# FORM EQP 5111 ATTACHMENT B2
# CORRECTIVE ACTION INFORMATION

This document is an attachment to Gage Products Company's (Gage) 2024 RCRA permit renewal application Form EQP 5111. The administrative rules promulgated pursuant to Part 111, Hazardous Waste Management, of Michigan's Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (Act 451) R 299.9504(1)(c), R 299.9508(1)(b), R 299.9525, R 299.9629, R 299.9635, and R 299.9636; §§324.11115a and 324.11115b of Act 451; and Title 40 of the Code of Federal Regulations (CFR) §270.14(d) and Part 264, Subpart F, establish requirements for submitting corrective action information and implementing a corrective action program for hazardous waste management facilities. All references to 40 CFR citations specified herein are adopted by reference in R 299.11003.

This license application attachment addresses requirements for corrective action information for the waste management units (WMU) at Gage's Limited Storage Facility (Gage LSF) located in Ferndale, Michigan. This attachment includes facility background information, current conditions, and release assessment requirements for operating license applications. This attachment supplies information to support the corrective action program specified in R 299.9629.

Gage LSF has prepared a Quality Assurance/Quality Control (QA/QC) plan. A discussion of the QA/QC plan has been provided at the end of the Waste Analysis Plan contained in Attachment A3, Appendix A3-1. The QA/QC Plan follows the written procedures outlined in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," U.S. Environmental Protection Agency (EPA) Publication SW846, Third Edition, Chapter 1 (November 1986), and its updates.

*(Check as appropriate)*

Applicant for Operating License for Existing Facility:

☒ R 299.9629 Corrective Action

☐ Elimination from corrective action requirements proposed for one or more units

☞ *More than one box may be checked, if one or more WMUs are proposed for elimination from corrective action requirements*

Applicant for Operating License for New, Altered, Enlarged, or Expanded Operating License:

☐ R 299.9629 Corrective Action

☐ Elimination from corrective action requirements proposed for one or more units

☞ *More than one box may be checked, if one or more units are proposed for elimination from corrective action requirements.*

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## B2.A FACILITY BACKGROUND
### B2.A.1 History and Description of Ownership and Operation

The Gage Products Company (hereinafter referred to as Gage) occupies approximately 11 acres at 625 Wanda Avenue in Ferndale, Michigan (Figure B2-1). The facility has been conceptually divided into five parcels (A, B, C, D and E) as illustrated on Figure B2-2. Gage purchased the property between Jewell and Silman Avenues (Parcel C; Figure B2-2) from Grand Trunk Western Railway. Gage subsequently developed the property and began operations in 1936. In 1970, Gage purchased the portion of property between Silman and Channing Avenues (Parcel B; Figure B2-2) and expanded the company's operations. In 1978, Gage purchased the former Wanda School property between Channing and Wordsworth Avenues (Parcel A; Figure B2-2). Dell Marking Systems rented a portion of the former school building from Gage, and currently rents a portion of Parcel B. In the early 1990's, Gage purchased the former Coca-Cola Bottling Company property located at 515 Wanda Avenue (Parcel D; Figure B2-2). In 1994, Gage acquired Jewell Avenue and closed this road to public use. In 2002, Gage purchased the former Wolf Wiping Cloth Company property located at 475 Wanda Avenue (Parcel E; Figure B2-2).

The majority of Gage's process and storage activities are presently conducted on Parcels B, C, and D (Figure B2-2). The present facility consists of several buildings that contain the company's offices, laboratories, storage, mixing, recycling and distribution operations. The remaining property generally consists of open, paved areas used for product and drum storage and vehicle loading/unloading. Parcel D is used for diesel fuel blending and packaging, equipment storage and storage of bulk finished product. Parcel E is used by Gage for equipment storage only. No process operations or management of hazardous materials associated with Gage's reclamation/reuse business have occurred on Parcel E.

The Gage limited storage facility (Gage LSF) accepts used solvents and hazardous secondary materials to produce reclaimed solvents, blended solvents, test and reference fuels, and specialty chemicals. Raw materials (solvents and additives) are stored on-site in pails, bags, 55-gallon drums, portable tanks, or tanks. These raw materials are then blended to customer specifications and packaged in pails, 55-gallon drums, totes, tankers, or railcars. For some of the specialty blended solvents, Gage recycles spent solvents into useable solvent fractions and combines these with virgin solvent to create finished products. Solvent recycling is conducted through thin film evaporation, distillation, or both.

Specialty product and fuel blending occurs in Fill House No. 6. In this process, the raw materials are blended in portable totes and tanks in quantities ranging from 55 gallons to 3,500 gallons. The finished products are stored in tanks, portable tanks,55-gallon drums, and pails. Solvent blending and filling are conducted in Fill House No. 1. In this process, solvents are dispensed into 55-gallon drums. Solvent remanufacturing is conducted in Fill House No. 2. In this process, evaporation and distillation takes place in process equipment. Finished product is stored in tanks in the product tank farm adjacent to the building.

#### B2.A.1 (a) Environmental Permits

The only environmental permits currently in effect at the Gage facility are Air Use Permits for regulated air emission sources and a Limited Storage Facility (LSF) operating license for the management of hazardous waste. These air permits and LSF license, and a wastewater discharge permit previously applicable to the facility, are described in this section.

#### Current Permits

The Gage facility is no longer subject to the Title V Renewal Operating Permit Program (Permit MI-ROP-N0841-2008). The facility is currently covered under the Permit to Install 64-18B issued on May 30, 2019 with no expiration date. The PTI 64-18B now covers the equipment from the voided Permit to Install Fuel Blending Expansion PTI-43-08.

A Part 111 LSF operating license was re-issued to the Gage LSF by the Michigan Department of Environmental Quality (MDEQ) on August 4, 2003. This permit allowed operation of a LSF at the site for the temporary storage of hazardous waste received from off-site in containers or bulk storage tanks. The Gage LSF consists of a truck unloading and container storage building and an adjacent tank farm. The Part 111 LSF operating license was preceded by an Act 64 LSF operating license that was issued on May 10, 1994 and expired on May 10, 1999. The current LSF operating license expires on March 31, 2025, and this document supports the LSF license re-application due on October 2, 2024.

### Past Permits

The Gage facility maintained an Industrial Waste Control Discharge Permit (Permit No. 489-001) to discharge wastewater to the City of Detroit's wastewater treatment plant. On July 29, 1994, the City of Detroit's Water and Sewerage Department notified Gage that their facility is classified as a Minor User of the Detroit sewerage system and as such Gage is not required to maintain a wastewater discharge permit from the City. Therefore, the Gage facility no longer maintains an Industrial Waste Control Discharge Permit from the City of Detroit.

### B2.A.1 (b) Waste Management

The Gage LSF facility recycles spent solvents received from off-site sources to produce usable solvents for industrial use. Hazardous wastes are generated from the site's recycling processes and subsequent solvent blending operations. A description of the hazardous wastes managed at the Gage LSF facility and the waste management activities performed at the site is included in this section.

### Waste Generation

Wastes managed at the Gage LSF include wastes generated both on- and off-site. Wastes generated on-site include residues from the site's recycling processes and subsequent solvent blending operations. These on-site generated wastes include still bottoms and spent solvents from equipment rinses. On-site generated wastes have the following U.S. EPA Hazardous Waste Numbers: D001, D002, D005, D007, D008, D018, D035, F003 and F005.

Hazardous wastes generated off-site and received at the Gage LSF for recycling include primarily ignitable and toxicity characteristic wastes (U.S. EPA Hazardous Waste Number D001, D005, D006, D007, D008, and D011) and spent solvents (U.S. EPA Hazardous Waste Numbers F001, F002, F003 and F005). Corrosive hazardous wastes (U.S. EPA Hazardous Waste Number D002) are also received from off-site for temporary storage prior to being shipped to a licensed treatment or disposal facility. Wastes are received in either bulk tanker truck or 55-gallon drum quantities.

### Waste Treatment

No waste treatment activities are performed at the Gage LSF. Spent solvent recycling activities are performed at the site, including thin film evaporation and distillation.

### Waste Storage

There are currently three active waste storage areas at the Gage facility and two inactive waste storage areas. A description of these five areas is provided in this section.

*<u>Current Storage Activities</u>*

Wastes are currently stored in 55-gallon drums in the Gage LSF and in bulk storage tanks in the Generated Hazardous Waste Storage Area (Solid Waste Management Unit [SWMU] 5). The Gage LSF is an approximately 4,200 square foot building that is enclosed on three sides and has a coated-concrete floor. Ignitable and corrosive hazardous wastes (D001 and D002, respectively) and spent solvents (F001, F002, F003 and F005) are stored in this building. A more detailed description of the Gage LSF is provided in Attachment B4, Environmental Assessment.

The Generated Hazardous Waste Storage Area includes three aboveground storage tanks and a concrete secondary containment system. Three tanks (9,000, 11,000 and 15,000 gallon capacities) are currently being used to store Gage-generated ignitable and toxicity characteristic hazardous wastes (D001, D005, D007, D008, D018, D035, F003 and F005). A more detailed description of the Generated Hazardous Waste Storage Area is provided in Section B2.A.3.

*Treatment, Storage and Disposal Facility Waste Activities*

The Gage LSF provides both bulk and container storage capacity for wastes received from off-site prior to it being recycled or shipped off-site to another treatment/disposal facility. The Gage LSF consists of a truck unloading and container storage building and an adjacent tank farm. The maximum storage capacity of the LSF is 25,000 gallons.

*Past Storage Activities*

Two areas of the Gage facility have previously been used to store hazardous waste. These areas include the Former Generated Hazardous Waste Storage Area (Area of Concern [AOC] 1) and the Back Storage Area (AOC 2), which are further discussed in Section B2.A.3.

The Former Generated Hazardous Waste Storage Area was located along the railroad tracks on the west side of the facility and was operated as a drum storage yard until the late 1980's. This area was used to store drums of hazardous waste (including D001, D002, F001, F002, and F003) that were generated on-site. A more detailed description of this storage area is provided in Section B2.A.3.

The Back Storage Area was located near the railroad tracks on the west side of the facility and was used to store both full and empty drums, including drums of ignitable hazardous waste (D001) and spent solvents (F003 and F005). In 1994, a limited storage facility for the storage of hazardous waste was constructed at the Back Storage Area location. A more detailed description of the Back Storage Area is provided in Section B2.A.3.

### B2.A.1 (c) Waste Disposal

No waste disposal activities are performed at the Gage facility. Any waste generated on-site or received from off-site that cannot be beneficially reused or reclaimed is sent off-site for disposal.

In the early 1980's, fifteen 55-gallon drums of material were excavated from the site at the western edge of Parcel A (AOC 8). This material was transported off-site to a licensed disposal facility.

### B2.A.1 (d) Underground Storage Tanks

Facility records show that 24 underground storage tanks (USTs) were located on the Gage facility property. A UST summary is provided on Table B2-1 that identifies for each tank: identification number, year removed, age at the time of removal, capacity, former contents, and former location. These tanks were located within seven separate underground storage tank areas (Figure B2-2). The 17 registered UST systems located on Parcels A, B, and C (as defined by Michigan Public Act 213 of 1994) were removed between 1985 and 1987 and the remaining UST systems were closed between 1986 and 2009.

### B2.A.1 (e) Previous Studies

A summary of previous investigations at the Gage facility is presented below.

### *Underground Storage Tank Investigations*

In 1984, O.H. Materials Company (OHM) evaluated the condition of the 17 USTs on Parcel A, B, and C at the Gage facility. Tanks 41, 48, and A (see Table B2-1) failed pressure-testing and were immediately emptied. OHM installed 12 monitoring wells (TMWs) around the four tank farms. OHM discovered free product in several of the wells near the truck dock and fill house areas and concluded that ground water existed in discontinuous zones across the site. In 1985, OHM installed an additional five monitoring wells (GMW-1 through GMW-5) at the perimeter of the site to provide additional ground water data. OHM's evaluation of the field data resulted in the following conclusions (OHM, 1986):

- The subsurface stratigraphy consists of approximately five feet of silty sand underlain by a gray-brown silty clay which appears to be continuous across the site,
- Fill material consisting of fine sand and construction debris is likely placed in low-lying areas,
- Ground water is present from three to six feet below the ground surface,
- Ground water flows toward the east-northeast,
- The horizontal hydraulic conductivity of the silty clay unit is $3.3 \times 10^{-3}$ feet/day ($1.16 \times 10^{-6}$ cm/sec), and;
- Volatile organic compounds (VOCs; primarily chlorobenzene) were present in ground water beneath the facility with the greatest concentrations found at MW-4, located in the southwest corner of Parcel C.

Gage removed all 17 of the registered USTs from Parcels A, B and C between 1985 and 1987. In accordance with standard UST closure practices at the time, a representative of the City of Ferndale's Fire Marshal Department made a site visit to inspect that the USTs had been removed, and to assure that the UST excavations were free of contamination. Soil samples for chemical analysis were not required as part of the Fire Marshal's inspection. As documented in an October 30, 1987 letter, the Fire Marshal indicated that all of the USTs had been properly closed.

Following acquisition of Parcels D and E, additional USTs were identified (see listing on Table B2-1). On Parcel D, kerosene and a fuel oil tank were identified and closed in place. A 6,000 gallon gasoline UST was removed from this parcel in 1991, prior to Gage's ownership. On Parcel E, it was determined that a 4,000 gallon gasoline UST had been removed from the property in 1986, also prior to Gage's ownership. During construction activities in 2009 along the Parcel C and Parcel D boundary, a 1,000-gallon fuel oil UST was identified and subsequently removed.

In an attempt to control what was believed to be migration of impacted ground water across the site, Gage installed two separate ground water recovery systems. These systems are described in Section B2.D, Interim Measures. The first system was installed on the east end of the product storage tank farm. The second system transected the east-west length of Parcel C.

### *Phase I and II Hydrogeological Investigations*

In July 1989, a Phase I Hydrogeological Investigation was initiated by Gage to further characterize soil and ground water quality beneath the site. This information was presented in a report prepared by WW Engineering & Science (WWES), titled "Results of Hydrogeological Investigation at Gage Products Company, Ferndale, Michigan", (WWES, 1990).

The 1989 Phase I investigation included the drilling of five soil borings to depths between 9 and 60 feet, the installation of one additional monitoring well (GMW-6), the replacement of two monitoring wells (GMW-4 and GMW-5), aquifer testing to determine the horizontal hydraulic conductivity of the shallow saturated fill material, collection of clay till soil samples to determine vertical hydraulic conductivity, collection of static water-level data, and collection and analysis of representative ground water samples for VOCs. The Phase I investigation documented the following:

Soils beneath the site consist of an upper fill layer that includes varying amounts of sand, gravel, silt, and clay. The fill layer is underlain by clay till that extends to at least 60 feet below ground surface. The clay till unit was found to be an aquitard with a calculated average hydraulic conductivity of 3.4 x $10^{-7}$ cm/sec.

Ground water occurs within the upper fill layer in discontinuous zones beneath the site. When contoured, water levels indicated flow is west to east, and is consistent with the topography of the upper surface of the clay till unit.

The original 12 TMW monitoring wells installed by OHM no longer exist. Gage personnel indicated that these wells were removed with the USTs at each location.

Analytical results from representative ground water samples collected from six of the GMWs indicated that ground water has been impacted by several VOCs. The highest concentrations of VOCs in the site's ground water were reported in samples obtained from GMW-4 located near the railroad spur.

There were no known industrial, domestic, or irrigation wells within a one-mile radius of the Gage facility.

Subsurface structures (utility lines) did not appear to be influencing ground water flow and the ground water remediation system installed by OHM at the Remanufacturing Building (Fill House No. 2) was inactive.

In July and August 1990, WWES conducted a Phase II Hydrogeologic Investigation on Gage's behalf. This investigation included; verification of conclusions presented in the Phase I Investigation report, installation of five soil borings in former UST locations to document soil conditions (TSB-1 through TSB-5), installation of one soil boring, C-SB-1, on the west side of the site to document upgradient soil conditions, installation and collection of a ground water sample from one monitoring well (GMW-7) to document upgradient (west of the site) ground water quality and collection of ground water samples from the existing six monitoring wells for laboratory analysis.

Results of WWES' Phase II hydrogeologic investigation confirmed data presented in the Phase I investigation. In addition, the analytical results from soil samples obtained from five borings performed in the former UST areas indicated some impacted soil remained at two locations; low levels of benzene, toluene, ethylbenzene, and xylene (collectively known as BTEX compounds) and chlorobenzene were detected in the truck dock UST area and low levels of BTEX, chlorobenzene and 1,1,1-trichloroethane were detected in the Fill House No. 2 UST area (WWES, 1990b).

### *Limited Storage Facility Operating License Application - 1992*

Additional investigation of Gage facility was conducted in 1992 for the Gage LSF operating license application. The scope of that investigation included an extensive topographic and utility survey to locate all site features, installation of five driven well point piezometers in the fill unit (P-1 through P-5), collection of soil samples from seven borings (B-8 through B-14) for physical soil testing, collection and analysis of ground water samples from seven existing monitoring wells and measurement of water levels in all wells and piezometers. The investigation documented the following (WWES, 1992):

- Ground water impact, depth, and flow direction.
- Surveyed topographic contours, property boundaries, buildings, waste management and storage areas, monitoring wells, soil borings, piezometers, known subsurface utilities, and all other main site features.
- The grain-size distribution, Atterburg limits, Unified Soil Classification System designation, moisture content, and vertical hydraulic conductivity of site soils (fill and clay till unit).
- The subsurface utilities within the clay soil appeared to have minimal effect on ground water flow.

### *Hydraulic Evaluation of the Ground Water Collection Trench*

Prior to issuance of Gage's LSF operating license, the MDEQ requested that Gage evaluate an inactive ground water collection trench at the facility for its effectiveness and its possible re-use as an interim corrective measure. A series of 14 shallow piezometers (P-6 through P-19) were installed in and adjacent to the collection trench. One piezometer (P-20) was installed along the southern boundary of Parcel C. Water levels in these and other piezometers and wells were monitored during a 72-hour pump test in the trench. Based on the following results of the trench evaluation, WWES did not recommend the use of the trench as an interim corrective measure (WWES, 1994):

- A portion of the trench was plugged and could not effectively transmit water.
- The collection system's zone of capture was limited; therefore, the trench would not affect movement of water within the fill layer.
- The saturated shallow fill layer was underlain by thick clay till aquitard and was thus vertically limited and not part of an aquifer system.

### *Hydraulic Monitoring Program*

In accordance with Gage's former Act 64 Operating License, Part V. A. 3, a Hydraulic Monitoring Program was implemented at the Gage facility on a quarterly basis for a period of one year. The MDNR approved the program for implementation in a letter dated October 27, 1994.

The data revealed a northwest to southeast hydraulic gradient across Parcels B and C of the site. The average linear velocity of ground water flow beneath the parcels is less than 10 feet per year. The remnants of a nonfunctional ground water collection trench beneath Parcel C have no discernible effect on ground water flow, nor do any other superficial structures on the site.

### *Tote and Drum Storage Area Upgrade*

In the spring of 1995, Gage undertook a project to upgrade the Tote and Drum Storage Area located on Parcel C of the Gage facility. As part of the project to resurface the Tote and Drum Storage Area, underlying fill material was removed and disposed of off-site. To ensure proper management of those soils, samples were collected and analyzed to determine if they were subject to regulation as a hazardous waste under applicable state and/or federal regulations. The scope of this work was discussed with and subsequently agreed upon by the MDEQ.

None of the samples analyzed exhibited the characteristic of a hazardous waste. In fact, no volatile or semi-volatile organic compounds were detected in any of the TCLP extract above the method detection limit.

### *Silman Avenue Utility Corridor Sampling and Analysis*

In August 1995 Gage, in anticipation of the paving of Silman Avenue, negotiated with the MDEQ and the U.S. EPA an approved program to sample and analyze the ground water that may be present in the utility corridors beneath Silman Avenue.

Four proposed sampling locations were selected and subsequently approved by the MDEQ and U.S. EPA. U.S. EPA geologist, Mr. Greg Rudloff, was on-site to observe the sampling activities. At three of the proposed sampling locations ground water was encountered and sampled for analysis (GP-TMW-01, 02 and 03).

Low levels of 5 VOCs were detected. None of the reported detections exceeded the Part 201 generic residential direct human contact criteria. Table B2-2 summarizes the analytical results for these soil samples.

### *Silman Avenue High Voltage Utility Line Excavation Sampling and Analysis*

MDEQ and Gage were on-site inspecting work being performed along Silman Avenue in January 1996 as a high voltage electrical utility line was being installed. PID screening of exposed soils within the trench by MDEQ isolated those areas suspected of being impacted and two samples were subsequently collected for analysis. Additionally, one sample of ground water that had seeped into the trench, and was subsequently pumped to a tote for temporary storage, was collected for analysis.

The resulting laboratory report for soils reveal the presence of xylenes at a concentration slightly above the direct human contact criteria. The ground water did not contain VOCs above either the direct contact criteria or volatilization to indoor air criteria. Table B2-2 summarizes the results of the analyses performed on the soil samples.

### *Pipe Trestle Foundation Excavation*

During May 1997, ongoing facility upgrades in the vicinity of a new railcar load/unload containment area afforded the opportunity to sample subsurface soils that were exposed during the installation of pipe trestle foundations. MDEQ and Horizon, as a representative of Gage, were on-site to split samples representative of soil conditions in the four northern most excavations completed at the time.

An exceedance of the direct human contact and volatilization to indoor air was noted in one of the four samples (EX-9). The analytical data are also summarized on Table B2-2.

### *Soil and Ground Water Sampling on the Grand Trunk Switching Yard*

The State of Michigan required Gage to perform an Off-Site Ground Water Assessment, pursuant to Part V of their former Act 64 Operating License, “Environmental Monitoring”. A work plan outlining the scope of work to be executed under this permit requirement was submitted to U.S. EPA and MDEQ in August, 1994. This work plan was incorporated as an element of the Gage facilities RFI. As part of this scope of work, a portion of the Grand Trunk Western switching yard, located immediately west of Gage’s Parcel C, was investigated.

To augment its shipping and receiving capacity and potentially reduce truck traffic on Wanda Avenue, Gage contemplated facility improvements that required them to purchase the portion of the Grand Trunk Western (GTW) switching yard that was investigated during the Off-Site Ground Water Assessment program.

Because Gage desired to finalize its plans for this facility upgrade as quickly as possible, and because future construction on the GTW parcel would likely restrict environmental investigation, Gage implemented a portion of the Off-Site Ground Water Assessment sampling program during the summer and fall of 1997.

The purpose of performing this off-site assessment of soil and ground water quality was twofold:

- to fulfill permit requirements as specified previously; and
- to provide determination regarding the environmental condition of this property prior to purchasing it from GTW.

To fulfill permit requirements, this assessment determined the quality of ground water (where encountered beneath the property) and the direction of ground water flow.

The results of this investigation determined that ground water was only present in two of the three locations investigated. The hydraulic gradient was to the southeast. Analytical results for the ground water samples did not reveal any exceedances of applicable regulatory criteria.

Eight soil samples were collected and analyzed. No exceedances of Part 201 soil criteria applicable to the site were observed. Tables B2-2 and B2-3 summarize the analytical results of soil and ground water samples, respectively.

Off-site migration from the Gage property to the Grand Trunk property was not evident as a result of this work, and is unlikely to occur since the ground water flow direction is from Grand Trunk toward the Gage property.

## Appendix IX Sampling

As explained in a letter from Horizon to Mr. Daniel Daily, MDEQ, dated August 8, 2000, Gage, in response to a request from the MDEQ, performed focused sampling and analysis for Appendix IX parameters to ensure that the Gage facility's RCRA Facility Investigation (RFI) work plan constituent list was sufficient to allow potential exposure risks posed by site environmental media to be fully assessed through the Corrective Action process. At MDEQ's request, Gage sampled ground water at select site locations and analyzed those samples for a modified Appendix IX list. It was MDEQ's preference that ground water be sampled rather than soil, given ground water's mobility and its potential to act as a transport mechanism.

In developing the modified Appendix IX constituent list, Horizon reviewed the list of materials currently used and/or stored on-site at the Gage facility to establish a preliminary list. The Appendix IX list was then reviewed and those constituents not commonly associated with surface coatings, related carriers, solvents and/or cleaning solvents were eliminated. The Appendix IX parameters that were eliminated generally included chemically incompatible compounds, pesticides, herbicides and pesticide/herbicide intermediates.

In a letter dated February 15, 2000, Horizon submitted the modified Appendix IX parameter list to the MDEQ for their approval. In a letter dated March 28, 2000 MDEQ responded wherein it was requested that an additional 18 organic compounds be added to the list. The final list included those compounds requested by the and PCBs as requested by Mr. Al Taylor.

Two Appendix IX sampling locations were selected:

- The first location was the former drum burial area in the northern portion of Parcel A, identified for purposes of the RCRA Corrective Action program as AOC 8. Existing ground water monitoring well GMW-1 is positioned in essentially the center of this former burial area and was used to obtain the groundwater sample during this event.

- The second location was in the vicinity of the intersection of Jewell and Wanda Avenues, at the southeast corner of Parcel C. The potential for ground water to migrate off-site has been suspected along a north-south oriented combined storm and sanitary sewer located beneath Parcel C. The combined sewer connects to a main beneath Jewell Avenue immediately south of Parcel C. A new permanent ground water monitoring well was to be installed to accommodate this sampling and analysis event. This well was to be positioned vertically and horizontally such that the screened interval of the well would intersect the backfill material surrounding the sewer line beneath Jewell Avenue.

Sampling at the first of the two locations (GMW-1) was completed on June 16, 2000. To briefly summarize those results, several inorganic species were detected; however, no concentrations were above applicable regulatory criteria including residential drinking water criteria. Additionally, three organic compounds were detected at low ppb levels, all of which were below applicable regulatory criteria including residential drinking water criteria. Of the three organic compounds detected, none were included in the list of additional compounds requested by the MDEQ.

Sampling at the second location, the intersection of Jewell and Wanda Avenues, could not be completed as ground water was not present in this location. MDEQ representatives were on-site to inspect this well installation and sampling effort. Based upon the absence for ground water, MDEQ agreed that installation of a monitoring well at this location was not necessary and that this particular migration route was not complete at the site.

Horizon concluded that there was no reason or justification to recommend the addition of any organic compound or inorganic species to the list of compounds originally proposed in the RFI Work Plan. In a letter dated July 30, 2009, the MDEQ concurred with that conclusion.

## Parcel D (Former Coca Cola Enterprises Property) Environmental Assessments and USTs

### *July 1993 Environmental Audit*

As documented in a report dated July 6, 1993, an environmental audit of Parcel D was performed by the Traverse Group, on behalf of Coca Cola Enterprises (The Traverse Group, 1993). Results of the audit indicated that additional soil removal was in progress to address residual soil impact related to a confirmed release (dated July 9, 1991) from a 6,000 gallon unleaded gasoline UST and associated dispenser and piping. The UST, dispenser, and piping were removed in July of 1991 (prior to Gage's ownership of this property). The audit also described: 1) the presence of solvent like odors in the restroom in the northeast corner of the facility, apparently originating from the floor drain; 2) the presence of two paint booths inside the facility; 3) areas of surface staining on the walls and the floor in the former boiler room in the northwest corner of the facility; and 4) railroad tracks observed directly west of the facility building.

### *October 1993 Environmental Assessment*

As documented in a report dated October 4, 1993, an environmental assessment including: 1) a Phase I Baseline Investigation; 2) an Environmental Assessment (Second Phase); and 3) a Sewer Investigation, was performed by WW Engineering and Science (WWES) on behalf of Gage (WWES, 1993). The Phase I Investigation indicated that the MDNR, in a letter dated August 18, 1993, granted a closure approval for the former 6,000 gallon gasoline UST. The Phase II investigation included the collection and analysis of soil samples to evaluate the paint booth area and the railroad track area west of the building. Analytical results indicated that soils in these areas were not impacted. The Sewer Investigation included smoke testing of the sewers in the facility. Based on the results of that investigation, several drain repairs were recommended to prevent the backflow of odors from the combined sewers that serve the building.

### *USTs Discovered in 1998*

As documented in a letter from Gage to Mr. Daniel Dailey dated July 23, 1998, Gage discovered two additional USTs beneath the floor in the back warehouse of the former Coca-Cola facility in May of 1998. The existence of these tanks had not been disclosed by the seller prior to Gage's purchasing the property, nor by two environmental consulting firms retained to perform Phase I, Phase II and Phase III Environmental Site Assessments of the property. The USTs, a 10,000 gallon kerosene tank and 20,000 gallon tank containing No. 5 fuel oil, were used as reservoirs to store heating oil for on-site consumptive purposes within the on-site boilers.

On June 4 and 5, 1998, Horizon conducted an investigation of the UST area. Samples of the fluids in the tanks were collected and soil borings were advanced to depths coincident with the bottoms of the tanks. Two samples were collected from the east end of Tank #1 at depths of 10-12 feet and 13-15 feet beneath the floor of the warehouse. The depth to the bottom of Tank #1 was measured to be 13 feet beneath the floor. A sample from each end (east and west ends) of Tank #2 was collected at depths of 14-16 feet. The depth to the bottom of Tank #2 was also measured to be 13 feet beneath the floor. No ground water was encountered at any of the probe locations.

The soil samples were analyzed for PNAs. Laboratory results indicated that none were detected in any of the samples; therefore, it was concluded that there had been no release from the USTs.

Fluid from Tank #1 was removed from the site by M.L. Chartier, Inc. and disposed of by General Oil Company on June 12, 1998. Disposal of the fluid within Tank #2 was performed by General Oil Company in August 1998

The USTs were closed in place by filling with an inert flowable material in accordance with applicable regulatory requirements.

### *UST Discovered in 2009*

In a letter dated September 9, 2009, Gage notified Mr. Daniel Daily that a contractor working for Gage had discovered a small UST on August 12, 2009, during excavation of a trench for construction of a concrete security wall outside of the north wall of the building at 515 Wanda Avenue, near the intersection of Wanda and Jewel. The existence of this UST was not disclosed by the previous property owner prior to Gage's purchase of the property in 1994, nor by two environmental consulting firms retained on separate occasions to perform a Phase I Environmental Site Assessment of the property.

Upon discovery of the UST, Gage contacted the City of Ferndale Fire Department, who in turn contacted the MDEQ.

Gage personnel measured the tank contents with a dip stick and determined that it was full of liquid. The tank had a capacity of approximately 1,000-gallons. Gage transferred the liquid to three 330-gallon totes and analyzed a sample of the tank contents via GC/MS. Based on the results, Gage determined that the contents consisted of water mixed with residual fuel oil. Based on the tank contents, the observed brass feed/return lines and historic knowledge of a boiler, Gage concluded that the UST was used to store fuel oil that was burned in a former on-site boiler.

Horizon contracted Commercial & Industrial Dismantling (CID) to remove the UST. Upon removal of the UST, Horizon collected two soil samples from the floor of the excavation, one from beneath each end of the tank.

The UST was power washed and residual liquids transferred to a drum. CID rendered the UST unusable prior to removing it from the site and transporting it to H&H Metal in Inkster, Michigan, a metal recycling facility.

The two soil samples from the bottom of the excavation were analyzed for polynuclear aromatic hydrocarbons (PNAs). Analytical results indicated that with the exception of very low levels of 2-methylnaphthalene and naphthalene, no PNAs were detected. The observed concentrations of 2-methylnaphthalene and naphthalene are below the most restrictive residential use criteria as defined by Part 201 of P.A. 451 of 1994, as amended (Part 201). Based on these results, the UST removal was deemed complete and no further action is planned.

## Parcel E Environmental Site Assessments

### *1998 Phase I ESA*

Horizon performed a Phase I Environmental Site Assessment (ESA) of the former Wolf Wiping Cloth Company site located at 475 Wanda Avenue, Ferndale, Michigan (Parcel E) in June 1998 (Horizon, July 1998). The Phase I ESA identified seven areas of environmental concern:

> Area 1: Two areas beneath the building floor where bailer machines were formerly located. The floor was covered with metal sheeting; consequently, the condition of the floor beneath the sheeting could not be identified.
>
> Area 2: A pit located in the southern portion of the building. The pit was formerly used to obtain access to the bottoms of machinery for repair. The condition of the bottom of the pit could not be identified during the Phase I investigation.
>
> Area 3: The floor drain located in the southeastern corner of the building. Heavy staining was noted on the floor around this drain.
>
> Area 4: Staining on the pavement near an above ground storage tank (AST). The contents of the AST are unknown; however it is suspected that spent hydraulic oil may have been stored in the tank.

Area 5: Heavily stained soils along the western portion of the exterior parking/storage area.

Area 6: A former 4,000 gallon gasoline UST which was removed in 1986. There are no records documenting clean closure of the UST.

Area 7: A 550 gallon diesel UST included in the City of Ferndale Fire Marshall's records but not identified during the Phase I site inspection. The location of this UST is unknown.

*1998 Phase II ESA*

Horizon conducted a Phase II ESA of the site in August 1998 (Horizon, September 1998). The purpose of the Phase II ESA was to investigate these seven areas identified in the Phase I and determine if the site meets the definition of a "facility" as defined by the MDEQ pursuant to Part 201 of Michigan P.A. 451 of 1994, as amended.

Prior to performing field investigation activities, Horizon made additional inquiries regarding the location of the 550 gallon diesel UST which was included in the City of Ferndale Fire Marshall's records (Area 7). Through conversations with Mr. Fred Cohen, the site owner, Mr. Jeff Goodwin, former General Manager for Wolf Wiping Cloth Company, and Mr. Ken Van Sparrentak of the City of Ferndale Fire Department, it was determined that the 550 gallon UST identified in the fire department records was actually a 550 gallon diesel AST. The AST is being addressed as Area 4.

A total of ten soil borings were installed throughout the areas of concern. Soil borings extended to depths of up to 10 feet below grade. A thin layer of fill was present above the clay unit that occurs throughout the area. No ground water was encountered. Soil samples were collected and analyzed for VOCs, PNAs, the Michigan 10 suite of metals and PCBs. With one exception, all results were below generic Part 201 residential criteria developed by the MDEQ. One soil sample collected in Area 3 at the property was found to contain arsenic at a concentration of 13 mg/kg, which exceeds the generic residential direct contact cleanup criterion of 7.6 mg/kg.

*1999 Addendum to the Phase II ESA*

A later review of the exceedance for arsenic in Area 3 of the property indicated that, based on soil background data compiled by the Waste Management Division of the MDEQ, an arsenic concentration of 13 mg/kg is consistent with background levels in the area (Horizon Environmental, April 1999).

### *Evaluation of Parcels D and E*

Parcel D is the former Coca-Cola Bottling Company property located at 515 Wanda Avenue. Parcel E is the former Wolf Wiping Cloth Company property located at 475 Wanda Avenue.

The Gage facility's 2003 re-issued LSF operating license identified the following WMUs and AOCs on Parcel D based on observations included in a 1993 Environmental Assessment:

| | |
|---|---|
| WMU Number 24 | Truck Wells and Oily Concrete Stains; |
| WMU Number 25 | Floor Drains that Connect to the POTW; |
| WMU Number 26 | Paint Room with Paint Filters Present; |
| WMU Number 27 | The Mechanical Room; |
| WMU Number 28 | Asbestos in Floor and Ceiling Tiles and Pipe Wrap; |
| AOC Number 9 | Fill Material in Sewer Trenches; and, |
| AOC Number 10 | Jewell Avenue. |

No WMUs or AOCs were identified by U.S. EPA or MDEQ at Parcel E.

In 2009, Horizon Environmental conducted an evaluation of Parcels D and E, including a site inspection, interviews with site personnel, a review of both internal and MDEQ site inspection documents, and a review of the environmental assessment reports for Parcels D and E. In a letter to the MDEQ dated December 30, 2009, Horizon provided a summary of the evaluation findings and recommendations regarding updating the RFI work plan. This evaluation determined that only SWMU 25 and AOC 10, both of which are associated with the combined sanitary/storm sewer that runs below the former Jewell Avenue roadway, warranted investigation as part of the RFI. Furthermore, no SWMUs or AOCs were identified on Parcel E.

### B2.A.2 Environmental Setting

### B2.A.2(a) Climate

Local, site-specific meteorological data has been provided in Attachment B4, Environmental Assessment.

### B2.A.2(b) Topography

The Gage property is located near the boundary of the Highland Park and the Royal Oak 7-1/2 minute topographic quadrangles. The Highland Park quadrangle (Figure B2-1) shows the site grade to be fairly level, with elevation varying between 635 and 640 feet. The site elevation contour map (Figure B2-3) shows a similar range of elevation with an east to west rise on Parcel C from 635 to 639 feet; generally level land at 637 feet on Parcel B; and, on Parcel A, land rising gently 1 to 3 feet to the buildings situated on a gentle “high” at 637 feet.

Regionally, the topography is also generally flat, with a gradual eastward decline in elevation from 650 feet, a mile west of the site, to 625 feet two miles east of the site.

### B2.A.2(c) Hydrogeology

#### Regional Geology

The regional geological and hydrogeologic setting of the Gage facility has been interpreted from several sources, including publications by J. A. Dorr, Jr. and D. F. Eschman, Western Michigan University, the United States Department of Agriculture, Soil Conservation Service (SCS); and glacial geology maps prepared by the Michigan Department of Natural Resources, Geological Survey Division.

The Gage facility is located in an area greatly influenced by the movement of glaciers that occupied Michigan during the Pleistocene Ice Age, which occurred approximately 11,000 to 12,000 years ago. Glacial drift soils beneath this part of Oakland County commonly range in thickness from 100 to 150 feet.

The glacial geologic profile is characterized in the available literature as consisting of layers of lacustrine clay and silt deposited in glacial lakes Wayne and Warren that were created by meltwaters from the Huron-Erie glacial lobe. These deposits are described as consisting of gray to dark reddish-brown clays and silts that are varved (laminated) in some locations. The laminations are created by slight textural differences created by seasonal increases or decreases in sediment load in the glacial meltwater. These deposits may also include small discontinuous layers of lacustrine sands and clay till.

The lacustrine deposits often overlie waterlain moraine deposits, which consist of brownish fine to medium sands, and occasional lenses of gravel and also include soil composed of lacustrine clay. These waterlain moraine deposits were deposited in beach or off-shore littoral environments.

Soil types near the site are classified by the SCS as “Urban Land” or land that is so altered by development that soil classification is not possible without subsurface investigation.

Bedrock in the region consists of the Antrim Formation shale at a depth of approximately 140 feet. The Antrim shale is late Devonian to early Mississippian in age (approximately 350 to 400 million years before present). The Antrim Formation is generally not considered a source of ground water in Michigan and is better known as a source of natural gas in southeast Michigan.

## Regional Hydrogeology

A review of information from Western Michigan University and the MDEQ Geological Survey Division, Glacial Geology and Ground Water Section, indicates no ground water aquifers in use in the vicinity of the site. The U. S. Geological Survey (Geological Survey Water-Supply Paper 2000, 1972) reports that the glacial deposits of the Ferndale area have a low permeability and correspondingly low potential to yield water. Potable water for this area is supplied by the Detroit Municipal Water Department which draws from distant surface water reserves such as Lake St. Clair and Lake Huron.

Well logs of record in the vicinity of the Gage facility are few with only 3 well logs found within the surrounding 9 sections (9 square miles). A waste disposal well log from approximately 1 mile northwest of the property shows sand to 7 feet underlain by clay to 110 feet, all overlying 18 feet of gravel and clay. A domestic water well in the same general area shows yellow clay, sand and gravel to 30 feet overlying 12 feet of blue clay and gravel, over a water-bearing gravel from 42 to 57 feet that yielded 20 gallons per minute. The static water level is recorded as 9 feet. The final log is a water well from roughly 1-1/2 miles northeast of the site at the Hazel Park racetrack. That log shows fill to 19 feet underlain, in sequence, by clay and hardpan to 109 feet, “putty sand” (probably very silty sand and not water-bearing) to 121 feet, hard clay to 132 feet and fine and coarse sand to 145 feet. These well logs are included in Appendix B2-1.

In summary, the record of wells indicates that ground water suitable for a domestic supply is not found within 50 feet of the land surface in the area, and that a few feet of surficial sand or fill overlying clayey, non-water-bearing materials that extend to a depth of more than 100 feet is the expected profile.

## Site Geology

### *General*

The site geology has been described in boring logs for 17 soil borings, 7 wells, and 22 piezometers installed at the site. The available boring logs from each investigation performed at the site are compiled in Appendix B2-1 and summarized in Table B2-2. Soil boring, well, and piezometer locations are shown on Figure B2-4. Four site cross-sections were constructed using the information provided on these logs for depths of up to 60 feet (Figures B2-5 through B2-8). The surface traces of the cross-sections are shown in Figure B2-4.

In general, soils encountered at the site consists of two soil types: a thin surficial granular fill that contains minor saturation in some locations; and, an underlying dry to moist clay till containing varying amounts of admixed sand, silt, and traces of gravel.

The surface fill material consists predominantly of fine sand along with silt, clay, gravel, organic matter, and anthropogenic debris. A sample of this fill material collected from SB-8 was classified as SM under the Unified Soil Classification System (USCS; Appendix B2-2). The thickness of fill observed in soil and well borings ranges from 0 to almost 6 feet (thicknesses range up to 11 feet in local excavated areas including UST vaults and collection trenches).

Laboratory grain size analyses for 11 clay unit soil samples collected from 6 borings indicate that this unit is classified as CL under the USCS (Appendix B2-2). In different locations the clay unit can be described as a sandy clay or silty clay, depending on the percentages of sand or silts present. The clay unit generally varies in color from a brown and gray mottled color to gray with increased depth. Results from falling-head permeameter tests run of clay samples (Appendix B2-2) indicate vertical hydraulic conductivities of between $1 \times 10^{-8}$ to $7.76 \times 10^{-7}$ cm/sec. These hydraulic conductivity values approach or exceed the minimum value of $10^{-7}$ cm/sec required for earth materials used in the construction of a liner at a Type I or II landfill.

The clay unit was encountered at a depth of 0 to 6 feet below the surface and is documented to an explored depth of 55 and 60 feet (SB-1 and SB-2, respectively). The clay unit has not been fully penetrated at any of the boring locations. Therefore, any granular, presumably water-lain moraine deposits in the area, if they exist, would lie below 60 feet in depth beneath the property.

*Top of Clay Elevation*

The attitude of the clay surface is depicted in a contour map of top of clay elevation data taken from the boring logs (Figure B2-9). There are abundant elevation data points in Parcel C, a handful in the south one-third of Parcel B, and one location (GMW-1) in Parcel A. (TSB-1 and TSB-2 are located in a former UST excavation in Parcel A and thus do not represent broader conditions.) The contour mapping in this and other report figures reflects this data point distribution.

The clay surface has little or no direct relationship to the site topography: A roughly east-west divide on the clay surface is apparent at approximately 635 feet elevation in the former Silman Avenue area. Southward across Parcel C the clay surface descends to below 630 feet, forming a portion of a shallow basin the lowest point of which is near Jewell Avenue (SB-14). North of the divide, the clay surface dips gently to the east and northeast across Parcel B. Farther north, in Parcel A, the clay surface is largely undefined due to lack of data.

The slope of the clay surface from the divide southward and from the Parcel C east boundary westward is as high as 0.04 feet/foot. The slope of the clay surface from the Parcel C west boundary eastward is between 0.01 and 0.02 feet/foot.

As will be discussed in the following sections, the clay surface topography controls the occurrence of saturated conditions within the fill, with infiltration accumulating in the low shallow basin areas.

*Fill Thickness*

The thickness of surficial fill encountered at the site has been contoured in Figure B2-10. This map greatly resembles the inversion of Figure B2-9, largely because the granular fill was imported to provide an even, if not perfectly level, site for development. The ridge on the clay in the Silman Avenue area corresponds approximately to the area of thinnest fill (0 to 1-foot); and filling in the clay basin of Parcel C was generally greater where the top of clay elevation was the deepest (SB-14).

## Site Hydrogeology

*General*

Thin, localized zones of saturation occur within the granular surficial fill material where low spots in the underlying clay unit allow accumulation of infiltrating surface run-off. Where the surficial fill is absent (thickness of fill is documented as “zero”), the clay is directly overlain by pavement or buildings at the surface and there is no significant accumulation of infiltration (i.e., no saturation).

The clay unit is characterized at virtually all well and boring sites as dry or moist. Its content of sand and silt, therefore, imparts no significant water-bearing character to the clay, and it is considered to be non-water-bearing. Extremely low vertical hydraulic conductivity values measured in the clay unit indicate that the saturated zones are perched by the clay and isolated from any deeper water bearing units.

*Hydrogeologic Data*

Hydrogeologic data taken from soil boring/well logs and water level measurements in wells and piezometers are summarized in Table B2-4. A number of locations drilled strictly as soil borings showed no zone of saturation: Of approximately 17 soil borings on Parcels A, B and C and 2 borings on Parcel D, 12 showed no saturation of the fill unit, or no fill present. Based on variability observed on Parcels A, B, C and D, it is expected that hydrogeologic characteristic of Parcel E will be similar to those observed on other portions of the Gage facility.

Presently, there are data for 7 monitoring wells, and 22 piezometers including 2 hand-driven well points in place at the site for use in obtaining perched water elevation data. The well construction materials are tabulated with other construction details in Table B2-4. The wells are either of 2-inch ID PVC or galvanized steel well casing with slotted PVC or wire-wrapped stainless-steel screens.

Select wells are illustrated in the cross-sections depicted in Figures B2-5 through B2-8.

*Saturated Thickness*

The saturated zone of the fill is generally so thin that the GMW wells are partly or completely screened in the underlying confining clay unit. Positioning of well screens completely in the clay till unit, renders two of the wells, GMW-1 and GMW-3 not usable as piezometers because little fill is present and the well is screened such that the top of the sand envelope surrounding the well screen makes little or no contact with the fill (GMW-1), or because no fill is present (GMW-3). GMW-1 has shown "negative" water levels with the static water level lying below the clay surface, the borehole functioning effectively as a sump allowing accumulation of infiltrating surface run-off.

Wells GMW-5 and GMW-7 are provisionally usable because of the questionable effectiveness of the top of the well sand pack contact with the fill seepage zone. Wells GMW-2, GMW-4, and GMW-6 are considered reliable. Nearly all of the piezometers used to monitor seepage levels (P-6, and P-11 through P-20) are screened at maximum depths of 5.5 to 9.5 feet, are sand packed to within 1 foot of the land surface, and are considered mostly reliable.

Water levels observed in the wells screened entirely or almost completely in the clay are likely representative of seepage from shallow stray silty lenses within the clay, or from the little contact they have with the lowermost saturated fill, or both.

The site-specific saturated thickness values for wells and piezometers are determined by subtracting the clay elevation from the water table elevations measured by Horizon in May, 1995. Observations of saturated conditions in soil borings at the time the borings were constructed were used in a qualitative sense. These data are summarized in Table B2-2 and depicted in the cross-sections of Figures B2-5 through B2-8 and contoured in Figure B2-10.

The contour map of Figure B2-10 shows that the saturated thickness of the fill is generally less than 3 feet and occurs mostly beneath Parcel C. A localized area of greater saturated thickness (3 to 4 feet) is seen in the south central portion of Parcel C, suggesting some amount of concentration due to the gravity component of runoff imparted by the sloping clay surface.

The saturated fill at the east margin of Parcel B is hydraulically separated from the Parcel C basin as evidenced by the six intervening soil borings that showed the clay ridge and thus no saturation when drilled (Figures B2-9 and B2-11).

Information related to saturation of the fill on Parcel A is sparse. The saturated TSB-1 and TSB-2 area in the east segment of the parcel is related strictly to these borings having been placed in a UST vault excavated into the clay that had been backfilled with granular material after UST removal. Monitoring well GMW-1 at the west end of Parcel A was a dry hole when drilled. It is not considered to be a useful piezometer or to be a meaningful indicator of saturated fill because there is insufficient seepage available even to fill the well bore up to the level of the clay surface.

