Amended Final Decision and Response to Comments

for

Occidental Chemical Corporation Montague Township, Michigan

EPA I.D. No. MID 006 014 906

October 2010

AMENDED FINAL DECISION AND RESPONSE TO COMMENTS FOR SELECTION OF UPDATED CORRECTIVE MEASURES FOR OCCIDENTAL CHEMICAL CORPORATION MONTAGUE TOWNSHIP, MICHIGAN MID 006 014 906

Introduction

The U.S. Environmental Protection Agency, Region 5 presents this Amended Final Decision and Response to Comments (Amended FDRC) for the Occidental Chemical Corporation (OCC) facility located in Montague Township, Michigan. This Amended FDRC includes the February 2010, Amended Statement of Basis (ASB) as Attachment I. The ASB provides the facility background, remedial work performed, summary of facility risks, summary of potential remedial alternatives, evaluation of the proposed remedy, and the updated remedy proposed by EPA.

The updated remedy proposed by EPA in the ASB addresses source areas and contaminated groundwater at and from the OCC facility. It was made available for public review and comment from February 26 to May 15, 2010. This Amended FDRC selects the final remedy to be implemented at the OCC facility based on the Administrative Record and public comments. EPA's Response to Comments addresses comments received on the ASB during the 79 day public comment period. In response to recommendations from the local White Lake community, the selected remedy has been substantially modified from the remedy proposed in the ASB.

Assessment of the Facility

EPA initially issued a Final Decision and Reponse to Comments (Initial FDRC) for the OCC facility on July 18, 2001, to clean up contaminated soil, sediment, and groundwater. That work was performed and completed by 2005, and is documented in the ASB. Another component of the Initial FDRC was to "evaluate and implement feasible on-site collection/treatment options for contaminated groundwater and residual waste to expedite groundwater cleanup." Collection and treatment options were evaluated through 2009 but no feasible options were found that could clean up the source areas and entire area of groundwater contamination.

EPA concluded that an updated remedial strategy was necessary to fully address the remaining contaminants in the source areas and groundwater. Because this updated remedial strategy represents a significant change from the Initial FDRC, the remedial alternatives were made available for public comment. The updated remedial strategy selected in this Amended FDRC is appropriate and necessary to protect human health and the environment.

Selected Remedy

EPA selects the following remedial components as the remedy to address contaminated groundwater and dense non-aqueous phase liquid (DNAPL) in source areas at the OCC facility. The selected remedy considers and reflects public comments by: 1) addressing long-term community concerns that the public believes can provide an overall benefit to the whole White Lake area community; 2) relying on more cost-effective containment measures and institutional controls to address contaminated groundwater and source areas; 3) providing for proactive research of contaminant processes and potential remediation technologies; and 4) designating an approximate 300 acre zone of groundwater in the sand aquifer as technically impracticable to cleanup at this time.

Other components of the Initial FDRC have been successfully implemented as detailed in the ASB and are not affected by the updated remedial strategy presented in this Amended FDRC.

Designation of a Technical Impracticability Zone.

In this Amended FDRC, EPA makes a technical impracticability (TI) determination regarding an area of groundwater contamination located at and released from the OCC facility. This TI determination is for the area of groundwater contamination depicted in Attachment II (Figures 7 and 14 from the OCC TI Evaluation, September 22, 2009), covering approximately 300 acres and a maximum sand aquifer thickness of approximately 100 feet. The TI Zone designated by this TI determination is consistent with the criteria set forth in 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*, EPA530-R-04-030, April 2004 at Section 12, and the *Guidance for Evaluating Technical Impracticability of Ground-Water Restoration*, Directive 9234.2-25, September 1993. The TI Zone is designated at this time because there are no available practicable technologies found that could enable OCC to meet groundwater cleanup levels derived from the State of Michigan Part 201 generic cleanup criteria and screening levels in the approximate 300 acre TI Zone. EPA's TI designation is subject to change, however, if technology is found in the future that is potentially capable of practically treating the source of contamination and cleaning up the groundwater.

Evaluation of technologies to remediate contaminants within the TI Zone has proven the various technologies to be unsuccessful due to the facility's large contaminant mass, the highly variable chemical and physical properties of the site contaminants, their long duration in the environment, continual releases from unrecoverable DNAPL source areas, low decay potential, low volatility and high retardation potential of some contaminants, the presence of contamination deep below the water table, and a local subsurface geology of interbedded silts and clays within a sand aquifer. Along with this designation of a TI Zone, EPA is requiring OCC to undertake practicable and protective alternative remedial measures. OCC is also voluntarily undertaking other measures responsive to comments received from the local community.

In the short-term, the currently operating purge well system will continue to operate, containing the groundwater contaminant plume at its southernmost boundary prior to discharge to White Lake. The current remediation objective is containment using the currently operating purge well system which has been demonstrated to be effective for over 25 years. In addition, all potentially impacted residences have been tied-in to the Montague public water supply system. The long-term remediation objective is to eventually find a technology that can effectively treat DNAPL in the source areas that contributes to the groundwater contaminant plume, or continue to operate the purge well system until criteria are met for termination.

This alternative remedial strategy, along with the required corrective measures and voluntary actions provided below, effectively provides layers of protection that prevent exposure to human and ecological receptors, and generally contains the source areas on OCC property, minimizes their risk, and prevents any impacts on the White Lake environment. If a technology is found to be potentially capable of treating the source areas and clean up groundwater, OCC must submit a work plan to EPA for approval that describes the necessary work to evaluate and implement that technology in the source areas, if feasible.

Corrective Measures for the Contaminated Groundwater Area Located in the Former Industrialized Area of the Facility and Extending Beyond Old Channel Trail to White Lake.

OCC shall continue to collect and treat contaminated groundwater using the existing purge well system located at White Lake until groundwater cleanup levels are met. Long-term groundwater cleanup levels are defined on page 8 of the ASB. Within one year of this Amended FDRC, OCC shall conduct an energy audit and assessment of waste management practices to optimize the existing purge well system and minimize its long-term energy use and carbon emissions, consistent with the Region 5 Greener Cleanup Interim Policy found at http://www.epa.gov/region5brownfields/pdf/gcinterimpolicyr05signedcopy1109.pdf. OCC shall submit the results and recommendations of the energy audit to EPA, along with a schedule for implementation.

Within 90 days of this Amended FDRC, OCC shall submit a work plan to EPA for approval for work that will characterize the vertical concentration of VOCs and hexachloroethane in soil gas above the defined groundwater contaminant plume south of Old Channel Trail, including the locations of potential receptors at private residences along Old Channel Trail and McFall Drive, and resort buildings on OCC property (see Figure 1 of Attachment 6 of the OCC Comments on Amended Statement of Basis for an Updated Remedy, May 14, 2010). The work plan shall also provide for determining whether buildings over the plume have basements or are on slabs, and the current concentrations of contaminants in groundwater south of Old Channel Trail. OCC shall implement the approved work plan in accordance with the approved schedule. OCC shall submit a final report that fully characterizes soil gas above the groundwater contaminant plume south of Old Channel Trail, assesses potential current and future risks associated with site-related contaminants that may volatilize to indoor air from the contaminant plume, and proposes any necessary additional work, such as sub-slab sampling, to be performed to fully assess indoor air risks. OCC shall initiate the additional work

and appropriate corrective actions if unacceptable risks to human health from groundwater volatilization of site contaminants to indoor air are found to be present in buildings south of Old Channel Trail.

Two inactive private wells have been identified within the residential area south of Old Channel Trail overlying the groundwater contaminant plume. Within 90 days of this Amended FDRC, OCC shall use best efforts to plug and abandon these two wells in accordance with state well abandonment procedures.

Corrective Measures for the On-Site Source Areas North of Old Channel Trail.

OCC shall conduct literature reviews to assess whether potentially applicable technologies have become available to clean up the four identified source areas where DNAPL is present. OCC shall submit the results of the literature reviews beginning in January 2014, as part of the three year periodic technical review assessment report. EPA may propose technologies to OCC for further evaluation that have been found to be successful at other cleanups being performed at RCRA and CERCLA sites.

Voluntary Action Commitments to be Performed by OCC.

