AMENDED STATEMENT OF BASIS FOR AN UPDATED REMEDY SELECTED FOR

OCCIDENTAL CHEMICAL CORPORATION
MONTAGUE TOWNSHIP, MICHIGAN
EPA I.D. NO. MID 006 014 906

February 2010

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

INTRODUCTION

This Amended Statement of Basis (ASB) updates a component of the final remedy selected by U.S. Environmental Protection Agency (EPA), Region 5 on July 18, 2001, for contaminated groundwater at the Occidental Chemical Corporation (OCC) facility. *See* Statement of Basis for Occidental Chemical Corporation, February 15, 2001 (Attachment A).

Under the original Statement of Basis (SB) (attached to this document), there were two objectives for the groundwater remedy -- "[t]he short-term cleanup objective to contain the migration of contaminated groundwater and the long-term objective . . . to reduce the contaminant concentrations throughout the plume below Michigan Part 201 cleanup goals *in a reasonable time*." (see Attachment A, Statement of Basis, p. 18, emphasis added). With regard to the long-term objective, the original remedy selected by EPA required OCC to investigate, evaluate and implement alternative methods for removing the residual wastes contributing to ongoing groundwater contamination. (see Attachment A, p. 22-24). In particular, EPA noted that "[t]he effectiveness of technologies to treat residual wastes (also referred to as dense non-aqueous phase liquids or DNAPLs) 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." (see Attachment A, p. 22). Further, EPA stated that "[m]aintaining 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."

Pursuant to the original remedy, OCC conducted additional investigation and study to identify and evaluate various technologies that could address the groundwater contamination in a timely fashion. No single feasible technology was found, however, that could effectively clean up <u>all</u> of the contaminated groundwater and residual waste at the OCC facility. Therefore, an updated remedial strategy was still needed to fully address the remaining contaminants in groundwater. Without implementation of such a remedial strategy, contaminated groundwater exceeding cleanup levels is expected to remain at the OCC facility for greater than 10,000 years. This ASB includes and evaluates potential remedial alternatives evaluated by OCC and provides an updated remedial strategy to address contaminated groundwater and residual waste.

This ASB is being issued by EPA as part of its public participation responsibilities under the Resource Conservation and Recovery Act (RCRA). The document summarizes work

performed by OCC since EPA selected the final remedy on July 18, 2001. A complete list of work performed by OCC is provided in Attachment B, Index to Administrative Record. Documents listed in Attachment B are available locally at the White Lake Community Library, and the Montague Branch of the Muskegon County Library.

EPA may modify the proposed updated remedy or select another remedy to address contaminated groundwater and residual waste, based on new information or public comments. The public is encouraged to review and comment on all of the potential remedial alternatives evaluated and the proposed updated remedy. EPA will select a final remedy after a 45-day public comment period and consideration of public comments.

PROPOSED UPDATED REMEDY

EPA proposes the following updated remedy components to address contaminated groundwater and residual waste at and from the OCC facility:

- Based upon studies conducted at the site, it is not technically practicable to clean up the entire area of groundwater contamination extending from source areas on OCC property to White Lake, but it is feasible and practicable to address contamination in the southern portion of the area of groundwater contamination by implementing the remedy as follows: install and operate six extraction wells immediately downgradient of the source areas in the southern portion. *See* Figure 1. It is anticipated that groundwater cleanup levels in the southern area meeting Part 201 criteria can be achieved within 18 years through installation and operation of the six extraction wells.

- Continue collection and treatment of contaminated groundwater using the purge well system located at White Lake until groundwater cleanup levels are met.

- Continue groundwater monitoring that ensures the long-term integrity of the remedy and protection of human health and the environment.

