

U.S. ENVIRONMENTAL PROTECTION AGENCY
Statement of Basis

General Motors Components Holdings Wyoming Operations
2100 Burlingame Avenue SW
Wyoming, Michigan
EPA-ID MID 017 079 625

INTRODUCTION

This Statement of Basis (SB) for the General Motors Components Holdings Wyoming Operations facility (GMCH Facility, GMCH, or the Facility) explains the U.S. Environmental Protection Agency's (EPA's) proposed remedy, to address human exposure to hazardous constituents in soil and groundwater found at the Facility and prevent their migration in order to protect human health and the environment.

In addition to EPA's preferred remedy for the GMCH Facility, this SB includes summaries of other potential remedies analyzed and considered for the Facility. EPA will select a final remedy for GMCH only after the public comment period has ended and the information received during this time has been reviewed and considered. EPA is issuing this SB as part of its public participation responsibilities under the Resource Conservation and Recovery Act (RCRA) which are specified at Title 40 Code of Federal Regulations (40 C.F.R.) Part 124.

This document summarizes information that can be found in greater detail in the December 2002 *Current Conditions Report*, the March 2011 *Revised RCRA Facility Investigation Report* and its subsequent Addenda, the October 2017 *Final Revised Corrective Measures Proposal*, and other documents in the Administrative Record for the Facility (Appendix). EPA encourages the public to review these documents to gain a more comprehensive understanding of the Facility and the RCRA activities that have been conducted there.

EPA may modify the proposed remedy or select another remedy based on new information or public comments; the public is encouraged to review and comment on all remedy alternatives. The public can be involved in the remedy selection process by reviewing the documents contained in the administrative record file and submitting comments to the EPA during the public comment period. In this document, EPA informs the public of the location and the availability of the administrative record, as well as the dates of the public comment period.

A public meeting has been scheduled for 5:00 pm to 7:00 pm on May 8, 2019, at the Early Childhood Center, 961 Joosten Street SW, Wyoming, Michigan. The public comment period will run from April 8, 2019, to midnight May 23, 2019.

PROPOSED REMEDY

Facility-Wide

- Establish baseline institutional controls through deed restrictions on land and groundwater at the Facility to ensure that the human health risk assumptions on future on-site groundwater and land use remain valid. These controls will maintain continued commercial/industrial use of the Facility, and will prohibit any future use of Facility groundwater for any purpose other than dewatering for construction/maintenance, sampling or other remediation activity.
- Continue to monitor and remove petroleum-based light non-aqueous phase liquid (LNAPL) at on-site monitoring wells MW-210, MW-211, W-86-2, W-87-6R, W-90-7, W-90-8 and W-90-14, which are located in the former Waste Cyanide Storage Tanks area.
- Implement soil management and health and safety plans for any subsurface work to be conducted within residual LNAPL areas.

On-Site and Off-Site Groundwater

- Establish baseline institutional controls for on-site groundwater as noted above.
- Continue to enforce control of off-site groundwater use through the existing Kent County Health Department water supply construction permit regulations that prohibit the issuance of new private groundwater wells in a contaminated aquifer on- and off-site.
- After EPA issues its Final Decision and Response to Comments (FD/RC), General Motors LLC (GM LLC) will petition the City of Wyoming to include the Facility property and the areal extent of the off-site groundwater plume in the City's Code of Ordinances Chapter 30 Water Well Restriction Zone.
- Continue operation of the Interim Measures Groundwater Extraction System (IMGES) to capture and treat impacted on-site groundwater. The remedial objective for this treatment system will be the attainment of federal drinking water standards (Maximum Contaminant Levels, or MCLs) for the contaminants (Constituents of Concern, or COCs) for eight consecutive quarters at on-site monitoring wells selected by EPA. GMCH will monitor on-site and off-site groundwater in accordance with the Groundwater Monitoring Plan (GMP) which is described in this SB.

- GMCH will operate the IMGES for a period of up to ten years, unless the remedial goal of attaining MCLs at the compliance wells for eight consecutive quarters is met within the 10- year period.
- GMCH will submit the results of groundwater monitoring to EPA annually.
- GMCH will evaluate and submit to EPA its written evaluation of the effectiveness of the IMGES in reducing groundwater contamination to the MCLs goal within 5 years from the date of EPA's Final Remedy Decision. Information from the assessment will be used to modify the IMGES system to assure MCLs will be met within 10 years from the Final Decision signature date.
- If COC concentrations are not attained at the compliance wells after the 10-year period, EPA will determine if a contingency remedy, or combination of remedies, will be required to bring on-site groundwater contamination below MCLs within a reasonable time period.

FACILITY BACKGROUND

Location and History

The GMCH Facility is located at 2100 Burlingame Avenue in the City of Wyoming, Michigan (Figure 1). The Facility encompasses approximately 96 acres which are zoned for light and heavy industry and includes 1.8 million square feet of building space. The main buildings house office space, production and manufacturing areas and storage areas. The entire site is bounded by Burton Avenue, the City of Wyoming Fire Department and residential areas to the north, commercial/industrial areas to the south, Pinery Park and commercial/residential areas to the east, and Burlingame Avenue and commercial/industrial areas to the west.

In addition to the manufacturing and storage buildings on the property the site contains an inactive power house, an on-site wastewater treatment plant (WWTP) and a lined emergency storm water overflow basin. The basin was previously used as a storm water retention pond.

Prior to 1946 the site was a low-lying area used as agricultural land. General Motors Corporation (GMC) purchased the property and built its Diesel Equipment Division facility. After several changes of corporate name and ownership the facility became known as Delphi Energy & Chassis Systems – Wyoming Operations. In October 2009 ownership of the facility was transferred from Delphi Corporation to General Motors Components Holdings (GMCH), and it is currently known as GMCH Wyoming Operations.

GMC filed for Chapter 11 protection under the United States Bankruptcy Code on June 1, 2009 and changed its name to Motors Liquidation Company. On July 10, 2009 a new company named General Motors Company (subsequently renamed General Motors LLC, or GM LLC) emerged. GM LLC assumed operation of the Wyoming Facility as GMCH.

In order to address RCRA corrective action obligations for the Wyoming Facility, EPA and GM LLC entered into a Performance Based Corrective Action Agreement (PBCAA) on September 27, 2010. GMCH managed the daily operation of the Wyoming Facility as EPA and GM LLC began discussion of an Administrative Order on Consent to serve as a legally-binding instrument for completion of corrective action at the Facility. The Administrative Order on Consent was executed on September 25, 2013.

Throughout the Facility's history it has been a manufacturer of automotive parts. Manufacturing processes have included wire draw, cold forming, screw machining, heat treating, grinding, plating and assembly. These operations require the use of plating solutions, degreasing solvents, and oils for lubricating and cutting.

Surface Water Hydrology

Three off-site surface water bodies are located in the area of the Facility (Figure 1).

- A small lake at Battjes Park, approximately 1,000 to 1,500 feet northwest of the Facility;
- The Grand River, approximately 1 mile north-northwest of the site; and
- Plaster Creek, a tributary of the Grand River, located approximately 1.5 miles east of the Facility.

Groundwater elevation and flow data collected during investigation of the Facility and surrounding area shows that the lake at Battjes Park does not appear to receive groundwater discharge from the GMCH property.

An underground 48 to 60-inch diameter pipeline, known as the Wyoming Drain, runs along the edge of the Facility property. The Wyoming Drain conveys storm water from the City of Wyoming's storm water retention pond southeast of the GMCH Facility to Plaster Creek. The Wyoming Drain occasionally receives part of the storm water from the Facility's emergency overflow basin.

Regional Geology and Groundwater Flow

The Facility is underlain by 30 to 75 feet of unconsolidated glacial sediments which consist of coarse to fine-grained sand with alternating layers of gravel and larger cobbles. These unconsolidated sediments are in turn underlain by bedrock which is primarily degraded and undegraded shale with beds of gypsum, sandstone and limestone (Figure 2).

Underneath the central portion of the Facility the unconsolidated sediments (or the shallow aquifer) is relatively thin (about 30 feet thick) across the northeastern portion of the property but thickens toward the west and southwest to more than 80 feet. Off-site, the shallow aquifer thins toward the far north because of increasing elevation of the bedrock surface, and toward the east because of thickening clay strata.

During investigation of the GMCH Facility several borings were drilled into the bedrock. A tight and competent clay layer overlies the bedrock. The bedrock beneath the property is predominantly shale which has very low permeability and transmissivity. Topography of the bedrock surface is very uneven, consisting of paleo-ridges and valleys which were eroded before the overlying unconsolidated soils were deposited. The uneven surface of the bedrock affects the directions of groundwater flow through the shallow aquifer.

Groundwater is generally encountered from 6 to 7 feet below ground surface (bgs) at the eastern and northeastern portions of the Facility to approximately 19 to 20 feet bgs at the northwestern portion of the property. Groundwater flow in the region is toward the north, in the direction of the Grand River which is 1.5 miles away for the Facility. Beneath the residential area north of the Facility, the water table occurs 6 to 20 feet bgs.

Midway beneath the Facility the bedrock surface rises and forms an east-west "ridge" which reduces the saturated thickness of the unconsolidated sediments to approximately 30 feet. The bedrock surface deepens and the unconsolidated sediments thicken toward the north and off-site. The north-facing slope of the bedrock ridge increases groundwater flow velocity to increase toward the north property line and immediately off-site, yet the velocity decreases north of Lee Street. Estimated groundwater flow velocity across the region is 0.88 foot/day or 320 feet/year.

Water Supply and Groundwater Use

The City of Wyoming supplies water to the Facility and the surrounding area, for potable and non-potable uses. The City draws this water from Lake Michigan.

Part of the investigation of the Facility and surrounding area included a water well location survey, identifying wells for potable and non-potable uses. In 2005 one potable well was identified at a residence located on Marquette Street, approximately 3,500 feet from the downgradient (north) Facility property boundary. This well was sampled during the investigations and no contaminants attributable to Facility operations were detected. The residence is currently connected to City drinking water lines and in 2015 the property owner verified that the well is no longer used. The Kent County Health Department is currently arranging for this well to be abandoned.

Ecology

The Facility and the immediate surrounding area have been significantly developed with much of the ground surface covered by buildings and pavement, such as commercial and industrial buildings, residential communities and public roadways. Approximately 95% of the Facility property is covered by buildings or pavement. The uncovered portion of the Facility is composed of either maintained grass lawn or landscaping.

The owner/operator's consultants conducted a habitat assessment to identify the potential for impacts from the Facility to affect endangered, threatened or special concern species, or high-quality natural communities. The habitat assessment did not identify any areas with unique or otherwise protected habitat. As previously described, the Facility does not have any natural areas for wildlife. Potential receptors are limited to species adapted to urban areas (eg., raccoons, gophers, rodents or common birds). Contaminated groundwater is not expected to discharge to surface water.

INVESTIGATIONS AND INTERIM MEASURES TAKEN

Investigations and Actions Prior to the RCRA Facility Investigation (RFI)

In 1993 EPA and its contractors performed an initial environmental investigation of the Facility (then known as General Motors Corporation, AC Rochester Division) to identify solid waste management units (SWMUs) and areas of concern (AOCs) which have or potentially release hazardous wastes or hazardous constituents at concentrations that could present unacceptable exposure to human health and the environment. This initial investigation is called the Preliminary Assessment/Visual Site Inspection (PA/VSI).

The PA/VSI identified the following five SWMUs and three AOCs (Figure 3):

- SWMU 1 – Southeast Hazardous Waste Storage Area
- SWMU 2 – Wastewater Treatment Plant
- SWMU 3 – Liquid Cyanide Waste Storage Area
- SWMU 4 – Northeast Hazardous Waste Storage Area
- SWMU 5 – Basement Tank Storage Area

- AOC 1 – TCE (trichloroethene) Spill Area
- AOC 2 – Cyanide Release Area/Stormwater Retention Pond
- AOC 3 – Gasoline and Diesel Fuel Release Area

In December 2002 the Facility's (then known as Delphi Corporation, Delphi Energy & Chassis Systems, Wyoming Operations) consultants completed their Current Conditions Report (CCR) which expanded on the PA/VSI for the Facility. GMC combined the nomenclature for all

SWMUs and AOCs into Areas of Interest, or AOIs. The CCR identified the following 21 AOIs (Figure 4):

- AOI-1 – TCE Still Bottom Tank Area (historic AOC-1)
- AOI-2 – Cyanide Waste Storage Tanks (historic SWMU-3)
- AOI-3 – Wastewater Treatment Plant (historic SWMU-2)
- AOI-4 – Grinding Swarf Collection Area
- AOI-5 – Quench Oil Stacks
- AOI-6 – Stormwater Retention Basin (historic AOC-2)
- AOI-7 – Free Product Observation-Chip Crusher Area
- AOI-8 – Former Gasoline UST
- AOI-9 – Former Tank Farm (historic AOC-3)
- AOI-10 – Former Tank Area West
- AOI-11 – Former Plating Area/Maintenance Basement
- AOI-12 – Southeast Hazardous Waste Storage Area (historic SWMU-1)
- AOI-13 – Northeast Hazardous Waste Storage Area (historic SWMU-4)
- AOI-14 – Basement Tank Storage Area/Heat Treat & Maintenance Basement (historic SWMU-5)
- AOI-15 – Sumps (approximately 60 located around the Facility)
- AOI-16 – Satellite Accumulation Areas
- AOI-17 – Chip Tower
- AOI-18 – Heat Treat Portion of Heat Treat & Maintenance Basement
- AOI-19 – Fire Training Area
- AOI-20 – Historical UST Areas
- AOI-21 – PCB-Containing Transformers

In addition to identifying the AOIs, the CCR described the screening process for determining which of the units warranted further investigation under the RFI. The screening was based on:

1. Site visits and visual inspections
2. Interviews with past and current employees
3. File reviews
4. Documentation of past or current releases
5. Potential for future releases
6. Whether or not units still exist
7. Whether or not releases have been addressed by previous remedial actions
8. All available sampling and analytical data

The Facility-wide screening goals for determination of human exposure risk are (A) EPA's non-cancer hazard index (HI) of 1 or less and a cumulative site cancer risk (CSCR) of 1×10^{-4} (one in 10,000), or (B) single-chemical cancer risks that exceed Michigan's single-chemical target risk

of 1×10^{-5} (one in 100,000). These goals were applied during the CCR and RFI and are discussed further in this SB.

The CCR concluded that the RFI must address AOIs 1, 2, 4, 6, 7/11, 8, 10, 15, 17, 19, and 20.

