUST BE DREDGED, AND TANNERY BAY SHOULD BE CLEANED SIMULTANEOUSLY* (OCC-118)

The selected remedy requires OCC to dredge sediment that poses a risk to human health and the environment. Sediment contaminated with PCB concentrations greater than 2 ppm and hexachlorobenzene concentrations greater than 0.45 ppm will be removed from an area below the outfall. The cleanup will significantly reduce the risk to human health and environment.

The cleanup at OCC is proceeding under an EPA Order and the cleanup at the tannery is under MDEQ jurisdiction. The main contaminant of concern in White Lake from the tannery is chromium, while OCC has discharged PCBs and C-series compounds.

The clean up of White Lake below the OCC discharge will proceed independently since it occurs in an area distant and isolated from the tannery. The area at the tannery requiring remediation does not extend to the area to be remediated by OCC.

5. *SOIL TESTING SHOULD BE PERFORMED ON PROPERTIES IN CLOSE PROXIMITY TO HOOKER AND AN EPIDEMIOLOGICAL STUDY SHOULD COMMENCE* (OCC-118)

In response to this comment and others received during the public comment period, we conducted soil sampling in the vicinity of OCC on June 5 and 6, 2001. Surface soil collected at 11 sample locations on private property located along Old Channel Trail was analyzed for C-series compounds and mirex. Results are expected in July 2001.

We have contacted the Agency for Toxic Substances and Disease Registry (ATSDR) regarding a Public Health Assessment for exposures related to Occidental Chemical. We will continue to pursue the possibility of an Assessment and will provide information as it becomes available.

6. *THERE SHOULD BE A COMPLETE REMOVAL OF CONTAMINATED SEDIMENTS IN WHITE LAKE WHICH RESULTED FROM THE FORMER HOOKER CHEMICAL OPERATION* (OCC-119)

We agree that sediment contaminated by OCC should be removed. The selected remedy requires OCC to dredge sediment contaminated with PCB and hexachlorobenzene concentrations greater than 2 ppm and 0.45 ppm, respectively.

7. *EPA SHOULD REQUIRE CONTAMINATED SEDIMENT AT DOWIE POINT BE DREDGED AND TREATED AND THE AREA SHOULD NOT BE USED FOR EXPERIMENTAL BIOREMEDIATION* (OCC-121)

BioGeoChe Mix™ bioremediation has been eliminated as a viable remedial alternative for contaminated sediment. The selected remedy requires OCC to dredge an area of sediment contaminated with PCB and hexachlorobenzene concentrations greater than 2 ppm and 0.45 ppm, respectively.

8. *THE PUBLIC COMMENT PERIOD SHOULD BE EXTENDED TO MAY 30, 2001 TO ALLOW FOR ADEQUATE PUBLIC REVIEW* (OCC-122, OCC-126, and OCC-128)

In response to these comments, the initial 45-day public comment period was extended to May 30, 2001. The additional time allowed a community workshop to be held by the Lake Michigan Federation and Technical Outreach Services for Communities (TOSC) on May 15, 2001, at the White Lake Community Library. Many public comments were submitted during the extended public comment period (see OCC-137 through OCC-154).

9. *EPA AND INVOLVED PARTIES SHOULD ACCEPT ONLY A FINAL REMEDY THAT MEETS OR EXCEEDS THE STANDARDS PROPOSED BY EPA IN ITS MARCH 1, 2001 PUBLIC MEETING* (OCC-123)

The final remedy selected meets or exceeds the standards initially proposed in the March 1, 2001, public meeting. Bioremediation has been eliminated as a feasible remedial alternative and has been replaced with dredging/excavation and treatment/disposal. The time-frame for remediating certain areas has been expedited as a result of this modification.

10. *I AM CONCERNED ABOUT ASBESTOS IN WHITE LAKE; DO YOU HAVE ANY STUDIES THAT SHOW ASBESTOS IN WATER IS HARMLESS* (OCC-125)

Asbestos is a known hazard when it is in a respirable form that is airborne and can lodge in the lungs. Asbestos at the OCC site is found in wet sediment at the bottom of a deep trough in White Lake. In response to this finding, OCC tested for asbestos in shallow water along the shoreline at Dowie's Point to determine if asbestos was being washed on shore where people could be exposed. No asbestos fibers were detected at Dowie's Point (OCC-109).

Ingestion of asbestos fibers has not been determined to pose a risk to human health similar to the inhalation of asbestos fibers. The Office of Drinking Water, EPA has established a maximum contaminant level for asbestos in drinking water of 7 million fibers/liter.

Asbestos is recognized as a concern during remediation since the management of sediment dredged from White Lake could release asbestos fibers to the air. State and Federal agencies will ensure that the handling of contaminated sediment is performed in a manner that minimizes the release of asbestos fibers to air. The requirements will be described in permits and work plan approvals.

11. *WHAT IS THE SOURCE OF ALIEN CHEMICALS FOUND ON-SITE* (OCC-127)

The Description of Current Conditions (see Appendix J, OCC-013) provides background information on the wide variety of wastes/compounds found at the OCC facility. Soil samples from 25 borings at the OCC facility were analyzed in 1978. Various VOCs and C-series compounds were detected. Mirex and kepone were also investigated and mirex was found to be present.

The chemicals detected in 1978 appear to be consistent with the chemicals investigated and detected during the RFI. The source of VOCs, C-series compounds, and mirex is from the on-site disposal of brine sludge, C-56 process residue, and C-56 catalyst wastes generated during the manufacturing process.

12. *HOW MANY TRUCKLOADS AND TOTAL AMOUNT OF HAZARDOUS WASTES FROM THE BERLIN AND FARRO LANDFILLS WERE DELIVERED TO THE SITE AND WHERE WAS THE WASTE PLACED* (OCC-127)

The Description of Current Conditions (OCC-013) describes that during OCC's manufacturing operations, some wastes were managed at various off-site facilities, including Berlin & Ferro Liquid Incineration. OCC sent 2500 tons of waste containing C-56 and VOCs to Berlin & Ferro from 1972 to 1975. The report also states that the 905,000 cubic yards of waste placed in the Secure Landfill Vault consisted of impacted soil and debris from 10 on-site disposal areas, the equalization pond, and the fine chemicals production facility. It does not mention the disposal of waste from Berlin & Ferro.

Other than the information provided above, there is no information in the Administrative Record to indicate whether wastes from Berlin & Ferro were disposed at the OCC facility and at what location.

13. *DID EPA INVESTIGATE THE PALEOCHANNEL UNDER THE CLAY LAYER AT THE OLD PRODUCTION FACILITY AND CAN IT BE A SOURCE OF CONTAMINANTS FOUND IN WHITE LAKE* (OCC-127)

The term "paleochannel" is used in the Administrative Order (OCC-001) to describe the ancestral surface water drainage system formed in the underlying clay beds. An upper sand layer (90 to 130-feet thick), with thin discontinuous silt and clay layers, lies on the clay bed. The buried paleochannel is shown in Figure 2 of the Administrative Order (OCC-001) and is represented by the 520-foot contour lines trending south-southeast from the old C-56 production unit.

The groundwater contaminant plume defined during the site investigation (see Figure 10, OCC-070) tends to follow the buried paleochannel, trending south-southeast from the old C-56 production unit. Wells were installed at three depths in the upper sand layer above the paleochannel. The bulk of the contamination was found in the middle and upper portions of the sand. There is no current evidence of significant contamination migrating to the base of the sand layer and top of the clay bed. The purge well system bisects the sand layer lying directly above

the buried paleochannel and captures contaminants before they can discharge to White Lake.

The source of contamination in White Lake is believed to be historical discharges from the OCC outfall when the facility was active. This is based on historical records and the type and distribution of contamination found in White Lake sediment. The outfall is currently monitored weekly for site-related contaminants. Data is submitted to MDEQ and EPA. There is no evidence of ongoing contamination to White Lake from the outfall discharge.

14. *DID THE SITE INJECTION WELLS AND TWO PLUGGED DISPOSAL WELLS TAP INTO THE PALEOCHANNEL* (OCC-127)

Page 5 of the Administrative Order (OCC-001) states that the facility identified itself as an owner and operator of underground injection wells. Brine was obtained from the salt formation by pumping water into the underlying strata (approximately 3000-feet deep) through the underground injection wells, dissolving the salt, and extracting the salt through on-site brine wells (OCC-013). Eight underground injection wells are identified as Areas 30 through 37 in Figure 7 of the Administrative Order (OCC-001). Two plugged disposal wells, shown as Areas 38 and 39, are also identified in Figure 7.

The disposal wells were constructed in 1953 and 1956 to a depth of approximately 2000-feet deep (OCC-013). The wells were originally intended for disposal of brine sludge but because of poor permeability in the Lower Travis formation in which they were drilled, the wells reportedly received very limited use. Brine sludge is reported to consist of water, sodium chloride, sodium hydroxide, sodium sulfate, sodium carbonate, magnesium hydroxide, calcium carbonate, and perlite. Both disposal wells were plugged in 1969. The disposal well plugging records can be found in Appendix S of the Description of Current Conditions (OCC-013).

The injection and disposal wells tapped into deep bedrock formations from 2000-feet to over 3000-feet deep. The well casings isolate salt mining and brine sludge disposal activities from the paleochannel which is found approximately 100-feet below the land surface.

15. *LITTLE IS KNOWN ABOUT THE CONSTRUCTION OF THE ON-SITE VAULT AND THE WASTES PLACED THERE; THE INTEGRITY OF THE VAULT MUST BE INVESTIGATED* (OCC-127)

The on-site vault is described in the Description of Current Conditions (OCC-013). Approximately 905,000 cubic yards of waste, soil, and debris containing varying amounts of chloroform, carbon tetrachloride, trichloroethylene, tetrachloroethylene, hexchlorobutadiene, hexachlorobenzene, hexachlorocyclopentadiene, octachlorocyclopentene, cadmium, chromium, and lead was placed in the on-site Secure Landfill Vault prior to its closure. The vault closure and post-closure plans, and EPA approval of the plans are found in Appendix P of the Description of Current Conditions (OCC-013). The vault construction includes a compacted clay-lined base (10-feet thick), compacted clay-lined sidewalls (10.4-feet thick), a leachate collection system, and control vents.

A 30-year post-closure groundwater monitoring plan for the vault was approved by EPA and is monitored by MDEQ. Three upgradient and ten downgradient monitoring wells are sampled quarterly for site-related constituents and data is provided to MDEQ. Inspections are conducted by MDEQ to determine compliance with the approved groundwater quality assessment program.

Twelve groundwater monitoring compliance evaluations by MDEQ were performed from July 5, 1984, through February 16, 1999. Five enforcement actions were taken by MDEQ in 1984, 1985, 1991, and 1993 to address violations of groundwater monitoring requirements. OCC has been in compliance with groundwater monitoring requirements since May 19, 1997.

16. *NOXIOUS FUMES WERE ENCOUNTERED DURING INSTALLATION OF THE FENCE IN 1994 AROUND THE SPUR LINE NEAR THE BACK OF THE POWER PLANT; HOW FAR TO THE WEST AND SOUTH WERE SAMPLES TAKEN IN THIS AREA* (OCC-127)

Surface soil sampling and confirmation soil borings were performed in this area during Phase II of the RFI (OCC-070). Surface soil samples (upper one-foot) were obtained up to 400-feet south and west of the spur line near the back of the power plant. Trace amounts (< 1 ppm) of volatile organic compounds and mirex were found at three locations within the fenced area but were not detected at five locations outside the fenced area.

Five confirmation soil borings were placed outside the fenced area at depths of 6 to 8-feet and 14 to 16-feet. Significant concentrations of site-related contaminants were not detected. Two deep soil borings taken in 1995 immediately west and south of the spur line (OCC-053) did not detect any significant concentrations of site-related contaminants at a depth of 1 to

3-feet and 16 to 18-feet.

Surface soil sampling west and south of OCC (on private property along Old Channel Trail) was also conducted on June 5 and 6, 2001. The soil was analyzed for C-series compounds and mirex. Results are expected in July 2001.

17. *FIGURE 8 OF THE ADMINISTRATIVE ORDER SHOWS CONTAMINATED GROUNDWATER UNDER THE LATHROP PROPERTY; THIS PROPERTY SHOULD BE TESTED* (OCC-127)

The Lathrop property (5780 Old Channel Trail) and other nearby residences (5725 and 5879 Old Channel Trail) are on City of Montague water. They do not use local groundwater and the western extent of the current groundwater contaminant plume is likely located just east of the Lathrop property (see Figure 10, OCC-070). Surface soil sampling was conducted by EPA at the Lathrop property on June 5, 2001. Results are expected in July 2001.

18. *THE ENTIRE GROUNDWATER CONTAMINANT PLUME SHOULD BE CAPTURED WITH PURGE WELLS AND TREATED THROUGH CARBON FILTRATION UNTIL CLEAN* (OCC-127)

We agree that additional groundwater cleanup is necessary beyond maintenance of the current purge well system. Without additional cleanup, groundwater is expected to remain contaminated above groundwater protection standards for hundreds of years. While the exact method of additional cleanup has not yet been defined, OCC initiated additional field investigations on June 20, 2001, to better define the ongoing sources of groundwater contamination. Implementation of additional groundwater remediation technologies are expected after completion of investigations to be performed by OCC in 2001 and 2002 (OCC-134 and OCC-155).

We will continue to update the Administrative Record to keep the local community informed and may conduct additional public meetings to discuss the progress of the cleanup and groundwater investigations.

19. *IN-PLACE CAPPING REQUIRES PERPETUAL MONITORING AS WELL AS FINANCIAL ASSURANCES FOR REPAIRS AND THERE ARE NO SUCCESS STORIES IN MICHIGAN FOR BIOREMEDIATION; IT IS ENVIRONMENTALLY SAFER AND LIKELY MORE COST EFFICIENT IN THE LONG RUN TO REMOVE THE CONTAMINATED SEDIMENTS AND PROPERLY DISPOSE OF THEM* (OCC-130)

We are also not aware of any successful applications of in-place bioremediation of PCB-contaminated sediment. OCC has not yet demonstrated that bioremediation is a viable alternative for reducing the toxicity of contaminated sediment.

We do regard capping as a viable remedial alternative under certain conditions and have published guidance on capping of contaminated sediment (see OCC-103). Long-term monitoring is a necessary component of any capping project.

The selected remedy does require contaminated sediment to be removed and it will be properly disposed.

20. *CONTAMINATED SEDIMENT IN WHITE LAKE SHOULD BE CLEANED UP AS QUICK AS POSSIBLE BY THOSE WHO CAUSED IT* (OCC-137)

We agree with this comment. The remedial alternative for addressing contaminated sediment is based on technical, environmental, human health, and institutional criteria (see Attachment III, Statement of Basis). A timely and effective cleanup is a component of the technical criterion. The specific time-frame for completion of the dredging project will be presented in plans to be submitted within 30 days of the Final Decision and Response to Comments.

21. *PROPOSED BIOREMEDIATION FOR WHITE LAKE IS UNTESTED AND SHOULD NOT BE USED* (OCC-138)

We agree with this comment. Bioremediation has been eliminated as a viable remedial alternative for contaminated sediment.

22. *LABORATORY AND PILOT STUDIES FOR BIOREMEDIATION SHOULD BE PRESENTED TO THE LOCAL COMMUNITY* (OCC-139)

A treatability evaluation of BioGeoChe Mix™ can be found in the Administrative Record (OCC-099). Additional studies are no longer necessary since bioremediation has been eliminated as a viable remedial alternative for contaminated sediment.

A pilot study on Daramend® bioremediation can be found in the Administrative Record (OCC-136). Additional studies are no longer necessary since excavation and off-site treatment/disposal is the selected remedy to address contaminated soil in the Former Small Disposal Pile Exposure Area.

23. *THE DEVELOPMENT OF MONTAGUE TOWNSHIP WILL BE SEVERELY IMPACTED IF CLEANUP ONLY ALLOWS FOR INDUSTRIAL USE* (OCC-139)

U.S. EPA risk assessment guidance (OCC-063) and institutional control guidance (OCC-083) allows facilities to consider current use and reasonably anticipated future land use of the property. Residential use is considered unrestricted land use and carries the greatest potential for exposure and the most conservative exposure assessments.

Consideration of non-residential use is appropriate in some situations, like the OCC facility. Exposure is limited by the placement of institutional controls. Institutional controls are non-engineered instruments, such as administrative and/or legal controls, that minimize the potential for human exposure to contamination by limiting land or resource use. They are a necessary component of the selected remedy at OCC.

The majority of OCC property is proposed for unrestricted land use (see Figure 4, OCC-104). However due to extensive subsurface soil and groundwater contamination, the former manufacturing area is proposed for restricted land use (non-residential) and groundwater use. Institutional controls will be implemented as part of the final remedy to limit exposure.

24. *OCC AGREES WITH THE CONTINUED USE OF THE GROUNDWATER COLLECTION AND TREATMENT SYSTEM* (OCC-140)

The continued use of the purge well system is a component of the selected remedy. Since this activity alone would result in groundwater remaining contaminated for hundreds of years, additional investigation and remediation of the source(s) of groundwater contamination is also required as part of the selected remedy.

25. *OCC AGREES DNAPL IS LIKELY PRESENT AND PROPOSES A PHASED APPROACH TO LOCATE THE DNAPL* (OCC-140)

The plan and schedule for dense non-aqueous phase liquid (DNAPL) investigation and remediation was approved on June 5, 2001 (OCC-155).