- An EPA finding of technical impracticability for contaminated groundwater can be issued where the Agency determines that a remedy is not expected to achieve groundwater cleanup levels associated with final cleanup goals because achieving such levels is not practicable from an engineering perspective. *See Recommendations from the EPA Ground Water Task Force, A Report by the Ground Water Task Force, December 2007* (the 2007 Ground Water Report) at footnote 6, pages 11-12; the *Handbook of Groundwater Protection and Cleanup Policies for RCRA Corrective Action for Facilities Subject to Corrective Action Under Subtitle C of the Resource Conservation and Recovery Act, April 2004* (the RCRA Groundwater Handbook) at Section 12; and the *Guidance for Evaluating Technical Impracticability of Ground Water Restoration, September 1993* (the 1993 Technical Impracticability Guidance) at pages 6-13. EPA has made a technical impracticability (TI) determination regarding the northern portion of the

area of groundwater contamination at this facility. This TI determination for the northern area of the groundwater contamination is consistent with the criteria set forth in the RCRA Groundwater Handbook and the 1993 Technical Impracticability Guidance, and is made because, at this point in time, there are no specific practicable technologies that will enable OCC to meet groundwater cleanup levels derived from the State of Michigan Part 201 generic cleanup criteria and screening levels. Technical reviews will be conducted every five years, however, to assess technologies that have the potential to effectively treat all of the source areas of contamination. Thereafter, EPA may modify or revoke the TI determination regarding the northern area of groundwater contamination at the facility, and, at that time, OCC shall implement any feasible and practicable technology capable of expediting cleanup of groundwater in the northern portion of the contaminant plume.

- Record institutional controls on the property deed that restrict land and groundwater use as discussed herein.

- OCC must provide financial assurance in the amount necessary to install the six well extraction system, treat collected groundwater, and conduct operation, maintenance, and monitoring (OM&M) for the life of the remedy. The capital cost estimate for the six well extraction system is $1.9 million. The annual OM&M cost for the existing purge well system is $1.2 million. The estimated total to operate the system for a projected 18 years is $45 million.

REMEDIAL WORK PERFORMED

EPA selected a final remedy to clean up the OCC facility on July 18, 2001. In response to public comments from a March 1, 2001, public meeting and a 90-day public comment period, EPA selected a final remedy that required, among other things, excavation and off-site disposal of contaminated soil and sediment. OCC has completed nearly all components of the selected remedy.

Remedial Components Completed

- In the summer of 2003, OCC completed dredging of White Lake, removing 10,500 cubic yards of contaminated sediment. The dredge project was performed using dredging positioning software to ensure proper placement of the bucket, and a Cable Arm environmental bucket to minimize re-suspension of sediment. Sampling confirmed that all sediment contaminated with PCBs greater than 2 mg/kg and hexachlorobenzene greater than 0.45 mg/kg was successfully removed from White Lake.

- In the fall of 2001, OCC excavated 100 cubic yards of soil at two locations within the former small disposal pile that were contaminated with hexachlorocyclopentadiene (C-56) and octachlorocyclopentene (C-58). Verification sampling confirmed that the cleanup goal of 320 mg/kg was met and the two excavations were backfilled and graded.

- In the fall of 2001, approximately one-half acre at the former burn pit area of the facility was covered with clean soil and graded. Surveying confirmed that the required two-foot protective soil cover was met. The area was hydroseeded after grading.

- From July 2002 to June 2005, seven small areas (total of one-quarter acre) identified as having stained soil, bare spots, or stressed vegetation were investigated and remediated. Over 350 tons of soil contaminated with C-56 and C-58 were removed and a two-foot soil cover was placed and seeded on each of the areas.

- In December 2001, EPA approved the OCC groundwater monitoring plan required by EPA's July 18, 2001 final remedy. OCC implemented the groundwater monitoring plan to ensure the long-term integrity of the remedy and protection of human health and the environment.

- OCC continues to collect contaminated groundwater at the purge well system located adjacent to White Lake and treat the groundwater using carbon filtration before discharge to White Lake. Since 1990, the system has removed and treated more than 6 billion gallons of contaminated groundwater. The purge well system currently operates at a combined pumping rate of 600 to 650 gallons per minute and removes approximately 10 to 20 pounds of contaminants each day.

- Site access controls such as gates and fences remain in place. 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.

Remedial Components to Be Completed

- A restrictive covenant was drafted in 2009 and it is currently being finalized for recording on the OCC facility deed. Restrictions regarding areas of the OCC facility include: 1) prohibition of activities that disturb the land; 2) prohibition of groundwater use; and 3) prohibition of building construction; or 4) required engineering controls to prevent vapor intrusion. In addition, the restrictive covenant will provide for EPA and Michigan Department of Environmental Quality to have access to the facility for activities related to the SB and ASB.