Investigations conducted during preparation of the CCR revealed four additional AOIs that warranted investigation under the RFI. These are:

- AOI-22 – Source of TCE in Well MW-111
- AOI-23 – Site Groundwater (off-site, on-site and perimeter wells)
- AOI-24 – Northern Parking Lot
- AOI-25 – Polynuclear Aromatic Hydrocarbons (PAHs) along Buringame Avenue

Interim Measures

The Facility owner/operator and its consultants discovered that contamination at the following AOIs required prompt remedial action (i.e., interim measures) in order to address potentially unacceptable exposure risk discovered before the RFI risk assessment had been completed:

- AOI-1 TCE Still Bottom Tank Area
- AOI-2 Cyanide Waste Storage Tanks
- AOI-6 Storm Water Retention Basin
- AOIs-23 and 24 Site Groundwater and Northern Parking Lot

AOI-1 (Figure 5)

The interim measures conducted at the AOI-1 source area (Figure 5) since 1986 are:

- Removal of the TCE still bottoms UST;
- Removal of approximately 100 to 150 cubic yards of contaminated soil to an extent limited by adjacent structures and utility lines;
- Installation and operation of a 26-inch diameter skimming well (W-86-PW) to expedite the removal of LNAPL along with pumping wells W-86-1 and W-88-PW; and
- Several phases of investigations to define the nature and extent of the contamination.

The volume of LNAPL extracted by W-86-PW decreased over time and its operation was terminated in 2005. To date, LNAPL has not been present in W-86-PW. Groundwater pumping from wells W-86-1 and W-88-PW has continued since 1997.

The Facility owner/operator began addressing contamination at this AOI in 1986. TCE and oil had been released from a 2,000-gallon TCE still-bottom waste oil underground storage tank (UST) in this area and had formed an LNAPL accumulation lens in soil and groundwater. In August 1986, the Facility removed the UST under Michigan Department of Environmental

Quality (MDEQ) oversight. During this initial excavation the LNAPL was discovered. Between 100 and 150 cubic yards of contaminated soil were removed during the initial excavation. The boundaries of the excavation were greatly limited by adjacent buildings and numerous utility lines. A 26-inch diameter extraction well, designated W-86-PW, was installed in the excavation to collect and remove the LNAPL, and the pit was backfilled with sand and paved with concrete.

In 1987, the Facility performed a second phase of investigation which included the installation of additional monitoring wells (designated W-87-1 through W-87-9) and several temporary monitoring wells to determine the location and concentrations of TCE in groundwater. This study showed that the source of TCE contamination is the LNAPL mass on the shallow water table. Dissolved TCE concentrations in groundwater decreased significantly with depth, and free-phase TCE was not detected.

To supplement extraction well W-86-PW two pumping wells (W-86-1 and W-88-PW) were installed in the vicinity. The additional wells extracted both LNAPL and contaminated groundwater. Contaminated groundwater is pumped to the City of Wyoming publicly-owned treatment works (POTW) under a sanitary sewer discharge permit.

Absorbent socks for collecting LNAPL have been placed in wells MW-210, MW-211, W-87-2E and W-87-6R. These socks are inspected, and replaced if necessary, on approximately a monthly basis.

AOI-2 (Figure 6)

In early 2010, GMCH removed two above-ground storage tanks, an adjacent utility/pump shed (See Haley & Aldrich of Michigan, Inc., 2010, October Generator Closure Report, Waste Liquid Cyanide Storage Tanks referenced in the Appendix to the SB) as part of RCRA closure activities for the site. Later in 2010 GMCH performed additional RCRA closure activities which included excavation of contaminated soil in the storage tanks area. All closure activities were conducted under the oversight of the Michigan Department of Environmental Quality (MDEQ).

Due to AOI-2's proximity to utility lines, building slabs and other structures not all contaminated soil was removed. MDEQ determined that the area must remain in post-closure status with waste left in place, which means that the State may require further removal of contaminated soil in the future.

During the closure activities at AOI-2 the adjacent monitoring wells were sampled for three quarters. No in-situ LNAPL was observed in the soil and groundwater at AOI-2 nor the adjacent monitoring wells during the tank removal and excavation process. LNAPL was discovered in two of the wells during the last of four quarterly sampling events.

Following the discovery of LNAPL, GMCH continued monitoring of the groundwater and began recovery of the LNAPL. From June through August of 2011, the Facility recorded groundwater

elevation and LNAPL thickness (where present) in order increases of LNAPL thickness with rise of the water table. GMCH began using peristaltic pumps to extract LNAPL from the monitoring wells that contained measurable thickness of the liquid.

In June 2011, the Facility had a composite sample of the LNAPL analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), metals, and total petroleum hydrocarbons (TPH). The detected compounds and metals are listed in Table 1, below:

Table 1: Constituents of Concern Detected in AOI-2 LNAPL

Constituents (ppm)	Sampled 6-29-11	Sampled 8-31-11
VOCs	None Detected	Not Analyzed
SVOCs	None Detected	Not Analyzed
PCBs		
Aroclor 1254	61	160
Metals		
Arsenic	4.7	15.0
Barium	6.7	6.7
Chromium (total)	180	240
Chromium (hexavalent)	Not Analyzed	9.6
Lead	1.2	1.1
TPH (gasoline range)	22,000	Not Analyzed
TPH (diesel range)	870	Not Analyzed

GMCH's investigation and analysis of the LNAPL indicate that the fluid is not affiliated with the former Cyanide Waste Storage Tanks. In addition to finding no detectable levels of cyanide, the tanks did not contain non-aqueous liquids during their service; no LNAPL was observed in the excavation during closure activities, and no LNAPL was detected in the adjacent monitoring wells before and during closure of the tank area.

Since the time of closure activities at AOI-2, the volume and measurable thickness of the LNAPL has decreased. LNAPL was detected as a sheen at and just above the water table during the installation of monitoring wells W-90-10 through W-90-14. A one-time measurable thickness of the liquid (4.3 inches) was observed in W-90-14 shortly after its installation and development. Monitoring well W-90-16 was installed downgradient of W-90-14, but there has been no indication of LNAPL at this location. The presence of LNAPL at measurable thickness has been delineated to its boundaries in groundwater at wells W-90-7, W-90-8 and W-90-14.

The calculated CCR of 1×10^{-4} and HI of 1 or less for risk of human exposure for the LNAPL at AOI-2 are within EPA's acceptable limits and the single-chemical human exposure risk are also below Michigan's single-chemical or cumulative target cancer risk of 1×10^{-5} , with the exception of the PCBs concentrations which exceed the Part 201 direct contact criterion of 16 mg/kg.

GMCH is currently monitoring the thickness of the LNAPL and is recovering the liquid with absorbent socks in wells MW-210, MW-211, W-86-2, W-87-6R, W-90-7, W-90-8 and W-90-14.

EPA's proposed final remedy for the LNAPL at AOI-2 is discussed further in the EPA's PROPOSED REMEDY section of this SB.

AOI-6 (Figure 4)

The former Storm Water Retention Basin was removed in August 2005 as an interim measure to eliminate the potential for discharge of impacted sediments within the basin to the Facility storm sewers. The unit was drained by the owner/operator and all accumulated sediments were removed. The Facility's consultants sampled the underlying soil for VOCs, SVOCs and metals. The concentrations of all detected compounds were within the previously described EPA and Michigan acceptable human health risk range for Cumulative Site Cancer Risk, non-cancer Hazard Index, and Single Chemical exposure. Monitoring wells were installed in the vicinity of AOI-6 to assess potential impacts to groundwater from the unit. Concentrations of vinyl chloride and beryllium found in the monitoring wells exceeded the risk criteria, and are discussed in the risk assessment portion of this SB.

After completing removal activities, the Facility's contractors backfilled the excavation with clean sand over the low-permeability clay liner under the basin. Currently, the unit is only used for temporary retention of storm water overflow which exceed the capacity of the Facility storm sewers. Retained storm water is subsequently discharged to the Wyoming Drain under permit from the City of Wyoming.

AOIs-23 and 24 (Figures 4 and 7)

The plume of contamination from AOIs-23 and 24 consists of chlorinated VOCs (CVOCs) and petroleum-related VOCs. The CVOCs are primarily TCE and its degradation compounds cis-1,2 dichloroethene (cis-1,2 DCE) and vinyl chloride. Petroleum VOCs are benzene, toluene, ethyl benzene and xylenes (BTEX) and are found in the site groundwater to a more limited extent than the CVOCs. Data from the RFI show that the CVOCs are only present in the shallow aquifer and are confined to the lower portion of the shallow aquifer downgradient of the Facility.

The primary source of the CVOCs in AOIs-23 and 24 was a release from the former TCE Still Bottoms Tank at AOI-1. Soil and groundwater near the former tank were impacted by the LNAPL. Vertical profiling of the groundwater beneath the LNAPL showed that the highest concentrations of TCE were detected near the water table/LNAPL horizon but decreased significantly with depth, suggesting that TCE solvated within the LNAPL is the primary source of the CVOC and its degradation compounds in the shallow aquifer. Free-phase TCE has not been detected.

In order to control the off-site migration of CVOCs and petroleum VOCs in groundwater, the Facility owner/operators (Delphi Energy & Chassis) installed three high-volume extraction wells along the northern (downgradient) boundary of the Facility. The installation was performed from July through September 2006 and the extraction wells were designated EW-701, EW-702 and EW-703 (Figure 7). The entire array is known as the IMGES.

The IMGES wells are screened at depths between 28 to 33 feet bgs in the shallow aquifer. The three wells discharge through a single pipeline to the City of Wyoming Publicly Owned Treatment Works (POTW) under a sanitary sewer variance. Pumping rates have varied over 12 years of operation depending upon conditions encountered and have ranged from approximately 20 to 70 gallons per minute (gpm). Approximately every quarter, the IMGES is shut down temporarily for the removal of fouling from the screens, conveyance piping and pumps.

After startup of the IMGES, effluent from the system was sampled and analyzed for constituents of concern. Because the appearance of BTEX was not anticipated, the Facility investigated AOI-24 to determine its source. The source was found to be a mass of non-chlorinated VOC solvent that appears to be Stoddard Fluid, more commonly known as "mineral spirits". The BTEX mass is centered at monitoring well MW-710 (Figure 7), which is the only location where the contaminant occurs in free-phase as a LNAPL. The origin of this contamination is not known but it is of limited areal extent (< 1.5 acres) and restricted to the level of the water table. Groundwater monitoring data have shown that BTEX compounds have not been detected more than 150 feet beyond the downgradient property line, which indicates that the contaminants degrade readily.

The majority of the initial CVOC mass at the site has been removed by the AOI-1 closure and removal actions. Stable or decreasing concentration trends of CVOCs in on-site monitoring wells have been observed prior to startup of the IMGES and have continued after startup of the system, as will be discussed further in the Proposed Remedy section of this SB.

The RCRA Facility Investigation (RFI) and Baseline Human Health Risk Assessment (BHHRA)

The RFI was conducted in seven phases from 2003 through 2010. During this time, the Facility owner/operators and their consultants evaluated potential risk to human health at 15 AOIs that were identified by EPA and the Facility owner/operators. Depending upon the history of each AOI, the Facility consultants sampled soil, groundwater, surface water, sediment or soil gas.

Constituents of Concern that were detected at the Facility before and during the RFI include:

Volatile Organic Compounds

Acetone, Benzene, 1,1 – dichloroethene (DCE), 1,2 – DCE, Ethylbenzene, Methylene chloride, Trichloroethene (TCE), cis (and trans), Vinyl chloride, and Xylenes.

Semivolatile Organic Compounds (SVOCs)

Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, bis(2-ethylhexyl)phthalate, Indeno(1,2,3-cd)pyrene and Napthalene.

Polychlorinated biphenyls (PCBs)

Total PCBs and Aroclors.

Inorganics

Antimony, Arsenic, Beryllium, Cadmium, Chromium, Cyanide, Lead, Nickel, Thallium, Vanadium and Zinc.

Baseline Human Health Risk Assessment

Data Selection

All soil, groundwater, soil vapor, and LNAPL data collected prior to and during the RFI that are representative of current baseline conditions were evaluated for human health risk assessment.

Borehole water data were not evaluated for the BHHRA because these data were collected primarily to support the location of monitoring wells installed during the RFI and do not represent typical groundwater quality at the Facility. Also, sediment and surface water data collected during the closure and conversion of AOI-6 were not used because the contaminated media have been removed off-site.

Exposure Assessment

The Exposure Assessment is based upon current and reasonably expected future land use at and around the Facility. The GMCH property is expected to be used for heavy industrial purposes and use of the surrounding area will remain residential, municipal and commercial/industrial for the foreseeable future. EPA will revisit all human health risk assumptions and may seek more direct remedies for contamination if GM or the current owner/operator contemplates demolition of buildings and/or change of land use.

The Facility's consultants conducted the BHHRA to assess potential impacts of the detected COCs on a variety of human receptors, both on-site and off-site of the property. These included:

On-Site:

- Routine workers
- Maintenance workers
- Construction workers
- Trespassers

Off-Site:

- Residents
- Routine workers
- Maintenance workers

For calculation of exposure risk to these receptors, the Facility's consultants evaluated the following pathways for exposure to COCs:

On-Site

- Inhalation of soil vapor or airborne contaminated dust
- Incidental ingestion of contaminated soil or airborne contaminated dust
- Dermal absorption (i.e., via the skin) of COCs via skin contact with contaminated soil, LNAPL or groundwater

Exposure of workers via potable (drinking, bathing) use of on-site groundwater was not evaluated in the BHHRA because groundwater is not used as a potable supply at the Facility, and a deed restriction prohibiting future potable groundwater use will be put in place as a final corrective measure. Exposure of routine workers to COCs by dermal contact with contaminated groundwater is not currently possible because of the nature of the manufacturing processes, and a deed restriction prohibiting future non-potable use will be put in place as a final corrective measure.

Off-Site

- Inhalation of COCs from on-site soil vapor or contaminated fugitive dust
- Inhalation of COCs from off-site contaminated groundwater

Exposure of residents via potable and non-potable groundwater uses is not expected because groundwater is not currently or reasonably expected to be a source of water supply downgradient of the Facility. The primary reason for this is reliance upon and enforcement of an existing Kent County Health Department ordinance which prohibits the installation of private groundwater wells in a contaminated aquifer. This will be discussed as an institutional control in the final corrective measures proposal portion of this SB.

Screening Criteria for the RFI

Risk management decisions are based on EPA and Michigan's acceptable excess cancer risk cleanup criteria.