26. *OCC REQUESTS THAT COLLECTION AND TREATMENT MEASURES TO EXPEDITE GROUNDWATER CLEANUP BE BASED UPON DATA GENERATED IN THE PHASED INVESTIGATION AND A TECHNICAL REVIEW OF THE PERFORMANCE, RELIABILITY, AND IMPLEMENTABILITY OF ALTERNATIVE CORRECTIVE MEASURES* (OCC-140)

We agree. The approved work plan describes Phase III of the investigation as an evaluation of remedial systems to address potential DNAPL in the subsurface at the site (OCC-134). The

available remedial technologies will be evaluated based upon the information gathered from the geophysical investigation program (Phase I) and the verification and delineation drilling program (Phase II).

The Administrative Order (OCC-001) requires that a technical evaluation of corrective measure alternatives, such as collection and treatment measures to expedite groundwater cleanup, be based on performance, reliability, implementability, and safety.

27. *OCC BELIEVES THAT THE STATEMENT OF BASIS OVERSTATES THE DEMONSTRATED EFFECTIVENESS OF TECHNOLOGIES TO ADDRESS DNAPL IN CONDITIONS EXPECTED AT THE SITE* (OCC-140)

Site contaminants in subsurface soil have been identified at the water table (i.e., smear zone) in the Northern and Central Exposure Areas. DNAPL is believed to be present based on contaminant concentrations in groundwater, but has not been verified.

Based on the current data, we believe that technologies are available to implement the clean up of sources contributing to groundwater contamination, especially in the smear zone. However, further delineation of the depth in which free-phase volatile organic and C-series compounds have migrated is necessary to determine the technologies, if any, that are practicable.

EPA's Advanced Notice of Proposed Rulemaking (Federal Register, Volume 61, p. 19451) does recognize that in certain situations (e.g., the presence of DNAPL), groundwater remediation may be technically impracticable. However, sufficient information must be available to justify such a determination. Necessary information on the presence and potential clean up of DNAPL will be gathered using a phased approach (OCC-134).

28. *OCC REQUESTS THAT DNAPL INVESTIGATIONS BE COMPLETED PRIOR TO REQUIRING THE IMPLEMENTATION OF ANY GROUNDWATER REMEDIAL TECHNOLOGIES* (OCC-140)

Completion of the smear zone and DNAPL investigation is expected to aid in the delineation of the depth in which free-phase volatile organic and C-series compounds have migrated. We agree that a better understanding of contaminant migration is necessary before the specific remedial technologies and requirements to address contaminant source cleanup can be formulated.

29. *OCC AGREES THAT THE CURRENT GROUNDWATER MONITORING PROGRAM REQUIRES REVISIONS TO INCORPORATE NEW WELLS AT THE SITE TO DOCUMENT THE EDGE OF THE PLUME* (OCC-140)

A long-term groundwater monitoring program must be proposed by OCC in the CMI phase of the corrective action, subject to EPA approval. The approved program will be incorporated into the Operation and Maintenance Plan for the final remedy.

30. *OCC RECOMMENDS THAT EPA INCORPORATE THE CURRENT GROUNDWATER MONITORING PROGRAM TO DEMONSTRATE THE PERFORMANCE OF THE PURGE WELL SYSTEM* (OCC-140)

At this time, we believe that the groundwater monitoring program for demonstrating purge well system performance is effective. The long-term groundwater monitoring program must be proposed by OCC in the CMI phase of the corrective action, subject to EPA approval. The approved program will be incorporated into the Operation and Maintenance Plan for the final remedy.

31. *THE RESULTS OF THE DARAMEND PILOT STUDY ARE NOT DIRECTLY APPLICABLE TO CONTAMINATED SOIL AT THE FORMER SMALL DISPOSAL PILE AND OCC REQUESTS FLEXIBILITY TO MANAGE THE SOIL AT AN APPROPRIATE PERMITTED OFF-SITE FACILITY* (OCC-140)

We agree. The proposed remedy has been modified to require excavation and off-site treatment/disposal of soil exceeding cleanup goals at the Former Small Disposal Pile Exposure Area. This remedial alternative is expected to result in a more timely and effective cleanup.

32. *OCC REQUESTS THAT THE REQUIREMENT TO FENCE THE ENTIRE FORMER INDUSTRIAL AREA BE REMOVED SINCE ANALYTICAL DATA DEMONSTRATES THAT SURFACE SOILS DO NOT POSE A THREAT TO INDUSTRIAL USE OF THE PROPERTY* (OCC-140)

Implementation of the selected remedy using engineered controls for surface soil and institutional controls for the former manufacturing portion of the facility, may eliminate the need to restrict site access. However, it may be prudent to maintain the site access restrictions to provide for: 1) integrity of the groundwater monitoring system; 2) security for the groundwater treatment system; 3) elimination of exposure pathways from groundwater investigations (OCC-155); 4) elimination of exposure pathways from sediment management; and 5) elimination of exposure pathways from implementation of remedies, as necessary, to expedite groundwater cleanup (OCC-134).

33. *OCC BELIEVES THAT CAPPING CONTAMINATED SEDIMENTS IS A TECHNICALLY SOUND SOLUTION AND THAT THE BENEFITS HAVE NOT BEEN FULLY EVALUATED; CAPPING SHOULD BE THE PREFERRED ALTERNATIVE* (OCC-140)

The CMS evaluated the various remedial alternatives for addressing contaminated sediment in White Lake that pose a risk to human health and the environment (OCC-110). Based on the evaluation of various remedial alternatives, the Statement of Basis (Attachment III) proposed a remedy that first reduced sediment toxicity (using bioremediation and "hotspot" removal) to minimize long-term risk, then used engineered controls (capping) to minimize exposure pathways. In the alternative, contaminated sediment would be dredged to eliminate risk.

We believe that the overall rating for a dredging scenario with flexible management of the dredged sediment is similar or better than the overall rating for a capping scenario. The dredging scenarios evaluated in the CMS (OCC-110) only considered management of dredged sediment using PCB/ACM conversion or vitrification. Both scenarios also considered only vacuum HEPA filtration for dewatering whereas passive physical separation in geotubes passed the initial screen and is reliable, being currently used for sediment remediation at a U.S. Army facility in Wisconsin.

As noted in our approval with modifications of the CMS (OCC-103), we did not necessarily concur with each individual qualitative rating for the various scenarios. In particular, we do not agree that TSCA regulations applicable to sediment containing greater than 50 ppm of PCBs result in a poor rating for the institutional criterion for dredging. In addition, community response to contaminated sediment in White Lake is unequivocal - remove it immediately!

34. *OCC REQUESTS THAT EPA LEAVE FLEXIBILITY IN THE FINAL REQUIREMENTS FOR REMEDIATION OF SEDIMENTS UNTIL ADDITIONAL SEDIMENT DATA ON SAMPLES COLLECTED MAY 17 AND 18, 2001, IS EVALUATED* (OCC-140)

We agree. The selected remedy for remediating contaminated sediment does not specify the total volume of sediment to be dredged. Instead, it specifies the cleanup goal for contaminated sediment in the area of the outfall as 2 ppm for PCBs and 0.45 ppm for hexachlorobenzene.

At this time, the proposed cleanup area is presented in Figure 3 of the Statement of Basis (Attachment III). We estimate the

upper two-feet of the proposed cleanup area requires dredging to meet the cleanup goals. The exact area and depth will be presented and approved in the CMI phase of corrective action, when the final data from the May 2001 sampling event is available. As required by Section VI.C.2 of the Administrative Order (OCC-001), the plans for implementing the corrective measures are due within 30 days of receipt of the Final Decision and Response to Comments.

35. *SIGNIFICANT PERMITTING IS REQUIRED TO IMPLEMENT ANY DREDGING OPERATION AT THE SITE AND THE ON-SITE THERMAL TREATMENT TECHNOLOGY REQUIRES A PILOT STUDY* (OCC-140)

We note these requirements. Our understanding of the MDEQ and U.S. Army Corps of Engineers permitting process is that it can take up to 180 days if a public hearing is requested. A description of the process and permit application can be found at http://www.deq.state.mi.us/lwm/Permits/pcu/application.html

The specific schedule for implementation of the dredging operation, subject to EPA approval, is part of the CMI Program Workplan due within 30 days of receipt of the Final Decision and Response to Comments.

We agree with the need for a pilot study before implementing on-site thermal treatment technology but are leaving open other alternatives, such as off-site treatment/disposal of dredged sediment. MDEQ would consider the pilot study results during the air permit process, which could take 180 days if a public comment period is required. We anticipate that dewatering of dredged sediment will be performed on-site, subject to EPA approval of the workplan and MDEQ permitting requirements.

36. *OCC REQUESTS THE FLEXIBILITY TO CHARACTERIZE ANY DREDGED SEDIMENT AND MANAGE THE SEDIMENT ACCORDING TO LEGAL REQUIREMENTS; THE SEDIMENT MAY NOT EXHIBIT A CHARACTERISTIC OF HAZARDOUS WASTE* (OCC-140)

We agree. The Final Decision leaves flexibility in the ultimate disposition of dredged sediment and leaves open other alternatives, such as off-site treatment/disposal of dredged sediment. The plans to facilitate the design, construction, operation, maintenance, and monitoring of dredging activities, subject to EPA approval, is part of the CMI Program Workplan due within 30 days of receipt of the Final Decision and Response to Comments.

37. *OCC REQUESTS THAT SEDIMENT NOT BE BIOREMEDIATED BUT SHOULD BE CAPPED IF HOTSPOT REMOVAL OF SEDIMENTS GREATER THAN 100 MG/KG PCB IS PERFORMED* (OCC-140)

BioGeoChe Mix™ bioremediation has been eliminated as a viable remedial alternative for contaminated sediment. The selected remedy requires OCC to dredge the area of sediment contaminated with PCB and hexachlorobenzene concentrations greater than 2 ppm and 0.45 ppm, respectively.

38. *IF THE EPA REQUIRES OCC TO DREDGE A HOTSPOT OF CONTAMINATED SEDIMENT, OCC REQUESTS THE FLEXIBILITY TO DREDGE A LARGER AREA AS A COMPLETE FINAL REMEDY FOR SEDIMENT* (OCC-140)

The selected remedy requires OCC to dredge the area of sediment in the vicinity of the outfall that is contaminated with PCB concentrations greater than 2 ppm and hexachlorobenzene concentrations greater than 0.45 ppm. We believe this remedial alternative is most protective of human health and the environment with respect to the evaluation criteria (technical, environmental, human health, and institutional). The exact area and depth to be dredged will be defined in the approved CMI Program Workplan.

39. *A FULL CLEANUP OF WHITE LAKE IS APPROPRIATE* (OCC-141)

We agree that sediment contaminated by OCC should be cleaned up. The selected remedy requires OCC to dredge an area of sediment contaminated with PCB and hexachlorobenzene concentrations greater than 2 ppm and 0.45 ppm, respectively.

40. *MORE TESTING IS NEEDED BEFORE A DECISION CAN BE MADE FOR USING BIOREMEDIATION* (OCC-142)

Additional testing is no longer necessary. Bioremediation has been eliminated as a viable remedial alternative for contaminated sediment and will no longer be used to address contaminated soil in the Former Small Disposal Pile Exposure Area.

41. *ANY REMEDIATION SHOULD BE A FINAL, NOT TEMPORARY SOLUTION* (OCC-143)

The removal of contaminated surface soil and sediment from the OCC facility and White Lake is a timely final solution. However certain components of the remedy require a long time-frame and technical solutions may not be available to effectively treat contaminated groundwater. The selected remedy is a balance of various remedial evaluation criteria such as performance,

reliability, implementability, safety, overall protection of human health, overall protection of environment, and institutional needs.

42. *UNPROVEN BIOREMEDIATION MEASURES SHOULD NOT BE USED TO CLEAN UP WHITE LAKE SEDIMENTS* (OCC-143)

Bioremediation has been eliminated as a viable remedial alternative for contaminated sediment and will no longer be used to address contaminated soil in the Former Small Disposal Pile Exposure Area. Thus, additional proof of the effectiveness of bioremediation at this site is no longer necessary.

43. *COST SHOULD NOT BE A DETERMINING FACTOR; THE BEST POSSIBLE REMEDIAL ACTION NEEDS TO BE DONE* (OCC-143)

The evaluation of a final remedy is based on technical, environmental, human health, and institutional criteria (see Attachment III, Statement of Basis). Cost estimates are developed for each corrective measure alternative but cost is not a criterion for eliminating corrective measure alternatives that adequately meet all technical, human health, and environmental criteria (OCC-001). A proper evaluation of the final remedy using technical, environmental, human health, and institutional criteria will ensure that the best possible remedial action is chosen.

44. *A COMPLETE CLEAN UP OF CONTAMINATED SEDIMENT, SOIL, AND GROUNDWATER IS NECESSARY* (OCC-144)

The selected remedy for addressing contaminated sediment in White Lake requires OCC to dredge an area of sediment contaminated with PCB and hexachlorobenzene concentrations that exceed risk-based cleanup goals. Soil in the Former Small Disposal Pile Exposure Area that exceeds risk-based cleanup goals will be excavated and managed off-site.

Remediating groundwater to risk-based cleanup goals is not practicable until the source(s) of groundwater contamination can be identified and feasible technologies developed to remove them. Field work to address the source(s) of groundwater contamination began on June 20, 2001 (OCC-105).

45. *WHITE LAKE MUST BE CLEANED UP IN THE BEST AND MOST COMPLETE WAY; THE SEDIMENTS MUST BE DREDGED* (OCC-145)

The selected remedy for addressing contaminated sediment in White Lake requires OCC to dredge an area of sediment contaminated with

PCB and hexachlorobenzene concentrations greater than 2 ppm and 0.45 ppm, respectively.

46. *THE DARAMEND PILOT STUDY DID NOT DEMONSTRATE THAT ENHANCED CONTAMINANT DEGRADATION HAD BEEN ACHIEVED IN THE DARAMEND-TREATED SAMPLES WHEN COMPARED TO CONTROL CONDITIONS* (OCC-146)

We agree with this comment. The laboratory study on Daramend® bioremediation can be found in the Administrative Record (OCC-136). Decreases in hexachlorobenzene concentrations (see Figure 1, OCC-136) were similar for the control and the four treatment types after 70 and 145 days of treatment. In order to demonstrate effective treatment, hexachlorobenzene concentrations in the treatment type(s) need to be significantly lower than those found in the untreated control.

Since bioremediation will no longer be used to address contaminated soil in the Former Small Disposal Pile Exposure Area, the effectiveness of Daramend® bioremediation at this site no longer needs to be demonstrated.

47. *DATA ON SOIL OXIDATION-REDUCTION POTENTIAL AND pH IS NEEDED TO EVALUATE TREATMENT CLAIMS THAT DARAMEND WORKS BY CYCLING BETWEEN ANAEROBIC AND AEROBIC CONDITIONS* (OCC-146)

Since bioremediation will no longer be used to address contaminated soil in the Former Small Disposal Pile Exposure Area, the effectiveness of Daramend® bioremediation at this site no longer needs to be demonstrated.

48. *THE TERMS OF A GUARANTEE FOR DARAMEND TECHNOLOGY BY WR GRACE NEED TO BE PROVIDED* (OCC-146)

Since bioremediation will no longer be used to address contaminated soil in the Former Small Disposal Pile Exposure Area, the effectiveness of Daramend® bioremediation at this site no longer needs to be guaranteed by WR Grace.

49. *WILL CAPPING BE PERFORMED IF DARAMEND TECHNOLGY PROVES TO BE INEFFECTIVE AND IS THERE AN ADDITIONAL OPPOTUNITY TO COMMENT ON THIS ALTERNATIVE REMEDIATION* (OCC-146)

Neither capping or Daramend® bioremediation will be used to address contaminated soil at the Former Small Disposal Pile Exposure Area. The soil will be excavated and sent off-site for proper treatment/disposal.

50. *THE RATING OF VERY GOOD FOR DARAMEND TECHNOLOGY IS NOT WARRANTED; THERE IS A LACK OF AN EFFECTIVE PILOT EVALUATION* (OCC-146)

We agree with this comment. Comments and concerns on Daramend® bioremediation were provided to OCC on October 31, 2000 (OCC-100). An effective pilot evaluation is no longer necessary since Daramend® bioremediation will not be used to address contaminated soil in the Former Small Disposal Pile Exposure Area.

51. *THERE IS NO INFORMATION ON THE SUCCESSFUL USE OF BIOGEOCHEMIX FOR PCB DEGRADATION* (OCC-146)

We agree but additional information is no longer necessary since BioGeoChe Mix™ bioremediation has been eliminated as a viable remedial alternative for contaminated sediment.

52. *METHANE PRODUCTION MAY CAUSE PHYSICAL DISRUPTION OF THE CAP AND MOBILIZE CONTAMINANTS* (OCC-146)

Evaluation of methane production's effect on the cap is no longer necessary since contaminated sediment will be dredged and not capped.

53. *A SATISFACTORY CLEANUP AT THE OCCIDENTAL SITE IS CRUCIAL TO RESTORING WHITE LAKE AND DELISTING IT AS AREA OF CONCERN* (OCC-147)

We believe that the selected remedy to dredge contaminated sediment will aid in the delisting of White Lake as an area of concern.

54. *THE STATEMENT OF BASIS FAILS OVERALL TO PROVIDE A SOUND SCIENTIFIC BASIS FOR ITS CHOICE OF REMEDIES TO REDUCE THE LONG-TERM PUBLIC HEALTH RISK OF THE SITE* (OCC-147)

The EPA Statement of Basis is supported by the Administrative Record. The proposed remedy for groundwater, soil, and sediment is based on EPA's evaluation of technical, human health, environmental, and institutional criteria as required by the Administrative Order (OCC-001). If necessary, the Statement of Basis provides for contingent remedies if certain requirements for the preferred remedy are not met in a timely manner (e.g., bioremediation).