Remedial Component to Clean Up Contaminated Groundwater and Residual Waste

EPA's July 18, 2001 final remedy required OCC to "evaluate and implement feasible on-site collection/treatment options for contaminated groundwater and residual waste to expedite groundwater cleanup." OCC evaluated and studied collection/treatment options from 2001 to 2009, but concluded that there were no feasible options currently available to clean up the entire area of groundwater contamination. The public record of all plans, reports, and correspondence associated with this remedial component is presented in Attachment B. The major milestones

detailing the history for evaluating on-site collection/treatment options for contaminated groundwater and residual waste (DNAPLs) are:

- *April 2001* - OCC submits a work plan that describes the field methods and data review methods used to conduct the DNAPL investigation.
- *June 2001* - EPA approves the DNAPL work plan.
- *March 2002* - OCC submits the Phase I DNAPL Report that presents the results of the geophysical investigation, reviews potential corrective measure technologies, and provides a schedule for Phase II investigations.
- *April 2002* - EPA approves the Phase I DNAPL Report.
- *May 2003* - OCC submits the Phase II DNAPL Report.
- *July 2003* - EPA approves the Phase II DNAPL Report.
- *September 2003* - OCC submits the bench and pilot study work plan for DNAPL removal.
- *November 2003* - EPA approves the bench and pilot study work plan for DNAPL removal.
- *September 2004* - OCC submits the bench study results for DNAPL removal report and pilot test work plan to address DNAPL.
- *November 2004* - EPA approves the bench study report and pilot test work plan.
- *June 2006* - OCC submits the pilot test report for treating DNAPL. The pilot test evaluated the effectiveness of two methods for treatment of DNAPL.
- *September 2006* - EPA approves the pilot test report.
- *October 2006* - OCC submits the pilot test work plan to evaluate the use of enhanced reductive dechlorination (ERD) to treat chlorinated solvents in DNAPL source areas and portions of the dissolved-phase plume.
- *January 2007* - EPA approves the pilot test work plan for ERD.
- *March 2008* - OCC submits the ERD pilot test and DNAPL treatment evaluation report.
- *December 2008* - EPA approves the ERD pilot test report, DNAPL treatment evaluation report, and in situ thermal desorption treatment evaluation report.
- *January 2009* - OCC submits the TI evaluation work plan.
- *February 2009* - EPA approves the TI evaluation work plan.
- *May 2009* - OCC submits the TI evaluation report.
- *July 2009* - EPA disapproves and provides comments on the TI evaluation report.
- *September 2009* - OCC submits the draft final TI evaluation report addressing EPA's disapproval with comments.

The technologies tested and evaluated by OCC to clean up contaminated groundwater and residual waste include:

- In-situ Chemical Oxidation
- Zero Valent Iron Reductive Dechlorination
- Biological Enhanced Reductive Dechlorination
- Surfactant Enhanced Aquifer Remediation
- In-situ Thermal Desorption

- DNAPL Extraction and Pump and Treat
- Physical Containment
- Excavation and Off-site Disposal
- In-situ Solidifcation
- Groundwater Extraction and Treatment and Use of TI Zone

A detailed review of these technologies and their usefulness to remediate site contamination can be found in the *Summary of Potential Remedial Alternatives*.

On September 22, 2009, OCC submitted a draft final proposal for a Technical Impracticability (TI) Waiver for the entire area of groundwater contamination, based on its conclusion that there were no feasible options currently available to clean up the entire area of groundwater contamination. OCC's TI Waiver proposal represents a fundamental change from EPA's final remedy component that required OCC to implement a feasible on-site collection/treatment option for contaminated groundwater and residual waste. EPA does not agree that a TI Waiver is appropriate for the entire area of groundwater contamination.