The Facility's consultants compared soil characterization data pertaining to the site with screening criteria based on cleanup standards developed by the MDEQ for implementation of Michigan Part 201 regulations. The soil screening criteria also include site-specific vapor intrusion (VI) which were calculated using the same target cancer risk and target non-cancer hazard quotient as the Part 201 criteria. The following are the screening criteria used to evaluate the soil analytical data during the RFI:

- Part 201 Industrial/Commercial II, III, IV Soil Direct Contact Criteria;
- Part 201 Industrial/Commercial II, III, IV Particulate Soil Inhalation Criteria; and
- Site-Specific Risk-Based Industrial Soil Vapor Intrusion Criteria

Groundwater data pertaining to the Facility were compared with screening criteria that are based on cleanup criteria developed by MDEQ for implementation of the Part 201 regulations. The groundwater screening criteria also included site-specific VI criteria that were calculated using the same target cancer risk and hazard quotient as the Part 201 criteria. The following are the screening criteria used to evaluate groundwater data during the RFI:

- Part 201 Residential Drinking Water Criteria;
- Part 201 Groundwater Contact Criteria;
- Site-Specific Risk-Based Residential Groundwater VI criteria; and
- Site-Specific Risk-Based Industrial Groundwater VI Criteria

As stated in this SB, the acceptable limits for potential human health risk used during the RFI to determine if specific AOIs may warrant corrective measures were EPA's CSCR of 1×10^{-4} and non-cancer HI less than or equal to 1, or Michigan's single-chemical or cumulative target cancer risk of 1×10^{-5} . The specific screening values for each COC in soil and groundwater are summarized in Tables 2 and 3, below:

Table 2: RFI Screening Criteria for Soil

Contaminant	Part 201 Direct Contact	Part 201 Soil Particle Inhalation	Risk-Based Soil Vapor Intrusion
VOCs			
Acetone	73,000	1,700,000,000	68,000
Benzene	400	470,000	4.4
1,1-DCE	570	78,000	250
Cis-1,2-DCE	640	1,000,000	NA
Trans-1,2-DCE	1,400	2,100,000	740
Ethylbenzene	140	13,000,000	1,200
Methylene chloride	2,300	8,300,000	73
Toluene	250	12,000,000	6,200
TCE	500	2,300,000	20
1,2,4-trimethylbenzene	110	36,000,000	9.7
Vinyl chloride	34	890,000	3.9
Xylenes	150	1,300,000,000	120
SVOCs			
Benzo(a)anthracene	80	NA	730,000
Benzo(a)pyrene	8.0	1,900	910,000
Benzo(b)fluoranthene	80	NA	87,000
Bis(2-ethylhexyl)phthalate	10,000	890,000	46,000,000,000
Indeno(1,2,3-cd)pyrene	80	NA	24,000,000
Naphthalene	52,000	88,000	270
PCBs			
PCBs – total Aroclors	16	6,500	640
Inorganics			
Antimony	670	5,900	NA
Arsenic	37	910	NA
Beryllium	1,600	590	NA
Cadmium	2,100	2,200	NA
Chromium	9,200	240	NA
Cobalt	9,000	5,900	NA
Cyanide-total	250	250	NA
Lead	900	44,000	NA
Manganese	90,000	1,500	NA
Nickel	150,000	16,000	NA
Thallium	130	NA	NA
Vanadium	5,500	NA	NA
Zinc	630,000	NA	NA

All values in mg/kg = milligrams per kilogram (or ppm). NA = None Available

Table 3: RFI Screening Criteria for Groundwater

Contaminant	Part 201 Residential Drinking Water	Part 201 Groundwater Contact	Risk-Based Residential Groundwater Vapor Intrusion	Risk-Based Industrial Groundwater Vapor Intrusion	1% Of Solubility
VOCs					
Acetone	0.73	31,000	200,000	2,500,000	10,000
Benzene	0.005	11	1.8	19	18
1,1-DCE	0.007	11	84	710	23
1,2-DCE - total	0.07	200	NA	NA	35
Cis-1,2-DCE	0.07	200	NA	NA	NA
Trans-1,2-DCE	0.1	220	28	240	63
Ethylbenzene	0.7	170	710	6,100	1.7
Methylene chloride	0.005	220	31	340	130
Toluene	1.0	530	3,200	28,000	5.3
TCE	0.005	22	7.9	81	11
Vinyl chloride	0.002	1	0.92	9.4	28
Xylenes	10	190	66	580	1.7
SVOCs					
Benzo(a)anthracene	0.0021	0.0094	30	1,200	0.000094
Benzo(a)pyrene	0.005	0.001	14	550	0.000016
Benzo(b)fluoranthene	0.0015	0.0015	2.2	72	0.000015
Bis(2-ethylhexyl)phthalate	0.006	0.32	110,000	1,800,000	0.0034
Indeno(1,2,3-cd)pyrene	0.002	0.002	140	5,300	0.000022
Napthalene	0.52	31	1.4	18	0.31
PCBs					
PCBs – total Aroclors	0.0005	0.0033	0.089	0.96	NA

All values in mg/L = milligrams per liter (or ppm). NA = None Available

Table 3, continued

Contaminant	Part 201 Residential Drinking Water	Part 201 Groundwater Contact	Risk-Based Residential Groundwater Vapor Intrusion	Risk-Based Industrial Groundwater Vapor Intrusion	1% Of Solubility
Inorganics					
Antimony	0.006	68	NA	NA	NA
Arsenic	0.01	4.3	NA	NA	NA
Beryllium	0.004	290	NA	NA	NA
Cadmium - dissolved	0.005	190	NA	NA	NA
Cadmium	0.005	190	NA	NA	NA
Chromium-total - dissolved	0.1	460	NA	NA	NA
Chromium	0.1	460	NA	NA	NA
Cobalt	0.04	2,400	NA	NA	NA
Cyanide - total	0.2	57	NA	NA	NA
Lead	0.004	NA	NA	NA	NA
Manganese - dissolved	0.86	9,100	NA	NA	NA
Manganese	0.86	9,100	NA	NA	NA
Nickel - dissolved	0.1	74,000	NA	NA	NA
Nickel	0.1	74,000	NA	NA	NA
Thallium	0.002	13	NA	NA	NA
Vanadium	0.0045	970	NA	NA	NA
Zinc	2.4	110,000	NA	NA	NA

All values in mg/L = milligrams per liter (or ppm). NA = Not Available

Updated Toxicity Values and AOIs 17 and 25

On January 19, 2017 EPA issued revised toxicity values for benzo(a)pyrene (or BaP) and other carcinogenic polynuclear aromatic hydrocarbons in EPA's national data base for human exposure risk calculations. This determination has the overall effect of reducing cancer risk estimates for areas of contamination that contain BaP. Because BaP is the contaminant upon which the calculated human health exposure risk was considered unacceptable for AOIs 17 and 25, GMCH's consultants re-calculated the human health risk estimates for the subject areas with the new EPA toxicity values. EPA concurs with the Facility's revised determination that exposure risk for human health is within acceptable range under current conditions for AOIs 17 and 25, and that corrective measures are not warranted. EPA notes that it may revisit this determination if toxicity values and site conditions change at AOIs 17 and 25.

At several other AOIs, maximum concentrations of COCs were detected in soil and/or groundwater at concentrations exceeding the screening criteria listed in Tables 2 and 3. However, through the calculation of conservative exposure point concentrations, evaluation of current institutional and engineered controls, limited extent of contamination, and both current and foreseeable exposure scenarios, the results of the BHHRA showed that risk of human exposure is within the acceptable HI, CSCR, or Michigan's Single-Chemical risk range. These AOIs are listed in Table 4, below:

Table 4: AOIs Not Requiring Corrective Measures Under Current Conditions

AOI	Contaminants Evaluated in the RFI
4	acetone, vinyl chloride, arsenic, lead, vanadium, benzene
6	beryllium, vinyl chloride
7	lead, vanadium, cis-1,2-DCE, TCE, vinyl chloride
8	benzene, toluene, ethylbenzene, xylenes
10	arsenic, lead, vanadium
11	lead, vanadium, cis-1,2-DCE, TCE, vinyl chloride
15	arsenic, beryllium, chromium, lead, manganese, nickel, vanadium, TCE, cis-1,2-DCE, vinyl chloride, bis(2-ethylhexyl)phthalate
17	benzo(a)pyrene
19	lead
20	beryllium, lead, manganese, vinyl chloride
22	cis-1,2-DCE, TCE, vinyl chloride
25	benzo(a)pyrene

Situation of Off-Site Groundwater Contamination (Figures 8, 9 and 10)

The contaminants which have migrated to the north beyond the Facility property boundary and beneath the adjacent residential area are predominantly the chlorinated VOCs, i.e., TCE, cis-1,2-DCE and vinyl chloride. BETX compounds have been detected in on-site groundwater (AOI-24); however, these compounds appear to degrade relatively quickly and have not been detected north of Burton Street (Figures 9 and 10).

As previously described, the majority of the on-site chlorinated VOC mass has been removed by the corrective measures taken at AOI-1, which is the source of the CVOCs detected beneath the residential area. Monitoring of the residual chlorinated and non-chlorinated VOCs in on-site wells shows stable to decreasing concentrations.

The three IMGES wells (EW-701, EW-702 and EW-703) that were installed along the northern property boundary of the Facility are intended to control off-site migration of the VOCs present in the on-site shallow aquifer.

For seven years, the Facility's consultants have sampled groundwater beneath the residential area from various depths and analyzed the samples for VOC contamination. The historical data show that CVOC concentrations of < 1 to approximately 30 micrograms per liter (ug/L or parts per billion or ppb) are confined to the lower portion of the aquifer above the bedrock surface, and that this contaminated horizon is overlain by 10 to 30 feet of groundwater in which CVOCs are either non-detect or meet drinking water criteria. As previously stated, the water table in the residential area occurs from 6 to 30 feet bgs. Figure 8 illustrates this situation in cross-section for vinyl chloride contamination as an example.

The off-site plume of CVOC contamination in groundwater terminates approximately 4,000 feet north of the Facility property boundary, which is south of Rathbone Street (Figures 9 and 10). Natural degradation processes (oxidation/reduction and bacterial action), combined with the on-site source removal at AOI-1 and operation of the IMGES appear to have made the CVOC mass diminish over time and have prevented its further migration.

In addition, consultants for GMCH conducted a Solute Transport Evaluation for the AOI-23 site-wide groundwater (found at Appendix A of the Corrective Measures Proposal) and have concluded that further off-site migration of chlorinated and non-chlorinated VOCs is held in check by natural attenuation processes. GMCH's evaluation also concludes that continued operation of the IMGES is not necessary in order to maintain acceptable levels of on-site and off-site human exposure risk.

EPA has addressed the necessity for operation of the IMGES/GES in the remedy alternatives section below in this SB.

Additional Evaluation of On-Site and Off-Site Groundwater Vapor Intrusion Risk

In order for EPA and the Facility to verify that there is no unacceptable on-site and off-site human exposure risk via the intrusion of vapor-phase contaminants into indoor air, GMCH investigated on-site groundwater and soil gas in addition to shallow groundwater beneath the residential area.

During April 2014, GMCH sampled soil gas at a depth of 5 feet bgs adjacent to wells W-87-2 and W-87-6R at AOI-1 (Figure 5). EPA and GMCH had previously reviewed soil and groundwater data obtained during and after remediation of AOI-1 and determined that naphthalene and vinyl chloride would pose the highest risk of vapor intrusion and would be the target compounds for the soil gas study. Naphthalene was not detected in the soil gas samples. However, vinyl chloride was detected at each location at concentrations of 120 and 33 micrograms per cubic meter of air ($\mu\text{g}/\text{m}^3$) respectively. These concentrations were below the Michigan Department of Human Health Services (DHHS) soil gas criterion of $930 \mu\text{g}/\text{m}^3$.

For evaluation of potential VI risk from VOC contamination in both on-site and off-site groundwater, GMCH's consultants used conservative hypothetical assumptions that the IMGES is shut down and that on-site contaminant concentrations will migrate off-site with no attenuation (although investigation has demonstrated that natural attenuation is indeed occurring). Specifically, groundwater VI risk estimates for residential buildings were calculated for 65 on-site and property line water table wells using EPA's most conservative attenuation factors and the maximum contaminant concentrations for the two most recent on-site groundwater sampling rounds at the time (through September 2016). Additionally, the on-site and perimeter monitoring data were compared with EPA and Michigan's acceptable excess cancer risk cleanup criteria. The specific risk calculations may be found in Appendix E of the Facility's October 2017 *Final Revised Corrective Measures Proposal* which is listed in the Administrative Record for this SB.

The calculated residential VI risk exceeds the acceptable limits at only three on-site wells (MW-709, MW-710 and EW-701), which are located in AOI-24 (Figure 7), because of elevated xylene concentrations. However, this location does not present an unacceptable off-site VI risk because the maximum xylene concentration is below the drinking water MCL of 10 mg/L for this compound, and historical off-site monitoring has shown that xylene and other BTEX degrade quickly at or beyond the property boundary.

In order to verify that CVOC and non-chlorinated VOC contamination in off-site groundwater does not pose unacceptable indoor air VI risk in the residential area to the north of the Facility, EPA wanted additional evaluation of groundwater quality at the water table, i.e., closest to the average 6-foot depth of residential basements.

Consultants for GMCH installed two new water table monitoring wells, MW-305S and MW-306S, in the residential area to supplement existing water table monitoring wells MW-312S, MW-315S, MW-316S, MW-318S and MW-325S (Figure 9). On April 9, 2014, all of the water table wells were sampled in order to get a “same day” analysis of groundwater quality closest to residential dwellings. All of the groundwater samples were analyzed for the full suite of VOCs by EPA standard method SW-846 8260B.

The only VOC that was detected during this exercise was cis-1,2-DCE, which was found in wells MW-312S, MW-315S, MW-316S and MW-325S at concentrations of 0.0046 mg/L, 0.0026 mg/L, 0.0014 mg/L and 0.0023 mg/L respectively.

These concentrations were well below the compound’s criteria for:

- Federal and Michigan Drinking Water MCL of 0.07 mg/L; and
- EPA and Michigan’s acceptable excess cancer risk cleanup criteria.

No other VOCs were detected during the exercise, which included benzene, TCE and vinyl chloride.

As previously explained in this SB, investigations have shown that the water table in the residential area occurs generally below the assumed the 6-foot (2-meter) bgs average basement depth of private dwellings. Within the aquifer, the horizon at which VOCs and CVOCs are found at concentrations above their respective MCLs is overlain by 10 to 30 feet of groundwater in which VOC and CVOC concentrations are either non-detect or well below MCLs (Figure 8).

EPA has determined that groundwater contamination below the residential dwellings does not present unacceptable risk of human exposure via inhalation of contaminants which intrude as vapor into indoor air.