Based on public comments and further evaluation of bioremediation technologies, the proposed remedy in the Statement of Basis has

been modified. Excavation of soil and dredging of sediment are selected components of the site remedy, rather than bioremediation.

55. *A GROUNDWATER MONITORING PROGRAM WITH REGULAR BIANNUAL SAMPLING IS NECESSARY TO ENSURE PRIVATE WELLS WILL NOT BECOME CONTAMINATED IN THE FUTURE* (OCC-147)

We conducted private well sampling in the vicinity of OCC on June 5 and 6, 2001. Well water collected at eight sample locations on private property along Old Channel Trail was analyzed for volatile organic and C-series compounds. Results are expected in July 2001.

Based on the results of private well and plume monitoring data, the need for routine private well sampling will be evaluated as part of the long-term facility groundwater monitoring program. OCC is currently operating under an approved groundwater monitoring program that will be re-evaluated during implementation of the corrective measures. A groundwater monitoring plan will be proposed by OCC during the Corrective Measures Implementation (CMI) phase of the project. The CMI is initiated 30 days after the Final Decision and Response to Comments. All plans submitted by OCC are subject to EPA approval.

56. *AN ANALYSIS AND/OR INSTALLATION OF MONITORING WELLS WITHIN THE PLUME AND ON ITS PERIMETER IS NECCESSARY TO ENSURE THAT THE INTERCEPTOR WELLS ARE CONTAINING THE CONTAMINANT PLUME* (OCC-147)

The current groundwater monitoring program adequately demonstrates that the interceptor wells are containing the contaminant plume. It consists of monitoring wells within the plume and at its perimeter. Data from private wells will be available in July 2001 to further evaluate the groundwater monitoring program. A long-term groundwater monitoring plan will be proposed by OCC during the CMI phase of the project. The CMI is initiated 30 days after the Final Decision and Response to Comments. All plans submitted by OCC are subject to EPA approval.

57. *MINIMUM CLEANUP GOALS FOR GROUNDWATER CONTAMINATION NEED TO BE SPECIFIED ALONG WITH CONTINGENCY PLANS IF THE GROUNDWATER CLEANUP GOALS ARE NOT MET* (OCC-147)

The groundwater cleanup levels at the OCC facility are derived from State of Michigan Part 201 generic cleanup criteria and

screening levels developed under the authority of the Natural Resources and Environmental Protection Act (Michigan Part 201). These are risk-based goals such that attaining the given concentration during cleanup will not result in adverse health effects or in an excess cancer rate (greater than 1 in 100,000). Since groundwater discharges to White Lake, more stringent groundwater/surface water interface criteria are used as the groundwater cleanup level where applicable (see Attachment III, Statement of Basis).

The groundwater cleanup goals are the current minimum cleanup goals. We recognize that in some situations, attainment of groundwater cleanup goals may be technically impracticable. The long-term operation and maintenance of the final remedy is the appropriate phase of corrective action to formulate and implement any contingent groundwater cleanup goals. Additional groundwater investigations and implementation of feasible groundwater remedial alternatives must be performed over the next few years before the time-frame and contingency plans for groundwater cleanup goals can be formulated.

58. *LAKE MICHIGAN FEDERATION RECOMMENDS AN ANALYSIS OF OVERALL WATER QUALITY THAT LOOKS AT THE CURRENT STATUS OF THE COMMUNITY SUPPLY, WHAT AREAS ARE IMPACTED, AND WHERE FUTURE DRINKING WATER WELLS MIGHT BE LOCATED* (OCC-147)

The scope of the Administrative Order (OCC-001) is to address releases at and from the facility that pose an unacceptable risk to human health and the environment. In that context, the groundwater contaminant plume has been defined and is currently intercepted before it discharges to White Lake. There is currently no human exposure to contaminated groundwater. However, institutional controls are necessary to ensure that potential exposure pathways for groundwater are eliminated (e.g., well restrictions in the vicinity of the plume).

59. *FURTHER SUBSURFACE SOIL SAMPLING IS NEEDED BEFORE REMEDIATING SOIL CONTAMINATION* (OCC-147)

Subsurface soil in the vicinity of the water table (i.e., smear zone), both in the Northern and Central Exposure Areas, contains site-related contaminants that act as a continuing source of groundwater contamination. Investigation of this smear zone and deeper clay and silt layers for dense non-aqueous phase liquid (DNAPL) was recently approved and field work was initiated on June 20, 2001 (OCC-105). The goal of the work is to locate the source(s) of groundwater contamination and implement a remedy that expedites groundwater cleanup.

Remediation required in the Former Small Disposal Pile and Former Burn Pit Exposure Areas is necessary to address potential risks posed by surface soil contamination. Proper remediation requires OCC to demonstrate that all contaminated soil exceeding cleanup goals at the Former Small Disposal Pile Exposure Area is removed. This requires confirmation sampling of surface and/or subsurface soil to demonstrate adequate removal.

60. *THE PUBLIC SHOULD HAVE AN OPPORTUNITY TO REVIEW THE STUDIES OF SUBSURFACE SOIL CONTAMINATION AND TO PROVIDE INPUT ON ADDITIONAL GROUNDWATER TREATMENT OPTIONS* (OCC-147)

We agree and expect to present the findings and proposed remedies to the public over the next few years. Plans, reports, letters, etc. will be placed in the Administrative Record at the local libraries as they become available.

61. *BIOREMEDIATION HAS NOT BEEN SHOWN TO BE EFFECTIVE IN DEGRADING SITE CONTAMINANTS* (OCC-147)

Bioremediation has been eliminated as a viable remedial alternative for contaminated sediment and bioremediation will no longer be used to address contaminated soil in the Former Small Disposal Pile Exposure Area. Thus, proving the effectiveness of bioremediation is no longer necessary.

62. *FUTURE USE OF THE SITE SHOULD BE DISCUSSED BETWEEN OCC AND MONTAGUE TOWNSHIP AND BE CONSISTENT WITH THE USE RESTRICTIONS IMPOSED AT THE SITE* (OCC-147)

Institutional controls will be implemented as part of the final remedy. We will discuss the implementation of deed restrictions with MDEQ and OCC.

63. *AIR SAMPLING SHOULD BE CONDUCTED DURING BIOREMEDIATION AND DURING DEVELOPMENT OF THE SITE TO ENSURE WORKER SAFETY* (OCC-147)

Bioremediation has been eliminated as a viable remedial alternative for contaminated sediment and will no longer be used to address contaminated soil in the Former Small Disposal Pile Exposure Area. Thus, air sampling during bioremediation is no longer necessary.

Air sampling was performed during Phase II of the RFI and risks evaluated (OCC-070). Volatile organic compounds discharging to ambient air or indoor air from contaminated subsurface soil and groundwater do not pose an unacceptable risk to human health.

Excavation of contaminated subsurface soil could pose a potential risk to workers that must be evaluated and monitored. OCC is required to prepare a health and safety plan for any disturbance of soil within the former manufacturing area. The plan could require air sampling depending on the location and depth of the excavation.

64. *THERE ARE NO STUDIES AVAILABLE TO SUPPORT THE USE OF BIOGEOCHEMIX TECHNOLOGY TO DEGRADE PCBS* (OCC-147)

We agree but studies regarding the effectiveness of BioGeoChe Mix™ bioremediation are no longer necessary. It has been eliminated as a viable remedial alternative for contaminated sediment.

65. *DREDGING OF CONTAMINATED SEDIMENT SHOULD BE PERFORMED AS ONE OVERALL ACTION* (OCC-147)

The selected remedy requires OCC to dredge an area of sediment contaminated with PCB and hexachlorobenzene concentrations greater than 2 ppm and 0.45 ppm, respectively. The dredging will be performed as one overall action.

66. *THE COMMUNITY SHOULD BE NOTIFIED OF ANY DREDGING ACTION AND PROVIDED WITH THE TECHNIQUE TO BE USED AND CONTROLS PLANNED TO REDUCE CONTAMINANT RESUSPENSION* (OCC-147)

The specific dredging plans will be provided during the CMI phase of corrective action that is scheduled to begin 30 days after the Final Decision and Response to Comments. The plans are subject to EPA approval and will be made available in the local libraries. Dredging of White Lake is also subject to MDEQ and U.S. Army Corps of Engineers permits. The permitting process allows for a public meeting and comment period.

67. *FISH IN WHITE LAKE SHOULD BE TESTED FOR SITE CONTAMINANTS AND TO DETERMINE THE NECESSITY FOR A FISH AND/OR WILDLIFE CONSUMPTION ADVISORY* (OCC-147)

Fish in White Lake have been tested and fish contaminant monitoring reports are available from MDEQ. Various fish in White Lake, such as carp, smallmouth bass, largemouth bass, walleye, northern pike, redhorse sucker, white sucker, and yellow perch were collected and analyzed for contaminants in July 1980, July 1984, July 1987, August 1991. Total PCBs were detected in fish fillets, with the highest concentrations in carp fillets.

There is a fish consumption advisory for White Lake due to elevated PCB concentrations. The advisory recommends no consumption of carp of any size by men, women, and children. Only one meal per month to one meal per week is recommended for large-sized smallmouth bass and walleye.

68. *OCC SHOULD COMPLETE ITS STUDY OF WORKER HEALTH BEGUN IN THE EARLY 1980s* (OCC-147)

We have contacted the Agency for Toxic Substances and Disease Registry (ATSDR) regarding the Health Assessment for exposures related to Occidental Chemical. We will pursue the possibility of continuing the Assessment and will provide information to the public.

69. *IT IS NOT CLEAR HOW INSTITUTIONAL CONTROLS WILL BE MAINTAINED FOR A LONG PERIOD OF TIME; A PLAN SHOULD BE DEVELOPED WITH MONTAGUE TOWNSHIP OFFICIALS TO ENSURE SITE RESTRICTIONS ARE MAINTAINED FOR THE LONG-TERM* (OCC-147)

Institutional controls will be implemented as part of the final remedy. We will discuss the implementation of deed restrictions with MDEQ and OCC.

70. *THE ON-SITE LANDFILL INTEGRITY SHOULD BE MONITORED* (OCC-147)

The integrity of the on-site landfill is monitored by assessing potential leakage of hazardous constituents into groundwater. A 30-year post-closure groundwater monitoring plan for the vault was approved by EPA and is monitored by MDEQ. Three upgradient and ten downgradient monitoring wells are sampled quarterly for site-related constituents and data is provided to MDEQ. Inspections are conducted by MDEQ to determine compliance with the approved groundwater quality assessment program.

Leachate generated within the landfill is also collected, analyzed, and treated on-site at the groundwater treatment system. The collection of leachate minimizes potential leakage of hazardous constituents to groundwater by lowering the hydraulic head within the landfill and removing mobile contaminants.

71. *ANY PROPOSAL SHOULD PROVIDE LONG-TERM SOLUTIONS TO THE CONTAMINATION PROBLEM; THE OPINIONS AND RECOMMENDATIONS OF THE TECHNICAL OUTREACH SERVICES FOR COMMUNITIES (TOSC) AT MICHIGAN STATE UNIVERSITY SHOULD BE CONSIDERED* (OCC-148)

The evaluation of a final remedy is based on technical, environmental, human health, and institutional criteria (see Attachment III, Statement of Basis). These criteria include an evaluation of the useful life of the remedy, a determination of the long-term beneficial effect on the environment, and the extent in which the remedy mitigates the long-term potential exposure to any residual contamination (OCC-001).

The long-term solution for contaminated groundwater, soil, and sediment has been selected as the final remedy. The removal of contaminated surface soil and sediment from the OCC facility and White Lake is a timely and long-term solution. Additional groundwater remediation is selected beyond the current purge well system. However the groundwater component of the remedy requires a long time-frame. Technical solutions may not be available to effectively treat contaminated groundwater.

The comments and concerns of TOSC are addressed in written comment numbers 46 through 52 above.

72. *THE CONCERNS STATED BY DR. CALI FOR THE LAKE MICHIGAN FEDERATION SHOULD BE CLOSELY CONSIDERED; NO PLANS FOR DEVELOPMENT SHOULD BE MADE YET* (OCC-149)

The concerns of Dr. Cali are considered in Lake Michigan Federation written comments above (OCC-147).

We are unaware of any specific plans for development of the OCC property. Land use at the OCC facility is provided in the CMS (see Figure 4, OCC-104). The former manufacturing area of OCC property has restricted land use and groundwater use that limits its development.

73. *ARE THE PURGE WELLS CAPTURING ALL OF THE CONTAMINANT PLUME* (OCC-150)

The current groundwater monitoring program adequately demonstrates that the purge wells are capturing the contaminant plume. There is also no recent evidence of contamination from the contaminant plume in White Lake. Contamination that is found in White Lake sediment is associated with historical discharges from the outfall.

The current groundwater monitoring program consists of monitoring wells within the plume and at its perimeter. A long-term groundwater monitoring plan will be proposed by OCC during the CMI phase of the project. The CMI is initiated 30 days after the Final Decision and Response to Comments. All plans submitted by

OCC are subject to EPA approval.

74. *DOES THE PALEOCHANNEL DESCRIBED IN THE ADMINISTRATIVE ORDER EXPLAIN THE ENORMITY OF CONTAMINANTS IN THE GROUNDWATER AND DOES IT EXPLAIN THE "HOT SPOT" IN WHITE LAKE* (OCC-150)

The "paleochannel" described in the Administrative Order (OCC-001) is an ancestral surface water drainage system formed in the underlying clay beds. An upper sand layer (90 to 130-feet thick), with thin discontinuous silt and clay layers lies on the clay bed. The buried paleochannel is shown in Figure 2 of the Administrative Order (OCC-001) and is represented by the 520-foot contour lines trending south-southeast from the old C-56 production unit.

The groundwater contaminant plume defined during the site investigation (see Figure 10, OCC-070) tends to follow the buried paleochannel, trending south-southeast from the old C-56 production unit. Wells were installed at three depths in the upper sand layer above the paleochannel. The bulk of the contamination was found in the middle and upper portions of the sand. There is no current evidence that significant contamination has migrated to the base of the sand layer and top of the clay bed. The purge well system bisects the sand layer lying directly above the buried paleochannel and effectively captures contaminants before they can discharge to White Lake.

The source of contamination in White Lake is believed to be historical discharges from the OCC outfall. This is based on historical records and the type and distribution of contamination found in White Lake sediment. The outfall is currently monitored weekly for site-related contaminants and data is submitted to MDEQ and EPA. There is no evidence of ongoing contamination of White Lake from the outfall discharge.

75. *WELLS IN THE VICINITY OF OCC SHOULD BE ROUTINELY SAMPLED* (OCC-150)

We conducted private well sampling in the vicinity of OCC on June 5 and 6, 2001. Well water collected at eight sample locations on private property along Old Channel Trail was analyzed for volatile organic and C-series compounds. Results are expected in July 2001.

Based on the results of private well and plume monitoring data, the need for routine private well sampling will be evaluated as part of the facility groundwater monitoring program. OCC is currently operating under an approved groundwater monitoring

program that will be re-evaluated during implementation of the corrective measures. A groundwater monitoring plan will be proposed by OCC during the CMI phase of the project. The CMI is initiated 30 days after the Final Decision and Response to Comments. All plans submitted by OCC are subject to EPA approval.

76. *ARE THE OLD DISPOSAL WELLS #1 AND #2 A SOURCE OF CONTAMINATION NOW* (OCC-150)

The two disposal wells are shown as Areas 38 and 39 in the Administrative Order (see Figure 7, OCC-001). They were constructed in 1953 and 1956 to a depth of approximately 2000-feet deep (OCC-013). The wells were originally intended for disposal of brine sludge but because of poor permeability in the Lower Travis formation in which they were drilled, the wells reportedly received very limited use. Brine sludge is reported to consist of water, sodium chloride, sodium hydroxide, sodium sulfate, sodium carbonate, magnesium hydroxide, calcium carbonate, and perlite. Both disposal wells were plugged in 1969. The disposal well plugging records can be found in Appendix S of the Description of Current Conditions (OCC-013).

The disposal wells tapped into deep bedrock formations 2000-feet deep. The well casings isolate salt mining and brine sludge disposal activities from the sand aquifer where groundwater contamination is found. The main source of current contamination is believed to be from the presence of residual contamination in the area of the water table (i.e., smear zone) and DNAPL likely present on silt and clay layers within the sand aquifer.

77. *ALTERNATIVE CLEANUP METHODS SHOULD BE PURSUED ALONG WITH DARAMEND TECHNOLOGY TO EXPEDITE SOIL CLEANUP* (OCC-150)

Neither capping or Daramend® bioremediation will be used to address contaminated soil at the Former Small Disposal Pile Exposure Area. The soil will be excavated and sent off-site for proper treatment/disposal.

78. *WILL AIR SAMPLING IN THE SIX EXPOSURE AREAS BE CONDUCTED DURING REMEDIATION* (OCC-150)

Remediation is currently required in only two exposure areas. Any on-site excavations (e.g., Former Small Disposal Pile Exposure Area) could pose a potential risk to workers that would be evaluated and monitored. OCC is required to prepare a health and safety plan for any disturbance of soil within the former manufacturing area. The plan could require air sampling

depending on the location and depth of excavation. Potential future remediation in the Northern, Central and Southern Exposure Areas to expedite groundwater cleanup may also require air sampling.