The saturated thickness shows variation seasonally and among monitoring sites even within the fairly dense data set of Parcel C. Records are documented for Parcel C piezometers P-1 through P-5 for February through July, 1992 (WWES, 1992). Except for P-3, all show low water levels in February rising to higher values in April, or, as often, continuing to rise into July. P-3 shows a high water level in February, decreasing through April, and increasing again into July. The high range over the 6 to 7-month period is 2.8 feet (P-2) and the low range is 0.5 feet (P-1).

Compiled information for Parcel B (WWES, 1992) is limited to occasional data for monitoring wells over the period August, 1989 to July, 1992 which show 1.7 feet of range for GMW-2 and 2.3 feet of variation for GMW-6. These variations represent 53% and 65%, respectively, of the total fill thicknesses at the two locations. In May, 1995, the saturated thickness at GMW-2 was 0 feet or nearly so.

*Water Table*

Fill unit water level elevation data are contoured in Figure B2-11. In this case, contouring is an integrative process that suggests a greater than warranted degree of hydraulic communication. The contouring is useful, however, in pointing out the influence of the clay basin on Parcel C and the clay ridge in the Silman Avenue area on the probable directions of water movement. A divide on the water surface is interpreted based on the lack of fill or accumulated infiltration in the area of the clay ridge; and the movement of water on Parcel C is inferred to have significant components into the basin from the west and north toward the south central portion of the site. Perched groundwater characteristics are fairly consistent throughout the Gage facility.

*Utilities*

Evidence of some external influence on the movement of water is seen in the general concentration of flow across Parcel C into the southeast area of the parcel. This includes the effect of the public water and sewer lines in the roadway rights-of-ways and the north-south storm sewer (up to 18 inches in diameter) which crosses Parcel C on a line nearly coinciding with the east wall of the truck well roughly 120 feet west of the east parcel boundary. If the utilities and/or the backfilled trenches affect perched water movement, the direction of movement likely corresponds to the flow direction of the sewer (and associated trench attitude). The flow directions of sewers based on surveyed invert elevations are indicated on Figure B2-12 and summarized below:

The elevations of the right-of-way storm sewer pipelines decrease to the south and east to intersect at a manhole at the intersection of Jewell and Wanda Avenues at elevations of roughly 629 feet (8-inch diameter) and 623 feet (18-inch diameter). The shallower pipeline is installed up to 5 or 6 feet into the clay and the deeper up to 11 or 12 feet into the clay.

The public water main is likely to be at a depth of approximately 5 feet. The 12-inch diameter main in the Jewell Avenue right-of-way is continuous with the water main in Wanda Avenue.

The north-south sewer pipe which traverse the eastern portion of Parcel C is at an elevation close to 632 feet (installed 3 to 4 feet into the clay) at Silman Avenue and at an elevation of 623 feet (installed approximately 9 feet into the clay) at Jewell Avenue (flow is toward the south).

The elevation information in northern Parcel C correlated with the limited perched water elevation data from eastern Parcel B indicate that seepage from the latter area migrates in a northeastward direction and may be intercepted by the storm sewer or public water main trenches in Wanda Avenue. The 8-inch diameter storm sewer invert is likely to be less than 5 feet below grade opposite Parcel B (based on the invert elevation of close to 629 feet at the Jewell Avenue intersection) and to be trenched a short vertical distance into the clay. The water main depth may be similar to the storm sewer depth.

As illustrated on Figure B2-2, an 18-inch diameter combined sanitary sewer/storm water crosses parcels D and E in a north-south direction. This is a fairly deep pipeline that is installed at a depth of up to 12 to 13 feet below ground surface. A 6-inch diameter water main crosses Parcel E in an east-west direction.

### *Collection Trenches*

In an attempt to influence the movement of perched water across the site, Gage voluntarily installed ground water recovery/treatment systems in two separate locations on the site.

The first system was located between the site’s existing above-ground storage-tank farm and truck well and expanded to include a seepage drain on the south side of the tank farm parallel to Jewell Avenue and a sump/manhole located north of the tank farm. Some free product was recovered from this trench but pumping was discontinued when recovery became intermittent.

The second system was located in the central portion of Parcel C, adjacent to the remanufacturing building. This system consists of a 500 foot long, east-west trending subsurface trench and collection manhole (2 feet in diameter and 11 feet deep). Coarse pea gravel was placed as backfill around the manhole. A recovery system was installed in the manhole with a meter discharge line to the sanitary sewer. The west end (approximately 100 feet) of this trench was destroyed when the Gage LSF was constructed.

Currently, neither of the collection trenches are pumped and thus do not exert an influence on perched water movement at the site. Potential influences of the trenches, if they were to be pumped, can be inferred based on their locations with respect to areas of significant perched water accumulation (low spots in the clay unit) as illustrated in Figure B2-10. The trench located south of the tank farm is positioned to intersect a significant amount of the perched water accumulation in Parcel C. The central trench that runs adjacent to the remanufacturing building intersects only the northernmost portion of perched water accumulation which is very thin (< 2 feet) due to the southward dip of the clay surface in this area.

The potential effects of the central trench were evaluated through a pump test (WWES, 1994). The trench extends through the fill layer into the underlying native clay layer to a depth of six feet below ground surface at its east and west ends, and to a depth of nine feet at its center. The trench excavation was backfilled with gravel and connected to a centrally located pre-cast concrete collection sump. Water that collects in the trench flows under gravity towards the collection sump when the sump is pumped. The trench was in operation from December 18, 1986 until October 18, 1987. Operations were discontinued because the trench drew so little water, it was thought to be ineffective (the sump was completely dewatered even at minimal pumping rates).

A 72 hour pump test was performed on the collection trench to assess the effectiveness of the trench as an interim remedial response measure and for future corrective action. The test evaluated the zone of influence that developed from operating the trench and consisted of three phases: a pre-test phase to establish base-line data on normal water level fluctuations; a drawdown phase; and a recovery phase.

The results of the test indicate that the zone of capture created by pumping the trench system is very limited. Figure B2-13 is a contour map of water levels observed during the drawdown phase of the test. The contours show that the effective capture zone for the trench extends only 25 to 50 feet to the south of the trench itself, leaving the southern half of Parcel C unaffected. The observed stable pump rate of 1.2 GPM (any greater rate resulted in complete dewatering of the sump) and the narrow capture zone indicate that movement of the perched water is not much affected by pumping of the trench and very little of the perched water actually enters the trench. It was not recommended that the use of the trench be pursued as an interim corrective measure.

### B2.A.2(d) Soil

The soils that can be expected to be encountered and most intensively impacted at the Gage facility and nearby areas are represented by the Urban Land-Thetford complex (see Appendix B2-4). This complex consists of Urban Land and nearly level (0 to 3 percent slopes), somewhat poorly drained Thetford soils, with moderately rapid permeable soils on lake plains and outwash plains. The soils formed in stratified sandy material. Thetford soils have a high water table at a depth of 1 to 2 feet in winter and spring. The available water capacity is low, and runoff is slow. Artificial drainage has represented the major management tool used for increasing the suitability's of these soils for various land uses.

### B2.A.2(e) Surface Water

The nearest evident surface waters consist of a few widely scattered ponds: one located in Palmer Park 2 miles to the south; another located in Woodland Cemetery 1/2 mile to the southwest; another located at a racetrack 2 miles to the northeast; and several located in the Detroit Zoological Park 3 miles to the northwest. There are no nearby permanent streams, surface drainage courses, wetlands or lakes.

Several shallow east-to-northeast-trending intermittent surface ditches, some of them apparently channelized natural runoff courses, occur 1-1/2 to 2 miles to the east and northeast of the site, and extend for 1/2 to 1 mile before terminating at an interstate highway or roadway. The high degree of residential development of the region suggests that surface runoff is handled primarily by curbside catch basins and the associated storm sewer system.

The U. S. Geological Survey (Geological Survey Water-Supply Paper 2000, 1972) reports that the southeast area of Oakland County, including the Ferndale area, is subject to damaging floods. No flood frequency or interval information is provided. According to the 2012 National Flood Insurance Program, the Gage facility is not located in a special flood hazard area.

In summary, permanent surface waters and cross-country runoff ditches and surface drains are regionally very sparse. The 7-1/2 minute topographic quadrangles show no wetland patterns in the region. There is currently no potential for flooding in the area of the Gage facility.

### B2.A.2(f) Surrounding Land Uses

Current and historic land use, existing or proposed zoning regulations, and ownership patterns in and around the Gage facility are detailed in Attachment B4, Environmental Assessment and shown on Figure B2-14.

### B2.A.2(g) Critical Habitats and Endangered Species

Habitat critical to the survival of local species and any rare or endangered plant or animal species in the area surrounding the Gage facility are discussed in Attachment B4, Environmental Assessment. There is no evidence of critical habitats or endangered species near the Gage facility.

### B2.A.3 Characterization of Potential or Actual Sources of Contamination [R 299.9504(c) and 40 CFR §270.14(d)]

This section describes actual or potential sources of contamination at the Gage that are subject to the corrective action requirements of Part 111 of Act 451. These sources include WMUs that are discernible units at which contaminants have been placed at any time, or at which contaminants have been released, or at which there is a threat of release regardless of the intended use of such unit. These sources also include areas of concern that are those units which do not meet the definition of WMU, but which may have released contaminants to the environment on a non-routine basis, or which may present an unacceptable risk to public health, safety, welfare, or the environment.

The U.S. EPA conducted a RCRA Facility Assessment (RFA) of the Gage facility in 1992. This RFA resulted in the identification of 15 Solid Waste Management Units (SWMUs) and eight Areas of Concern (AOCs) on Parcels A, B, and C. The locations of the SWMUs and AOCs identified by the U.S. EPA are shown on Figure B2-15. In October 1993, an Environmental Assessment of Parcel D was performed, and several of the observations noted in the assessment were identified by MDEQ as SWMUs or AOCs. No SWMUs or AOCs have been identified on Parcel E. A description of each area is provided in the following sections. These descriptions are based on: 1) information obtained during a site visit and interviews of long-time Gage employees (Marvin Geary, Matt Partridge, and Sharon Stahl) conducted by Horizon personnel in June 1995; 2) information contained in the RFA document (U.S. EPA, 1992); and 3) information contained in the Environmental Assessment document for Parcel D (WWES, 1993).

### B2.A.3(a) Former Underground Storage Tank Area on Parcel A

### B2.A.3(a)(1) Unit Characteristics

According to Gage facility records, three USTs were located in the former underground storage tank area on Parcel

A (SWMU 15). These USTs were present on the property at the time that Gage purchased the former Wanda School property in 1978. The available information regarding these USTs is presented on Table B2-1 and below:

| UST | Capacity (gallons) | Contents | Material of Construction | Age at Removal (years) | Year Removed |
|---|---|---|---|---|---|
| A | 6,000 | Formaldehyde | Fiberglass | 8-13 | 1985 |
| B | 6,000 | Glycol | Steel | 8-13 | 1985 |
| C | 3,000/3,000* | B-300 soap/Pine oil | Steel | 8-13 | 1985 |

* This tank had two compartments of equal size.

### B2.A.3(a)(2) Waste Characteristics and Management

No wastes were managed in these USTs.

### B2.A.3(a)(3) History of Releases or Potential to Release

In 1984, Tank A failed a pressure-test and was immediately emptied. Gage personnel removed all three USTs in 1985. In accordance with standard UST closure practices at the time, a representative of the City of Ferndale's Fire Department made a site inspection to confirm that the USTs had been removed, and to witness that the UST excavations were free of contamination and properly closed. The Fire Marshal did not require the analysis of soil samples as part of the inspection.

The RFA states that floating organic solvents were detected in tank monitoring wells in this area in the past. However, this statement does not apply to this UST area because: 1) the USTs did not contain organic solvents; 2) the 1986 report by OHM did not identify this area as an area of concern (OHM, 1986); 3) the City of Ferndale's Fire Marshal Department witnessed the clean closure of the UST area; and 4) a 1990 investigation of the UST area did not identify contamination. To elaborate, in 1990 two soil borings (TSB-1 and TSB-2) were installed in this former UST area to a depth of 12.5 feet. A total of five soil samples were collected from various depths in these borings and analyzed for VOCs (EPA Methods 8010 and 8020) to document soil conditions in the area. Because none of these chemicals were detected in the soil samples and the boring logs did not indicate the presence of impacted soil, the report of the investigation concluded that the previous location of USTs did not appear to be an on-going source of contamination (WWES, 1990; Appendix B2-1).

### B2.A.3(b) Open Area on Parcel A – AOC 8

### B2.A.3(b)(1) Unit Characteristics

The open area on Parcel A (AOC 8) is used for employee parking, storage of old equipment including empty containers, and temporary storage of empty semi-truck trailers and tankers awaiting return to customers.

### B2.A.3(b)(2) Waste Characteristics and Management

There are no wastes managed in this unit.

### B2.A.3(b)(3) History of Releases or Potential to Release

The only known release in this area occurred in April of 1993 when approximately 45 gallons of rain water spilled from a tote to the ground. The affected soil was excavated and disposed off-site. Half of the area is paved with asphalt and the other half is bare ground. This area has been used for parking and storage since the parcel's purchase in 1978.

In the early 1980's, 15 55-gallon drums were excavated from the western edge of this area (near GMW-1; Figure

B2-3) by Gage personnel. The contents of these drums are unknown. However, the drums were disposed off-site in a licensed landfill by EETCO. In 1985, OHM installed a soil boring at GMW-1 to a depth of 30 feet. The boring log indicates that an organic odor was detected between depths of four to 10.5 feet. The boring was then backfilled to a depth of 15 feet and a 10 foot well screen was installed (OHM, 1986; Appendix B2-1). Low levels of VOCs have been historically detected in GMW-1 and are summarized on Table B2-3a.

Impacted soil in AOC 8 was removed in 2022/2023 and soil gas was subsequently sampled near the northwestern property boundary with an adjacent commercial property. On August 30, 2024, Michigan Department of Environment, Great Lakes and Energy (EGLE) issued a letter concluding, *"it does not appear that soil gas is migrating off-site from Parcel A above the residential site-specific volatilization to indoor air criteria (SSVIAC). However, a vapor source in soil remains in the AOC 8 area due to the exceedances of the SSVIAC soil criteria present. The remaining vapor source area with the soil exceedances must be restricted to require additional evaluation if the area is ever developed with an occupied building. It is expected that this restriction will be implemented as part of final corrective measures*".

### B2.A.3(c) Fill House 6

### B2.A.3(c)(1) Unit Characteristics

Fill House 6 (SWMU 12) contains solvent blending operations in which the raw material solvents are blended into products in one of several mixing tanks and dispensed into 550-gallon totes or 55-gallon drums.

### B2.A.3(c)(2) Waste Characteristics and Management

Each mixing tank is cleaned with solvent between batches and the resulting waste is drained through a pipe at the base of the tank into a 5-gallon pail. This waste material is then accumulated in a 55-gallon drum for off-site disposal. The EPA hazardous waste numbers of waste managed in this area are primarily D001, F003, and F005, but also may include D018 and D035.

### B2.A.3(c)(3) History of Releases or Potential to Release

Fill House 6 has been operated since 1982. According to Gage personnel, there have been no known releases from this area. During the 1992 RFA site inspection, the concrete floor of Fill House 6 was noted to be stained and cracked.

Soil borings SB-2, TSB-4, and SB-12 (Figure B2-3) were installed in the vicinity of Fill House 6 in 1989, 1990, and 1992, respectively. Monitoring well GMW-6 (Figure B2-6) was also installed in 1989. SB-2 was installed to a depth of 60 feet and soil samples were collected for visual classification of soil. Soil samples were not collected for laboratory analysis. However, because a sufficient saturated thickness was encountered within the fill at SB-2, monitoring well GMW-6 was installed at this location. The boring log sheet and well construction details are contained in Appendix B2-1. Low levels of organic compounds have been historically detected in GMW-6 and are summarized on Table B2-3a.

Soil boring TSB-4 was installed to a depth of 10.5 feet and three soil samples were collected from varying depths for laboratory analysis of VOCs (EPA Method 8010 and 8020). None of these compounds were detected in any of the soil samples (WWES, 1990b).

Soil boring SB-12 was installed to a depth of 30 feet and soil samples were collected for visual classification, headspace soil gas screening with a PID, and physical laboratory testing. Soil samples were not collected for laboratory analysis. PID readings were similar to or below those of TSB-4 which correlated to levels below laboratory detection limits. The boring log sheet is contained in Appendix B2-1.

## B2.A.3(d) Former Underground Storage Tank Area by Fill House 6

### B2.A.3(d)(1) Unit Characteristics

According to Gage facility records, three UST systems were located in the former underground storage tank area by Fill House 6 (SWMU 13). The available information regarding these USTs is presented on Table 1 and below:

| UST | Capacity (gallons) | Contents | Materials of Construction | Age at Removal (years) | Year Removed |
|---|---|---|---|---|---|
| D | 6,000 | Leaded gasoline | Steel | 10 | 1987 |
| E | 10,000 | Unleaded gasoline | Steel | 10 | 1987 |
| F | 10,000 | #2 Diesel fuel | Steel | 10 | 1987 |

### B2.A.3(d)(2) Waste Characteristics and Management

No wastes were managed in these tanks.

### B2.A.3(d)(3) History of Releases or Potential to Release

In 1984, these USTs passed a pressure test indicating that a release had not occurred from the tanks. Gage personnel removed all three USTs in 1987. In accordance with standard UST closure practices at the time, a representative of the City of Ferndale's Fire Marshal Department made a site visit to inspect that the USTs had been removed, and to witness that the UST excavations were free of contamination and properly closed. The Fire Marshal did not require the analysis of soil samples as part of the inspection.

The RFA states that floating organic solvents were detected in tank monitoring wells in this area in the past. However, this statement does not apply to this UST area because: 1) the USTs contained fuel, not organic solvents; 2) the 1986 report by OHM did not identify this area as an area of concern (OHM, 1986); 3) the City of Ferndale's Fire Marshal Department witnessed the clean closure of the UST area; and 4) subsequent investigation of the UST area did not identify contamination.

## B2.A.3(e) Tanker Off-Loading Area

### B2.A.3(e)(1) Unit Characteristics

The tanker off-loading area is located immediately north of Fill House 6 (SWMU 14). Tanker trucks containing raw material (i.e., solvent) are parked in this area while the contents are off-loaded into Fill House 6. This area has been operated in conjunction with Fill House 6 since 1982.

### B2.A.3(e)(2) Waste Characteristics and Management

According to Gage personnel, there have been no known releases from this area and wastes are not managed in this area.

### B2.A.3(e)(3) History of Releases or Potential to Release

During the 1992 RFA site inspection, the concrete pad of the tanker off-loading area was noted to have unsealed joints and some cracks, but no staining. The RFA states that the release potential to all media is low in this area. This statement has been confirmed by investigation of the area.

### B2.A.3(f) Unpaved Area of Silman Avenue

#### B2.A.3(f)(1) Unit Characteristics

The area identified in the RFI as the "Unpaved Area of Silman Avenue" is located immediately south of Fill House 6 and north of the Tote and Drum Storage Area (AOC 5). Silman Avenue is a public road which vehicles traverse on their way to and from the Gage facility and the Alpha & Omega facility located immediately west of the Gage facility. This road was paved in 1995. Portions of this area are also used for the temporary storage of empty semi-truck trailers and tankers awaiting return to customers.

#### B2.A.3(f)(2) Waste Characteristics and Management

According to Gage personnel, wastes are not managed in this area. Material handling areas on either side of Silman Avenue have been curbed since 1987 to prevent the release of any potential spills in these areas to Silman Avenue.

#### B2.A.3(f)(3) History of Releases or Potential to Release

According to Gage personnel, there have been no known releases to this area. Soil boring SB-4 (Figure B2-3) was installed near Silman Avenue to a depth of 9.5 feet in 1989 and soil samples were collected for visual classification and headspace soil gas screening with a PID. Soil samples were not collected for laboratory analysis. PID readings were well below those of TSB-4 which correlated to non-detectable levels of VOCs in laboratory analyses. The boring log sheet for SB-4 is contained in Appendix B2-1.

### B2.A.3(g) Silman Avenue Sewers

#### B2.A.3(g)(1) Unit Characteristics

Two sewer catch basins are located on the south side of Silman Avenue (AOC 6). Both sewers have perforated cast iron covers and drain Silman Avenue.

#### B2.A.3(g)(2) Waste Characteristics and Management

According to Gage personnel, there have been no known releases to these sewers.

#### B2.A.3(g)(3) History of Releases or Potential to Release

Material handling areas on either side of Silman Avenue have been curbed since 1987 to prevent the release of any potential spill in these areas to Silman Avenue and its sewers.

Soil boring SB-10 was installed to a depth of 30 feet in 1992 and soil samples were collected for visual classification, headspace soil gas screening with a PID, and physical laboratory testing. Soil samples were not collected for laboratory analysis. PID readings were elevated to a depth of seven feet and an odor was noted on the boring log sheet at these depths. The boring log sheet for SB-10 is contained in Appendix B2-1.

### B2.A.3(h) Covered Storage Area

#### B2.A.3(h)(1) Unit Characteristics

The Covered Storage Area (AOC 7) is located west of Fill House 6. This area is enclosed on three sides and is open on the fourth side for access. Raw material and product are stored in this area in pails, bags, and 55-gallon drums.

### B2.A.3(h)(2) Waste Characteristics and Management

At one time hazardous waste drums were stored in this area. The EPA hazardous waste numbers of waste that was managed in this area were D001, D002, F003, F005, D018, and D035. The drums were stored on the concrete floor.

### B2.A.3(h)(3) History of Releases or Potential to Release

The Covered Storage Area was constructed in approximately 1981-1982. According to Gage personnel, there have been no known releases from this area. During the 1992 RFA site inspection, the concrete floor was noted to have unsealed joints and some cracks, but no staining.

The RFA states that the release potential to all media is low in this area. This statement was confirmed by an investigation of the area in 1992 in which soil boring SB-12 (Figure B2-3) was installed to a depth of 30 feet and soil samples were collected for visual classification, headspace soil gas screening with a PID, and physical laboratory testing. Soil samples were not collected for laboratory analysis. PID readings were similar to or below those of other soil samples which correlated to levels below laboratory detection limits. The boring log sheet is contained in Appendix B2-1.

### B2.A.3(i) Tote and Drum Storage Area

### B2.A.3(i)(1) Unit Characteristics

The Tote and Drum Storage Area is located at the corner of Silman and Wanda Avenues (SWMU 1).

### B2.A.3(i)(2) Waste Characteristics and Management

Finished product is stored in this area in 55-gallon drums and 550-gallon totes prior to shipment to customers. Some empty tanks are also stored in this area. Totes were also occasionally steam-cleaned in this area

A 6 to12 inch thick concrete pad was installed in this area in approximately 1980. Secondary containment was installed around the storage area pad in 1994 in the form of a 6-inch concrete curb and rolled access ramps. The RFA report states that at the time of the visual site inspection, the concrete pad had many unsealed joints and some cracks.

Drums are stored on wooden pallets or on the concrete pad and stacked up to two layers high. Tote tanks are 550-gallon stainless steel or aluminum rectangular tanks which are stored upright on legs. The Tote and Drum Storage Area is used to store final product, not wastes. No wastes are managed in this area.

### B2.A.3(i)(3) History of Releases or Potential to Release

According to Gage personnel, there have been no known releases from this area. During the 1992 RFA site inspection, no evidence of releases was noted.

Soil borings SB-4, SB-10, and SB-11 (Figure B2-3) were installed in or near the Tote and Drum Storage Area in 1989 and 1992. Monitoring well GMW-3 (Figure B2-3) was installed in 1985. Soil boring SB-4 was installed to a depth of 9.5 feet and soil samples were collected for visual classification and headspace soil gas screening with a PID. Soil samples were not collected for laboratory analysis. PID readings were well below those of other soil samples which correlated to non-detectable levels of VOCs in laboratory analyses. The boring log sheet for SB-4 is contained in Appendix B2-1.

Soil boring SB-10 and SB-11 were installed to a depth of 30 feet and soil samples were collected for visual classification, headspace soil gas screening with a PID, and physical laboratory testing. Soil samples were not collected for laboratory analysis. PID readings were elevated to a depth of seven feet in SB-10 and an odor was noted on the boring log sheet at these depths. PID readings were elevated to a depth of 20 feet in SB-10 and a slight odor was noted on the boring log sheet immediately below the concrete. The boring log sheet for SB-10 and SB-11 are contained in Appendix B2-1.

Monitoring well GMW-3 was installed at the southeast corner of Parcel C in 1985. The log sheet and well construction details are contained in Appendix B2-1. Low levels of organic compounds have been historically detected in GMW-3 and are summarized on Table B2-3a.

### B2.A.3(j) Truck Well

### B2.A.3(j)(1) Unit Characteristics

The Truck Well (SWMU 2) consists of a sloped concrete truck ramp with space for two trucks and adjoining retaining walls.

### B2.A.3(j)(2) Waste Characteristics and Management

The Truck Well (SWMU 2) consists of a sloped concrete truck ramp with space for two trucks and adjoining retaining walls.

### B2.A.3(j)(3) History of Releases or Potential to Release

According to Gage personnel there have been no known releases in this area. During the 1992 RFA site inspection, some staining, unsealed joints and cracks were noted in the Truck Well. No quantitative information is available for environmental media in the Truck Well area (TSB-3 was installed north of the Truck Well but was located within a tank vault).

### B2.A.3(k) Former Underground Storage Tank Area by the Truck Well

### B2.A.3(k)(1) Unit Characteristics

According to Gage facility records, five UST systems were located in the Former Underground Storage Tank Area by the Truck Well (SWMU 3). The available information regarding these USTs is presented on Table B2-1 and below:

| UST | Capacity (gallons) | | Contents | Material of Construction | Age at Removal (years) | Year Removed |
|---|---|---|---|---|---|---|
| | | | | | | |
| 47 | 6,000 | | Mineral seal oil | Steel | 8-13 | 1987 |
| 48 | 6,000 | | #4550 Solvent/ petroleum distillate | Steel | 6-11 | 1987 |
| 49 | 6,000 | | Methanol | Steel | 8-13 | 1987 |
| 50 | 6,000 | | Hydrocarbon solvent | Steel | 8-13 | 1987 |
| 51 | 6,000 | | Hydrocarbon solvent | Steel | 8-13 | 1987 |

### B2.A.3(k)(2) Waste Characteristics and Management

No wastes were managed in these tanks.

### B2.A.3(k)(3) History of Releases or Potential to Release

During a 1984 UST investigation, Tank 48 failed a pressure-test and free product was discovered in three monitoring wells (TMW-1, 2 and 3; no longer present at the site) placed within the tank area. Tank 48 was immediately emptied and a free product recovery system was established using the three monitoring wells (OHM, 1986). Gage personnel removed all five USTs in 1987. In accordance with standard UST closure practices at the time, a representative of the City of Ferndale's Fire Department inspected the site to confirm that the USTs had been removed, and to witness that the UST excavations were free of contamination and properly closed. The Fire Marshal did not require the analysis of soil samples as part of the inspection.

In 1990 soil boring TSB-3 was installed in this former UST area to a depth of 10.5 feet. Two soil samples were collected from this boring (one shallow and one deep) and analyzed for VOCs (EPA Methods 8010 and 8020) to document soil conditions in the area. Although some VOCs were detected in the soil samples, the report of the investigation concluded that the previous location of USTs did not appear to be an on-going source of contamination (WWES, 1990). The analytical results for TSB-3 are summarized on Table B2-2.

### B2.A.3(l) Bulk Tank Storage Area

### B2.A.3(l)(1) Unit Characteristics

The Bulk Tank Storage Area (SWMU 4) has been used to store finished product since the early 1950's. Secondary containment for this tank farm was originally provided by an earthen berm which was replaced with five to eight-foot high concrete containment walls in 1985. In the early 1980's, a concrete containment floor was installed. During the 1992 RFA, some of the secondary containment joints were thought to be unsealed, and cracks/deterioration were observed in the secondary containment structure. However, Gage personnel state that the integrity of the containment floor is continually monitored and repaired as necessary. Currently, the concrete dike is lined with a high density polyethylene liner which is inspected and maintained.

The Bulk Tank Storage Area currently contains 89 aboveground storage tanks of various ages which are used to store finished product prior to packaging. The tanks in this area are constructed of carbon or stainless steel and have capacities ranging from 1,000 gallons to 29,000 gallons. Permanent pipelines connect the tanks to the mixing and filling operations.

### B2.A.3(l)(2) Waste Characteristics and Management

The Bulk Tank Storage Area is used to store raw materials, intermediate and finished product, not wastes. No wastes are managed in this area.

### B2.A.3(l)(3) History of Releases or Potential to Release

During the 1992 RFA site inspection, some staining was noted on the concrete pad in the tank farm and where the ancillary piping from the tank farm entered Fill House 1 (SWMU 11).

Soil borings TSB-3 and SB-14 (Figure B2-3) were installed in or near the Bulk Tank Storage Area in 1990 and 1992, respectively. Soil boring TSB-3 was installed in the former UST area located immediately east of the Bulk Tank Storage Area to a depth of 10.5 feet. Two soil samples were collected from this boring (one shallow and one deep) and analyzed for VOCs (EPA Methods 8010 and 8020) to document soil conditions in the area (WWES, 1990). A few VOCs were detected in the soil samples at relatively low concentrations (Table B2-2).

## B2.A.3(m) Generated Hazardous Waste Storage Area

### B2.A.3(m)(1) Unit Characteristics

The Generated Hazardous Waste Storage Area (SWMU 5) has been used since 1987 to store hazardous waste generated on-site from Gage's recycling processes. Three aboveground storage tanks are located in this area. The capacities of these tanks are 9,000, 11,000 and 15,000 gallons, respectively. The floor and 5-foot walls of the secondary containment unit are lined with 6 inches of micro-silica concrete. Permanent pipelines connect the tanks to the remanufacturing operation.

### B2.A.3(m)(2) Waste Characteristics and Management

The EPA hazardous waste numbers of waste managed in this area are D001, D005, D007, D008, D018, D035, F003, and F005.

### B2.A.3(m)(3) History of Releases or Potential to Release

According to Gage personnel, there have been no known releases from this area. During the 1992 RFA site inspection, the flashing around the base of the 15,000-gallon tank was observed to be dented. No quantitative information is available for environmental media in the immediate vicinity of the Generated Hazardous Waste Storage Area.

## B2.A.3(n) Limited Storage Area Tanks

### B2.A.3(n)(1) Unit Characteristics

Under the terms of Gage's LSF operating license, waste is stored in five aboveground storage tanks with capacities ranging from 1,000 to 6,000 gallons. Permanent pipelines connect the tanks to the adjacent Gage LSF. The concrete floor and 5-foot walls of the unit's secondary containment system are lined with 6 inches of micro-silica concrete.

### B2.A.3(n)(2) Waste Characteristics and Management

The primary EPA hazardous waste numbers of wastes managed in this area are D001, D005, D007, D008, F003, and F005.

### B2.A.3(n)(3) History of Releases or Potential to Release

No releases have occurred from this unit. Based on the design, operational history, and physical integrity of the unit, as described in Attachment B4, Environmental Assessment, releases from these tanks are not likely.

## B2.A.3(o) Railroad Loading/Unloading Area

### B2.A.3(o)(1) Unit Characteristics

The Railroad Loading/Unloading Area (SWMU 7) extends along the railroad spur on the southwest corner of the Gage facility. In this area rail cars were unloaded of raw material through aboveground and underground pipelines extending to the Bulk Tank Storage Area where the material was stored. The rail spur was upgraded in 1998 to include catch basins under both sidings indented to collect potential releases from rail cars during loading and unloading activities. These catch basins are connected to two 15,000 gallon secondary containment vessels.

### B2.A.3(o)(2) Waste Characteristics and Management

According to Gage LSF personnel, wastes were shipped from the upgraded Railroad Loading/Unloading Area to cement kilns for disposal. The EPA hazardous waste numbers of waste managed in this area are D001, D005, D007, D008, D018, D035, F003, and F005.

### B2.A.3(o)(3) History of Releases or Potential to Release

According to Gage LSF personnel, there have been no known releases in this area with the exception of *de minimis* spills associated with material handling practices (e.g., disconnecting hoses) when transferring raw materials before the upgrade occurred. The RFA report noted that the soil in this area was stained.

Soil boring C-SB-1 and monitoring wells GMW-4 and GMW-7 (Figure B2-3) were installed in the vicinity of the Railroad Loading/Unloading Area. Soil boring C-SB-1 was installed to a depth of 10.5 feet and four soil samples were collected from varying depths for laboratory analysis of VOCs (EPA Method 8010 and 8020). Nine VOCs were detected in these soil samples (WWES, 1990) at relatively low concentrations (Table B2-2). The boring log is contained in Appendix B2-1.

Monitoring well GMW-4 was originally installed in 1985 (OHM, 1986) and replaced in 1989 (WWES, 1990). Monitoring well GMW-7 was installed in 1990 (WWES, 1990). The boring logs and well construction details are contained in Appendix B2-1. Several organic compounds have been historically detected in GMW-4 and GMW-7 and are summarized on Table B2-3a.

### B2.A.3(p) Former Piping Area

### B2.A.3(p)(1) Unit Characteristics

The Former Piping Area (SWMU 8) extends along the north side of the Bulk Tank Storage Area. Historically, pipelines in this area were located on the surface of the ground and were used to convey raw material and finished product between the Bulk Tank Storage Area (SWMU 4) and Fill House No.1 (SWMU 11). These pipelines were replaced with aboveground elevated pipelines in 1991. A conveyor belt is presently located in this area and is used to transport clean, unused drums to Fill House No.1. Soil in this area is either covered with gravel or concrete.

### B2.A.3(p)(2) Waste Characteristics and Management

The Former Piping Area was used to convey raw material and final product only. No wastes were managed in this area.

### B2.A.3(p)(3) History of Releases or Potential to Release

According to Gage LSF personnel, there were no known releases in this area. During the 1992 RFA site inspection, stained soil was observed in this area. Soils were excavated and sent to a licensed landfill in 2012 when portions of this area were paved. No quantitative information is available for environmental media in the immediate vicinity of the Former Piping Area.

### B2.A.3(q) Former Underground Storage Tank Area by Fill House 2

### B2.A.3(q)(1) Unit Characteristics

According to Gage LSF facility records, six USTs were located in the Former Underground Storage Tank Area by Fill House 2 (SWMU 9). The available information regarding these USTs is presented on Table B2-1 and below:

| UST | Capacity (gallons) | Contents | Material of Construction | Age at Removal (year) | Year Removed |
|---|---|---|---|---|---|
| 41 | 3,000 | Antifreeze | Steel | 9-14 | 1987 |
| 42 | 3,000 | Ethyl acetate | Steel | 11-16 | 1987 |
| 43 | 1,500 | n-Butanol | Steel | 11-16 | 1987 |
| 44 | 1,500 | Ethylene glycol monobutyl ether | Steel | 11-16 | 1987 |
| 45 | 1,500 | Diacetone alcohol | Steel | 11-16 | 1987 |
| 46 | 1,500 | Chlorobenzene or ethyl acetate | Steel | 11-16 | 1986 |

### B2.A.3(q)(2) Waste Characteristics and Management

No wastes were managed in these tanks.

### B2.A.3(q)(3) History of Releases or Potential to Release

During a 1984 UST investigation, Tank 41 failed a pressure-test and free product was discovered in monitoring wells placed within the tank area. Tank 41 was immediately emptied and a ground water collection trench system was subsequently installed across Parcel C (OHM, 1986). Gage personnel removed all six USTs in 1986 and 1987. In accordance with standard UST closure practices at the time, a representative of the City of Ferndale's Fire Department inspected the site to confirm that the USTs had been removed, and to witness that the UST excavations were free of contamination and properly closed. The Fire Marshal did not require the analysis of soil samples as part of the inspection. Construction on Fill House 2 began in 1987 following removal of the six USTs.

In 1990 soil boring TSB-5 (Figure B2-3) was installed in this former UST area to a depth of 10.5 feet. Five soil samples were collected from this boring at varying depths and analyzed for VOCs (EPA Methods 8010 and 8020) to document soil conditions in the area. Although some VOCs were detected in the soil samples, the report of the investigation concluded that the previous location of USTs did not appear to be an on-going source of contamination (WWES, 1990). The analytical results for TSB-5 are summarized on Table B2-2.

### B2.A.3(r) Tank Wagon Loading /Unloading Area

### B2.A.3(r)(1) Unit Characteristics

The Tank Wagon Loading/Unloading Area (SWMU 10) is located immediately north of Fill House 1 (SWMU 11; Figure B2-15). Up to four tanker trucks can be parked in this area at one time while one of the following activities takes place:

- Finished product is loaded into the tankers from the tank farm through Fill House 1;
- Raw material (i.e., solvent) is off-loaded into the tank farm through Fill House 1; or,
- Spent solvent is off-loaded into the Remanufacturing Building (formerly known as Fill House 2) for recycling from the two most western truck bays.

### B2.A.3(r)(2) Waste Characteristics and Management

The primary EPA hazardous waste numbers of waste managed in this area are D001, F001, F003, and F005.

### B2.A.3(r)(3) History of Releases or Potential to Release

This area has been operated in conjunction with Fill House 1 since 1951. Release controls include a concrete floor with a 200-gallon capacity dry sump, a galvanized metal roof to prevent precipitation run-off, dry disconnect couplings, and the placement of 5-gallon metal containers beneath the hose connections of trucks to contain leakage. According to Gage personnel, releases from this area have been limited to *de minimis* spills associated with material handling practices (e.g., disconnecting hoses) and were contained by either the 5-gallon containers or the dry sump. During the 1992 RFA site inspection, unsealed joints and staining were noted on the concrete pad, purple-gray paint was noted on several connections between pipes and hoses, and minor leaking was noted at two hose connections from Fill House 1. These minor leaks were contained by the dry sump. No quantitative information is available for environmental media in the immediate vicinity of the Tank Wagon Loading/Unloading Area.

### B2.A.3(s) Fill House 1

### B2.A.3(s)(1) Unit Characteristics

Fill House 1 (SWMU 11) contains solvent blending operations in which the raw material solvents are blended into product in the adjacent tank farm in blending tanks and dispensed directly into 550-gallon totes and 55-gallon drums or through the Tank Wagon Loading/Unloading Area (SWMU 10) into tanker trucks. Each blending tank is cleaned with solvent between batches and the resulting waste is drained through a pipe at the base of the tank into a 5-gallon pail. This waste material is then accumulated in a 55-gallon drum for further reclamation on-site, or off-site disposal.

### B2.A.3(s)(2) Waste Characteristics and Management

The EPA hazardous waste numbers of waste managed in this area are D001, D018, D035, F003, and F005.

### B2.A.3(s)(3) History of Releases or Potential to Release

Fill House 1 has been in operation since 1951. According to Gage personnel, releases from this area have been limited to *de minimis* spills associated with material handling practices (e.g., disconnecting hoses). During the 1992 RFA site inspection, the concrete floor of Fill House 1 was noted to have unsealed joints.

Soil boring TSB-3 (Figure B2-3) was installed in the former UST area located immediately south of Fill House 1 to a depth of 10.5 feet. Two soil samples were collected from this boring (one shallow and one deep) and analyzed for VOCs (EPA Methods 8010 and 8020) to document soil conditions in the area (WWES, 1990). A few VOCs were detected in the soil samples at relatively low concentrations (Table B2-2).

### B2.A.3(t) Former Generated Hazardous Waste Storage Area

### B2.A.3(t)(1) Unit Characteristics

The Former Generated Hazardous Waste Storage Area (AOC 1) was part of a storage yard for 55-gallon drums which was used until the late 1980's.

### B2.A.3(t)(2) Waste Characteristics and Management

Drums stored in this area included new, reconditioned, or empty (as returned from clients) drums. Drums of hazardous waste generated by the Gage facility were also stored in this area. The EPA hazardous waste numbers of waste managed in this area were D001, D002, F001, F002, F003, and F005. The area is currently the location where the Gage LSF was built in the early 1990's, and the rail spur upgrade occurred in 1998.

### B2.A.3(t)(3) History of Releases or Potential to Release

There were no reported releases in this area. Soil borings C-SB-1, SB-8 and monitoring well GMW-7 (Figure B2-3) were installed in the Former Generated Hazardous Waste Storage Area in 1990 and 1992. Soil boring C-SB-1 was installed in 1990 to a depth of 10.5 feet and four soil samples were collected from varying depths for laboratory analysis of VOCs (EPA Method 8010 and 8020). Nine VOCs were detected in these soil samples (WWES, 1990) at relatively low concentrations (Table B2-2). The boring log is contained in Appendix B2-1.

Soil boring SB-8 was installed in 1992 to a depth of 30 feet and soil samples were collected for visual classification, headspace soil gas screening with a PID, and physical laboratory testing. Soil samples were not collected for laboratory analysis. Elevated PID readings were obtained in soil at a depth of 15 feet. The boring log sheet for SB-8 is contained in Appendix B2-1.

Monitoring well GMW-7 was installed in 1990 (WWES, 1990). The boring logs and well construction details are contained in Appendix B2-1. Several organic compounds have been historically detected in GMW-7 and are summarized on Table B2-3a.

### B2.A.3(u) Former Storage Area at the Boiler Building

### B2.A.3(u)(1) Unit Characteristics

The Former Storage Area at the Boiler Building (AOC 2) was the site of a dry storage warehouse used for the storage of primarily powders, pigments and other dry materials. According to Gage facility personnel, the only liquid known to have been stored in this warehouse consisted of case oil for facility equipment. The Boiler Building was converted to this new use in 1991.

### B2.A.3(u)(2) Waste Characteristics and Management

No wastes were managed in this area.

### B2.A.3(u)(3) History of Releases or Potential to Release

During the 1992 RFA site inspection, no evidence of releases was noted in this area.

Soil borings SB-1, SB-9 and monitoring well GMW-5 (Figure B2-3) were installed in the vicinity of the Former Storage Area at the Boiler Building in 1989 and 1992. SB-1 was installed to a depth of 55 feet and soil samples were collected and screened in the field for visual classification and the presence of VOCs. Soil samples were not collected for laboratory analysis. The boring log sheet is contained in Appendix B2-1. Low levels of organic compounds have been historically detected in GMW-6 and are summarized on Table B2-3a.

Soil boring SB-9 was installed in 1992 to a depth of 30 feet and soil samples were collected for visual classification, headspace soil gas screening with a PID, and physical laboratory testing. Soil samples were not collected for laboratory analysis. Elevated PID readings were obtained in soil to a depth of 10 feet. The boring log sheet for SB-9 is contained in Appendix B2-1.

Monitoring well GMW-5 was originally installed in 1985 (OHM, 1986) and replaced in 1989 (WWES, 1990a). A few organic compounds have been sporadically detected in GMW-5 since 1985. The analytical results of the historical sampling of GMW-5 are summarized on Table B2-3a and Table B2-3b.

### B2.A.3(v) Back Storage Area

### B2.A.3(v)(1) Unit Characteristics

The Back Storage Area (AOC 3) was part of the drum storage yard. In 1987, a concrete pad with a central containment sump was installed in this area to store drums of hazardous waste. The 1992 RFA report noted that joints in the pad appeared to be unsealed. In 1994, a state-of-the-art hazardous waste limited storage facility (LSF) was constructed at this location.

### B2.A.3(v)(2) Waste Characteristics and Management

The EPA hazardous waste numbers of waste managed in this area are D001, F003, and F005.

### B2.A.3(v)(3) History of Releases or Potential to Release

According to Gage personnel, there were no known releases in this area. During the 1992 RFA site inspection, minor staining of the concrete pad was observed.

Soil borings SB-8 and SB-9 were installed in the vicinity of the Back Storage Area in 1992 to a depth of 30 feet and soil samples were collected for visual classification, headspace soil gas screening with a PID, and physical laboratory testing. Soil samples were not collected for laboratory analysis. Elevated PID readings were observed in SB-8 to a depth of 15 feet. Elevated PID readings were obtained in SB-9 to a depth of 10 feet. The boring log sheets for SB-8 and SB9 are contained in Appendix B2-1.

### B2.A.3(w) Former Steam-Out and Storage Area

### B2.A.3(w)(1) Unit Characteristics

According to Gage personnel, the Former Steam-Out and Storage Area (AOC 4) is misnamed because containers were not steam-cleaned in this area with the exception of one tote during a site inspection by the MDEQ. During installation of a steam line, product containers (i.e., totes and drums) were temporarily stored in this location for safety reasons. However, this area is not typically used for container storage. This area may have been an extension of the drum storage yard. The area is currently covered with concrete.

### B2.A.3(w)(2) Waste Characteristics and Management

There is no waste stored in this area.

### B2.A.3(w)(3) History of Releases or Potential to Release

According to Gage personnel, there were no known releases in this area. During the 1992 RFA site inspection, no evidence of releases was observed. No quantitative information is available for environmental media in the immediate vicinity of this area.

### B2.A.3(x) Floor Drains that Connect to the POTW

### B2.A.3(x)(1) Unit Characteristics

A 1993 Environmental Assessment of Parcel D noted that several floor drains were observed throughout the warehouse/process area and a former mechanical room, all of which were connected to the municipal wastewater treatment system.

Horizon’s evaluation found no evidence to indicate that the sewer system was degraded or damaged. As part of the 1993 Environmental Assessment, an investigation of the site’s sewer system was conducted in response to reported sewer odor problems at the site. It was determined that inadequate sewer traps allowed the backflow of sewer gases and odors from the municipal sewer system into the building. No integrity problems were identified with the sewer system. Furthermore, past site operations (i.e., beverage production) would not have involved the discharge of materials that could have resulted in damage to the sewer system (e.g., strong acids).

### B2.A.3(x)(2) Waste Characteristics and Management

Information on the site's development and past operations indicates that materials discharged to the sewer system were primarily food grade and not hazardous materials.

### B2.A.3(x)(3) History of Releases or Potential to Release

Because of the age of the building and the primary use of food-grade materials at the site, there was no evidence of a release or potential release of hazardous substances to the environment from floor drains at the Parcel D property.

The 2009 evaluation of Parcel D concluded that even though there was little potential for a release of hazardous materials to the environment as a result of past discharges to the sewer system on Parcel D, any concern in that regard would be addressed by the approved RFI work plan which included investigation of subsurface utility corridors where they leave the Gage property. The utility corridor investigation included the combined sewer that runs below the former Jewell Avenue roadway to Wanda Avenue. This sewer manages sanitary wastewater and storm water from both Parcels C and D, and as such, investigation of this utility corridor would address potential releases from both Parcels C and D. No additional investigation of the floor drains or sewer corridors associated with Parcel D was recommended.

### B2.A.3(y) Jewell Avenue

### B2.A.3(y)(1) Unit Characteristics

In 1994, Gage acquired Jewell Avenue and closed this road to public use. During the 2009 site inspection, this drive appeared to have been recently rebuilt with concrete to support heavy truck traffic and sealed concrete joints to prevent releases to the environment.

### B2.A.3(y)(2) Waste Characteristics and Management

A 1993 Environmental Assessment of Parcel D noted that the "MDNR file information indicates volatile organic, semi-volatile organic, and polychlorinated biphenyl compounds are present in perched ground water below the Gage facility. Ground-water movement below the Gage facility is reported to be to the southeast, in the general direction of Jewell Avenue…." No known waste were handled or stored in this area.

### B2.A.3(y)(3) History of Releases or Potential to Release

The 2009 evaluation of Parcel D concluded that the approved RFI work plan included investigation of potential off-site migration of impacted ground water from the sewer corridor below the former Jewell Avenue roadway. The RFI investigation provided for the collection and analysis of environmental media at the point where the sewer system extended off-site at Wanda Avenue and was adequate to determine if impacted ground water had migrated onto the former Jewell Avenue roadway. No additional investigation of the former Jewell Avenue was recommended.

### B2.A.3(z) 2024 Update: Fuel release AOC 11

### B2.A.3(z)(1) Unit Characteristics

AOC 11 has been added to the License for fuel that was released from a fuel line leak to on-site soils and could not be fully recovered using excavation. Concentrations of toluene and chlorobenzene remain in-place in on-site soils on Parcel D at levels that exceed nonresidential cleanup criteria under Part 201, Environmental Remediation, of Act 451. Therefore, a corrective action program under Part 111 is required for the fuel release pursuant to R

299.9629(1) and (3), and Condition V.A of the License.