SUMMARY OF FACILITY RISKS

A human health risk assessment for residential exposure to contaminated groundwater was performed for the final remedy selected on July 18, 2001. The estimated cancer risk associated with residents ingesting contaminated groundwater is 3.4×10^{-1}. This risk is equivalent to three additional persons in ten contracting cancer from a lifetime exposure to these contaminants, which significantly exceeds EPA's upper range of potential risk of 1 in 10,000 and warrants a remedy to protect human health by preventing the consumption of contaminated groundwater. The non-cancer health effects associated with ingestion of contaminated groundwater include damage to human organs from hexachlorocyclopentadiene at concentrations that exceed acceptable levels. Although drinking water for the residential area of Montague Township is currently provided by the City of Montague through a new municipal well located north of the OCC facility, there are still risks that groundwater which discharges to White Lake could contaminate the waters of the lake, as well as drinking water wells and endanger human health, welfare and the environment.

The objectives of the proposed updated remedy in this ASB are: 1) to clean up groundwater in the southern portion of the contaminant plume to protect White Lake, and allow for the beneficial use of groundwater resources and unrestricted use of OCC property south of Old Channel Trail; and 2) record and maintain access restrictions on the former industrialized portion of the OCC facility north of Old Channel Trail until a feasible technology can be implemented that is capable of treating DNAPLs in the source areas and achieving groundwater cleanup levels in the northern portion of the contaminant plume.

The three groundwater remediation components include groundwater cleanup levels, point of compliance, and remediation time-frame. Groundwater cleanup levels are the

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 groundwater cleanup levels should be achieved. Remediation time-frame includes 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 an excess cancer rate (greater than 1 in 100,000). Since groundwater discharges to White Lake, the more stringent groundwater/surface water interface criteria in Michigan Part 201 are used as the groundwater cleanup levels where applicable.

The point of compliance for groundwater represents where cleanup levels should be achieved within a contaminated aquifer. The point of compliance at the OCC facility is 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 areas encompassing the original sources of groundwater contamination. EPA typically refers to this point of compliance as the "throughout-the-plume/unit boundary" point of compliance. Currently, it is not technically feasible to achieve groundwater cleanup levels in the northern portion of the contaminant plume due to the presence of DNAPL in the source areas.

The groundwater cleanup levels provided below [in μg/l or parts per billion (ppb)] are 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

SCOPE OF CORRECTIVE ACTION

Contamination at and from the OCC facility has been partially addressed through implementation of the final remedy selected by EPA on July 18, 2001. However, as recognized in the EPA final remedy, an updated remedial strategy is still necessary to fully address the remaining contaminants in the groundwater. Without such a strategy, contaminated groundwater exceeding cleanup levels is expected to remain at the OCC facility and under a residential area for greater than 10,000 years.

Contaminated groundwater is a principal threat at this facility because of the very long-term potential for direct ingestion through drinking water wells and discharge to surface water in White Lake. The short-term cleanup objective is to contain the migration of contaminated groundwater and reduce the size of the contaminant plume. The long-term objective is to reduce the contaminant concentrations throughout the plume below Michigan Part 201 cleanup goals by implementing an effective technology if and when it becomes available.

SUMMARY OF POTENTIAL REMEDIAL ALTERNATIVES

There is an estimated mass of 568 tons of residual contaminants in DNAPL in the upper sand aquifer at the OCC facility. These source areas are found beneath the water table at the Former Primary Disposal Area, Former Primary Ash Disposal Area, Former Fine Chemical Production Area, and Former Equalization Pond Area. Without cleanup of these source areas, OCC estimates that it will take greater than 10,000 years to meet the required groundwater cleanup levels at the OCC facility and in a residential area south of Old Channel Trail. Pursuant to the final remedy selected by EPA in 2001, OCC evaluated several technologies for treating these source areas that continue to contribute to groundwater contamination. These technologies are as follows:

In-Situ Chemical Oxidation (ISCO) - ISCO uses strong oxidizing agents to convert hazardous contaminants into non-hazardous or less hazardous forms. Oxidizing agents studied and evaluated for use at the OCC facility include Fenton's reagent, persulfate, permanganate, and ozone. Fenton's reagent was evaluated in the field and failed to reduce the amount of hexachlorocyclopentadiene (C-56) and octachlorocyclopentene (C-58), and it increased soil temperatures which could mobilize the contaminants. Persulfate was not utilized in the pilot test due to the higher reactivity and performance of Fenton's reagent and ozone. Permanganate was found not to be feasible as it does not treat carbon tetrachloride, a major site contaminant. Ozone was tested in the field in combination with the injection of hydrogen peroxide but failed to reduce the amount of C-56 and C-58 in the DNAPL.