EPA and OCC recognize that operation of the existing purge well system will likely be required for many years unless an effective technology can be found to treat and remove DNAPL at the source areas. Therefore, OCC voluntarily agrees to initiate a research program within the commercial and academic community to study the unique environmental circumstances present at the OCC facility. The research is expected to be performed on a laboratory bench study scale. OCC agrees to provide research funds as necessary for implementation of accepted proposals to study the processes occurring at the on-site source areas to better understand the processes on a micro-scale and/or study and evaluate potential innovative technologies for in situ treatment of site contaminants. OCC technical staff or contractors will evaluate the proposals and notify EPA of the projects that are to be funded and the reasons for rejecting any proposals. OCC agrees to submit updates to EPA on the results of any funded research projects and the potential for using the gathered information for further bench scale studies or possible field pilot studies, beginning in January 2014 as part of the three year periodic technical review assessment report.

Consistent with the restrictive covenants recorded on the OCC property deed on June 4, 2010, under State of Michigan Part 201 requirements, OCC voluntarily agrees to establish a conservation easement along its non-industrialized lakefront property with a local government agency or qualified not-for-profit land protection organization, as depicted in Figure 1. OCC agrees that within one year of this Amended FDRC, they will execute the conservation easement in accordance with all applicable Michigan environmental and property laws, and record the conservation easement on the property deed that is binding in perpetuity on all future owners of the property. The purpose of the conservation easement is to ensure permanent preservation of valuable lakeshore habitat and to restrict future development of the lakefront property to reduce potential risk of harm from exposure to contamination by human receptors, given the long time

frame expected for groundwater cleanup levels to be met within the defined groundwater contaminant plume.

Consistent with previous voluntary actions by OCC to restore and establish wildlife habitat on its property and to promote limited use of the facility by the public, OCC voluntarily agrees to work and coordinate with the Muskegon Conservation District (MCD) to establish and fund an environmental stewardship program. Over the next three years, OCC will fund a position within the MCD that will focus on facilitating community-wide partnerships for the long-term conservation, preservation, and restoration of White Lake.

Monitoring, Financial Assurance, Reporting, and Certification Requirements.

OCC shall continue to perform long-term groundwater monitoring in accordance with the Groundwater Monitoring Plan approved by EPA in January 2002. OCC shall submit the results and evaluation of the long-term groundwater monitoring program beginning in January 2014, as part of the three year periodic technical review assessment report.

Within 90 days of this Amended FDRC, OCC shall obtain financial assurance for completion of the selected remedy in the amount necessary to perform the required corrective measures and conduct long-term operation, maintenance, and monitoring (OM&M). Within 45 days of this Amended FDRC, OCC shall submit to EPA for approval, a cost estimate of capital costs and OM&M costs for the selected remedy. The cost estimate shall be in net present value over an appropriate period of analysis. OCC shall provide financial assurance in the amount approved by EPA in one of the forms permitted under 40 C.F.R. § 264.145 (modified to replace the terms "post-closure" and "closure" with "corrective action" and referencing the Administrative Order, as approved by EPA).

OCC shall submit quarterly progress reports to EPA that provide the information detailed in Attachment III of the Administrative Order, EPA Docket No. V-W-009-93. Quarterly progress reports are due the 10th day of the third month following this Amended FDRC, beginning January 10, 2011, and every three months, thereafter.

OCC shall conduct periodic technical reviews of data from the long-term groundwater monitoring program, available literature related to cleanup technologies potentially applicable to source areas at the site, and research projects funded to understand site source processes and/or potential innovative technologies. These technical reviews shall evaluate site conditions, the integrity of the remedy, and source cleanup possibilities, including the presence of any new potential unacceptable risks posed to on-site and off-site receptors, and the availability of technologies that may treat the on-site source areas and expedite groundwater cleanup. OCC shall submit the periodic technical review as an assessment report, including recommendations, to EPA for review and comment every three years starting in January 2014.

An original and one copy of all plans and reports required by this Amended FDRC shall be submitted to EPA along with an electronic (.pdf) version. All plans and reports will be

electronically available on the EPA website constructed to provide site information to the public. EPA is responsible for adding plans and reports to the website.

OCC shall provide annual certification by a responsible corporate officer or duly authorized representative of all documents submitted for the previous year pursuant to this Amended FDRC, and consistent with Section VI.D.4 of the Administrative Order, EPA Docket No. V-W-009-93. The first annual certification shall be submitted beginning with the fifth quarter progress report due January 10, 2012, and every year, thereafter.

The remedy selected by EPA for the OCC facility meets the threshold criteria that reflect the performance standards that must be achieved, including:

- Protect Human Health and the Environment
- Attain Media Cleanup Standards Set by EPA
- Control the Sources of Releases
- Comply with Any Applicable Standards for Management of Wastes

The selected remedy also considers balancing criteria that represent a combination of technical measures and management controls that helped identify the best remedy, including:

- Long-term Reliability and Effectiveness
- Short-term Effectiveness
- Reduction in the Toxicity, Mobility, or Volume of Wastes
- Implementability
- Cost

Public Participation Activities

A 79 day public comment period was held from February 26 to May 15, 2010. Public meetings were held on April 14, 2010, at the Montague Township Hall to present the remedy and on May 13, 2010, to take formal oral comments. The public was notified of this public comment period and public meetings in the Muskegon Chronicle and White Lake Beacon newspapers, and through direct mailings. The April 14, 2010, meeting was attended by a total of 80 people, including three representatives of EPA, and ten representatives of state and local government. The May 13, 2010, meeting was attended by a total of 15 people.

A total of 49 organizations, governmental bodies, and local citizens provided written comments on the EPA proposed remedy. 92% of the commenters either opposed or did not endorse the proposed remedy. Twelve people provided oral comments at the May 13, 2010, public meeting, and only two endorsed the proposed remedy. EPA synthesized a total of 21 substantive and unique written and oral comments from the general public. OCC provided 22 unique comments on the proposed remedy.

Public Comments and EPA's Response to Comments

Comments received on the proposed remedy from the local and state community were considered and resulted in modifications to the EPA proposed remedy. The EPA final remedy, as presented in this document, addresses public comments by: 1) using current containment measures and institutional controls to define the TI Zone; 2) facilitating OCC's voluntary funding of research projects to investigate clean up of source areas; 3) facilitating OCC's voluntary placement of a conservation easement on OCC lakefront property; 4) facilitating OCC's voluntary establishment of an environmental stewardship program; and 5) constructing, operating, and maintaining an EPA website to present and update all site information related to this Amended FDRC.

The White Lake Public Advisory Council (PAC) provided comments on the proposed remedy that were generally endorsed by the local community. The PAC recommended environmental projects that were consistent with the environmental priorities of the group and community, and provided cost-effective, significant and measurable benefits to the White Lake area. The PAC believed that EPA's initial proposed remedy provided little environmental benefit to the White Lake area community. The PAC's alternative approach was endorsed by the Mayor of Montague, City of Whitehall, a Michigan State Senator and State Representative, ten local citizens providing personal endorsements of the PAC position, and signed form letters from 21 local citizens endorsing the PAC position. The PAC position in its comments, recommends actions as follows:

- a conservation easement for OCC property along White Lake
- a health study of former OCC employees
- an environmental stewardship program for community education and outreach
- research funds to assess technologies and biennial reporting of the results
- biennial public updates
- monitoring of private drinking water wells
- capping of all unused private drinking water wells
- assurance that any groundwater cleanup does not move contamination to clean areas.

In addition to the PAC position which opposed the EPA initial proposed remedy, seven local citizens, Montague Township, Muskegon Conservation District, and the White Lake Association representing 250 property owners did not endorse EPA's initial proposed remedy. These commenters generally did not see the need for the proposed additional purge well system since the current system adequately protects White Lake and city water has been extended to the affected area. Other concerns expressed by the commenters included having to connect to city water against their wishes, possible negative effects of the remedy on site reclamation and habitat restoration, on-site activities adversely impacting nearby residents, unwanted development of OCC property south of Old Channel Trail and the White Lake shoreline, wasted use of OCC funds that could be better used for research and site habitat restoration, and the

possible adverse affect of new pumping on groundwater flow and redirection of contaminants or drying up of nearby wells.

Some commenters requested that EPA develop a website to allow users to monitor all of the work that has been performed at the OCC site. The website should also be updated as new information becomes available. For example, the website could be used to present the results of new technologies being investigated that could directly treat the source areas and effectively clean up groundwater within a reasonable timeframe.

Finally, three local citizens endorsed the EPA initial proposed remedy, believing that the additional cleanup would help address the legacy of contamination at the site and protect White Lake.

Provided below are written and oral comments on the remedy that EPA believes are important in finalizing the appropriate remedy and to clarify information that is beneficial for the public to know. Since many of the commenters supported the PAC position, only specific comments beyond their endorsement of the PAC comments are included and responded to by EPA. Public comments most frequently provided are presented first, with the PAC comments being discussed as Comments 1 to 8. Comments from OCC are provided in a new section following local community comments.