### B2.A.3(z)(2) Waste Characteristics and Management

The spill was associated with a virgin fuel and not a hazardous waste. Soil samples showed detections of toluene and chlorobenzene above Part 201 criteria.

### B2.A.3(z)(3) History of Releases or Potential to Release

Soil from fuel released from an on-site fuel line on March 8, 2019 in an area next to the west side of the secondary containment for the tank farm on the west end of the former Coca-Cola Building on Parcel D. East of the railroad tracks. The extent of the impact has not been fully characterized. Analytical data from the March 8, 2019, Memo soil samples showed detections of toluene and chlorobenzene above Part 201 criteria. Excavation has been completed in order to remove as much of the release as possible. Remaining soil impacts could not be excavated due to location: they are adjacent to an underground electrical line and the secondary containment foundation.

### B2.A.3(aa) 2024 Update: Tote Rinse Area, SWMU 29

### B2.A.3(aa)(1) Unit Characteristics

WMU 29 Tote Rinse Area – currently operating with no known or suspected releases. Under Gage's Operating License, PART V - CORRECTIVE ACTION CONDITIONS, this unit should be included under Paragraph C.2(b) WMUs and AOCs that do not require corrective action at this time, based on the design of the unit and available information described herein that indicates that no known or suspected releases of contaminants from the unit has occurred.

### B2.A.3(aa)(2) Waste Characteristics and Management

The wastes that have been managed consist of the residual from the empty tote (materials that are managed at the facility). The totes are cleaned out using new reclaimed wash solvents produced by Gage.

### B2.A.3(aa)(3) History of Releases or Potential to Release

The have been no known releases from WMU 29.

## B2.B FACILITY'S ASSESSMENT OF KNOWN NATURE AND EXTENT OF CONTAMINATION

### B2.B.1 Groundwater

### B2.B.1(a) Characterization History

Historical analytical data for Gage facility ground water were also consolidated and compared to cleanup criteria developed by the MDEQ for non-residential properties pursuant to Part 201 of Act 451. A summary of the historical analytical data for the facility's ground water is provided on Tables B2-3a and B2-3b. A summary of analytical data for the "effluent" (i.e., ground water) collected from the ground water collection trench is provided on Table B2-5. Sample locations are shown on Figure B2-2 (effluent samples were collected from the center catch basin of the ground water collection trench).

The analytical data for the facility's ground water were compared to the same soil criteria discussed in Attachment B4, Environmental Assessment (i.e., direct contact criteria) because the facility's ground water is perched (i.e., not in an aquifer), occurs in isolated low spots (i.e., is not laterally continuous) and Rule 299.5709(4) of the Michigan Administrative Code allows ground water not in an aquifer to be addressed by the application of soil cleanup criteria.

A supplemental investigation was performed in 2013. This report is attached to the April 27, 2015 RCRA Facility Investigation, Risk Evaluation and Corrective Measures Plan as Appendix B. The supplemental investigation did not identify any additional impacts to groundwater but did identify low levels of VOC's associated with the utilities along Wanda Street. Both of these reports have previously been submitted to EGLE and are therefore, not included in this permit renewal application.

### B2.B.1(b) Description of Horizontal and Vertical Extent of Plume(s)

As shown on Tables B2-3a, B2-3b and B2-5, results for the water samples collected from monitoring wells GMW-4 and GMW-7, located in the western portion of Parcel C, and the effluent from the collection trench contained VOCs above the residential and non-residential risk-based criteria (drinking water, ground water volatilization to indoor air and ground water contact criteria). These areas are delineated to the west by the results of the soil and ground water sampling on the Grand Trunk Switching Yard including the temporary monitoring wells (TMW-01 through TMW-03). No other ground water samples from the site contained chemical concentrations above these criteria. Most notably, results for the temporary and permanent monitoring wells located along the eastern property line at Wanda Avenue were below residential and non-residential risk-based criteria including residential drinking water criteria.

### B2.B.1(c) Horizontal and Vertical Direction of Contaminant Movement

As presented in Section B2.A.2.c, due to the clay and fill nature of the soil at the Gage facility and because the ground water is perched, contaminant migration is unlikely to occur.

### B2.B.1(d) Velocity of Groundwater Contaminant Movement

As presented in the Environmental Setting Section B2.A.c, due to the clay and fill nature of the soil at the Gage facility and because the ground water movement is limited for perched groundwater, a groundwater velocity determination is not applicable.

### B2.B.1(e) Factors Influencing Plume Movement

As presented in Section B2.A.2.c, Environmental Setting, due to the clay and fill nature of the soil at the Gage facility and because the ground water movement is limited for perched groundwater, plume movement is not applicable.

### B2.B.1(f) Extrapolation of Future Contaminant Movement

As presented in Section B2.A.2.c, Environmental Setting, due to the clay and fill nature of the soil at the Gage facility and because the ground water movement is limited for perched groundwater, future contaminant movement is not likely to occur.

### B2.B.1(g) Recommendations or Established Requirements for Additional Investigations

Additional investigations are planned at the Gage facility as identified in the *Project Management Plan* of the *RCRA Facility Investigation Work Plan*, Revision 2 Update, February 2012 and approved by the MDEQ as documented in an October 19, 2012 letter from Elizabeth M. Brown, Chief of the Office of Waste Management and Radiological Protection with the identified subject "Approval with Modification; RCRA Facility investigation (RFI) Work Plan Revision 2 Update."

## B2.B.2 Soil

### B2.B.2(a) Characterization History

Historical analytical data for Gage facility soils were consolidated and compared to cleanup criteria developed by the MDEQ for non-residential properties pursuant to Part 201 of Michigan's Natural Resources and Environmental Protection Act (Act 451 of 1994 as amended). (Part 201 was formerly known as Michigan's Environmental Response Act [Act 307]). A summary of the historical analytical data for the Gage facility's soil is provided on Table B2-2 and sample locations are shown on Figure B2-3.

A supplemental investigation was performed in 2013. This report is attached to the April 27, 2015 RCRA Facility Investigation, Risk Evaluation and Corrective Measures Plan as Appendix B. The investigation delineated impacted soils in AOC 8. Both of these reports have previously been submitted to EGLE and are therefore, not included in this permit renewal application.

On November 9-10, 2022, Gage conducted a remedial excavation to remove approximately 550 tons of impacted soils and surrounding residual fill on Parcel A (AOC 8) as a presumptive remedy to address the potential vapor intrusion pathway for adjacent off-site properties. A report documenting the excavation, soil verification sampling, and post excavation soil gas sampling was provided to EGLE on February 24, 2023. In a letter from EGLE dated August 2024, EGLE acknowledged the removal of soil from AOC 8 and concurred soil vapors were not migrating off site.

### B2.B.2(b) Description of Horizontal and Vertical Extent of Contamination

As shown on Table B2-2, the soil samples collected from the western portion of Parcel C contained trimethylbenzenes and xylenes above non-residential risk-based criteria (direct contact criteria and soil volatilization to into air criteria). This area is delineated to the west by the results of the soil and ground water sampling on the Grand Trunk Switching Yard including the soil and temporary monitoring wells (TMW-01 through TMW-03) and the soil samples collected when the area was excavated to install the Sprint line (Sprint -1 through Sprint-5).

### B2.B.2(c) Description of Soil and Contaminant Properties

A general description of the available soil characterization for the facility is presented in Section B2.A.2.d, Environmental Setting. In general, soils encountered at the site consist of a thin surficial granular fill that contains minor saturation in some locations and an underlying dry to moist clay till containing varying amounts of admixed sand, silt, and traces of gravel.

### B2.B.2(d) Velocity and Direction of Contaminant Movement

Due to the clayey nature of the soils and the limited amount of granular fill, contaminant movement has not been observed at the Gage facility.

### B2.B.2(e) Extrapolation of Future Contaminant Movement

Due to the clayey nature of the soils and the limited amount of granular fill, contaminant movement is not expected to occur at the Gage facility.

### B2.B.2(f) Recommendations or Established Requirements for Additional Investigations

Additional investigation is planned at the Gage facility as identified in the *RCRA Facility Investigation Work Plan*, Revision 2 Update, February 2012 and approved by the MDEQ.

### B2.B.3 Surface Water and Sediment

There is no surface water or sediment present at the site or nearby as detailed in Section B2.A.2.e, Environmental Setting. As such, assessment of known nature and extent of contamination in surface water or sediment is not applicable.

### B2.B.4 Air

Operations at the Gage facility are permitted under Permit to Install 64-18B pursuant to the Part 55 Air Pollution Control Rule. The hazardous waste management units are operated in accordance with Subparts BB and CC as detailed in Attachments C11a, C11b and C11c. In addition, the thin film evaporator vent is compliant with Subpart AA. Because air emissions at the Gage facility are regulated under applicable state requirements, assessment of potential air contamination at the facility is not required.

### B2.B.5 Subsurface Gas Contamination

A supplemental investigation was performed in 2013. This report is attached to the April 27, 2015 RCRA Facility Investigation, Risk Evaluation and Corrective Measures Plan as Appendix B. The investigation delineated impacted soils in AOC 8. Additional investigation for the vapor intrusion (VI) pathway was conducted starting in 2018. These investigations are documented in reports which were submitted to EGLE and therefore are not included in this permit renewal application. Results of the VI investigations resulted in the following corrective actions:

- Vapor intrusion sampling off site at 600 Wanda indicated no risk of vapor intrusion. EGLE provided a letter confirming the results and that Gage had meet its obligation to evaluate the vapor pathway.

- On November 9-10, 2022, Gage conducted a remedial excavation to remove approximately 550 tons of impacted soils and surrounding residual fill on Parcel A (AOC 8) as a presumptive remedy to address the potential vapor intrusion pathway for adjacent off-site properties. A report documenting the excavation, soil verification sampling, and post excavation soil gas sampling was provided to EGLE on February 24, 2023. In a letter from EGLE dated August 2024, EGLE acknowledged the removal of soil from AOC 8, concurred soil vapors were not migrating off site and indicated*, “a vapor source in soil remains in the AOC 8 area due to the exceedances of the SSVIAC soil criteria present”.*

Gage planned to implement a sub-slab depressurization system (SSDS) to presumptively mitigate the VI pathway in three on-site indoor air spaces (Fill house #6, the Reman office, and the Production office next to Fill house #1). During design of these systems, several issues were identified including availability of fans with appropriate electrical hazard classification (required due to the locations of these fans) and the methane concentrations below the floor slabs. As a result, a revised work plan describing alternative VI mitigation approaches for each of these areas was submitted to EGLE on August 2, 2022. EGLE requested additional information in an email dated August 25, 2022, including demonstration of MIOSHA applicability for Fill House #6. A response to EGLE’s request for additional information was submitted to EGLE on December 1, 2022. EGLE approved the responses, and the August 2, 2022 work plan with conditions on January 13, 2023. These plans have previously been submitted to EGLE and therefore have not been included in this permit renewal application.

## B2.C FACILITY’S EXPOSURE ASSESSMENT

This section describes the potential exposure pathways at the site. An exposure pathway describes the course a chemical or physical agent takes from the source of contamination to the exposed population. An exposure pathway analysis links the sources, locations, and types of environmental releases with population locations and activity patterns to identify significant pathways of potential exposure.

An exposure pathway generally consists of four elements: (1) a source and mechanism of chemical release or potential release; (2) a retention or transport medium; (3) a point of potential human contact with the contaminated medium (referred to as the exposure point); and (4) an exposure route (e.g., ingestion of drinking water) at the exposure point. Each pathway describes the mechanism by which a population may be exposed to chemicals that may originate from a site.

As previously discussed, conceptual models identify “reasonable” current and potential future exposure pathways. Current exposure pathways are based on existing conditions at the site while future exposure pathways are based on assumptions regarding future uses of the site. Reasonable exposures are the greatest exposures that are reasonably expected to occur. The determination of "reasonable" is based on quantitative information, standard assumptions, and best professional judgment. The intent is to identify conservative exposure scenarios that are still within the range of probability.

### B2.C.1 Human Exposure and Threats

### B2.C.1(a) Exposure Pathway

Portions of the Gage facility have been industrialized since 1936. Any chemicals and oils used in facility operations during this time have the potential to be sources of contamination if they were “improperly” (as defined by today’s standards) used, handled, and/or disposed on-site. If chemicals and oils were improperly managed at the site, then these substances could have directly impacted the site’s soil (through spillage or run-off from paved surfaces) and air (through volatilization and fugitive dust emissions). Contaminants could then have been transferred from the soil to the shallow perched ground water (through leaching from soil). This perched water might also have migrated into the utility corridors which traverse the site because the soil typically used to backfill utility trenches would be more permeable than the natural clayey soil present on-site and might thereby provide a preferential flow pathway for perched water.

Whether any contaminants actually impacted or remain in site-related soil, perched ground water, or utility trench backfill will be determined or confirmed through the RFI, as a result of the conceptual model having identified the potential for a complete exposure pathway relevant to the medium in question. For example, although historical operations may have directly discharged contaminants to the air, this medium would not currently be impacted from this source due to: 1) cessation of improper chemical management activities; and 2) the rapid movement of this medium from the site. Based on this information, investigation of the air pathway was not recommended as part of the RFI. However, if initial investigations of surface soil detect the presence of contaminants at concentrations and under conditions conducive to volatilization, then additional investigation of the air pathway would be recommended. Through this process, the conceptual model becomes a dynamic tool that can be used throughout all phases of site investigation to identify potential exposure pathways at a site.

#### *Soil*

Although the majority of soil at the Gage facility is covered with pavement or buildings, on-site workers might be exposed to unpaved soils through inadvertent ingestion, dermal absorption and/or inhalation during outdoor or subsurface (e.g., utility repair) work activities. Off-site residents and off-site workers would not be directly exposed to the Gage facility’s soil at their off-site locations.

#### *Perched Ground Water*

On-site workers are not exposed to perched ground water under the Gage facility through direct ingestion because drinking water wells are not present on-site and the Gage facility’s drinking water is supplied by Detroit Metro Water & Sewer. However, given the shallow depth of the perched ground water, on-site workers might be exposed to this perched ground water through inadvertent ingestion, dermal absorption and/or inhalation during subsurface (e.g., utility repair) work activities. These exposures would be similar to soil exposures.

Off-site subsurface utility workers and residents may be exposed to the perched ground water or vapors derived from the Gage facility if off-site migration through utility corridors or other permeable subsurface routes has occurred.

### *Backfilled Utility Corridors*

Current and future on-site workers might be exposed to backfill material through inadvertent ingestion, dermal absorption and/or inhalation during activities related to the on-site utility corridors. Off-site workers might also be exposed to backfill material through inadvertent ingestion, dermal absorption and/or inhalation during activities related to off-site utility corridors which have connections to on-site utility corridors. Off-site residents would not be exposed to materials in utility corridors either on-site or off-site.

### *Air*

Exposure points to impacted air can be either on or downwind of a subject property. Therefore, off-site residents, on-site workers, and off-site workers could be exposed to chemicals in the air through inhalation. Exposure may occur through inhalation of volatilized substances or air-borne particulates (i.e., dust) from a subject property's soil. However, air-borne particulates would not be a significant source of exposure from the Gage facility because the majority of the site's soil is covered with pavement, buildings or grass.

## B2.C.1(b) Actual or Potential Receptors

The potential exposure pathways for each potentially exposed population under the current land use are summarized on below:

> **Off-Site Residents:** may be exposed to potential contaminants from the Gage facility through air emanating from the Gage facility. Evidence to date indicates that ground water at the perimeter of the site, and that in utility corridors, does not present an inhalation threat to off-site residents. Similarly, soil beneath the site does not present an inhalation threat to off-site residents. However, the RFI will finitely address this concern coincident with the evaluation of potential off-site utility worker exposures.
>
> **On-Site Workers:** may be exposed to potential contaminants from the Gage facility through contact, ingestion or inhalation of volatilized constituents derived from on-site soil, perched ground water, backfill material in on-site utility corridors, and air.
>
> **Off-Site Workers:** may be exposed to potential contaminants from the Gage facility through contact, ingestion or inhalation of volatilized constituents derived from backfill material in off-site utility corridors, or other permeable subsurface conduits, and air emanating from the Gage facility.

If the site were maintained at current conditions in the future, then the future potential exposure pathways are the same as the current potential exposure pathways. However, future exposures will decrease if remedial actions are undertaken or if exposure controls are implemented at the Gage facility.

The exposure pathways identified above are only *potential* pathways because it is currently unknown whether the proper conditions exist to complete the exposure pathways. An exposure pathway consists of four elements: (1) a source and mechanism of chemical release or potential release; (2) a retention or transport medium; (3) a point of potential human contact with the contaminated medium (referred to as the exposure point); and (4) an exposure route (e.g., ingestion of drinking water) at the exposure point. If any of these four elements do not exist, the exposure pathway will be incomplete, and exposure will not occur. For example, even if ground water (a transport medium) were to flow beneath the site and into a downgradient well (the exposure point) from which the ground water was ingested (the exposure route), exposure would not occur if a chemical was not present in the ground water. In this example, because there was no source, the exposure pathway would be incomplete, and no exposure would exist.

To determine whether the potential exposure pathways are complete, investigations of the environmental media in question (i.e., areas of concern) must be conducted. A summary of this evaluation is provided in the following section.

### B2.C.1(c) Evidence of Exposure

Known environmental impacts and release information is include in Attachment B4, Environmental Assessment. There is no evidence of exposure to human receptors.

### B2.C.2 Environmental Exposure and Threats

### B2.C.2(a) Exposure Pathway

The exposure pathways that present a potential threat to the environment are the same pathways that present a potential exposure threat to humans and are discussed in Section B2.C.1, Human Exposure and Threats.

### B2.C.2(b) Actual or Potential Receptors

There is no evidence of contaminant migration within the perched ground water or ground water migration off-site. In addition, there are no surface water features present on the Gage facility or on nearby properties. Based on this, there are no known environmental threats to on-site or off-site receptors.

### B2.C.2(c) Evidence of Exposure

Known environmental impacts and release information for the site are included in Attachment B4, Environmental Assessment. Documented environmental exposures include impacted soil and ground water at the Gage facility.

## B2.D INTERIM MEASURES

In an attempt to control what was believed to be migration of impacted ground water across the site, Gage installed two separate ground water recovery systems. Information presented in this report regarding the design of each remediation system was obtained from previous reports and Gage personnel. Because “as-built” drawings are not available for either system, actual construction details are not known.

### B2.D.1 Bulk Tank Storage Area

### B2.D.1(a) Objective of the Measure

The first ground water recovery system was installed in 1984 following the discovery of free product in monitoring wells located near the Bulk Tank Storage Area (SWMU 4). The system was composed of ground water recovery pumps placed in well-driven points and was designed to be manually operated by Gage personnel based on water levels in each well (OHM, 1986).

### B2.D.1(b) Design and Construction

Because “as-built” drawings are not available for either system, actual construction details are not known.

### B2.D.1(c) Operation, Monitoring, and Maintenance

The water/product mixture removed from the wells was to be pumped to three storage tanks connected in series through which free product would be separated from water. The system was subsequently expanded to include a seepage drain on the south side of the tank farm parallel to Jewell Avenue and a sump located north of the tank farm. Drainage from these two locations was directed to a manhole located on the east side of the tank farm.

### B2.D.1(d) Evaluation of Measure Effectiveness

Gage personnel indicated that design problems prevented long-term operation of this system. Documented operational information is not available and it is unknown how much free product was collected during operation of this system.

### B2.D.1(e) Proposed or Required Schedules for Continued Operation or Future Changes in the Measure

Because it was determined that the system was ineffective, operation schedules are not required.

### B2.D.2 Former Underground Storage Tank Area by Fill House 2

### B2.D.2(a) Objective of the Measure

The second ground water recovery system was installed in 1986 following the discovery of free product in monitoring wells located near the Former Underground Storage Tank Area by Fill House 2 (SWMU 9). The second system was installed in 1986 following the discovery of free product in monitoring wells located near the Former Underground Storage Tank Area by Fill House 2 (SWMU 9). Based on preliminary design plans, this system consists of a subsurface trench which was intended to intercept ground water and any free product and convey it to a collection basin from which it would be disposed.

### B2.D.2(b) Design and Construction

The ground water collection trench was excavated from the natural clay soils and backfilled with pea gravel. A 2-foot diameter, concrete catch basin was installed in approximately the center of the trench at a depth of 11 feet. A recovery system was installed in the catch basin, which consisted of a pneumatic-type ground water pump, a liquid level meter to indicate drawdown, discharge lines to a product/water separator, an air compressor, product storage barrels, and a metered discharge line to the sanitary sewer. Because “as-built” drawings are not available for either system, actual construction details are not known.

### B2.D.2(c) Operation, Monitoring, and Maintenance

According to Gage personnel, this system began operating on December 18, 1986, and remained in service for approximately 304 days. During this period, approximately 387.5 gallons of free product and 369,992 gallons of ground water were recovered.

### B2.D.2(d) Evaluation of Measure Effectiveness

Use of the system was discontinued after 304 days because the system did not function properly and was believed to be ineffective.

### B2.D.2(e) Proposed or Required Schedules for Continued Operation or Future Changes in the Measure

This system is no longer in operation and as such, this section is not applicable.

### B2.D.3 AOC 8: Soil Excavation

### B2.D.3(a) Objective of the Measure

The objective of the measure was to remove impacted soils. This interim measure is described in the 2013

Supplemental Investigation Report attached to the 2015 RCRA Facility Investigation, Risk Evaluation and Corrective Measures Plan as Appendix B. This report has been submitted to EGLE and has not been attached to this application. Impacted soils in AOC 8 were delineated and removed in 2022/2023. Soil vapor monitoring was performed following the excavation. In a letter dated August 30, 2024, EGLE concurred that the soil vapors were not migrating off site. Based on the August 30, 2024, letter from EGLE, it is Gage's understanding the AOC 8 interim measure has been completed.

### B2.D.3(b) Design and Construction

There are no design or construction details associated with this interim measure.

### B2.D.3(c) Operation, Monitoring, and Maintenance

There are no ongoing operation, monitoring or maintenance associated with this interim measure. An institutional control was established to address low levels of volatile organic compounds associated with utilities along Wanda Street. See the 2015 RCRA Facility Investigation, Risk Evaluation and Corrective Measures Plan as Appendix F, previously submitted to EGLE.

### B2.D.3(e) Proposed or Required Schedules for Continued Operation or Future Changes in the Measure

There are no proposed or required schedules for continued operation or future changes associated with this interim measure.

## B2.D4 Onsite vapor intrusion mitigation

### B2.D.4(a) Objective of the Measure

Gage planned to implement a sub-slab depressurization system (SSDS) to presumptively mitigate the VI pathway in three on-site indoor air spaces (Fill house #6, the Reman office, and the Production office next to Fill house #1). During design of these systems, several issues were identified including availability of fans with appropriate electrical hazard classification (required due to the locations of these fans) and the methane concentrations below the floor slabs. As a result, a revised work plan describing alternative VI mitigation approaches for each of these areas was submitted to EGLE on August 2, 2022. EGLE requested additional information in an email dated August 25, 2022, including demonstration of MIOSHA applicability for Fill House #6. A response to EGLE's request for additional information was submitted to EGLE on December 1, 2022. EGLE approved the responses, and the August 2, 2022 work plan with conditions on January 13, 2023. The new work plan included modifications to the HVAC system in the "Reman Control Room" to pressurize the building to prevent VI with a system to monitor positive pressure in the room. The plan included the installation of a Cupolex flooring system in the Production Office to address VI. The third area, Fill House 6, will be monitored under the OSHA 29 CFR 1910 safety rules. The positive pressure HVAC system in the Reman Control Room and the Cupolex floor in the Production Office were installed instead of the SSDS system(s).

### B2.D.4(b) Design and Construction

A revised work plan with design and construction information has been approved by EGLE on August 25, 2022.

Gage has completed modifications to the HVAC system in the Reman Control Room to pressurize the building to prevent VI and is monitoring pressure in the room. The design included the installation of a cupolex flooring system in the production office to address VI. Design details were previously submitted and approved by EGLE. Therefore, design and construction details are not included in this permit application.

The onsite SSDS vapor mitigation system will not be installed due to the work plan modification to alternatively use the HVAC system, OSHA monitoring in Fill House 6 and the Cupolex Floor system.

### B2.D.4(c) Operation, Monitoring, and Maintenance

Modifications to the HVAC system in the Reman Control Room will require some monitoring and maintenance. Gage is in the process of preparing an OM&M plan for the operation, monitoring and maintenance of the new HVAC system, Cupolex Floor and OSHA monitoring. The OM&M will include monitoring of pressure in the areas to ensure positive pressure to prevent potential vapor intrusion and OSHA monitoring in Fill House 6.

### B2.D.4(e) Proposed or Required Schedules for Continued Operation or Future Changes in the Measure

Gage is in the process of preparing an OM&M plan for the operation, monitoring and maintenance of the new HVAC system, including monitoring the pressure in the area to ensure positive pressure to prevent potential vapor intrusion. The OM&M plan will include a schedule for continued operation of the HVAC system. No future changes to the HVAC measures are anticipated.

## B2.E ENVIRONMENTAL INDICATORS

Environmental Indicator (EI) forms for the Gage facility are included in Appendix B2-7. There are no known uncontrolled exposures to contaminated soil or ground water. Human expose and ground water releases are controlled by facility controls and operational procedures as a requirement of the Part 111 LSF Operating License.

## B2.F FACILITY'S ASSESSMENT OF KNOWN OR PROPOSED CONSTITUENTS OF CONCERN [R 299.9629(3)(a)(i) and (3)(b)(i)]

A list of materials handled at the site is included as Appendix B2-3. A review of the analyses which have been performed to date at the Gage facility reveals that perched ground water has been characterized for an extensive suite of compounds. These scans include full base-neutral-acid scans (8270), full VOC scans (8260), phenols (604/625), PCBs and pesticides (8080), the "Michigan 10" metals suite and various major ions. The vast majority of compounds detected in previous investigations are VOCs.

Based on a review of the analytical data and the Gage facility materials list, and additional ground water sampling and analysis for a modified Appendix IX list of constituents, the MDEQ[1] requested that the RFI Work Plan analytical parameters list include VOCs by U.S. EPA Method 8260/5035. These parameters and associated analytical methods are defined in the Quality Assurance Project Plan (QAPP), which included as an attachment to the RFI Work Plan and which has been approved by the MDEQ.

## B2.G ESTABLISHED OR PROPOSED CLEANUP CRITERIA [R 299.9629(3)(a)(ii) and (iii) and R 299.9629(3)(b)(ii) and (iii)]

All site investigation data will be evaluated so that the relationships between site investigation results for each medium are apparent. A summary will be prepared that describes the concentrations of specific contaminants at the site and the background levels surrounding the site. Part 201 generic non-residential cleanup standards will be used to screen site characterization data gathered on-site and generic residential criteria will be used to screen site characterization data collected at the site perimeter, off-site, and at any other locations where unrestricted exposures may occur.

1 Letter from Horizon Environmental to Mr. Daniel Daily, dated August 8, 2000, and MDEQ approval letter dated July 30, 2009.

## B2.H ESTABLISHED OR PROPOSED COMPLIANCE POINTS AND PERIODS
[R 299.9629(3)(a)(iv) and (v) and R 299.9629(3)(b)(iv) and (v)]

No compliance points or periods have been proposed or established through an existing license or through existing facility-specific studies or reports, including those developed pursuant to Part 201 and RCRA Corrective Action.

## B2.I OFF-SITE ACCESS

No information has been identified that indicates a need for off-site access to implement corrective action or remediations.

## B2.J PUBLIC INVOLVEMENT PLAN

The Community Action Plan (Appendix B2-5) plan describes the procedures for dissemination of information to the public regarding RFI activities.

## B2.K HEALTH AND SAFETY PLAN

The Health and Safety Plan (Appendix B2-6) provides a brief description of the facility and known hazards; an evaluation of the health risks to workers implementing the field investigation activities; a list of key personnel and alternates responsible for site safety, response operations, and for protection of human health; a delineation of work areas; a description of the levels of personal protective equipment to be worn by personnel; established procedures to control site access; a description of documentation procedures for personnel on-site or visiting and for calibration of field screening equipment; established site emergency procedures; a description of requirements for an environmental surveillance program; a specification of any routine and special training required for responders; and established procedures for protecting workers from weather-related problems. The H&SP also addresses emergency medical care for injuries and toxicological problems and provides directions and a map to nearby hospitals.

The H&SP is consistent with appropriate NIOSH, OSHA, and U.S. EPA guidance documents.

## B2.L NOTICE REQUIREMENTS
[R 299.9525]

A notice of statutory obligations related to hazardous waste management for the Gage facility was issued to the Oakland County Register of Deeds on November 9, 2000, for the facility as required under R 299.9525. A copy of the notice is included in Appendix B2-8.

## B2.M JUSTIFICATION FOR PROPOSED ELIMINATION OF ANY WASTE MANAGEMENT UNIT FROM THE CORRECTIVE ACTION PROGRAM OR INTENT TO PROCEED WITH CORRECTIVE ACTIONS

No waste management units have been removed since 2013 and there are no proposals to eliminate waste management units from the corrective action program at this time.

All relevant waste management units are addressed in the 2015 RFI Work Plan and detailed in Section B2.A.3. Implementation of the approved RFI Work Plan is ongoing. A supplemental investigation was performed in 2013. This report is attached to the April 27, 2015, RCRA Facility Investigation, Risk Evaluation and Corrective Measures Plan as Appendix B. These reports were previously submitted to EGLE and therefore have not been included with this permit application.

# Tables

## Table B2-1

## Description of Former Underground Storage Tanks
## Gage Products
## Ferndale, Michigan

| UST | Capacity *(gallons)* | Contents | Location | Construction | Age at Removal *(year)* | Year Removed |
|---|---|---|---|---|---|---|
| 41 | 3,000 | Antifreeze | Fill House 2 | Steel | 9-14 | 1987 |
| 42 | 3,000 | Ethyl acetate | Fill House 2 | Steel | 11-16 | 1987 |
| 43 | 1,500 | n-Butanol | Fill House 2 | Steel | 11-16 | 1987 |
| 44 | 1,500 | Ethylene glycol monobutyl ether | Fill House 2 | Steel | 11-16 | 1987 |
| 45 | 1,500 | Diacetone alcohol | Fill House 2 | Steel | 11-16 | 1987 |
| 46 | 1,500 | Chlorobenzene or ethyl acetate | Fill House 2 | Steel | 11-16 | 1986 |
| 47 | 6,000 | Mineral seal oil | East of tank farm | Steel | 8-13 | 1987 |
| 48 | 6,000 | #4550 Solvent/ petroleum distillate | East of tank farm | Steel | 6-11 | 1987 |
| 49 | 6,000 | Methanol | East of tank farm | Steel | 8-13 | 1987 |
| 50 | 6,000 | Hydrocarbon solvent | East of tank farm | Steel | 8-13 | 1987 |
| 51 | 6,000 | Hydrocarbon solvent | East of tank farm | Steel | 8-13 | 1987 |
| A | 6,000 | Formaldehyde | Former schoolhouse | Fiberglass | 8-13 | 1985 |
| B | 6,000 | Glycol | Former schoolhouse | Steel | 8-13 | 1985 |
| C | 3,000/3,000* | B-300 soap/Pine oil | Former schoolhouse | Steel | 8-13 | 1985 |
| D | 6,000 | Leaded gasoline | Maintenance area | Steel | 10 | 1987 |
| E | 10,000 | Unleaded gasoline | Maintenance area | Steel | 10 | 1987 |
| F | 10,000 | #2 Diesel fuel | Maintenance area | Steel | 10 | 1987 |
| G** | 40 | Hydraulic oil | Maintenance area hoist | Steel | NA | NA |
| H** | 40 | Hydraulic oil | Fill House 2 hoist | Steel | NA | NA |

* This tank had two compartments of equal size.
** This tank is not part of an underground storage tank system as defined in Michigan P.A. 213 of 1994, as amended, because it is part of a piece of equipment and used for the equipment's operational purposes.

# Table B2-1

## Description of Former Underground Storage Tanks
## Gage Products
## Ferndale, Michigan

| UST | Capacity *(gallons)* | Contents | Location | Construction | Age at Removal *(year)* | Year Removed |
|---|---|---|---|---|---|---|
| --- | 10,000 | Kerosene | Below Floor; North Side Former Coca Cola Bldg. (Parcel D) | Steel | NA | 1998 (Closed In Place) |
| --- | 20,000 | No. 5 Fuel Oil | Below Floor; North Side Former Coca Cola Bldg. (Parcel D) | Steel | NA | 1998 (Closed In Place) |
| --- | 1,000 | Fuel Oil | Outside North Wall; Former Coca Cola Bldg. (Parcel C) | Steel | NA | 2009 |
| --- | 6,000 | Gasoline | Parking Lot South of Former Coca Cola Bldg. (Parcel D) | Steel | NA | 1991 |
| --- | 4,000 | Gasoline | Outside SW Corner of Bldg. (Parcel E) | Steel | NA | 1986 |

# Table B2-2 - Update 2011 Criteria
## Summary of Analytical Results for Soil Samples
## Gage Products
## Ferndale, Michigan

| Sample Location | | Background | Non-Residential | Non-Residential | Non-Residential | Residential | 1 | 2 | 3 | 4 | C-SB-1 | C-SB-1 | C-SB-1 | C-SB-1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lab Sample ID | | Target | Soil | Volatile | Direct | Soil | 97-05-131 | 97-05-131 | 97-05-131 | 97-05-131 | 45693 | 45694 | 45695 | 45696 |
| Sampled By | | Method | Volatilization to | Soil | Contact | Volatilization to | MDEQ | MDEQ | MDEQ | MDEQ | WWES | WWES | WWES | WWES |
| Analyzed By | | Detection | Indoor Air | Inhalation | | Indoor Air | | | | | | | | |
| Sample Date | | Limit | Inhalation | Infinite | | Inhalation | 5/16/1997 | 5/16/1997 | 5/16/1997 | 5/16/1997 | 7/31/1990 | 7/31/1990 | 7/31/1990 | 7/31/1990 |
| Sample Depth (ft.) | | | | | | | | | | | 0.0 - 1.5 | 3.0 - 4.5 | 6.0 - 7.5 | 9.0 - 10.5 |
| ***Inorganics*** | ***Units*** | | | | | | | | | | | | | |
| Arsenic {B} | mg/Kg | 5.8 | NLV | NLV | 37 | NLV | **13** | **8.3** | **9.6** | **3.8** | --- | --- | --- | --- |
| Cadmium {B} | mg/Kg | 1.2 | NLV | NLV | 2100 | NLV | **2** | **2.5** | **3.5** | **2** | --- | --- | --- | --- |
| Chromium, Total | mg/Kg | 18 | NLV | NLV | 9200 | NLV | **34** | **77** | **116** | **7** | --- | --- | --- | --- |
| Chromium (VI) | mg/Kg | 18 | NLV | NLV | 9200 | NLV | --- | --- | --- | --- | --- | --- | --- | --- |
| Chromium (III) {B,H} | mg/Kg | 18 | NLV | NLV | 1000000 {D} | NLV | --- | --- | --- | --- | --- | --- | --- | --- |
| Copper {B} | mg/Kg | 32 | NLV | NLV | 73000 | NLV | **86.5** | **207** | **243** | **6.9** | --- | --- | --- | --- |
| Iron | mg/Kg | 12000 | NLV | NLV | 580000 | NLV | **18300** | **34000** | **23000** | **5940** | --- | --- | --- | --- |
| Lead {B} | mg/Kg | 21 | NLV | NLV | 900 (DD) | NLV | **203** | **752** | **920** | **66.8** | --- | --- | --- | --- |
| Mercury (Inorganic) {B} | mg/Kg | 0.13 | 89 | 62 | 580 | 48 | **0.13** | **0.14** | **0.15** | **0.17** | --- | --- | --- | --- |
| Nickel | mg/Kg | 20 | NLV | NLV | 150000 | NLV | **20** | **25** | **27** | **5** | --- | --- | --- | --- |
| Zinc {B} | mg/Kg | 47 | NLV | NLV | 630000 | NLV | **310** | **817** | **810** | **54.9** | --- | --- | --- | --- |
| ***Semi-Volatiles*** | ***Units*** | | | | | | | | | | | | | |
| Acenaphthene | ug/Kg | 330 | 3.5E+8 | 9.7E+7 | 1.3E+8 | 1.9E+8 | **2000** | **1700** | <130 | **430** | --- | --- | --- | --- |
| Acenaphthylene | ug/Kg | 330 | 3.0E+6 | 2.7E+6 | 5.2E+6 | 1.6E+6 | <120 | <1200 | <130 | <120 | --- | --- | --- | --- |
| Anthracene | ug/Kg | 330 | 1.0E+9 {D} | 1.6E+9 | 7.3E+8 | 1.0E+9 {D} | <120 | <1200 | <130 | **240** | --- | --- | --- | --- |
| Benzo(a)anthracene {Q} | ug/Kg | 330 | NLV | NLV | 80000 | NLV | **440** | <1200 | **180** | **900** | --- | --- | --- | --- |
| Benzo(a)pyrene {Q} | ug/Kg | 330 | NLV | NLV | 8000 | NLV | **370** | <2400 | <260 | **860** | --- | --- | --- | --- |
| Benzo(b&k)fluoranthene | ug/Kg | 330 | ID | ID | 80000 | ID | **1910** | <2400 | **950** | **1600** | --- | --- | --- | --- |
| Benzo(g,h,i)perylene | ug/Kg | 330 | NLV | NLV | 7.0E+6 | NLV | **340** | <6000 | **260** | **550** | --- | --- | --- | --- |
| bis(2-Chloroethoxy)methane | ug/Kg | 330 | NA | NA | NA | NA | <240 | <2400 | <260 | <240 | --- | --- | --- | --- |
| bis(2-Chloroethyl)ether {I} | ug/Kg | 100 | 44000 | 13000 | 58000 | 8300 | <120 | <2400 | <130 | <120 | --- | --- | --- | --- |
| bis(2-Chloroisopropyl)ether | ug/Kg | 330 | NA | NA | NA | NA | <120 | <1200 | <130 | <120 | --- | --- | --- | --- |
| bis(2-Ethylhexyl)phthalate | ug/Kg | 330 | NLV | NLV | 1.0E+7 {C} | NLV | **49000** | **170000** | **2500** | **1400** | --- | --- | --- | --- |
| 4-Bromo diphenyl ether | ug/Kg | 330 | NA | NA | NA | NA | <240 | <2400 | <260 | <240 | --- | --- | --- | --- |
| Butyl benzyl phthalate | ug/Kg | 330 | NLV | NLV | 3.1E+5 {C} | NLV | **4400** | <1200 | <130 | <120 | --- | --- | --- | --- |
| beta-Chloronaphthalene | ug/Kg | 330 | ID | ID | 1.8E+8 | ID | <240 | <2400 | <260 | <240 | --- | --- | --- | --- |
| 4-Chloro diphenyl ether | ug/Kg | 330 | NA | NA | NA | NA | <240 | --- | <130 | <120 | --- | --- | --- | --- |
| Chrysene {Q} | ug/Kg | 330 | ID | ID | 8.0E+6 | ID | **760** | <1200 | **260** | **1000** | --- | --- | --- | --- |
| Decabromodiphenyl ether | ug/Kg | NA | 1.0E+9 {D} | 1.0E+8 | 1.1E+7 | 1.0E+9 {D} | --- | --- | --- | --- | --- | --- | --- | --- |
| Di-n-butyl phthalate | ug/Kg | 330 | NLV | NLV | 7.6E+5 {C} | NLV | **400** | <1200 | <130 | **190** | --- | --- | --- | --- |
| Di-n-octyl phthalate | ug/Kg | 330 | NLV | NLV | 2.0E+7 | NLV | <240 | <2400 | <260 | <240 | --- | --- | --- | --- |
| Dibenzo(a,h)anthracene {Q} | ug/Kg | 330 | NLV | NLV | 8000 | NLV | <600 | <6000 | <650 | **150** | --- | --- | --- | --- |
| Dibenzofuran | ug/Kg | 330 | 3.6E+6 | 1.6E+5 | ID | 2.0E+6 | --- | --- | --- | --- | --- | --- | --- | --- |
| 3,3'-Dichlorobenzidine | ug/Kg | 2000 | NLV | NLV | 30000 | NLV | --- | --- | --- | --- | --- | --- | --- | --- |
| Diethyl phthalate | ug/Kg | 330 | NLV | NLV | 7.4E+5 {C} | NLV | <120 | <1200 | <130 | **2600** | --- | --- | --- | --- |
| Dimethyl phthalate | ug/Kg | 330 | NLV | NLV | 7.9E+5 {C} | NLV | <240 | <2400 | <260 | <240 | --- | --- | --- | --- |
| 2,4-Dinitrotoluene | ug/Kg | 330 | NLV | NLV | 2.2E+5 | NLV | <600 | <6000 | <650 | <600 | --- | --- | --- | --- |
| 2,6-Dinitrotoluene | ug/Kg | 330 | NA | NA | NA | NA | <600 | <6000 | <650 | <600 | --- | --- | --- | --- |
| 1,2-Diphenylhydrazine | ug/Kg | 330 | NA | NA | NA | NA | <240 | <2400 | <260 | <240 | --- | --- | --- | --- |

# Table B2-2 - Update 2011 Criteria
## Summary of Analytical Results for Soil Samples
## Gage Products
## Ferndale, Michigan

| Sample Location<br>Lab Sample ID<br>Sampled By<br>Analyzed By<br>Sample Date<br>Sample Depth (ft.) | | Background Target Method Detection Limit | Non-Residential Soil Volatilization to Indoor Air Inhalation | Non-Residential Volatile Soil Inhalation Infinite | Non-Residential Direct Contact | Residential Soil Volatilization to Indoor Air Inhalation | 1<br>97-05-131<br>MDEQ<br><br>5/16/1997 | 2<br>97-05-131<br>MDEQ<br><br>5/16/1997 | 3<br>97-05-131<br>MDEQ<br><br>5/16/1997 | 4<br>97-05-131<br>MDEQ<br><br>5/16/1997 | C-SB-1<br>45693<br>WWES<br><br>7/31/1990<br>0.0 - 1.5 | C-SB-1<br>45694<br>WWES<br><br>7/31/1990<br>3.0 - 4.5 | C-SB-1<br>45695<br>WWES<br><br>7/31/1990<br>6.0 - 7.5 | C-SB-1<br>45696<br>WWES<br><br>7/31/1990<br>9.0 - 10.5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Semi-Volatiles Cont.*** | **Units** | | | | | | | | | | | | | |
| Fluoranthene | ug/Kg | 330 | 1.0E+9 {D} | 8.9E+8 | 1.3E+8 | 1.0E+9 {D} | **750** | **870** | **310** | **2200** | --- | --- | --- | --- |
| Fluorene | ug/Kg | 330 | 1.0E+9 {D} | 1.5E+8 | 8.7E+7 | 5.8E+8 | <120 | **2100** | <130 | <120 | --- | --- | --- | --- |
| Hexachlorobenzene (C-66) | ug/Kg | 330 | 2.2E+5 | 56000 | 37000 | 41000 | <120 | <1200 | <130 | <120 | --- | --- | --- | --- |
| Hexachlorobutadiene (C-46) | ug/Kg | 50 | 3.5E+5 {C} | 4.6E+5 | 3.5E+5 {C} | 1.3E+5 | <240 | <2400 | <260 | <240 | --- | --- | --- | --- |
| Hexachlorocyclopentadiene (C-56) | ug/Kg | 330 | 56000 | 60000 | 7.2E+5 {C} | 30000 | --- | --- | --- | --- | --- | --- | --- | --- |
| Hexachloroethane | ug/Kg | 300 | 79000 | 6.6E+5 | 7.3E+5 | 40000 | <120 | <1200 | <130 | <120 | --- | --- | --- | --- |
| Indeno(1,2,3-cd)pyrene {Q} | ug/Kg | 330 | NLV | NLV | 80000 | NLV | **290** | <6000 | **200** | **550** | --- | --- | --- | --- |
| Isophorone | ug/Kg | 330 | NLV | NLV | 2.4E+6 {C} | NLV | <120 | <1200 | <130 | <120 | --- | --- | --- | --- |
| 2-Methylnaphthalene | ug/Kg | 330 | 4.9E+6 | 1.8E+6 | 2.6E+7 | 2.7E+6 | **96000** | **81000** | **59** | **91000** | --- | --- | --- | --- |
| n-Nitroso-di-n-propylamine | ug/Kg | 330 | NLV | NLV | 5400 | NLV | --- | --- | --- | --- | --- | --- | --- | --- |
| n-Nitroso-di-propylamine | ug/Kg | 330 | NLV | NLV | 5400 | NLV | <240 | <2400 | <260 | <240 | --- | --- | --- | --- |
| Naphthalene | ug/Kg | 330 | 4.7E+5 | 3.5E+5 | 5.2E+7 | 2.5E+5 | **11000** | **23000** | **950** | **12000** | --- | --- | --- | --- |
| Nitrobenzene {I} | ug/Kg | 330 | 1.7E+5 | 64000 | 3.4E+5 | 91000 | <240 | <2400 | <260 | <240 | --- | --- | --- | --- |
| N-Nitrosodiphenylamine | ug/Kg | 330 | NLV | NLV | 7.8E+6 | NLV | --- | --- | --- | --- | --- | --- | --- | --- |
| n-Nitroso-n-propylamine | ug/Kg | 330 | NLV | NLV | 5400 | NLV | <240 | <2400 | <260 | <240 | --- | --- | --- | --- |
| Phenanthrene | ug/Kg | 330 | 5.1E+6 | 1.9E+5 | 5.2E+6 | 2.8E+6 | **1400** | **1500** | **330** | **1500** | --- | --- | --- | --- |
| Pyrene | ug/Kg | 330 | 1.0E+9 {D} | 7.8E+8 | 8.4E+7 | 1.0E+9 {D} | **830** | **1100** | **330** | **2000** | --- | --- | --- | --- |
| ***Volatiles*** | **Units** | | | | | | | | | | | | | |
| Acetone {I} | ug/Kg | 1000 | 1.1E+8 {C} | 1.6E+8 | 7.3E+7 | 1.1E+8 {C} | <61000 | <50000 | <140 | <65000 | --- | --- | --- | --- |
| Acrylonitrile {I} | ug/Kg | 100 | 35000 | 17000 | 74000 | 6600 | <6100 | <5000 | <14 | <6500 | --- | --- | --- | --- |
| Benzene {I} | ug/Kg | 50 | 8400 | 45000 | 4.0E+5 {C} | 1600 | <6100 | <5000 | <14 | <6500 | **33** | <500 | <250 | <1000 |
| Bromobenzene {I} | ug/Kg | 100 | 5.8E+5 | 5.4E+5 | 7.6E+5 {C} | 3.1E+5 | --- | --- | --- | --- | <40 | <1000 | <500 | <2000 |
| Bromochloromethane | ug/Kg | 100 | NA | NA | NA | NA | <6100 | <5000 | <14 | <6500 | <300 | <7500 | <3800 | <15000 |
| Bromodichloromethane | ug/Kg | 100 | 6400 | 31000 | 4.9E+5 | 1200 | --- | --- | --- | --- | <40 | <1000 | <500 | <2000 |
| Bromoform | ug/Kg | 100 | 7.7E+5 | 3.1E+6 | 8.7E+5 {C} | 1.5E+5 | <6100 | <5000 | <14 | <6500 | <300 | <7500 | <3800 | <15000 |
| Bromomethane | ug/Kg | 200 | 1600 | 13000 | 1.0E+6 | 860 | <12000 | <10000 | <29 | <13000 | <200 | <5000 | <2500 | <10000 |
| 2-Butanone (MEK) {I} | ug/Kg | 750 | 2.7E+7 {C} | 3.5E+7 | 2.7E+7 {C,DD} | 2.7E+7 {C} | <12000 | <10000 | <29 | <13000 | --- | --- | --- | --- |
| n-Butylbenzene | ug/Kg | 50 | ID | ID | 8.0E+6 | ID | --- | --- | --- | --- | --- | --- | --- | --- |
| sec-Butylbenzene | ug/Kg | 50 | ID | ID | 8.0E+6 | ID | --- | --- | --- | --- | --- | --- | --- | --- |
| tert-Butylbenzene | ug/Kg | 50 | ID | ID | 8.0E+6 | ID | --- | --- | --- | --- | --- | --- | --- | --- |
| Carbon disulfide {I,R} | ug/Kg | 250 | 1.4E+5 | 1.6E+6 | 2.8E+5 {C,DD} | 76000 | <12000 | <10000 | <29 | <13000 | --- | --- | --- | --- |
| Carbon tetrachloride | ug/Kg | 50 | 990 | 12000 | 3.9E+5 {C} | 190 | <6100 | <5000 | <14 | <6500 | <80 | <2000 | <1000 | <4000 |
| Chlorobenzene {I} | ug/Kg | 50 | 2.2E+5 | 9.2E+5 | 2.6E+5 {C} | 1.2E+5 | <6100 | <5000 | **360** | <6500 | **2800** | **70000** | **43000** | ***220000*** |
| Dibromochloromethane | ug/Kg | 100 | 21000 | 80000 | 5.0E+5 | 3900 | <6100 | <5000 | <14 | <6500 | --- | --- | --- | --- |
| Chloroethane {I} | ug/Kg | 250 | 9.5E+5 {C} | 3.6E+7 | 9.5E+5 {C} | 9.5E+5 {C} | <12000 | <10000 | <29 | <13000 | <200 | <5000 | <2500 | <10000 |
| 2-Chloroethyl vinyl ether | ug/Kg | 5000 | ID | ID | ID | ID | --- | --- | --- | --- | <200 | <5000 | <2500 | <10000 |
| Chloroform | ug/Kg | 50 | 38000 | 1.5E+5 | 1.5E+6 {C} | 7200 | <6100 | <500 | <14 | <6500 | <20 | <500 | <250 | <1000 |
| Chloromethane {I} | ug/Kg | 250 | 10000 | 1.2E+5 | 1.1E+6 {C} | 2300 | <12000 | <10000 | <29 | <13000 | <200 | <5000 | <2500 | <10000 |
| 2-Chlorotoluene | ug/Kg | 50 | 5.0E+5 {C} | 1.5E+6 | 5.0E+5 {C} | 2.7E+5 | --- | --- | --- | --- | --- | --- | --- | --- |
| 4-Chlorotoluene | ug/Kg | 50 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- |