AOIs Which Require Corrective Measures

EPA and the Facility's consultants compared the concentrations of COCs detected at the AOIs with the human health screening criteria listed in Tables 2 and 3, in addition to assessing whether the presence and concentrations of COCs could present unacceptable risk due to cumulative multiple chemical exposure and/or be sources of off-site releases which may require corrective measures. These comparisons are summarized in Table 5, below:

Table 5: Comparison of Detected COC Concentrations with RFI Screening Criteria

AOI	Contaminant	Maximum Detected In Soil (mg/kg)	Maximum Detected In Groundwater (mg/L)	Whether Exceeds Criteria Listed in Tables 2 and 3	Comments
1	PCBs	8.14	0.0012	No (soil) Yes (gw)	Human exposure pathways incomplete under current conditions. Engineered and institutional controls will be maintained.
	Acetone	0.4	3.7	No (soil) Yes (gw)	
	Benzene	0.21	0.063	No (soil) Yes (gw)	
	Toluene	0.21	2.1	No (soil) Yes (gw)	
	Cis-1,2-DCE	0.068	3.6	No (soil) Yes (gw)	Still bottoms UST removal and remediation of AOI-1 removed source of groundwater contamination.
	TCE	1,100	5.5	Yes (soil) Yes (gw)	
	Vinyl chloride	0.12	14	No (soil) Yes (gw)	Groundwater Extraction System is capturing a portion of contaminant plume.
	Xylenes	3.9	6.3	No (soil) No (gw)	
	Napthalene	20	0.06	No (soil) No (gw)	
	Pyrene	0.44	Not detected	No (soil) No (gw)	
	Bis(2-ethylhexyl)phthalate	3.9	0.24	No (soil) Yes (gw)	Off-site groundwater is not used as a source of potable water.
	Arsenic	7.2	0.029	No (soil) Yes (gw)	
	Barium	330	0.92	No (soil) No (gw)	There is no off-site risk of human exposure through vapor intrusion.
	Beryllium	2	0.091	No (soil) Yes (gw)	
	Cadmium	0.72	0.0041	No (soil) No (gw)	
	Chromium	61	0.18	No (soil) Yes (gw)	
	Cobalt	4.9	2.8	No (soil) Yes (gw)	
	Lead	47	1.5	No (soil) Yes (gw)	
	Manganese	1,500	1.8	No (soil) Yes (gw)	
	Nickel	30	1.3	No (soil) Yes (gw)	
Thallium	0.21	0.005	No (soil) Yes (gw)		
Vanadium	28	0.0091	No (soil) Yes (gw)		
Zinc	79	35	No (soil) Yes (gw)		
Cyanide	Not detected	0.15	No (soil) No (gw)		

Table 5, continued

AOI	Contaminant	Maximum Detected In Soil (mg/kg)	Maximum Detected in Groundwater (mg/L)	Whether Exceeds Criteria Listed in Tables 2 and 3	Comments
2	Cadmium	76.6	0.0392	No (soil) Yes (gw)	Maximum detections in soil are pre-excavation. Analytical data for AOI-2 LNAPL listed in Table 1. LNAPL is currently being recovered. AOI-2 and associated contamination confined well within property boundaries. Human exposure pathways incomplete under current conditions. Engineered and institutional controls will be maintained.
	Chromium	720	0.0148	No (soil) No (gw)	
	Cyanide	24	0.15	Yes (soil) No (gw)	
	Nickel	1,210	0.0339	No (soil) No (gw)	
	PCBs	3.28	Not detected	No (soil)	
23	Benzene	Not sampled	0.016	Yes (gw)	Only exceedances are for drinking water. No drinking water receptors. Contaminant levels stable or decreasing. No indoor air VI risk. Human exposure pathways incomplete under current conditions. Institutional controls will be maintained.
	Toluene	Not sampled	Not detected	No (gw)	
	Ethylbenzene	Not sampled	Not detected	No (gw)	
	Xylenes	Not sampled	Not detected	No (gw)	
	Cis-1,2-DCE	Not sampled	0.13	Yes (gw)	
	TCE	Not sampled	0.013	Yes (gw)	
Vinyl chloride	Not sampled	0.0094	Yes (gw)		
24	Benzene	Not detected	0.01	No (soil) Yes (gw)	Only exceedances are for drinking water. No drinking water receptors. Human exposure pathways incomplete under current conditions. Engineered and institutional controls will be maintained.
	Toluene	1.1	2.1	No (soil) Yes (gw)	
	Ethyl benzene	0.94	2.5	No (soil) Yes (gw)	
	Xylenes	3.5	6.3	No (soil) No (gw)	
	Cis-1,2-DCE	Not detected	0.04	No (soil) No (gw)	
	TCE	Not detected	Not detected	No (soil) No (gw)	
Vinyl chloride	Not detected	0.085	No (soil) Yes (gw)		

mg/kg = milligrams per kilogram (parts per million, or ppm). mg/L = milligrams per liter (parts per million, or ppm).

SUMMARY OF FACILITY RISKS

The GMCH Facility is an active manufacturing complex and is expected to remain as such for the foreseeable future. EPA will revisit human health risk assumptions if GM or the present owner/operator contemplates demolition of buildings and/or changes of land use. As previously described in this SB, the Facility is zoned for light and heavy industrial use. Access to the property is restricted by a security fence, gates, guards and electronic surveillance. The properties surrounding the Facility are residential, municipal public works, commercial/industrial, city park land, and public roads. Uses of these adjacent lands are also expected to remain unchanged for the foreseeable future.

Consultants for the Facility performed the BHHRA as part of the overall RFI. As stated earlier, the acceptable range of human health risk is EPA’s CSCR of 1×10^{-4} and HI of less than or equal to 1 and Michigan’s Single Chemical Risk of 1×10^{-5} . The BHHRA determined whether COCs (contaminants) present within or migrating from the Facility create current or potential unacceptable exposure risk to human receptors through the following pathways.

Potable and Non-Potable Water Use

Off-site residents could be exposed to levels of VOC contaminants above acceptable human health limits by extracting groundwater from the deeper portions of the aquifer for uses such as drinking, bathing, washing vehicles, lawn and garden maintenance, or recreation (eg. "kiddie pool"). However, an area-wide survey determined that there are no active groundwater extraction wells in the entire residential and commercial/industrial zones to the north (downgradient) of the Facility, and drinking water for the Facility and the surrounding area is supplied by City of Wyoming municipal lines. Also, the entire Facility and residential/commercial/light industrial areas north of the Facility are covered by an enforceable Kent County Health Department water supply construction ordinance (Water Supply Regulations, Kent County, Michigan, September 1996) which prohibits the installation of new private water supply wells in the subject area.

To provide an additional enforceable control, GM LLC will petition the City of Wyoming to include the Facility property and the areal extent of the off-site groundwater plume in the City's Code of Ordinances Chapter 30 Water Well Restriction Zone, after EPA issues its FD/RC.

Inhalation of Contaminated Soil Particles or Contaminants as Vapor

There is a possibility that on-site workers may accidentally inhale wind-borne contaminated soil particles during excavations at the Facility for construction or maintenance purposes. Worker safety issues are covered under GMCH's Due Care Plan for the Facility, which includes diagrams that show areas of contamination, contaminant concentrations, and requirements for writing Health and Safety Plans for specific construction and maintenance projects. Requirements include measures for dust suppression and personal protective equipment for the workers.

Off-site receptors such as residents could be exposed to fugitive dust particles from the Facility if on-site contaminated soil is exposed and subjected to dry and windy conditions. However, such occurrences would be very unlikely. Nearly the entire surface of the Facility is covered by buildings, pavement or grass that is maintained.

As described earlier in this SB, EPA and GMCH conducted a thorough assessment to determine if on-site or off-site human receptors are exposed to vapor-phase contaminants at concentrations above the range of risk that is allowable by EPA and the State of Michigan. Consultants for GMCH sampled and analyzed soil gas and groundwater, and then used the data and conservative federal and state screening criteria for calculation of inhalation risk.

Based on these data, EPA has determined that there is no risk of human exposure to vapor-phase contaminants via inhalation of indoor air above the allowable federal and state exposure range, under current conditions. EPA does not expect these conditions to change because off-site contaminated groundwater is confined to the lower level of the aquifer and overlain by

uncontaminated groundwater, and because of the existing Kent County groundwater use ordinance and the proposed City of Wyoming water well restriction ordinance which will prohibit extraction of contaminated groundwater to which humans and animals could be exposed.

Direct Human Contact with Contaminated Soil and Groundwater

As previously described, the enforceable Kent County Health Department ordinance is an effective institutional control that protects off-site receptors from contact with contaminated groundwater by prohibiting its extraction. Contamination that is attributable to the Facility has not migrated to off-site soil.

Ecological Risk

As stated previously, consultants for the Facility have conducted a habitat assessment to identify the potential for contamination from the Facility to affect endangered, threatened or special concern species or high quality natural features. This on-site and off-site assessment did not identify any areas with unique or otherwise protected habitat, and the property does not provide naturalized areas for wildlife, based on current and foreseeable land use of the Facility and surrounding area. Pathways of exposure for terrestrial and aquatic species are incomplete.

Conclusions

Current on-site and off-site conditions do not present unacceptable risk of human and ecological exposure to contamination. EPA has determined that corrective measures and/or continued monitoring are necessary at AOIs 1, 2, 23 and 24 to further remove contaminant mass and provide additional assurance that residual contamination will not present future risks.

SCOPE OF CORRECTIVE ACTION

Final corrective measures for the GMCH Facility must ensure:

1. Soil and groundwater contamination will not endanger human health.
2. Contamination attributable to the Facility that has migrated off-site will not endanger human health or the environment.
3. Institutional and engineered controls to protect human health and the environment will be recorded as a restrictive Environmental Covenant in the property deed, and will be binding on all future owners of the GMCH Facility property.

As summarized in the “Investigations and Interim Measures Taken” of this SB, the Facility owner/operators have installed remedial systems to remove and stabilize releases of contamination at AOIs 1, 2, 23 and 24.

PERFORMANCE STANDARDS FOR CORRECTIVE MEASURES

Each remedial alternative must meet three performance standards which are the main objectives under the RCRA program. These standards are:

1. Protect human health and the environment;
2. Attain media cleanup standards; and
3. Control the sources of releases.

BALANCING CRITERIA

Often, more than one remedial procedure will meet the performance standards listed above. For EPA to select the most appropriate remedy, the technological options must be evaluated before a procedure or combination of procedures is proposed as the final remedy. The balancing criteria for such a decision are:

- Long-term reliability and effectiveness;
- Reduction of toxicity, mobility, or volume of wastes;
- Short-term effectiveness;
- Implementability;
- Cost; and
- State and community acceptance.

GMCH is continuing to remove LNAPL at AOI-1, and as described previously the still bottoms UST contaminant source and contaminated soil have been removed. Chlorinated VOCs from AOI-1 in groundwater are being removed by the IMGES and are attenuating to non-detect off-site. EPA and GMCH concur that LNAPL removal must continue at AOI-1. GMCH will continue to operate the IMGES as the Facility Groundwater Extraction System until EPA determines that its operation may be discontinued, as explained below.

The waste cyanide storage tanks and contaminated soil have been removed at AOI-2. GMCH continues to extract LNAPL from this location and the volume of the liquid is decreasing. The areal extent of the LNAPL mass has been delineated, and its boundaries lie well within the Facility property lines. EPA has determined that this area of contamination will be documented in a survey plat which, along with the Due Care Plan, will be recorded in the property deed. As explained below in the Proposed Remedy section SB, GMCH will continue to extract LNAPL from AOI-2 until EPA determines that active removal is no longer necessary to protect human health and the environment.

SUMMARY OF ALTERNATIVES

EPA has evaluated remedial alternatives for AOIs 1, 2, 23 and 24. GMCH is an active manufacturing facility for which on-site access is controlled. Remedial systems have been installed at and downgradient of the subject AOIs. Pavement and contaminant removal systems are already in place at the Facility and serve as engineered controls to protect human health. Institutional controls which prevent human exposure to contamination are already in place in the downgradient residential and commercial/industrial areas, and such controls will become enforceable at the Facility after EPA issues its FD/RC.

EPA has concluded:

- Current and expected future routine worker, maintenance worker, construction worker and trespasser exposures to soil, groundwater and/or LNAPL would not result in risks that exceed EPA's HI of 1 and CSCR of 1×10^{-4} . single-chemical risks that would not exceed Michigan's single-chemical target risk of 1×10^{-5} for these groups, and
- Under a hypothetical case in which off-site groundwater is unrestricted, unacceptable risk may occur in the future from potable use of contaminated groundwater.

These conclusions are based on the assumption that use of the Facility property and surrounding area will not change for the foreseeable future. Institutional controls (on-site and off-site) will be part of all of the corrective measures alternatives described below.

If future land use changes or the property owner ceases operations and decommissions the Facility, EPA will revisit the human health risk assumptions and may seek more direct remedies for the contamination.

EPA has evaluated alternatives for the final remedy from the perspective of area-wide (on- and off-site) groundwater quality. This focus encompasses contamination issues for AOIs 1, 2, 23 and 24.

Facility-Wide

Alternative 1 – Institutional Controls and Groundwater Performance Monitoring Program

This alternative includes reliance on the existing Kent County Health Department water supply construction regulations and GM LLC's petition to include the Facility and off-site plume in the City of Wyoming Code of Ordinances Chapter 30 for protection of off-site human health and the environment in addition to the on-site land and groundwater use restrictions which will be entered as an Environmental Covenant into the GMCH property deed, as previously described in this SB.

Under Alternative 1 GMCH would also shut down the IMGES and immediately begin monitoring COC concentrations in groundwater downgradient of the extraction system when potential increases ("rebound") of contaminant concentrations at the water table are most likely to occur.

At least 90 days prior to shutting down the IMGES, GMCH will prepare and submit for EPA review and approval its groundwater monitoring plan that will include selected well locations, frequency of sampling, target analyte list, contaminant concentrations that will "trigger" restart of the IMGES, and any other contingency measures as determined by EPA.

Another objective of the groundwater monitoring plan will be long-term verification that COC concentrations in shallow and deep groundwater will continue to attenuate or remain stable and will therefore not endanger human health and the environment. This will include submission of annual groundwater monitoring reports for EPA review.

Alternative 2 – Institutional Controls and Continued Groundwater Extraction

Alternative 2 combines the institutional controls specified in Alternative 1 with the engineered control provided by operating the IMGES as a final corrective measure (the "GES"). Although GMCH's Solute Transport Evaluation concludes that operation of the extraction system is not necessary to maintain allowable levels of human exposure risk, the GES does remove a portion of the VOC mass from groundwater which is migrating off-site from the Facility and therefore provides additional protection of human health and the environment.

During operation of the GES, GMCH will monitor on-site and off-site VOC concentrations in accordance with the groundwater monitoring plan which is explained in greater detail below in EPA's proposed remedy. GMCH or the current owner/operator will annually submit to EPA its groundwater monitoring report which will include a summary of new data, comparison of the new data with federal and state regulatory and human health risk criteria, the Facility's interpretations and recommendations for future actions.