Zero Valent Iron (ZVI) Reductive Dechlorination - ZVI uses an emulsion of oil and water, with nanoscale iron particles contained within the emulsion droplets. A bench study in the laboratory found that C-56 and C-58 were only partially degraded to intermediate products which could not be fully assessed.

Biological Enhanced Reductive Dechlorination (ERD) - ERD involves providing favorable conditions for microorganisms by supplying oxygen or nutrients. The stimulated microorganisms can then use the contaminants as food and degrade them. A bench study in the laboratory and pilot test in the field were performed by OCC. Full dechlorination of carbon tetrachloride and tetrachloroethylene could not be achieved.

Surfactant Enhanced Aquifer Remediation (SEAR) - SEAR uses surfactants to increase the solubility and flush the contaminants that could then be recovered using pump and treat. This technology was not feasible due to the very low solubility of C-56 and C-58.

In-Situ Thermal Desorption (ISTD) - ISTD applies heat to the soil and the volatilized contaminants are recovered by a soil vapor extraction system. Heating C-56 produces hydrochloric acid gas which corrodes collection and treatment systems. In addition, an extensive dewatering system would be needed to reach effective operating temperatures. Complexities and risks associated with ISTD make this technology unfeasible.

DNAPL Extraction and Pump and Treat - There is no free DNAPL at the OCC site. The DNAPL is held in place on clay layers by interfacial tension within the pore throats of the aquifer material. It is not feasible to recover a significant amount of DNAPL under these site conditions.

Physical Containment - Physical containment of DNAPL source areas using barrier walls, sheet piling, slurry walls, or groundwater flow alteration could prevent future migration of contaminants and result in the downgradient cleanup of the dissolved-phase plume migrating and being collected at White Lake. Sheet piling is not feasible to a depth of 130 feet, however, and barrier walls using jet grouting risk mobilizing the DNAPL. OCC is concerned that barriers could alter the groundwater flow and widen the plume of contamination. OCC believes that since the existing purge well system effectively contains the groundwater contaminant plume, physical containment provides little or no gain in reducing potential exposure or cleanup timeframe. OCC concluded that physical containment is not an effective or feasible technology.

Excavation and Off-Site Disposal - OCC undertook an extensive evaluation involving the removal of contaminated soil extending 25 feet below the water table from the four DNAPL source areas. Dewatering and temporary sheet piling would be used along with an air-tight sprung structure to reduce exposure and migration of contaminants. Removal would occur within 100' by 100' excavation sub-sections. This project is estimated to take 24 months and cost $145 million. OCC contends that even if 90% of the source (511 tons) could be removed under this option, it would still take a significantly long time of hundreds if not thousands of years to meet groundwater cleanup levels at the OCC facility.

In-Situ Solidification (ISS) - Soil would be mixed with material such as Portland cement to reduce the permeability of the DNAPL source areas. Excavation down to impacted soil within sheet piling would be required and an air-tight sprung structure would be used to reduce exposure to the community. ISS would occur within 100' by 100' excavation sub-sections. This project is estimated to take 24 months and cost $88 million. While ISS would greatly reduce the permeability of the treated area, DNAPL would continue to leach but at a slower rate. The cleanup timeframe is expected to increase.

Groundwater Extraction and Treatment and Use of TI Zone - Up to six additional extraction (purge) wells located just south of the known DNAPLs source areas could be installed and operated to enhance the current purge well system located at White Lake. Using this option, the estimated cleanup timeframe in the southern one-third portion of the plume (south of Old Channel Trail) could be achieved in 18 years. At that time, OCC calculates that the purge well system at White Lake could be turned off. This project is estimated to cost $1.9 million. OCC believes that there is no environmental benefit to expediting groundwater cleanup in this area, however, because groundwater would be restored in an area that is not used as a source of drinking water. Although OCC contends remediation of the entire area of contaminated groundwater is not practicable, EPA does not agree and has made a TI determination for only the northern area (north of Old Channel Trail) of groundwater contamination.