# Table B2-2 - Update 2011 Criteria
## Summary of Analytical Results for Soil Samples
## Gage Products
## Ferndale, Michigan

| Sample Location<br>Lab Sample ID<br>Sampled By<br>Analyzed By<br>Sample Date<br>Sample Depth (ft.) | | Background Target Method Detection Limit | Non-Residential Soil Volatilization to Indoor Air Inhalation | Non-Residential Volatile Soil Inhalation Infinite | Non-Residential Direct Contact | Residential Soil Volatilization to Indoor Air Inhalation | 1<br>97-05-131<br>MDEQ<br><br>5/16/1997 | 2<br>97-05-131<br>MDEQ<br><br>5/16/1997 | 3<br>97-05-131<br>MDEQ<br><br>5/16/1997 | 4<br>97-05-131<br>MDEQ<br><br>5/16/1997 | C-SB-1<br>45693<br>WWES<br><br>7/31/1990<br>0.0 - 1.5 | C-SB-1<br>45694<br>WWES<br><br>7/31/1990<br>3.0 - 4.5 | C-SB-1<br>45695<br>WWES<br><br>7/31/1990<br>6.0 - 7.5 | C-SB-1<br>45696<br>WWES<br><br>7/31/1990<br>9.0 - 10.5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Volatiles Cont.*** | ***Units*** | | | | | | | | | | | | | |
| Dibromochloropropane | ug/Kg | 10 | 1200 {C} | 15000 | 1200 {C} | 1200 {C} | <12000 | <10000 | <29 | <13000 | --- | --- | --- | --- |
| Dibromochloromethane | ug/Kg | 100 | 21000 | 80000 | 5.0E+5 | 3900 | --- | --- | --- | --- | <60 | <1500 | <750 | <3000 |
| Ethylene dibromide | ug/Kg | 20 | 3600 | 5800 | 430 | 670 | --- | --- | --- | --- | --- | --- | --- | --- |
| Dibromomethane | ug/Kg | 250 | ID | ID | 2.0E+6 {C} | ID | <6100 | <5000 | **1** | <6500 | --- | --- | --- | --- |
| Ethylene dibromide | ug/Kg | 20 | 3600 | 5800 | 430 | 670 | <6100 | <5000 | <14 | <6500 | --- | --- | --- | --- |
| trans-1,4-Dichloro-2-butene | ug/Kg | 50 | NA | NA | NA | NA | <6100 | <5000 | <14 | <6500 | --- | --- | --- | --- |
| 1,2-Dichlorobenzene | ug/Kg | 100 | 2.1E+5 {C} | 4.6E+7 | 2.1E+5 {C} | 2.1E+5 {C} | <120 | <5000 | <14 | <20 | <300 | <7500 | <3800 | <15000 |
| 1,3-Dichlorobenzene | ug/Kg | 100 | 48000 | 94000 | 1.7E+5 {C} | 26000 | <120 | <5000 | <14 | <120 | <300 | <7500 | <3800 | <15000 |
| 1,4-Dichlorobenzene | ug/Kg | 100 | 1.0E+5 | 2.6E+5 | 1.9E+6 | 19000 | <120 | <5000 | <14 | <120 | <300 | <7500 | <3800 | <15000 |
| Dibromochloromethane | ug/Kg | 100 | 21000 | 80000 | 5.0E+5 | 3900 | --- | --- | --- | --- | --- | --- | --- | --- |
| Dichlorodifluoromethane | ug/Kg | 250 | 1.7E+6 | 6.3E+7 | 1.0E+6 {C} | 9.0E+5 | <12000 | <10000 | <29 | <13000 | <200 | <5000 | <2500 | <10000 |
| 1,1-Dichloroethane {I} | ug/Kg | 50 | 4.3E+5 | 2.5E+6 | 8.9E+5 {C} | 2.3E+5 | --- | --- | --- | --- | --- | --- | --- | --- |
| 1,2-Dichloroethane {I} | ug/Kg | 50 | 11000 | 21000 | 4.2E+5 | 2100 | --- | --- | --- | --- | --- | --- | --- | --- |
| 1,1-Dichloroethane {I} | ug/Kg | 50 | 4.3E+5 | 2.5E+6 | 8.9E+5 {C} | 2.3E+5 | <6100 | <5000 | <14 | <6500 | **170** | <1000 | <500 | <2000 |
| 1,2-Dichloroethane {I} | ug/Kg | 50 | 11000 | 21000 | 4.2E+5 | 2100 | <6100 | <5000 | <14 | <6500 | <40 | <1000 | <500 | <2000 |
| 1,1-Dichloroethylene {I} | ug/Kg | 50 | 330 | 3700 | 5.7E+5 {C} | 62 | <6100 | <5000 | <29 | <6500 | <40 | <1000 | <500 | <2000 |
| cis-1,2-Dichloroethylene {I} | ug/Kg | 50 | 41000 | 2.1E+5 | 6.4E+5 {C} | 22000 | <6100 | <5000 | <14 | <6500 | --- | --- | --- | --- |
| trans-1,2-Dichloroethylene | ug/Kg | 50 | 43000 | 3.3E+5 | 1.4E+6 {C} | 23000 | <6100 | <5000 | <14 | <65000 | <40 | <1000 | <500 | <2000 |
| 2,2-Dichloropropane | ug/Kg | 50 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- |
| 1,2-Dichloropropane {I} | ug/Kg | 50 | 7400 | 30000 | 5.5E+5 {C} | 4000 | <6100 | <5000 | <14 | <6500 | <60 | <1500 | <750 | <3000 |
| 1,3-Dichloropropane | ug/Kg | 50 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- |
| 1,1-Dichloropropene | ug/Kg | 50 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- |
| cis-1,3-Dichloropropene {I,J} | ug/Kg | 50 | 5400 | 60000 | 2.4E+5 | 1000 | <6100 | <5000 | <14 | <6500 | <80 | <2000 | <1000 | <4000 |
| trans-1,3-Dichloropropene {I, J} | ug/Kg | 50 | 5400 | 60000 | 2.4E+5 | 1000 | <6100 | <5000 | <14 | <6500 | <80 | <2000 | <1000 | <4000 |
| Diethyl ether {I} | ug/Kg | 200 | 7.4E+6 {C} | 1.0E+8 | 7.4E+6 {C} | 7.4E+6 {C} | --- | --- | --- | --- | --- | --- | --- | --- |
| Diethylbenzene | ug/Kg | 50 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- |
| Dimethyl disulfide | ug/Kg | 50 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- |
| Diethyl ether {I} | ug/Kg | 200 | 7.4E+6 {C} | 1.0E+8 | 7.4E+6 {C} | 7.4E+6 {C} | --- | --- | --- | --- | --- | --- | --- | --- |
| Ethylbenzene {I} | ug/Kg | 50 | 1.4E+5 {C} | 2.4E+6 | 1.4E+5 {C} | 87000 | **12000** | **40000** | **88** | **36000** | **220** | **11000** | **3500** | **1200** |
| Hexachlorobutadiene (C-46) | ug/Kg | 50 | 3.5E+5 {C} | 4.6E+5 | 3.5E+5 {C} | 1.3E+5 | --- | --- | --- | --- | --- | --- | --- | --- |
| Hexachloroethane | ug/Kg | 300 | 79000 | 6.6E+5 | 7.3E+5 | 40000 | <6100 | <5000 | <14 | <6500 | --- | --- | --- | --- |
| 2-Hexanone {I} | ug/Kg | 2500 | 1.8E+6 | 1.3E+6 | 2.5E+6 {C} | 9.9E+5 | <12000 | <10000 | <29 | <13000 | --- | --- | --- | --- |
| Iodomethane | ug/Kg | 100 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- |
| Isopropyl benzene {I} | ug/Kg | 250 | 3.9E+5 {C} | 2.0E+6 | 3.9E+5 {C} | 3.9E+5 {C} | **2900** | **3200** | <14 | **3900** | --- | --- | --- | --- |
| p-Isopropyltoluene | ug/Kg | 100 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- |
| 5-Methly-2-Hexanone | ug/Kg | 100 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- |
| Iodomethane | ug/Kg | 100 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- |
| 4-Methyl-2-pentanone (MIBK) {I} | ug/Kg | 2500 | 2.7E+6 {C} | 5.3E+7 | 2.7E+6 {C} | 2.7E+6 {C} | <12000 | <10000 | <29 | <13000 | --- | --- | --- | --- |
| Methyl-tert-butyl ether (MTBE) | ug/Kg | 250 | 5.9E+6 {C} | 3.0E+7 | 5.9E+6 {C} | 5.9E+6 {C} | <12000 | <10000 | <29 | <13000 | --- | --- | --- | --- |

# Table B2-2 - Update 2011 Criteria
## Summary of Analytical Results for Soil Samples
## Gage Products
## Ferndale, Michigan

| Sample Location | | Background | Non-Residential | Non-Residential | Non-Residential | Residential | 1 | 2 | 3 | 4 | C-SB-1 | C-SB-1 | C-SB-1 | C-SB-1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lab Sample ID | | Target | Soil | Volatile | Direct | Soil | 97-05-131 | 97-05-131 | 97-05-131 | 97-05-131 | 45693 | 45694 | 45695 | 45696 |
| Sampled By | | Method | Volatilization to | Soil | Contact | Volatilization to | MDEQ | MDEQ | MDEQ | MDEQ | WWES | WWES | WWES | WWES |
| Analyzed By | | Detection | Indoor Air | Inhalation | | Indoor Air | | | | | | | | |
| Sample Date | | Limit | Inhalation | Infinite | | Inhalation | 5/16/1997 | 5/16/1997 | 5/16/1997 | 5/16/1997 | 7/31/1990 | 7/31/1990 | 7/31/1990 | 7/31/1990 |
| Sample Depth (ft.) | | | | | | | | | | | 0.0 - 1.5 | 3.0 - 4.5 | 6.0 - 7.5 | 9.0 - 10.5 |
| ***Volatiles Cont.*** | ***Units*** | | | | | | | | | | | | | |
| Methylene chloride | ug/Kg | 100 | 2.4E+5 | 7.0E+5 | 2.3E+6 {C} | 45000 | <12000 | <10000 | <29 | <13000 | <100 | <2500 | <1300 | <5000 |
| 2-Methylnaphthalene | ug/Kg | 330 | 4.9E+6 | 1.8E+6 | 2.6E+7 | 2.7E+6 | --- | --- | --- | --- | --- | --- | --- | --- |
| Naphthalene | ug/Kg | 330 | 4.7E+5 | 3.5E+5 | 5.2E+7 | 2.5E+5 | **22000** | **31000** | **68** | **66000** | --- | --- | --- | --- |
| n-Propylbenzene {I} | ug/Kg | 100 | ID | ID | 8.0E+6 | ID | **4500** | **5800** | <14 | **9000** | --- | --- | --- | --- |
| Styrene {I} | ug/Kg | 50 | 5.2E+5 {C} | 3.3E+6 | 5.2E+5 {C} | 2.5E+5 | <6100 | <5000 | <14 | <6500 | --- | --- | --- | --- |
| 1,1,1,2-Tetrachloroethane | ug/Kg | 100 | 33000 | 1.2E+5 | 4.4E+5 {C} | 6200 | <6100 | <5000 | <14 | <6500 | --- | --- | --- | --- |
| 1,1,2,2-Tetrachloroethane | ug/Kg | 50 | 23000 | 34000 | 2.4E+5 | 4300 | <6100 | <5000 | <14 | <6500 | <40 | <1000 | <500 | <2000 |
| Tetrachloroethylene | ug/Kg | 50 | 60000 | 6.0E+5 | 88000 {C} | 11000 | <6100 | <5000 | <14 | <6500 | **170** | <1000 | <500 | <2000 |
| Tetrahydrofuran | ug/Kg | 1000 | 2.4E+6 | 1.5E+7 | 9.5E+6 | 1.3E+6 | --- | --- | --- | --- | --- | --- | --- | --- |
| Toluene {I} | ug/Kg | 100 | 2.5E+5 {C} | 3.3E+6 | 2.5E+5 {C} | 2.5E+5 {C} | <6100 | <5000 | **7.8** | <6500 | **360** | **1900** | **860** | **1000** |
| 1,2,3-Trichlorobenzene | ug/Kg | 330 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- |
| 1,2,4-Trichlorobenzene | ug/Kg | 330 | 1.1E+6 {C} | 3.4E+7 | 1.1E+6 {C,DD} | 1.1E+6 {C} | <240 | <10000 | <29 | <13000 | --- | --- | --- | --- |
| 1,1,1-Trichloroethane | ug/Kg | 50 | 4.6E+5 | 4.5E+6 | 4.6E+5 {C} | 2.5E+5 | <6100 | <5000 | <14 | <6500 | **800** | <1000 | <500 | <2000 |
| 1,1,2-Trichloroethane | ug/Kg | 50 | 24000 | 57000 | 8.4E+5 | 4600 | <6100 | <5000 | <14 | <6500 | <60 | <1500 | <750 | <3000 |
| Trichloroethylene | ug/Kg | 50 | 37000 | 2.6E+5 | 5.0E+5 {C,DD} | 7100 | <6100 | <5000 | <14 | <6500 | **87** | <1000 | <500 | <2000 |
| Trichlorofluoromethane | ug/Kg | 100 | 5.6E+5 {C} | 1.1E+8 | 5.6E+5 {C} | 5.6E+5 {C} | <12000 | <10000 | <29 | <13000 | <60 | <1500 | <750 | <3000 |
| 1,2,3-Trichloropropane | ug/Kg | 100 | 7500 | 11000 | 8.3E+5 {C} | 4000 | <6100 | <5000 | <14 | <6500 | --- | --- | --- | --- |
| 1,2,4-Trimethylbenzene {I} | ug/Kg | 100 | 1.1E+5 {C} | 2.5E+7 | 1.1E+5 {C} | 1.1E+5 {C} | ***240000*** | ***120000*** | **190** | ***170000*** | --- | --- | --- | --- |
| 1,3,5-Trimethylbenzene {I} | ug/Kg | 100 | 94000 {C} | 1.9E+7 | 94000 {C} | 94000 {C} | **80000** | **36000** | **660** | **49000** | --- | --- | --- | --- |
| Vinyl acetate | ug/Kg | 5000 | 1.5E+6 | 2.0E+6 | 2.4E+6 {C,DD} | 7.9E+5 | <12000 | <10000 | <29 | <13000 | --- | --- | --- | --- |
| Vinyl chloride | ug/Kg | 40 | 2800 | 29000 | 34000 | 270 | <12000 | <10000 | <29 | <13000 | <200 | <5000 | <2500 | <10000 |
| Xylene, p&m | ug/Kg | 100 | 1.5E+5 {C} | 5.4E+7 | 1.5E+5 {C} | 1.5E+5 {C} | **100000** | ***270000*** | **110** | ***160000*** | --- | --- | --- | --- |
| Xylene, o | ug/Kg | 50 | 1.5E+5 {C} | 5.4E+7 | 1.5E+5 {C} | 1.5E+5 {C} | **48000** | **8100** | **61** | **52000** | --- | --- | --- | --- |
| Xylene (Total) | ug/Kg | 150 | 1.5E+5 {C} | 5.4E+7 | 1.5E+5 {C} | 1.5E+5 {C} | --- | --- | --- | --- | **590** | **19000** | **6400** | <5000 |
| ***PCB's*** | ***Units*** | | | | | | | | | | | | | |
| Aroclor 1016 | ug/Kg | 330 | 1.6E+7 | 8.1E+5 | 16000 {T} | 3.0E+6 | <600 | <600 | <650 | <600 | --- | --- | --- | --- |
| Aroclor 1221 | ug/Kg | 330 | 1.6E+7 | 8.1E+5 | 16000 {T} | 3.0E+6 | <600 | <600 | <650 | <600 | --- | --- | --- | --- |
| Aroclor 1232 | ug/Kg | 330 | 1.6E+7 | 8.1E+5 | 16000 {T} | 3.0E+6 | <600 | <600 | <650 | <600 | --- | --- | --- | --- |
| Aroclor 1242 | ug/Kg | 330 | 1.6E+7 | 8.1E+5 | 16000 {T} | 3.0E+6 | <600 | <600 | <650 | <600 | --- | --- | --- | --- |
| Aroclor 1248 | ug/Kg | 330 | 1.6E+7 | 8.1E+5 | 16000 {T} | 3.0E+6 | <600 | <600 | <650 | <600 | --- | --- | --- | --- |
| Aroclor 1254 | ug/Kg | 330 | 1.6E+7 | 8.1E+5 | 16000 {T} | 3.0E+6 | **780** | **390** | <650 | <600 | --- | --- | --- | --- |
| Aroclor 1260 | ug/Kg | 330 | 1.6E+7 | 8.1E+5 | 16000 {T} | 3.0E+6 | <600 | <600 | **590** | <600 | --- | --- | --- | --- |
| Aroclor 1262 | ug/Kg | 330 | 1.6E+7 | 8.1E+5 | 16000 {T} | 3.0E+6 | <600 | <600 | <650 | <600 | --- | --- | --- | --- |
| Aroclor 1268 | ug/Kg | 330 | 1.6E+7 | 8.1E+5 | 16000 {T} | 3.0E+6 | <600 | <600 | <650 | <600 | --- | --- | --- | --- |
| ***Pesticides*** | ***Units*** | | | | | | | | | | | | | |
| Aldrin | ug/Kg | 20 | 7.1E+6 | 2.0E+5 | 4300 | 1.3E+6 | --- | --- | --- | --- | --- | --- | --- | --- |
| alpha-Hexachlorocyclohexane | ug/Kg | 10 | 1.6E+5 | 41000 | 12000 | 30000 | --- | --- | --- | --- | --- | --- | --- | --- |
| beta-Hexachlorocyclohexane | ug/Kg | 20 | NLV | NLV | 25000 | NLV | --- | --- | --- | --- | --- | --- | --- | --- |
| delta-Hexachlorocyclohexane | ug/Kg | 20 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- |
| 4-4'-DDD | ug/Kg | 20 | NLV | NLV | 4.0E+5 | NLV | --- | --- | --- | --- | --- | --- | --- | --- |

# Table B2-2 - Update 2011 Criteria
## Summary of Analytical Results for Soil Samples
## Gage Products
## Ferndale, Michigan

| Sample Location<br>Lab Sample ID<br>Sampled By<br>Analyzed By<br>Sample Date<br>Sample Depth (ft.) | | Background Target Method Detection Limit | Non-Residential Soil Volatilization to Indoor Air Inhalation | Non-Residential Volatile Soil Inhalation Infinite | Non-Residential Direct Contact | Residential Soil Volatilization to Indoor Air Inhalation | 1<br>97-05-131<br>MDEQ<br><br>5/16/1997 | 2<br>97-05-131<br>MDEQ<br><br>5/16/1997 | 3<br>97-05-131<br>MDEQ<br><br>5/16/1997 | 4<br>97-05-131<br>MDEQ<br><br>5/16/1997 | C-SB-1<br>45693<br>WWES<br><br>7/31/1990<br>0.0 - 1.5 | C-SB-1<br>45694<br>WWES<br><br>7/31/1990<br>3.0 - 4.5 | C-SB-1<br>45695<br>WWES<br><br>7/31/1990<br>6.0 - 7.5 | C-SB-1<br>45696<br>WWES<br><br>7/31/1990<br>9.0 - 10.5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Pesticides Cont.*** | **Units** | | | | | | | | | | | | | |
| 4-4'-DDE | ug/Kg | 20 | NLV | NLV | 1.9E+5 | NLV | --- | --- | --- | --- | --- | --- | --- | --- |
| 4-4'-DDT | ug/Kg | 20 | NLV | NLV | 2.8E+5 | NLV | --- | --- | --- | --- | --- | --- | --- | --- |
| Dieldrin | ug/Kg | 20 | 7.2E+5 | 64000 | 4700 | 1.4E+5 | --- | --- | --- | --- | --- | --- | --- | --- |
| Endosulfan I {J} | ug/Kg | 20 | ID | ID | 4.4E+6 | ID | --- | --- | --- | --- | --- | --- | --- | --- |
| Endosulfan II {J} | ug/Kg | 20 | ID | ID | 4.4E+6 | ID | --- | --- | --- | --- | --- | --- | --- | --- |
| Endosulfan Sulfate {J} | ug/Kg | 20 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- |
| Endrin | ug/Kg | 20 | NLV | NLV | 1.9E+5 | NLV | --- | --- | --- | --- | --- | --- | --- | --- |
| Endrin Aldehyde | ug/Kg | 20 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- |
| Heptachlor | ug/Kg | 20 | 1.9E+6 | 2.1E+5 | 23000 | 3.5E+5 | --- | --- | --- | --- | --- | --- | --- | --- |
| Heptachlor epoxide | ug/Kg | 20 | NLV | NLV | 9500 | NLV | --- | --- | --- | --- | --- | --- | --- | --- |
| Lindane | ug/Kg | 20 | ID | ID | 42000 | ID | --- | --- | --- | --- | --- | --- | --- | --- |
| Methoxychlor | ug/Kg | 50 | ID | ID | 5.6E+6 | ID | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Misc*** | **Units** | | | | | | | | | | | | | |
| Percent Solids | % | NA | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- |

# Table B2-2 - Update 2011 Criteria
## Summary of Analytical Results for Soil Samples
## Gage Products
## Ferndale, Michigan

| Sample Location<br>Lab Sample ID<br>Sampled By<br>Analyzed By<br>Sample Date<br>Sample Depth (ft.) | | Background Target Method Detection Limit | Non-Residential Soil Volatilization to Indoor Air Inhalation | Non-Residential Volatile Soil Inhalation Infinite | Non-Residential Direct Contact | Residential Soil Volatilization to Indoor Air Inhalation | EX-10<br>170837<br>Horizon<br>TriMatrix<br>5/16/1997 | EX-7<br>170834<br>Horizon<br>TriMatrix<br>5/16/1997 | EX-8<br>170835<br>Horizon<br>TriMatrix<br>5/16/1997 | EX-9<br>170836<br>Horizon<br>TriMatrix<br>5/16/1997 | Sprint #1<br>173110<br>Horizon<br>TriMatrix<br>6/26/1997 | Sprint #2<br>173111<br>Horizon<br>TriMatrix<br>6/26/1997 | Sprint #3<br>173112<br>Horizon<br>TriMatrix<br>6/26/1997 | Sprint #4<br>173113<br>Horizon<br>TriMatrix<br>6/26/1997 | Sprint #5<br>173114<br>Horizon<br>TriMatrix<br>6/26/1997 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Inorganics*** | ***Units*** | | | | | | | | | | | | | | |
| Arsenic {B} | mg/Kg | 5.8 | NLV | NLV | 37 | NLV | **6.2** | **8.5** | **8.7** | **5.3** | **6.8 {J}** | **1.8** | **2** | **4.7** | **4.3** |
| Cadmium {B} | mg/Kg | 1.2 | NLV | NLV | 2100 | NLV | **3.7** | **1.9** | **5.4** | **1.8** | **0.72** | **0.26** | **0.78** | **0.81** | **0.17** |
| Chromium, Total | mg/Kg | 18 | NLV | NLV | 9200 | NLV | **58** | **86*** | **51** | **8** | **10 {J}** | **12** | **4.3** | **3.9** | **1.6** |
| Chromium (VI) | mg/Kg | 18 | NLV | NLV | 9200 | NLV | --- | --- | --- | --- | | | | | |
| Chromium (III) {B,H} | mg/Kg | 18 | NLV | NLV | 1000000 {D} | NLV | --- | --- | --- | --- | | | | | |
| Copper {B} | mg/Kg | 32 | NLV | NLV | 73000 | NLV | **76** | **86** | **74** | **15** | **54 {J}** | **8** | **11** | **30** | **9.4** |
| Iron | mg/Kg | 12000 | NLV | NLV | 580000 | NLV | **14900** | **36700** | **15500** | **16600** | **13400** | **13100 {J}** | **5560** | **10000** | **8500** |
| Lead {B} | mg/Kg | 21 | NLV | NLV | 900 (DD) | NLV | **312** | **350*** | **182** | **194** | **98** | **7** | **5.4** | **104** | **3.6** |
| Mercury (Inorganic) {B} | mg/Kg | 0.13 | 89 | 62 | 580 | 48 | **0.25** | **0.21** | **0.15*** | **0.13** | **0.16** | <0.10 | <0.10 | <0.10 | <0.10 |
| Nickel | mg/Kg | 20 | NLV | NLV | 150000 | NLV | **12** | **13*** | **11** | **8.5** | **9.3 {J}** | **11** | **4.6** | **6.4** | **7.3** |
| Zinc {B} | mg/Kg | 47 | NLV | NLV | 630000 | NLV | **412** | **330*** | **259** | **442** | **346 {J}** | **32** | **22** | **130** | **20** |
| ***Semi-Volatiles*** | ***Units*** | | | | | | | | | | | | | | |
| Acenaphthene | ug/Kg | 330 | 3.5E+8 | 9.7E+7 | 1.3E+8 | 1.9E+8 | <6600 | <330 | <3300 | <330 | <330 | <330 | <330 | <330 | <330 |
| Acenaphthylene | ug/Kg | 330 | 3.0E+6 | 2.7E+6 | 5.2E+6 | 1.6E+6 | <6600 | <330 | <3300 | <330 | <330 | <330 | <330 | <330 | <330 |
| Anthracene | ug/Kg | 330 | 1.0E+9 {D} | 1.6E+9 | 7.3E+8 | 1.0E+9 {D} | <6600 | <330 | <3300 | <330 | <330 | <330 | <330 | <330 | <330 |
| Benzo(a)anthracene {Q} | ug/Kg | 330 | NLV | NLV | 80000 | NLV | <6600 | **340** | <3300 | **350** | <330 | <330 | <330 | **570** | <330 |
| Benzo(a)pyrene {Q} | ug/Kg | 330 | NLV | NLV | 8000 | NLV | <6600 | **330** | <3300 | **410** | <330 | <330 | <330 | **630** | <330 |
| Benzo(b&k)fluoranthene | ug/Kg | 330 | ID | ID | 80000 | ID | <6600 | **830** | <3300 | **800** | **660** | <330 | <330 | **1200** | <330 |
| Benzo(g,h,i)perylene | ug/Kg | 330 | NLV | NLV | 7.0E+6 | NLV | <6600 | **380** | <3300 | **360** | <330 | <330 | <330 | <330 | <330 |
| bis(2-Chloroethoxy)methane | ug/Kg | 330 | NA | NA | NA | NA | <6600 | <330 | <3300 | <330 | <330 | <330 | <330 | <330 | <330 |
| bis(2-Chloroethyl)ether {I} | ug/Kg | 100 | 44000 | 13000 | 58000 | 8300 | <6600 | <330 | <3300 | <330 | <330 | <330 | <330 | <330 | <330 |
| bis(2-Chloroisopropyl)ether | ug/Kg | 330 | NA | NA | NA | NA | <6600 | <330 | <3300 | <330 | <330 | <330 | <330 | <330 | <330 |
| bis(2-Ethylhexyl)phthalate | ug/Kg | 330 | NLV | NLV | 1.0E+7 {C} | NLV | **200000** | **3500** | **66000** | **530** | <330 | <330 | <330 | <330 | <330 |
| 4-Bromo diphenyl ether | ug/Kg | 330 | NA | NA | NA | NA | <6600 | <330 | <3300 | <330 | <330 | <330 | <330 | <330 | <330 |
| Butyl benzyl phthalate | ug/Kg | 330 | NLV | NLV | 3.1E+5 {C} | NLV | <6600 | <330 | **9100** | <330 | <330 | <330 | <330 | <330 | <330 |
| beta-Chloronaphthalene | ug/Kg | 330 | ID | ID | 1.8E+8 | ID | <6600 | <330 | <3300 | <330 | <330 | <330 | <330 | <330 | <330 |
| 4-Chloro diphenyl ether | ug/Kg | 330 | NA | NA | NA | NA | <6600 | <330 | <3300 | <330 | <330 | <330 | <330 | <330 | <330 |
| Chrysene {Q} | ug/Kg | 330 | ID | ID | 8.0E+6 | ID | <6600 | **370** | <3300 | **360** | <330 | <330 | <330 | **530** | <330 |
| Decabromodiphenyl ether | ug/Kg | NA | 1.0E+9 {D} | 1.0E+8 | 1.1E+7 | 1.0E+9 {D} | --- | --- | --- | --- | <330 | <330 | <330 | <330 | <330 |
| Di-n-butyl phthalate | ug/Kg | 330 | NLV | NLV | 7.6E+5 {C} | NLV | <6600 | <330 | <3300 | <330 | <330 | <330 | <330 | <330 | <330 |
| Di-n-octyl phthalate | ug/Kg | 330 | NLV | NLV | 2.0E+7 | NLV | **82000** | **420** | **31000** | <330 | <330 | <330 | <330 | <330 | <330 |
| Dibenzo(a,h)anthracene {Q} | ug/Kg | 330 | NLV | NLV | 8000 | NLV | <6600 | <330 | <3300 | <330 | <330 | <330 | <330 | <330 | <330 |
| Dibenzofuran | ug/Kg | 330 | 3.6E+6 | 1.6E+5 | ID | 2.0E+6 | --- | --- | --- | --- | <330 | <330 | <330 | <330 | <330 |
| 3,3'-Dichlorobenzidine | ug/Kg | 2000 | NLV | NLV | 30000 | NLV | --- | --- | --- | --- | <330 | <330 | <330 | <330 | <330 |
| Diethyl phthalate | ug/Kg | 330 | NLV | NLV | 7.4E+5 {C} | NLV | <6600 | <330 | <3300 | <330 | <330 | <330 | <330 | <330 | <330 |
| Dimethyl phthalate | ug/Kg | 330 | NLV | NLV | 7.9E+5 {C} | NLV | <6600 | <330 | <3300 | <330 | <330 | <330 | <330 | <330 | <330 |
| 2,4-Dinitrotoluene | ug/Kg | 330 | NLV | NLV | 2.2E+5 | NLV | <6600 | <300* | <3300 | <330 | <330 | <330 | <330 | <330 | <330 |
| 2,6-Dinitrotoluene | ug/Kg | 330 | NA | NA | NA | NA | <6600 | <330 | <3300 | <330 | <330 | <330 | <330 | <330 | <330 |
| 1,2-Diphenylhydrazine | ug/Kg | 330 | NA | NA | NA | NA | <6600 | <330 | <3300 | <330 | <330 | <330 | <330 | <330 | <330 |

# Table B2-2 - Update 2011 Criteria
## Summary of Analytical Results for Soil Samples
## Gage Products
## Ferndale, Michigan

| Sample Location | | Background | Non-Residential | Non-Residential | Non-Residential | Residential | EX-10 | EX-7 | EX-8 | EX-9 | Sprint #1 | Sprint #2 | Sprint #3 | Sprint #4 | Sprint #5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lab Sample ID | | Target | Soil | Volatile | Direct | Soil | 170837 | 170834 | 170835 | 170836 | 173110 | 173111 | 173112 | 173113 | 173114 |
| Sampled By | | Method | Volatilization to | Soil | Contact | Volatilization to | Horizon | Horizon | Horizon | Horizon | Horizon | Horizon | Horizon | Horizon | Horizon |
| Analyzed By | | Detection | Indoor Air | Inhalation | | Indoor Air | TriMatrix | TriMatrix | TriMatrix | TriMatrix | TriMatrix | TriMatrix | TriMatrix | TriMatrix | TriMatrix |
| Sample Date | | Limit | Inhalation | Infinite | | Inhalation | 5/16/1997 | 5/16/1997 | 5/16/1997 | 5/16/1997 | 6/26/1997 | 6/26/1997 | 6/26/1997 | 6/26/1997 | 6/26/1997 |
| Sample Depth (ft.) | | | | | | | | | | | | | | | |
| ***Semi-Volatiles Cont.*** | ***Units*** | | | | | | | | | | | | | | |
| Fluoranthene | ug/Kg | 330 | 1.0E+9 {D} | 8.9E+8 | 1.3E+8 | 1.0E+9 {D} | <6600 | **380** | <3300 | **970** | **480** | <330 | <330 | **1000** | <330 |
| Fluorene | ug/Kg | 330 | 1.0E+9 {D} | 1.5E+8 | 8.7E+7 | 5.8E+8 | <6600 | <330 | <3300 | <330 | <330 | <330 | <330 | <330 | <330 |
| Hexachlorobenzene (C-66) | ug/Kg | 330 | 2.2E+5 | 56000 | 37000 | 41000 | <400 | <20 | <200 | <20 | <20 | <20 | <20 | <20 | <20 |
| Hexachlorobutadiene (C-46) | ug/Kg | 50 | 3.5E+5 {C} | 4.6E+5 | 3.5E+5 {C} | 1.3E+5 | <6600 | <330 | <3300 | <330 | <330 | <330 | <330 | <330 | <330 |
| Hexachlorocyclopentadiene (C-56) | ug/Kg | 330 | 56000 | 60000 | 7.2E+5 {C} | 30000 | <6600 | <330 | <3300 | <330 | <330 | <330 | <330 | <330 | <330 |
| Hexachloroethane | ug/Kg | 300 | 79000 | 6.6E+5 | 7.3E+5 | 40000 | <6600 | <330 | <3300 | <330 | --- | --- | --- | --- | --- |
| Indeno(1,2,3-cd)pyrene {Q} | ug/Kg | 330 | NLV | NLV | 80000 | NLV | <6600 | <330 | <3300 | <330 | <330 | <330 | <330 | <330 | <330 |
| Isophorone | ug/Kg | 330 | NLV | NLV | 2.4E+6 {C} | NLV | <6600 | <330 | <3300 | <330 | <330 | <330 | <330 | <330 | <330 |
| 2-Methylnaphthalene | ug/Kg | 330 | 4.9E+6 | 1.8E+6 | 2.6E+7 | 2.7E+6 | **140000** | **480** | **66000** | **6300** | <330 | <330 | <330 | <330 | <330 |
| n-Nitroso-di-n-propylamine | ug/Kg | 330 | NLV | NLV | 5400 | NLV | --- | --- | --- | --- | <330 | <330 | <330 | <330 | <330 |
| n-Nitroso-di-propylamine | ug/Kg | 330 | NLV | NLV | 5400 | NLV | <6600 | <330 | <3300 | <330 | --- | --- | --- | --- | --- |
| Naphthalene | ug/Kg | 330 | 4.7E+5 | 3.5E+5 | 5.2E+7 | 2.5E+5 | **45000** | <330 | **7900** | **4000** | <330 | <330 | <330 | <330 | <330 |
| Nitrobenzene {I} | ug/Kg | 330 | 1.7E+5 | 64000 | 3.4E+5 | 91000 | <6600 | <330 | <3300 | <330 | <330 | <330 | <330 | <330 | <330 |
| N-Nitrosodiphenylamine | ug/Kg | 330 | NLV | NLV | 7.8E+6 | NLV | --- | --- | --- | --- | <330 | <330 | <330 | <330 | <330 |
| n-Nitroso-n-propylamine | ug/Kg | 330 | NLV | NLV | 5400 | NLV | <6600 | <300* | <3300 | <330 | --- | --- | --- | --- | --- |
| Phenanthrene | ug/Kg | 330 | 5.1E+6 | 1.9E+5 | 5.2E+6 | 2.8E+6 | <6600 | <330 | <3300 | **440** | <330 | <330 | <330 | **470** | <330 |
| Pyrene | ug/Kg | 330 | 1.0E+9 {D} | 7.8E+8 | 8.4E+7 | 1.0E+9 {D} | <6600 | **540** | <3300 | **690** | **390** | <330 | <330 | **840** | <330 |
| ***Volatiles*** | ***Units*** | | | | | | | | | | | | | | |
| Acetone {I} | ug/Kg | 1000 | 1.1E+8 {C} | 1.6E+8 | 7.3E+7 | 1.1E+8 {C} | <2900 | <100 | <3300 | <100 | <100 | <100 | <100 | <100 | <100 |
| Acrylonitrile {I} | ug/Kg | 100 | 35000 | 17000 | 74000 | 6600 | <290 | <10 | <330 | <10 | <10 | <10 | <10 | <10 | <10 |
| Benzene {I} | ug/Kg | 50 | 8400 | 45000 | 4.0E+5 {C} | 1600 | <290 | <10 | <330 | <10 | <10 | <10 | <10 | <10 | <10 |
| Bromobenzene {I} | ug/Kg | 100 | 5.8E+5 | 5.4E+5 | 7.6E+5 {C} | 3.1E+5 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Bromochloromethane | ug/Kg | 100 | NA | NA | NA | NA | <290 | <10 | <330 | <10 | <10 | <10 | <10 | <10 | <10 |
| Bromodichloromethane | ug/Kg | 100 | 6400 | 31000 | 4.9E+5 | 1200 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Bromoform | ug/Kg | 100 | 7.7E+5 | 3.1E+6 | 8.7E+5 {C} | 1.5E+5 | <290 | <10 | <330 | <10 | <10 | <10 | <10 | <10 | <10 |
| Bromomethane | ug/Kg | 200 | 1600 | 13000 | 1.0E+6 | 860 | <290 | <10 | <330 | <10 | <10 | <10 | <10 | <10 | <10 |
| 2-Butanone (MEK) {I} | ug/Kg | 750 | 2.7E+7 {C} | 3.5E+7 | 2.7E+7 {C,DD} | 2.7E+7 {C} | <2900 | <100 | <3300 | <100 | <100 | <100 | <100 | <100 | <100 |
| n-Butylbenzene | ug/Kg | 50 | ID | ID | 8.0E+6 | ID | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| sec-Butylbenzene | ug/Kg | 50 | ID | ID | 8.0E+6 | ID | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| tert-Butylbenzene | ug/Kg | 50 | ID | ID | 8.0E+6 | ID | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Carbon disulfide {I,R} | ug/Kg | 250 | 1.4E+5 | 1.6E+6 | 2.8E+5 {C,DD} | 76000 | <2900 | <100 | <3300 | <100 | <100 | <100 | <100 | <100 | <100 |
| Carbon tetrachloride | ug/Kg | 50 | 990 | 12000 | 3.9E+5 {C} | 190 | <290 | <10 | <330 | <10 | <10 | <10 | <10 | <10 | <10 |
| Chlorobenzene {I} | ug/Kg | 50 | 2.2E+5 | 9.2E+5 | 2.6E+5 {C} | 1.2E+5 | <290 | <10 | <330 | <10 | <10 {J} | <10 | <10 | <10 | <10 |
| Dibromochloromethane | ug/Kg | 100 | 21000 | 80000 | 5.0E+5 | 3900 | <290 | <10 | <330 | <10 | <10 | <10 | <10 | <10 | <10 |
| Chloroethane {I} | ug/Kg | 250 | 9.5E+5 {C} | 3.6E+7 | 9.5E+5 {C} | 9.5E+5 {C} | <290 | <10 | <330 | <10 | <10 | <10 | <10 | <10 | <10 |
| 2-Chloroethyl vinyl ether | ug/Kg | 5000 | ID | ID | ID | ID | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Chloroform | ug/Kg | 50 | 38000 | 1.5E+5 | 1.5E+6 {C} | 7200 | <290 | <10 | <330 | <10 | <10 | <10 | <10 | <10 | <10 |
| Chloromethane {I} | ug/Kg | 250 | 10000 | 1.2E+5 | 1.1E+6 {C} | 2300 | <290 | <10 | <330 | <10 | <10 | <10 | <10 | <10 | <10 |
| 2-Chlorotoluene | ug/Kg | 50 | 5.0E+5 {C} | 1.5E+6 | 5.0E+5 {C} | 2.7E+5 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4-Chlorotoluene | ug/Kg | 50 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- |

## Table B2-2 - Update 2011 Criteria
## Summary of Analytical Results for Soil Samples
## Gage Products
## Ferndale, Michigan

| Sample Location | | Background | Non-Residential | Non-Residential | Non-Residential | Residential | EX-10 | EX-7 | EX-8 | EX-9 | Sprint #1 | Sprint #2 | Sprint #3 | Sprint #4 | Sprint #5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lab Sample ID | | Target | Soil | Volatile | Direct | Soil | 170837 | 170834 | 170835 | 170836 | 173110 | 173111 | 173112 | 173113 | 173114 |
| Sampled By | | Method | Volatilization to | Soil | Contact | Volatilization to | Horizon | Horizon | Horizon | Horizon | Horizon | Horizon | Horizon | Horizon | Horizon |
| Analyzed By | | Detection | Indoor Air | Inhalation | | Indoor Air | TriMatrix | TriMatrix | TriMatrix | TriMatrix | TriMatrix | TriMatrix | TriMatrix | TriMatrix | TriMatrix |
| Sample Date | | Limit | Inhalation | Infinite | | Inhalation | 5/16/1997 | 5/16/1997 | 5/16/1997 | 5/16/1997 | 6/26/1997 | 6/26/1997 | 6/26/1997 | 6/26/1997 | 6/26/1997 |
| Sample Depth (ft.) | | | | | | | | | | | | | | | |
| ***Volatiles Cont.*** | ***Units*** | | | | | | | | | | | | | | |
| Dibromochloropropane | ug/Kg | 10 | 1200 {C} | 15000 | 1200 {C} | 1200 {C} | <1500 | <50 | <1600 | <50 | <50 | <50 | <50 | <50 | <50 |
| Dibromochloromethane | ug/Kg | 100 | 21000 | 80000 | 5.0E+5 | 3900 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Ethylene dibromide | ug/Kg | 20 | 3600 | 5800 | 430 | 670 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dibromomethane | ug/Kg | 250 | ID | ID | 2.0E+6 {C} | ID | <290 | <10 | <330 | <10 | <10 | <10 | <10 | <10 | <10 |
| Ethylene dibromide | ug/Kg | 20 | 3600 | 5800 | 430 | 670 | <290 | <10 | <330 | <10 | <10 | <10 | <10 | <10 | <10 |
| trans-1,4-Dichloro-2-butene | ug/Kg | 50 | NA | NA | NA | NA | <290 | <10 | <330 | <10 | <10 | <10 | <10 | <10 | <10 |
| 1,2-Dichlorobenzene | ug/Kg | 100 | 2.1E+5 {C} | 4.6E+7 | 2.1E+5 {C} | 2.1E+5 {C} | <290 | <10 | <330 | <10 | <10 | <10 | <10 | <10 | <10 |
| 1,3-Dichlorobenzene | ug/Kg | 100 | 48000 | 94000 | 1.7E+5 {C} | 26000 | <290 | <10 | <330 | <10 | <10 | <10 | <10 | <10 | <10 |
| 1,4-Dichlorobenzene | ug/Kg | 100 | 1.0E+5 | 2.6E+5 | 1.9E+6 | 19000 | <290 | <10 | <330 | <10 | <10 | <10 | <10 | <10 | <10 |
| Dibromochloromethane | ug/Kg | 100 | 21000 | 80000 | 5.0E+5 | 3900 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dichlorodifluoromethane | ug/Kg | 250 | 1.7E+6 | 6.3E+7 | 1.0E+6 {C} | 9.0E+5 | <290 | <10 | <330 | <10 | <10 | <10 | <10 | <10 | <10 |
| 1,1-Dichloroethane {I} | ug/Kg | 50 | 4.3E+5 | 2.5E+6 | 8.9E+5 {C} | 2.3E+5 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1,2-Dichloroethane {I} | ug/Kg | 50 | 11000 | 21000 | 4.2E+5 | 2100 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1,1-Dichloroethane {I} | ug/Kg | 50 | 4.3E+5 | 2.5E+6 | 8.9E+5 {C} | 2.3E+5 | <290 | <10 | <330 | <10 | <10 | <10 | <10 | <10 | <10 |
| 1,2-Dichloroethane {I} | ug/Kg | 50 | 11000 | 21000 | 4.2E+5 | 2100 | <290 | <10 | <330 | <10 | <10 | <10 | <10 | <10 | <10 |
| 1,1-Dichloroethylene {I} | ug/Kg | 50 | 330 | 3700 | 5.7E+5 {C} | 62 | <290 | <10 | <330 | <10 | <10 | <10 | <10 | <10 | <10 |
| cis-1,2-Dichloroethylene {I} | ug/Kg | 50 | 41000 | 2.1E+5 | 6.4E+5 {C} | 22000 | <290 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| trans-1,2-Dichloroethylene | ug/Kg | 50 | 43000 | 3.3E+5 | 1.4E+6 {C} | 23000 | <290 | <10 | <10 | <10 | <10 | <10 | <10 | <10 | <10 |
| 2,2-Dichloropropane | ug/Kg | 50 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1,2-Dichloropropane {I} | ug/Kg | 50 | 7400 | 30000 | 5.5E+5 {C} | 4000 | <290 | <10 | <330 | <10 | <10 | <10 | <10 | <10 | <10 |
| 1,3-Dichloropropane | ug/Kg | 50 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1,1-Dichloropropene | ug/Kg | 50 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| cis-1,3-Dichloropropene {I,J} | ug/Kg | 50 | 5400 | 60000 | 2.4E+5 | 1000 | <290 | <10 | <330 | <10 | <10 | <10 | <10 | <10 | <10 |
| trans-1,3-Dichloropropene {I, J} | ug/Kg | 50 | 5400 | 60000 | 2.4E+5 | 1000 | <290 | <10 | <330 | <10 | <10 | <10 | <10 | <10 | <10 |
| Diethyl ether {I} | ug/Kg | 200 | 7.4E+6 {C} | 1.0E+8 | 7.4E+6 {C} | 7.4E+6 {C} | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Diethylbenzene | ug/Kg | 50 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dimethyl disulfide | ug/Kg | 50 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Diethyl ether {I} | ug/Kg | 200 | 7.4E+6 {C} | 1.0E+8 | 7.4E+6 {C} | 7.4E+6 {C} | <2900 | <100 | <3300 | <100 | <100 | <100 | <100 | <100 | <100 |
| Ethylbenzene {I} | ug/Kg | 50 | 1.4E+5 {C} | 2.4E+6 | 1.4E+5 {C} | 87000 | **300** | <10 | **630** | **8200** | <10 | <10 | <10 | <10 | <10 |
| Hexachlorobutadiene (C-46) | ug/Kg | 50 | 3.5E+5 {C} | 4.6E+5 | 3.5E+5 {C} | 1.3E+5 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Hexachloroethane | ug/Kg | 300 | 79000 | 6.6E+5 | 7.3E+5 | 40000 | <290 | <10 | <330 | <10 | <10 | <10 | <10 | <10 | <10 |
| 2-Hexanone {I} | ug/Kg | 2500 | 1.8E+6 | 1.3E+6 | 2.5E+6 {C} | 9.9E+5 | <2900 | <100 | <3300 | <100 | <100 | <100 | <100 | <100 | <100 |
| Iodomethane | ug/Kg | 100 | NA | NA | NA | NA | <2900 | <100 | <3300 | <100 | <100 | <100 | <100 | <100 | <100 |
| Isopropyl benzene {I} | ug/Kg | 250 | 3.9E+5 {C} | 2.0E+6 | 3.9E+5 {C} | 3.9E+5 {C} | <290 | <10 | **380** | **3300** | <10 | <10 | <10 | <10 | <10 |
| p-Isopropyltoluene | ug/Kg | 100 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 5-Methly-2-Hexanone | ug/Kg | 100 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Iodomethane | ug/Kg | 100 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4-Methyl-2-pentanone (MIBK) {I} | ug/Kg | 2500 | 2.7E+6 {C} | 5.3E+7 | 2.7E+6 {C} | 2.7E+6 {C} | <2900 | <100 | <3300 | <100 | <100 | <100 | <100 | <100 | <100 |
| Methyl-tert-butyl ether (MTBE) | ug/Kg | 250 | 5.9E+6 {C} | 3.0E+7 | 5.9E+6 {C} | 5.9E+6 {C} | <2900 | <100 | <3300 | <100 | <100 | <100 | <100 | <100 | <100 |