Local Community Comments

1. *CLEAN UP OF GROUNDWATER UNDER THE LAKE SHORE PORTION OF THE SITE PROVIDES NEGLIGIBLE BENEFITS FOR A LARGE COST OF $24 MILLION. THERE IS LITTLE ECOLOGICAL BENEFIT TO THE SITE FROM THE PROPOSED REMEDY BEYOND THE LIMITED CLEANUP OF A SMALL AREA OF GROUNDWATER CONTAMINATION WHICH IS ALREADY BEING EFFECTIVELY CAPTURED.*

It is EPA's ultimate goal to return contaminated groundwater to its maximum beneficial use (*Handbook of Groundwater Protection and Cleanup Policies for RCRA Corrective Action*, EPA530-R-04-030, April 2004). In this case, groundwater in the area has historically been an important resource that was used as the water source for public and some private water supplies. However, since OCC has assisted in the construction of a new public water supply well located away from the contaminated groundwater area, the laying and hookup of water distribution lines, and payment of water bills for homes within the area of groundwater contamination, the risk of ingestion of contaminated groundwater is very low and additional measures to treat the groundwater are not cost-effective. Thus, EPA recognizes the public's opinion that the cost of the initial proposed remedy disproportionately outweighs the resulting environmental benefits. This pragmatic community viewpoint is further illustrated by the community's request for other environmental actions that can be used to benefit the whole White Lake community.

In response to public comments, EPA has modified the initial proposed remedy, and selected a final remedy that addresses community concerns. The selected remedy does not

require the construction of a new purge well system to expedite the cleanup of groundwater in the portion of the contaminant plume south of Old Channel Trail. In the alternative, EPA will focus on containment of contamination using the existing purge well system and institutional controls that prevent potential risks from exposure to site contaminants. EPA and OCC will also focus on pursuing research that may ultimately be used to clean up the source areas.

2. *THE PROPOSED REMEDY DOES NOT PROVIDE A DISTINCT BENEFIT TO THE WHITE LAKE AREA COMMUNITY MORE THAN WHAT IS ALREADY UNDERWAY. EVEN IF THE EXISTING PURGE WELL SYSTEM WERE TO FAIL IT WOULD TAKE APPROXIMATELY 166 DAYS FOR CONTAMINATED GROUNDWATER TO REACH WHITE LAKE, MORE THAN ENOUGH TIME TO REPAIR ANY PROBLEMS.*

An OCC analysis from 1998, conducted at the request of MDEQ after a major power outage, determined that it would take 50 to 100 days for contaminated groundwater to reach White Lake if the purge well system was not operational. Since its inception over 25 years ago, the longest the purge well system has been down due to a power outage is a little over two days back in November 1998. This historical information demonstrates that the purge well system is effective and reliable in protecting White Lake. The EPA selected remedy relies on the existing purge well system to contain the groundwater contaminant plume.

3. *THE PAC RECOMMENDS CONSIDERATION OF MORE COST-EFFECTIVE ENVIRONMENTAL PROJECTS THAT WOULD ADDRESS THE WHITE LAKE AREA OF CONCERN PRIORITIES AND PROVIDE FOR SIGNIFICANT AND MEASURABLE EFFECTS. THESE INCLUDE: 1) A CONSERVATION EASEMENT TO ENSURE PERMANENT PROTECTION OF OCC LAKESHORE PROPERTY; 2) A RE-START OF THE HEALTH STUDY OF FORMER OCC EMPLOYEES BEGUN IN 1980; AND 3) ESTABLISHMENT OF AN ENDOWMENT FUND TO SUPPORT PUBLIC EDUCATION AND OUTREACH, AND OTHER ACTIVITIES TO ENSURE THE HEALTH OF WHITE LAKE.*

OCC has voluntarily agreed to establish a conservation easement along its non-industrialized lakefront property with a local government agency or qualified not-for-profit land protection organization. OCC has also voluntarily agreed to work with the local White Lake area community to establish and fund an environmental stewardship program.

The PAC's request for OCC to restart a mortality study completed in 1980 for workers is problematic. The mortality study examined records for 341 people who had worked at the OCC Plant for at least 90 days between October 1, 1953, and December 31, 1974, and that had died through December 31, 1978. The study appears to have been discounted by the federal Agency for Toxic Substances and Disease Registry (ATSDR) because death certificates do not provide information on complications at the time of death and that the study group was paid. EPA believes it would be more productive to focus any health studies on the local community which would include former workers still living in the area and that any evaluations be conducted by appropriate health departments.

EPA and ATSDR contacted the Michigan Department of Community Health (MDCH) to consider a community health study. MDCH does maintain a cancer registry but it is not expected to provide the data necessary to determine if a particular site of contamination is contributing to higher disease rates. MDCH also does not have the staff or funding to undertake an epidemiological study.

A cancer mapping project has been initiated in the greater White Lake area by volunteers, http://www.mlive.com/news/muskegon/index.ssf/2010/09/cancer_crisis_muskegon_county.html with assistance from the Muskegon County Health Department, and followup by the county epidemiologist. EPA and the Michigan Department of Natural Resources and Environment (MDNRE) can provide the necessary records for contaminated sites in the study area to aid in the completion of the project.

4. *THE PAC RECOMMENDS THAT OCC CONTRIBUTE ADDITIONAL RESEARCH FUNDS TO IDENTIFY AN EFFECTIVE TECHNOLOGY TO CLEAN UP CONTAMINATED GROUNDWATER AND PROVIDE BIENNIAL REPORTS ON ITS PROGRESS.*

Operation of the existing purge well system would have to continue for hundreds, if not thousands, of years before it could remove contaminants to the point where cleanup levels are met unless an effective technology can be found to treat and remove the source areas. Therefore, it is appropriate to actively pursue research that could eventually aid in cleanup of the source areas. OCC has voluntarily agreed to initiate a research program within the commercial and academic community and provide funding to study the unique environmental circumstances present at the OCC facility. Updates of research progress will be provided to EPA and be made available on the EPA website (see comment #13).

5. *THE PAC RECOMMENDS THAT OCC REMAIN A HIGH PRIORITY SITE FOR EPA ATTENTION AND OVERSIGHT, AND THAT THE COMMUNITY IS PROVIDED REGULAR BIENNIAL UPDATES.*

The OCC site has been designated as high priority on the EPA Region 5 List of the 2020 Universe of Corrective Action Sites. By the year 2020, EPA plans to have largely completed the work of constructing the final remedy at the OCC facility. EPA will provide regular updates of corrective action activities at OCC on the EPA website (see comment #13).

6. *THE PAC RECOMMENDS THAT PRIVATE DRINKING WATER WELLS IN THE VICINITY OF THE OCC SITE BE MONITORED AND RESULTS REPORTED TO THE COMMUNITY.*

The extent of contaminated groundwater is fully defined and the edge of the contaminated area has been monitored since January 2002. The contaminant plume is stable and is controlled by the current purge well system at White Lake. In addition, EPA sampled eight private wells just west of the site along Old Channel Trail in June 2001. None of the site contaminants were detected in drinking water at these residences, confirming that site contaminants were not impacting any private wells. OCC will continue to monitor the

boundaries of contamination to confirm that the plume remains stable and report the results to EPA for verification. This monitoring program is an appropriate and effective alternative to sampling private wells outside of the defined and monitored area of groundwater contamination.

7. *THE PAC RECOMMENDS THAT ALL UNUSED PRIVATE DRINKING WATER WELLS WITHIN AND NEAR THE GROUNDWATER CONTAMINANT PLUME BE CAPPED.*

Only two unused private wells have been identified within the area of the groundwater contaminant plume. The two private wells are disconnected, the residences have water service agreements with OCC, and water is supplied by the Montague public water system. The EPA selected remedy requires OCC to properly seal and abandon both wells.

8. *THE PAC RECOMMENDS THAT CLEANUP OF THE SITE NOT MOVE CONTAMINATION INTO UNPOLLUTED AREAS AND THAT CLIMATE CHANGE (i.e., "GREEN" CLEANUP) IS CONSIDERED WITH ANY GROUNDWATER CLEANUP ACTIVITIES.*

EPA has selected a final remedy that does not require OCC to install an additional purge well system north of Old Channel Trail. The current purge well system will be relied upon to contain and maintain the stable groundwater contaminant plume. The EPA selected remedy requires OCC to conduct an energy audit and optimize the energy use for the purge well system, consistent with EPA's "greener cleanup" policy.