A TI determination for the contaminated groundwater area located at the source areas north of Old Channel Trail and on facility property is appropriate. OCC has demonstrated that the portion of the groundwater contaminant plume south of Old Channel Trail can be cleaned up and the aquifer restored within a reasonable time frame. However, it is not practicable to clean up the portion of the groundwater contaminant plume within the sand aquifer (approximately 100 feet thick) above the lower clay surface, located north of Old Channel Trail due to the presence of DNAPL that can not be effectively removed or treated.

EVALUATION OF THE PROPOSED UPDATED REMEDY

The updated remedy proposed by EPA to clean up contaminated groundwater at and from the OCC facility is:

Groundwater Extraction and Treatment and Designation of TI Zone for the Northern Area of Groundwater Contamination. This remedy will include the installation and operation of six additional extraction (purge) wells located north of Old Channel Trail (see Figure 1) until groundwater cleanup levels are met and the continued operation of the existing purge well system at White Lake until groundwater cleanup levels are met.

Further, this remedy will include the designation of the groundwater contaminant plume and source areas north of the new six well purge system as a TI Zone. The Administrative Record for this TI determination includes site-wide geologic and hydrogeologic information; contaminant source and release information; and contaminant distribution, transport, and fate parameters. OCC has adequately defined key site conditions and mechanisms that limit restoration potential of the sand aquifer north of Old Channel Trail. The existing purge well system located at White Lake has been effectively operated and maintained. Groundwater monitoring of the contaminant plume demonstrates the successful performance of this system. However, groundwater restoration time frames using the EPA REMchlor Model are predicted to be extremely long (>10,000 years for this remedy). The contaminants present at the site present significant constraints to remediation. Extensive treatability and pilot tests have been performed with minimal success. There are currently no applicable technologies available to achieve groundwater restoration of the entire contaminant plume within a reasonable time frame. Costs associated with the removal of residual waste within the aquifer are excessive and may not achieve groundwater cleanup standards if the wastes at great depth are not totally removed.

The upper estimated cost of the proposed updated remedy over 18 years is $45 million. The majority of cost is associated with an upper estimate of $2.4 million for annual OM&M activities. OM&M activities are currently $1.2 million per year.

The following discussion profiles the performance of the proposed updated remedy against technical standards and other factors for evaluating a remedy.

1. **Protect Human Health and the Environment.** The immediate protection of human health and the environment at the OCC facility is effectively addressed by the currently operating purge well system that eliminates the discharge of contaminants to White Lake and the prohibitions on local groundwater use. The long-term protection of human health and the environment is effectively addressed by installing an operating an additional six well purge system that would allow the achievement of groundwater cleanup levels within the non-industrialized portion of the OCC property and residential area south of Old Channel Trail, extending to White Lake. Residual waste and groundwater contamination will eventually be restricted to the formerly industrialized portion of OCC property that is distant from White Lake, is fenced, has access controls, has or will have deed restrictions, and can only be developed under an industrial scenario.

2. **Attain Media Cleanup Standards.** A portion of the groundwater contaminant plume extending beyond the industrialized portion of OCC property and Old Channel Trail will be addressed by the new six well purge system. This new system would allow groundwater cleanup standards in this area to be met in 18 years.

3. **Control the Sources of Releases.** Releases to White Lake are currently being controlled by the existing purge well system. Releases from all source areas will not be immediately controlled due to technical impracticability in the northern portion of the area of contamination. However, downgradient of all the source areas and within the formerly industrialized portion of the OCC facility, releases contributing to groundwater contamination will be contained and treated further through the use of a new six well purge system.

4. **Comply with Any Applicable Standards for Management of Wastes.** Granulated activated carbon used to treat contaminated groundwater from the existing purge system and new six well purge system will be properly characterized and treated/disposed off-site in accordance with all applicable regulations and permits at a regulated facility.

5. **Long-term Reliability and Effectiveness.** Reliability of the proposed updated remedy is evaluated through OM&M requirements, demonstrated effectiveness of both purge well systems, and achievement of groundwater cleanup levels south of Old Channel Trail.