# Table B2-2 - Update 2011 Criteria
## Summary of Analytical Results for Soil Samples
## Gage Products
## Ferndale, Michigan

| Sample Location | | Background | Non-Residential | Non-Residential | Non-Residential | Residential | EX-10 | EX-7 | EX-8 | EX-9 | Sprint #1 | Sprint #2 | Sprint #3 | Sprint #4 | Sprint #5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lab Sample ID | | Target | Soil | Volatile | Direct | Soil | 170837 | 170834 | 170835 | 170836 | 173110 | 173111 | 173112 | 173113 | 173114 |
| Sampled By | | Method | Volatilization to | Soil | Contact | Volatilization to | Horizon | Horizon | Horizon | Horizon | Horizon | Horizon | Horizon | Horizon | Horizon |
| Analyzed By | | Detection | Indoor Air | Inhalation | | Indoor Air | TriMatrix | TriMatrix | TriMatrix | TriMatrix | TriMatrix | TriMatrix | TriMatrix | TriMatrix | TriMatrix |
| Sample Date | | Limit | Inhalation | Infinite | | Inhalation | 5/16/1997 | 5/16/1997 | 5/16/1997 | 5/16/1997 | 6/26/1997 | 6/26/1997 | 6/26/1997 | 6/26/1997 | 6/26/1997 |
| Sample Depth (ft.) | | | | | | | | | | | | | | | |
| ***Volatiles Cont.*** | ***Units*** | | | | | | | | | | | | | | |
| Methylene chloride | ug/Kg | 100 | 2.4E+5 | 7.0E+5 | 2.3E+6 {C} | 45000 | <290 | <10 | <330 | <10 | <10 | <10 | <10 | <10 | <10 |
| 2-Methylnaphthalene | ug/Kg | 330 | 4.9E+6 | 1.8E+6 | 2.6E+7 | 2.7E+6 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Naphthalene | ug/Kg | 330 | 4.7E+5 | 3.5E+5 | 5.2E+7 | 2.5E+5 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| n-Propylbenzene {I} | ug/Kg | 100 | ID | ID | 8.0E+6 | ID | <290 | <10 | **410** | **5400** | <10 | <10 | <10 | <10 | <10 |
| Styrene {I} | ug/Kg | 50 | 5.2E+5 {C} | 3.3E+6 | 5.2E+5 {C} | 2.5E+5 | <290 | <10 | <330 | <10 | <10 | <10 | <10 | <10 | <10 |
| 1,1,1,2-Tetrachloroethane | ug/Kg | 100 | 33000 | 1.2E+5 | 4.4E+5 {C} | 6200 | <290 | <10 | <330 | <10 | <10 | <10 | <10 | <10 | <10 |
| 1,1,2,2-Tetrachloroethane | ug/Kg | 50 | 23000 | 34000 | 2.4E+5 | 4300 | <290 | <10 | <330 | <10 | <10 | <10 | <10 | <10 | <10 |
| Tetrachloroethylene | ug/Kg | 50 | 60000 | 6.0E+5 | 88000 {C} | 11000 | <290 | <10 | <330 | <10 | <10 | <10 | <10 | <10 | <10 |
| Tetrahydrofuran | ug/Kg | 1000 | 2.4E+6 | 1.5E+7 | 9.5E+6 | 1.3E+6 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Toluene {I} | ug/Kg | 100 | 2.5E+5 {C} | 3.3E+6 | 2.5E+5 {C} | 2.5E+5 {C} | <290 | <10 | <330 | **8000** | <10 | <10 | <10 | <10 | <10 |
| 1,2,3-Trichlorobenzene | ug/Kg | 330 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1,2,4-Trichlorobenzene | ug/Kg | 330 | 1.1E+6 {C} | 3.4E+7 | 1.1E+6 {C,DD} | 1.1E+6 {C} | <290 | <10 | <330 | <10 | <10 | <10 | <10 | <10 | <10 |
| 1,1,1-Trichloroethane | ug/Kg | 50 | 4.6E+5 | 4.5E+6 | 4.6E+5 {C} | 2.5E+5 | <290 | <10 | **,330** | <10 | <10 | <10 | <10 | <10 | <10 |
| 1,1,2-Trichloroethane | ug/Kg | 50 | 24000 | 57000 | 8.4E+5 | 4600 | <290 | <10 | <330 | <10 | <10 | <10 | <10 | <10 | <10 |
| Trichloroethylene | ug/Kg | 50 | 37000 | 2.6E+5 | 5.0E+5 {C,DD} | 7100 | <290 | <10 | <330 | <10 | <10 | <10 | <10 | <10 | <10 |
| Trichlorofluoromethane | ug/Kg | 100 | 5.6E+5 {C} | 1.1E+8 | 5.6E+5 {C} | 5.6E+5 {C} | <290 | <10 | <330 | <10 | <10 | <10 | <10 | <10 | <10 |
| 1,2,3-Trichloropropane | ug/Kg | 100 | 7500 | 11000 | 8.3E+5 {C} | 4000 | <290 | <10 | <330 | <10 | <10 | <10 | <10 | <10 | <10 |
| 1,2,4-Trimethylbenzene {I} | ug/Kg | 100 | 1.1E+5 {C} | 2.5E+7 | 1.1E+5 {C} | 1.1E+5 {C} | **46000** | **13** | **40000** | ***150000*** | <10 | **25** | <10 | <10 | <10 |
| 1,3,5-Trimethylbenzene {I} | ug/Kg | 100 | 94000 {C} | 1.9E+7 | 94000 {C} | 94000 {C} | **27000** | <10 | **44000** | **62000** | <10 | **310** | <10 | <10 | <10 |
| Vinyl acetate | ug/Kg | 5000 | 1.5E+6 | 2.0E+6 | 2.4E+6 {C,DD} | 7.9E+5 | <2900 | <100 | <3300 | <100 | <100 | <100 | <100 | <100 | <100 |
| Vinyl chloride | ug/Kg | 40 | 2800 | 29000 | 34000 | 270 | <290 | <10 | <330 | <10 | <10 | <10 | <10 | <10 | <10 |
| Xylene, p&m | ug/Kg | 100 | 1.5E+5 {C} | 5.4E+7 | 1.5E+5 {C} | 1.5E+5 {C} | **52000** | <20 | **14000** | **73000** | <20 | <20 | <20 | <20 | <20 |
| Xylene, o | ug/Kg | 50 | 1.5E+5 {C} | 5.4E+7 | 1.5E+5 {C} | 1.5E+5 {C} | **2500** | <10 | **22000** | **76000** | <10 | <10 | <10 | <10 | <10 |
| Xylene (Total) | ug/Kg | 150 | 1.5E+5 {C} | 5.4E+7 | 1.5E+5 {C} | 1.5E+5 {C} | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***PCB's*** | ***Units*** | | | | | | | | | | | | | | |
| Aroclor 1016 | ug/Kg | 330 | 1.6E+7 | 8.1E+5 | 16000 {T} | 3.0E+6 | <330 | <330 | <330 | <330 | <330 | <330 | <330 | <330 | <330 |
| Aroclor 1221 | ug/Kg | 330 | 1.6E+7 | 8.1E+5 | 16000 {T} | 3.0E+6 | <330 | <330 | <330 | <330 | <330 | <330 | <330 | <330 | <330 |
| Aroclor 1232 | ug/Kg | 330 | 1.6E+7 | 8.1E+5 | 16000 {T} | 3.0E+6 | <330 | <330 | <330 | <330 | <330 | <330 | <330 | <330 | <330 |
| Aroclor 1242 | ug/Kg | 330 | 1.6E+7 | 8.1E+5 | 16000 {T} | 3.0E+6 | <330 | <330 | <330 | <330 | <330 | <330 | <330 | <330 | <330 |
| Aroclor 1248 | ug/Kg | 330 | 1.6E+7 | 8.1E+5 | 16000 {T} | 3.0E+6 | <330 | <330 | <330 | <330 | <330 | <330 | <330 | <330 | <330 |
| Aroclor 1254 | ug/Kg | 330 | 1.6E+7 | 8.1E+5 | 16000 {T} | 3.0E+6 | **1600** | **1200** | **1100** | <330 | <330 | <330 | <330 | <330 | <330 |
| Aroclor 1260 | ug/Kg | 330 | 1.6E+7 | 8.1E+5 | 16000 {T} | 3.0E+6 | **460** | **950** | **480** | <330 | <330 | <330 | <330 | <330 | <330 |
| Aroclor 1262 | ug/Kg | 330 | 1.6E+7 | 8.1E+5 | 16000 {T} | 3.0E+6 | <330 | <330 | <330 | <330 | <330 | <330 | <330 | <330 | <330 |
| Aroclor 1268 | ug/Kg | 330 | 1.6E+7 | 8.1E+5 | 16000 {T} | 3.0E+6 | <330 | <330 | <330 | <330 | <330 | <330 | <330 | <330 | <330 |
| ***Pesticides*** | ***Units*** | | | | | | | | | | | | | | |
| Aldrin | ug/Kg | 20 | 7.1E+6 | 2.0E+5 | 4300 | 1.3E+6 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| alpha-Hexachlorocyclohexane | ug/Kg | 10 | 1.6E+5 | 41000 | 12000 | 30000 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| beta-Hexachlorocyclohexane | ug/Kg | 20 | NLV | NLV | 25000 | NLV | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| delta-Hexachlorocyclohexane | ug/Kg | 20 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4-4'-DDD | ug/Kg | 20 | NLV | NLV | 4.0E+5 | NLV | --- | --- | --- | --- | **0.0049** | <0.0033 | <0.0033 | <0.0033 | <0.0033 |

# Table B2-2 - Update 2011 Criteria
## Summary of Analytical Results for Soil Samples
## Gage Products
## Ferndale, Michigan

| Sample Location<br>Lab Sample ID<br>Sampled By<br>Analyzed By<br>Sample Date<br>Sample Depth (ft.) | | Background Target Method Detection Limit | Non-Residential Soil Volatilization to Indoor Air Inhalation | Non-Residential Volatile Soil Inhalation Infinite | Non-Residential Direct Contact | Residential Soil Volatilization to Indoor Air Inhalation | EX-10<br>170837<br>Horizon<br>TriMatrix<br>5/16/1997 | EX-7<br>170834<br>Horizon<br>TriMatrix<br>5/16/1997 | EX-8<br>170835<br>Horizon<br>TriMatrix<br>5/16/1997 | EX-9<br>170836<br>Horizon<br>TriMatrix<br>5/16/1997 | Sprint #1<br>173110<br>Horizon<br>TriMatrix<br>6/26/1997 | Sprint #2<br>173111<br>Horizon<br>TriMatrix<br>6/26/1997 | Sprint #3<br>173112<br>Horizon<br>TriMatrix<br>6/26/1997 | Sprint #4<br>173113<br>Horizon<br>TriMatrix<br>6/26/1997 | Sprint #5<br>173114<br>Horizon<br>TriMatrix<br>6/26/1997 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Pesticides Cont.*** | ***Units*** | | | | | | | | | | | | | | |
| 4-4'-DDE | ug/Kg | 20 | NLV | NLV | 1.9E+5 | NLV | --- | --- | --- | --- | <0.0033 | <0.0033 | <0.0033 | <0.0033 | <0.0033 |
| 4-4'-DDT | ug/Kg | 20 | NLV | NLV | 2.8E+5 | NLV | --- | --- | --- | --- | **0.011** | <0.0033 | <0.0033 | <0.0033 | <0.0033 |
| Dieldrin | ug/Kg | 20 | 7.2E+5 | 64000 | 4700 | 1.4E+5 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Endosulfan I {J} | ug/Kg | 20 | ID | ID | 4.4E+6 | ID | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Endosulfan II {J} | ug/Kg | 20 | ID | ID | 4.4E+6 | ID | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Endosulfan Sulfate {J} | ug/Kg | 20 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Endrin | ug/Kg | 20 | NLV | NLV | 1.9E+5 | NLV | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Endrin Aldehyde | ug/Kg | 20 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heptachlor | ug/Kg | 20 | 1.9E+6 | 2.1E+5 | 23000 | 3.5E+5 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heptachlor epoxide | ug/Kg | 20 | NLV | NLV | 9500 | NLV | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Lindane | ug/Kg | 20 | ID | ID | 42000 | ID | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Methoxychlor | ug/Kg | 50 | ID | ID | 5.6E+6 | ID | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Misc*** | ***Units*** | | | | | | | | | | | | | | |
| Percent Solids | % | NA | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- |

# Table B2-2 - Update 2011 Criteria
## Summary of Analytical Results for Soil Samples
## Gage Products
## Ferndale, Michigan

| Sample Location | | Background | Non-Residential | Non-Residential | Non-Residential | Residential | SS #1 West Portion Trench | SS #2 East Portion Trench | SS#1 | SS#2 | TMW-01 | TMW-02 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lab Sample ID | | Target | Soil | Volatile | Direct | Soil | | | | | 179275 | 179276 |
| Sampled By | | Method | Volatilization to | Soil | Contact | Volatilization to | Horizon | Horizon | MDEQ | MDEQ | Horizon | Horizon |
| Analyzed By | | Detection | Indoor Air | Inhalation | | Indoor Air | DLZ | DLZ | MDEQ | MDEQ | TriMatrix | TriMatrix |
| Sample Date | | Limit | Inhalation | Infinite | | Inhalation | 1/19/1996 | 1/19/1996 | 1/19/1996 | 1/19/1996 | 9/30/1997 | 9/30/1997 |
| Sample Depth (ft.) | | | | | | | | | | | 0-1 | 0-1 |
| ***Inorganics*** | ***Units*** | | | | | | | | | | | |
| Arsenic {B} | mg/Kg | 5.8 | NLV | NLV | 37 | NLV | --- | --- | --- | --- | **3.1** | **6.9** |
| Cadmium {B} | mg/Kg | 1.2 | NLV | NLV | 2100 | NLV | --- | --- | --- | --- | **0.094** | **0.16** |
| Chromium, Total | mg/Kg | 18 | NLV | NLV | 9200 | NLV | --- | --- | --- | --- | **9.4** | **51** |
| Chromium (VI) | mg/Kg | 18 | NLV | NLV | 9200 | NLV | --- | --- | --- | --- | <0.2 | <0.2 |
| Chromium (III) {B,H} | mg/Kg | 18 | NLV | NLV | 1000000 {D} | NLV | --- | --- | --- | --- | **9.4** | **51** |
| Copper {B} | mg/Kg | 32 | NLV | NLV | 73000 | NLV | --- | --- | --- | --- | **9.6** | **18** |
| Iron | mg/Kg | 12000 | NLV | NLV | 580000 | NLV | --- | --- | --- | --- | **5940** | **14400** |
| Lead {B} | mg/Kg | 21 | NLV | NLV | 900 (DD) | NLV | --- | --- | --- | --- | **5.6** | **22** |
| Mercury (Inorganic) {B} | mg/Kg | 0.13 | 89 | 62 | 580 | 48 | --- | --- | --- | --- | <0.10 | **0.13** |
| Nickel | mg/Kg | 20 | NLV | NLV | 150000 | NLV | --- | --- | --- | --- | **7.3** | **9.2** |
| Zinc {B} | mg/Kg | 47 | NLV | NLV | 630000 | NLV | --- | --- | --- | --- | **22** | **52** |
| ***Semi-Volatiles*** | ***Units*** | | | | | | | | | | | |
| Acenaphthene | ug/Kg | 330 | 3.5E+8 | 9.7E+7 | 1.3E+8 | 1.9E+8 | --- | --- | --- | --- | <330 | <330 |
| Acenaphthylene | ug/Kg | 330 | 3.0E+6 | 2.7E+6 | 5.2E+6 | 1.6E+6 | --- | --- | --- | --- | <330 | <330 |
| Anthracene | ug/Kg | 330 | 1.0E+9 {D} | 1.6E+9 | 7.3E+8 | 1.0E+9 {D} | --- | --- | --- | --- | <330 | <330 |
| Benzo(a)anthracene {Q} | ug/Kg | 330 | NLV | NLV | 80000 | NLV | --- | --- | --- | --- | <330 | <330 |
| Benzo(a)pyrene {Q} | ug/Kg | 330 | NLV | NLV | 8000 | NLV | --- | --- | --- | --- | <330 | <330 |
| Benzo(b&k)fluoranthene | ug/Kg | 330 | ID | ID | 80000 | ID | --- | --- | --- | --- | <330 | **490** |
| Benzo(g,h,i)perylene | ug/Kg | 330 | NLV | NLV | 7.0E+6 | NLV | --- | --- | --- | --- | <330 | <330 |
| bis(2-Chloroethoxy)methane | ug/Kg | 330 | NA | NA | NA | NA | --- | --- | --- | --- | <330 | <330 |
| bis(2-Chloroethyl)ether {I} | ug/Kg | 100 | 44000 | 13000 | 58000 | 8300 | --- | --- | --- | --- | <330 | <330 |
| bis(2-Chloroisopropyl)ether | ug/Kg | 330 | NA | NA | NA | NA | --- | --- | --- | --- | <330 | <330 |
| bis(2-Ethylhexyl)phthalate | ug/Kg | 330 | NLV | NLV | 1.0E+7 {C} | NLV | --- | --- | --- | --- | <330 | <330 |
| 4-Bromo diphenyl ether | ug/Kg | 330 | NA | NA | NA | NA | --- | --- | --- | --- | <330 | <330 |
| Butyl benzyl phthalate | ug/Kg | 330 | NLV | NLV | 3.1E+5 {C} | NLV | --- | --- | --- | --- | <330 | <330 |
| beta-Chloronaphthalene | ug/Kg | 330 | ID | ID | 1.8E+8 | ID | --- | --- | --- | --- | <330 | <330 |
| 4-Chloro diphenyl ether | ug/Kg | 330 | NA | NA | NA | NA | --- | --- | --- | --- | <330 | <330 |
| Chrysene {Q} | ug/Kg | 330 | ID | ID | 8.0E+6 | ID | --- | --- | --- | --- | <330 | <330 |
| Decabromodiphenyl ether | ug/Kg | NA | 1.0E+9 {D} | 1.0E+8 | 1.1E+7 | 1.0E+9 {D} | --- | --- | --- | --- | --- | --- |
| Di-n-butyl phthalate | ug/Kg | 330 | NLV | NLV | 7.6E+5 {C} | NLV | --- | --- | --- | --- | <330 | <330 |
| Di-n-octyl phthalate | ug/Kg | 330 | NLV | NLV | 2.0E+7 | NLV | --- | --- | --- | --- | <330 | <330 |
| Dibenzo(a,h)anthracene {Q} | ug/Kg | 330 | NLV | NLV | 8000 | NLV | --- | --- | --- | --- | <330 | <330 |
| Dibenzofuran | ug/Kg | 330 | 3.6E+6 | 1.6E+5 | ID | 2.0E+6 | --- | --- | --- | --- | --- | --- |
| 3,3'-Dichlorobenzidine | ug/Kg | 2000 | NLV | NLV | 30000 | NLV | --- | --- | --- | --- | --- | --- |
| Diethyl phthalate | ug/Kg | 330 | NLV | NLV | 7.4E+5 {C} | NLV | --- | --- | --- | --- | <330 | <330 |
| Dimethyl phthalate | ug/Kg | 330 | NLV | NLV | 7.9E+5 {C} | NLV | --- | --- | --- | --- | <330 | <330 |
| 2,4-Dinitrotoluene | ug/Kg | 330 | NLV | NLV | 2.2E+5 | NLV | --- | --- | --- | --- | <330 | <330 |
| 2,6-Dinitrotoluene | ug/Kg | 330 | NA | NA | NA | NA | --- | --- | --- | --- | <330 | <330 |
| 1,2-Diphenylhydrazine | ug/Kg | 330 | NA | NA | NA | NA | --- | --- | --- | --- | <330 | <330 |

# Table B2-2 - Update 2011 Criteria
## Summary of Analytical Results for Soil Samples
## Gage Products
## Ferndale, Michigan

| Sample Location | | Background | Non-Residential | Non-Residential | Non-Residential | Residential | SS #1 West Portion Trench | SS #2 East Portion Trench | SS#1 | SS#2 | TMW-01 | TMW-02 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lab Sample ID | | Target | Soil | Volatile | Direct | Soil | | | | | 179275 | 179276 |
| Sampled By | | Method | Volatilization to | Soil | Contact | Volatilization to | Horizon | Horizon | MDEQ | MDEQ | Horizon | Horizon |
| Analyzed By | | Detection | Indoor Air | Inhalation | | Indoor Air | DLZ | DLZ | MDEQ | MDEQ | TriMatrix | TriMatrix |
| Sample Date | | Limit | Inhalation | Infinite | | Inhalation | 1/19/1996 | 1/19/1996 | 1/19/1996 | 1/19/1996 | 9/30/1997 | 9/30/1997 |
| Sample Depth (ft.) | | | | | | | | | | | 0-1 | 0-1 |
| ***Semi-Volatiles Cont.*** | ***Units*** | | | | | | | | | | | |
| Fluoranthene | ug/Kg | 330 | 1.0E+9 {D} | 8.9E+8 | 1.3E+8 | 1.0E+9 {D} | --- | --- | --- | --- | <330 | <330 |
| Fluorene | ug/Kg | 330 | 1.0E+9 {D} | 1.5E+8 | 8.7E+7 | 5.8E+8 | --- | --- | --- | --- | <330 | <330 |
| Hexachlorobenzene (C-66) | ug/Kg | 330 | 2.2E+5 | 56000 | 37000 | 41000 | --- | --- | --- | --- | <20 | <20 |
| Hexachlorobutadiene (C-46) | ug/Kg | 50 | 3.5E+5 {C} | 4.6E+5 | 3.5E+5 {C} | 1.3E+5 | --- | --- | --- | --- | <330 | <330 |
| Hexachlorocyclopentadiene (C-56) | ug/Kg | 330 | 56000 | 60000 | 7.2E+5 {C} | 30000 | --- | --- | --- | --- | <330 | <330 |
| Hexachloroethane | ug/Kg | 300 | 79000 | 6.6E+5 | 7.3E+5 | 40000 | --- | --- | --- | --- | --- | --- |
| Indeno(1,2,3-cd)pyrene {Q} | ug/Kg | 330 | NLV | NLV | 80000 | NLV | --- | --- | --- | --- | <330 | <330 |
| Isophorone | ug/Kg | 330 | NLV | NLV | 2.4E+6 {C} | NLV | --- | --- | --- | --- | <330 | <330 |
| 2-Methylnaphthalene | ug/Kg | 330 | 4.9E+6 | 1.8E+6 | 2.6E+7 | 2.7E+6 | --- | --- | --- | --- | <330 | <330 |
| n-Nitroso-di-n-propylamine | ug/Kg | 330 | NLV | NLV | 5400 | NLV | --- | --- | --- | --- | <330 | <330 |
| n-Nitroso-di-propylamine | ug/Kg | 330 | NLV | NLV | 5400 | NLV | --- | --- | --- | --- | --- | --- |
| Naphthalene | ug/Kg | 330 | 4.7E+5 | 3.5E+5 | 5.2E+7 | 2.5E+5 | --- | --- | --- | --- | <330 | <330 |
| Nitrobenzene {I} | ug/Kg | 330 | 1.7E+5 | 64000 | 3.4E+5 | 91000 | --- | --- | --- | --- | <330 | <330 |
| N-Nitrosodiphenylamine | ug/Kg | 330 | NLV | NLV | 7.8E+6 | NLV | --- | --- | --- | --- | <330 | <330 |
| n-Nitroso-n-propylamine | ug/Kg | 330 | NLV | NLV | 5400 | NLV | --- | --- | --- | --- | --- | --- |
| Phenanthrene | ug/Kg | 330 | 5.1E+6 | 1.9E+5 | 5.2E+6 | 2.8E+6 | --- | --- | --- | --- | <330 | <330 |
| Pyrene | ug/Kg | 330 | 1.0E+9 {D} | 7.8E+8 | 8.4E+7 | 1.0E+9 {D} | --- | --- | --- | --- | <330 | <330 |
| ***Volatiles*** | ***Units*** | | | | | | | | | | | |
| Acetone {I} | ug/Kg | 1000 | 1.1E+8 {C} | 1.6E+8 | 7.3E+7 | 1.1E+8 {C} | **8200** | <3800 | <13000 | <13000 | <100 | <100 |
| Acrylonitrile {I} | ug/Kg | 100 | 35000 | 17000 | 74000 | 6600 | --- | --- | <1300 | <1300 | <10 | <10 |
| Benzene {I} | ug/Kg | 50 | 8400 | 45000 | 4.0E+5 {C} | 1600 | <850 | <750 | <1300 | <1300 | <10 | <10 |
| Bromobenzene {I} | ug/Kg | 100 | 5.8E+5 | 5.4E+5 | 7.6E+5 {C} | 3.1E+5 | <850 | <750 | --- | --- | --- | --- |
| Bromochloromethane | ug/Kg | 100 | NA | NA | NA | NA | <850 | <750 | <1300 | <1300 | <10 | <10 |
| Bromodichloromethane | ug/Kg | 100 | 6400 | 31000 | 4.9E+5 | 1200 | <850 | <750 | <1300 | <1300 | --- | --- |
| Bromoform | ug/Kg | 100 | 7.7E+5 | 3.1E+6 | 8.7E+5 {C} | 1.5E+5 | <850 | <750 | <1300 | <1300 | <10 | <10 |
| Bromomethane | ug/Kg | 200 | 1600 | 13000 | 1.0E+6 | 860 | <850 | <750 | <2500 | <2600 | <10 | <10 |
| 2-Butanone (MEK) {I} | ug/Kg | 750 | 2.7E+7 {C} | 3.5E+7 | 2.7E+7 {C,DD} | 2.7E+7 {C} | **7700** | <3800 | <2500 | <2600 | <100 | <100 |
| n-Butylbenzene | ug/Kg | 50 | ID | ID | 8.0E+6 | ID | **35000** | **5500** | --- | --- | --- | --- |
| sec-Butylbenzene | ug/Kg | 50 | ID | ID | 8.0E+6 | ID | **25000** | **3400** | --- | --- | --- | --- |
| tert-Butylbenzene | ug/Kg | 50 | ID | ID | 8.0E+6 | ID | <850 | <750 | --- | --- | --- | --- |
| Carbon disulfide {I,R} | ug/Kg | 250 | 1.4E+5 | 1.6E+6 | 2.8E+5 {C,DD} | 76000 | <4300 | <3800 | <2500 | <2600 | <100 | <100 |
| Carbon tetrachloride | ug/Kg | 50 | 990 | 12000 | 3.9E+5 {C} | 190 | <850 | <750 | <1300 | <1300 | <10 | <10 |
| Chlorobenzene {I} | ug/Kg | 50 | 2.2E+5 | 9.2E+5 | 2.6E+5 {C} | 1.2E+5 | **1100** | <750 | <1300 | <1300 | <10 | <10 |
| Dibromochloromethane | ug/Kg | 100 | 21000 | 80000 | 5.0E+5 | 3900 | --- | --- | --- | --- | <10 | <10 |
| Chloroethane {I} | ug/Kg | 250 | 9.5E+5 {C} | 3.6E+7 | 9.5E+5 {C} | 9.5E+5 {C} | <850 | <750 | <2500 | <2600 | <10 | <10 |
| 2-Chloroethyl vinyl ether | ug/Kg | 5000 | ID | ID | ID | ID | <4300 | <3800 | --- | --- | --- | --- |
| Chloroform | ug/Kg | 50 | 38000 | 1.5E+5 | 1.5E+6 {C} | 7200 | <850 | <750 | <1300 | <1300 | <10 | <10 |
| Chloromethane {I} | ug/Kg | 250 | 10000 | 1.2E+5 | 1.1E+6 {C} | 2300 | <850 | <750 | <2500 | <2600 | <10 | <10 |
| 2-Chlorotoluene | ug/Kg | 50 | 5.0E+5 {C} | 1.5E+6 | 5.0E+5 {C} | 2.7E+5 | <850 | <750 | --- | --- | --- | --- |
| 4-Chlorotoluene | ug/Kg | 50 | NA | NA | NA | NA | <850 | <750 | --- | --- | --- | --- |

# Table B2-2 - Update 2011 Criteria
## Summary of Analytical Results for Soil Samples
## Gage Products
## Ferndale, Michigan

| Sample Location<br>Lab Sample ID<br>Sampled By<br>Analyzed By<br>Sample Date<br>Sample Depth (ft.) | | Background Target Method Detection Limit | Non-Residential Soil Volatilization to Indoor Air Inhalation | Non-Residential Volatile Soil Inhalation Infinite | Non-Residential Direct Contact | Residential Soil Volatilization to Indoor Air Inhalation | SS #1 West Portion Trench<br><br>Horizon<br>DLZ<br>1/19/1996 | SS #2 East Portion Trench<br><br>Horizon<br>DLZ<br>1/19/1996 | SS#1<br><br>MDEQ<br>MDEQ<br>1/19/1996 | SS#2<br><br>MDEQ<br>MDEQ<br>1/19/1996 | TMW-01<br>179275<br>Horizon<br>TriMatrix<br>9/30/1997<br>0-1 | TMW-02<br>179276<br>Horizon<br>TriMatrix<br>9/30/1997<br>0-1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Volatiles Cont.*** | **Units** | | | | | | | | | | | |
| Dibromochloropropane | ug/Kg | 10 | 1200 {C} | 15000 | 1200 {C} | 1200 {C} | <850 | <750 | <2500 | <2600 | <50 | <50 |
| Dibromochloromethane | ug/Kg | 100 | 21000 | 80000 | 5.0E+5 | 3900 | <850 | <750 | <1300 | <1300 | --- | --- |
| Ethylene dibromide | ug/Kg | 20 | 3600 | 5800 | 430 | 670 | <850 | <750 | <1300 | <1300 | --- | --- |
| Dibromomethane | ug/Kg | 250 | ID | ID | 2.0E+6 {C} | ID | <850 | <750 | <1300 | <1300 | <10 | <10 |
| Ethylene dibromide | ug/Kg | 20 | 3600 | 5800 | 430 | 670 | --- | --- | --- | --- | <10 | <10 |
| trans-1,4-Dichloro-2-butene | ug/Kg | 50 | NA | NA | NA | NA | <4300 | <3800 | <1300 | <1300 | <10 | <10 |
| 1,2-Dichlorobenzene | ug/Kg | 100 | 2.1E+5 {C} | 4.6E+7 | 2.1E+5 {C} | 2.1E+5 {C} | <850 | <750 | <1300 | <1300 | <10 | <10 |
| 1,3-Dichlorobenzene | ug/Kg | 100 | 48000 | 94000 | 1.7E+5 {C} | 26000 | <850 | <750 | <1300 | <1300 | <10 | <10 |
| 1,4-Dichlorobenzene | ug/Kg | 100 | 1.0E+5 | 2.6E+5 | 1.9E+6 | 19000 | <850 | <750 | <1300 | <1300 | <10 | <10 |
| Dibromochloromethane | ug/Kg | 100 | 21000 | 80000 | 5.0E+5 | 3900 | --- | --- | --- | --- | <10 | <10 |
| Dichlorodifluoromethane | ug/Kg | 250 | 1.7E+6 | 6.3E+7 | 1.0E+6 {C} | 9.0E+5 | <850 | <750 | <2500 | <2600 | <10 | <10 |
| 1,1-Dichloroethane {I} | ug/Kg | 50 | 4.3E+5 | 2.5E+6 | 8.9E+5 {C} | 2.3E+5 | <850 | <750 | <1300 | <1300 | --- | --- |
| 1,2-Dichloroethane {I} | ug/Kg | 50 | 11000 | 21000 | 4.2E+5 | 2100 | <850 | <750 | <1300 | <1300 | --- | --- |
| 1,1-Dichloroethane {I} | ug/Kg | 50 | 4.3E+5 | 2.5E+6 | 8.9E+5 {C} | 2.3E+5 | --- | --- | --- | --- | <10 | <10 |
| 1,2-Dichloroethane {I} | ug/Kg | 50 | 11000 | 21000 | 4.2E+5 | 2100 | --- | --- | --- | --- | <10 | <10 |
| 1,1-Dichloroethylene {I} | ug/Kg | 50 | 330 | 3700 | 5.7E+5 {C} | 62 | <850 | <750 | <1300 | <1300 | <10 | <10 |
| cis-1,2-Dichloroethylene {I} | ug/Kg | 50 | 41000 | 2.1E+5 | 6.4E+5 {C} | 22000 | <850 | <750 | <1300 | <1300 | <10 | <10 |
| trans-1,2-Dichloroethylene | ug/Kg | 50 | 43000 | 3.3E+5 | 1.4E+6 {C} | 23000 | <850 | <750 | <1300 | <1300 | <10 | <10 |
| 2,2-Dichloropropane | ug/Kg | 50 | NA | NA | NA | NA | <850 | <750 | --- | --- | --- | --- |
| 1,2-Dichloropropane {I} | ug/Kg | 50 | 7400 | 30000 | 5.5E+5 {C} | 4000 | <850 | <750 | <1300 | <1300 | <10 | <10 |
| 1,3-Dichloropropane | ug/Kg | 50 | NA | NA | NA | NA | <850 | <750 | --- | --- | --- | --- |
| 1,1-Dichloropropene | ug/Kg | 50 | NA | NA | NA | NA | <850 | <750 | --- | --- | --- | --- |
| cis-1,3-Dichloropropene {I,J} | ug/Kg | 50 | 5400 | 60000 | 2.4E+5 | 1000 | <850 | <750 | <1300 | <1300 | <10 | <10 |
| trans-1,3-Dichloropropene {I, J} | ug/Kg | 50 | 5400 | 60000 | 2.4E+5 | 1000 | <850 | <750 | <1300 | <1300 | <10 | <10 |
| Diethyl ether {I} | ug/Kg | 200 | 7.4E+6 {C} | 1.0E+8 | 7.4E+6 {C} | 7.4E+6 {C} | --- | --- | <2500 | <2600 | --- | --- |
| Diethylbenzene | ug/Kg | 50 | NA | NA | NA | NA | **38000** | **5100** | --- | --- | --- | --- |
| Dimethyl disulfide | ug/Kg | 50 | NA | NA | NA | NA | <4300 | <3800 | --- | --- | --- | --- |
| Diethyl ether {I} | ug/Kg | 200 | 7.4E+6 {C} | 1.0E+8 | 7.4E+6 {C} | 7.4E+6 {C} | --- | --- | --- | --- | <100 | <100 |
| Ethylbenzene {I} | ug/Kg | 50 | 1.4E+5 {C} | 2.4E+6 | 1.4E+5 {C} | 87000 | **50000** | **61000** | **39000** | **39000** | <10 | <10 |
| Hexachlorobutadiene (C-46) | ug/Kg | 50 | 3.5E+5 {C} | 4.6E+5 | 3.5E+5 {C} | 1.3E+5 | <4300 | <3800 | --- | --- | --- | --- |
| Hexachloroethane | ug/Kg | 300 | 79000 | 6.6E+5 | 7.3E+5 | 40000 | --- | --- | <1300 | <1300 | <10 | <10 |
| 2-Hexanone {I} | ug/Kg | 2500 | 1.8E+6 | 1.3E+6 | 2.5E+6 {C} | 9.9E+5 | <4300 | <3800 | <2500 | **2900** | <100 | <100 |
| Iodomethane | ug/Kg | 100 | NA | NA | NA | NA | <850 | <750 | --- | --- | <100 | <100 |
| Isopropyl benzene {I} | ug/Kg | 250 | 3.9E+5 {C} | 2.0E+6 | 3.9E+5 {C} | 3.9E+5 {C} | **12000** | **5700** | **7000** | **5400** | <10 | <10 |
| p-Isopropyltoluene | ug/Kg | 100 | NA | NA | NA | NA | **23000** | **3800** | --- | --- | --- | --- |
| 5-Methly-2-Hexanone | ug/Kg | 100 | NA | NA | NA | NA | **15000** | **64000** | --- | --- | --- | --- |
| Iodomethane | ug/Kg | 100 | NA | NA | NA | NA | --- | --- | <1300 | <1300 | --- | --- |
| 4-Methyl-2-pentanone (MIBK) {I} | ug/Kg | 2500 | 2.7E+6 {C} | 5.3E+7 | 2.7E+6 {C} | 2.7E+6 {C} | <4300 | **7500** | <2500 | <2600 | <100 | <100 |
| Methyl-tert-butyl ether (MTBE) | ug/Kg | 250 | 5.9E+6 {C} | 3.0E+7 | 5.9E+6 {C} | 5.9E+6 {C} | <4300 | <3800 | <2500 | <2600 | <100 | <100 |

# Table B2-2 - Update 2011 Criteria
## Summary of Analytical Results for Soil Samples
## Gage Products
## Ferndale, Michigan

| Sample Location<br>Lab Sample ID<br>Sampled By<br>Analyzed By<br>Sample Date<br>Sample Depth (ft.) | | Background Target Method Detection Limit | Non-Residential Soil Volatilization to Indoor Air Inhalation | Non-Residential Volatile Soil Inhalation Infinite | Non-Residential Direct Contact | Residential Soil Volatilization to Indoor Air Inhalation | SS #1 West Portion Trench<br><br>Horizon<br>DLZ<br>1/19/1996 | SS #2 East Portion Trench<br><br>Horizon<br>DLZ<br>1/19/1996 | SS#1<br><br>MDEQ<br>MDEQ<br>1/19/1996 | SS#2<br><br>MDEQ<br>MDEQ<br>1/19/1996 | TMW-01<br>179275<br>Horizon<br>TriMatrix<br>9/30/1997<br>0-1 | TMW-02<br>179276<br>Horizon<br>TriMatrix<br>9/30/1997<br>0-1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Volatiles Cont.*** | ***Units*** | | | | | | | | | | | |
| Methylene chloride | ug/Kg | 100 | 2.4E+5 | 7.0E+5 | 2.3E+6 {C} | 45000 | <850 | <750 | <2500 | <2600 | <10 | <10 |
| 2-Methylnaphthalene | ug/Kg | 330 | 4.9E+6 | 1.8E+6 | 2.6E+7 | 2.7E+6 | --- | --- | **39000** | **42000** | --- | --- |
| Naphthalene | ug/Kg | 330 | 4.7E+5 | 3.5E+5 | 5.2E+7 | 2.5E+5 | **52000** | **15000** | **28000** | **8600** | --- | --- |
| n-Propylbenzene {I} | ug/Kg | 100 | ID | ID | 8.0E+6 | ID | **34000** | **11000** | **23000** | **8200** | <10 | <10 |
| Styrene {I} | ug/Kg | 50 | 5.2E+5 {C} | 3.3E+6 | 5.2E+5 {C} | 2.5E+5 | <850 | <750 | <1300 | <1300 | <10 | <10 |
| 1,1,1,2-Tetrachloroethane | ug/Kg | 100 | 33000 | 1.2E+5 | 4.4E+5 {C} | 6200 | <850 | <750 | <1300 | <1300 | <10 | <10 |
| 1,1,2,2-Tetrachloroethane | ug/Kg | 50 | 23000 | 34000 | 2.4E+5 | 4300 | <850 | <750 | <1300 | <1300 | <10 | <10 |
| Tetrachloroethylene | ug/Kg | 50 | 60000 | 6.0E+5 | 88000 {C} | 11000 | <850 | **1100** | <1300 | **1800** | <10 | <10 |
| Tetrahydrofuran | ug/Kg | 1000 | 2.4E+6 | 1.5E+7 | 9.5E+6 | 1.3E+6 | <10000 | <10000 | --- | --- | --- | --- |
| Toluene {I} | ug/Kg | 100 | 2.5E+5 {C} | 3.3E+6 | 2.5E+5 {C} | 2.5E+5 {C} | **3000** | <750 | **11000** | **79000** | <10 | <10 |
| 1,2,3-Trichlorobenzene | ug/Kg | 330 | NA | NA | NA | NA | <4300 | <3800 | --- | --- | --- | --- |
| 1,2,4-Trichlorobenzene | ug/Kg | 330 | 1.1E+6 {C} | 3.4E+7 | 1.1E+6 {C,DD} | 1.1E+6 {C} | <4300 | <3800 | <2500 | <2600 | <10 | <10 |
| 1,1,1-Trichloroethane | ug/Kg | 50 | 4.6E+5 | 4.5E+6 | 4.6E+5 {C} | 2.5E+5 | <850 | <750 | <1300 | <1300 | <10 | <10 |
| 1,1,2-Trichloroethane | ug/Kg | 50 | 24000 | 57000 | 8.4E+5 | 4600 | <850 | <750 | <1300 | <1300 | <10 | <10 |
| Trichloroethylene | ug/Kg | 50 | 37000 | 2.6E+5 | 5.0E+5 {C,DD} | 7100 | <850 | <750 | <1300 | <1300 | <10 | <10 |
| Trichlorofluoromethane | ug/Kg | 100 | 5.6E+5 {C} | 1.1E+8 | 5.6E+5 {C} | 5.6E+5 {C} | <850 | <750 | <2500 | <2600 | <10 | <10 |
| 1,2,3-Trichloropropane | ug/Kg | 100 | 7500 | 11000 | 8.3E+5 {C} | 4000 | <850 | <750 | <1300 | <1300 | <10 | <10 |
| 1,2,4-Trimethylbenzene {I} | ug/Kg | 100 | 1.1E+5 {C} | 2.5E+7 | 1.1E+5 {C} | 1.1E+5 {C} | ***280000*** | ***170000*** | ***250000*** | **100000** | <10 | <10 |
| 1,3,5-Trimethylbenzene {I} | ug/Kg | 100 | 94000 {C} | 1.9E+7 | 94000 {C} | 94000 {C} | **76000** | **48000** | **61000** | **30000** | <10 | <10 |
| Vinyl acetate | ug/Kg | 5000 | 1.5E+6 | 2.0E+6 | 2.4E+6 {C,DD} | 7.9E+5 | <4300 | <3800 | <2500 | <2600 | <100 | <100 |
| Vinyl chloride | ug/Kg | 40 | 2800 | 29000 | 34000 | 270 | <850 | <750 | <2500 | <2600 | <10 | <10 |
| Xylene, p&m | ug/Kg | 100 | 1.5E+5 {C} | 5.4E+7 | 1.5E+5 {C} | 1.5E+5 {C} | --- | --- | --- | --- | <20 | <20 |
| Xylene, o | ug/Kg | 50 | 1.5E+5 {C} | 5.4E+7 | 1.5E+5 {C} | 1.5E+5 {C} | --- | --- | --- | --- | <10 | <10 |
| Xylene (Total) | ug/Kg | 150 | 1.5E+5 {C} | 5.4E+7 | 1.5E+5 {C} | 1.5E+5 {C} | ***320000*** | ***290000*** | ***242000*** | ***370000*** | --- | --- |
| ***PCB's*** | ***Units*** | | | | | | | | | | | |
| Aroclor 1016 | ug/Kg | 330 | 1.6E+7 | 8.1E+5 | 16000 {T} | 3.0E+6 | --- | --- | --- | --- | <330 | <330 |
| Aroclor 1221 | ug/Kg | 330 | 1.6E+7 | 8.1E+5 | 16000 {T} | 3.0E+6 | --- | --- | --- | --- | <330 | <330 |
| Aroclor 1232 | ug/Kg | 330 | 1.6E+7 | 8.1E+5 | 16000 {T} | 3.0E+6 | --- | --- | --- | --- | <330 | <330 |
| Aroclor 1242 | ug/Kg | 330 | 1.6E+7 | 8.1E+5 | 16000 {T} | 3.0E+6 | --- | --- | --- | --- | <330 | <330 |
| Aroclor 1248 | ug/Kg | 330 | 1.6E+7 | 8.1E+5 | 16000 {T} | 3.0E+6 | --- | --- | --- | --- | <330 | <330 |
| Aroclor 1254 | ug/Kg | 330 | 1.6E+7 | 8.1E+5 | 16000 {T} | 3.0E+6 | --- | --- | --- | --- | <330 | <330 |
| Aroclor 1260 | ug/Kg | 330 | 1.6E+7 | 8.1E+5 | 16000 {T} | 3.0E+6 | --- | --- | --- | --- | <330 | <330 |
| Aroclor 1262 | ug/Kg | 330 | 1.6E+7 | 8.1E+5 | 16000 {T} | 3.0E+6 | --- | --- | --- | --- | <330 | <330 |
| Aroclor 1268 | ug/Kg | 330 | 1.6E+7 | 8.1E+5 | 16000 {T} | 3.0E+6 | --- | --- | --- | --- | <330 | <330 |
| ***Pesticides*** | ***Units*** | | | | | | | | | | | |
| Aldrin | ug/Kg | 20 | 7.1E+6 | 2.0E+5 | 4300 | 1.3E+6 | --- | --- | --- | --- | <1.7 | <1.7 |
| alpha-Hexachlorocyclohexane | ug/Kg | 10 | 1.6E+5 | 41000 | 12000 | 30000 | --- | --- | --- | --- | <1.7 | <1.7 |
| beta-Hexachlorocyclohexane | ug/Kg | 20 | NLV | NLV | 25000 | NLV | --- | --- | --- | --- | <1.7 | <1.7 |
| delta-Hexachlorocyclohexane | ug/Kg | 20 | NA | NA | NA | NA | --- | --- | --- | --- | <1.7 | <1.7 |
| 4-4'-DDD | ug/Kg | 20 | NLV | NLV | 4.0E+5 | NLV | --- | --- | --- | --- | <3.3 | <3.3 |