9. *THE PROPOSED NEW PURGE WELL SYSTEM IS NOT NEEDED SINCE THE CURRENT PURGE WELL SYSTEM EFFECTIVELY CONTAINS THE PLUME ANDAFFECTED PROPERTY OWNERS ARE ON CITY WATER. IT DOES NOT INCREASE PROTECTION OF HUMAN HEALTH, DOES NOT ADDRESS THE SOURCE AREAS, AND DOES NOT PROVIDE ADDITIONAL PROTECTION FOR WHITE LAKE. IT CAN BE DISRUPTIVE TO NEIGHBORS FROM INCREASED TRUCK TRAFFIC, BE MORE VISIBLE, AND WOULD BE DISRUPTIVE TO PRIME WILDLIFE HABITAT.*

EPA has selected a final remedy that does not require OCC to install an additional purge well system north of Old Channel Trail. The current purge well system will be relied upon to contain and maintain the stable groundwater contaminant plume.

10. *THE COST/BENEFIT OF THE PROPOSED REMEDY IS OUT OF BALANCE AND NOT WORTH IT FOR CLEANUP OF SUCH A SMALL AREA. CLEANUP OF GROUNDWATER UNDER THE LAKESHORE PORTION OF THE SITE PROVIDES NEGLIGIBLE BENEFITS FOR SUCH A LARGE COST. THE MONEY CAN BE BETTER SPENT ON IMPROVING THE ENVIRONMENT AND ENHANCING THE NATURAL HABITAT OR RESEARCHING TECHNOLOGIES THAT CAN BE EFFECTIVE IN THE FUTURE TO CLEANUP THE SITE. PLACING SUBSTANTIAL ADDITIONAL FINANCIAL BURDEN ON OCC WILL NOT BE CONDUCIVE FOR CONTINUATION OF THEIR VOLUNTARY EFFORTS TO RECLAIM THE SITE AND ENGAGE IN ADDITIONAL COMMUNITY EFFORTS.*

Cost is used as a balancing factor in evaluating a remedy. For example, if two remedies similarly meet performance standards to protect human health and the environment, attain media cleanup standards, and control the sources of releases, then balancing factors such as reliability and effectiveness, reduction in toxicity or volume of wastes, implementability, and cost are used to help identify the best remedy.

In the ASB (see pages 11 to 13), EPA evaluated and proposed a remedy to add an additional purge well system north of Old Channel Trail. EPA concluded that the remedy provided the best balance of the performance standards and balancing factors. However the remedy proposed by EPA was considered in the context of technical policy related to restoration of groundwater and designation of a technical impracticability zone. EPA at that time did not have the perspective of the local community and its innovative approach for protecting human health and the environment, while benefiting the White Lake area community.

The final remedy selected in this decision incorporates public comment and is consistent with the performance and technical standards for evaluating a remedy. However, rather than focusing on reducing groundwater contamination in an area that is served by a public water supply and mostly controlled by OCC, EPA recognizes that the alternative remedy proposed by the local community is equally protective, controls the source of releases, is effective, and easily implementable, all at a lower cost. Neither the remedy proposed or selected by EPA is capable of attaining groundwater cleanup levels within a reasonable timeframe since no technology has been found to treat the source areas contributing to groundwater contamination. However, the selected remedy does provide for OCC's agreement to voluntarily fund research to better understand the processes occurring at the source areas and potentially develop a process that might treat them.

11. PUMPING MORE WATER WILL NOT SHORTEN THE CLEANUP TIMEFRAME AND IS RISKY. IT MAY CAUSE OTHER PROBLEMS BY MOVING GROUNDWATER AND DRAWING CONTAMINANTS TOWARD NEARBY RESIDENTIAL WELLS ALONG THE WHITE LAKE SHORELINE. EPA HAS BEEN SUCCESSFUL IN STABILIZING THE AREA AND THE COMMUNITY HAS DEVELOPED AFTER MUCH EFFORT, A PUBLIC WATER SUPPLY FOR THE AREA.

EPA has selected a final remedy that does not require OCC to install an additional purge well system north of Old Channel Trail. The current purge well system will be relied upon to contain and maintain the stable groundwater contaminant plume. Groundwater conditions will not be altered and EPA does not believe that contaminants could spread to water well users.

12. MANDATE OCC TO CONTINUE TO EXPLORE NEW TECHNOLOGIES AT PERIODIC TIME INTERVALS UNTIL A SAFE AND EFFECTIVE TECHNOLOGY IS DEVELOPED TO ADDRESS CONTAMINATION AT THE SITE.

The EPA selected remedy provides for OCC to voluntarily initiate and fund a research program within the commercial and academic community to study the unique environmental

circumstances present at the OCC facility. Updates of research progress will be provided to EPA and be made available on the EPA website (see comment #13). Technical reviews will be provided every three years that re-evaluate site conditions and cleanup possibilities.

13. *PEOPLE ARE TRYING TO GET INFORMATION. CREATE A USER FRIENDLY WEBSITE THAT SHARES RESOURCES, PROVIDES MAPS OF SITE FEATURES, EXPLAINS THE WORK PERFORMED, PROVIDES CONTACTS, PROVIDES REGULAR MONITORING REPORTS, PROVIDES UPDATES, AND ALLOWS THE PUBLIC TO ASK QUESTIONS.*

EPA agrees that a website is an effective way for the community to access important information on the studies and actions being performed for the cleanup at the OCC facility. EPA will establish a website for the OCC cleanup at http://www.epa.gov/reg5rcra/wptdiv/sites and notify local government officials and commenters of its availability when complete. Information generated during the performance of the selected final remedy will be added to the website as it becomes available.

14. *RELOCATING THE SIX PURGE EXTRACTION WELLS FROM THEIR PRESENT LOCATION TO NEARER THE CONTAMINANT PLUME IS A WISE MOVE AND PROVIDES FOR A FAILSAFE OPERATION TO PROTECT WHITE LAKE.*

Based on the majority of comments received from the local community, EPA has selected a final remedy that does not require the installation of additional purge wells north of Old Channel Trail. EPA believes that it is equally protective to rely on the current purge well system at White Lake to contain the groundwater contaminant plume along with institutional controls (deed restrictions) and a public water supply to prevent exposure to site contaminants.

15. *EVEN IF THE PURGE WELLS ARE MOVED NORTH, THE AREA BETWEEN OLD CHANNEL TRAIL AND WHITE LAKE SHOULD NOT BE DEVELOPED. DEED RESTRICTIONS AND NON-DEVELOPMENT EASEMENTS SHOULD BE PLACED ON THIS AREA. THE SITE TO THE SOUTH WILL HAVE TO BE MONITORED TO MAKE SURE THE CONTAMINANT PLUME IS NOT SPREADING.*

EPA has selected a final remedy that does not require the installation of additional purge wells north of Old Channel Trail. A restrictive covenant has been recorded on the OCC property deed, filed with Muskegon County on June 4, 2010. OCC has volunteered to place a conservation easement on its lakeshore property. A groundwater monitoring program in place since January 2002, monitors the contaminant plume to ensure that it is not spreading.

16. *ENCOURAGE OCC TO CONTINUE ITS WILDLIFE HABITAT RESTORATION PROGRAM.*

OCC has voluntarily supported wildlife habitat restoration of its property in cooperative efforts with environmental organizations such as the Wildlife Habitat Council, and is committed to further natural enhancements at the site. OCC has expressed an interest in furthering its

restoration projects and establishing an environmental stewardship program. An example of this program could be the future extension of the Montague bike trail to Lake Michigan using the former railroad right-of-way on OCC property. Because of site access restrictions, this trail can be used to provide a safe showcase of the wildlife habitat restoration projects at the site. This potential "rails-to-trails" program is being promoted through matching federal grants, http://www.rff.org/RFF/Documents/RFF-BCK-ORRG_DOT.pdf, and OCC is actively pursuing federal funds that they would match.

OCC has agreed to voluntarily initiate an environmental stewardship program to support environmental education in the community, using its site as a successful example of restoration of former industrial property. The voluntary establishment of an environmental stewardship program by OCC is incorporated into the EPA Final Decision in support of public comments from the local community.

17. PUMPED WATER SHOULD BE PUT BACK IN THE GROUND RATHER THAN DISCHARGED TO WHITE LAKE. I AM CONCERNED THAT WELLS COULD GO DRY. HAS A STUDY BEEN DONE TO MAP THE FLOW OF GROUNDWATER IN THE AREA? CAN UNIVERSITIES BE CONTACTED REGARDING THE SITUATION AND SOLUTIONS SOUGHT?