6. **Reduction in the Toxicity, Mobility, or Volume of Wastes.** Removal of the contaminant mass immediately downgradient of the source areas to White Lake from the existing purge system and new six well purge system will reduce the volume and toxicity of contaminants at and from the OCC facility and prevent the uncontrolled migration of contaminants to surface water and underneath a residential area. Monitoring will assess the reduction in mobility of contaminants south of Old Channel Trail to White Lake.

7. **Short-term Effectiveness.** OCC has developed an OM&M program to ensure the remedy is safe and protective of human health and the environment. Remedial activities include a health

and safety plan to protect workers. The current purge well system has demonstrated effectiveness in controlling the groundwater contaminant plume over the 20 years it has operated.

8. **Implementability.** Implementability of the proposed updated remedy is determined by evaluating the level of difficulty of construction and time required for implementation and improvements. A purge well system has been operating at the OCC facility for decades and has been effective in eliminating the discharge of contaminants to White Lake. Installation of a similar six well purge system north of Old Channel Trail is not a difficult construction project, and will improve groundwater quality to the south and allow for groundwater cleanup levels to be met in 18 years. Institutional controls will be recorded on the property deed soon.

9. **Cost.** The upper estimated cost of the EPA-proposed updated remedy beyond that remedy proposed by OCC is $23.5 million over 18 years. This cost estimate assumes that the OM&M requirements for the new six well purge system are equivalent to the existing OM&M annual cost of $1.2 million for the existing purge well system. The capital cost for construction of the new six well purge system is $1.9 million.

Beyond 18 years, EPA estimates that annual OM&M costs will be less than the current $1.2 million. This reduction in costs is based on the different performance standards for the current and new purge well system. The performance standard for the current purge well system is to maintain an inward gradient from White Lake of -0.1 feet. This performance standard requires an excessive pumping of the unconfined aquifer to maintain the inward gradient. The performance standard for the new purge well system would be based on the transmissivity of the contaminated portion of the unconfined aquifer and will likely require a lower pumping rate and reduce the volume of groundwater to be treated.

OCC calculates that at the conclusion of the 18 year period, contaminant concentrations will have declined sufficiently to allow the existing purge well system at White Lake to cease operating. If this reduction occurs, the cost of operating this purge well system will be eliminated at that time.

Based on information currently available, the EPA-proposed updated remedy provides the best balance with respect to the standards and factors described above. EPA believes that the proposed updated remedy is protective of human health and the environment and will effectively control the short and long-term exposure to contaminants in groundwater. All applicable standards regarding groundwater protection and on-site/off-site waste management would be addressed and complied with during implementation of the remedy.

PUBLIC PARTICIPATION

EPA will open a 45-day public comment period for the community to comment on the updated remedial strategy for cleanup of contaminated groundwater and residual waste. If enough interest is shown, EPA will have a public meeting to present the remedial alternatives

and proposed updated remedy, answer questions, and accept oral comments. Please contact Rafael Gonzalez (information below) to express your interest in a public meeting during the 45-day public comment period.

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
RCRA 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. (except federal holidays)

After consideration of the comments received, EPA will select a final updated remedy and document the selection in a Final Decision and Response to Comments. 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 request information on the public comment period for the proposed updated remedy at the OCC facility, please contact:

Mr. Rafael Gonzalez
Public Affairs Specialist
U.S. Environmental Protection Agency, Region 5
77 West Jackson Boulevard
Land and Chemicals Division, L-8J
Chicago, Illinois 60604-3590
(312) 886-0269
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To send written comments or request technical information on the OCC facility, please contact:

Mr. Kenneth Bardo
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U.S. Environmental Protection Agency, Region 5
77 West Jackson Boulevard
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Aerial Photo Source: Abrams Aerial Survey Corporation

Approximate Locations for Conceptual Purge Wells

MW-97-05 Monitoring Well (Select Wells Shown)

Purge Well

Extent of Dissolved Volatile Organics Plume

New Water Line for Conceptual Purge Wells

Extent of DNAPL Contamination

Capture Zone

0 300 600 1,200 1,800 2,400 Feet

N W E S

L:\work\GIS\MSRM\2009MapsVZone of Capture.mxd

AECOM

Figure 21

Zone of Capture Map Showing Ground Water Extraction Wells

Former Occidental Chemical Site
Montague, Michigan

98355	August 2009	Creator: CPP082009
		Q.C: JT