# Table B2-2 - Update 2011 Criteria
## Summary of Analytical Results for Soil Samples
## Gage Products
## Ferndale, Michigan

| Sample Location<br>Lab Sample ID<br>Sampled By<br>Analyzed By<br>Sample Date<br>Sample Depth (ft.) | | Background Target Method Detection Limit | Non-Residential Soil Volatilization to Indoor Air Inhalation | Non-Residential Volatile Soil Inhalation Infinite | Non-Residential Direct Contact | Residential Soil Volatilization to Indoor Air Inhalation | SS #1 West Portion Trench<br><br>Horizon<br>DLZ<br>1/19/1996 | SS #2 East Portion Trench<br><br>Horizon<br>DLZ<br>1/19/1996 | SS#1<br><br>MDEQ<br>MDEQ<br>1/19/1996 | SS#2<br><br>MDEQ<br>MDEQ<br>1/19/1996 | TMW-01<br>179275<br>Horizon<br>TriMatrix<br>9/30/1997<br>0-1 | TMW-02<br>179276<br>Horizon<br>TriMatrix<br>9/30/1997<br>0-1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Pesticides Cont.*** | ***Units*** | | | | | | | | | | | |
| 4-4'-DDE | ug/Kg | 20 | NLV | NLV | 1.9E+5 | NLV | --- | --- | --- | --- | <3.3 | <3.3 |
| 4-4'-DDT | ug/Kg | 20 | NLV | NLV | 2.8E+5 | NLV | --- | --- | --- | --- | <3.3 | **6.6** |
| Dieldrin | ug/Kg | 20 | 7.2E+5 | 64000 | 4700 | 1.4E+5 | --- | --- | --- | --- | <3.3 | <3.3 |
| Endosulfan I {J} | ug/Kg | 20 | ID | ID | 4.4E+6 | ID | --- | --- | --- | --- | <3.3 | <3.3 |
| Endosulfan II {J} | ug/Kg | 20 | ID | ID | 4.4E+6 | ID | --- | --- | --- | --- | <3.3 | <3.3 |
| Endosulfan Sulfate {J} | ug/Kg | 20 | NA | NA | NA | NA | --- | --- | --- | --- | <3.3 | <3.3 |
| Endrin | ug/Kg | 20 | NLV | NLV | 1.9E+5 | NLV | --- | --- | --- | --- | <3.3 | <3.3 |
| Endrin Aldehyde | ug/Kg | 20 | NA | NA | NA | NA | --- | --- | --- | --- | <3.3 | <3.3 |
| Heptachlor | ug/Kg | 20 | 1.9E+6 | 2.1E+5 | 23000 | 3.5E+5 | --- | --- | --- | --- | <1.7 | <1.7 |
| Heptachlor epoxide | ug/Kg | 20 | NLV | NLV | 9500 | NLV | --- | --- | --- | --- | <1.7 | <1.7 |
| Lindane | ug/Kg | 20 | ID | ID | 42000 | ID | --- | --- | --- | --- | <1.7 | <1.7 |
| Methoxychlor | ug/Kg | 50 | ID | ID | 5.6E+6 | ID | --- | --- | --- | --- | <50 | <50 |
| ***Misc*** | ***Units*** | | | | | | | | | | | |
| Percent Solids | % | NA | NA | NA | NA | NA | **74** | **84** | **76** | **79** | --- | --- |

**Table B2-2 - Update 2011 Criteria**
**Summary of Analytical Results for Soil Samples**
**Gage Products**
**Ferndale, Michigan**

| Sample Location | | Background | Non-Residential | Non-Residential | Non-Residential | Residential | TMW-03 | TSB-1 | TSB-1 | TSB-1 | TSB-2 | TSB-2 | TSB-3 | TSB-3 | TSB-4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lab Sample ID | | Target | Soil | Volatile | Direct | Soil | 179277 | 45669 | 45670 | 45671 | 45672 | 45673 | 45674 | 45675 | 45994 |
| Sampled By | | Method | Volatilization to | Soil | Contact | Volatilization to | Horizon | WWES | WWES | WWES | WWES | WWES | WWES | WWES | WWES |
| Analyzed By | | Detection | Indoor Air | Inhalation | | Indoor Air | TriMatrix | | | | | | | | |
| Sample Date | | Limit | Inhalation | Infinite | | Inhalation | 9/30/1997 | 8/3/1990 | 8/3/1990 | 8/3/1990 | 8/3/1990 | 8/3/1990 | 8/3/1990 | 8/3/1990 | 8/6/1990 |
| Sample Depth (ft.) | | | | | | | 0-1 | 4.0-5.5 | 9.0-10.5 | 11.5-12.5 | 2.0-3.5 | 11.0-12.5 | 2.0 - 3.5 | 9.0 - 10.5 | 2.0-3.5 |
| ***Inorganics*** | **Units** | | | | | | | | | | | | | | |
| Arsenic {B} | mg/Kg | 5.8 | NLV | NLV | 37 | NLV | **7.9** | --- | --- | --- | --- | --- | --- | --- | --- |
| Cadmium {B} | mg/Kg | 1.2 | NLV | NLV | 2100 | NLV | **0.25** | --- | --- | --- | --- | --- | --- | --- | --- |
| Chromium, Total | mg/Kg | 18 | NLV | NLV | 9200 | NLV | **62** | --- | --- | --- | --- | --- | --- | --- | --- |
| Chromium (VI) | mg/Kg | 18 | NLV | NLV | 9200 | NLV | <0.2 | --- | --- | --- | --- | --- | --- | --- | --- |
| Chromium (III) {B,H} | mg/Kg | 18 | NLV | NLV | 1000000 {D} | NLV | **62** | --- | --- | --- | --- | --- | --- | --- | --- |
| Copper {B} | mg/Kg | 32 | NLV | NLV | 73000 | NLV | **19** | --- | --- | --- | --- | --- | --- | --- | --- |
| Iron | mg/Kg | 12000 | NLV | NLV | 580000 | NLV | **12700** | --- | --- | --- | --- | --- | --- | --- | --- |
| Lead {B} | mg/Kg | 21 | NLV | NLV | 900 (DD) | NLV | **13** | --- | --- | --- | --- | --- | --- | --- | --- |
| Mercury (Inorganic) {B} | mg/Kg | 0.13 | 89 | 62 | 580 | 48 | <0.10 | --- | --- | --- | --- | --- | --- | --- | --- |
| Nickel | mg/Kg | 20 | NLV | NLV | 150000 | NLV | **10** | --- | --- | --- | --- | --- | --- | --- | --- |
| Zinc {B} | mg/Kg | 47 | NLV | NLV | 630000 | NLV | **36** | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Semi-Volatiles*** | **Units** | | | | | | | | | | | | | | |
| Acenaphthene | ug/Kg | 330 | 3.5E+8 | 9.7E+7 | 1.3E+8 | 1.9E+8 | <330 | --- | --- | --- | --- | --- | --- | --- | --- |
| Acenaphthylene | ug/Kg | 330 | 3.0E+6 | 2.7E+6 | 5.2E+6 | 1.6E+6 | <330 | --- | --- | --- | --- | --- | --- | --- | --- |
| Anthracene | ug/Kg | 330 | 1.0E+9 {D} | 1.6E+9 | 7.3E+8 | 1.0E+9 {D} | <330 | --- | --- | --- | --- | --- | --- | --- | --- |
| Benzo(a)anthracene {Q} | ug/Kg | 330 | NLV | NLV | 80000 | NLV | <330 | --- | --- | --- | --- | --- | --- | --- | --- |
| Benzo(a)pyrene {Q} | ug/Kg | 330 | NLV | NLV | 8000 | NLV | <330 | --- | --- | --- | --- | --- | --- | --- | --- |
| Benzo(b&k)fluoranthene | ug/Kg | 330 | ID | ID | 80000 | ID | <330 | --- | --- | --- | --- | --- | --- | --- | --- |
| Benzo(g,h,i)perylene | ug/Kg | 330 | NLV | NLV | 7.0E+6 | NLV | <330 | --- | --- | --- | --- | --- | --- | --- | --- |
| bis(2-Chloroethoxy)methane | ug/Kg | 330 | NA | NA | NA | NA | <330 | --- | --- | --- | --- | --- | --- | --- | --- |
| bis(2-Chloroethyl)ether {I} | ug/Kg | 100 | 44000 | 13000 | 58000 | 8300 | <330 | --- | --- | --- | --- | --- | --- | --- | --- |
| bis(2-Chloroisopropyl)ether | ug/Kg | 330 | NA | NA | NA | NA | <330 | --- | --- | --- | --- | --- | --- | --- | --- |
| bis(2-Ethylhexyl)phthalate | ug/Kg | 330 | NLV | NLV | 1.0E+7 {C} | NLV | <330 | --- | --- | --- | --- | --- | --- | --- | --- |
| 4-Bromo diphenyl ether | ug/Kg | 330 | NA | NA | NA | NA | <330 | --- | --- | --- | --- | --- | --- | --- | --- |
| Butyl benzyl phthalate | ug/Kg | 330 | NLV | NLV | 3.1E+5 {C} | NLV | <330 | --- | --- | --- | --- | --- | --- | --- | --- |
| beta-Chloronaphthalene | ug/Kg | 330 | ID | ID | 1.8E+8 | ID | <330 | --- | --- | --- | --- | --- | --- | --- | --- |
| 4-Chloro diphenyl ether | ug/Kg | 330 | NA | NA | NA | NA | <330 | --- | --- | --- | --- | --- | --- | --- | --- |
| Chrysene {Q} | ug/Kg | 330 | ID | ID | 8.0E+6 | ID | <330 | --- | --- | --- | --- | --- | --- | --- | --- |
| Decabromodiphenyl ether | ug/Kg | NA | 1.0E+9 {D} | 1.0E+8 | 1.1E+7 | 1.0E+9 {D} | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Di-n-butyl phthalate | ug/Kg | 330 | NLV | NLV | 7.6E+5 {C} | NLV | <330 | --- | --- | --- | --- | --- | --- | --- | --- |
| Di-n-octyl phthalate | ug/Kg | 330 | NLV | NLV | 2.0E+7 | NLV | <330 | --- | --- | --- | --- | --- | --- | --- | --- |
| Dibenzo(a,h)anthracene {Q} | ug/Kg | 330 | NLV | NLV | 8000 | NLV | <330 | --- | --- | --- | --- | --- | --- | --- | --- |
| Dibenzofuran | ug/Kg | 330 | 3.6E+6 | 1.6E+5 | ID | 2.0E+6 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 3,3'-Dichlorobenzidine | ug/Kg | 2000 | NLV | NLV | 30000 | NLV | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Diethyl phthalate | ug/Kg | 330 | NLV | NLV | 7.4E+5 {C} | NLV | <330 | --- | --- | --- | --- | --- | --- | --- | --- |
| Dimethyl phthalate | ug/Kg | 330 | NLV | NLV | 7.9E+5 {C} | NLV | <330 | --- | --- | --- | --- | --- | --- | --- | --- |
| 2,4-Dinitrotoluene | ug/Kg | 330 | NLV | NLV | 2.2E+5 | NLV | <330 | --- | --- | --- | --- | --- | --- | --- | --- |
| 2,6-Dinitrotoluene | ug/Kg | 330 | NA | NA | NA | NA | <330 | --- | --- | --- | --- | --- | --- | --- | --- |
| 1,2-Diphenylhydrazine | ug/Kg | 330 | NA | NA | NA | NA | <330 | --- | --- | --- | --- | --- | --- | --- | --- |

# Table B2-2 - Update 2011 Criteria
## Summary of Analytical Results for Soil Samples
## Gage Products
## Ferndale, Michigan

| Sample Location | | Background | Non-Residential | Non-Residential | Non-Residential | Residential | TMW-03 | TSB-1 | TSB-1 | TSB-1 | TSB-2 | TSB-2 | TSB-3 | TSB-3 | TSB-4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lab Sample ID | | Target | Soil | Volatile | Direct | Soil | 179277 | 45669 | 45670 | 45671 | 45672 | 45673 | 45674 | 45675 | 45994 |
| Sampled By | | Method | Volatilization to | Soil | Contact | Volatilization to | Horizon | WWES | WWES | WWES | WWES | WWES | WWES | WWES | WWES |
| Analyzed By | | Detection | Indoor Air | Inhalation | | Indoor Air | TriMatrix | | | | | | | | |
| Sample Date | | Limit | Inhalation | Infinite | | Inhalation | 9/30/1997 | 8/3/1990 | 8/3/1990 | 8/3/1990 | 8/3/1990 | 8/3/1990 | 8/3/1990 | 8/3/1990 | 8/6/1990 |
| Sample Depth (ft.) | | | | | | | 0-1 | 4.0-5.5 | 9.0-10.5 | 11.5-12.5 | 2.0-3.5 | 11.0-12.5 | 2.0 - 3.5 | 9.0 - 10.5 | 2.0-3.5 |
| ***Semi-Volatiles Cont.*** | ***Units*** | | | | | | | | | | | | | | |
| Fluoranthene | ug/Kg | 330 | 1.0E+9 {D} | 8.9E+8 | 1.3E+8 | 1.0E+9 {D} | <330 | --- | --- | --- | --- | --- | --- | --- | --- |
| Fluorene | ug/Kg | 330 | 1.0E+9 {D} | 1.5E+8 | 8.7E+7 | 5.8E+8 | <330 | --- | --- | --- | --- | --- | --- | --- | --- |
| Hexachlorobenzene (C-66) | ug/Kg | 330 | 2.2E+5 | 56000 | 37000 | 41000 | <20 | --- | --- | --- | --- | --- | --- | --- | --- |
| Hexachlorobutadiene (C-46) | ug/Kg | 50 | 3.5E+5 {C} | 4.6E+5 | 3.5E+5 {C} | 1.3E+5 | <330 | --- | --- | --- | --- | --- | --- | --- | --- |
| Hexachlorocyclopentadiene (C-56) | ug/Kg | 330 | 56000 | 60000 | 7.2E+5 {C} | 30000 | <330 | --- | --- | --- | --- | --- | --- | --- | --- |
| Hexachloroethane | ug/Kg | 300 | 79000 | 6.6E+5 | 7.3E+5 | 40000 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Indeno(1,2,3-cd)pyrene {Q} | ug/Kg | 330 | NLV | NLV | 80000 | NLV | <330 | --- | --- | --- | --- | --- | --- | --- | --- |
| Isophorone | ug/Kg | 330 | NLV | NLV | 2.4E+6 {C} | NLV | <330 | --- | --- | --- | --- | --- | --- | --- | --- |
| 2-Methylnaphthalene | ug/Kg | 330 | 4.9E+6 | 1.8E+6 | 2.6E+7 | 2.7E+6 | <330 | --- | --- | --- | --- | --- | --- | --- | --- |
| n-Nitroso-di-n-propylamine | ug/Kg | 330 | NLV | NLV | 5400 | NLV | <330 | --- | --- | --- | --- | --- | --- | --- | --- |
| n-Nitroso-di-propylamine | ug/Kg | 330 | NLV | NLV | 5400 | NLV | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Naphthalene | ug/Kg | 330 | 4.7E+5 | 3.5E+5 | 5.2E+7 | 2.5E+5 | <330 | --- | --- | --- | --- | --- | --- | --- | --- |
| Nitrobenzene {I} | ug/Kg | 330 | 1.7E+5 | 64000 | 3.4E+5 | 91000 | <330 | --- | --- | --- | --- | --- | --- | --- | --- |
| N-Nitrosodiphenylamine | ug/Kg | 330 | NLV | NLV | 7.8E+6 | NLV | <330 | --- | --- | --- | --- | --- | --- | --- | --- |
| n-Nitroso-n-propylamine | ug/Kg | 330 | NLV | NLV | 5400 | NLV | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Phenanthrene | ug/Kg | 330 | 5.1E+6 | 1.9E+5 | 5.2E+6 | 2.8E+6 | <330 | --- | --- | --- | --- | --- | --- | --- | --- |
| Pyrene | ug/Kg | 330 | 1.0E+9 {D} | 7.8E+8 | 8.4E+7 | 1.0E+9 {D} | <330 | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Volatiles*** | ***Units*** | | | | | | | | | | | | | | |
| Acetone {I} | ug/Kg | 1000 | 1.1E+8 {C} | 1.6E+8 | 7.3E+7 | 1.1E+8 {C} | <100 | --- | --- | --- | --- | --- | --- | --- | --- |
| Acrylonitrile {I} | ug/Kg | 100 | 35000 | 17000 | 74000 | 6600 | <10 | --- | --- | --- | --- | --- | --- | --- | --- |
| Benzene {I} | ug/Kg | 50 | 8400 | 45000 | 4.0E+5 {C} | 1600 | <10 | <20 | <20 | <20 | <20 | <20 | ***2600*** | <20 | <20 |
| Bromobenzene {I} | ug/Kg | 100 | 5.8E+5 | 5.4E+5 | 7.6E+5 {C} | 3.1E+5 | --- | <40 | <40 | <40 | <40 | <40 | <5000 | <40 | <40 |
| Bromochloromethane | ug/Kg | 100 | NA | NA | NA | NA | <10 | <300 | <300 | <300 | <300 | <300 | <38000 | <300 | <300 |
| Bromodichloromethane | ug/Kg | 100 | 6400 | 31000 | 4.9E+5 | 1200 | --- | <40 | <40 | <40 | <40 | <40 | <5000 | <40 | <40 |
| Bromoform | ug/Kg | 100 | 7.7E+5 | 3.1E+6 | 8.7E+5 {C} | 1.5E+5 | <10 | <300 | <300 | <300 | <300 | <300 | <38000 | <300 | <300 |
| Bromomethane | ug/Kg | 200 | 1600 | 13000 | 1.0E+6 | 860 | <10 | <200 | <200 | <200 | <200 | <200 | <25000 | <200 | <200 |
| 2-Butanone (MEK) {I} | ug/Kg | 750 | 2.7E+7 {C} | 3.5E+7 | 2.7E+7 {C,DD} | 2.7E+7 {C} | <100 | --- | --- | --- | --- | --- | --- | --- | --- |
| n-Butylbenzene | ug/Kg | 50 | ID | ID | 8.0E+6 | ID | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| sec-Butylbenzene | ug/Kg | 50 | ID | ID | 8.0E+6 | ID | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| tert-Butylbenzene | ug/Kg | 50 | ID | ID | 8.0E+6 | ID | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Carbon disulfide {I,R} | ug/Kg | 250 | 1.4E+5 | 1.6E+6 | 2.8E+5 {C,DD} | 76000 | <100 | --- | --- | --- | --- | --- | --- | --- | --- |
| Carbon tetrachloride | ug/Kg | 50 | 990 | 12000 | 3.9E+5 {C} | 190 | <10 | <80 | <80 | <80 | <80 | <80 | <10000 | <80 | <80 |
| Chlorobenzene {I} | ug/Kg | 50 | 2.2E+5 | 9.2E+5 | 2.6E+5 {C} | 1.2E+5 | <10 | <20 | <20 | <20 | <20 | <20 | **87000** | **250** | <20 |
| Dibromochloromethane | ug/Kg | 100 | 21000 | 80000 | 5.0E+5 | 3900 | <10 | --- | --- | --- | --- | --- | --- | --- | --- |
| Chloroethane {I} | ug/Kg | 250 | 9.5E+5 {C} | 3.6E+7 | 9.5E+5 {C} | 9.5E+5 {C} | <10 | <200 | <200 | <200 | <200 | <200 | <25000 | <200 | <200 |
| 2-Chloroethyl vinyl ether | ug/Kg | 5000 | ID | ID | ID | ID | --- | <200 | <200 | <200 | <200 | <200 | <25000 | <200 | <200 |
| Chloroform | ug/Kg | 50 | 38000 | 1.5E+5 | 1.5E+6 {C} | 7200 | <10 | <20 | <20 | <20 | <20 | <20 | <2500 | <20 | <20 |
| Chloromethane {I} | ug/Kg | 250 | 10000 | 1.2E+5 | 1.1E+6 {C} | 2300 | <10 | <200 | <200 | <200 | <200 | <200 | <25000 | <200 | <200 |
| 2-Chlorotoluene | ug/Kg | 50 | 5.0E+5 {C} | 1.5E+6 | 5.0E+5 {C} | 2.7E+5 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4-Chlorotoluene | ug/Kg | 50 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- |

# Table B2-2 - Update 2011 Criteria
## Summary of Analytical Results for Soil Samples
## Gage Products
## Ferndale, Michigan

| Sample Location | | Background | Non-Residential | Non-Residential | Non-Residential | Residential | TMW-03 | TSB-1 | TSB-1 | TSB-1 | TSB-2 | TSB-2 | TSB-3 | TSB-3 | TSB-4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lab Sample ID | | Target | Soil | Volatile | Direct | Soil | 179277 | 45669 | 45670 | 45671 | 45672 | 45673 | 45674 | 45675 | 45994 |
| Sampled By | | Method | Volatilization to | Soil | Contact | Volatilization to | Horizon | WWES | WWES | WWES | WWES | WWES | WWES | WWES | WWES |
| Analyzed By | | Detection | Indoor Air | Inhalation | | Indoor Air | TriMatrix | | | | | | | | |
| Sample Date | | Limit | Inhalation | Infinite | | Inhalation | 9/30/1997 | 8/3/1990 | 8/3/1990 | 8/3/1990 | 8/3/1990 | 8/3/1990 | 8/3/1990 | 8/3/1990 | 8/6/1990 |
| Sample Depth (ft.) | | | | | | | 0-1 | 4.0-5.5 | 9.0-10.5 | 11.5-12.5 | 2.0-3.5 | 11.0-12.5 | 2.0 - 3.5 | 9.0 - 10.5 | 2.0-3.5 |
| ***Volatiles Cont.*** | **Units** | | | | | | | | | | | | | | |
| Dibromochloropropane | ug/Kg | 10 | 1200 {C} | 15000 | 1200 {C} | 1200 {C} | <50 | --- | --- | --- | --- | --- | --- | --- | --- |
| Dibromochloromethane | ug/Kg | 100 | 21000 | 80000 | 5.0E+5 | 3900 | --- | <60 | <60 | <60 | <60 | <60 | <7500 | <60 | <60 |
| Ethylene dibromide | ug/Kg | 20 | 3600 | 5800 | 430 | 670 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dibromomethane | ug/Kg | 250 | ID | ID | 2.0E+6 {C} | ID | <10 | --- | --- | --- | --- | --- | --- | --- | --- |
| Ethylene dibromide | ug/Kg | 20 | 3600 | 5800 | 430 | 670 | <10 | --- | --- | --- | --- | --- | --- | --- | --- |
| trans-1,4-Dichloro-2-butene | ug/Kg | 50 | NA | NA | NA | NA | <10 | --- | --- | --- | --- | --- | --- | --- | --- |
| 1,2-Dichlorobenzene | ug/Kg | 100 | 2.1E+5 {C} | 4.6E+7 | 2.1E+5 {C} | 2.1E+5 {C} | <10 | <300 | <300 | <300 | <300 | <300 | <38000 | <300 | <300 |
| 1,3-Dichlorobenzene | ug/Kg | 100 | 48000 | 94000 | 1.7E+5 {C} | 26000 | <10 | <300 | <300 | <300 | <300 | <300 | <38000 | <300 | <300 |
| 1,4-Dichlorobenzene | ug/Kg | 100 | 1.0E+5 | 2.6E+5 | 1.9E+6 | 19000 | <10 | <300 | <300 | <300 | <300 | <300 | <38000 | <300 | <300 |
| Dibromochloromethane | ug/Kg | 100 | 21000 | 80000 | 5.0E+5 | 3900 | <10 | --- | --- | --- | --- | --- | --- | --- | --- |
| Dichlorodifluoromethane | ug/Kg | 250 | 1.7E+6 | 6.3E+7 | 1.0E+6 {C} | 9.0E+5 | <10 | <200 | <200 | <200 | <200 | <200 | <25000 | <200 | <200 |
| 1,1-Dichloroethane {I} | ug/Kg | 50 | 4.3E+5 | 2.5E+6 | 8.9E+5 {C} | 2.3E+5 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1,2-Dichloroethane {I} | ug/Kg | 50 | 11000 | 21000 | 4.2E+5 | 2100 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1,1-Dichloroethane {I} | ug/Kg | 50 | 4.3E+5 | 2.5E+6 | 8.9E+5 {C} | 2.3E+5 | <10 | <40 | <40 | <40 | <40 | <40 | <5000 | <40 | <40 |
| 1,2-Dichloroethane {I} | ug/Kg | 50 | 11000 | 21000 | 4.2E+5 | 2100 | <10 | <40 | <40 | <40 | <40 | <40 | <5000 | <40 | <40 |
| 1,1-Dichloroethylene {I} | ug/Kg | 50 | 330 | 3700 | 5.7E+5 {C} | 62 | <10 | <40 | <40 | <40 | <40 | <40 | <5000 | <40 | <40 |
| cis-1,2-Dichloroethylene {I} | ug/Kg | 50 | 41000 | 2.1E+5 | 6.4E+5 {C} | 22000 | <10 | --- | --- | --- | --- | --- | --- | --- | --- |
| trans-1,2-Dichloroethylene | ug/Kg | 50 | 43000 | 3.3E+5 | 1.4E+6 {C} | 23000 | <10 | <40 | <40 | <40 | <40 | <40 | <5000 | <40 | <40 |
| 2,2-Dichloropropane | ug/Kg | 50 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1,2-Dichloropropane {I} | ug/Kg | 50 | 7400 | 30000 | 5.5E+5 {C} | 4000 | <10 | <60 | <60 | <60 | <60 | <60 | <7500 | <60 | <60 |
| 1,3-Dichloropropane | ug/Kg | 50 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1,1-Dichloropropene | ug/Kg | 50 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| cis-1,3-Dichloropropene {I,J} | ug/Kg | 50 | 5400 | 60000 | 2.4E+5 | 1000 | <10 | <80 | <80 | <80 | <80 | <80 | <10000 | <80 | <80 |
| trans-1,3-Dichloropropene {I, J} | ug/Kg | 50 | 5400 | 60000 | 2.4E+5 | 1000 | <10 | <80 | <80 | <80 | <80 | <80 | <10000 | <80 | <80 |
| Diethyl ether {I} | ug/Kg | 200 | 7.4E+6 {C} | 1.0E+8 | 7.4E+6 {C} | 7.4E+6 {C} | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Diethylbenzene | ug/Kg | 50 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dimethyl disulfide | ug/Kg | 50 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Diethyl ether {I} | ug/Kg | 200 | 7.4E+6 {C} | 1.0E+8 | 7.4E+6 {C} | 7.4E+6 {C} | <100 | --- | --- | --- | --- | --- | --- | --- | --- |
| Ethylbenzene {I} | ug/Kg | 50 | 1.4E+5 {C} | 2.4E+6 | 1.4E+5 {C} | 87000 | <10 | <20 | <20 | <20 | <20 | <20 | **7500** | **22** | <20 |
| Hexachlorobutadiene (C-46) | ug/Kg | 50 | 3.5E+5 {C} | 4.6E+5 | 3.5E+5 {C} | 1.3E+5 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Hexachloroethane | ug/Kg | 300 | 79000 | 6.6E+5 | 7.3E+5 | 40000 | <10 | --- | --- | --- | --- | --- | --- | --- | --- |
| 2-Hexanone {I} | ug/Kg | 2500 | 1.8E+6 | 1.3E+6 | 2.5E+6 {C} | 9.9E+5 | <100 | --- | --- | --- | --- | --- | --- | --- | --- |
| Iodomethane | ug/Kg | 100 | NA | NA | NA | NA | <100 | --- | --- | --- | --- | --- | --- | --- | --- |
| Isopropyl benzene {I} | ug/Kg | 250 | 3.9E+5 {C} | 2.0E+6 | 3.9E+5 {C} | 3.9E+5 {C} | <10 | --- | --- | --- | --- | --- | --- | --- | --- |
| p-Isopropyltoluene | ug/Kg | 100 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 5-Methly-2-Hexanone | ug/Kg | 100 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Iodomethane | ug/Kg | 100 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4-Methyl-2-pentanone (MIBK) {I} | ug/Kg | 2500 | 2.7E+6 {C} | 5.3E+7 | 2.7E+6 {C} | 2.7E+6 {C} | <100 | --- | --- | --- | --- | --- | --- | --- | --- |
| Methyl-tert-butyl ether (MTBE) | ug/Kg | 250 | 5.9E+6 {C} | 3.0E+7 | 5.9E+6 {C} | 5.9E+6 {C} | <100 | --- | --- | --- | --- | --- | --- | --- | --- |

# Table B2-2 - Update 2011 Criteria
## Summary of Analytical Results for Soil Samples
## Gage Products
## Ferndale, Michigan

| Sample Location | | Background | Non-Residential | Non-Residential | Non-Residential | Residential | TMW-03 | TSB-1 | TSB-1 | TSB-1 | TSB-2 | TSB-2 | TSB-3 | TSB-3 | TSB-4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lab Sample ID | | Target | Soil | Volatile | Direct | Soil | 179277 | 45669 | 45670 | 45671 | 45672 | 45673 | 45674 | 45675 | 45994 |
| Sampled By | | Method | Volatilization to | Soil | Contact | Volatilization to | Horizon | WWES | WWES | WWES | WWES | WWES | WWES | WWES | WWES |
| Analyzed By | | Detection | Indoor Air | Inhalation | | Indoor Air | TriMatrix | | | | | | | | |
| Sample Date | | Limit | Inhalation | Infinite | | Inhalation | 9/30/1997 | 8/3/1990 | 8/3/1990 | 8/3/1990 | 8/3/1990 | 8/3/1990 | 8/3/1990 | 8/3/1990 | 8/6/1990 |
| Sample Depth (ft.) | | | | | | | 0-1 | 4.0-5.5 | 9.0-10.5 | 11.5-12.5 | 2.0-3.5 | 11.0-12.5 | 2.0 - 3.5 | 9.0 - 10.5 | 2.0-3.5 |
| ***Volatiles Cont.*** | ***Units*** | | | | | | | | | | | | | | |
| Methylene chloride | ug/Kg | 100 | 2.4E+5 | 7.0E+5 | 2.3E+6 {C} | 45000 | <10 | <100 | <100 | <100 | <100 | <100 | <13000 | <100 | <100 |
| 2-Methylnaphthalene | ug/Kg | 330 | 4.9E+6 | 1.8E+6 | 2.6E+7 | 2.7E+6 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Naphthalene | ug/Kg | 330 | 4.7E+5 | 3.5E+5 | 5.2E+7 | 2.5E+5 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| n-Propylbenzene {I} | ug/Kg | 100 | ID | ID | 8.0E+6 | ID | <10 | --- | --- | --- | --- | --- | --- | --- | --- |
| Styrene {I} | ug/Kg | 50 | 5.2E+5 {C} | 3.3E+6 | 5.2E+5 {C} | 2.5E+5 | <10 | --- | --- | --- | --- | --- | --- | --- | --- |
| 1,1,1,2-Tetrachloroethane | ug/Kg | 100 | 33000 | 1.2E+5 | 4.4E+5 {C} | 6200 | <10 | --- | --- | --- | --- | --- | --- | --- | --- |
| 1,1,2,2-Tetrachloroethane | ug/Kg | 50 | 23000 | 34000 | 2.4E+5 | 4300 | <10 | <40 | <40 | <40 | <40 | <40 | <5000 | <40 | <40 |
| Tetrachloroethylene | ug/Kg | 50 | 60000 | 6.0E+5 | 88000 {C} | 11000 | <10 | <40 | <40 | <40 | <40 | <40 | <5000 | <40 | <40 |
| Tetrahydrofuran | ug/Kg | 1000 | 2.4E+6 | 1.5E+7 | 9.5E+6 | 1.3E+6 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Toluene {I} | ug/Kg | 100 | 2.5E+5 {C} | 3.3E+6 | 2.5E+5 {C} | 2.5E+5 {C} | <10 | <20 | <20 | <20 | <20 | <20 | **9900** | **58** | <20 |
| 1,2,3-Trichlorobenzene | ug/Kg | 330 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1,2,4-Trichlorobenzene | ug/Kg | 330 | 1.1E+6 {C} | 3.4E+7 | 1.1E+6 {C,DD} | 1.1E+6 {C} | <10 | --- | --- | --- | --- | --- | --- | --- | --- |
| 1,1,1-Trichloroethane | ug/Kg | 50 | 4.6E+5 | 4.5E+6 | 4.6E+5 {C} | 2.5E+5 | <10 | <40 | <40 | <40 | <40 | <40 | <5000 | <40 | <40 |
| 1,1,2-Trichloroethane | ug/Kg | 50 | 24000 | 57000 | 8.4E+5 | 4600 | <10 | <60 | <60 | <60 | <60 | <60 | <7500 | <60 | <60 |
| Trichloroethylene | ug/Kg | 50 | 37000 | 2.6E+5 | 5.0E+5 {C,DD} | 7100 | <10 | <40 | <40 | <40 | <40 | <40 | <5000 | <40 | <40 |
| Trichlorofluoromethane | ug/Kg | 100 | 5.6E+5 {C} | 1.1E+8 | 5.6E+5 {C} | 5.6E+5 {C} | <10 | <60 | <60 | <60 | <60 | <60 | <7500 | <60 | <60 |
| 1,2,3-Trichloropropane | ug/Kg | 100 | 7500 | 11000 | 8.3E+5 {C} | 4000 | <10 | --- | --- | --- | --- | --- | --- | --- | --- |
| 1,2,4-Trimethylbenzene {I} | ug/Kg | 100 | 1.1E+5 {C} | 2.5E+7 | 1.1E+5 {C} | 1.1E+5 {C} | <10 | --- | --- | --- | --- | --- | --- | --- | --- |
| 1,3,5-Trimethylbenzene {I} | ug/Kg | 100 | 94000 {C} | 1.9E+7 | 94000 {C} | 94000 {C} | <10 | --- | --- | --- | --- | --- | --- | --- | --- |
| Vinyl acetate | ug/Kg | 5000 | 1.5E+6 | 2.0E+6 | 2.4E+6 {C,DD} | 7.9E+5 | <100 | --- | --- | --- | --- | --- | --- | --- | --- |
| Vinyl chloride | ug/Kg | 40 | 2800 | 29000 | 34000 | 270 | <10 | <200 | <200 | <200 | <200 | <200 | <25000 | <200 | <200 |
| Xylene, p&m | ug/Kg | 100 | 1.5E+5 {C} | 5.4E+7 | 1.5E+5 {C} | 1.5E+5 {C} | <20 | --- | --- | --- | --- | --- | --- | --- | --- |
| Xylene, o | ug/Kg | 50 | 1.5E+5 {C} | 5.4E+7 | 1.5E+5 {C} | 1.5E+5 {C} | <10 | --- | --- | --- | --- | --- | --- | --- | --- |
| Xylene (Total) | ug/Kg | 150 | 1.5E+5 {C} | 5.4E+7 | 1.5E+5 {C} | 1.5E+5 {C} | --- | <100 | <100 | <100 | <100 | <100 | **26000** | **110** | <100 |
| ***PCB's*** | ***Units*** | | | | | | | | | | | | | | |
| Aroclor 1016 | ug/Kg | 330 | 1.6E+7 | 8.1E+5 | 16000 {T} | 3.0E+6 | <330 | --- | --- | --- | --- | --- | --- | --- | --- |
| Aroclor 1221 | ug/Kg | 330 | 1.6E+7 | 8.1E+5 | 16000 {T} | 3.0E+6 | <330 | --- | --- | --- | --- | --- | --- | --- | --- |
| Aroclor 1232 | ug/Kg | 330 | 1.6E+7 | 8.1E+5 | 16000 {T} | 3.0E+6 | <330 | --- | --- | --- | --- | --- | --- | --- | --- |
| Aroclor 1242 | ug/Kg | 330 | 1.6E+7 | 8.1E+5 | 16000 {T} | 3.0E+6 | <330 | --- | --- | --- | --- | --- | --- | --- | --- |
| Aroclor 1248 | ug/Kg | 330 | 1.6E+7 | 8.1E+5 | 16000 {T} | 3.0E+6 | <330 | --- | --- | --- | --- | --- | --- | --- | --- |
| Aroclor 1254 | ug/Kg | 330 | 1.6E+7 | 8.1E+5 | 16000 {T} | 3.0E+6 | <330 | --- | --- | --- | --- | --- | --- | --- | --- |
| Aroclor 1260 | ug/Kg | 330 | 1.6E+7 | 8.1E+5 | 16000 {T} | 3.0E+6 | <330 | --- | --- | --- | --- | --- | --- | --- | --- |
| Aroclor 1262 | ug/Kg | 330 | 1.6E+7 | 8.1E+5 | 16000 {T} | 3.0E+6 | <330 | --- | --- | --- | --- | --- | --- | --- | --- |
| Aroclor 1268 | ug/Kg | 330 | 1.6E+7 | 8.1E+5 | 16000 {T} | 3.0E+6 | <330 | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Pesticides*** | ***Units*** | | | | | | | | | | | | | | |
| Aldrin | ug/Kg | 20 | 7.1E+6 | 2.0E+5 | 4300 | 1.3E+6 | <1.7 | --- | --- | --- | --- | --- | --- | --- | --- |
| alpha-Hexachlorocyclohexane | ug/Kg | 10 | 1.6E+5 | 41000 | 12000 | 30000 | <1.7 | --- | --- | --- | --- | --- | --- | --- | --- |
| beta-Hexachlorocyclohexane | ug/Kg | 20 | NLV | NLV | 25000 | NLV | <1.7 | --- | --- | --- | --- | --- | --- | --- | --- |
| delta-Hexachlorocyclohexane | ug/Kg | 20 | NA | NA | NA | NA | <1.7 | --- | --- | --- | --- | --- | --- | --- | --- |
| 4-4'-DDD | ug/Kg | 20 | NLV | NLV | 4.0E+5 | NLV | <3.3 | --- | --- | --- | --- | --- | --- | --- | --- |

# Table B2-2 - Update 2011 Criteria
## Summary of Analytical Results for Soil Samples
## Gage Products
## Ferndale, Michigan

| Sample Location<br>Lab Sample ID<br>Sampled By<br>Analyzed By<br>Sample Date<br>Sample Depth (ft.) | | Background Target Method Detection Limit | Non-Residential Soil Volatilization to Indoor Air Inhalation | Non-Residential Volatile Soil Inhalation Infinite | Non-Residential Direct Contact | Residential Soil Volatilization to Indoor Air Inhalation | TMW-03<br>179277<br>Horizon<br>TriMatrix<br>9/30/1997<br>0-1 | TSB-1<br>45669<br>WWES<br><br>8/3/1990<br>4.0-5.5 | TSB-1<br>45670<br>WWES<br><br>8/3/1990<br>9.0-10.5 | TSB-1<br>45671<br>WWES<br><br>8/3/1990<br>11.5-12.5 | TSB-2<br>45672<br>WWES<br><br>8/3/1990<br>2.0-3.5 | TSB-2<br>45673<br>WWES<br><br>8/3/1990<br>11.0-12.5 | TSB-3<br>45674<br>WWES<br><br>8/3/1990<br>2.0 - 3.5 | TSB-3<br>45675<br>WWES<br><br>8/3/1990<br>9.0 - 10.5 | TSB-4<br>45994<br>WWES<br><br>8/6/1990<br>2.0-3.5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Pesticides Cont.*** | **Units** | | | | | | | | | | | | | | |
| 4-4'-DDE | ug/Kg | 20 | NLV | NLV | 1.9E+5 | NLV | **6.4** | --- | --- | --- | --- | --- | --- | --- | --- |
| 4-4'-DDT | ug/Kg | 20 | NLV | NLV | 2.8E+5 | NLV | **12** | --- | --- | --- | --- | --- | --- | --- | --- |
| Dieldrin | ug/Kg | 20 | 7.2E+5 | 64000 | 4700 | 1.4E+5 | <3.3 | --- | --- | --- | --- | --- | --- | --- | --- |
| Endosulfan I {J} | ug/Kg | 20 | ID | ID | 4.4E+6 | ID | <3.3 | --- | --- | --- | --- | --- | --- | --- | --- |
| Endosulfan II {J} | ug/Kg | 20 | ID | ID | 4.4E+6 | ID | <3.3 | --- | --- | --- | --- | --- | --- | --- | --- |
| Endosulfan Sulfate {J} | ug/Kg | 20 | NA | NA | NA | NA | <3.3 | --- | --- | --- | --- | --- | --- | --- | --- |
| Endrin | ug/Kg | 20 | NLV | NLV | 1.9E+5 | NLV | <3.3 | --- | --- | --- | --- | --- | --- | --- | --- |
| Endrin Aldehyde | ug/Kg | 20 | NA | NA | NA | NA | <3.3 | --- | --- | --- | --- | --- | --- | --- | --- |
| Heptachlor | ug/Kg | 20 | 1.9E+6 | 2.1E+5 | 23000 | 3.5E+5 | <1.7 | --- | --- | --- | --- | --- | --- | --- | --- |
| Heptachlor epoxide | ug/Kg | 20 | NLV | NLV | 9500 | NLV | <1.7 | --- | --- | --- | --- | --- | --- | --- | --- |
| Lindane | ug/Kg | 20 | ID | ID | 42000 | ID | <1.7 | --- | --- | --- | --- | --- | --- | --- | --- |
| Methoxychlor | ug/Kg | 50 | ID | ID | 5.6E+6 | ID | <50 | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Misc*** | **Units** | | | | | | | | | | | | | | |
| Percent Solids | % | NA | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- |

# Table B2-2 - Update 2011 Criteria
## Summary of Analytical Results for Soil Samples
## Gage Products
## Ferndale, Michigan

| Sample Location<br>Lab Sample ID<br>Sampled By<br>Analyzed By<br>Sample Date<br>Sample Depth (ft.) | | Background Target Method Detection Limit | Non-Residential Soil Volatilization to Indoor Air Inhalation | Non-Residential Volatile Soil Inhalation Infinite | Non-Residential Direct Contact | Residential Soil Volatilization to Indoor Air Inhalation | TSB-4<br>45995<br>WWES<br><br>8/6/1990<br>6.0-7.5 | TSB-4<br>45996<br>WWES<br><br>8/6/1990<br>0.5-2.0 | TSB-5<br>45991<br>WWES<br><br>8/6/1990<br>2.0 - 3.5 | TSB-5<br>45992<br>WWES<br><br>8/6/1990<br>9.0 - 10.5 | TSB-5<br>45993<br>WWES<br><br>8/6/1990<br>0.5 - 2.0 | TSB-5<br>45997<br>WWES<br><br>8/6/1990<br>6.0 - 7.5 | TSB-5<br>45998<br>WWES<br><br>8/6/1990<br>4.0 - 5.5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Inorganics*** | ***Units*** | | | | | | | | | | | | |
| Arsenic {B} | mg/Kg | 5.8 | NLV | NLV | 37 | NLV | --- | --- | --- | --- | --- | --- | --- |
| Cadmium {B} | mg/Kg | 1.2 | NLV | NLV | 2100 | NLV | --- | --- | --- | --- | --- | --- | --- |
| Chromium, Total | mg/Kg | 18 | NLV | NLV | 9200 | NLV | --- | --- | --- | --- | --- | --- | --- |
| Chromium (VI) | mg/Kg | 18 | NLV | NLV | 9200 | NLV | --- | --- | --- | --- | --- | --- | --- |
| Chromium (III) {B,H} | mg/Kg | 18 | NLV | NLV | 1000000 {D} | NLV | --- | --- | --- | --- | --- | --- | --- |
| Copper {B} | mg/Kg | 32 | NLV | NLV | 73000 | NLV | --- | --- | --- | --- | --- | --- | --- |
| Iron | mg/Kg | 12000 | NLV | NLV | 580000 | NLV | --- | --- | --- | --- | --- | --- | --- |
| Lead {B} | mg/Kg | 21 | NLV | NLV | 900 (DD) | NLV | --- | --- | --- | --- | --- | --- | --- |
| Mercury (Inorganic) {B} | mg/Kg | 0.13 | 89 | 62 | 580 | 48 | --- | --- | --- | --- | --- | --- | --- |
| Nickel | mg/Kg | 20 | NLV | NLV | 150000 | NLV | --- | --- | --- | --- | --- | --- | --- |
| Zinc {B} | mg/Kg | 47 | NLV | NLV | 630000 | NLV | --- | --- | --- | --- | --- | --- | --- |
| ***Semi-Volatiles*** | ***Units*** | | | | | | | | | | | | |
| Acenaphthene | ug/Kg | 330 | 3.5E+8 | 9.7E+7 | 1.3E+8 | 1.9E+8 | --- | --- | --- | --- | --- | --- | --- |
| Acenaphthylene | ug/Kg | 330 | 3.0E+6 | 2.7E+6 | 5.2E+6 | 1.6E+6 | --- | --- | --- | --- | --- | --- | --- |
| Anthracene | ug/Kg | 330 | 1.0E+9 {D} | 1.6E+9 | 7.3E+8 | 1.0E+9 {D} | --- | --- | --- | --- | --- | --- | --- |
| Benzo(a)anthracene {Q} | ug/Kg | 330 | NLV | NLV | 80000 | NLV | --- | --- | --- | --- | --- | --- | --- |
| Benzo(a)pyrene {Q} | ug/Kg | 330 | NLV | NLV | 8000 | NLV | --- | --- | --- | --- | --- | --- | --- |
| Benzo(b&k)fluoranthene | ug/Kg | 330 | ID | ID | 80000 | ID | --- | --- | --- | --- | --- | --- | --- |
| Benzo(g,h,i)perylene | ug/Kg | 330 | NLV | NLV | 7.0E+6 | NLV | --- | --- | --- | --- | --- | --- | --- |
| bis(2-Chloroethoxy)methane | ug/Kg | 330 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- |
| bis(2-Chloroethyl)ether {I} | ug/Kg | 100 | 44000 | 13000 | 58000 | 8300 | --- | --- | --- | --- | --- | --- | --- |
| bis(2-Chloroisopropyl)ether | ug/Kg | 330 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- |
| bis(2-Ethylhexyl)phthalate | ug/Kg | 330 | NLV | NLV | 1.0E+7 {C} | NLV | --- | --- | --- | --- | --- | --- | --- |
| 4-Bromo diphenyl ether | ug/Kg | 330 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- |
| Butyl benzyl phthalate | ug/Kg | 330 | NLV | NLV | 3.1E+5 {C} | NLV | --- | --- | --- | --- | --- | --- | --- |
| beta-Chloronaphthalene | ug/Kg | 330 | ID | ID | 1.8E+8 | ID | --- | --- | --- | --- | --- | --- | --- |
| 4-Chloro diphenyl ether | ug/Kg | 330 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- |
| Chrysene {Q} | ug/Kg | 330 | ID | ID | 8.0E+6 | ID | --- | --- | --- | --- | --- | --- | --- |
| Decabromodiphenyl ether | ug/Kg | NA | 1.0E+9 {D} | 1.0E+8 | 1.1E+7 | 1.0E+9 {D} | --- | --- | --- | --- | --- | --- | --- |
| Di-n-butyl phthalate | ug/Kg | 330 | NLV | NLV | 7.6E+5 {C} | NLV | --- | --- | --- | --- | --- | --- | --- |
| Di-n-octyl phthalate | ug/Kg | 330 | NLV | NLV | 2.0E+7 | NLV | --- | --- | --- | --- | --- | --- | --- |
| Dibenzo(a,h)anthracene {Q} | ug/Kg | 330 | NLV | NLV | 8000 | NLV | --- | --- | --- | --- | --- | --- | --- |
| Dibenzofuran | ug/Kg | 330 | 3.6E+6 | 1.6E+5 | ID | 2.0E+6 | --- | --- | --- | --- | --- | --- | --- |
| 3,3'-Dichlorobenzidine | ug/Kg | 2000 | NLV | NLV | 30000 | NLV | --- | --- | --- | --- | --- | --- | --- |
| Diethyl phthalate | ug/Kg | 330 | NLV | NLV | 7.4E+5 {C} | NLV | --- | --- | --- | --- | --- | --- | --- |
| Dimethyl phthalate | ug/Kg | 330 | NLV | NLV | 7.9E+5 {C} | NLV | --- | --- | --- | --- | --- | --- | --- |
| 2,4-Dinitrotoluene | ug/Kg | 330 | NLV | NLV | 2.2E+5 | NLV | --- | --- | --- | --- | --- | --- | --- |
| 2,6-Dinitrotoluene | ug/Kg | 330 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- |
| 1,2-Diphenylhydrazine | ug/Kg | 330 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- |