79. *WHITE LAKE SHOULD NOT BE USED AS A TESTING GROUND FOR BIOGEOCHEMIX AND CAPPING MAY NOT BE EFFECTIVE* (OCC-150)

Bioremediation of contaminated sediment using BioGeoChe Mix™ has been eliminated as a feasible treatment alternative. There is not enough known about this technology to address concerns regarding its effectiveness. Therefore, additional studies to demonstrate its effectiveness are no longer necessary.

We believe that dredging an area of sediment contaminated with PCB and hexachlorobenzene concentrations greater than 2 ppm and 0.45 ppm, respectively, best meets the evaluation criteria and is the selected remedy.

Capping can be a viable remedial alternative under certain conditions and EPA has published guidance on capping of contaminated sediment (OCC-103). However for this site, dredging has been selected to remediate contaminated sediment in White Lake.

80. *DOES FISH SAMPLING INCLUDE C-SERIES COMPOUNDS AND HOW OFTEN IS ANALYSIS PERFORMED* (OCC-150)

Fish in White Lake have been consistently tested for hexachlorobenzene. Contaminant monitoring reports are available from MDEQ. Carp, smallmouth bass, largemouth bass, walleye, northern pike, redhorse sucker, white sucker, and yellow perch were collected and analyzed for hexachlorobenzene in July 1980, July 1984, July 1987, August 1991. Trace amounts of hexachlorobenzene (maximum detect of 22 ppb) were occasionally detected in carp fillets.

81. *DOES MDEQ REGULARLY MONITOR THE VAULT AND KEEP TRACK OF THE CONCENTRATIONS OF POLLUTANTS IN THE LEACHATE* (OCC-150)

Yes, MDEQ regularly monitors the vault to assess whether hazardous constituents are leaking into groundwater. A 30-year post-closure groundwater monitoring plan for the vault was approved by EPA and is monitored by MDEQ. Three upgradient and ten downgradient monitoring wells are sampled quarterly for site-related constituents and data is provided to MDEQ. Inspections are conducted by MDEQ to determine compliance with the approved groundwater quality assessment program.

Leachate generated within the landfill is analyzed for metals, VOCs, and C-series compounds in the spring and fall every year. The data is submitted to MDEQ. In seven sampling events from the spring of 1997 through the spring of 2000, the leachate typically contained 1 ppb of cadmium, and had a range of 63 to 441 ppb of VOCs and 1 to 30 ppb of C-series compounds.

The concentrations of VOCs and C-series compounds detected in the vault leachate are significantly lower than the concentrations currently found within the contaminated groundwater plume.

82. *THE OCC PROPERTY SHOULD BE CLEANED UP TO A PUBLIC HEALTH STANDARD, NOT AN INDUSTRIAL STANDARD* (OCC-150)

The standard to which a facility is cleaned up is dependent on the current use and reasonably anticipated future land use of the property. Residential use is considered unrestricted land use and carries the greatest potential for exposures and the most conservative exposure assessments. Consideration of non-residential use is appropriate in some situations, like at the OCC facility. In this case, institutional controls are necessary. Institutional controls are non-engineered instruments, such as administrative and/or legal controls, that minimize the potential for human exposure to contamination by limiting land or resource use.

The majority of OCC property is proposed for unrestricted land use (see Figure 4, OCC-104). However due to subsurface soil and groundwater contamination, the former manufacturing area is proposed for restricted land use (non-residential) and groundwater use. Institutional controls will be implemented as part of the final remedy.

83. *MORE TESTING ON THE EXTENT OF GROUNDWATER CONTAMINATION AND WHERE IT IS COMING FROM IS NECESSARY* (OCC-150)

The extent of groundwater contamination was defined during Phase II of the RFI (see Figure 10, OCC-070). Additionally, private wells were sampled in the vicinity of OCC on June 5 and 6, 2001. Well water collected at eight sample locations on private property along Old Channel Trail was analyzed for volatile organic and C-series compounds. Results are expected in July 2001.

We agree that the source of groundwater contamination needs to be determined. The site became inactive and was partially cleaned up approximately 20 years ago, yet groundwater contamination is still significant. We believe that subsurface soil in the

vicinity of the water table (i.e., smear zone), both in the Northern and Central Exposure Areas, and DNAPL sitting on clay and silt layers within the upper sand aquifer are potential sources of groundwater contamination. Investigation of the smear zone, and clay and silt layers was recently approved and field work was initiated on June 20, 2001 (OCC-105). The goal is to locate the source(s) of groundwater contamination and implement a remedy in two to three years that would expedite groundwater cleanup.

84. *BIOREMEDIATION IS NOT A PROVEN SOLUTION AND A SAND CAP IS NOT PROTECTIVE OF WHITE LAKE* (OCC-151)

We agree that OCC has not yet demonstrated that bioremediation is a viable alternative for reducing the toxicity of the contaminated sediment. This demonstration, however, is no longer necessary since bioremediation has been eliminated as a viable remedial alternative.

We do regard capping as a viable remedial alternative under certain conditions and have published guidance on capping of contaminated sediment (OCC-103). However for this site, dredging has been selected to remediate contaminated sediment in White Lake.

85. *THE CLEANUP SHOULD BE ABLE TO PROVIDE A CLEAN LAKE AND SAFE DRINKING WATER* (OCC-152)

We agree with these goals. The final remedy was evaluated using environmental and human health criteria (see Attachment III, Statement of Basis). Environmental criteria includes an assessment of the short and long-term beneficial and adverse effects on the environment from the cleanup. The human health criteria includes an assessment of the extent to which the cleanup mitigates short and long-term exposure to contamination and how human health is protected during and after cleanup (OCC-001). Meeting the environmental and human health criteria will assure a clean lake and safe drinking water.

86. *THERE SHOULD BE TIMELY COMPLETION OF THE CLEANUP OF SOIL, GROUNDWATER, AND SEDIMENT; WHITE LAKE NEEDS TO BE CLEANED UP SO IT IS NOT AN AREA OF CONCERN* (OCC-153)

We agree with this comment. The remedial alternatives for addressing contaminated soil, groundwater, and sediment are based on technical, environmental, human health, and institutional criteria (see Attachment III, Statement of Basis). Timely cleanup is a component of the technical evaluation criteria and

is one of the reasons that bioremediation has been eliminated as a viable remedial alternative for contaminated sediment. The specific time-frame for completion of the soil excavation and sediment dredging projects will be presented in plans to be submitted within 30 days of the Final Decision and Response to Comments.

For groundwater, additional investigations began on June 20, 2001, to define the source(s) of contamination. Timely completion of groundwater cleanup is more problematical because of the large extent of contamination and depth at which the contamination occurs. However, the groundwater cleanup goal is to return usable groundwater to its maximum beneficial use within a reasonable time-frame.

The Final Decision and Response to Comments only addresses the clean up of contaminants in White Lake originating from the OCC facility. Other facilities on White Lake are being addressed by MDEQ and may be at different phases of investigation and cleanup. Completion of all facility cleanups may be necessary to delist White Lake as an "area of concern".

87. *EVERYTHING SHOULD BE DONE TO CLEAN UP THE SITE FOREVER* (OCC-154)

Cleanup goals are proposed for groundwater, soil, and sediment contamination at and from the OCC facility (see Attachment III, Statement of Basis). Achievement of the cleanup goals will be protective of human health and the environment, and constitute a successful cleanup.

ATTACHMENT II

Index to Administrative Record

Index to the Administrative Record
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Montague Township, Michigan
MID 006 014 906

Document Number	Date	Description/Author	Location
OCC-001	3/24/93	Administrative Order for Occidental Chemical Corporation (OCC)	
OCC-002	6/7/93	Letter from OCC to U.S. EPA submitting Community Relations Plan, Task III of the RFI Work Plan (includes plan). Received by U.S. EPA on June 9, 1993.	
OCC-003	6/7/93	Letter from OCC to U.S. EPA submitting Task I, Description of Current Conditions.	
OCC-004	8/9/93	Letter from U.S. EPA to OCC forwarding amendment to Administrative Order dated August 4, 1993.	
OCC-005	9/29/93	Letter from U.S. EPA to OCC requiring submission of an Interim Measures Work Plan.	
OCC-006	10/21/93	Letter from OCC to U.S. EPA describing how it will proceed with Interim Measures. Received by U.S. EPA on October 22, 1993.	
OCC-007	11/5/93	Letter from OCC to U.S. EPA submitting the Interim Measures Work Plan. Received by U.S. EPA on November 8, 1993.	

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Document Number	Date	Description/Author	Location
OCC-008	11/17/93	Letter from U.S. EPA to OCC providing comments on Tasks I, II, and III of the RFI Work Plan.	
OCC-009	12/7/93	Letter from OCC to U.S. EPA requesting time extension for response to U.S. EPA comments on the RFI Work Plan. Received by U.S. EPA on December 9, 1993.	
OCC-010	12/17/93	Letter from U.S. EPA to OCC granting 30-day time extension.	
OCC-011	12/21/93	Letter from U.S. EPA to OCC approving with conditions, the Interim Measures Work Plan submitted on November 5, 1993.	
OCC-012	1/27/94	Letter from OCC to U.S. EPA submitting revised Interim Measures Work Plan, including Site Security Plan, Residential Water Well User Survey Plan, Health and Safety Plan, and Community Relations Plan.	

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Document Number	Date	Description/Author	Location
OCC-013	1/28/94	Letter from OCC to U.S. EPA responding to U.S. EPA comments from November 17, 1993 and submitting revised Tasks I, II, and III of the RFI Work Plan (includes Task I and II plans). Received by U.S. EPA on February 1, 1994.	***Task I Plan only at C***
OCC-014	2/2/94	Letter from OCC to U.S. EPA submitting Demolition Work Plan for the OCC facility (includes work plan).	***Work Plan only at C***
OCC-015	2/11/94	Letter from OCC to U.S. EPA submitting final Residential Water Well User Survey. Received by U.S. EPA on February 11, 1994.	
OCC-016	3/11/94	Letter from U.S. EPA to OCC providing comments on the Demolition Work Plan submitted on February 2, 1994.	
OCC-017	4/14/94	Letter from U.S. EPA to OCC discussing concerns with Quality Assurance Project Plan (Task III, RFI Work Plan).	
OCC-018	6/1/94	Letter from U.S. EPA to OCC providing comments on the second submittal of Tasks I, II, and III of the RFI Work Plan.	

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Document Number	Date	Description/Author	Location
OCC-019	6/17/94	Letter from OCC to U.S. EPA responding to U.S. EPA comments from March 11, 1994 on the Demolition Work Plan. Received by U.S. EPA on June 27, 1994.	
OCC-020	6/24/94	Letter from U.S. EPA to OCC providing comments on the revised Quality Assurance Project Plan (Task III, RFI Work Plan).	
OCC-021	7/31/94	Letter from OCC to U.S. EPA responding to U.S. EPA comments on the RFI Work Plan and transmitting revised plans. Received by U.S. EPA on August 2, 1994.	
OCC-022	8/23/94	Letter from U.S. EPA to OCC regarding concerns with laboratory chosen by OCC to provide analytical services.	
OCC-023	9/1/94	Letter from U.S. EPA to U.S. Fish and Wildlife Service requesting information on protected species in area of OCC.	
OCC-024	9/19/94	Letter from OCC to U.S. EPA submitting revised Residential Water Well User Survey Report (includes report). Received by U.S. EPA on September 22, 1994.	

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Document Number	Date	Description/Author	Location
OCC-025	9/28/94	Letter from U.S. Fish and Wildlife Service to U.S. EPA responding to September 1, 1994 inquiry. Received by U.S. EPA on September 30, 1994.	
OCC-026	12/12/94	Letter from Michigan Dept. of Natural Resources (MDNR) to U.S. EPA providing comments on the demolition of the boiler smoke stack at OCC. Received by U.S. EPA on December 16, 1994.	
OCC-027	12/16/94	Letter from U.S. EPA to OCC providing comments on the second revision of the Quality Assurance Project Plan (Task III, RFI Work Plan) submitted in October 1994.	
OCC-028	2/2/95	Letter from OCC to U.S. EPA submitting the Pre-Demolition Sampling and Analysis Report (includes report).	***Report only at C and M***
OCC-029	2/6/95	Letter from U.S. EPA to OCC providing concerns on Quality Assurance Project Plan (Task III, RFI Work Plan).	

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Document Number	Date	Description/Author	Location
OCC-030	2/20/95	Letter from OCC to U.S. EPA submitting revised Project Management Plan, Field Sampling Plan, and Quality Assurance Project Plan (Task III, RFI Work Plan) and providing responses to U.S. EPA comments on the plans.	
OCC-031	2/24/95	Sampling, Analysis, and Risk Assessment Report for the Boiler Stack at the OCC Facility. Report prepared by Midwest Research Institute.	
OCC-032	3/2/95	Letter from U.S. EPA to OCC providing comments on third submittal of the RFI Work Plan.	
OCC-033	3/9/95	Letter from U.S. EPA to OCC postponing submittal of Phase II RFI Work Plan.	
OCC-034	4/5/95	Letter from OCC to U.S. EPA submitting revised Project Management Plan and Field Sampling Plan (Task III, RFI Work Plan) and responses to U.S. EPA comments. Received by U.S. EPA on April 7, 1995.	

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Document Number	Date	Description/Author	Location
OCC-035	5/8/95	Letter from MDNR to U.S. EPA providing comments on the Sampling, Analysis and Risk Assessment Report for the Boiler Stack at the OCC Facility submitted on February 24, 1995. Received by U.S. EPA on May 11, 1995.	
OCC-036	5/17/95	Letter from OCC to U.S. EPA responding to concerns regarding stack demolition.	
OCC-037	8/23/95	Letter from U.S. EPA to OCC approving with conditions, the Task III RFI Work Plan.	
OCC-038	9/22/95	Letter from U.S. EPA to OCC acknowledging start of RFI field activities.	
OCC-039	9/25/95	Letter from U.S. EPA to OCC determining that demolition of the boiler stack would not pose an unacceptable risk to human health and the environment.	
OCC-040	9/29/95	Letter from OCC to U.S. EPA submitting revisions to the Project Management Plan, Field Sampling Plan, and Quality Assurance Project Plan (Task III, RFI Work Plan) and responses to U.S. EPA's conditional approval of August 23, 1995.	

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OCC-041	9/29/95	Approved Task III RFI Work Plan (Phase I) consisting of the Health and Safety Plan, June 1993; Community Relations Plan, January 1994; Data Management Plan, Revision 2, July 1994; Field Sampling Plan, Revision 4, September 1995; Project Management Plan, Revision 4, September 1995; and Quality Assurance Project Plan (QAPP), Revision 7, September 1995.	***Complete Work Plan only at C, QAPP at M***
OCC-042	9/29/95	Letter from OCC to MDNR notifying of demolition of boiler stack. Received by U.S. EPA on October 5, 1995.	
OCC-043	10/26/95	Letters from U.S. EPA to local residents regarding facility investigation and demolition activities.	
OCC-044	11/3/95	Letter from Michigan Dept. of Environmental Quality (MDEQ) to OCC regarding regulations applicable to demolition of the boiler stack.	
OCC-045	12/8/95	Letter from Earth Tech (OCC contractor) to U.S. EPA describing soil boring results.	

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Document Number	Date	Description/Author	Location
OCC-046	12/13/95	Letter from OCC to MDEQ notifying of release of leachate from the hazardous waste landfill.	
OCC-047	1/30/96	Letter from U.S. EPA to OCC providing comments on the revised Quality Assurance Project Plan.	
OCC-048	2/22/96	Letter from U.S. EPA to OCC requesting amendment of cleanup criteria.	
OCC-049	3/27/96	Letter from MDEQ to U.S. EPA providing data from leachate release and requesting inclusion of investigation with ongoing corrective action. Received by U.S. EPA on April 1, 1996.	
OCC-050	4/9/96	Letter from U.S. EPA to OCC requiring leachate release investigation to be incorporated into Phase II RFI Work Plan.	
OCC-051	5/8/96	Letter from OCC to U.S. EPA concurring with inclusion of leachate release investigation into Phase II RFI Work Plan.	
OCC-052	7/25/96	Air Monitoring and Data Collection During Stack Demolition at the OCC Facility Report. Report prepared by Midwest Research Institute.	

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Document Number	Date	Description/Author	Location
OCC-053	10/15/96	Letter from Earth Tech to U.S. EPA submitting Phase I RFI Report (includes report).	***Report only at C and M***
OCC-054	10/25/96	Letter from OCC to MDEQ submitting analytical data from demolition activities. Received by U.S. EPA on October 31, 1996.	
OCC-055	11/22/96	Letter from Earth Tech to U.S. EPA providing list of Phase II RFI analytical methods. Received by U.S. EPA on November 29, 1996.	
OCC-056	6/13/97	Letter from U.S. EPA to OCC disapproving Phase II RFI Work Plan and providing comments.	
OCC-057	7/31/97	Letter from Earth Tech to U.S. EPA submitting responses to U.S. EPA comments on the Phase II RFI Work Plan and revised pages.	
OCC-058	9/11/97	Letter from U.S. EPA to OCC approving Phase I RFI Report submitted on October 15, 1996, and conditionally approving the Phase II RFI Work Plan revisions submitted on July 31, 1997.	