Alternative 3 – Institutional Controls and Enhanced Bioremediation

This alternative includes the establishment of the institutional controls specified in Alternative 1 with shutdown of the IMGES and an enhanced bioremediation program to preemptively treat a potential rebound of contaminant concentrations in groundwater upon termination of the IMGES. Although the RFI and groundwater monitoring data show that chemical reduction/oxidation (“redox”) are actively attenuating VOCs in on-site and off-site groundwater, GMCH’s calculations indicate that the BTEX compounds have the highest potential to rebound in water table groundwater at concentrations that result in unacceptable off-site VI risk to off-site residents. BTEX compounds are most effectively degraded via aerobic (i.e., involving oxygen) biodegradation.

An enhanced biodegradation program could be implemented where the highest BTEX concentrations are located beneath the Northern Parking Lot (AOI-24). An activated carbon liquid could be injected into the upper portion of the shallow aquifer at the target location. This technology works by sorbing the dissolved BTEX compounds into the carbon matrix which then allows them to be degraded by native bacteria which are attracted to the carbon, thereby removing the contaminant mass by immobilization and biodegradation.

To monitor the effectiveness of the treatment program, the Facility will sample and analyze groundwater at and downgradient of the treatment location quarterly for one year after shutdown of the IMGES and injection of the carbon additive, and biannually thereafter.

At least 90 days before treatment begins at the target area and the IMGES is shut down, the Facility will submit for EPA’s review and approval a contingency plan that will be implemented at AOI-24 if on-site contaminant concentrations increase to levels that would lead to unacceptable off-site VI exposure risk. Contingency options would include re-start of the IMGES, more aggressive treatment of the target area with carbon or another additive, extraction at the target area, and other technologies which EPA and the Facility may evaluate.

EVALUATION OF THE PROPOSED REMEDY AND ALTERNATIVES

Protect Human Health and the Environment

Based on the findings of the RFI and BHHRA, EPA has determined that there is no current unacceptable risk of human exposure to COCs in Facility groundwater, as long as it is not used for any potable purpose. Alternatives 1, 2 and 3 all rely on the same institutional controls to prevent off-site groundwater use. Alternatives 1 and 3 utilize monitoring programs to verify that groundwater conditions at the water table remain stable, and they also include contingency actions to address changes, if they occur. As such, these alternatives are protective of human health and the environment. Alternative 2 and 3 presume that further reduction of water table contaminant concentrations will continue and use active remediation to ensure that unacceptable

future exposures will not occur. Therefore, Alternatives 2 and 3 appear to enhance the current protectiveness provided by institutional controls.

Attain Media Cleanup Standards

Although EPA has determined that there is no unacceptable on-site and off-site human exposure risk under current conditions, EPA's goal for this corrective action is to ensure that COC concentrations will remain at or below drinking water criteria (MCLs) in all groundwater that migrates beyond the Facility boundary, without requiring active remediation.

All of the remedy alternatives will eventually achieve this goal, albeit in different timeframes. Alternatives 1 and 2 primarily rely upon the amount of time required for natural attenuation processes to reduce on-site COC concentrations to their respective MCLs. Because of active in-situ remediation, Alternative 3 would likely achieve the same objective within a shorter time period.

Controlling the Sources of Releases

The principal sources of groundwater contamination have been removed from AOIs 1 and 2, although residual chlorinated VOC compounds remain in groundwater at and downgradient from AOI-1 and are migrating off-site in the lower portion of the shallow aquifer. An area of high BTEX concentrations remains beneath the pavement at AOI-24, and acts as a source of groundwater contamination. However, the RFI and other investigations demonstrate that this contamination quickly degrades after migrating beyond the property line.

Alternative 1 depends upon natural attenuation and continued monitoring of groundwater contamination and thus does not control sources of releases. Although Alternative 2 provides some reduction of contaminant mass, it does not address the sources of contamination. The targeted treatment proposed in Alternative 3 would degrade groundwater contamination at its source and in so doing would control it.

Reduction of Toxicity, Mobility or Volume of Wastes

Alternative 1 is a passive remedy that would achieve this objective over a lengthy time period that would be required for natural degradation processes to reduce all on-site and off-site VOC concentrations to MCLs or lower. Alternative 2 involves a slightly more aggressive removal of contamination but is also dependent upon natural attenuation over approximately 10 years. Because Alternative 3 is direct treatment of the source area to degrade VOC mass through aerobic processes, it would be the most effective technology for achieving this goal, and it would likely be achieved in a shorter period of time.

Implementability

The IMGES and off-site institutional controls already exist, so Alternatives 1 and 2 would be the simplest to implement. Alternative 3 would involve multiple injections, mobilization of personnel and equipment and a performance monitoring period, and would therefore require the most effort of the three alternatives.

Cost

Consultants for GMCH have estimated the following costs for the remedial alternatives:

Alternative 1 - \$415,000 (Assumes 1 year of GES operation and 3 years of monitoring)

Alternative 2 - \$1,060,000 (Assumes 10 years of GES operation and maintenance and groundwater monitoring)

Alternative 3 - \$1,170,000 (Assumes no GES operation. Assumes design, operation and maintenance of 30,000 sq ft remediation area to 10 feet below water table, with initial 90,000 lbs of additive and second treatment of 45,000 lbs of additive, and 5 years of groundwater monitoring.

State and Community Acceptance

EPA will provide notice of and the opportunity to comment on its proposed remedy for the GMCH Facility to the local community and the State of Michigan. The RFI and the BHHRA demonstrate that there is no unacceptable risk of on-site or off-site human exposure to COCs attributable to the Facility under current conditions. Implementation of EPA's proposed remedy will ensure that the risk of on-site and off-site human exposure remains negligible, and that on-site and off-site contaminant concentrations will be reduced to further lower risk to human health and the environment.

EPA'S PROPOSED REMEDY

EPA's proposed final corrective measures involve the stipulations of Alternative 2, i.e., on-site and off-site institutional controls, continued operation of the GES, and groundwater monitoring both on-site and off-site. However, the Agency's proposed remedy includes active remediation by in-situ treatment of groundwater contamination, similar to Alternative 3, as a contingency which may be implemented in the future.

Facility-Wide

After EPA issues its FD/RC, GMCH will enter a restrictive covenant into the property deed that will ensure:

- Property use will be restricted to commercial/industrial use in perpetuity;
- Groundwater beneath the property will not be used for any purpose other than dewatering for construction and maintenance activities, and sampling for environmental remediation;
- A plat drawn by a registered surveyor will be included which shows the locations of LNAPL and contaminated soil as a reference for construction and maintenance projects; and
- The Facility Due Care Plan and health and safety plan requirements for construction and maintenance projects will be referenced.

AOI-1

GMCH will continue to monitor and remove LNAPL from monitoring wells MW-210, MW-211, W-86-2 and W-86-6R (Figure 5) until the LNAPL is no longer visible for four consecutive quarters.

GMCH will submit progress reports to EPA annually after issuance of EPA's FD/RC or within 90 days of verification that LNAPL is no longer visible at the monitoring wells listed above. If LNAPL remains present after five years, GMCH may submit to EPA a Technical Impracticability (TI) demonstration to request termination of LNAPL removal. The TI demonstration will include information such as a transmissivity study, formation saturation study, and citations of relevant portions of the BHHRA.

EPA will review the TI and will determine if continued LNAPL removal at AOI-1 is necessary.

Groundwater contamination at and migrating from AOI-1 will be addressed in the Facility-wide remedy decision explained below.

AOI-2

GMCH will continue to monitor and remove LNAPL from monitoring wells W-90-7, W-90-8 and W-90-14 (Figure 6) until the LNAPL is no longer visible for four consecutive quarters.

GMCH will submit to EPA progress reports annually regarding LNAPL removal at monitoring wells W-90-7, W-90-8 and W-90-14 for five years from the date of EPA's FD/RC or within 90 days of verification that LNAPL is no longer visible at these wells.

If LNAPL remains present after five years, GMCH may submit a TI demonstration for EPA review and determination in accordance with the conditions specified for the remedy at AOI-1, above.

Figure 11 shows the locations at AOI-1 and AOI-2 at which LNAPL will be monitored and removed.

On-Site and Off-Site Groundwater (including AOI-1, AOI-2, AOI-23 and AOI-24)

EPA proposes reliance upon the existing Kent County Health Department water supply construction ordinance as the off-site institutional control to prevent human exposure to contaminated groundwater from the deeper levels of the aquifer beneath the commercial and residential areas beyond the Facility boundary.

The on-site institutional control which EPA proposes is the above-described restrictive covenant that will be entered into the GMCH property deed after EPA issues its FD/RC.

GMCH or future owner/operators will continue to operate the GES until EPA determines that the system may be shut down. EPA's determination will be based upon the results of the following groundwater monitoring plan which is described in the following paragraphs and as Appendix 2 to this SB.

GMCH or future owner/operators will sample and analyze on-site and off-site groundwater for the chlorinated and non-chlorinated site-specific VOCs listed previously in this SB as the Constituents of Concern, using EPA Test Method SW-846 8260.

Figure 12 shows the location of the monitoring wells that will be sampled. The rationale for selecting these wells is as follows:

Off-Site

Monitoring wells MW-305/305S, MW-306/306S, MW-312S and MW-316S will be used to identify changes in groundwater quality, if any, that may result in unacceptable human exposure in the residential area north of the GES. Monitoring groundwater at these locations will verify that water table VOC concentrations continue to not pose unacceptable VI risk to human receptors.

Property Boundary

Monitoring wells MW-302/302S, MW-303/303S, MW-707 and MW-711/711S will be sampled to identify increases in COC concentrations, if any, proximal to the property boundary that may result in an increase in concentrations at the off-site monitoring wells listed above. The water table wells proximal to the property boundary will serve as sentinel wells to monitor for changes in the water table concentrations of COCs that could migrate off-site and pose an unacceptable VI risk. Sampling of these wells will provide data that could indicate potential changes in the aquifer and will help evaluate the effectiveness of the GES.

On-Site Immediately Upgradient of the Property Boundary

Existing monitoring wells MW-202, MW-602, and MW-710 will be sampled. In addition, two new water table monitoring wells MW-202S and MW-602S will be installed to provide additional monitoring of the water table groundwater quality. Also, a third well, MW-710D will be installed. Data from these six wells, along with data from other on-site monitoring wells, will be used to determine whether operation of the GES is necessary to minimize migration of COCs at concentrations greater than drinking water standards.

Beneath the Facility Manufacturing Building

Monitoring wells MW-114S/114D, MW-206 and MW-802 located within the manufacturing building will be monitored to identify potential changes in COC concentrations beneath the building. The concentrations at these locations may forecast changes to groundwater approaching the GES.

Source Area at AOI-1

Monitoring wells W-87-3 and W-87-4 will be sampled to evaluate changes in residual COCs in groundwater downgradient of the former TCE Still Bottoms Tank.

Schedule for Groundwater Sampling

Table 6 shows the sampling schedule for the selected monitoring wells.

Table 6: Groundwater Sampling Schedule for GMCH Wyoming Operations

Well	Water Table Well?	Sampling Frequency	Water Levels Measured?
Off-Site Monitoring Wells			
MW-305	No	Once Annually	Yes
MW-305S	Yes	Once Annually	Yes
MW-306	No	Once Annually	Yes
MW-306S	Yes	Once Annually	Yes
MW-312S	Yes	Once Annually	Yes
MW-316S	Yes	Once Annually	Yes
Property Boundary Monitoring Wells			
MW-302	No	Semi-Annually	Yes
MW-302S	Yes	Semi-Annually	Yes
MW-303	No	Semi-Annually	Yes
MW-303S	Yes	Semi-Annually	Yes
MW-707	Yes	Semi-Annually	Yes
MW-711D	No	Semi-Annually	Yes
MW-711S	Yes	Semi-Annually	Yes
On-Site Immediately Upgradient Monitoring Wells			
MW-202	No	Semi-Annually	Yes
MW-202S	Yes	Semi-Annually	Yes
MW-602	No	Semi-Annually	Yes
MW-602S	Yes	Semi-Annually	Yes
MW-710	Yes	Semi-Annually	Yes
MW-710D	No	Semi-Annually	Yes

Table 6, continued

Well	Water Table Well?	Sampling Frequency	Water Levels Measured?
Beneath the Manufacturing Building			
MW-114S	Yes	Semi-Annually	Yes
MW-114D	No	Semi-Annually	Yes
MW-206	No	Semi-Annually	Yes
MW-802	Yes	Semi-Annually	Yes
AOI-1 Source Area Monitoring Wells			
W-87-3	Yes	Semi-Annually	Yes
W-87-4	No	Semi-Annually	Yes

REMEDIATION GOAL FOR ON-SITE AND OFF-SITE GROUNDWATER

EPA has determined that remediation of on-site groundwater will be complete, and operation of the GES will no longer be necessary when chlorinated and non-chlorinated VOC concentrations are at or below the respective MCLs (i.e., drinking water standards) throughout the aquifer beneath the Facility property for eight consecutive quarters. EPA considers drinking water criteria to be an appropriate level of protection for human health in groundwater that passes beyond the property boundary and which may no longer be under the control of the Facility owner/operator.

By March 1st of each calendar year following the issuance of EPA’s FD/RC, GMCH or the current owner/operator will submit annual groundwater monitoring reports to EPA. The fifth-annual and (if necessary) tenth-annual groundwater monitoring reports will include an evaluation of the effectiveness of GES operation to achieve the on-site remedial goal. If the on-site remedial goal is not met within ten (10) years of the date of EPA’s FD/RC, EPA will require GMCH or the future owner/operator to submit a plan for active remediation of remaining VOC contamination in on-site groundwater that remains above MCLs.

In order to verify that off-site VOCs at concentrations above EPA and State allowable limits for protection of human health remain confined to the lower portions of the aquifer, GMCH or future owner/operators will annually monitor deep and water table VOC concentrations at the Off-Site Monitoring Wells listed in Table 6 for ten (10) years after the date of EPA’s FD/RC for this action.

EVALUATION AND REPORTING

GMCH will report sampling and data evaluation results to EPA in annual groundwater monitoring reports. The reports will include the following:

- Summary of data, with interpretations and recommendations;
- Background and current site description;

- Monitoring network and schedule;
- Comparison of new data with EPA's MCLs;
- Comparison of new data from the property boundary and off-site water table wells with EPA Residential Vapor Intrusion Screening Levels (VISL) (at a target cancer risk of 1×10^{-5} and target hazard quotient [HQ] of 1);
- Comparison of new data from the on-site water table wells with EPA Non-Residential Vapor Intrusion Screening Levels (VISL) (at a target cancer risk of 1×10^{-5} and a target HQ of 1);
- If a groundwater concentration from an off-site water table well exceeds a residential VISL, GMCH or current owner/operator will calculate cumulative cancer and hazard index residential vapor intrusion risk estimates for that location using the same methodology as used in the RFI BHHRA;
- Verification and evaluation of on-site and off-site institutional controls;
- Problems encountered, if any; and
- Recommendations including changes to the monitoring plan, contingency actions, or requests to terminate monitoring.