EPA has selected a final remedy that does not require OCC to install an additional purge well system and water will not be pumped out of the ground north of Old Channel Trail. The groundwater being collected at White Lake naturally recharged the lake and it is appropriate to discharge the treated groundwater to White Lake.

18. OCC SHOULD CHECK OUR WELL WATER.

The extent of contaminated groundwater has been fully defined and the edge of the contaminated area has been monitored since January 2002. The contaminant plume is stable and is controlled by the OCC purge well system at White Lake. In addition, EPA sampled eight private wells just west of the site along Old Channel Trail in June 2001. None of the site contaminants were detected in drinking water from these residences, confirming that site contaminants were not impacting any private wells. OCC will continue to monitor the boundaries of contamination to confirm that the plume remains stable and report the results to EPA for verification. This monitoring program is an appropriate and effective alternative to sampling private wells outside of the defined and monitored area of groundwater contamination.

19. THE CLEANUP MUST BE HELD TO THE MOST STRINGENT STANDARDS. ANY NEW TECHNOLOGIES THAT COME ALONG MUST BE EMBRACED AND EMPLOYED IF THEY CAN CLEANUP THE CHEMICALS.

The remedy selected by EPA meets the standards used for evaluating a remedy and requires OCC to evaluate and initiate a technology that proves to be effective in treating site contaminants.

20. *THE TI PROGRAM IS A SMART WAY TO PROTECT THE ENVIRONMENT AND FOCUS RESOURCES ON REMOVING THE SOURCE OF THE PROBLEM WHEN A TECHNOLOGY BECOMES AVAILABLE.*

The remedy selected by EPA provides for OCC to voluntarily fund research projects to find new and effective technologies to remove the source of contamination.

21. *IF THE LAND BETWEEN OLD CHANNEL TRAIL AND WHITE LAKE GETS CLEANED UP IN THE NEXT 20 YEARS, WETLAND AREAS ARE LIKELY TO BE DEVELOPED AND LOST. I AM CONCERNED THAT DEVELOPMENT WILL RUIN THE LAKEFRONT AND OPPOSE THE EPA PROPOSAL.*

The remedy selected by EPA does not require OCC to install a new purge well system designed to cleanup groundwater south of Old Channel Trail within about 20 years. OCC has voluntarily agreed to place a conservation easement on its lakefront property to ensure permanent preservation of valuable lakeshore habitat and restrict future development.

OCC Comments

1. *THE EPA INITIAL PROPOSED REMEDY PRESENTS A REVISED TI ZONE THAT REQUIRES THE INSTALLATION AND LONG TERM OPERATION OF SIX ADDITIONAL PURGE WELLS. THESE ADDITIONAL PURGE WELLS ARE WHOLLY UNWARRANTED BECAUSE OF THE ABSENCE OF ANY EXPOSURE RISK TO BE ADDRESSED, THE DISPROPORTIONATE COST OF THE NEW PURGE WELL SYSTEM AS COMPARED TO ANY PRACTICAL BENEFITS THAT MAY BE CONFERRED UPON THE PROPERTIES, AND THE FACT THAT THE NEW PURGE WELL SYSTEM WOULD BE A DUPLICATIVE GROUNDWATER TREATMENT SYSTEM THAT IS NOT SUPPORTED BY THE RECORD AND NOT JUSTIFIED BY APPROPRIATE APPLICATION OF EPA GUIDANCE, POLICY, AND DECISIONMAKING CRITERIA.*

In response to public comments, EPA has modified the initial proposed remedy, and selected a final remedy that addresses community concerns. The final selected remedy does not require the construction of a new purge well system to expedite the cleanup of groundwater in the portion of the contaminant plume south of Old Channel Trail. In the alternative, EPA will focus on containment of contamination using the existing purge well system and institutional controls to reduce potential risk of exposure to site contaminants. Additionally, OCC has agreed to pursue research that can ultimately be used to clean up the source areas.

2. *THE CURRENT OPERATING PURGE WELL SYSTEM MEETS THE OBJECTIVES OF EPA'S INITIAL PROPOSED REMEDY IN THE ASB, AND HAS PROTECTED AND WILL CONTINUE TO PROTECT WHITE LAKE, AS IT HAS FOR OVER 20 YEARS, WITHOUT MODIFICATION.*

EPA agrees that the current purge well system effectively protects White Lake and the selected remedy relies on that system to contain the contaminant plume.

3. *IT IS EPA'S APPARENT INTENT TO ALLOW PROPERTIES IMMEDIATELY DOWNGRADIENT OF THE FACILITY TO USE GROUNDWATER AS A SOURCE OF DRINKING WATER IN THE FUTURE. THE AFFECTED PROPERTIES ARE CURRENTLY USING MUNICIPAL WATER AND USE OF GROUNDWATER AT THIS TIME IS PROHIBITED. ACCORDINGLY, THERE IS NO INGESTION RISK PATHWAY AND NO POTENTIAL FOR ANY FUTURE INGESTION PATHWAY. EPA'S STATED GOAL TO UTILIZE GROUNDWATER IN THE FUTURE DOES NOT APPEAR TO BE A PRUDENT ONE. EPA'S INITIAL PROPOSED REMEDY DOES NOT RECOGNIZE THE EXISTING AND RELIABLE MUNICIPAL SUPPLY OF DRINKING WATER, THE EFFICACY OF INSTITUTIONAL CONTROLS ON GROUNDWATER USE, AND THE INHERENT RISK IN THE FUTURE OF ALLOWING DRINKING WATER WELLS DOWNGRADIENT FROM AN AREA OF DNAPL CONTAMINATION.*

It is EPA's ultimate goal to return contaminated groundwater to its maximum beneficial use (*Handbook of Groundwater Protection and Cleanup Policies for RCRA Corrective Action*, EPA530-R-04-030, April 2004). Given the specific conditions at the OCC facility, however, the final remedy selected by EPA recognizes the municipal supply of drinking water and the institutional controls that are currently in place. The long-term goal of the remedy to return contaminated groundwater to its maximum beneficial use can only be achieved by the development of an effective technology that can treat the DNAPL present in the source areas. The selected final remedy provides for further research and literature reviews to aid in the search of an effective technology to clean up DNAPL.

4. *EPA IDENTIFIES A GOAL TO ALLOW FOR UNRESTRICTED USE OF OCC PROPERTY SOUTH OF OLD CHANNEL TRAIL. OCC IS CURRENTLY FINALIZING PERMANENT RESTRICTIVE COVENANTS PRECLUDING THE USE OF GROUNDWATER AS REQUIRED BY THE FINAL DECISION. OCC DOES NOT INTEND TO DEVELOP ITS RIPARIAN PROPERTY SOUTH OF OLD CHANNEL TRAIL. THE EPA PROPOSED REMEDY AND TI ZONE IS INCONSISTENT WITH THE 2001 FINAL DECISION WHICH DETERMINED THAT OCC SHOULD RESTRICT GROUNDWATER USE ON ITS PROPERTY.*

It is EPA's ultimate goal to return contaminated groundwater to its maximum beneficial use (*Handbook of Groundwater Protection and Cleanup Policies for RCRA Corrective Action*, EPA530-R-04-030, April 2004). Uncontaminated groundwater is an important resource in the area that can be used as the water source for public and private water supplies. If groundwater in the area south of Old Channel Trail can meet cleanup levels in a reasonable timeframe, the goal of clean groundwater as a resource can be attained in this area and current groundwater restrictions can be reconsidered. However, since OCC has assisted in the construction of a new public water supply well located away from the contaminated groundwater area, the laying and hookup of water distribution lines, and payment of water bills for homes within the area of

groundwater contamination, EPA understands that the cost of the proposed initial remedy may not be cost effective in light of an alternative remedial strategy that is equally protective.

In response to public comments, EPA has modified the initial proposed remedy, and selected a final remedy that addresses community concerns, is equally protective, and less costly. The selected remedy does not require the construction of a new purge well system to expedite the cleanup of groundwater in the portion of the contaminant plume south of Old Channel Trail. In the alternative, EPA will focus on containment of contamination using the existing purge well system and institutional controls that prevent potential risks from exposure to site contaminants. OCC will also focus on pursuing research that may ultimately be used to cleanup the source areas.

Since OCC does not intend to develop its lakefront property, its voluntary establishment of a conservation easement is consistent with OCC's future site use plans.