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Document Number	Date	Description/Author	Location
OCC-059	10/9/97	Letter from OCC to U.S. EPA providing schedule of implementation for Phase II RFI work.	
OCC-060	11/97	Approved Phase II RFI Work Plan consisting of the Health and Safety Plan, January 1997; Community Relations Plan, January 1997; Data Management Plan, January 1997; Field Sampling Plan, Revision 1, July 1997; Project Management Plan, Revision 2, November 1997; and Quality Assurance Project Plan, Revision 1, July 1997.	***Work Plan only at C and M***
OCC-061	11/20/97	Letter from Earth Tech to U.S. EPA providing scope of work and schedule for Phase II RFI work.	
OCC-062	1/12/98	Letter from U.S. EPA to OCC requiring new methodology for determining volatile organic compounds in soil.	
OCC-063	2/12/98	Letter from U.S. EPA to OCC providing Region 5 risk assessment guidance.	
OCC-064	2/20/98	Letter from OCC to U.S. EPA responding to U.S. EPA's letter of January 12, 1998.	

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Document Number	Date	Description/Author	Location
OCC-065	4/13/98	U.S. EPA memorandum directing national cleanup levels for dioxin in soil at RCRA sites.	
OCC-066	4/23/98	Letter from U.S. EPA to OCC designating a new EPA Project Coordinator.	
OCC-067	5/1/98	Letter from Earth Tech to U.S. EPA submitting revised Phase II plans to address new methodology for determining volatile organic compounds in soil.	
OCC-068	5/27/98	Letter from U.S. EPA to OCC approving revisions to methodology submitted on May 1, 1998.	
OCC-069	12/3/98	Letter from OCC to U.S. EPA notifying of new automated security at OCC facility.	
OCC-070	4/30/99	Letter from OCC to U.S. EPA submitting Phase II RFI Report, Volumes I, II and III (includes report).	***Report only at C and M***
OCC-071	9/29/99	Letter from OCC to MDEQ submitting comments on draft NPDES discharge permit.	

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OCC-072	10/28/99	Letter from U.S. EPA to OCC providing initial comments on the Phase II RFI Report submitted on April 30, 1999, and notification of new EPA Project Coordinator.	
OCC-073	11/9/99	Letter from Earth Tech to U.S. EPA presenting results of White Lake sediment sampling and proposing additional sampling.	
OCC-074	11/15/99	Letter from U.S. EPA to OCC approving with modifications, the proposed additional sampling of White Lake sediments.	
OCC-075	11/22/99	Letter from OCC to U.S. EPA acknowledging November 15, 1999, U.S. EPA letter.	
OCC-076	12/20/99	Letter from OCC to U.S. EPA responding to U.S. EPA comments from November 15, 1999 on White Lake sediment sampling.	
OCC-077	1/4/00	E-mail from U.S. EPA to OCC providing preliminary comments on White Lake sampling.	
OCC-078	1/10/00	Letter from Earth Tech to OCC responding to EPA preliminary comments provided on January 4, 2000.	

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Document Number	Date	Description/Author	Location
OCC-079	1/20/00	E-mail from U.S. EPA to OCC providing comments on groundwater data from Well T and monitoring for mirex.	
OCC-080	1/28/00	Letter from OCC to U.S. EPA responding to U.S. EPA comments provided on January 20, 2000.	
OCC-081	2/2/00	Letter from Earth Tech to U.S. EPA responding to U.S. EPA comment provided on November 15, 1999 regarding the presence of Aroclor 1248 (PCB) in sediments.	
OCC-082	2/7/00	Letter from U.S. EPA to OCC approving with modifications, the Phase II RFI Report submitted on April 30, 1999.	
OCC-083	4/3/00	Letter from U.S. EPA to OCC providing Region 5 guidance on institutional controls (includes guidance dated March 2000).	
OCC-084	4/7/00	Letter from OCC to U.S. EPA responding to U.S. EPA comments in the February 7, 2000, approval of the Phase II RFI Report and submittal of the CMS Work Plan (includes work plan).	

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OCC-085	4/25/00	Letter from OCC to U.S. EPA responding to U.S. EPA's initial comments on the RFI Report provided on October 28, 1999.	
OCC-086	4/28/00	Letter from OCC to U.S. EPA presenting results of the February 2000 White Lake sediment sampling event.	
OCC-087	5/10/00	Letter from OCC to U.S. EPA regarding the schedule for additional White Lake sediment sampling.	
OCC-088	5/15/00	Letter from U.S. EPA to OCC approving with modifications, the proposed additional sampling of White Lake sediments.	
OCC-089	5/16/00	Letter from U.S. EPA to OCC responding to RFI Report modifications.	
OCC-090	5/16/00	Letter from U.S. EPA to OCC approving with modifications, the CMS Work Plan submitted on April 7, 2000.	
OCC-091	5/24/00	Letter from OCC to U.S. EPA responding to U.S. EPA comments provided on May 15, 2000 regarding the sediment sampling plan.	

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Document Number	Date	Description/Author	Location
OCC-092	8/24/00	Letter from OCC to U.S. EPA submitting the Results of the Investigation and Evaluation of White Lake Sediments report (includes report).	***Report only at C***
OCC-093	9/15/00	Letter from U.S. EPA to OCC approving with modifications, the White Lake sediments report submitted on August 24, 2000.	
OCC-094	9/15/00	Letter from Earth Tech to U.S. EPA submitting the Corrective Measures Study for Soil and Groundwater for the Former OCC Site report, and the Human Health and Ecological Risk Assessment for Soil and Groundwater for the OCC Site report (includes both reports)	***Reports only at C and M***
OCC-095	9/21/00	Letter from OCC to U.S. EPA submitting requested deed restrictions at OCC facility (includes deed restrictions).	
OCC-096	9/27/00	Letter from Earth Tech to U.S. EPA submitting requested literature on Daramend® technology for soil treatment.	

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Document Number	Date	Description/Author	Location
OCC-097	10/16/00	Letter from Earth Tech to U.S. EPA submitting the Draft Human Health and Ecological Risk Assessment for White Lake near Dowie's Point report (includes report).	***Report only at C***
OCC-098	10/26/00	Letter from OCC to U.S. EPA submitting responses to U.S. EPA comments on the White Lake sediments report approved on September 15, 2000 (includes addendum).	
OCC-099	10/31/00	Letter from Earth Tech to U.S. EPA submitting Corrective Measures Study for White Lake Sediment near Dowie's Point for the Former OCC Site report (includes report).	***Report only at C***
OCC-100	10/31/00	Letter from U.S. EPA to OCC approving with modifications, the Corrective Measures Study for Soil and Groundwater for the Former OCC Site report, and the Human Health and Ecological Risk Assessment for Soil and Groundwater for the OCC Site report submitted on September 15, 2000. (includes Daramend® technology evaluation by U.S. EPA).	

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Document Number	Date	Description/Author	Location
OCC-101	11/13/00	Letter from OCC to U.S. EPA identifying U.S. EPA sediment sampling location in White Lake.	
OCC-102	11/24/00	Letter from U.S. EPA to Montague Township Board inquiring use of the township hall for a public meeting.	
OCC-103	12/7/00	Letter from U.S. EPA to OCC approving with modifications, the Draft Human Health and Ecological Risk Assessment for White Lake near Dowie's Point report submitted on October 16, 2000 and the Corrective Measures Study for White Lake Sediment near Dowie's Point for the Former OCC Site report submitted on October 31, 2000 (includes Tannery Bay report and U.S. EPA guidance on in-situ capping of contaminated sediments).	
OCC-104	12/21/00	Letter from Earth Tech to U.S. EPA responding to U.S. EPA comments on the Corrective Measures Study for Soil and Groundwater for the Former OCC Site report approved by U.S. EPA on October 31, 2000 and submission of the final report (Revision 1).	

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Document Number	Date	Description/Author	Location
OCC-105	12/21/00	Letter from Earth Tech to U.S. EPA responding to U.S. EPA comments on the Human Health and Ecological Risk Assessment for Soil and Groundwater for the OCC Site report approved by U.S. EPA on October 31, 2000 and submission of the final report (Revision 1).	
OCC-106	12/22/00	Letter from OCC Counsel to U.S. EPA commenting on U.S. EPA's approval with modifications of risk assessment and CMS Report regarding the protection of deer mice.	
OCC-107	1/10/01	Receipt of TSCA guidelines for demonstrating effective bioremediation of PCBs (includes guidelines dated January 21, 1993).	
OCC-108	1/25/01	Letter from OCC to U.S. EPA providing MDEQ dioxin sampling results for soil collected on August 28, 2000.	
OCC-109	1/25/01	Letter from Earth Tech to U.S. EPA responding to U.S. EPA comments on the Draft Human Health and Ecological Risk Assessment for White Lake near Dowie's Point report approved by U.S. EPA on December 7, 2000, including submission of the final report (Revision 1).	

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Document Number	Date	Description/Author	Location
OCC-110	1/25/01	Letter from Earth Tech to U.S. EPA responding to U.S. EPA comments on the Corrective Measures Study for White Lake Sediment near Dowie's Point for the Former OCC Site report approved by U.S. EPA on December 7, 2000, including submission of the final report (Revision 1).	
OCC-111	2/22/01	Earth Tech report summarizing the field events associated with the removal of asbestos-containing material along the access road to the old OCC mooring dock in White Lake.	
OCC-112	2/25/01	E-mail from Melvin Lathrop to U.S. EPA providing comments on the EPA proposed remedy.	
OCC-113	3/1/01	Sign-in sheet for public meeting of EPA proposed remedy held on Thursday, March 1, 2001 at the Montague Township Hall, Montague, Michigan.	
OCC-114	3/1/01	Sign-in sheet for oral comments to be presented at public meeting of EPA proposed remedy held on Thursday, March 1, 2001 at the Montague Township Hall, Montague, Michigan.	

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Document Number	Date	Description/Author	Location
OCC-115	3/1/01	Transcript of U.S. EPA public meeting. Oral comments on the EPA proposed remedy taken Thursday, March 1, 2001 at the Montague Township Hall, Montague, Michigan	
OCC-116	3/6/01	E-mail from Monica Kurland Herman to EPA providing comments on the EPA proposed remedy.	
OCC-117	3/7/01	E-mail from Joseph Kurland to EPA providing comments on the EPA proposed remedy.	
OCC-118	3/7/01	Letter from Pamela Melichar to EPA providing comments on the EPA proposed remedy.	
OCC-119	3/8/01	Letter from City of Whitehall (Norman Ullman, Mayor) to EPA providing Whitehall City Council motion on the EPA proposed remedy.	
OCC-120	3/14/01	E-mail from EPA to Melvin Lathrop providing data on soil sampling along Old Channel Trail and cleanup criteria for dioxin.	
OCC-121	3/15/01	Letter from White River Township (Joy Ann Lehman, Clerk) to EPA providing White River Township Board resolution on the EPA proposed remedy.	

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OCC-122	3/22/01	Letter from Lake Michigan Federation (Tanya Cabala, Michigan Director) to EPA requesting time extension for public comment period.	
OCC-123	4/3/01	Letter from City of Montague (Melinda O'Connell, City Clerk) to EPA providing Montague City Council resolution on the EPA proposed remedy.	
OCC-124	4/5/01	Letter from OCC to U.S. EPA providing additional White Lake sediment sampling proposed for mid-May.	
OCC-125	4/9/01	E-mail from Steve Kauranen to EPA requesting information on asbestos in fresh water.	
OCC-126	4/11/01	E-mail from Diana Jancek-Anderson to EPA requesting time extension for public comment period.	
OCC-127	4/11/01	Letter from Betty Dahlstrom to EPA providing comments on the EPA proposed remedy.	
OCC-128	4/12/01	E-mail from Cynthia Price to EPA requesting time extension for public comment period.	
OCC-129	4/12/01	E-mail from EPA to Steve Kauranen responding to April 9, 2001 inquiry.	

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OCC-130	4/13/01	E-mail from Roger Jones of MDEQ providing comments on the EPA proposed remedy.	
OCC-131	4/14/01	Letter from Congressman Hoekstra requesting information on EPA's extension of the public comment period.	
OCC-132	4/15/01	E-mail from Montague Township (Jeff King, Treasurer) to EPA notifying of impending comments.	
OCC-133	4/23/01	Letter from U.S. EPA to OCC approving with modifications, the additional White Lake sediment sampling plan submitted on April 5, 2001.	
OCC-134	4/26/01	OCC submittal of the Work Plan for the DNAPL Investigation Program.	
OCC-135	5/8/01	Letter from EPA to Congressman Hoekstra providing a response to the April 14, 2001 inquiry.	
OCC-136	5/11/01	E-mail from Earth Tech to EPA providing final report on the Daramend pilot study by Grace Bioremediation Technologies.	
OCC-137	5/16/01	Letter from Connie Johnson to EPA providing comments on the EPA proposed remedy.	

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Document Number	Date	Description/Author	Location
OCC-138	5/18/01	E-mail from Fritz Korthase to EPA providing comments on the EPA proposed remedy.	
OCC-139	5/21/01	Letter from James Cousino to EPA providing comments on the EPA proposed remedy.	
OCC-140	5/24/01	Letter from OCC to EPA providing comments on the EPA proposed remedy.	
OCC-141	5/26/01	Letter from Rick Witham to EPA providing comments on the EPA proposed remedy.	
OCC-142	5/26/01	Letter from Diane Bevans to EPA providing comments on the EPA proposed remedy.	
OCC-143	5/26/01	Letter from Linda Lamoreaux to EPA providing comments on the EPA proposed remedy.	
OCC-144	5/26/01	Letter from Judith Youngquist to EPA providing comments on the EPA proposed remedy.	
OCC-145	5/30/01	E-mail from Sara Benovic to EPA providing comments on the EPA proposed remedy.	

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OCC-146	5/30/01	E-mail from Technical Outreach Services for Communities (Kirk Riley, TOSC Program Coordinator) to EPA providing comments on the EPA proposed remedy.	
OCC-147	5/30/01	Letter from Lake Michigan Federation (Tanya Cabala, Michigan Director) to EPA providing comments on the EPA proposed remedy.	
OCC-148	5/30/01	Letter from Eloise Baxter to EPA providing comments on the EPA proposed remedy.	
OCC-149	5/30/01	Letter from Ellen Munro to EPA providing comments on the EPA proposed remedy.	
OCC-150	5/30/01	Letter from Diana Jancek-Anderson to EPA providing comments on the EPA proposed remedy.	
OCC-151	5/30/01	Letter from Anne Dake to EPA providing comments on the EPA proposed remedy.	
OCC-152	5/30/01	Letter from Megan Hanner to EPA providing comments on the EPA proposed remedy.	

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Document Number	Date	Description/Author	Location
OCC-153	5/30/01	Letter from White Lake Association (Tom Thompson, President) to EPA providing comments on the EPA proposed remedy.	
OCC-154	5/30/01	Letter from Betty Johnson to EPA providing comments on the EPA proposed remedy.	
OCC-155	6/5/01	Letter from U.S. EPA to OCC approving with modifications, the DNAPL Work Plan submitted on April 26, 2001.	

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ATTACHMENT III

Statement of Basis

STATEMENT OF BASIS

for

Occidental Chemical Corporation
Montague Township, Michigan
EPA I.D. No. MID 006 014 906

February 15, 2001

Statement of Basis for Occidental Chemical Corporation Located in Montague Township, Michigan

INTRODUCTION

This Statement of Basis (SB) explains the proposed remedy for contaminated groundwater, soil, and sediment at the Occidental Chemical Corporation (OCC) facility. In addition, the SB includes summaries of all corrective measure scenarios evaluated by OCC. The United States Environmental Protection Agency (U.S. EPA) will select a final remedy for the OCC facility only after the public comment period has ended and the information provided by the public has been reviewed and substantive comments considered.

This SB is being issued by U.S. EPA as part of its public participation responsibilities under the Resource Conservation and Recovery Act (RCRA). The document summarizes information that can be found in greater detail in the final RCRA Facility Investigation (RFI) and Corrective Measure Study (CMS) Reports and other pertinent documents contained in the Administrative Record. U.S. EPA encourages the public to review these documents in order to gain a more comprehensive understanding of the OCC facility and the RCRA activities that have been conducted.

U.S. EPA may modify the proposed remedy or select another remedy based on new information or public comments. Therefore, the public is encouraged to review and comment on all corrective measure scenarios. The public can be involved in the remedy selection process by reviewing the documents contained in the Administrative Record and attending the public meeting scheduled for March 1, 2001 at the Montague Township Hall.

PROPOSED REMEDY

The U.S. EPA is proposing the following remedy to address all contaminated media at and from the OCC facility:

- Continued collection of contaminated groundwater by the purge well system and treatment using carbon filtration before discharge to White Lake;

- Evaluation and implementation of feasible on-site collection/treatment options for contaminated groundwater and residual waste to expedite groundwater cleanup;

- Implementation of a groundwater monitoring program to ensure the long-term integrity of the remedy and protection of human health and the environment;

- *In situ* treatment of on-site contaminated surface soil, or in the alternative, excavation and off-site thermal treatment;

- *In situ* treatment and containment of contaminated sediment in White Lake combined with "hotspot" removal, or in the alternative, dredging and on-site treatment;

- Long-term maintenance of site access controls; and

- Implementation of institutional controls that restrict land and groundwater use.

A more detailed discussion of U.S. EPA's proposed remedy is provided in the following sections.

FACILITY BACKGROUND

The OCC facility is located in Montague Township, Muskegon County, Michigan, just west of the town of Montague, Michigan and just north of White Lake. Land use surrounding the OCC facility is residential to the east and south, industrial and woodlots to the west, and undeveloped woodlots to the north. Private wells are located to the south and east. Residences to the south were connected to the Montague public water supply in 1976.