The fifth-annual and, if needed, tenth-annual groundwater monitoring reports will include an evaluation of the effectiveness of the GES operations toward achieving the groundwater remedial goal. If the groundwater remedial goal is not achieved within the ten-year period, the evaluation of the system will include evaluations of alternative approaches to achieve the goal. In addition, GMCH or the current owner/operator may use the groundwater monitoring data to propose when operation of the GES may no longer be warranted.

Table 7: Schedule of Compliance for GMCH Wyoming Operations

Deliverable	Due Date
Establish baseline institutional controls, interim engineered controls and any additional institutional controls	Within 90 days after date of EPA's FD/RC
Implement all institutional controls	Within 90 days of EPA's approval of control language
Implement Groundwater Monitoring	Within 90 days after date of EPA's FD/RC
Submit Operation and Maintenance Plan for GES and LNAPL recovery	Within 90 days after date of EPA's FD/RC
Provide documentation of LNAPL removal at AOI-1	Within 90 days after LNAPL verified no longer visible
Provide documentation of LNAPL removal at AOI-2	Within 90 days after LNAPL verified no longer visible
Submit annual groundwater monitoring reports	March 1 st of each calendar year following date of EPA's FD/RC
Submit evaluation of GES effectiveness	With fifth-annual groundwater monitoring report and, if necessary, tenth-annual groundwater monitoring report

PUBLIC PARTICIPATION

EPA invites the community and public to submit comments regarding the proposed remedies for AOIs 1, 2, 23 and 24 as explained in this Statement of Basis. EPA has set a public comment period which begins April 8, 2019, and will end at midnight May 23, 2019, to encourage public participation in the remedy selection process.

EPA has scheduled a public meeting for 5:00 pm May 8, 2019, at the Early Childhood Center, 961 Joosten Street SW, Wyoming, Michigan, to provide the public with an additional opportunity to comment on the proposed remedy.

The public may submit written comments and questions to the following address:

U.S. Environmental Protection Agency, Region 5
Remediation and Reuse Branch (LU-16J)
77 West Jackson Boulevard
Chicago, Illinois 60604
Attention: Don Heller
heller.donald@epa.gov
(312) 353-1248

The Administrative Record is available for review at the following two locations:

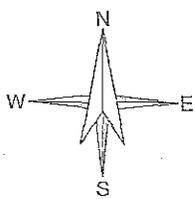
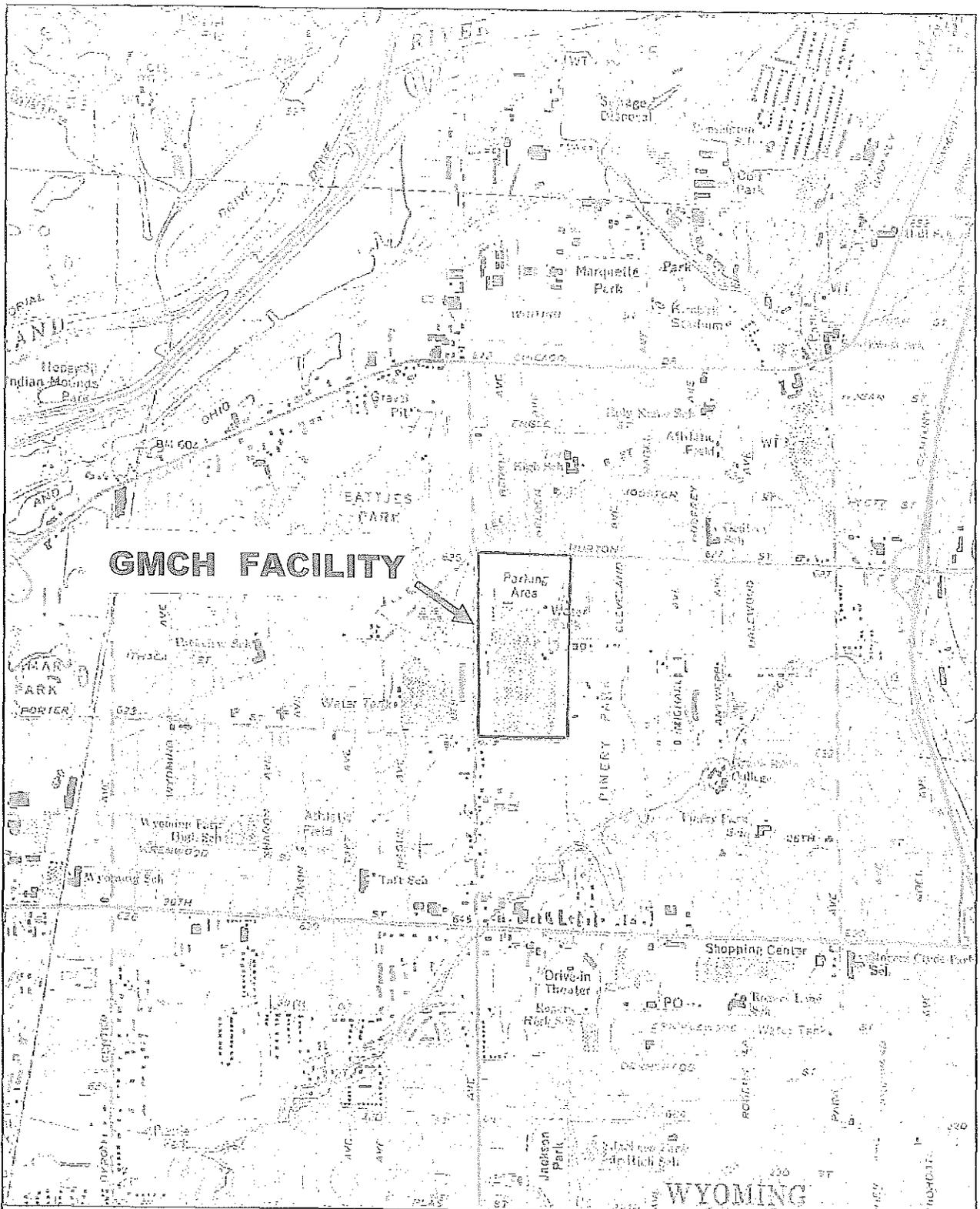
Kent District Library – Wyoming Branch
3350 Michael Avenue, SW
Wyoming, Michigan 49509
www.kdl.org/location/wyoming-branch
(616) 784-2007
Monday-Thursday 9:30 am – 8:00 pm (Eastern Time)
Friday 9:30 am – 6:00 pm
Saturday 9:30 am – 5:00 pm
Sunday 1:00 pm – 5:00 pm

and

U.S. Environmental Protection Agency, Region 5
77 West Jackson Boulevard, 7th Floor Records Center
Chicago, Illinois
Monday – Friday 8:00 am – 4:00 pm (Central Time)
(312) 886-0902

After EPA's consideration of any public comments that are received, EPA will summarize the comments and will provide responses in a Response to Comments document. EPA will prepare the Final Decision and Response to Comments and both of these documents will be included in the Administrative Record. EPA will provide copies of the Final Decision and Response to Comments to all who submitted comments on the proposed remedy decision.

G:\27640208- WLCSA OVERSIGHT AND REPORTING\CLOSURE REPORT\CAD\27640-208-FIGURE 01.DWG



SITE COORDINATES: 42°55'29"N 85°42'11"W



U.S.G.S. QUADRANGLE: GRAND RAPIDS WEST, MI

FIGURE 1

LOCATION OF GMCH FACILITY

SCALE: 1:24000
AUGUST 2011

Site Geology & Hydrogeology

- 25 to 75 feet unconsolidated glacial sediments
- Mississippian Michigan Formation weathered shale/gypsum (relatively impermeable)

NORTH

SOUTH

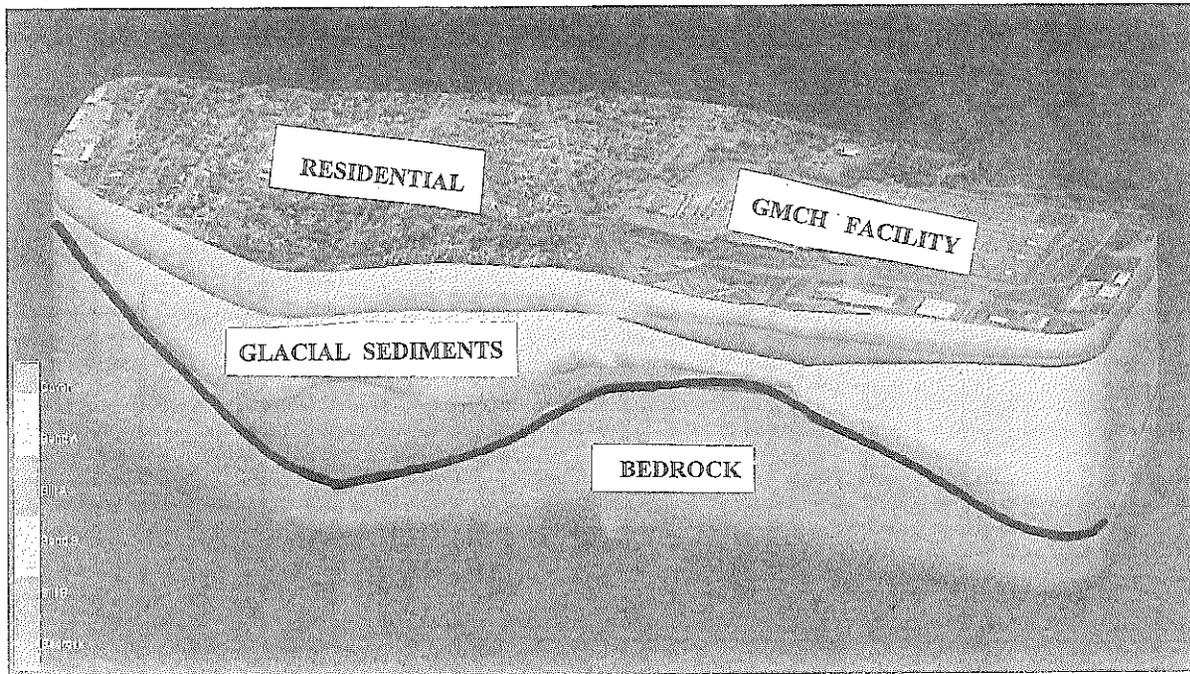


FIGURE 2 GEOLOGY OF THE GMCH FACILITY AREA

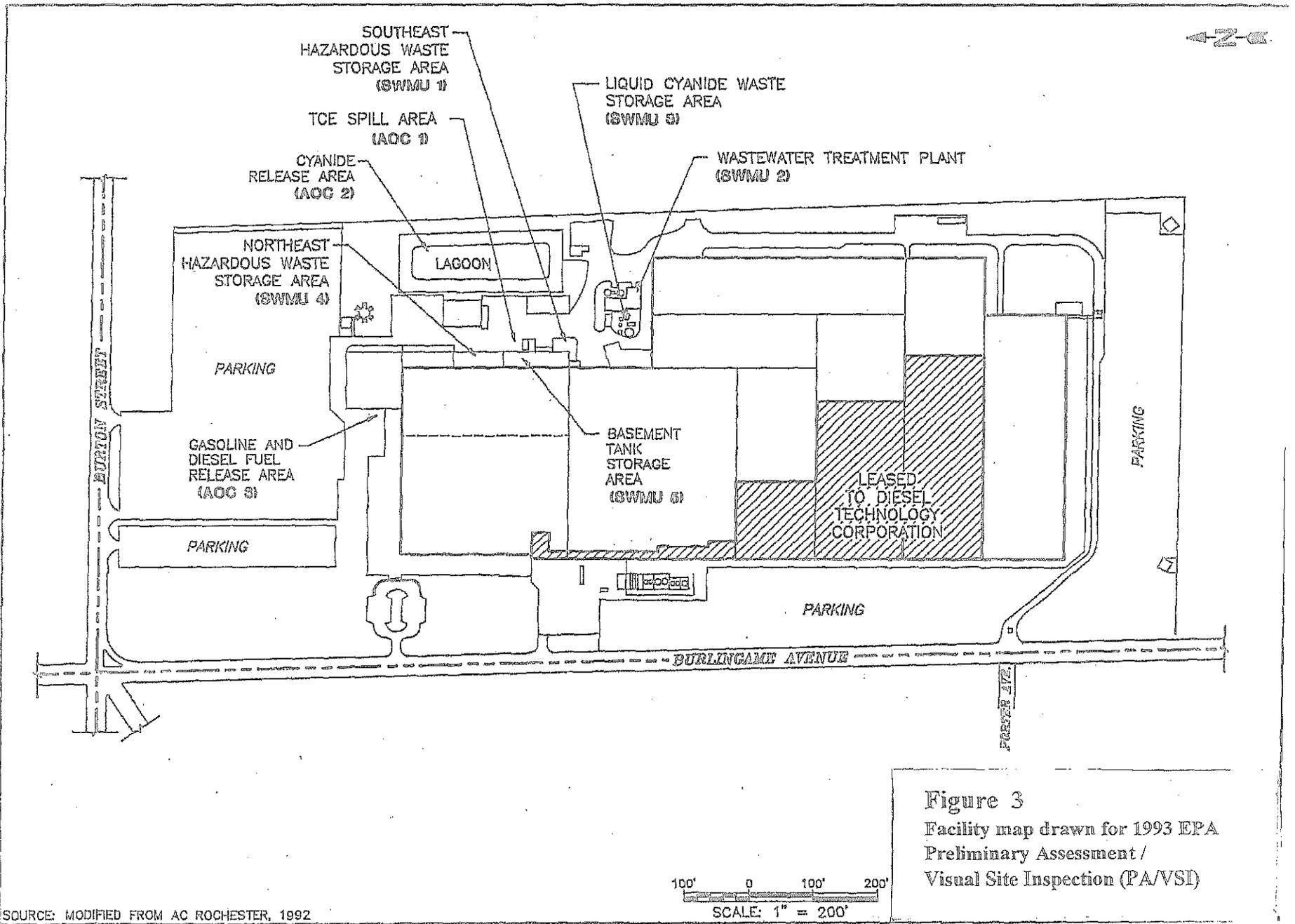


Figure 3
 Facility map drawn for 1993 EPA
 Preliminary Assessment /
 Visual Site Inspection (PA/VSI)