5. *EPA'S AMENDED STATEMENT OF BASIS STATES THAT THERE IS A "VERY LONG-TERM POTENTIAL FOR DIRECT INGESTION THROUGH DRINKING WATER WELLS AND DISCHARGE TO SURFACE WATER IN WHITE LAKE." THIS STATEMENT IS NOT SUPPORTED BY THE ADMINISTRATIVE RECORD AND CONTRADICTS THE PROVEN EFFECTIVENESS OF THE CURRENT PURGE WELL SYSTEM, THE NEW MUNICIPAL WATER SUPPLY, AND VARIOUS INSTITUTIONAL CONTROLS PLACED ON THE PROPERTY.*

The statement quoted in the ASB is meant to acknowledge the very long timeframe for cleanup which could be possibly thousands of years, as determined by OCC . EPA believes that potential risks from the presence of contaminated groundwater could increase during this long timeframe. Indeed, it is possible that with time, knowledge and oversight may fade which could potentially increase human or natural actions that may increase exposure to contamination and its risks.

In response to public comments, EPA has selected a final remedy that relies on the proven effectiveness of the current purge well system, municipal water supply, and various institutional controls to minimize the possibility of exposure to contaminated groundwater. Additional remedial elements that further enhance the protectiveness of the final remedy include OCC's research of new technologies to treat the source areas, implementation of a voluntary conservation easement along OCC lakefront property, soil gas investigations, plugging and abandonment of private wells, and financial assurance to ensure the long-term viability of the final remedy.

6. *AT BEST, THE ADDITIONAL PURGE WELL SYSTEM PROPOSED BY EPA WOULD REDUCE THECONTAMINATED GROUNDWATER AREA BY ONLY 30%. FURTHER, 70% OF THE CONTAMINATED GROUNDWATER AREA IS OWNED BY OCC AND IS PRESENTLY SUBJECT TO RESTRICTIVE COVENANTS. THUS, THE EPA PROPOSED REMEDY HAS LIMITED EFFECT ON ATTAINING MEDIA SPECIFIC CLEANUP*

CRITERIA IN THE PLUME AND THE EPA PROPOSED TI ZONE DOES NOT CONTROL THE SOURCES OF RELEASES TO ANY GREATER DEGREE THAN THE OCC TI ZONE.

With the designation of a TI Zone, EPA has determined that the source of releases from residual DNAPL can not be controlled but only contained. EPA must decide, after considering public comment, where the best location is to contain the ongoing releases; at White Lake using the current purge well system or further upgradient at the southernmost extent of DNAPL source areas. EPA proposed the latter in its ASB. However, based on public opinion, EPA understands that the cost of the proposed remedy may far outweigh the resulting environmental benefits especially when the alternative remedy recommended by OCC and the community supports the community's request for other environmental actions that can be used to benefit the whole White Lake community. Therefore, the final selected remedy has been modified to rely on the current purge well system to contain releases before they can enter the White Lake environment.

7. *THERE IS NO EVIDENCE THAT THE CURRENT PURGE WELL SYSTEM AND EXISTING MUNICIPAL WATER SUPPLY WILL NOT BE RELIABLE, EFFECTIVE, AND ADEQUATE ON A LONG-TERM BASIS TO CAPTURE AND ELIMINATE EXPOSURE PATHWAYS TO THE ENVIRONMENT AND THE PUBLIC FROM THE OCC TI ZONE.*

EPA agrees that the current purge well system has demonstrated long-term reliability and effectiveness. The demonstrated long-term reliability and effectiveness of the current purge well system is a significant consideration in EPA's selection of the final remedy which incorporates the TI Zone proposed by OCC.

8. *THE EXISTING PURGE WELL SYSTEM ALREADY CAPTURES AND TREATS GROUNDWATER, THUS REDUCING TOXICITY AND MOBILITY OF THE CONTAMINATED GROUNDWATER. THE ADDITIONAL PURGE WELL SYSTEM WOULD NOT MEANINGFULLY FURTHER REDUCE THE TOXICITY OR MOBILITY OF CONTAMINATION. EPA'S PROPOSED TI ZONE WOULD NOT REDUCE THE CONCENTRATIONS OF THE DNAPL.*

Remedies are preferred that employ treatment technologies capable of eliminating or substantially reducing the inherent potential for contaminated media to cause future environmental releases or other risks to human health and the environment. Because an effective technology could not be found to treat the source areas and completely control the releases, EPA has proposed the designation of a TI Zone. In its proposed remedy, EPA believed that a new purge well system located north of Old Channel Trail, closer to the source areas, would further reduce the toxicity and mobility of contaminants in groundwater as the area south begins to clean and eventually meet groundwater cleanup levels. However, based on public comments, EPA has adopted an alternate remedial strategy in the final remedy that relies on containment of contamination using the existing purge well system and institutional controls that prevent potential risks from exposure to site contaminants, and recognizes OCC's proposed TI Zone. OCC will also focus on pursuing research that may ultimately be used to cleanup the source areas.

9. *THE AMENDED STATEMENT OF BASIS STATES THE NEW SIX WELL PURGE SYSTEM WILL "PREVENT THE UNCONTROLLED MIGRATION OF CONTAMINANTS TO SURFACE WATER." THIS IS NOT AN ACCURATE STATEMENT. THE CURRENT PURGE WELL SYSTEM ALREADY PREVENTS THE MIGRATION OF CONTAMINANTS TO SURFACE WATER.*

In its evaluation of the proposed remedy for reducing the toxicity, mobility or volume of wastes, EPA states the "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" (emphasis added). In this context, the statement is accurate.

10. *THE OCC TI ZONE HAS PROVEN SHORT-TERM EFFECTIVENESS, AND THE EPA PROPOSED TI ZONE DOES NOT IMPROVE THE SHORT-TERM EFFECTIVENESS OF THE REMEDY.*

Short-term effectiveness is particularly relevant where remedial activities are conducted in densely populated areas, or where waste characteristics require special protective measures. For example, the excavation and off-site disposal of source area contamination could have a very negative short-term effectiveness. In the case of the current purge well system and OCC proposed TI Zone, EPA agrees that it has demonstrated long-term reliability and effectiveness, probably equivalent with the EPA-proposed remedy. The demonstrated long-term reliability and effectiveness of the current purge well system is a significant factor that EPA considered in its selection of the final remedy.

11. *THE CURRENT PURGE WELL SYSTEM, ALONG WITH THE MUNICIPAL WATER SUPPLY PROVIDED BY OCC, HAS BEEN FULLY IMPLEMENTED. THE EPA PROPOSED TI ZONE AND THE ASSOCIATED NEW PURGE WELL SYSTEM HAS NOT BEEN DESIGNED OR INSTALLED AND, THEREFORE, UNCERTAINTIES EXIST REGARDING ITS IMPLEMENTABILITY.*

Implementability of a remedy must take into account the extra time needed to receive required state or local approvals, time for beneficial results, and the availability of treatment capacity. The implementability of a new purge well system would have to account for these factors along with proper designs that ensure that the current groundwater contaminant plume boundaries are not de-stabilized by the new system. Since the current purge well system has been operational for over 25 years, implementability of that remedy is not a balancing factor that must be considered. In response to public comments, EPA has modified the proposed remedy and a new purge well system is not being required in the final selected remedy.

12. *THE NEW PURGE WELL SYSTEM COSTS A DISPROPORTIONATELY LARGE AMOUNT OF MONEY ESPECIALLY COMPARED TO THE THEORETICAL BENEFIT TO ONLY EIGHT DEVELOPED PROPERTIES THAT OVERLIE THE PLUME AND WHICH*

CURRENTLY USE UNCONTAMINATED SOURCES OF MUNICIPAL WATER.

The selected final remedy will not require the construction of a new purge well system to expedite the cleanup of groundwater in the portion of the contaminant plume south of Old Channel Trail. In the alternative, EPA will focus on containment of contamination using the existing purge well system and institutional controls to prevent potential risk of exposure to site contaminants. EPA and OCC will also focus on pursuing research that can ultimately be used to clean up the source areas.

13. *THE OCC TI ZONE ELIMINATES THREATS TO HUMAN HEALTH AND THE ENVIRONMENT. THE ADDITIONAL EXPENDITURES CONNECTED WITH EPA'S PROPOSED TI ZONE ARE WHOLLY DISPROPORTIONATELY HIGH GIVEN THE LACK OF ANY ADDITIONAL HUMAN HEALTH OR ENVIRONMENTAL PROTECTION TO BE DERIVED FROM THE PROPOSED REMEDY.*

The EPA proposed a TI Zone to address EPA's ultimate goal to return contaminated groundwater to its maximum beneficial use (*Handbook of Groundwater Protection and Cleanup Policies for RCRA Corrective Action*, EPA530-R-04-030, April 2004). However, since OCC has assisted in the construction of a new public water supply well that distributes water to residences within the contaminant plume area, EPA agrees that along with containment using the current purge well system, threats to human health and the environment have been eliminated. Therefore, the TI Zone selected in the final remedy is consistent with the TI Zone proposed by OCC in the final TI Evaluation Report.