The manufacturing portion of the OCC facility was operated from 1952 until 1983. OCC produced gaseous chlorine, sodium hydoxide, hydrogen gas, and fine chemical derivatives (hexachlorocyclopentadiene, muriatic acid, hydrochloric acid). Hexachlorocyclopentadiene is a raw material used in the production of other chemicals, including pesticides, flame retardants, resins, dyes, pharmaceuticals, and plastics. Various volatile organic compounds (chloroform, carbon tetrachloride, trichloroethylene, tetrachloroethylene), C-series compounds (hexachlorobutadiene, hexachlorocyclopentadiene, octachlorocyclopentene, hexachlorobenzene), and mirex were generated as hazardous wastes during the manufacturing operations.

On October 30, 1979, the Ingham County Michigan Circuit Court entered a Consent Judgement to address contamination at the OCC facility. In the following years, wastes and contaminated soil were excavated and placed in an on-site containment vault; a purge well system was installed to halt the movement of contaminated groundwater into White Lake; and a groundwater monitoring program was implemented to evaluate the effectiveness of the purge well system. The adequacy of the cleanup performed by OCC remained in dispute with the State of Michigan throughout the 1980's.

On March 24, 1993, U.S. EPA issued a RCRA Administrative Order that required OCC to conduct the necessary investigations to fully identify the nature and extent of contamination at the facility and to evaluate and implement the long-term corrective measures necessary to protect human health and the environment. From 1993 through 2000, OCC continued operation and maintenance of the purge well system and monitoring, conducted a water user survey, installed fencing to restrict site access, removed an uncontrolled asbestos waste pile, conducted field investigations (RFI), and evaluated corrective measure alternatives (CMS) to address contamination posing a risk to human health and the environment. The results of the interim measures, RFI, and CMS follow.

Interim Corrective Measures

° Over 2.5-billion gallons of contaminated groundwater has been collected by the purge well system and treated on-site to remove contaminants. This resulted in the removal of approximately 60,000-pounds of chlorinated organic hazardous wastes from the environment that potentially discharge to White Lake.

° Water users were identified in the vicinity of the groundwater contaminant plume. Groundwater being used by nearby residences was sampled in 1994. The survey confirmed that there was no exposure to contaminated groundwater at nearby residences.

° Approximately two miles of 8-foot high, 9-gauge wire fencing was installed in 1994 to restrict site access to 170 acres of the former manufacturing area where soil impacts were identified in the RFI.

° Four-hundred cubic yards of soil and asbestos-containing material were removed from a 4,800 square foot area in October 2000 near Dowie's Point and disposed off-site.

Investigation Results

° Contaminated groundwater in the sand underlying the OCC facility was encountered from 20 to 50 feet below the ground surface. The contaminant plume extends from the northern disposal areas to the purge well system located at White Lake (approximately 6500 feet long). The maximum width of the plume is approximately 2000 feet (see Figure 1). The plume is contained entirely on OCC property except for a small portion at the northern portion of Blueberry Ridge. Contaminants that exceed State of Michigan drinking water criteria along with their maximum detected concentrations are chlorides (12,100,100 parts per billion [ppb]), carbon tetrachloride (46,000 ppb), chloroform (520 ppb), tetrachloroethylene (73,000 ppb), trichloroethylene (2,300 ppb), hexachlorobutadiene (890 ppb), hexachlorocyclopentadiene (1,100 ppb), hexachloroethane (1,800 ppb), and octachlorocyclopentene (61 ppb).

° The source of groundwater contamination appears to be from activities associated with the northern disposal areas (residue, brine sludge), the central brine sludge disposal areas, the former fine chemicals production facility, and the former chlorine production plant. Residual contamination or a dense non-aqueous phase liquid (DNAPL) of C-series and volatile organic compounds appears to be present in groundwater at the northern residue disposal area and the former fine chemicals production facility. The DNAPL is a continuing source of groundwater contamination.

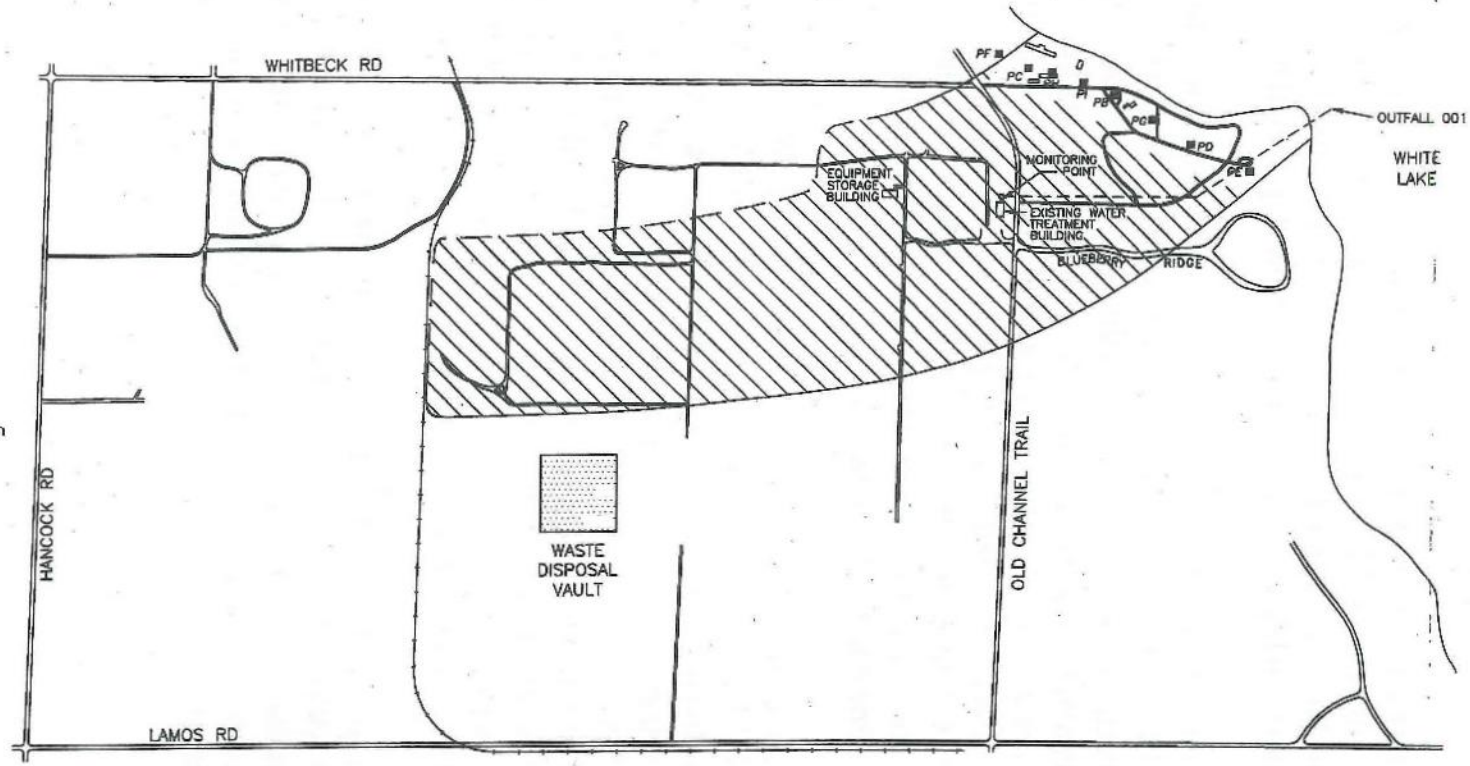


FIGURE 1

GROUNDWATER BASELINE LAYOUT & PLUME DEFINITION

GLEN SPRINGS HOLDINGS, INC.
MONTAGUE, MICHIGAN

AUGUST, 2000 24791.01

EARTH TECH

° Surface soil (upper 2 feet) in the northern, central, southern, former burn pit, and former small disposal pile exposure areas (see Figure 2) are locally contaminated with C-series compounds (hexachlorocyclopentadiene, octachlorocyclopentene, and hexachlorobenzene), mirex, and volatile organic compounds (carbon tetrachloride, methylene chloride, and tetrachloroethylene). Surface soil is locally contaminated with dioxin and furan compounds in the stack fall and former burn pit exposure areas.

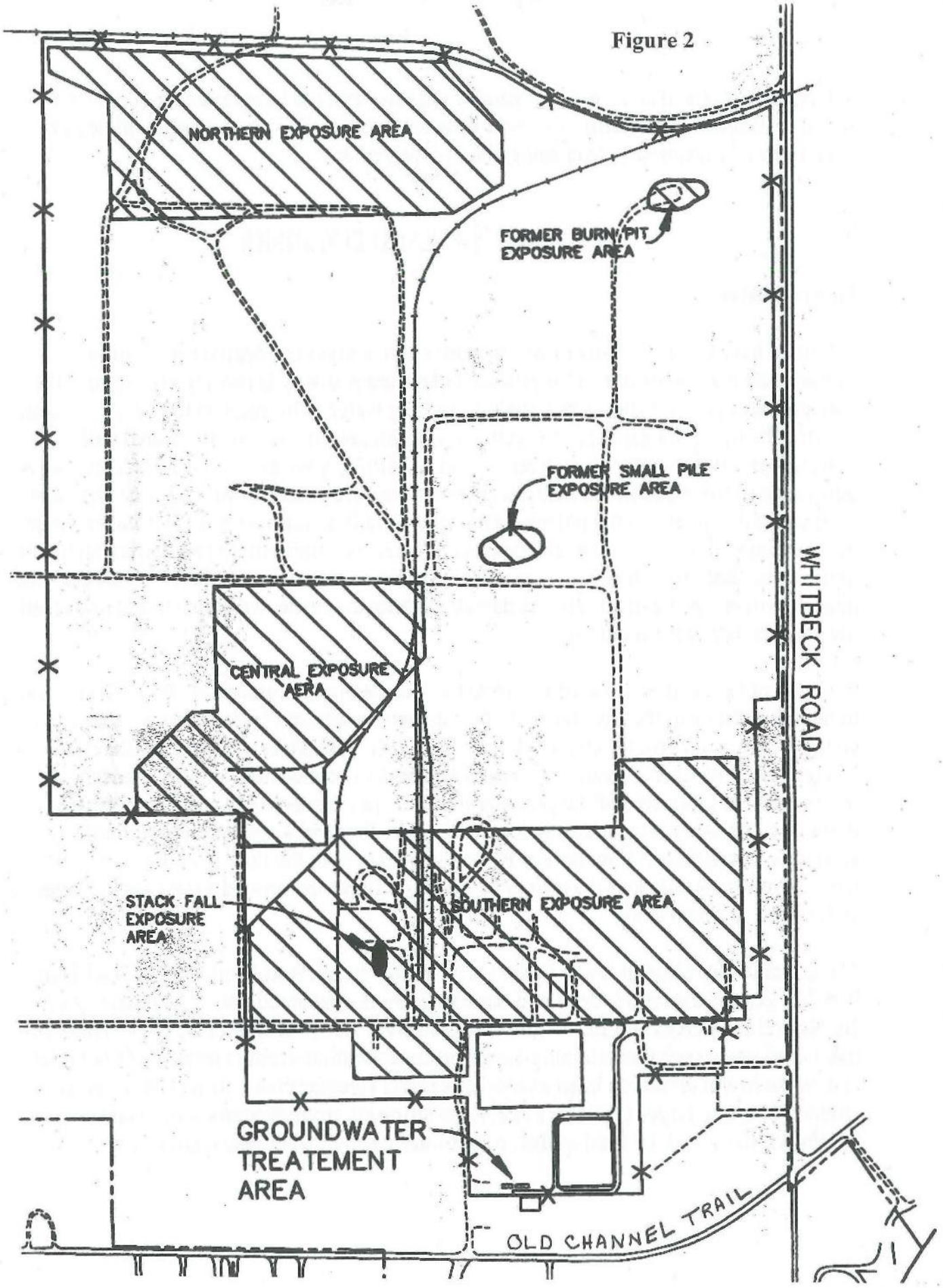
° OCC performed a treatability study to assess bioremediation of surface soil. The results of the study will be available in March 2001. Based on U.S. EPA research, proposed Daramend® bioremediation appears to be a viable technology for breaking down resistant C-series compounds present in surface soil at the OCC facility.

° The nature and extent of subsurface contamination (below 2 feet) was not extensively investigated within the designated exposure areas. Subsurface soil sampling was focused at the perimeter of each exposure area to confirm the areal limit of potential subsurface contamination. There were no significant detections of volatile organic or C-series compounds in the perimeter soil borings. Soil borings within two exposure areas (northern and central) detected significant concentrations of tetrachloroethylene, C-series compounds (hexachlorobutadiene, hexachlorocyclopentadiene, octachlorocyclopentene, and hexachlorobenzene), and mirex in subsurface soil. These locations were used for residue disposal and fine chemical production.

° At least 3,000 cubic yards of sediment at the OCC outfall to White Lake is contaminated with PCBs, C-series compounds (hexachlorobenzene, hexachlorobutadiene, hexachlorocyclopentadiene, and octachlorocyclopentene), and asbestos. There is an approximate 1,250 square foot "hotspot" area just beneath the outfall where significant concentrations of PCBs (>100 ppm) occur. PCBs and C-series compounds were not found in surface water but significant concentrations were found in zebra mussels inhabiting the highly contaminated sediment area. The source of contamination appears to be historical discharges from the OCC outfall. Current outfall monitoring shows no ongoing releases of C-series compounds to White Lake.

° OCC performed a treatability study to assess the bioremediation of White Lake sediment using BioGeoCheMix™ but U.S. EPA concluded the data to be invalid because the methodology produced highly variable results. The ability to break down PCBs and C-series compounds in White Lake sediment is unknown and significant testing is required before approval.

Figure 2


NORTHERN EXPOSURE AREA
FORMER BURN PIT EXPOSURE AREA
FORMER SMALL PILE EXPOSURE AREA
WHITBECK ROAD
CENTRAL EXPOSURE AERA
STACK FALL EXPOSURE AREA
SOUTHERN EXPOSURE AREA
GROUNDWATER TREATEMENT AREA
OLD CHANNEL TRAIL

° Contaminated soil is a source of volatile organics emitted to ambient air at the OCC facility. Tetrachloroethylene was most frequently detected in air samples, with lesser detections of trichloroethylene and carbon tetrachloride.

SUMMARY OF FACILITY RISKS

Groundwater

A human health risk assessment was performed to address residential exposure to contaminated groundwater. This potential exposure pathway is incomplete because the contaminated groundwater is not used as drinking water. The risk calculated for exposure to groundwater is not expected to occur. The estimated cancer risk associated with potential groundwater exposure from residential drinking water is 3.4×10^{-1}. This risk is equivalent to three additional persons in ten contracting cancer from a lifetime exposure to these contaminants. This potential risk substantially exceeds U.S. EPA's upper range of potential risk of 1 in 10,000 and warrants a corrective measure to protect human health in the event that groundwater is consumed. The non-cancer health effects associated with hexachlorocyclopentadiene, such as damage to human organs, were also found to exceed the acceptable hazard standard.

The goal of the proposed corrective measure is to cleanup groundwater and mitigate risks to human health and the environment. Groundwater cleanup objectives include three components: groundwater cleanup levels, point of compliance, and remediation time frames. Groundwater cleanup levels represent specific concentrations of chemicals designed to be protective of the groundwater use and other possible routes of exposure. Point of compliance represents the locations where the media cleanup levels should be achieved. Remediation time frames typically include both the time it would take to implement the remedy and the estimated time to achieve the groundwater cleanup levels at the point of compliance.

The groundwater cleanup levels at the OCC facility are derived from State of Michigan Part 201 generic cleanup criteria and screening levels developed under the authority of the Natural Resources and Environmental Protection Act (Michigan Part 201). These are risk-based goals such that attaining the given concentration during cleanup will not result in adverse health effects or in an excess cancer rate (greater than 1 in 100,000). Since groundwater discharges to White Lake, more stringent groundwater/surface water interface criteria may be used as the groundwater cleanup level where applicable.

The point of compliance for groundwater represents where groundwater cleanup levels should be achieved within a contaminated aquifer. The groundwater point of compliance for RCRA Corrective Action should be throughout the area where groundwater is contaminated above the cleanup levels, or, when waste is left in place, at and beyond the boundary of the waste management area encompassing the original sources of groundwater contamination. U.S. EPA typically refers to this point of compliance as the "throughout-the-plume/unit boundary" point of compliance.

The groundwater cleanup levels below are typically exceeded throughout-the-plume as evident in groundwater sampled at the Northern Exposure Area, Central Exposure Area, Old Channel Trail, Blueberry Ridge, and purge well system at White Lake. In the vicinity of the former fine chemicals production facility (Central Exposure Area), groundwater cleanup levels are exceeded in the deeper portion of the sand aquifer for chlorides, trichloroethylene, and tetrachloroethylene.

GROUNDWATER CONTAMINANT	GROUNDWATER CLEANUP LEVEL (ppb)
Carbon tetrachloride	5.0
Chloride	125,000*
Chloroform	100
cis-1,2-dichloroethylene	70
trans-1,2-dichloroethylene	100
Hexachlorobutadiene	0.053*
Hexachlorobenzene	1.0
Hexachlorocyclopentadiene	50
Hexachloroethane	6.7*
Mirex	0.02
Octachlorocyclopentene	50
Tetrachloroethylene	5.0
Trichloroethylene	5.0

* Groundwater/Surface Water Interface Criteria

Surface Soil

Human health and ecological risk assessments were performed at six exposure areas: 1) Northern; 2) Central; 3) Southern; 4) Stack Fall; 5) Former Burn Pit; and 6) Former Small Disposal Pile. The exposure areas are shown in Figure 2.