SOURCE: MODIFIED FROM AC ROCHESTER, 1992

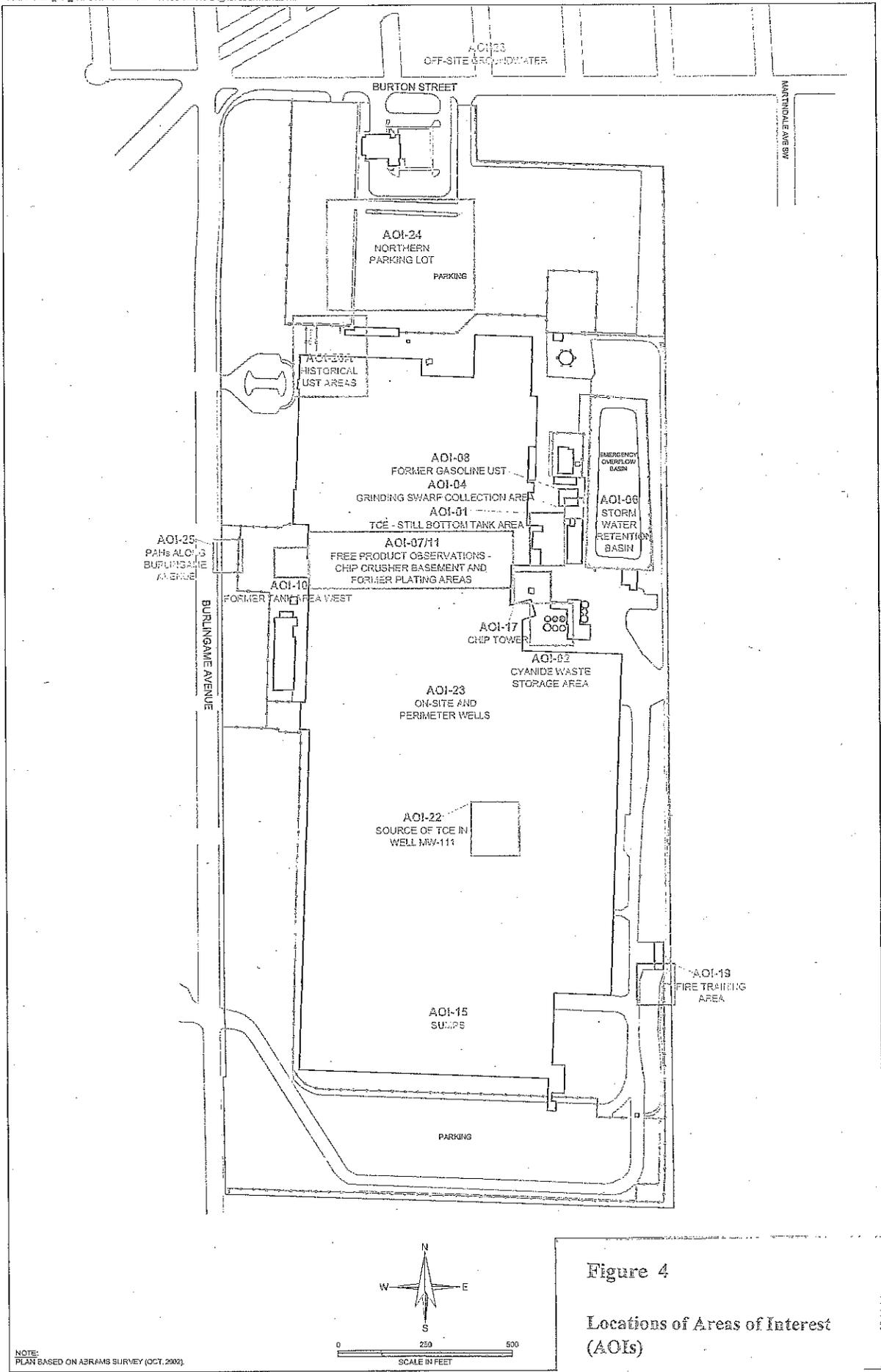


Figure 4

Locations of Areas of Interest (AOIs)