14. *THE EPA DID NOT REFERENCE CARBON EMISSIONS AND THE REGION 5 GREENER CLEANUP INTERIM POLICY WHEN COMPARING THE EPA PROPOSED TI ZONE TO THE OCC TI ZONE. IMPLEMENTATION OF THE OCC TI ZONE WILL EMIT A LOWER AMOUNT OF CARBON DIOXIDE THAN THE IMPLEMENTATION OF THE EPA PROPOSED TI ZONE. THE ADDITION OF MORE EXTRACTION WELLS DOES NOT "MINIMIZE ENERGY USE," MINIMIZE GREENHOUSE GAS EMISSIONS," AND "REDUCE WASTES," CONTRADICTING THE GREENER CLEANUP POLICY.*

EPA evaluates a remedy using standards reflecting major technical components such as protection of human health and the environment, attainment of media cleanup standards, control of the source of releases, and compliance with waste management standards. Further, other factors representing technical measures and management controls are considered in the evaluation, including long-term reliability and effectiveness, reduction in the toxicity, mobility, or volume of wastes, short-term effectiveness, implementability, and cost. "Greener cleanup" is not a required factor that must be considered in the evaluation of a remedy. The Greener Cleanup Interim Policy does provide good approaches, however, that EPA should consider to minimize energy use, and hence carbon emissions, in the implementation of a remedy. In the implementation of the selected remedy, EPA believes that there is an opportunity to evaluate the energy use and waste management practices of the current purge well system, including collection and treatment of groundwater. The final remedy requires OCC to conduct an energy

audit and assessment of waste management practices, and implement corrective actions consistent with the Region 5 Greener Cleanup Interim Policy.

15. *IT IS APPARENT THAT THE GREATER WHITE LAKE COMMUNITY VIEWS THE EPA PROPOSED REMEDY AS NOT ACHIEVING ANY RELEVANT GOAL. OCC SHARES THE GREATER WHITE LAKE COMMUNITY VIEW THAT DISAGREES WITH THE EPA TI ZONE.*

Public opinion from the greater White Lake community has re-shaped the EPA remedy. The public comments are reflected in the selected remedy which does not require a new purge well system and designates a TI Zone consistent with that proposed by OCC in the final TI Evaluation Report.

16. *APPROVAL OF THE OCC TI ZONE IS CONSISTENT WITH THE GUIDANCE FOR EVALUATING THE TECHNICAL IMPRACTICABILITY OF GROUND-WATER RESTORATION AND EPA POLICY ON RCRA CORRECTIVE ACTION. THE COSTLY REMEDY MODIFICATION PROPOSED BY EPA IS NOT MANDATED BY RELEVANT GUIDANCE. AN APPROPRIATE APPROACH IS A MIX OF ACTIVE REMEDIES, ENGINEERING CONTROLS, AND INSTITUTIONAL CONTROLS. THE ADMINISTRATIVE RECORD SUPPORTS THE OCC TI ZONE.*

Applicable TI guidance is set forth in 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*, EPA530-R-04-030, April 2004 at Section 12, and the *Guidance for Evaluating Technical Impracticability of Ground-Water Restoration*, Directive 9234.2-25, September 1993. In response to public comments, EPA re-visited this applicable TI guidance and believes the OCC proposed TI Zone designated in the selected remedy is consistent with this guidance.

Source control (containment) will be performed using the existing purge well system at White Lake. This alternative remedial strategy is technically practicable, has achieved short-term protection goals, controls the source of contamination originating from DNAPL, achieves groundwater cleanup levels outside the TI Zone, provides for appropriate long-term OM&M and financial assurance, and is consistent with overall cleanup goals for the facility. Remediating a portion of the plume with a new purge well system may not be necessary if remediating that portion of the plume provides no significant reduction in risk to actual and potential receptors. Because of the use of an effective public water system and restrictive covenants placed on OCC property, remediating this portion of the plume will not result in a significant risk reduction beyond that provided by the public water system and the restrictive covenants.

17. *THE TECHNICAL IMPRACTICABILTY OF CURRENTLY ADDRESSING DNAPL DOES NOT JUSTIFY A NEW PURGE WELL SYSTEM TO CREATE A MARGINALLY SMALLER TI ZONE. THERE IS NO INCREMENTAL INCREASE IN HUMAN HEALTH PROTECTION, ADDITIONAL RISK MAY BE CREATED, AND AN EQUIVALENT LEVEL*

OF PROTECTION HAS ALREADY BEEN PROVIDED AT SIGNIFICANTLY LESS COST.

Based on public comments, EPA has modified the proposed remedy and selected a final remedy that does not require the construction of a new purge well system to expedite the cleanup of groundwater in the portion of the contaminant plume south of Old Channel Trail and designates a TI Zone proposed by OCC.

18. *THE OCC TI ZONE RELIES UPON EXISTING REMEDIAL SYSTEMS AND MUNICIPAL WATER WHICH FOR DECADES HAVE BEEN DEMONSTRATED TO RELIABLY MITIGATE PUBLIC HEALTH AND ECOLOGICAL RISKS. THE EPA PROPOSED TI ZONE DOES NOT PROVIDE ANY ADDITIONAL LONG OR SHORT-TERM EFFECTIVENESS AND DOES NOT FURTHER ADDRESS THE MOBILITY, TOXICITY, OR VOLUME OF WASTES.*

The EPA proposed TI Zone addresses EPA's ultimate goal to return contaminated groundwater to its maximum beneficial use (*Handbook of Groundwater Protection and Cleanup Policies for RCRA Corrective Action*, EPA530-R-04-030, April 2004). Clean groundwater in the area is an important resource as the water source for public and private water supplies. However, since OCC has assisted in the construction of a new public water supply well located away from the contaminated groundwater area, the laying and hookup of water distribution lines, and payment of water bills for homes within the area of groundwater contamination, EPA agrees that along with containment measures using the current purge well system, risks to public health and the environment have been eliminated.

Based on public comments, EPA has modified the proposed remedy and selected a final remedy that designates a TI Zone as proposed by OCC, and does not require the construction of a new purge well system to expedite the cleanup of groundwater in the portion of the contaminant plume south of Old Channel Trail.

19. *OCC REQUESTS THAT EPA ACCEPT OCC'S RECOMMENDED TI ZONE SHOWN IN FIGURE 1 AND 14 OF THE OCC TI EVALUATION REPORT.*

EPA has selected a final remedy that does not require the installation of additional purge wells north of Old Channel Trail. EPA has designated a TI Zone for the area of groundwater contamination depicted in Attachment II of this Amended FDRC (Figures 7 and 14 from the OCC TI Evaluation, September 22, 2009) that covers approximately 300 acres and a maximum sand aquifer thickness of approximately 100 feet.

20. *SHOULD EPA PERSIST IN PURSUING THE PROPOSED TI ZONE, OCC HAS SPECIFIC COMMENTS REGARDING IMPLEMENTATION OF THE NEW PURGE WELL SYSTEM SUCH AS FLEXIBILITY IN THE NUMBER OF WELLS, WATER TREATMENT METHOD, DURATION OF CLEANUP, SHUT DOWN CRITERIA FOR THE CURRENT PURGE WELL SYSTEM, AND UPDATED COST ESTIMATES FOR FINANCIAL ASSURANCE.*

EPA has selected a final remedy that does not require the installation of additional purge wells north of Old Channel Trail and designates a TI Zone as proposed by OCC.

21. *EPA UNNECESSARILY STATES THAT "THE ESTIMATED CANCER RISK ASSOCIATED WITH THE RESIDENTS INGESTING CONTAMINATED GROUNDWATER IS 3.4 X 10^{-1}." THIS STATEMENT IS INACCURATE AND SHOULD BE DELETED AS THERE IS NO COMPLETE EXPOSURE PATH THAT IS REQUIRED TO HAVE A RISK.*

The cancer risk described on page 6 of the ASB is taken from the Administrative Record, specifically from page 8 of the summary of facility risks provided in the February 15, 2001, Statement of Basis. EPA agrees that there currently is no complete exposure pathway for residential consumption of contaminated groundwater. All residences within the contaminant plume boundary are on the Montague public water supply system which was provided in part by OCC and water service agreements have been entered into between the residents and OCC.