Northern Exposure Area - This area was used for disposal of wastes from brine operations and fine chemical production. Soil from the Northern Exposure Area was excavated and placed in the on-site landfill over 15 years ago. Clean soil from the construction of the on-site landfill was used to grade the area.

The presence of tetrachloroethylene, hexachlorobenzene, octachlorocyclopentene, and/or mirex was found at 32 of the 62 surface soil sample locations at respective maximum concentrations of 0.26 parts per million (ppm), 17 ppm, 5.3 ppm, and 20 ppm. The estimated cancer risk associated with industrial exposure to surface soil in the Northern Exposure Area is 2.3×10^{-7}. This is equivalent to two additional persons in ten-million contracting cancer from exposure to these contaminants in an industrial setting. This potential risk does not exceed U.S. EPA's acceptable lower range of potential risk of 1 in 1,000,000 nor do any of the maximum concentrations exceed Michigan Part 201 soil cleanup goals for industrial/commercial II property. The non-cancer health effects associated with octachlorocyclopentene, such as damage to human organs, were also found not to exceed the acceptable hazard standard.

In a residential setting, the risk to human health posed by surface soil contamination in the Northern Exposure Area is 1.2×10^{-6}, which slightly exceeds U.S. EPA's acceptable lower range of potential risk. The maximum concentrations of hexachlorobenzene and mirex also exceed Michigan Part 201 soil cleanup goals for residential/commercial I property. The proposed corrective measure to address this risk is an institutional control that restricts residential development.

Hazards to ecological receptors such as the deer mouse, bob-white, white-tailed deer, and red-tailed hawk from contaminated surface soil do not exceed the acceptable hazard standard.

Central Exposure Area - This area was the location of the Fine Chemicals Production Facility. It includes contaminated soil associated with fine chemical production (e.g., "No Mans Land") and a brine sludge disposal area. Soil excavated from the area was placed in the on-site landfill over 15 years ago and a large depression remains from the excavation.

The presence of tetrachloroethylene, carbon tetrachloride, hexachlorobenzene, hexachlorocyclopentadiene, octachlorocyclopentene, hexachlorobutadiene, and/or mirex was found at 26 of the 60 surface soil sample locations at respective maximum concentrations of 1.0 ppm, 0.054 ppm, 1.3 ppm, 81 ppm, 25 ppm, 17 ppm, and 0.083 ppm. The estimated cancer risk associated with industrial exposure to surface soil in the Central Exposure Area is 2.2×10^{-7}. This is equivalent to two additional persons in ten-million contracting cancer from an exposure to these contaminants in an industrial setting. This potential risk does not exceed U.S. EPA's acceptable lower range of potential risk of 1 in 1,000,000 nor do any of the maximum concentrations exceed Michigan Part 201 soil cleanup goals for industrial/commercial II property. The non-cancer health effects associated with hexachlorocyclopentadiene and octachlorocyclopentene, such as damage to human organs, were also found not to exceed acceptable hazard standards.

In a residential setting, the risk to human health posed by surface soil contamination in the Central Exposure Area is 9.4×10^{-7}, which is slightly below U.S. EPA's acceptable lower range of potential risk. None of the maximum concentrations exceed Michigan Part 201 soil cleanup goals for residential/commercial I property. Any potential risk will be addressed by an institutional control that restricts residential development.

Hazards to ecological receptors such as the deer mouse, bob-white, white-tailed deer, and red-tailed hawk from contaminated surface soil do not exceed the acceptable hazard standard.

Southern Exposure Area - This area was the location of various piles, impoundments, tank farms, ground stains, and storage areas. Production of hydrogen gas, chlorine gas, and caustic from brine occurred in this area. All production facilities were demolished in 1995 and 1996, foundations excavated to two-feet below grade, and the area graded and seeded.

The presence of tetrachloroethylene, carbon tetrachloride, chloroform, trichloroethylene, hexachlorobenzene, octachlorocyclopentene, hexachloroethane, and/or mirex was found at 37 of the 56 surface soil sample locations at respective maximum concentrations of 0.43 ppm, 0.12 ppm, 0.4 ppm, 0.11 ppm, 3.5 ppm, 1.5 ppm, 0.11 ppm, and 0.81 ppm. The estimated cancer risk associated with industrial exposure to surface soil in the Southern Exposure Area is 2.7×10^{-7}. This is equivalent to two or three additional persons in ten-million contracting cancer from an exposure to these contaminants in an industrial setting. This potential risk does not exceed U.S. EPA's acceptable lower range of potential risk of 1 in 1,000,000 nor do any of the maximum concentrations exceed

Michigan Part 201 soil cleanup goals for industrial/commercial II property. The non-cancer health effects associated with octachlorocyclopentene, such as damage to human organs, were also found not to exceed the acceptable hazard standard.

In a residential setting, the risk to human health posed by surface soil contamination in the Southern Exposure Area is 9.8×10^{-7}, which is slightly below U.S. EPA's acceptable lower range of potential risk. None of the maximum concentrations exceed Michigan Part 201 soil cleanup goals for residential/commercial I property. Any potential risk will be addressed by an institutional control that restricts residential development.

Hazards to ecological receptors such as the deer mouse, bob-white, white-tailed deer, and red-tailed hawk from contaminated surface soil do not exceed the acceptable hazard standard.

Stack Fall Exposure Area - This area is where the stack from the former power plant fell during demolition. Three soil samples were collected after the rubble was cleared and analyzed for dioxins and furans.

Dioxins and furans were found in all three surface soil samples at a maximum concentration (total toxicity equivalents) of 0.00071 ppm. The estimated cancer risk associated with industrial exposure to surface soil in the Stack Fall Exposure Area (approximately 0.1 acres) is 2.6×10^{-5}. This is equivalent to two or three additional persons in one-hundred thousand contracting cancer from an exposure to these contaminants in an industrial setting. This potential risk does not exceed U.S. EPA's acceptable upper range of potential risk of 1 in 10,000 nor does the maximum concentration exceed U.S. EPA's dioxin/furan cleanup level of 0.005 ppm for commercial/industrial soil or Michigan Part 201 cleanup criteria of 0.00099 ppm for industrial/commercial II property.

In a residential setting, the risk to human health posed by dioxin and furan surface soil contamination in the Stack Fall Exposure Area is 1.8×10^{-4}, which slightly exceeds U.S. EPA's acceptable upper range of potential risk of 1 in 10,000. The maximum concentration also exceeds the Michigan Part 201 soil cleanup goal of 0.00009 ppm for residential/commercial I property. This unacceptable risk will be addressed by an institutional control that restricts residential development.

Hazards to the deer mouse from dioxin/furan contaminated surface soil exceed the acceptable hazard standard but are not exceeded for the bob-white, white-tailed deer, and red-tailed hawk. Because of the small exposure area (0.1 acres) and the lack of an

unacceptable hazard to species higher in the food chain, a corrective measure to protect the deer mouse is not warranted.

Former Burn Pit Exposure Area - This area was used to burn trash from 1952 through 1978. All debris in the area and the top three-inches of underlying soil was excavated and placed in the on-site landfill over 15 years ago.

The presence of tetrachloroethylene, carbon tetrachloride, chloroform, hexachlorobenzene, hexachlorocyclopentadiene, octachlorocyclopentene, hexachlorobutadiene, mirex and/or dioxins/furans was found at 7 of the 25 surface soil sample locations at respective maximum concentrations of 7.5 ppm, 0.29 ppm, 0.18 ppm, 18 ppm, 12 ppm, 17 ppm, 4.4 ppm, 0.067 ppm, and 0.000022 ppm. The estimated cancer risk associated with industrial exposure to surface soil in the Former Burn Pit Exposure Area is 2.4×10^{-6}. This is equivalent to two or three additional persons in one-million contracting cancer from an exposure to these contaminants in an industrial setting. This potential risk slightly exceeds U.S. EPA's acceptable lower range of potential risk of 1 in 1,000,000 but none of the maximum concentrations of soil contaminants exceed Michigan Part 201 soil cleanup goals for industrial/commercial II property. The non-cancer health effects associated with hexachlorocyclopentadiene and octachlorocyclopentene, such as damage to human organs, were found not to exceed the acceptable hazard standard. The proposed corrective measure to address the potential risk associated with industrial exposure is placement of clean fill and topsoil, and grading and seeding of the excavated area to prevent direct contact with contaminants in the soil. Groundwater monitoring will be performed in four monitoring wells located along Whitbeck Road to ensure that groundwater cleanup levels are not exceeded due to migration of soil contaminants in the former burn pit to groundwater.

In a residential setting, the risk to human health posed by surface soil contamination in the Former Burn Pit Exposure Area is 1.38×10^{-5}, which exceeds U.S. EPA's acceptable lower range of potential risk. The maximum concentrations of carbon tetrachloride and hexachlorobenzene also exceed Michigan Part 201 soil cleanup goals for residential/commercial I property. The proposed corrective measure to address this risk is an institutional control that restricts residential development.

Hazards to the deer mouse from contaminated surface soil slightly exceed the acceptable hazard standard but are not exceeded for the bob-white, white-tailed deer, and red-tailed hawk. The placement of clean fill and topsoil, and grading and seeding of the excavated area will prevent direct contact with contaminants in the soil, improve the habitat, and protect the environment.

Former Small Disposal Pile Exposure Area - This area was used in the 1950's and 1960's to dispose of brine sludge from the chlor-alkali production area. All debris in the area and the top three-inches of underlying soil was excavated and placed in the on-site landfill over 15 years ago.

The presence of tetrachloroethylene, carbon tetrachloride, chloroform, hexachlorocyclopentadiene, octachlorocyclopentene, and/or mirex was found at 8 of the 21 surface soil sample locations at respective maximum concentrations of 0.064 ppm, 0.062 ppm, 0.12 ppm, 3,300 ppm, 750 ppm and 0.11 ppm. The estimated cancer risk associated with industrial exposure to surface soil in the Former Small Disposal Pile Exposure Area is 4.3×10^{-7}. This is equivalent to four additional persons in ten-million contracting cancer from an exposure to these contaminants in an industrial setting. This potential risk does not exceed U.S. EPA's acceptable lower range of potential risk of 1 in 1,000,000. The non-cancer health effects associated with hexachlorocyclopentadiene and octachlorocyclopentene, such as damage to human organs, approaches the acceptable hazard standard and the maximum concentrations of hexachlorocyclopentadiene and octachlorocyclopentadiene exceed the Michigan Part 201 soil cleanup goal of 720 ppm for both industrial/commercial II and residential/commercial I property. The proposed corrective measure to address this potential health hazard is a combination of *in situ* bioremediation using Daramend® technology in the southwest and northeast portions of the Former Small Disposal Pile Exposure Area and an institutional control that restricts the area from residential development. A successful demonstration of Daramend® technology to remediate contaminated soil in the former small disposal pile exposure area could allow for additional remediation of on-site contaminated soil currently being addressed through institutional controls.

Hazards to the deer mouse from contaminated surface soil significantly exceed the acceptable hazard standard but are not exceeded for the bob-white, white-tailed deer, and red-tailed hawk. The proposed corrective measure will temporarily disrupt the habitat but result in reduced hazards to the deer mouse when the soil cleanup goals are attained and the habitat is restored.

Subsurface Soil

Subsurface soil was not extensively investigated in the exposure areas. At the western edge of the Northern Exposure Area, subsurface soil sampled in two borings (greater than 10-feet deep) was found to be contaminated with C-series compounds, especially at the water table. At the location of the former fine chemicals production facility in the Central

Exposure Area (including "No Mans Land"), subsurface soil sampled in two borings (greater than 6-feet deep) was found to be contaminated with volatile organic and C-series compounds. In the Southern Exposure Area, none of the samples from four borings (greater than 4-feet deep) showed any contamination.

There is currently no risk from exposure because subsurface contaminants are found at a substantial depth below surface. However, contaminants in subsurface soil are a continuing source of groundwater contamination and could be encountered during future development of the OCC property. The corrective measures proposed to address subsurface contamination are supplemental on-site collection/treatment of contaminated groundwater and residual waste, and institutional controls that restrict subsurface excavations and residential development.

Ambient Air

Air sampling was conducted in the large Northern, Central, and Southern Exposure Areas. The potential cancer risks associated with exposure to ambient air and indoor air were all below U.S. EPA's acceptable lower range of potential risk of 1 in 1,000,000. In addition, none of the maximum concentrations detected in each area exceeded the Michigan Part 201 indoor air and ambient air cleanup goals for both industrial/commercial II and residential/commercial I property.

White Lake Sediment

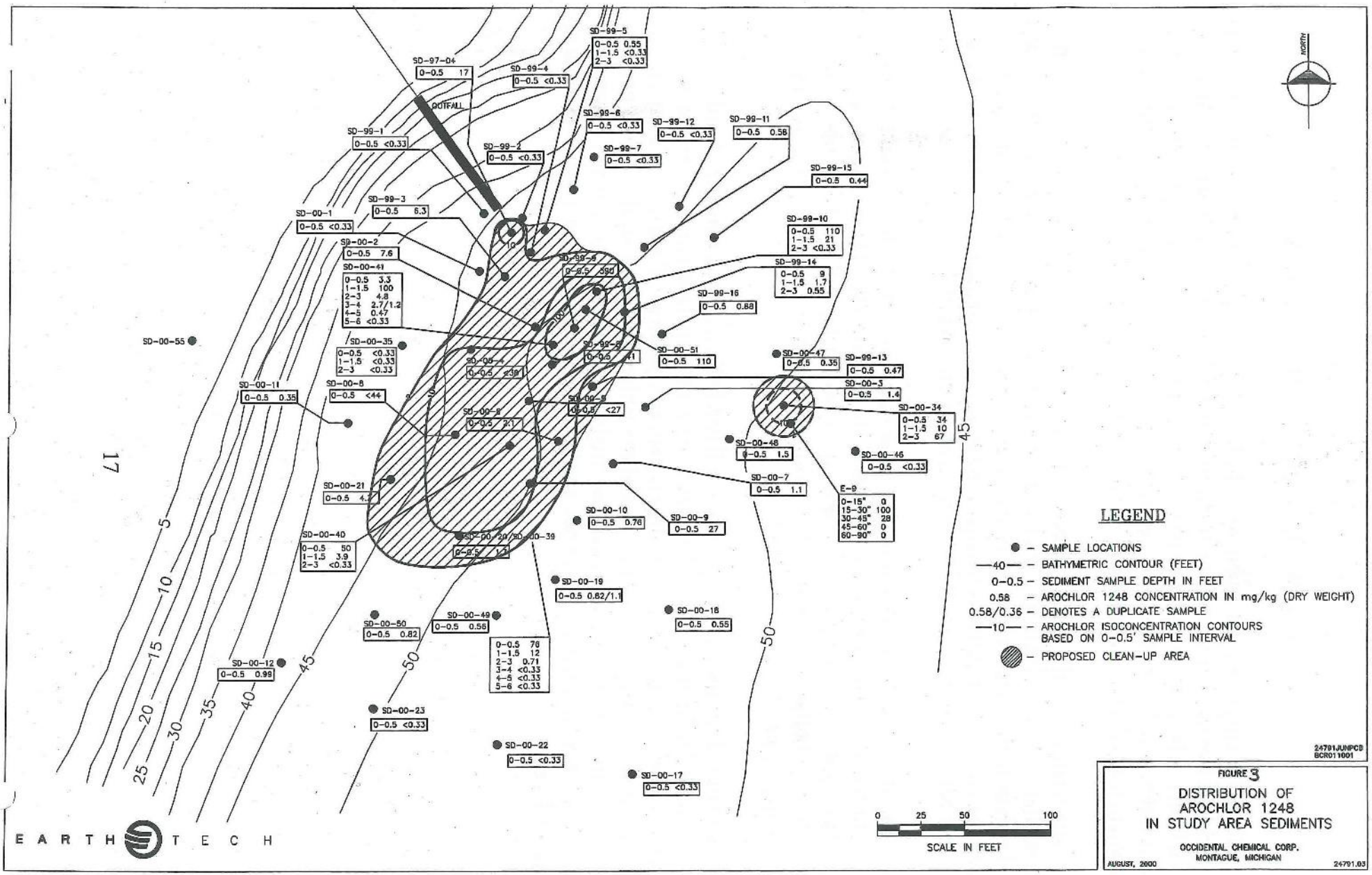
A human health and ecological risk assessment was performed to address exposure to contaminated sediment in the vicinity of the OCC outfall (White Lake Study Area). The outfall currently discharges treated groundwater from the OCC facility at a depth of 34-feet below the lake surface. A trough up to 65-feet deep is in the vicinity of the outfall. In the past, the outfall discharged process wastewater from organic and inorganic chemical manufacturing, and cooling water from a power plant.

The presence of PCBs (Aroclor 1248), hexachlorobenzene, hexachlorobutadiene, hexachlorocyclopentadiene, hexachloroethane, and octachlorocyclopentene were found in 54 of 75 sediment sample locations within the White Lake Study Area (23 acres) at respective maximum concentrations of 390 ppm, 110 ppm, 130 ppm, 330 ppm, 0.15 ppm, and 530 ppm. The estimated cancer risk associated with the consumption of fish within the White Lake Study Area by adults is 1.4×10^{-3}. This estimate uses conservative assumptions, including 15 grams of fish are eaten per day for 30 years, half of the fish eaten are caught from the White Lake Study Area which represents only 1% of White

Lake, and that fish spend half their time and obtain half their food from the White Lake Study Area. This potential risk exceeds U.S. EPA's acceptable upper range of potential risk of 1 in 10,000. Most of the cancer risk is associated with PCB (Aroclor 1248) accumulation in fish. The non-cancer health effects associated with the uptake of C-series compounds in fish and their ingestion by humans was also found to slightly exceed the acceptable hazard standard for children. Most of the health effects are associated with hexachlorobenzene and octachlorocyclopentene.