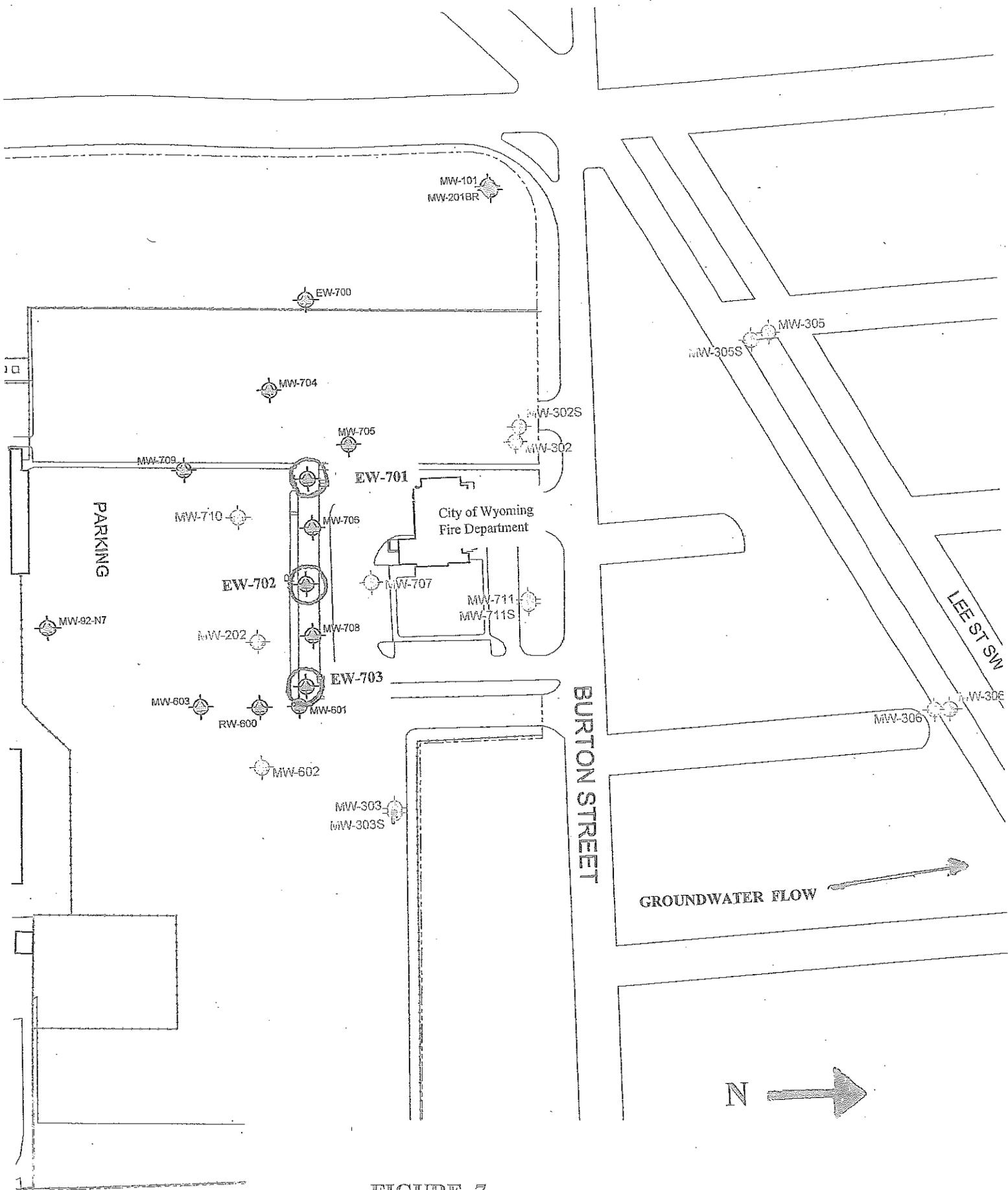


FIGURE 7

LOCATIONS OF AOI-24 MONITORING WELLS
AND GROUNDWATER EXTRACTION SYSTEM WELLS

Vinyl chloride cross section – Off-Site

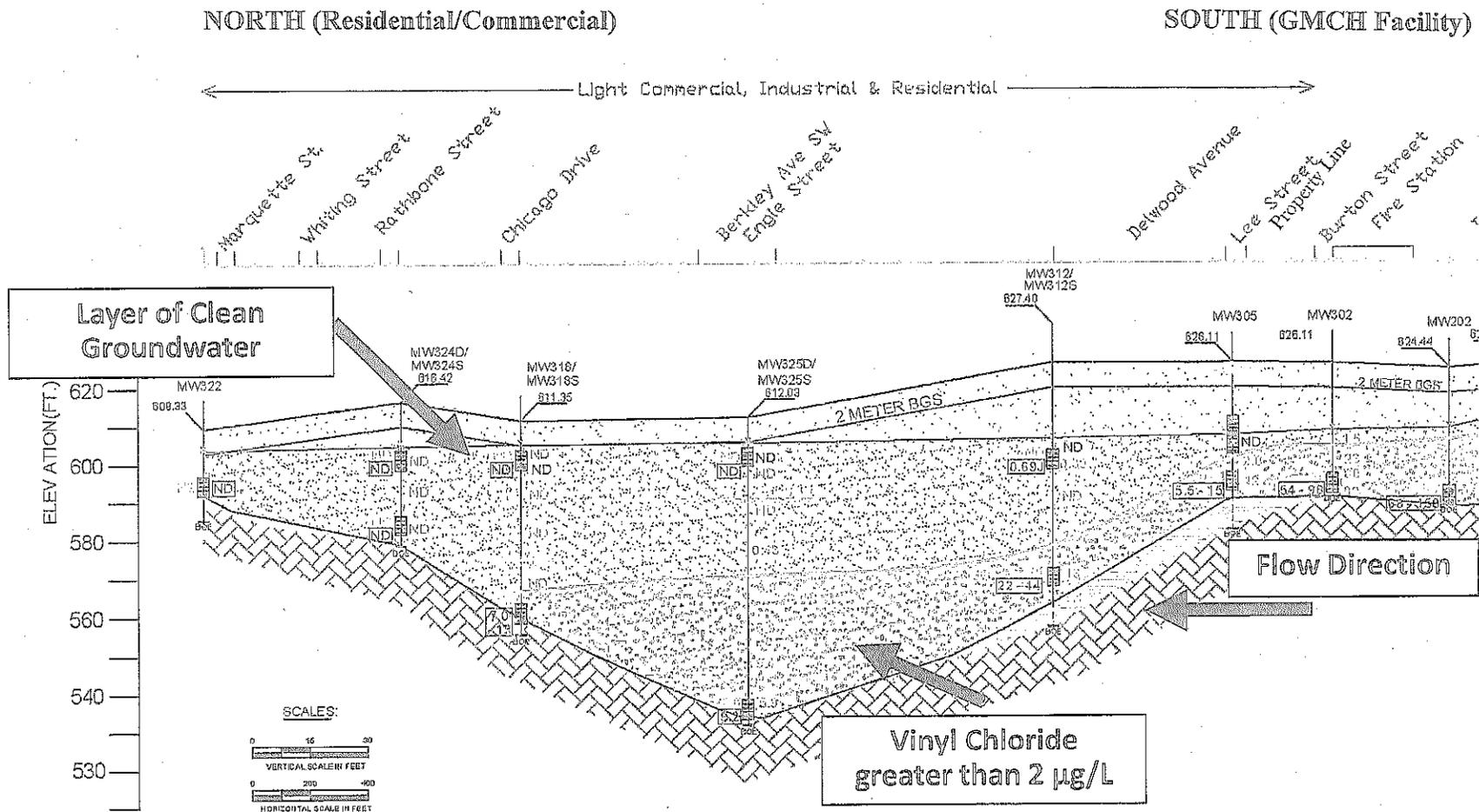


FIGURE 8

ILLUSTRATION OF CHLORINATED VOC CONCENTRATIONS ABOVE DRINKING WATER CRITERIA, CONFINED TO LOWER PORTION OF THE AQUIFER

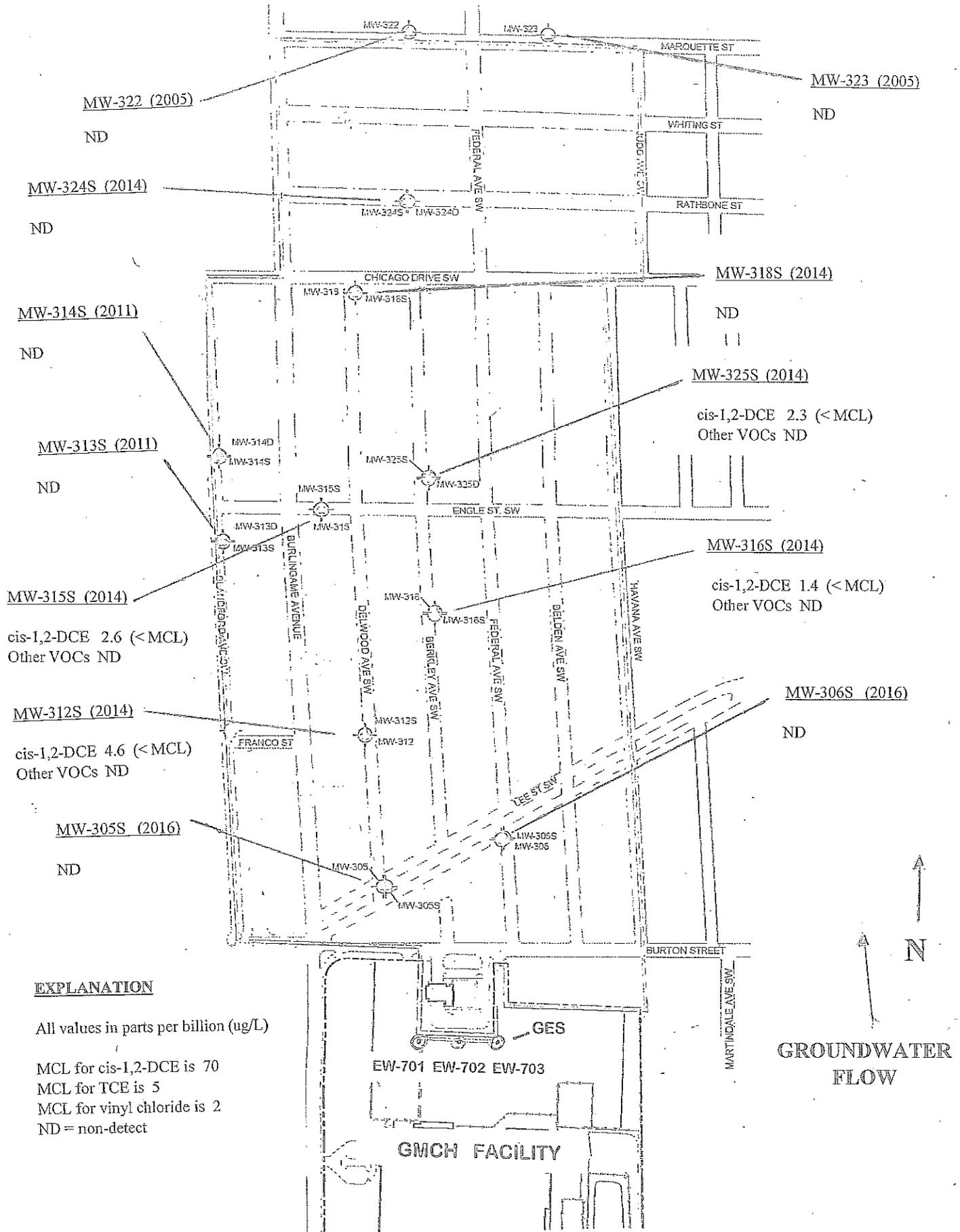


FIGURE 9

MOST RECENT MONITORING DATA FOR OFF-SITE VOC CONCENTRATIONS IN SHALLOW (WATER TABLE) GROUNDWATER

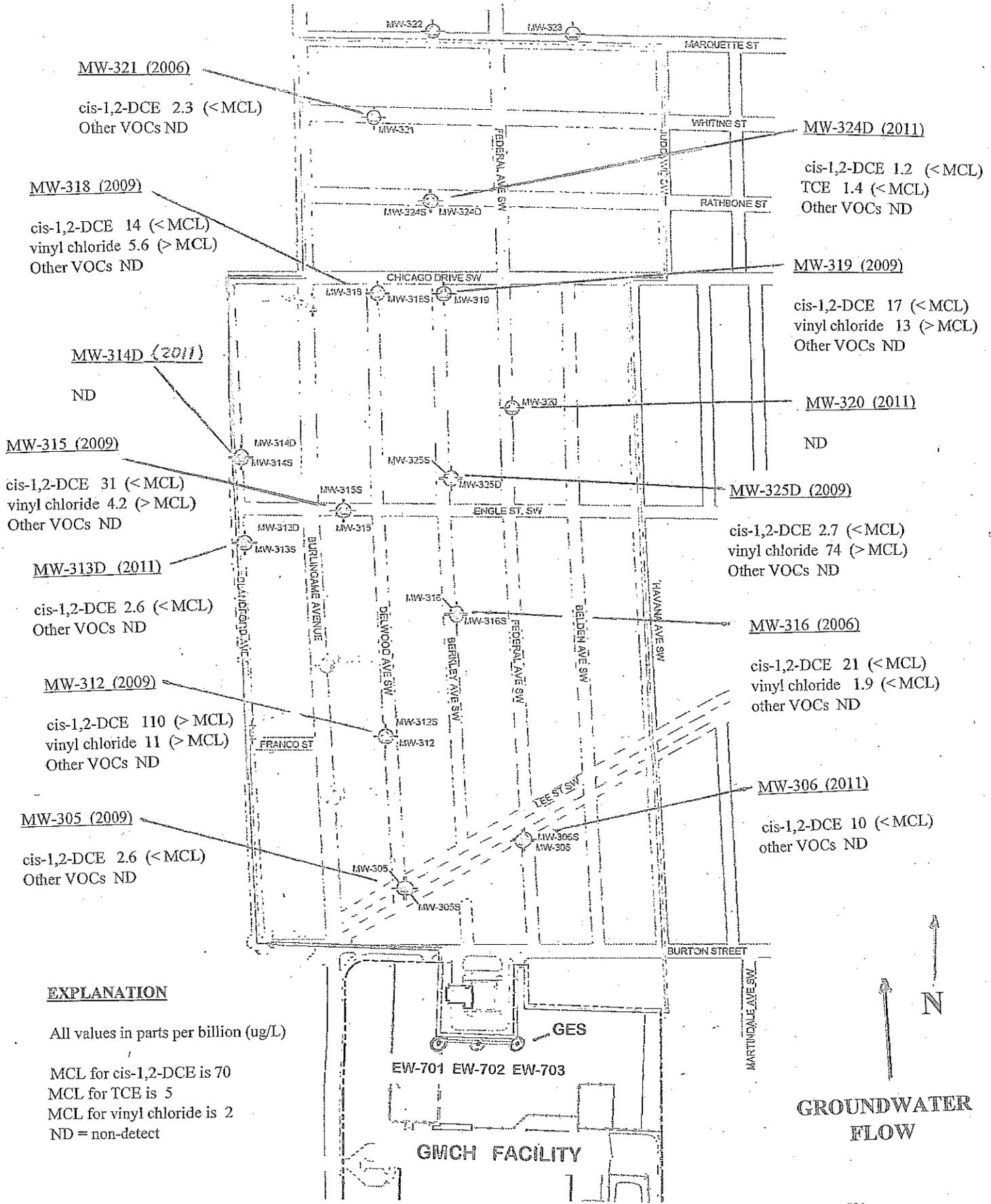
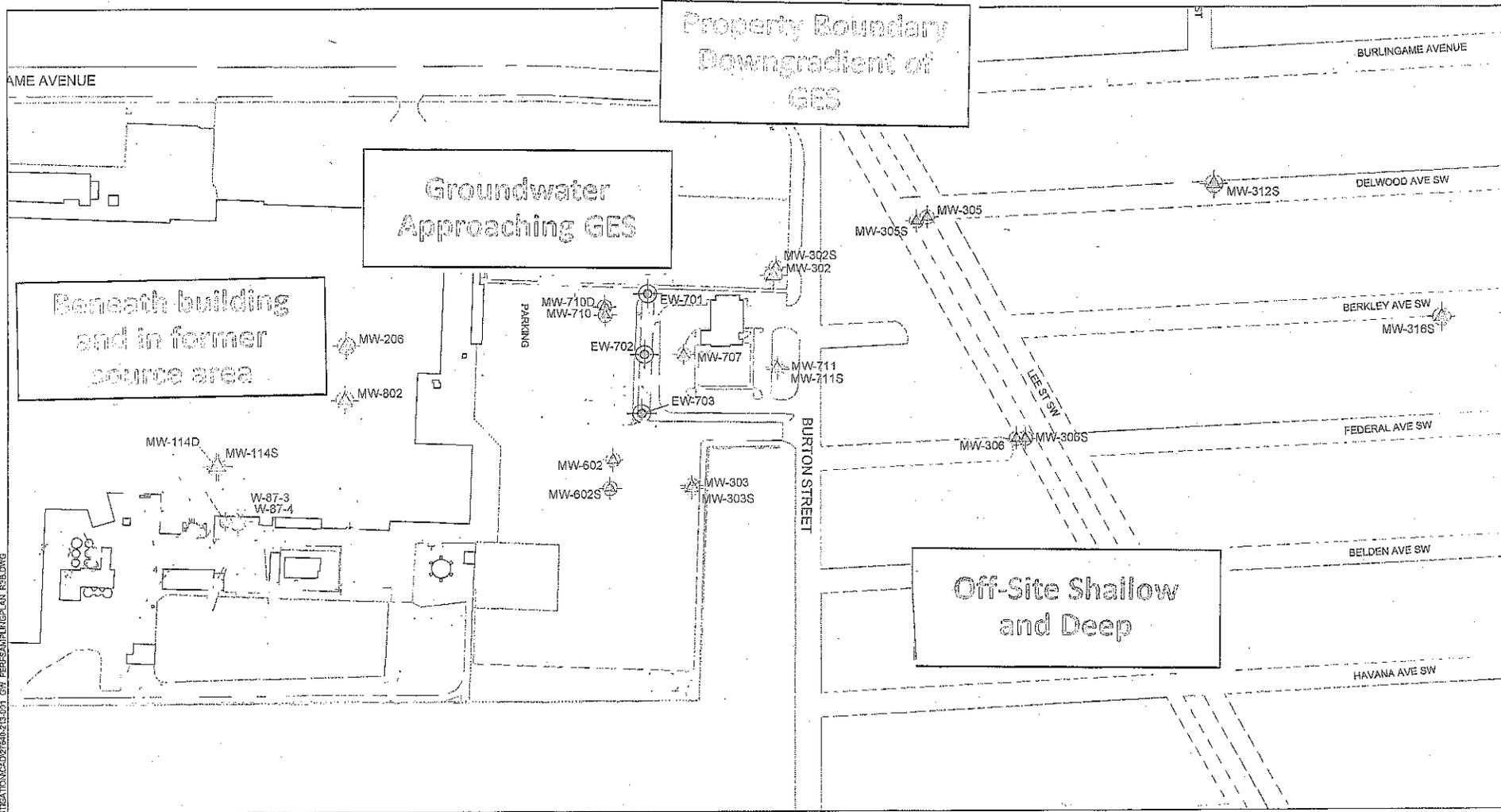


FIGURE 10

MOST RECENT MONITORING DATA FOR OFF-SITE VOC CONCENTRATIONS IN DEEP (~20' to 70' bgs) GROUNDWATER



ROSS, LLOYD
 02/26/2003 GROUNDWATER INVESTIGATION/02/26/03/01 GW FDS/SAMPLING PLAN REV.DWG

LEGEND	GROUNDWATER MONITORING WELL NETWORK	NOTES
—	⊕	1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
- - -	⊕	
⊕	⊕	
	⊕	
	⊕	
	⊕	

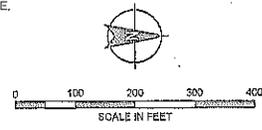


FIGURE 12
WELLS TO BE MONITORED UNDER
EPA REMEDY DECISION

APPENDIX

Administrative Record Index For Proposed Corrective Measures Decision

General Motors Components Holdings Wyoming Operations EPA I.D. MID 017 079 625

1. U.S. Environmental Protection Agency, 1989, Office of Emergency and Remedial Response, Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual, Washington, DC. EPA/540-1-89-002. OSWER Directive 9285.7-01a. December.
2. PRC Environmental Management, Inc. April 1993, Preliminary Assessment/Visual Site Inspection-Delphi Energy & Chassis Systems, Wyoming Operations, 2100 Burlingame Avenue SW, Wyoming, Michigan.
3. Kent County Health Department Water Supply Regulations, for Kent County, Michigan.
4. ENVIRON International Corporation, November 2003, Environmental Indicator CA 725 Report – Determination of Current Human Exposures Under Control – Delphi Corporation, Delphi Energy & Chassis Systems, Wyoming, Michigan.
5. U.S. Environmental Protection Agency, 2001, Users Guide for Evaluating Subsurface Vapor Intrusion into Buildings, Office of Emergency & Remedial Response, Washington, DC, February.
6. Haley & Aldrich, Inc., April 2006A, Interim Measures Work Plan, Interim Measure Groundwater Extraction System, AOI-23 – Off-Site Groundwater.
7. Haley & Aldrich, Inc., April 2006B, Interim Measures Construction Summary Report – AOI-6 – Storm Water Retention Basin Sediment Removal.
8. Haley & Aldrich, Inc., March 2007, Interim Measures Construction Summary Report - AOI-23 – Groundwater Extraction System Installation.
9. Haley & Aldrich of Michigan, Inc., December 2002, Current Conditions Report – Delphi Corporation, Delphi Energy & Chassis Systems, Wyoming, Michigan.
10. Haley & Aldrich of Michigan, Inc., April 2003, RCRA Facility Investigation Work Plan, Delphi Corporation, Delphi Energy & Chassis Systems, Wyoming, Michigan.

11. Haley & Aldrich of Michigan, Inc., May 2003, RCRA Facility Investigation Work Plan, Addendum #1, Delphi Corporation, Delphi Energy & Chassis Systems, Inc., Wyoming, Michigan.
12. Haley & Aldrich of Michigan, Inc., December 2003, RCRA Facility Investigation Work Plan, Addendum #2, Delphi Corporation, Delphi Energy & Chassis Systems, Inc., Wyoming, Michigan.
13. Haley & Aldrich of Michigan, Inc. February 2004, RCRA Facility Investigation Work Plan, Addendum #3, Delphi Corporation, Delphi Energy & Chassis Systems, Inc., Wyoming, Michigan.
14. Haley & Aldrich of Michigan, Inc., April 2006, Interim Measure Construction Summary Report – AOI-6 – Storm Water Retention Basin Sediment Removal, Delphi Corporation, Delphi Energy & Chassis, Inc., Wyoming, Michigan.
15. Haley & Aldrich of Michigan, Inc., July 2010, RCRA Facility Investigation Work Plan Addendum #4, General Motors Components Holdings, Wyoming Operations, Wyoming, Michigan.
16. Haley & Aldrich of Michigan, Inc., October 2010, RCRA Facility Investigation Work Plan Addendum #5, General Motors Components Holdings, Wyoming Operations, Wyoming, Michigan.
17. Haley & Aldrich of Michigan, Inc., 2010, RCRA Generator Closure Report, Waste Liquid Cyanide Storage Tanks, General Motors Components Holdings, Wyoming Operations, Wyoming, Michigan.
18. Haley & Aldrich of Michigan, Inc., March 2011, Revised RCRA Facility Investigation Report, General Motors Components Holdings, Wyoming Operations, Wyoming, Michigan.
19. Haley & Aldrich of Michigan, Inc., June 2011, Errata Material for Revised RFI Report Dated March 3, 2011, General Motors Components Holdings, Wyoming Operations, Wyoming, Michigan.
20. Haley & Aldrich of Michigan, Inc., September 2011, RCRA Facility Investigation Work Plan Addendum #6, General Motors Components Holdings, Wyoming operations, Wyoming, Michigan.
21. Haley & Aldrich of Michigan, Inc., December 2011, Corrective Measures Proposal, General Motors Components Holdings, Wyoming Operations, Wyoming, Michigan.

22. Haley & Aldrich of Michigan, Inc., February 2012, Revised RCRA Facility Investigation Report Addendum #1, General Motors Components Holdings, Wyoming Operations, Wyoming, Michigan.
23. Haley & Aldrich of Michigan, Inc., July 2014, Revised RCRA Facility Investigation Report Addendum #2, General Motors Components Holdings, Wyoming Operations, Wyoming, Michigan.
24. Haley & Aldrich of Michigan, Inc., February – December 2016, Quarterly Groundwater Monitoring Reports, General Motors Components Holdings, Wyoming Operations, Wyoming, Michigan.
25. Haley & Aldrich of Michigan, Inc., October 2017, Final Revised Corrective Measures Proposal, General Motors Components Holdings, Wyoming Operations, Wyoming, Michigan.