The risk described in the ASB only represents potential risk. It quantifies how contaminants in groundwater could potentially threaten human health if the exposure pathway was complete and groundwater consumed. This potential risk provides the basis for requiring the remediation in the initial final remedy selected on July 18, 2001, and further provides the framework for requiring the remedy in this Amended FDRC.

22. *EPA STATES THAT "THERE ARE STILL RISKS THAT GROUNDWATER WHICH DISCHARGES TO WHITE LAKE COULD CONTAMINATE THE WATERS OF THE LAKE .... ENDANGERING HUMAN HEALTH, WELFARE AND THE ENVIRONMENT." THIS STATEMENT IS INACCURATE AND MISLEADING AS THERE IS NO DISCHARGE OF CONTAMINATED WATER TO WHITE LAKE.*

The risks described here are not meant to indicate that these risks currently occur. Because the time to cleanup groundwater as determined by OCC is likely to be thousands of years if the source areas are not cleaned up, EPA believes that potential risks from the presence of contaminated groundwater could increase during this long timeframe. As stated in our response to comment 5, it is possible that with time, knowledge and oversight may fade and potentially enhance human or natural actions that might increase exposure to contamination and its risks.

In response to public comments, EPA selected a final remedy that eliminates this potential risk through operation of the current purge well system along with institutional controls. At this time, EPA acknowledges that these controls to prevent exposure to site contaminants will likely need to remain in place for a very long time. Therefore, it is prudent to actively pursue research of potential technologies to treat the source areas so there is not a total reliance on these corrective measures to be maintained for thousands of years.

Corrective Action Complete Determination

Once OCC believes it has met its corrective measures obligations, it may submit a request with supporting information to EPA Region 5 for a corrective action complete determination (CACD). Once EPA Region 5 receives the request for a CACD, EPA may issue a CACD based on the content and completeness of information provided by OCC, EPA guidance, and the terms of this Amended FDRC. This request should include a written explanation and supporting documentation demonstrating that OCC satisfies the criteria for the CACD determination, based on information outlined in the February 23, 2005, EPA guidance on CACD; the selected measures, contaminant cleanup goals and criteria, and other conditions specified in this Amended FDRC; and all additional measures, criteria, and conditions specified in the Administrative Order implementing this Amended FDRC.

At a minimum, the CACD request must: 1) demonstrate that construction activities are complete, 2) demonstrate that all required institutional controls have been implemented, 3) demonstrate that the cleanup goals and objectives have been achieved for obtaining a CACD and, 4) where post-CACD remedial activities such as continuing a pump and treat system or groundwater monitoring, i) identify criteria and standards that would either confirm that these long term remedial activities are functioning as intended, or would be the basis for additional work, and ii) identify the criteria for satisfaction and termination of these post-CACD activities.

Administrative Record

The Administrative Record for the selected remedy is available at the Montague Branch Muskegon County Library, 8778 Ferry Street, Montague, Michigan 49437; White Lake Community Library, 3900 White Lake Drive, Whitehall, Michigan 49461; and the 7th Floor Records Center at EPA Region 5, 77 W. Jackson Blvd., Chicago, Illinois 60604.

Future Actions

The Administrative Order, EPA Docket No. V-W-009-93 (AO) requires OCC to implement the selected remedy in a manner consistent with the Scope of Work for Corrective Measures Implementation, Attachment III to the AO.

Declaration

Based on the Administrative Record compiled for this corrective action, EPA has determined that the selected remedy for the OCC facility is appropriate and protective of human health and the environment.

10/12/10

Bruce F. Sypniewski
Acting Director
Land and Chemicals Division

Date

Attachments (2)

IN THE MATTER OF:

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

Aerial Map Shot 2009, Datum: NAD 27 Projection: State Plane Michigan South

Legend

- Purge Well
- Property Boundary
- Conceptual Conservation Easement Area

figure 1

CONCEPTUAL CONSERVATION EASEMENT AREA
GLENN SPRINGS HOLDINGS INC.
Montague, Michigan

9970DM(PRES001)GIS-WA003 August 11, 2010

ATTACHMENT I

Amended Statement of Basis, February 2010

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 all 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
E-mail: gonzalez.rafaelp@epa.gov

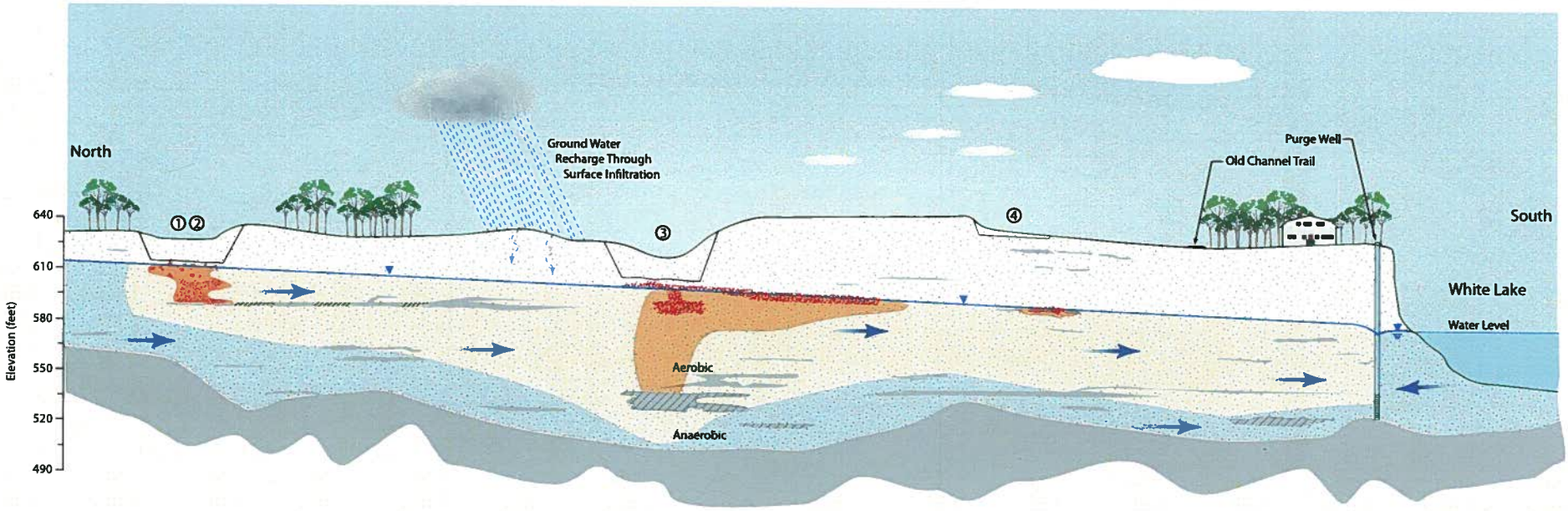
To send written comments or request technical information on the OCC facility, please contact:

Mr. Kenneth Bardo
EPA Project Manager
U.S. Environmental Protection Agency, Region 5
77 West Jackson Boulevard
Corrective Action Section, LU-9J
Chicago, Illinois 60604-3590
(312) 886-7566
E-mail: bardo.kenneth@epa.gov

ATTACHMENT II

Technical Impracticability Zone

Note: Profile view approximately 6,240 feet.



Note: Scale is Approximate

DNAPL
Dissolved VOC Plume
Dissolved C-56 Plume
Sand Aquifer
Silt
Clay
Water Table Level
Groundwater Flow

Historical DNAPL Entry Locations
① Former Primary Disposal Area
② Former Primary Ash Disposal Area
③ Former Fine Chemical Production Area
④ Former Equalization Pond

Approximate Areas of Initial Excavations

* Note: Only C-56 and VOC's Shown in Site Conceptual Model

AECOM
5555 Glenwood Hills Parkway, SE Suite 200 Grand Rapids, MI 49512 (616) 942-9600

DRAWN BY: M. Haworth	DATE: April 21, 2009
CHECKED BY: JT	EDITED BY: ENC041509
FILE NAME:	

FIGURE 7

Site Conceptual Model

Former Occidental Chemical Site
Montague, MI

PROJECT NUMBER 98355	SCALE: As shown

Aerial Photo Source: Abrams Aerial Survey Corporation

MW-05-02 Monitoring Well (Select Wells Shown)

Ph Purge Well

Extent of DNAPL Contamination

Property Line

TI Zone

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

N

W E

S

AECOM

Figure 14

TI Zone

Former Occidental Chemical Site
Montague, Michigan

98355	April 2009	Creator: CPP090209
		Q.C: JT