The proposed corrective measure to address this potential risk and health hazard is *in situ* bioremediation and capping provided these measures can be demonstrated to be effective in reducing toxicity and minimizing releases to the environment. Since bioremediation and capping may take up to three years to complete, U.S. EPA proposes "hotspot"removal of the most contaminated sediment (>100 ppm of PCB) during the first year to immediately reduce the toxicity of the sediment and the volume of contamination while bioremediation is investigated (see Figure 3). An alternative corrective measure would be to dredge and treat all of the contaminated sediment if bioremediation is not proven to be effective in reducing toxicity prior to capping.

Hazards to ecological receptors such as benthic organisms that live in the sediment (e.g., zebra mussels, scuds, snails), fish (large-mouth bass and common carp), mammals (river otter), and birds (herring gull and bald eagle) were evaluated. The acceptable hazard standard was exceeded for receptors living within the aquatic environment, including benthic organisms, large-mouth bass, and common carp, along with the herring gull which consumes these species. Almost all of the hazard to ecological receptors is associated with PCBs (Aroclor 1248). The proposed corrective measure will temporarily disrupt the White Lake habitat but minimize hazards to the environment when the sediment cleanup goals are attained and the habitat restored.



24781JUNPCB
BCR011001

FIGURE 3

DISTRIBUTION OF AROCHLOR 1248 IN STUDY AREA SEDIMENTS

OCCIDENTAL CHEMICAL CORP.
MONTAGUE, MICHIGAN

AUGUST, 2000 24791.03

SCOPE OF CORRECTIVE ACTION

Many of the environmental problems at the OCC facility have been addressed through the Michigan Consent Judgement and implementation of interim corrective measures under the Order. These actions have helped stabilize the release of site contaminants to air, soil, and water. Final corrective measures are still necessary to fully address the remaining contaminants in the groundwater, soil, and sediment.

Contaminated groundwater is a principal threat at this facility because of the long-term potential for direct ingestion through drinking water wells and discharge to surface water. The short-term cleanup objective is to contain the migration of contaminated groundwater and the long-term objective is to reduce the contaminant concentrations throughout the plume below Michigan Part 201 cleanup goals in a reasonable time.

Localized areas of contaminated soil are a risk due to the long-term potential for direct human contact and migration of contaminants to groundwater. The cleanup objectives are to reduce the contaminant concentrations below Michigan Part 201 cleanup goals, reduce contributions to groundwater in a timely manner, and isolate contaminated soil from direct contact.

Contaminated sediment in White Lake is a threat to the aquatic environment and people consuming fish from the lake. The cleanup objectives are to minimize exposure to contaminated sediment by eliminating the exposure pathway. Calculations show that the elimination of concentrations of PCBs and hexachlorobenzene at levels above 2 ppm and 0.45 ppm respectively, in the White Lake Study Area sediment would remove significant ecological risks and reduce cancer risk and health hazards to an acceptable level for adults and children.

SUMMARY OF CORRECTIVE MEASURE SCENARIOS

The corrective measure scenarios analyzed to cleanup groundwater, soil, and sediment contamination at and from the OCC facility are presented below. These scenarios generally correspond with those outlined in the Final CMS Reports (Revision 1, 12/21/00 and 1/25/01).

° **Baseline Controls:** Institutional controls to restrict the entire former industrial area to non-residential use only; institutional controls to restrict water rights in the industrial area and in the area of the groundwater contaminant plume; and maintenance of fencing along the property line to restrict site access to the former industrial portion of the facility.

° **Groundwater Scenario 1:** Baseline Controls and Existing Pump and Treat (Purge Well) System.

° **Groundwater Scenario 2:** Baseline Controls, Existing Pump and Treat (Purge Well) System, and Two Additional Pump and Treat Systems.

° **Groundwater Scenario 3:** Baseline Controls, Existing Pump and Treat (Purge Well) System, and Two Dual-Phase Vapor Extraction Systems.

° **Site Scenario 1:** Capping of Surface Soil in Former Small Disposal Pile Exposure Area.

° **Site Scenario 2:** *In situ* Daramend® Bioremediation of Surface Soil in Former Small Disposal Pile Exposure Area.

° **Site Scenario 3:** *Ex situ* Daramend® Bioremediation of Surface Soil in Former Small Disposal Pile Exposure Area.

° **Site Scenario 4:** On-site Thermal Treatment of Surface Soil in Former Small Disposal Pile Exposure Area.

° **Site Scenario 5:** Off-site Thermal Treatment of Surface Soil in Former Small Disposal Pile Exposure Area.

° **Site Scenario 6:** On-site Disposal of Surface Soil in Former Small Disposal Pile Exposure Area.

° **White Lake Study Area Scenario 1:** *In situ* Bioremediation of White Lake Sediment Using BioGeoChe Mix™.

° **White Lake Study Area Scenario 2:** *In situ* Capping of White Lake Sediment.

° **White Lake Study Area Scenario 3:** *In situ* Bioremediation and Capping of White Lake Sediment Using BioGeoChe Mix™ (Scenarios 1 and 2).

° **White Lake Study Area Scenario 4:** Contained Aquatic Disposal of Dredged White Lake Sediment.

° **White Lake Study Area Scenario 5:** On-site Disposal of Dredged White Lake Sediment.

° **White Lake Study Area Scenario 6A:** On-site Thermochemical Treatment of Dredged White Lake Sediment.

° **White Lake Study Area Scenario 6B:** On-site Vitrification Treatment of Dredged White Lake Sediment.

OCC has estimated the capital cost, annual operation and maintenance (O&M) cost, and net present value associated with each corrective measure scenario.

Corrective Measure Scenario	Estimated Capital Cost	Annual O&M Cost	Net Present Value*
Baseline Controls	$ 35,000	$ 0	$ 35,000
Groundwater 1	$ 20,000	$ 850,000	$ 12,200,000
Groundwater 2	$ 1,633,000	$ 1,639,000	$ 37,324,000
Groundwater 3	$ 4,542,000	$ 2,447,000	$ 51,810,000
Surface Soil Site 1	$ 76,000	$ 31,000	$ 524,000
Surface Soil Site 2	$ 147,000	$ 0	$ 147,000
Surface Soil Site 3	$ 268,000	$ 0	$ 268,000
Surface Soil Site 4	$ 3,765,000	$ 0	$ 3,765,000
Surface Soil Site 5	$ 372,000	$ 0	$ 372,000
Surface Soil Site 6	$ 327,000	$ 120,000	$ 2,050,000
White Lake Study Area 1	$ 1,088,000	$ 90,000	$ 2,292,000
White Lake Study Area 2	$ 584,000	$ 67,000	$ 1,475,000
White Lake Study Area 3	$ 1,237,000	$ 67,000	$ 2,128,000
White Lake Study Area 4	$ 847,000	$ 134,000	$ 2,223,000
White Lake Study Area 5	$ 1,545,000	$ 148,000	$ 3,022,000
White Lake Study Area 6A	$ 3,299,000	$ 67,000	$ 3,784,000
White Lake Study Area 6B	$ 3,817,000	$ 67,000	$ 4,302,000

* O&M costs included in net present value are for a 30 year period. The actual remediation period may be longer for groundwater scenarios.

EVALUATION OF PROPOSED REMEDY

The proposed remedy to cleanup contaminated groundwater, soil, and sediment at and from the OCC facility is:

- Groundwater Scenario 1 (pump and treat), including baseline controls, plus supplemental collection and treatment measures to expedite cleanup (e.g., *in situ* oxidation, dual-phase extraction system, sparge-assisted soil vapor extraction).

- Surface Soil Site Scenario 2 (bioremediation), with contingent Surface Soil Site Scenario 5 (thermal treatment), and modified Surface Soil Site Scenario 1 (soil cover); and

- White Lake Study Area Scenario 3 (bioremediation and capping) and "hotspot" removal of small area containing the most contaminated sediment, with contingent White Lake Study Area Scenario 6A (dredging and thermochemical treatment).

The estimated net present value of the proposed remedy ranges from $14,586,000 to $16,467,000. The upper range of the estimate includes contingent excavation and treatment of contaminated soil, and dredging and treatment of contaminated sediment. The estimate does not include costs associated with supplemental measures to expedite groundwater cleanup and remove small area of contaminated sediment to reduce toxicity.

The following discussion profiles the performance of the proposed remedy against technical, environmental, human health, and institutional criteria.

1. **Technical.** Performance of the proposed remedy is evaluated through effectiveness and useful life. Institutional controls to restrict land and groundwater use, and fencing to restrict site access are expected to be effective when combined with the proposed engineered controls. The U.S. EPA will ensure OCC's responsibility for institutional controls and will coordinate the controls with state and local government. The groundwater remedy (purge well system) will continue to perform its intended function of containing, collecting, and treating contaminated groundwater to eliminate releases to White Lake. The effectiveness of technologies to treat residual wastes contributing to groundwater contamination has been demonstrated at other facilities but additional study to identify the specific areas of residual waste and further characterize the site geology are necessary before proceeding. Monitoring wells installed within the groundwater contaminant plume will demonstrate cleanup and monitoring wells installed at the

perimeter of the groundwater contaminant plume will ensure that groundwater cleanup levels are being met and that the plume is not expanding.

A study of the effectiveness of bioremediating surficial soil should be available in March. If proven to be effective, it may have application at other areas of the OCC facility. In the alternative, excavation and disposal are effective measures for eliminating the risk posed by contaminated soil. Topsoil application effectively isolates minimally contaminated soil from human contact and mammals.

The effectiveness of the chosen technology to bioremediate White Lake sediment requires additional study of at least one year. In addition, characterization of natural forces influencing the contaminated sediment area is needed to ensure that capping will effectively isolate the contaminated sediment from the White Lake environment as long as necessary. In the alternative, dredging is a proven technology for remediating contaminated sediment. Thermochemical treatment of PCBs and asbestos-containing material is an effective technology for destroying the contaminants contained in sediment.

Reliability of the proposed remedy is evaluated through operation and maintenance (O&M) requirements and demonstrated reliability. An O&M Manual would prescribe maintenance requirements for the fence to restrict access. The groundwater remedy has a proven record of having minimal risk of failure and has established O&M procedures. The bioremediation of contaminated soil and sediment needs further demonstration of reliability before it can be implemented, but in the alternative, thermochemical treatment has proven reliability. Capping sediment is a reliable technology, provided applicable EPA guidance is followed to demonstrate the appropriateness of capping sediment in White Lake. Proper cap construction that addresses the site-specific conditions must be fully identified to minimize long-term O&M requirements.

Implementability of the proposed remedy is evaluated through its constructability and the time required for implementation and improvements. Institutional controls will be implemented in accordance with the U.S. EPA-approved CMI Work Plan. The groundwater remedy has already been partially installed and continues to provide beneficial results. Supplemental remediation of groundwater contamination sources requires additional time (at least one year) but technologies are available to implement source cleanup (e.g., *in situ* oxidation, dual-phase extraction system, sparge-assisted soil vapor extraction) which would improve groundwater conditions in a more timely manner. If bioremediation can be

demonstrated for contaminated soil and sediment, improvements could be seen within two years. More immediate improvements are proposed by early "hotspot" removal of a small area of sediment that contains a significant volume of the contamination. In the alternative, thermochemical treatment could be implemented within a similar time frame if bioremediation does not prove feasible.

Safety of the proposed remedy is evaluated for workers, nearby communities and the local environment. The chances for fire, explosion and exposure to hazardous constituents are considered. The purge well system has a proven safety record. An O&M manual would be developed to further ensure safety through proper maintenance. Technologies applicable to the treatment of contaminant sources would be screened to ensure the safety of workers, nearby residences, and the environment. Any corrective measure activities associated with contaminated soil and sediment require the development of a health and safety plan. Potential impacts on the White Lake environment from bioremediation/capping or dredging/thermochemical treatment need to identified and minimized during implementation.

2. **Environmental.** The selected remedy should provide the greatest improvement to the environment over the shortest period of time. Adverse effects from the implementation of the remedy should be minimized.

Maintaining the current purge well system as the sole technology to address groundwater contamination protects White Lake but is not feasible to cleanup groundwater since it would take hundreds of years to improve the groundwater conditions. Expedited cleanup of the groundwater will be achieved by investigating and implementing alternative methods for removing the residual wastes contributing to ongoing groundwater contamination. For on-site treatment, discharge of treated groundwater must meet State of Michigan standards. The bioremediation of soil may take months longer than excavation and disposal but has the potential to reduce the toxicity of contaminated soil rather than moving it to another location for long-term maintenance. If effective, it also may have application to improve other areas of the OCC facility that would benefit the environment. Bioremediation and capping of contaminated sediment will prevent releases and adverse effects on the White Lake environment provided that additional study can demonstrate the technology to be effective. Early "hotspot" removal will substantially improve the White lake environment in a short period of time. In the alternative, dredging of contaminated sediment would immediately

improve the White Lake environment and thermochemical treatment would eliminate the contaminants contributing to sediment toxicity.

3. **Human Health.** The selected remedy should mitigate the short-term and long-term potential for exposure to contaminants and protect human health during and after its implementation. Compliance with existing State of Michigan and U.S. EPA criteria, standards or guidelines is essential.

   The overall protection of human health is addressed effectively for groundwater by institutional controls and the purge well system. The purge well system restricts the migration of contaminants into White Lake and the institutional controls restrict groundwater usage within the contaminant plume. However, future protection may be diminished because of the extremely long time frames (hundreds of years) that these corrective measures would have to be in place. Supplemental measures to address residual waste and groundwater contaminants at the source areas would expedite cleanup and address these long-term concerns. Compliance with groundwater cleanup levels would be addressed by a groundwater monitoring program.

   Bioremediation of contaminated soil to Michigan Part 201 cleanup goals will mitigate industrial exposure to contaminants at the Former Small Disposal Pile Exposure Area. In the alternative, soil excavation and off-site thermal treatment will also mitigate exposure. A soil cover at the Former Burn Pit Exposure Area will mitigate industrial and environmental exposure.

   Bioremediation and capping of contaminated sediment will eliminate the pathway into the White Lake environment that increases the human cancer risk associated with fish consumption. Effective and reliable bioremediation and capping are essential to prevent the long-term migration of contaminants into the White Lake environment. Long-term potential risk due to failure of the cap is minimized by a reduction in the toxicity of sediment from "hotspot" removal and biodegradation of resistant compounds. In the alternative, dredging and thermochemical treatment of contaminated sediment will also eliminate this pathway. Appropriate measures will be employed during dredging to prevent the dispersal of contaminants into the White Lake environment.

4. **Institutional.** The selected remedy should address applicable Federal, State and local standards, regulations and ordinances for the design, operation and timing of each corrective measure scenario.

On-site treatment of contaminated groundwater has addressed applicable regulations over its history. Michigan Part 201 cleanup goals have been designated for groundwater and soil. Applicable permits for construction and operation of additional on-site treatment units and discharges will be assessed and may increase the time necessary for implementation of the corrective measure scenarios. Design documents for components that require State or Federal permits will be submitted early on during the corrective measures implementation process and performed concurrently, where possible, to reduce the time necessary for implementation.

Based on information currently available, the proposed remedy provides the best balance of corrective measure scenarios with respect to the evaluation criteria. U.S. EPA believes that the proposed remedy is protective of human health and the environment and will effectively control the exposure to contaminants in groundwater, soil, and sediment. In the alternative, contingent remedies are in place if bioremediation does not meet the required performance standards. All applicable standards regarding groundwater protection and on-site/off-site waste management would be addressed and complied with during the corrective measures implementation process.

PUBLIC PARTICIPATION

U.S. EPA solicits input from the community on the corrective measures proposed for cleanup of contaminated groundwater, soil, and sediment. The public is also invited to provide comment on corrective measure scenarios not addressed in this Statement of Basis. U.S. EPA has set a public comment period from March 1, 2001 through April 15, 2001, to encourage public participation in the selection process. The comment period will begin with a public meeting where U.S. EPA will present the investigations results and the proposed remedy, answer pertinent questions, and accept oral comments.

The public meeting is scheduled for Thursday, 7:00 p.m., March 1, 2001, at the Montague Township Hall located at 8915 Whitbeck Road, Montague, Michigan, telephone number (231) 894-4414.

The Administrative Record for the OCC Facility is available at the following locations:

Montague Branch Muskegon County Library
8778 Ferry Street
Montague, Michigan 49437
(231) 893-2675

White Lake Community Library
3900 White Lake Drive
Whitehall, Michigan 49461
(231) 894-9531

U.S. EPA, Region 5
Waste, Pesticides and Toxics Division Records Center
77 West Jackson Boulevard, 7th Floor
Chicago, Illinois 60604-3590
(312) 886-0902
Hours: Mon-Fri, 8:00 a.m. - 4:00 p.m.

After consideration of the comments received, U.S. EPA will select the remedy and document the selection in the Final Decision and Response to Comments. In addition, public comments will be summarized and responses provided. The Final Decision and Response to Comments will be drafted at the conclusion of the public comment period and incorporated into the Administrative Record.

To send written comments or request technical information on the OCC facility, please contact:

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To request information on the public comment period process, please contact:

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