# Table B2-2 - Update 2011 Criteria
## Summary of Analytical Results for Soil Samples
## Gage Products
## Ferndale, Michigan

| Sample Location | | Background | Non-Residential | Non-Residential | Non-Residential | Residential | TSB-4 | TSB-4 | TSB-5 | TSB-5 | TSB-5 | TSB-5 | TSB-5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lab Sample ID | | Target | Soil | Volatile | Direct | Soil | 45995 | 45996 | 45991 | 45992 | 45993 | 45997 | 45998 |
| Sampled By | | Method | Volatilization to | Soil | Contact | Volatilization to | WWES | WWES | WWES | WWES | WWES | WWES | WWES |
| Analyzed By | | Detection | Indoor Air | Inhalation | | Indoor Air | | | | | | | |
| Sample Date | | Limit | Inhalation | Infinite | | Inhalation | 8/6/1990 | 8/6/1990 | 8/6/1990 | 8/6/1990 | 8/6/1990 | 8/6/1990 | 8/6/1990 |
| Sample Depth (ft.) | | | | | | | 6.0-7.5 | 0.5-2.0 | 2.0 - 3.5 | 9.0 - 10.5 | 0.5 - 2.0 | 6.0 - 7.5 | 4.0 - 5.5 |
| ***Semi-Volatiles Cont.*** | ***Units*** | | | | | | | | | | | | |
| Fluoranthene | ug/Kg | 330 | 1.0E+9 {D} | 8.9E+8 | 1.3E+8 | 1.0E+9 {D} | --- | --- | --- | --- | --- | --- | --- |
| Fluorene | ug/Kg | 330 | 1.0E+9 {D} | 1.5E+8 | 8.7E+7 | 5.8E+8 | --- | --- | --- | --- | --- | --- | --- |
| Hexachlorobenzene (C-66) | ug/Kg | 330 | 2.2E+5 | 56000 | 37000 | 41000 | --- | --- | --- | --- | --- | --- | --- |
| Hexachlorobutadiene (C-46) | ug/Kg | 50 | 3.5E+5 {C} | 4.6E+5 | 3.5E+5 {C} | 1.3E+5 | --- | --- | --- | --- | --- | --- | --- |
| Hexachlorocyclopentadiene (C-56) | ug/Kg | 330 | 56000 | 60000 | 7.2E+5 {C} | 30000 | --- | --- | --- | --- | --- | --- | --- |
| Hexachloroethane | ug/Kg | 300 | 79000 | 6.6E+5 | 7.3E+5 | 40000 | --- | --- | --- | --- | --- | --- | --- |
| Indeno(1,2,3-cd)pyrene {Q} | ug/Kg | 330 | NLV | NLV | 80000 | NLV | --- | --- | --- | --- | --- | --- | --- |
| Isophorone | ug/Kg | 330 | NLV | NLV | 2.4E+6 {C} | NLV | --- | --- | --- | --- | --- | --- | --- |
| 2-Methylnaphthalene | ug/Kg | 330 | 4.9E+6 | 1.8E+6 | 2.6E+7 | 2.7E+6 | --- | --- | --- | --- | --- | --- | --- |
| n-Nitroso-di-n-propylamine | ug/Kg | 330 | NLV | NLV | 5400 | NLV | --- | --- | --- | --- | --- | --- | --- |
| n-Nitroso-di-propylamine | ug/Kg | 330 | NLV | NLV | 5400 | NLV | --- | --- | --- | --- | --- | --- | --- |
| Naphthalene | ug/Kg | 330 | 4.7E+5 | 3.5E+5 | 5.2E+7 | 2.5E+5 | --- | --- | --- | --- | --- | --- | --- |
| Nitrobenzene {I} | ug/Kg | 330 | 1.7E+5 | 64000 | 3.4E+5 | 91000 | --- | --- | --- | --- | --- | --- | --- |
| N-Nitrosodiphenylamine | ug/Kg | 330 | NLV | NLV | 7.8E+6 | NLV | --- | --- | --- | --- | --- | --- | --- |
| n-Nitroso-n-propylamine | ug/Kg | 330 | NLV | NLV | 5400 | NLV | --- | --- | --- | --- | --- | --- | --- |
| Phenanthrene | ug/Kg | 330 | 5.1E+6 | 1.9E+5 | 5.2E+6 | 2.8E+6 | --- | --- | --- | --- | --- | --- | --- |
| Pyrene | ug/Kg | 330 | 1.0E+9 {D} | 7.8E+8 | 8.4E+7 | 1.0E+9 {D} | --- | --- | --- | --- | --- | --- | --- |
| ***Volatiles*** | ***Units*** | | | | | | | | | | | | |
| Acetone {I} | ug/Kg | 1000 | 1.1E+8 {C} | 1.6E+8 | 7.3E+7 | 1.1E+8 {C} | --- | --- | --- | --- | --- | --- | --- |
| Acrylonitrile {I} | ug/Kg | 100 | 35000 | 17000 | 74000 | 6600 | --- | --- | --- | --- | --- | --- | --- |
| Benzene {I} | ug/Kg | 50 | 8400 | 45000 | 4.0E+5 {C} | 1600 | <20 | <20 | <20 | <20 | <5000 | **210** | <20 |
| Bromobenzene {I} | ug/Kg | 100 | 5.8E+5 | 5.4E+5 | 7.6E+5 {C} | 3.1E+5 | <40 | <40 | <40 | <40 | <10000 | <40 | <40 |
| Bromochloromethane | ug/Kg | 100 | NA | NA | NA | NA | <300 | <300 | <300 | <300 | <75000 | <300 | <300 |
| Bromodichloromethane | ug/Kg | 100 | 6400 | 31000 | 4.9E+5 | 1200 | <40 | <40 | <40 | <40 | <10000 | <40 | <40 |
| Bromoform | ug/Kg | 100 | 7.7E+5 | 3.1E+6 | 8.7E+5 {C} | 1.5E+5 | <300 | <300 | <300 | <300 | <75000 | <300 | <300 |
| Bromomethane | ug/Kg | 200 | 1600 | 13000 | 1.0E+6 | 860 | <200 | <200 | <200 | <200 | <50000 | <200 | <200 |
| 2-Butanone (MEK) {I} | ug/Kg | 750 | 2.7E+7 {C} | 3.5E+7 | 2.7E+7 {C,DD} | 2.7E+7 {C} | --- | --- | --- | --- | --- | --- | --- |
| n-Butylbenzene | ug/Kg | 50 | ID | ID | 8.0E+6 | ID | --- | --- | --- | --- | --- | --- | --- |
| sec-Butylbenzene | ug/Kg | 50 | ID | ID | 8.0E+6 | ID | --- | --- | --- | --- | --- | --- | --- |
| tert-Butylbenzene | ug/Kg | 50 | ID | ID | 8.0E+6 | ID | --- | --- | --- | --- | --- | --- | --- |
| Carbon disulfide {I,R} | ug/Kg | 250 | 1.4E+5 | 1.6E+6 | 2.8E+5 {C,DD} | 76000 | --- | --- | --- | --- | --- | --- | --- |
| Carbon tetrachloride | ug/Kg | 50 | 990 | 12000 | 3.9E+5 {C} | 190 | <80 | <80 | <80 | <80 | <20000 | <80 | <80 |
| Chlorobenzene {I} | ug/Kg | 50 | 2.2E+5 | 9.2E+5 | 2.6E+5 {C} | 1.2E+5 | <20 | <20 | <20 | <20 | <5000 | **160** | <20 |
| Dibromochloromethane | ug/Kg | 100 | 21000 | 80000 | 5.0E+5 | 3900 | --- | --- | --- | --- | --- | --- | --- |
| Chloroethane {I} | ug/Kg | 250 | 9.5E+5 {C} | 3.6E+7 | 9.5E+5 {C} | 9.5E+5 {C} | <200 | <200 | <200 | <200 | <50000 | <200 | <200 |
| 2-Chloroethyl vinyl ether | ug/Kg | 5000 | ID | ID | ID | ID | <200 | <200 | <200 | <200 | <50000 | <200 | <200 |
| Chloroform | ug/Kg | 50 | 38000 | 1.5E+5 | 1.5E+6 {C} | 7200 | <20 | <20 | <20 | <20 | <5000 | <20 | <20 |
| Chloromethane {I} | ug/Kg | 250 | 10000 | 1.2E+5 | 1.1E+6 {C} | 2300 | <200 | <200 | <200 | <200 | <50000 | <200 | <200 |
| 2-Chlorotoluene | ug/Kg | 50 | 5.0E+5 {C} | 1.5E+6 | 5.0E+5 {C} | 2.7E+5 | --- | --- | --- | --- | --- | --- | --- |
| 4-Chlorotoluene | ug/Kg | 50 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- |

# Table B2-2 - Update 2011 Criteria
# Summary of Analytical Results for Soil Samples
# Gage Products
# Ferndale, Michigan

| Sample Location<br>Lab Sample ID<br>Sampled By<br>Analyzed By<br>Sample Date<br>Sample Depth (ft.) | | Background Target Method Detection Limit | Non-Residential Soil Volatilization to Indoor Air Inhalation | Non-Residential Volatile Soil Inhalation Infinite | Non-Residential Direct Contact | Residential Soil Volatilization to Indoor Air Inhalation | TSB-4<br>45995<br>WWES<br><br>8/6/1990<br>6.0-7.5 | TSB-4<br>45996<br>WWES<br><br>8/6/1990<br>0.5-2.0 | TSB-5<br>45991<br>WWES<br><br>8/6/1990<br>2.0 - 3.5 | TSB-5<br>45992<br>WWES<br><br>8/6/1990<br>9.0 - 10.5 | TSB-5<br>45993<br>WWES<br><br>8/6/1990<br>0.5 - 2.0 | TSB-5<br>45997<br>WWES<br><br>8/6/1990<br>6.0 - 7.5 | TSB-5<br>45998<br>WWES<br><br>8/6/1990<br>4.0 - 5.5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Volatiles Cont.*** | **Units** | | | | | | | | | | | | |
| Dibromochloropropane | ug/Kg | 10 | 1200 {C} | 15000 | 1200 {C} | 1200 {C} | --- | --- | --- | --- | --- | --- | --- |
| Dibromochloromethane | ug/Kg | 100 | 21000 | 80000 | 5.0E+5 | 3900 | <60 | <60 | <60 | <60 | <15000 | <60 | <60 |
| Ethylene dibromide | ug/Kg | 20 | 3600 | 5800 | 430 | 670 | --- | --- | --- | --- | --- | --- | --- |
| Dibromomethane | ug/Kg | 250 | ID | ID | 2.0E+6 {C} | ID | --- | --- | --- | --- | --- | --- | --- |
| Ethylene dibromide | ug/Kg | 20 | 3600 | 5800 | 430 | 670 | --- | --- | --- | --- | --- | --- | --- |
| trans-1,4-Dichloro-2-butene | ug/Kg | 50 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- |
| 1,2-Dichlorobenzene | ug/Kg | 100 | 2.1E+5 {C} | 4.6E+7 | 2.1E+5 {C} | 2.1E+5 {C} | <300 | <300 | <300 | <300 | <75000 | <300 | <300 |
| 1,3-Dichlorobenzene | ug/Kg | 100 | 48000 | 94000 | 1.7E+5 {C} | 26000 | <300 | <300 | <300 | <300 | <75000 | <300 | <300 |
| 1,4-Dichlorobenzene | ug/Kg | 100 | 1.0E+5 | 2.6E+5 | 1.9E+6 | 19000 | <300 | <300 | <300 | <300 | <75000 | <300 | <300 |
| Dibromochloromethane | ug/Kg | 100 | 21000 | 80000 | 5.0E+5 | 3900 | --- | --- | --- | --- | --- | --- | --- |
| Dichlorodifluoromethane | ug/Kg | 250 | 1.7E+6 | 6.3E+7 | 1.0E+6 {C} | 9.0E+5 | <200 | <200 | <200 | <200 | <50000 | <200 | <200 |
| 1,1-Dichloroethane {I} | ug/Kg | 50 | 4.3E+5 | 2.5E+6 | 8.9E+5 {C} | 2.3E+5 | --- | --- | --- | --- | --- | --- | --- |
| 1,2-Dichloroethane {I} | ug/Kg | 50 | 11000 | 21000 | 4.2E+5 | 2100 | --- | --- | --- | --- | --- | --- | --- |
| 1,1-Dichloroethane {I} | ug/Kg | 50 | 4.3E+5 | 2.5E+6 | 8.9E+5 {C} | 2.3E+5 | <40 | <40 | <40 | <40 | <10000 | <40 | <40 |
| 1,2-Dichloroethane {I} | ug/Kg | 50 | 11000 | 21000 | 4.2E+5 | 2100 | <40 | <40 | <40 | <40 | <10000 | <40 | <40 |
| 1,1-Dichloroethylene {I} | ug/Kg | 50 | 330 | 3700 | 5.7E+5 {C} | 62 | <40 | <40 | <40 | <40 | <10000 | <40 | <40 |
| cis-1,2-Dichloroethylene {I} | ug/Kg | 50 | 41000 | 2.1E+5 | 6.4E+5 {C} | 22000 | --- | --- | --- | --- | --- | --- | --- |
| trans-1,2-Dichloroethylene | ug/Kg | 50 | 43000 | 3.3E+5 | 1.4E+6 {C} | 23000 | <40 | <40 | <40 | <40 | <10000 | <40 | <40 |
| 2,2-Dichloropropane | ug/Kg | 50 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- |
| 1,2-Dichloropropane {I} | ug/Kg | 50 | 7400 | 30000 | 5.5E+5 {C} | 4000 | <60 | <60 | <60 | <60 | <15000 | <60 | <60 |
| 1,3-Dichloropropane | ug/Kg | 50 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- |
| 1,1-Dichloropropene | ug/Kg | 50 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- |
| cis-1,3-Dichloropropene {I,J} | ug/Kg | 50 | 5400 | 60000 | 2.4E+5 | 1000 | <80 | <80 | <80 | <80 | <20000 | <80 | <80 |
| trans-1,3-Dichloropropene {I, J} | ug/Kg | 50 | 5400 | 60000 | 2.4E+5 | 1000 | <80 | <80 | <80 | <80 | <20000 | <80 | <80 |
| Diethyl ether {I} | ug/Kg | 200 | 7.4E+6 {C} | 1.0E+8 | 7.4E+6 {C} | 7.4E+6 {C} | --- | --- | --- | --- | --- | --- | --- |
| Diethylbenzene | ug/Kg | 50 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- |
| Dimethyl disulfide | ug/Kg | 50 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- |
| Diethyl ether {I} | ug/Kg | 200 | 7.4E+6 {C} | 1.0E+8 | 7.4E+6 {C} | 7.4E+6 {C} | --- | --- | --- | --- | --- | --- | --- |
| Ethylbenzene {I} | ug/Kg | 50 | 1.4E+5 {C} | 2.4E+6 | 1.4E+5 {C} | 87000 | <20 | <20 | **23** | **120** | **32000** | **810** | **90** |
| Hexachlorobutadiene (C-46) | ug/Kg | 50 | 3.5E+5 {C} | 4.6E+5 | 3.5E+5 {C} | 1.3E+5 | --- | --- | --- | --- | --- | --- | --- |
| Hexachloroethane | ug/Kg | 300 | 79000 | 6.6E+5 | 7.3E+5 | 40000 | --- | --- | --- | --- | --- | --- | --- |
| 2-Hexanone {I} | ug/Kg | 2500 | 1.8E+6 | 1.3E+6 | 2.5E+6 {C} | 9.9E+5 | --- | --- | --- | --- | --- | --- | --- |
| Iodomethane | ug/Kg | 100 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- |
| Isopropyl benzene {I} | ug/Kg | 250 | 3.9E+5 {C} | 2.0E+6 | 3.9E+5 {C} | 3.9E+5 {C} | --- | --- | --- | --- | --- | --- | --- |
| p-Isopropyltoluene | ug/Kg | 100 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- |
| 5-Methly-2-Hexanone | ug/Kg | 100 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- |
| Iodomethane | ug/Kg | 100 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- |
| 4-Methyl-2-pentanone (MIBK) {I} | ug/Kg | 2500 | 2.7E+6 {C} | 5.3E+7 | 2.7E+6 {C} | 2.7E+6 {C} | --- | --- | --- | --- | --- | --- | --- |
| Methyl-tert-butyl ether (MTBE) | ug/Kg | 250 | 5.9E+6 {C} | 3.0E+7 | 5.9E+6 {C} | 5.9E+6 {C} | --- | --- | --- | --- | --- | --- | --- |

# Table B2-2 - Update 2011 Criteria
## Summary of Analytical Results for Soil Samples
## Gage Products
## Ferndale, Michigan

| Sample Location<br>Lab Sample ID<br>Sampled By<br>Analyzed By<br>Sample Date<br>Sample Depth (ft.) | | Background<br>Target<br>Method<br>Detection<br>Limit | Non-Residential<br>Soil<br>Volatilization to<br>Indoor Air<br>Inhalation | Non-Residential<br>Volatile<br>Soil<br>Inhalation<br>Infinite | Non-Residential<br>Direct<br>Contact | Residential<br>Soil<br>Volatilization to<br>Indoor Air<br>Inhalation | TSB-4<br>45995<br>WWES<br><br>8/6/1990<br>6.0-7.5 | TSB-4<br>45996<br>WWES<br><br>8/6/1990<br>0.5-2.0 | TSB-5<br>45991<br>WWES<br><br>8/6/1990<br>2.0 - 3.5 | TSB-5<br>45992<br>WWES<br><br>8/6/1990<br>9.0 - 10.5 | TSB-5<br>45993<br>WWES<br><br>8/6/1990<br>0.5 - 2.0 | TSB-5<br>45997<br>WWES<br><br>8/6/1990<br>6.0 - 7.5 | TSB-5<br>45998<br>WWES<br><br>8/6/1990<br>4.0 - 5.5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Volatiles Cont.*** | ***Units*** | | | | | | | | | | | | |
| Methylene chloride | ug/Kg | 100 | 2.4E+5 | 7.0E+5 | 2.3E+6 {C} | 45000 | <100 | <100 | <100 | <100 | <25000 | <100 | <100 |
| 2-Methylnaphthalene | ug/Kg | 330 | 4.9E+6 | 1.8E+6 | 2.6E+7 | 2.7E+6 | --- | --- | --- | --- | --- | --- | --- |
| Naphthalene | ug/Kg | 330 | 4.7E+5 | 3.5E+5 | 5.2E+7 | 2.5E+5 | --- | --- | --- | --- | --- | --- | --- |
| n-Propylbenzene {I} | ug/Kg | 100 | ID | ID | 8.0E+6 | ID | --- | --- | --- | --- | --- | --- | --- |
| Styrene {I} | ug/Kg | 50 | 5.2E+5 {C} | 3.3E+6 | 5.2E+5 {C} | 2.5E+5 | --- | --- | --- | --- | --- | --- | --- |
| 1,1,1,2-Tetrachloroethane | ug/Kg | 100 | 33000 | 1.2E+5 | 4.4E+5 {C} | 6200 | --- | --- | --- | --- | --- | --- | --- |
| 1,1,2,2-Tetrachloroethane | ug/Kg | 50 | 23000 | 34000 | 2.4E+5 | 4300 | <40 | <40 | <40 | <40 | <10000 | <40 | <40 |
| Tetrachloroethylene | ug/Kg | 50 | 60000 | 6.0E+5 | 88000 {C} | 11000 | <40 | <40 | <40 | <40 | <10000 | <40 | <40 |
| Tetrahydrofuran | ug/Kg | 1000 | 2.4E+6 | 1.5E+7 | 9.5E+6 | 1.3E+6 | --- | --- | --- | --- | --- | --- | --- |
| Toluene {I} | ug/Kg | 100 | 2.5E+5 {C} | 3.3E+6 | 2.5E+5 {C} | 2.5E+5 {C} | <40 | <20 | <20 | **290** | <5000 | **360** | <20 |
| 1,2,3-Trichlorobenzene | ug/Kg | 330 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- |
| 1,2,4-Trichlorobenzene | ug/Kg | 330 | 1.1E+6 {C} | 3.4E+7 | 1.1E+6 {C,DD} | 1.1E+6 {C} | --- | --- | --- | --- | --- | --- | --- |
| 1,1,1-Trichloroethane | ug/Kg | 50 | 4.6E+5 | 4.5E+6 | 4.6E+5 {C} | 2.5E+5 | <40 | <40 | <40 | **140** | <10000 | **150** | <40 |
| 1,1,2-Trichloroethane | ug/Kg | 50 | 24000 | 57000 | 8.4E+5 | 4600 | <60 | <60 | <60 | <60 | <15000 | <60 | <60 |
| Trichloroethylene | ug/Kg | 50 | 37000 | 2.6E+5 | 5.0E+5 {C,DD} | 7100 | <40 | <40 | <40 | <40 | <10000 | <40 | <40 |
| Trichlorofluoromethane | ug/Kg | 100 | 5.6E+5 {C} | 1.1E+8 | 5.6E+5 {C} | 5.6E+5 {C} | <60 | <60 | <60 | <60 | <15000 | <60 | <60 |
| 1,2,3-Trichloropropane | ug/Kg | 100 | 7500 | 11000 | 8.3E+5 {C} | 4000 | --- | --- | --- | --- | --- | --- | --- |
| 1,2,4-Trimethylbenzene {I} | ug/Kg | 100 | 1.1E+5 {C} | 2.5E+7 | 1.1E+5 {C} | 1.1E+5 {C} | --- | --- | --- | --- | --- | --- | --- |
| 1,3,5-Trimethylbenzene {I} | ug/Kg | 100 | 94000 {C} | 1.9E+7 | 94000 {C} | 94000 {C} | --- | --- | --- | --- | --- | --- | --- |
| Vinyl acetate | ug/Kg | 5000 | 1.5E+6 | 2.0E+6 | 2.4E+6 {C,DD} | 7.9E+5 | --- | --- | --- | --- | --- | --- | --- |
| Vinyl chloride | ug/Kg | 40 | 2800 | 29000 | 34000 | 270 | <200 | <200 | <200 | <200 | <50000 | <200 | <200 |
| Xylene, p&m | ug/Kg | 100 | 1.5E+5 {C} | 5.4E+7 | 1.5E+5 {C} | 1.5E+5 {C} | --- | --- | --- | --- | --- | --- | --- |
| Xylene, o | ug/Kg | 50 | 1.5E+5 {C} | 5.4E+7 | 1.5E+5 {C} | 1.5E+5 {C} | --- | --- | --- | --- | --- | --- | --- |
| Xylene (Total) | ug/Kg | 150 | 1.5E+5 {C} | 5.4E+7 | 1.5E+5 {C} | 1.5E+5 {C} | <100 | <100 | **9200** | **1400** | ***170000*** | **2100** | **550** |
| ***PCB's*** | ***Units*** | | | | | | | | | | | | |
| Aroclor 1016 | ug/Kg | 330 | 1.6E+7 | 8.1E+5 | 16000 {T} | 3.0E+6 | --- | --- | --- | --- | --- | --- | --- |
| Aroclor 1221 | ug/Kg | 330 | 1.6E+7 | 8.1E+5 | 16000 {T} | 3.0E+6 | --- | --- | --- | --- | --- | --- | --- |
| Aroclor 1232 | ug/Kg | 330 | 1.6E+7 | 8.1E+5 | 16000 {T} | 3.0E+6 | --- | --- | --- | --- | --- | --- | --- |
| Aroclor 1242 | ug/Kg | 330 | 1.6E+7 | 8.1E+5 | 16000 {T} | 3.0E+6 | --- | --- | --- | --- | --- | --- | --- |
| Aroclor 1248 | ug/Kg | 330 | 1.6E+7 | 8.1E+5 | 16000 {T} | 3.0E+6 | --- | --- | --- | --- | --- | --- | --- |
| Aroclor 1254 | ug/Kg | 330 | 1.6E+7 | 8.1E+5 | 16000 {T} | 3.0E+6 | --- | --- | --- | --- | --- | --- | --- |
| Aroclor 1260 | ug/Kg | 330 | 1.6E+7 | 8.1E+5 | 16000 {T} | 3.0E+6 | --- | --- | --- | --- | --- | --- | --- |
| Aroclor 1262 | ug/Kg | 330 | 1.6E+7 | 8.1E+5 | 16000 {T} | 3.0E+6 | --- | --- | --- | --- | --- | --- | --- |
| Aroclor 1268 | ug/Kg | 330 | 1.6E+7 | 8.1E+5 | 16000 {T} | 3.0E+6 | --- | --- | --- | --- | --- | --- | --- |
| ***Pesticides*** | ***Units*** | | | | | | | | | | | | |
| Aldrin | ug/Kg | 20 | 7.1E+6 | 2.0E+5 | 4300 | 1.3E+6 | --- | --- | --- | --- | --- | --- | --- |
| alpha-Hexachlorocyclohexane | ug/Kg | 10 | 1.6E+5 | 41000 | 12000 | 30000 | --- | --- | --- | --- | --- | --- | --- |
| beta-Hexachlorocyclohexane | ug/Kg | 20 | NLV | NLV | 25000 | NLV | --- | --- | --- | --- | --- | --- | --- |
| delta-Hexachlorocyclohexane | ug/Kg | 20 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- |
| 4-4'-DDD | ug/Kg | 20 | NLV | NLV | 4.0E+5 | NLV | --- | --- | --- | --- | --- | --- | --- |

# Table B2-2 - Update 2011 Criteria
# Summary of Analytical Results for Soil Samples
# Gage Products
# Ferndale, Michigan

| Sample Location<br>Lab Sample ID<br>Sampled By<br>Analyzed By<br>Sample Date<br>Sample Depth (ft.) | | Background Target Method Detection Limit | Non-Residential Soil Volatilization to Indoor Air Inhalation | Non-Residential Volatile Soil Inhalation Infinite | Non-Residential Direct Contact | Residential Soil Volatilization to Indoor Air Inhalation | TSB-4<br>45995<br>WWES<br><br>8/6/1990<br>6.0-7.5 | TSB-4<br>45996<br>WWES<br><br>8/6/1990<br>0.5-2.0 | TSB-5<br>45991<br>WWES<br><br>8/6/1990<br>2.0 - 3.5 | TSB-5<br>45992<br>WWES<br><br>8/6/1990<br>9.0 - 10.5 | TSB-5<br>45993<br>WWES<br><br>8/6/1990<br>0.5 - 2.0 | TSB-5<br>45997<br>WWES<br><br>8/6/1990<br>6.0 - 7.5 | TSB-5<br>45998<br>WWES<br><br>8/6/1990<br>4.0 - 5.5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Pesticides Cont.*** | ***Units*** | | | | | | | | | | | | |
| 4-4'-DDE | ug/Kg | 20 | NLV | NLV | 1.9E+5 | NLV | --- | --- | --- | --- | --- | --- | --- |
| 4-4'-DDT | ug/Kg | 20 | NLV | NLV | 2.8E+5 | NLV | --- | --- | --- | --- | --- | --- | --- |
| Dieldrin | ug/Kg | 20 | 7.2E+5 | 64000 | 4700 | 1.4E+5 | --- | --- | --- | --- | --- | --- | --- |
| Endosulfan I {J} | ug/Kg | 20 | ID | ID | 4.4E+6 | ID | --- | --- | --- | --- | --- | --- | --- |
| Endosulfan II {J} | ug/Kg | 20 | ID | ID | 4.4E+6 | ID | --- | --- | --- | --- | --- | --- | --- |
| Endosulfan Sulfate {J} | ug/Kg | 20 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- |
| Endrin | ug/Kg | 20 | NLV | NLV | 1.9E+5 | NLV | --- | --- | --- | --- | --- | --- | --- |
| Endrin Aldehyde | ug/Kg | 20 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- |
| Heptachlor | ug/Kg | 20 | 1.9E+6 | 2.1E+5 | 23000 | 3.5E+5 | --- | --- | --- | --- | --- | --- | --- |
| Heptachlor epoxide | ug/Kg | 20 | NLV | NLV | 9500 | NLV | --- | --- | --- | --- | --- | --- | --- |
| Lindane | ug/Kg | 20 | ID | ID | 42000 | ID | --- | --- | --- | --- | --- | --- | --- |
| Methoxychlor | ug/Kg | 50 | ID | ID | 5.6E+6 | ID | --- | --- | --- | --- | --- | --- | --- |
| ***Misc*** | ***Units*** | | | | | | | | | | | | |
| Percent Solids | % | NA | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- |

**Table B2-2 - Update 2011 Criteria**
**Summary of Analytical Results for Soil Samples**
**Gage Products**
**Ferndale, Michigan**

# Footnotes

Criteria from RRD Op Memo 1, Part 201 Rule 299-5748 January 23, 2006
» Target Method Detection Limit (TMDL) from MDEQ RRD Operational Memo#2 July 5, 2007.

Results Qualifiers:
J=Estimated value or value not accurate.
--- Parameter not analyzed
Bolded value denotes parameter detected above detection limit
Shaded values exceed TMDL and Non-Residential Soil Volatilization to Indoor Air Inhalation Criteria.
Underlined values exceed TMDL and Non-Residential Direct Contact Criteria
*Italicized values exceed TMDL and Residential SVIIC*
Criteria Qualifiers:
[1] Although criteria is hexavlent Chromium, results are total
{B} Background, may be substitued if higher than cleanup criterion
{C} Value presented is a screening level based on the chemical-specific generic Csat.
{D} Calculated criterion exceeds 100% hence is reduced to 100% or 1.0E+9 ppb
{H} Valence-specific chromium data must be compared to the corresponding valence-specific clean-up critieria
{I} Hazardous substance may exhibit the characteristic of ignitability
{J} Hazardous substance may be present in several isomer forms and shall be added together for comparison to criteria
{Q} Criteria for carcinogenic PAHs were developed using RPPs to benzo(a)pyrene
{T} Refer to the TSCA
{DD} Hazardous substance causes developmental effects
ID = Inadequate data to develop criterion
IP = Development of generic GSI value in process.
NA = Criterion or value is not available, or not applicable
NLL = Hazardous substance is not likely to leach under most soil conditions
NLV = Hazardous substance is not likely to volatilize under most conditions

# Table B2-3A
## Summary of Analytical Results for Organic Groundwater Samples - Update 2011 Criteria
## Gage Products
## Ferndale, Michigan

| Sample Location | | Target | Residential | Residential | Non-Residential | Groundwater | GMW-1 | GMW-1 | GMW-1 | GMW-1 | GMW-1 | GMW-1 | GMW-2 | GMW-2 | GMW-2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lab Sample ID | | Method | Drinking | Groundwater | Groundwater | Contact | 2930-01 | 2930-11 | 23464 | 30187 | 45676 | 253477 | 2930-02 | 2930-10 | 23465 |
| Sampled By | | Detection | Water | Volatilization to | Volatilization to | Criteria | OHM | OHM | EDI | WWES | WWES | Horizon | OHM | OHM | EDI |
| Analyzed By | | Limit | Criteria | Indoor Air | Indoor Air | | | | | | | TriMatrix | | | |
| Sample Date | | | | Inhalation | Inhalation | | 9/5/85 | 3/19/86 | 8/2/89 | 12/5/89 | 8/2/90 | 6/16/2000 | 9/5/85 | 3/19/86 | 8/2/89 |
| Sample Depth (Ft.) | | | | Criteria | Criteria | | | | | | | | | | |
| ***Volatiles*** | ***Units*** | | | | | | | | | | | | | | |
| Acetate | ug/L | 1000 | 4200 | ID | ID | ID | --- | --- | --- | --- | --- | <50 | --- | --- | --- |
| Acetonitrile | ug/L | 50 | 140 | 2.4E+7 | 4.5E+7 | 5.6E+6 | --- | --- | --- | --- | --- | <10 | --- | --- | --- |
| Acrylonitrile {I} | ug/L | 2 | 2.6 | 34000 | 1.9E+5 | 14000 | --- | --- | --- | --- | --- | <1.0 | --- | --- | --- |
| Allyl Chloride | ug/L | NA | NA | NA | NA | NA | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |
| Benzene {I} | ug/L | 1 | 5.0 {A} | 5600 | 35000 | 11000 | <1 | <1 | <1 | **300** | <5 | <1.0 | <1 | <1 | <1 |
| Bromobenzene | ug/L | 1 | 18 | 1.8E+5 | 3.9E+5 | 12000 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Bromochloromethane | ug/L | 1 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Bromodichloromethane | ug/L | 1 | 80 {A,W} | 4800 | 37000 | 14000 | <1 | <1 | <2 | <10 | <10 | <1.0 | <1 | <1 | <2 |
| Bromoform | ug/L | 1 | 80 {A,W} | 4.7E+5 | 3.1E+6 {S} | 1.4E+5 | <1 | <1 | <15 | <10 | <75 | <1.0 | <1 | <1 | <15 |
| Bromomethane | ug/L | 5 | 10 | 4000 | 9000 | 70000 | <1 | <1 | <10 | <10 | <50 | <1.0 | <1 | <1 | <10 |
| 2-Butanone (MEK) {I} | ug/L | 25 | 13000 | 2.4E+8 {S} | 2.4E+8 {S} | 2.4E+8 {S} | --- | --- | --- | --- | --- | <10 | --- | --- | --- |
| n-Butylbenzene | ug/L | 1 | 80 | ID | ID | 5900 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| sec-Butylbenzene | ug/L | 1 | 80 | ID | ID | 4400 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Tert-Butylbenzene | ug/L | 1 | 80 | ID | ID | 8900 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Carbon disulfide {I,R} | ug/L | 5 | 800 | 2.5E+5 | 5.5E+5 | 1.2E+6 {S} | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |
| Carbon tetrachloride | ug/L | 1 | 5.0 {A} | 370 | 2400 | 4600 | <1 | <1 | <4 | <10 | <20 | <1.0 | <1 | <1 | <4 |
| Chlorobenzene {I} | ug/L | 1 | 100 {A} | 2.1E+5 | 4.7E+5 {S} | 86000 | **115** | <1 | <1 | <10 | <5 | <1.0 | **77** | <1 | <1 |
| Chlorodibromomethane | ug/L | 5 | 80 {A,W} | 14000 | 1.1E+5 | 18000 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Chloroethane {I} | ug/L | 5 | 430 | 5.7E+6 {S} | 5.7E+6 {S} | 4.4E+5 | <1 | **114** | <10 | **71** | <50 | <1.0 | <1 | <1 | <10 |
| 2-Chloroethyl vinyl ether | ug/L | 10 | ID | ID | ID | ID | <1 | <1 | <10 | <10 | <50 | --- | <1 | <1 | <10 |
| Chloroform | ug/L | 1 | 80 {A,W} | 28000 | 1.8E+5 | 1.5E+5 | <1 | <1 | <1 | <10 | <5 | <1.0 | <1 | <1 | <1 |
| 1-Chlorohexane | ug/L | NA | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Chloromethane {I} | ug/L | 5 | 260 | 8600 | 45000 | 4.9E+5 | <1 | <1 | <10 | <10 | <50 | <1.0 | <1 | <1 | <10 |
| 2-Chlorotoluene | ug/L | 5 | 150 | 2.2E+5 | 3.7E+5 {S} | 44000 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4-Chlorotoluene | ug/L | 5 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1,2-Dibromo-3-Chloropropane | ug/L | 0.2 | 0.2 {A} | 1200 {S} | 1200 {S} | 390 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dibromochloromethane | ug/L | 5 | 80 {A,W} | 14000 | 1.1E+5 | 18000 | <1 | <1 | <3 | <10 | <15 | --- | <1 | <1 | <3 |
| Ethylene dibromide | ug/L | 0.05 | 0.05 {A} | 2400 | 15000 | 25 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Ethylene dibromide | ug/L | 0.05 | 0.05 {A} | 2400 | 15000 | 25 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dibromomethane | ug/L | 5 | 80 | ID | ID | 5.3E+5 | --- | --- | --- | --- | --- | <1.0 | --- | --- | --- |
| trans-1,4-Dichloro-2-butene | ug/L | 1 | NA | NA | NA | NA | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |
| 1,2-Dichlorobenzene | ug/L | 1 | 600 {A} | 1.6E+5 {S} | 1.6E+5 {S} | 1.6E+5 {S} | --- | --- | <15 | <10 | <75 | --- | --- | --- | <15 |
| 1,3-Dichlorobenzene | ug/L | 1 | 6.6 | 18000 | 41000 | 2000 | --- | --- | <15 | <10 | <75 | --- | --- | --- | <15 |
| 1,4-Dichlorobenzene | ug/L | 1 | 75 {A} | 16000 | 74000 {S} | 6400 | --- | --- | <15 | <10 | <75 | --- | --- | --- | <15 |
| Dichlorodifluoromethane | ug/L | 5 | 1700 | 2.2E+5 | 3.0E+5 {S} | 3.0E+5 {S} | --- | --- | <10 | <10 | <50 | <1.0 | --- | --- | <10 |
| 1,1-Dichloroethane {I} | ug/L | 1 | 880 | 1.0E+6 | 2.3E+6 | 2.4E+6 | **3.7** | **123** | **30** | **23** | **20** | **3.8** | <1 | <1 | <2 |
| 1,2-Dichloroethane {I} | ug/L | 1 | 5.0 {A} | 9600 | 59000 | 19000 | <1 | <1 | <2 | <10 | <10 | <1.0 | <1 | <1 | <2 |
| 1,1-Dichloroethylene {I} | ug/L | 1 | 7.0 {A} | 200 | 1300 | 11000 | <1 | <1 | <2 | <10 | <10 | <1.0 | <1 | <1 | <2 |
| cis-1,2-Dichloroethylene {I} | ug/L | 1 | 70 {A} | 93000 | 2.1E+5 | 2.0E+5 | --- | --- | --- | <10 | --- | <1.0 | --- | --- | --- |
| trans-1,2-Dichloroethylene | ug/L | 1 | 100 {A} | 85000 | 2.0E+5 | 2.2E+5 | <1 | <1 | <2 | <10 | <10 | <1.0 | <1 | <1 | <2 |
| 1,2-Dichloropropane {I} | ug/L | 1 | 5.0 {A} | 16000 | 36000 | 16000 | <1 | <1 | <3 | <10 | <15 | <1.0 | <1 | <1 | <3 |
| 1,3-Dichloropropane | ug/L | 1 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2,2-Dichloropropane | ug/L | 1 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| cis-1,3-Dichloropropene {I,J} | ug/L | 1 | 8.5 | 3900 | 26000 | 5500 | --- | <1 | --- | --- | --- | <1.0 | --- | <1 | --- |

# Table B2-3A
## Summary of Analytical Results for Organic Groundwater Samples - Update 2011 Criteria
## Gage Products
## Ferndale, Michigan

| Sample Location | | Target | Residential | Residential | Non-Residential | Groundwater | GMW-1 | GMW-1 | GMW-1 | GMW-1 | GMW-1 | GMW-1 | GMW-2 | GMW-2 | GMW-2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lab Sample ID | | Method | Drinking | Groundwater | Groundwater | Contact | 2930-01 | 2930-11 | 23464 | 30187 | 45676 | 253477 | 2930-02 | 2930-10 | 23465 |
| Sampled By | | Detection | Water | Volatilization to | Volatilization to | Criteria | OHM | OHM | EDI | WWES | WWES | Horizon | OHM | OHM | EDI |
| Analyzed By | | Limit | Criteria | Indoor Air | Indoor Air | | | | | | | TriMatrix | | | |
| Sample Date | | | | Inhalation | Inhalation | | 9/5/85 | 3/19/86 | 8/2/89 | 12/5/89 | 8/2/90 | 6/16/2000 | 9/5/85 | 3/19/86 | 8/2/89 |
| Sample Depth (Ft.) | | | | Criteria | Criteria | | | | | | | | | | |
| ***Volatiles Cont.*** | ***Units*** | | | | | | | | | | | --- | --- | --- | --- |
| 1,1-Dichloropropene | ug/L | 1 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| trans-1,3-Dichloropropene {I, J} | ug/L | 1 | 8.5 | 3900 | 26000 | 5500 | <1 | <1 | <4 | <10 | <20 | <1.0 | <1 | <1 | <4 |
| cis-1,3-Dichloropropene {I,J} | ug/L | 1 | 8.5 | 3900 | 26000 | 5500 | <1 | --- | <4 | <10 | <20 | --- | <1 | --- | <4 |
| 1,4-Dioxane | ug/L | 1 | 85 | NLV | NLV | 1.7E+6 | --- | --- | --- | --- | --- | <150 | --- | --- | --- |
| Ethyl ether | ug/L | 10 | 10 {E} | 6.1E+7 {S} | 6.1E+7 {S} | 3.5E+7 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Ethylbenzene {I} | ug/L | 1 | 74 {E} | 1.1E+5 | 1.7E+5 {S} | 1.7E+5 {S} | <1 | **9.3** | <1 | <10 | <5 | <1.0 | <1 | <1 | <1 |
| Formaldehyde | ug/L | 100 | 1300 | 63000 | 3.6E+5 | 3.0E+7 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Hexachloroethane | ug/L | 5 | 7.3 | 27000 | 50000 {S} | 1900 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2-Hexanone {I} | ug/L | 50 | 1000 | 4.2E+6 | 8.7E+6 | 5.2E+6 | --- | --- | --- | --- | --- | <50 | --- | --- | --- |
| Iodomethane | ug/L | 1 | NA | NA | NA | NA | --- | --- | --- | --- | --- | <10 | --- | --- | --- |
| Isopropyl benzene {I} | ug/L | 5 | 800 | 56000 {S} | 56000 {S} | 56000 {S} | --- | --- | --- | --- | --- | <1.0 | --- | --- | --- |
| p-Isopropyltoluene | ug/L | 5 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Methyl ethyl ketone | ug/L | 25 | 13000 | 2.4E+8 {S} | 2.4E+8 {S} | 2.4E+8 {S} | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Methyl isobutyl ketone | ug/L | 50 | 1800 | 2.0E+7 {S} | 2.0E+7 {S} | 1.3E+7 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4-Methyl-2-pentanone (MIBK) {I} | ug/L | 50 | 1800 | 2.0E+7 {S} | 2.0E+7 {S} | 1.3E+7 | --- | --- | --- | --- | --- | <50 | --- | --- | --- |
| Methyl-tert-butyl ether (MTBE) | ug/L | 5 | 40 {E} | 4.7E+7 {S} | 4.7E+7 {S} | 6.1E+5 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Methylene chloride | ug/L | 5 | 5.0 {A} | 2.2E+5 | 1.4E+6 | 2.2E+5 | <1 | <1 | <5 | <10 | <25 | <5.0 | <1 | <1 | <5 |
| n-Propylbenzene {I} | ug/L | 1 | 80 | ID | ID | 15000 | --- | --- | --- | --- | --- | <1.0 | --- | --- | --- |
| Propionitrile | ug/L | NA | NA | NA | NA | NA | --- | --- | --- | --- | --- | <10 | --- | --- | --- |
| Styrene {I} | ug/L | 1 | 100 {A} | 1.7E+5 | 3.1E+5 {S} | 9700 | --- | --- | --- | --- | --- | <1.0 | --- | --- | --- |
| 1,1,1,2-Tetrachloroethane | ug/L | 1 | 77 | 15000 | 96000 | 30000 | --- | --- | --- | --- | --- | <1.0 | --- | --- | --- |
| 1,1,2,2-Tetrachloroethane | ug/L | 1 | 8.5 | 12000 | 77000 | 4700 | <1 | <1 | <2 | <10 | <10 | <1.0 | <1 | <1 | <2 |
| Tetrachloroethylene | ug/L | 1 | 5.0 {A} | 25000 | 1.7E+5 | 12000 | <1 | <1 | <2 | <10 | <10 | <1.0 | <1 | <1 | <2 |
| Toluene {I} | ug/L | 1 | 790 {E} | 5.3E+5 {S} | 5.3E+5 {S} | 5.3E+5 {S} | **4.7** | **445** | **250** | **170** | **300** | **6.1** | <1 | <1 | <1 |
| 1,2,3-Trichlorobenzene | ug/L | 5 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1,2,4-Trichlorobenzene | ug/L | 5 | 70 {A} | 3.0E+5 {S} | 3.0E+5 {S} | 19000 | --- | --- | --- | --- | --- | <1.0 | --- | --- | --- |
| 1,1,1-Trichloroethane | ug/L | 1 | 200 {A} | 6.6E+5 | 1.3E+6 {S} | 1.3E+6 {S} | <1 | <1 | <2 | <10 | <10 | <1.0 | <1 | <1 | <2 |
| 1,1,2-Trichloroethane | ug/L | 1 | 5.0 {A} | 17000 | 1.1E+5 | 21000 | <1 | <1 | <3 | <10 | <15 | <1.0 | <1 | <1 | <3 |
| Trichloroethylene | ug/L | 1 | 5.0 {A} | 15000 | 97000 | 22000 | <1 | <1 | <2 | <10 | <10 | **3.2** | <1 | <1 | <2 |
| Trichlorofluoromethane | ug/L | 1 | 2600 | 1.1E+6 {S} | 1.1E+6 {S} | 1.1E+6 {S} | --- | <10 | <3 | <10 | <15 | <1.0 | --- | <10 | <3 |
| 1,2,3-Trichloropropane | ug/L | 1 | 42 | 8300 | 18000 | 84000 | --- | --- | --- | --- | --- | <1.0 | --- | --- | --- |
| 1,2,4-Trimethylbenzene {I} | ug/L | 1 | 63 {E} | 56000 {S} | 56000 {S} | 56000 {S} | --- | --- | --- | --- | --- | <1.0 | --- | --- | --- |
| 1,3,5-Trimethylbenzene {I} | ug/L | 1 | 72 {E} | 61000 {S} | 61000 {S} | 61000 {S} | --- | --- | --- | --- | --- | <1.0 | --- | --- | --- |
| Vinyl acetate | ug/L | 100 | 640 | 4.1E+6 | 8.9E+6 | 8.0E+6 | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |
| Vinyl chloride | ug/L | 1 | 2.0 {A} | 1100 | 13000 | 1000 | <1 | <1 | <10 | <10 | <50 | <1.0 | <1 | <1 | <10 |
| Xylene, p&m | ug/L | 2 | 280 {E} | 1.9E+5 {S} | 1.9E+5 {S} | 1.9E+5 {S} | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Xylene (Total) | ug/L | 3 | 280 {E} | 1.9E+5 {S} | 1.9E+5 {S} | 1.9E+5 {S} | --- | **48.4** | --- | <30 | **32** | --- | --- | --- | --- |
| Xylene, o | ug/L | 1 | 280 {E} | 1.9E+5 {S} | 1.9E+5 {S} | 1.9E+5 {S} | --- | --- | --- | --- | --- | <3.0 | --- | --- | --- |
| ***Semi-Volatiles*** | ***Units*** | | | | | | | | | | | --- | --- | --- | --- |
| Acenaphthene | ug/L | 5 | 1300 | 4200 {S} | 4200 {S} | 4200 {S} | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |
| Acenaphthylene | ug/L | 5 | 52 | 3900 {S} | 3900 {S} | 3900 {S} | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |
| Acetophenone | ug/L | 5 | 1500 | 6.1E+6 {S} | 6.1E+6 {S} | 6.1E+6 {S} | --- | --- | --- | --- | --- | <10 | --- | --- | --- |
| Aniline {I} | ug/L | 4 | 53 | NLV | NLV | 1.4E+5 | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |

# Table B2-3A
## Summary of Analytical Results for Organic Groundwater Samples - Update 2011 Criteria
## Gage Products
## Ferndale, Michigan

| Sample Location<br>Lab Sample ID<br>Sampled By<br>Analyzed By<br>Sample Date<br>Sample Depth (Ft.) | | Target Method Detection Limit | Residential Drinking Water Criteria | Residential Groundwater Volatilization to Indoor Air Inhalation Criteria | Non-Residential Groundwater Volatilization to Indoor Air Inhalation Criteria | Groundwater Contact Criteria | GMW-1<br>2930-01<br>OHM<br><br>9/5/85 | GMW-1<br>2930-11<br>OHM<br><br>3/19/86 | GMW-1<br>23464<br>EDI<br><br>8/2/89 | GMW-1<br>30187<br>WWES<br><br>12/5/89 | GMW-1<br>45676<br>WWES<br><br>8/2/90 | GMW-1<br>253477<br>Horizon<br>TriMatrix<br>6/16/2000 | GMW-2<br>2930-02<br>OHM<br><br>9/5/85 | GMW-2<br>2930-10<br>OHM<br><br>3/19/86 | GMW-2<br>23465<br>EDI<br><br>8/2/89 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Semi-Volatiles Cont.*** | ***Units*** | | | | | | | | | | | --- | --- | --- | --- |
| Anthracene | ug/L | 5 | 43 {S} | 43 {S} | 43 {S} | 43 {S} | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |
| Benzidine | ug/L | 0.3 | 0.3 {M} :0.0037 | NLV | NLV | 7.1 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Benzo(a)anthracene {Q} | ug/L | 1 | 2.1 | NLV | NLV | 9.4 {S,AA} | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |
| Benzo(a)pyrene {Q} | ug/L | 1 | 5.0 {A} | NLV | NLV | 1.0 {M,AA} :0.64 | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |
| Benzo(b&k)fluoranthene {Q} | ug/L | 1 | 1.5 {S,AA} | ID | ID | 1.5 {S,AA} | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Benzo(b)fluoranthene {Q} | ug/L | 1 | 1.5 {S,AA} | ID | ID | 1.5 {S,AA} | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |
| Benzo(g,h,i)perylene | ug/L | 1 | 1.0 {M} :0.26 {S} | NLV | NLV | 1.0 {M,AA} :0.26 {S} | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |
| Benzo(k)fluoranthene {Q} | ug/L | 1 | 1.0 {M} :0.8 {S} | NLV | NLV | 1.0 {M,AA} :0.8 {S} | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |
| Benzoic acid | ug/L | 50 | 32000 | NLV | NLV | 3.5E+6 {S} | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Benzyl alcohol | ug/L | 50 | 10000 | NLV | NLV | 4.4E+7 {S} | --- | --- | --- | --- | --- | <20 | --- | --- | --- |
| bis(2-Chloroethoxy)methane | ug/L | 5 | NA | NA | NA | NA | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |
| bis(2-Chloroethyl)ether {I} | ug/L | 1 | 2.0 | 38000 | 2.1E+5 | 5700 | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |
| bis(2-Chloroisopropyl)ether | ug/L | 5 | NA | NA | NA | NA | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |
| bis(2-Ethylhexyl)phthalate | ug/L | 5 | 6.0 {A} | NLV | NLV | 320 {AA} | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |
| 4-Bromo diphenyl ether | ug/L | 5 | NA | NA | NA | NA | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |
| Butyl benzyl phthalate | ug/L | 5 | 1200 | NLV | NLV | 2700 {S} | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |
| 4-Chloro-3-methylphenol | ug/L | 5 | 150 | NLV | NLV | 79000 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4-Chloroaniline | ug/L | 10 | NA | NA | NA | NA | --- | --- | --- | --- | --- | <20 | --- | --- | --- |
| beta-Chloronaphthalene | ug/L | 5 | 1800 | ID | ID | 6700 {S} | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |
| 2-Chlorophenol | ug/L | 10 | 45 | 4.9E+5 | 1.1E+6 | 94000 | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |
| 4-Chloro diphenyl ether | ug/L | 5 | NA | NA | NA | NA | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |
| Chrysene {Q} | ug/L | 1 | 1.6 {S} | ID | ID | 1.6 {S,AA} | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |
| Decabromodiphenyl ether | ug/L | 10 | 30 {S} | 30 {S} | 30 {S} | 30 {S} | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Di-n-octyl phthalate | ug/L | 5 | 130 | NLV | NLV | 400 | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |
| Dibenzo(a,h)anthracene {Q} | ug/L | 2 | 2.0 {M} :0.21 | NLV | NLV | 2.0 {M,AA} :0.31 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dibenzofuran | ug/L | 4 | ID | 10000 {S} | 10000 {S} | ID | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |
| Di-n-butyl phthalate | ug/L | 5 | 880 | NLV | NLV | 11000 {S} | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |
| 1,2-Dichlorobenzene | ug/L | 1 | 600 {A} | 1.6E+5 {S} | 1.6E+5 {S} | 1.6E+5 {S} | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |
| 1,3-Dichlorobenzene | ug/L | 1 | 6.6 | 18000 | 41000 | 2000 | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |
| 1,4-Dichlorobenzene | ug/L | 1 | 75 {A} | 16000 | 74000 {S} | 6400 | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |
| 3,3'-Dichlorobenzidine | ug/L | 0.3 | 1.1 | NLV | NLV | 180 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2,4-Dichlorophenol | ug/L | 10 | 73 | NLV | NLV | 48000 | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |
| 2,6-Dichlorophenol | ug/L | 5 | NA | NA | NA | NA | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |
| Diethyl phthalate | ug/L | 5 | 5500 | NLV | NLV | 1.1E+6 {S} | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |
| Dimethyl phthalate | ug/L | 5 | 73000 | NLV | NLV | 4.2E+6 {S} | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |
| 2,4-Dimethylphenol | ug/L | 5 | 370 | NLV | NLV | 5.2E+5 | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |
| 3,3-Dimethylbenzidine | ug/L | 0.3 | NA | NA | NA | NA | --- | --- | --- | --- | --- | <10 | --- | --- | --- |
| 2,4-Dinitrophenol | ug/L | 25 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2,4-Dinitrotoluene | ug/L | 5 | 7.7 | NLV | NLV | 8600 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2,6-Dinitrotoluene | ug/L | 5 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Diphenylamine | ug/L | NA | NA | NA | NA | NA | --- | --- | --- | --- | --- | <10 | --- | --- | --- |
| 1,2-Diphenylhydrazine | ug/L | 5 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Fluoranthene | ug/L | 1 | 210 {S} | 210 {S} | 210 {S} | 210 {S} | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |

# Table B2-3A
## Summary of Analytical Results for Organic Groundwater Samples - Update 2011 Criteria
## Gage Products
## Ferndale, Michigan

| Sample Location | | Target | Residential | Residential | Non-Residential | Groundwater | GMW-1 | GMW-1 | GMW-1 | GMW-1 | GMW-1 | GMW-1 | GMW-2 | GMW-2 | GMW-2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lab Sample ID | | Method | Drinking | Groundwater | Groundwater | Contact | 2930-01 | 2930-11 | 23464 | 30187 | 45676 | 253477 | 2930-02 | 2930-10 | 23465 |
| Sampled By | | Detection | Water | Volatilization to | Volatilization to | Criteria | OHM | OHM | EDI | WWES | WWES | Horizon | OHM | OHM | EDI |
| Analyzed By | | Limit | Criteria | Indoor Air | Indoor Air | | | | | | | TriMatrix | | | |
| Sample Date | | | | Inhalation | Inhalation | | 9/5/85 | 3/19/86 | 8/2/89 | 12/5/89 | 8/2/90 | 6/16/2000 | 9/5/85 | 3/19/86 | 8/2/89 |
| Sample Depth (Ft.) | | | | Criteria | Criteria | | | | | | | | | | |
| ***Semi-Volatiles Cont.*** | ***Units*** | | | | | | | | | | | --- | --- | --- | --- |
| Fluorene | ug/L | 5 | 880 | 2000 {S} | 2000 {S} | 2000 {S} | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |
| Hexachlorobenzene (C-66) | ug/L | 0.2 | 1.0 {A} | 440 | 3000 | 4.6 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Hexachlorobutadiene (C-46) | ug/L | 0.05 | 15 | 1600 | 3200 {S} | 400 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Hexachlorocyclopentadiene (C-56) | ug/L | 5 | 50 {A} | 130 | 420 | 1600 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Hexachloroethane | ug/L | 5 | 7.3 | 27000 | 50000 {S} | 1900 | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |
| Hexachloropropene | ug/L | NA | NA | NA | NA | NA | --- | --- | --- | --- | --- | <50 | --- | --- | --- |
| Indeno(1,2,3-cd)pyrene {Q} | ug/L | 2 | 2.0 {M} :0.022 {S} | NLV | NLV | 2.0 {M} :0.022 {S} | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |
| Isophorone | ug/L | 5 | 770 | NLV | NLV | 9.9E+5 | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |
| 2-Methyl-4,6-dinitrophenol | ug/L | 20 | 20 {M} :2.6 | NLV | NLV | 9500 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2-Methylnaphthalene | ug/L | 5 | 260 | 25000 {S} | 25000 {S} | 25000 {S} | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |
| 2-Methylphenol {J} | ug/L | 10 | 370 | NLV | NLV | 8.1E+5 | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |
| 3-Methylphenol {J} | ug/L | 10 | 370 | NLV | NLV | 8.1E+5 | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |
| 4-Methylphenol {J} | ug/L | 10 | 370 | NLV | NLV | 8.1E+5 | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |
| Naphthalene | ug/L | 5 | 520 | 31000 {S} | 31000 {S} | 31000 {S} | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |
| 1,4-Naphthylamine | ug/L | NA | NA | NA | NA | NA | --- | --- | --- | --- | --- | <10 | --- | --- | --- |
| 1-Naphthylamine | ug/L | NA | NA | NA | NA | NA | --- | --- | --- | --- | --- | <10 | --- | --- | --- |
| 2-Naphthylamine | ug/L | NA | NA | NA | NA | NA | --- | --- | --- | --- | --- | <10 | --- | --- | --- |
| 2-Nitroaniline | ug/L | 25 | NA | NA | NA | NA | --- | --- | --- | --- | --- | <20 | --- | --- | --- |
| 3-Nitroaniline | ug/L | 25 | NA | NA | NA | NA | --- | --- | --- | --- | --- | <20 | --- | --- | --- |
| 4-Nitroaniline | ug/L | 25 | NA | NA | NA | NA | --- | --- | --- | --- | --- | <20 | --- | --- | --- |
| Nitrobenzene {I} | ug/L | 3 | 3.4 | 2.8E+5 | 5.5E+5 | 11000 | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |
| 2-Nitrophenol | ug/L | 5 | 20 | NLV | NLV | 79000 | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |
| 4-Nitrophenol | ug/L | 25 | NA | NA | NA | NA | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |
| 4-Nitroquinoline-1-oxide | ug/L | NA | NA | NA | NA | NA | --- | --- | --- | --- | --- | <10 | --- | --- | --- |
| n-Nitroso-di-n-propylamine | ug/L | 5 | 5.0 {M} :0.19 | NLV | NLV | 360 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| N-Nitroso-di-methylamine | ug/L | 5 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| N-Nitroso-di-methylamine | ug/L | 5 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| N-Nitrosodiphenylamine | ug/L | 5 | 270 | NLV | NLV | 35000 {S} | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Pentachlorophenol | ug/L | 1 | 1.0 {A} | NLV | NLV | 200 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Phenacetin | ug/L | NA | NA | NA | NA | NA | --- | --- | --- | --- | --- | <10 | --- | --- | --- |
| Phenanthrene | ug/L | 2 | 52 | 1000 {S} | 1000 {S} | 1000 {S} | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |
| Phenol | ug/L | 5 | 4400 | NLV | NLV | 2.9E+7 | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |
| 1,4-Phenylenediamine | ug/L | NA | NA | NA | NA | NA | --- | --- | --- | --- | --- | <10 | --- | --- | --- |
| Pyrene | ug/L | 5 | 140 {S} | 140 {S} | 140 {S} | 140 {S} | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |
| Pyridine | ug/L | 20 | 20 {M} :7.3 | 5500 | 12000 | 94000 | --- | --- | --- | --- | --- | <10 | --- | --- | --- |
| 1,2,4-Trichlorobenzene | ug/L | 5 | 70 {A} | 3.0E+5 {S} | 3.0E+5 {S} | 19000 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2,4,5-Trichlorophenol | ug/L | 5 | 730 | NLV | NLV | 1.7E+5 | --- | --- | --- | --- | --- | <10 | --- | --- | --- |
| 2,4,6-Trichlorophenol | ug/L | 4 | 120 | NLV | NLV | 10000 | --- | --- | --- | --- | --- | <5.0 | --- | --- | --- |
| ***Halogenateds*** | ***Units*** | | | | | | | | | | | | | | |
| Hexabromobenzene | ug/L | 0.02 | 0.17 {S} :20 | ID | ID | 0.17 {S} :1500 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Pentachlorobenzene | ug/L | 5 | 6.1 | ID | ID | 240 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1,2,3,4-Tetrachlorobenzene | ug/L | 5 | NA | NA | NA | NA | --- | --- | --- | --- | --- | <10 | --- | --- | --- |
| 1,2,4,5-Tetrachlorobenzene | ug/L | 2 | 1300 {S} | 1300 {S} | 1300 {S} | 1300 {S} | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1,3,5-Trichlorobenzene | ug/L | 5 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- |

# Table B2-3A
## Summary of Analytical Results for Organic Groundwater Samples - Update 2011 Criteria
## Gage Products
## Ferndale, Michigan

| Sample Location | | Target Method Detection Limit | Residential Drinking Water Criteria | Residential Groundwater Volatilization to Indoor Air Inhalation Criteria | Non-Residential Groundwater Volatilization to Indoor Air Inhalation Criteria | Groundwater Contact Criteria | GMW-1 | GMW-1 | GMW-1 | GMW-1 | GMW-1 | GMW-1 | GMW-2 | GMW-2 | GMW-2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lab Sample ID | | | | | | | 2930-01 | 2930-11 | 23464 | 30187 | 45676 | 253477 | 2930-02 | 2930-10 | 23465 |
| Sampled By | | | | | | | OHM | OHM | EDI | WWES | WWES | Horizon | OHM | OHM | EDI |
| Analyzed By | | | | | | | | | | | | TriMatrix | | | |
| Sample Date | | | | | | | 9/5/85 | 3/19/86 | 8/2/89 | 12/5/89 | 8/2/90 | 6/16/2000 | 9/5/85 | 3/19/86 | 8/2/89 |
| Sample Depth (Ft.) | | | | | | | | | | | | | | | |
| ***PCB's*** | ***Units*** | | | | | | | | | | | | | | |
| BP-6 | *ug/L* | NA | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Aroclor 1016 | ug/L | 0.2 | 0.5 {A} | 45 {S} | 45 {S} | 3.3 {AA} | --- | --- | --- | --- | --- | <0.20 | --- | --- | --- |
| Aroclor 1221 | ug/L | 0.2 | 0.5 {A} | 45 {S} | 45 {S} | 3.3 {AA} | --- | --- | --- | --- | --- | <0.20 | --- | --- | --- |
| Aroclor 1232 | ug/L | 0.2 | 0.5 {A} | 45 {S} | 45 {S} | 3.3 {AA} | --- | --- | --- | --- | --- | <0.20 | --- | --- | --- |
| Aroclor 1242 | ug/L | 0.2 | 0.5 {A} | 45 {S} | 45 {S} | 3.3 {AA} | --- | --- | --- | --- | --- | <0.20 | --- | --- | --- |
| Aroclor 1248 | ug/L | 0.2 | 0.5 {A} | 45 {S} | 45 {S} | 3.3 {AA} | --- | --- | --- | --- | --- | <0.20 | --- | --- | --- |
| Aroclor 1254 | ug/L | 0.2 | 0.5 {A} | 45 {S} | 45 {S} | 3.3 {AA} | --- | --- | --- | --- | --- | <0.20 | --- | --- | --- |
| Aroclor 1260 | ug/L | 0.2 | 0.5 {A} | 45 {S} | 45 {S} | 3.3 {AA} | --- | --- | --- | --- | --- | <0.20 | --- | --- | --- |
| Aroclor 1262 | ug/L | 0.2 | 0.5 {A} | 45 {S} | 45 {S} | 3.3 {AA} | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Aroclor 1268 | ug/L | 0.2 | 0.5 {A} | 45 {S} | 45 {S} | 3.3 {AA} | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Pesticides*** | ***Units*** | | | | | | | | | | | | | | |
| Aldrin | ug/L | 0.01 | 0.098 | 180 {S} | 180 {S} | 0.34 {AA} | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| alpha-BHC | ug/L | 0.05 | 0.43 | 2000 {S} | 2000 {S} | 60 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| beta-BHC | ug/L | 0.02 | 0.88 | NLV | NLV | 120 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| delta-BHC | ug/L | 0.05 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| gamma-BHC (Lindane) | ug/L | 0.03 | 0.2 {A} | ID | ID | 190 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| a-Chlordane {J} | ug/L | 2 | 2.0 {A} | 56 {S} | 56 {S} | 15 {AA} | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| g-Chlordane {J} | ug/L | 2 | 2.0 {A} | 56 {S} | 56 {S} | 15 {AA} | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4-4'-DDD | ug/L | 0.1 | 9.1 | NLV | NLV | 44 {AA} | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4-4'-DDE | ug/L | 0.1 | 4.3 | NLV | NLV | 27 {AA} | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4-4'-DDT | ug/L | 0.02 | 3.6 | NLV | NLV | 13 {AA} | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dieldrin | ug/L | 0.02 | 0.11 | 200 {S} | 200 {S} | 2.4 {AA} | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Endosulfan I {J} | ug/L | 0.03 | 44 | ID | ID | 510 {S} | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Endosulfan II {J} | ug/L | 0.03 | 44 | ID | ID | 510 {S} | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Endosulfan Sulfate {J} | ug/L | 0.05 | 44 | ID | ID | 510 {S} | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Endrin | ug/L | 0.02 | 2.0 {A} | NLV | NLV | 160 {AA} | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Endrin Aldehyde | ug/L | 0.02 | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heptachlor | ug/L | 0.01 | 0.4 {A} | 180 {S} | 180 {S} | 2.9 {AA} | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heptachlor epoxide | ug/L | 0.01 | 0.2 {A} | NLV | NLV | 9.0 {AA} | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Methoxychlor | ug/L | 0.5 | 40 {A} | ID | ID | 45 {S} | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Mirex | ug/L | 0.02 | 0.02 {M} :6.8E-6 {S} | ID | ID | 0.02 {M} :6.8E-6 {S} | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Pentachloronitrobenzene | ug/L | 20 | 32 {S} | 32 {S} | 32 {S} | 32 {S} | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Toxaphene | ug/L | 1 | 3.0 {A} | NLV | NLV | 44 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Misc.*** | ***Units*** | | | | | | | | | | | | | | |
| Alkalinity | ug/L | NA | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Bicarbonate Alkalinity | ug/L | NA | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Carbonate Alkalinity | ug/L | NA | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Conductivity | *umho/cm* | NA | NA | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| pH | pH | NA | 6.5 to 8.5 {E} | NA | NA | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- |

# Table B2-3A
## Summary of Analytical Results for Organic Groundwater Samples - Update 2011 Criteria
## Gage Products
## Ferndale, Michigan

| Sample Location | | Target | GMW-2 | GMW-2 | GMW-2 | GMW-2 | GMW-3 | GMW-3 | GMW-3 | GMW-3 | GMW-3 | GMW-3 | GMW-3 | GMW-3 | GMW-4 (dup) | GMW-4 | GMW-4 | GMW-4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lab Sample ID | | Method | 30184 | 46003 | 109071-0001 | | 2930-03 | 2930-09 | 23466 | 30185 | 46000 | | 109071-0002 | | 109071-0004 | 2930-04 | 2930-08 | 23468 |
| Sampled By | | Detection | WWES | WWES | WWES | MDNR | OHM | OHM | EDI | WWES | WWES | MDNR | WWES | MDNR | WWES | OHM | OHM | EDI |
| Analyzed By | | Limit | | | | | | | | | | | | | | | | |
| Sample Date | | | 12/5/89 | 8/6/90 | 11/23/92 | 11/24/92 | 9/5/85 | 3/19/86 | 8/2/89 | 12/5/89 | 8/6/90 | 11/23/92 | 11/23/92 | 11/24/92 | 11/23/92 | 9/5/85 | 3/19/86 | 8/3/89 |
| Sample Depth (Ft.) | | | | | | | | | | | | | | | | | | |
| ***Volatiles*** | ***Units*** | | | | | | | | | | | | | | | | | |
| Acetate | ug/L | 1000 | --- | --- | --- | <5 | --- | --- | --- | --- | --- | <5 | --- | --- | --- | --- | --- | --- |
| Acetonitrile | ug/L | 50 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Acrylonitrile {I} | ug/L | 2 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Allyl Chloride | ug/L | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Benzene {I} | ug/L | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | **2.6** | --- | --- | **44.8** | <1000 | <5000 |
| Bromobenzene | ug/L | 1 | --- | --- | <1 | --- | --- | --- | --- | --- | --- | --- | <1 | --- | --- | --- | --- | --- |
| Bromochloromethane | ug/L | 1 | --- | --- | <1 | --- | --- | --- | --- | --- | --- | --- | <1 | --- | --- | --- | --- | --- |
| Bromodichloromethane | ug/L | 1 | <1 | <2 | <1 | <1 | <1 | <1 | <2 | <1 | <2 | <1 | <1 | --- | --- | <1 | <1000 | <10000. |
| Bromoform | ug/L | 1 | <1 | <15 | <1 | <1 | <1 | <1 | <15 | <1 | <15 | <1 | <1 | --- | --- | <1 | <1000 | <75000. |
| Bromomethane | ug/L | 5 | <1 | <10 | <1 | <5 | <1 | <1 | <10 | <1 | <10 | <5 | <1 | --- | --- | <1 | <1000 | <50000 |
| 2-Butanone (MEK) {I} | ug/L | 25 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| n-Butylbenzene | ug/L | 1 | --- | --- | <1 | --- | --- | --- | --- | --- | --- | --- | <1 | --- | --- | --- | --- | --- |
| sec-Butylbenzene | ug/L | 1 | --- | --- | <1 | --- | --- | --- | --- | --- | --- | --- | <1 | --- | --- | --- | --- | --- |
| Tert-Butylbenzene | ug/L | 1 | --- | --- | <1 | --- | --- | --- | --- | --- | --- | --- | <1 | --- | --- | --- | --- | --- |
| Carbon disulfide {I,R} | ug/L | 5 | --- | --- | --- | <5 | --- | --- | --- | --- | --- | <5 | --- | --- | --- | --- | --- | --- |
| Carbon tetrachloride | ug/L | 1 | <1 | <4 | <1 | <1 | <1 | <1 | <4 | <1 | <4 | <1 | <1 | --- | --- | <1 | <1000 | <20000 |
| Chlorobenzene {I} | ug/L | 1 | **8** | **7** | <1 | <1 | **23.1** | **13.3** | <1 | **39** | <1 | **2.2** | <1 | --- | --- | **390000** | **141000** | **360000** |
| Chlorodibromomethane | ug/L | 5 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Chloroethane {I} | ug/L | 5 | <1 | <10 | <1 | <5 | <1 | <1 | <10 | <1 | <10 | <5 | <1 | --- | --- | **24.3** | <1000 | <50000. |
| 2-Chloroethyl vinyl ether | ug/L | 10 | <1 | <10 | --- | --- | <1 | <1 | <10 | <1 | <10 | --- | --- | --- | --- | <1 | <1000 | <50000. |
| Chloroform | ug/L | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | --- | --- | <1 | <1000 | <5000 |
| 1-Chlorohexane | ug/L | NA | --- | --- | <1 | --- | --- | --- | --- | --- | --- | --- | <1 | --- | --- | --- | --- | --- |
| Chloromethane {I} | ug/L | 5 | <1 | <10 | <1 | <5 | <1 | <1 | <10 | <1 | <10 | <5 | <1 | --- | --- | <1 | <1000 | <50000. |
| 2-Chlorotoluene | ug/L | 5 | --- | --- | <1 | --- | --- | --- | --- | --- | --- | --- | <1 | --- | --- | --- | --- | --- |
| 4-Chlorotoluene | ug/L | 5 | --- | --- | <1 | --- | --- | --- | --- | --- | --- | --- | <1 | --- | --- | --- | --- | --- |
| 1,2-Dibromo-3-Chloropropane | ug/L | 0.2 | --- | --- | <1 | --- | --- | --- | --- | --- | --- | --- | <1 | --- | --- | --- | --- | --- |
| Dibromochloromethane | ug/L | 5 | <1 | <3 | <1 | <1 | <1 | <1 | <3 | <1 | <3 | <1 | <1 | --- | --- | <1 | <1000 | <15000. |
| Ethylene dibromide | ug/L | 0.05 | --- | --- | <1 | <1 | --- | --- | --- | --- | --- | <1 | <1 | --- | --- | --- | --- | --- |
| Ethylene dibromide | ug/L | 0.05 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dibromomethane | ug/L | 5 | --- | --- | <1 | --- | --- | --- | --- | --- | --- | --- | <1 | --- | --- | --- | --- | --- |
| trans-1,4-Dichloro-2-butene | ug/L | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1,2-Dichlorobenzene | ug/L | 1 | <1 | <15 | <1 | --- | --- | --- | <15 | <1 | <15 | <0.7 | <1 | --- | --- | --- | --- | <75000. |
| 1,3-Dichlorobenzene | ug/L | 1 | <1 | <15 | <1 | --- | --- | --- | <15 | <1 | <15 | <0.1 | <1 | --- | --- | --- | --- | <75000. |
| 1,4-Dichlorobenzene | ug/L | 1 | <1 | <15 | <1 | --- | --- | --- | <15 | <1 | <15 | <0.25 | <1 | --- | --- | --- | --- | <75000. |
| Dichlorodifluoromethane | ug/L | 5 | <1 | <10 | <1 | --- | --- | --- | <10 | <1 | <10 | --- | <1 | --- | --- | --- | --- | <50000. |
| 1,1-Dichloroethane {I} | ug/L | 1 | <1 | <2 | <1 | <1 | <1 | **10.1** | <2 | **1** | <2 | **9.4 J** | **7** | --- | --- | **371** | <1000 | <10000. |
| 1,2-Dichloroethane {I} | ug/L | 1 | <1 | <2 | <1 | <1 | <1 | <1 | <2 | <1 | <2 | <1 | <1 | --- | --- | <1 | <1000 | <10000. |
| 1,1-Dichloroethylene {I} | ug/L | 1 | <1 | <2 | --- | <1 | <1 | <1 | <2 | <1 | <2 | <1 | --- | --- | --- | **1.1** | <1000 | <10000. |
| cis-1,2-Dichloroethylene {I} | ug/L | 1 | <1 | --- | <1 | <1 | --- | --- | --- | <1 | --- | <1 | <1 | --- | --- | --- | --- | --- |
| trans-1,2-Dichloroethylene | ug/L | 1 | <1 | <2 | <1 | <1 | <1 | <1 | <2 | <1 | <2 | <1 | <1 | --- | --- | **109** | <1000 | <10000. |
| 1,2-Dichloropropane {I} | ug/L | 1 | <1 | <3 | <1 | <1 | <1 | <1 | <3 | <1 | <3 | <1 | <1 | --- | --- | <1 | <1000 | <15000. |
| 1,3-Dichloropropane | ug/L | 1 | --- | --- | <1 | --- | --- | --- | --- | --- | --- | --- | <1 | --- | --- | --- | --- | --- |
| 2,2-Dichloropropane | ug/L | 1 | --- | --- | <1 | --- | --- | --- | --- | --- | --- | --- | <1 | --- | --- | --- | --- | --- |
| cis-1,3-Dichloropropene {I,J} | ug/L | 1 | --- | --- | --- | --- | --- | <1 | --- | --- | --- | --- | --- | --- | --- | --- | <1000 | --- |

# Table B2-3A
## Summary of Analytical Results for Organic Groundwater Samples - Update 2011 Criteria
## Gage Products
## Ferndale, Michigan

| Sample Location | | Target | GMW-2 | GMW-2 | GMW-2 | GMW-2 | GMW-3 | GMW-3 | GMW-3 | GMW-3 | GMW-3 | GMW-3 | GMW-3 | GMW-3 | GMW-4 (dup) | GMW-4 | GMW-4 | GMW-4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lab Sample ID | | Method | 30184 | 46003 | 109071-0001 | | 2930-03 | 2930-09 | 23466 | 30185 | 46000 | | 109071-0002 | | 109071-0004 | 2930-04 | 2930-08 | 23468 |
| Sampled By | | Detection | WWES | WWES | WWES | MDNR | OHM | OHM | EDI | WWES | WWES | MDNR | WWES | MDNR | WWES | OHM | OHM | EDI |
| Analyzed By | | Limit | | | | | | | | | | | | | | | | |
| Sample Date | | | 12/5/89 | 8/6/90 | 11/23/92 | 11/24/92 | 9/5/85 | 3/19/86 | 8/2/89 | 12/5/89 | 8/6/90 | 11/23/92 | 11/23/92 | 11/24/92 | 11/23/92 | 9/5/85 | 3/19/86 | 8/3/89 |
| Sample Depth (Ft.) | | | | | | | | | | | | | | | | | | |
| ***Volatiles Cont.*** | **Units** | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1,1-Dichloropropene | ug/L | 1 | --- | --- | <1 | --- | --- | --- | --- | --- | --- | --- | <1 | --- | --- | --- | --- | --- |
| trans-1,3-Dichloropropene {I, J} | ug/L | 1 | <1 | <4 | --- | <1 | <1 | <1 | <4 | <1 | <4 | <1 | --- | --- | --- | <1 | <1000 | <20000. |
| cis-1,3-Dichloropropene {I,J} | ug/L | 1 | <1 | <4 | --- | <1 | <1 | --- | <4 | <1 | <4 | <1 | --- | --- | --- | <1 | --- | <20000. |
| 1,4-Dioxane | ug/L | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Ethyl ether | ug/L | 10 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Ethylbenzene {I} | ug/L | 1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | --- | --- | <1 | <1000 | <5000 |
| Formaldehyde | ug/L | 100 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Hexachloroethane | ug/L | 5 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2-Hexanone {I} | ug/L | 50 | --- | --- | --- | <5 | --- | --- | --- | --- | --- | <5 | --- | --- | --- | --- | --- | --- |
| Iodomethane | ug/L | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Isopropyl benzene {I} | ug/L | 5 | --- | --- | <1 | --- | --- | --- | --- | --- | --- | --- | <1 | --- | --- | --- | --- | --- |
| p-Isopropyltoluene | ug/L | 5 | --- | --- | <1 | --- | --- | --- | --- | --- | --- | --- | <1 | --- | --- | --- | --- | --- |
| Methyl ethyl ketone | ug/L | 25 | --- | --- | --- | <5 | --- | --- | --- | --- | --- | <5 | --- | --- | --- | --- | --- | --- |
| Methyl isobutyl ketone | ug/L | 50 | --- | --- | --- | <5 | --- | --- | --- | --- | --- | <5 | --- | --- | --- | --- | --- | --- |
| 4-Methyl-2-pentanone (MIBK) {I} | ug/L | 50 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Methyl-tert-butyl ether (MTBE) | ug/L | 5 | --- | --- | --- | <5 | --- | --- | --- | --- | --- | <5 | --- | --- | --- | --- | --- | --- |
| Methylene chloride | ug/L | 5 | <1 | <5 | <1 | <5 | <1 | <1 | <5 | <1 | <5 | <5 | <1 | --- | --- | **42** | <1000 | <25000. |
| n-Propylbenzene {I} | ug/L | 1 | --- | --- | <1 | --- | --- | --- | --- | --- | --- | --- | <1 | --- | --- | --- | --- | --- |
| Propionitrile | ug/L | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Styrene {I} | ug/L | 1 | --- | --- | <1 | <1 | --- | --- | --- | --- | --- | <1 | <1 | --- | --- | --- | --- | --- |
| 1,1,1,2-Tetrachloroethane | ug/L | 1 | --- | --- | <1 | --- | --- | --- | --- | --- | --- | --- | <1 | --- | --- | --- | --- | --- |
| 1,1,2,2-Tetrachloroethane | ug/L | 1 | <1 | <2 | <1 | <1 | <1 | <1 | <2 | <1 | <2 | <1 | <1 | --- | --- | <1 | <1000 | <10000. |
| Tetrachloroethylene | ug/L | 1 | <1 | <2 | <1 | <1 | <1 | <1 | <2 | <1 | <2 | <1 | <1 | --- | --- | **11** | <1000 | <10000. |
| Toluene {I} | ug/L | 1 | <1 | <1 | **3.5** | <1 | <1 | <1 | <1 | <1 | <1 | <1 | **1.2** | --- | --- | **2020** | <1000 | <5000 |
| 1,2,3-Trichlorobenzene | ug/L | 5 | --- | --- | <1 | --- | --- | --- | --- | --- | --- | <0.01 | <1 | --- | --- | --- | --- | --- |
| 1,2,4-Trichlorobenzene | ug/L | 5 | --- | --- | <1 | --- | --- | --- | --- | --- | --- | <0.01 | <1 | --- | --- | --- | --- | --- |
| 1,1,1-Trichloroethane | ug/L | 1 | <1 | <2 | <1 | <1 | <1 | **5.55** | <2 | <1 | <2 | <1 | <1 | --- | --- | **5.5** | <1000 | <10000. |
| 1,1,2-Trichloroethane | ug/L | 1 | <1 | <3 | <1 | <1 | <1 | <1 | <3 | <1 | <3 | <1 | <1 | --- | --- | <1 | <1000 | <15000. |
| Trichloroethylene | ug/L | 1 | <1 | <2 | <1 | <1 | <1 | <1 | <2 | **2** | <2 | **2.5** | <1 | --- | --- | **21.6** | <1000 | <10000. |
| Trichlorofluoromethane | ug/L | 1 | <1 | <3 | <1 | --- | --- | <10 | <3 | <1 | <3 | --- | <1 | --- | --- | --- | <1000 | <15000. |
| 1,2,3-Trichloropropane | ug/L | 1 | --- | --- | <1 | --- | --- | --- | --- | --- | --- | --- | <1 | --- | --- | --- | --- | --- |
| 1,2,4-Trimethylbenzene {I} | ug/L | 1 | --- | --- | <1 | --- | --- | --- | --- | --- | --- | --- | <1 | --- | --- | --- | --- | --- |
| 1,3,5-Trimethylbenzene {I} | ug/L | 1 | --- | --- | <1 | --- | --- | --- | --- | --- | --- | --- | <1 | --- | --- | --- | --- | --- |
| Vinyl acetate | ug/L | 100 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Vinyl chloride | ug/L | 1 | <1 | <10 | <1 | <5 | <1 | <1 | <10 | <1 | <10 | <5 | <1 | --- | --- | **4.6** | <1000 | <50000. |
| Xylene, p&m | ug/L | 2 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Xylene (Total) | ug/L | 3 | <3 | <5 | <1 | <1 | --- | --- | --- | <3 | <5 | **1.9** | <1 | --- | --- | --- | --- | --- |
| Xylene, o | ug/L | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Semi-Volatiles*** | **Units** | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Acenaphthene | ug/L | 5 | --- | --- | <5 | <1 | --- | --- | --- | --- | --- | <1 | <5 | --- | --- | --- | --- | --- |
| Acenaphthylene | ug/L | 5 | --- | --- | <5 | <1 | --- | --- | --- | --- | --- | <1 | <5 | --- | --- | --- | --- | --- |
| Acetophenone | ug/L | 5 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Aniline {I} | ug/L | 4 | --- | --- | <5 | --- | --- | --- | --- | --- | --- | --- | <5 | --- | --- | --- | --- | --- |

# Table B2-3A
## Summary of Analytical Results for Organic Groundwater Samples - Update 2011 Criteria
## Gage Products
## Ferndale, Michigan

| Sample Location | | Target | GMW-2 | GMW-2 | GMW-2 | GMW-2 | GMW-3 | GMW-3 | GMW-3 | GMW-3 | GMW-3 | GMW-3 | GMW-3 | GMW-3 | GMW-4 (dup) | GMW-4 | GMW-4 | GMW-4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lab Sample ID | | Method | 30184 | 46003 | 109071-0001 | | 2930-03 | 2930-09 | 23466 | 30185 | 46000 | | 109071-0002 | | 109071-0004 | 2930-04 | 2930-08 | 23468 |
| Sampled By | | Detection | WWES | WWES | WWES | MDNR | OHM | OHM | EDI | WWES | WWES | MDNR | WWES | MDNR | WWES | OHM | OHM | EDI |
| Analyzed By | | Limit | | | | | | | | | | | | | | | | |
| Sample Date | | | 12/5/89 | 8/6/90 | 11/23/92 | 11/24/92 | 9/5/85 | 3/19/86 | 8/2/89 | 12/5/89 | 8/6/90 | 11/23/92 | 11/23/92 | 11/24/92 | 11/23/92 | 9/5/85 | 3/19/86 | 8/3/89 |
| Sample Depth (Ft.) | | | | | | | | | | | | | | | | | | |
| ***Semi-Volatiles Cont.*** | **Units** | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Anthracene | ug/L | 5 | --- | --- | <5 | <1 | --- | --- | --- | --- | --- | <1 | <5 | --- | --- | --- | --- | --- |
| Benzidine | ug/L | 0.3 | --- | --- | <5 | <15 | --- | --- | --- | --- | --- | <15 | <5 | --- | --- | --- | --- | --- |
| Benzo(a)anthracene {Q} | ug/L | 1 | --- | --- | <5 | <1 | --- | --- | --- | --- | --- | <1 | <5 | --- | --- | --- | --- | --- |
| Benzo(a)pyrene {Q} | ug/L | 1 | --- | --- | <5 | <2 | --- | --- | --- | --- | --- | <2 | <5 | --- | --- | --- | --- | --- |
| Benzo(b&k)fluoranthene {Q} | ug/L | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Benzo(b)fluoranthene {Q} | ug/L | 1 | --- | --- | <5 | <2 | --- | --- | --- | --- | --- | <2 | <5 | --- | --- | --- | --- | --- |
| Benzo(g,h,i)perylene | ug/L | 1 | --- | --- | <5 | <5 | --- | --- | --- | --- | --- | <5 | <5 | --- | --- | --- | --- | --- |
| Benzo(k)fluoranthene {Q} | ug/L | 1 | --- | --- | <5 | <2 | --- | --- | --- | --- | --- | <2 | <5 | --- | --- | --- | --- | --- |
| Benzoic acid | ug/L | 50 | --- | --- | <5 | --- | --- | --- | --- | --- | --- | --- | <5 | --- | --- | --- | --- | --- |
| Benzyl alcohol | ug/L | 50 | --- | --- | <5 | --- | --- | --- | --- | --- | --- | --- | <5 | --- | --- | --- | --- | --- |
| bis(2-Chloroethoxy)methane | ug/L | 5 | --- | --- | <5 | <2 | --- | --- | --- | --- | --- | <2 | <5 | --- | --- | --- | --- | --- |
| bis(2-Chloroethyl)ether {I} | ug/L | 1 | --- | --- | <5 | <1 | --- | --- | --- | --- | --- | <1 | <5 | --- | --- | --- | --- | --- |
| bis(2-Chloroisopropyl)ether | ug/L | 5 | --- | --- | <5 | <1 | --- | --- | --- | --- | --- | <1 | <5 | --- | --- | --- | --- | --- |
| bis(2-Ethylhexyl)phthalate | ug/L | 5 | --- | --- | <5 | **2.5** | --- | --- | --- | --- | --- | **2.5** | <5 | --- | --- | --- | --- | --- |
| 4-Bromo diphenyl ether | ug/L | 5 | --- | --- | <5 | <2 | --- | --- | --- | --- | --- | <2 | <5 | --- | --- | --- | --- | --- |
| Butyl benzyl phthalate | ug/L | 5 | --- | --- | <5 | <1 | --- | --- | --- | --- | --- | <1 | <5 | --- | --- | --- | --- | --- |
| 4-Chloro-3-methylphenol | ug/L | 5 | --- | --- | <5 | <10 | --- | --- | --- | --- | --- | <10 | <5 | --- | --- | --- | --- | --- |
| 4-Chloroaniline | ug/L | 10 | --- | --- | <5 | --- | --- | --- | --- | --- | --- | --- | <5 | --- | --- | --- | --- | --- |
| beta-Chloronaphthalene | ug/L | 5 | --- | --- | <5 | <2 | --- | --- | --- | --- | --- | <2 | <5 | --- | --- | --- | --- | --- |
| 2-Chlorophenol | ug/L | 10 | --- | --- | <5 | <10 | --- | --- | --- | --- | --- | <10 | <5 | --- | --- | --- | --- | --- |
| 4-Chloro diphenyl ether | ug/L | 5 | --- | --- | <5 | --- | --- | --- | --- | --- | --- | --- | <5 | --- | --- | --- | --- | --- |
| Chrysene {Q} | ug/L | 1 | --- | --- | <5 | <1 | --- | --- | --- | --- | --- | <1 | <5 | --- | --- | --- | --- | --- |
| Decabromodiphenyl ether | ug/L | 10 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Di-n-octyl phthalate | ug/L | 5 | --- | --- | <5 | <2 | --- | --- | --- | --- | --- | <2 | <5 | --- | --- | --- | --- | --- |
| Dibenzo(a,h)anthracene {Q} | ug/L | 2 | --- | --- | <5 | <5 | --- | --- | --- | --- | --- | <5 | <5 | --- | --- | --- | --- | --- |
| Dibenzofuran | ug/L | 4 | --- | --- | <5 | --- | --- | --- | --- | --- | --- | --- | <5 | --- | --- | --- | --- | --- |
| Di-n-butyl phthalate | ug/L | 5 | --- | --- | <5 | <1 | --- | --- | --- | --- | --- | <1 | <5 | --- | --- | --- | --- | --- |
| 1,2-Dichlorobenzene | ug/L | 1 | --- | --- | <5 | <1 | --- | --- | --- | --- | --- | <1 | <5 | --- | --- | --- | --- | --- |
| 1,3-Dichlorobenzene | ug/L | 1 | --- | --- | <5 | <1 | --- | --- | --- | --- | --- | <1 | <5 | --- | --- | --- | --- | --- |
| 1,4-Dichlorobenzene | ug/L | 1 | --- | --- | <5 | <1 | --- | --- | --- | --- | --- | <1 | <5 | --- | --- | --- | --- | --- |
| 3,3'-Dichlorobenzidine | ug/L | 0.3 | --- | --- | <5 | <10 | --- | --- | --- | --- | --- | <10 | <5 | --- | --- | --- | --- | --- |
| 2,4-Dichlorophenol | ug/L | 10 | --- | --- | <5 | <10 | --- | --- | --- | --- | --- | <10 | <5 | --- | --- | --- | --- | --- |
| 2,6-Dichlorophenol | ug/L | 5 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Diethyl phthalate | ug/L | 5 | --- | --- | <5 | <1 | --- | --- | --- | --- | --- | <1 | <5 | --- | --- | --- | --- | --- |
| Dimethyl phthalate | ug/L | 5 | --- | --- | <5 | <2 | --- | --- | --- | --- | --- | <2 | <5 | --- | --- | --- | --- | --- |
| 2,4-Dimethylphenol | ug/L | 5 | --- | --- | <5 | <10 | --- | --- | --- | --- | --- | <10 | <5 | --- | --- | --- | --- | --- |
| 3,3-Dimethylbenzidine | ug/L | 0.3 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2,4-Dinitrophenol | ug/L | 25 | --- | --- | <5 | <50 | --- | --- | --- | --- | --- | <50 | <5 | --- | --- | --- | --- | --- |
| 2,4-Dinitrotoluene | ug/L | 5 | --- | --- | <5 | <5 | --- | --- | --- | --- | --- | <5 | <5 | --- | --- | --- | --- | --- |
| 2,6-Dinitrotoluene | ug/L | 5 | --- | --- | <5 | <5 | --- | --- | --- | --- | --- | <5 | <5 | --- | --- | --- | --- | --- |
| Diphenylamine | ug/L | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1,2-Diphenylhydrazine | ug/L | 5 | --- | --- | --- | <2 | --- | --- | --- | --- | --- | <2 | --- | --- | --- | --- | --- | --- |
| Fluoranthene | ug/L | 1 | --- | --- | <5 | <1 | --- | --- | --- | --- | --- | <1 | <5 | --- | --- | --- | --- | --- |

# Table B2-3A
## Summary of Analytical Results for Organic Groundwater Samples - Update 2011 Criteria
## Gage Products
## Ferndale, Michigan

| Sample Location<br>Lab Sample ID<br>Sampled By<br>Analyzed By<br>Sample Date<br>Sample Depth (Ft.) | | Target Method Detection Limit | GMW-2<br>30184<br>WWES<br><br>12/5/89 | GMW-2<br>46003<br>WWES<br><br>8/6/90 | GMW-2<br>109071-0001<br>WWES<br><br>11/23/92 | GMW-2<br><br>MDNR<br><br>11/24/92 | GMW-3<br>2930-03<br>OHM<br><br>9/5/85 | GMW-3<br>2930-09<br>OHM<br><br>3/19/86 | GMW-3<br>23466<br>EDI<br><br>8/2/89 | GMW-3<br>30185<br>WWES<br><br>12/5/89 | GMW-3<br>46000<br>WWES<br><br>8/6/90 | GMW-3<br><br>MDNR<br><br>11/23/92 | GMW-3<br>109071-0002<br>WWES<br><br>11/23/92 | GMW-3<br><br>MDNR<br><br>11/24/92 | GMW-4 (dup)<br>109071-0004<br>WWES<br><br>11/23/92 | GMW-4<br>2930-04<br>OHM<br><br>9/5/85 | GMW-4<br>2930-08<br>OHM<br><br>3/19/86 | GMW-4<br>23468<br>EDI<br><br>8/3/89 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Semi-Volatiles Cont.*** | ***Units*** | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Fluorene | ug/L | 5 | --- | --- | <5 | <1 | --- | --- | --- | --- | --- | <1 | <5 | --- | --- | --- | --- | --- |
| Hexachlorobenzene (C-66) | ug/L | 0.2 | --- | --- | <5 | <1 | --- | --- | --- | --- | --- | <1 | <5 | --- | --- | --- | --- | --- |
| Hexachlorobutadiene (C-46) | ug/L | 0.05 | --- | --- | <5 | <2 | --- | --- | --- | --- | --- | <2 | <5 | --- | --- | --- | --- | --- |
| Hexachlorocyclopentadiene (C-56) | ug/L | 5 | --- | --- | <5 | <2 | --- | --- | --- | --- | --- | <2 | <5 | --- | --- | --- | --- | --- |
| Hexachloroethane | ug/L | 5 | --- | --- | <5 | <1 | --- | --- | --- | --- | --- | <1 | <5 | --- | --- | --- | --- | --- |
| Hexachloropropene | ug/L | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Indeno(1,2,3-cd)pyrene {Q} | ug/L | 2 | --- | --- | <5 | <5 | --- | --- | --- | --- | --- | <5 | <5 | --- | --- | --- | --- | --- |
| Isophorone | ug/L | 5 | --- | --- | <5 | <1 | --- | --- | --- | --- | --- | <1 | <5 | --- | --- | --- | --- | --- |
| 2-Methyl-4,6-dinitrophenol | ug/L | 20 | --- | --- | <5 | <40 | --- | --- | --- | --- | --- | <40 | <5 | --- | --- | --- | --- | --- |
| 2-Methylnaphthalene | ug/L | 5 | --- | --- | <5 | --- | --- | --- | --- | --- | --- | --- | <5 | --- | --- | --- | --- | --- |
| 2-Methylphenol {J} | ug/L | 10 | --- | --- | <5 | <10 | --- | --- | --- | --- | --- | <10 | <5 | --- | --- | --- | --- | --- |
| 3-Methylphenol {J} | ug/L | 10 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4-Methylphenol {J} | ug/L | 10 | --- | --- | <5 | <10 | --- | --- | --- | --- | --- | <10 | <5 | --- | --- | --- | --- | --- |
| Naphthalene | ug/L | 5 | --- | --- | <5 | <1 | --- | --- | --- | --- | --- | <1 | <5 | --- | --- | --- | --- | --- |
| 1,4-Naphthylamine | ug/L | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1-Naphthylamine | ug/L | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2-Naphthylamine | ug/L | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2-Nitroaniline | ug/L | 25 | --- | --- | <5 | --- | --- | --- | --- | --- | --- | --- | <5 | --- | --- | --- | --- | --- |
| 3-Nitroaniline | ug/L | 25 | --- | --- | <5 | --- | --- | --- | --- | --- | --- | --- | <5 | --- | --- | --- | --- | --- |
| 4-Nitroaniline | ug/L | 25 | --- | --- | <5 | --- | --- | --- | --- | --- | --- | --- | <5 | --- | --- | --- | --- | --- |
| Nitrobenzene {I} | ug/L | 3 | --- | --- | <5 | <2 | --- | --- | --- | --- | --- | <2 | <5 | --- | --- | --- | --- | --- |
| 2-Nitrophenol | ug/L | 5 | --- | --- | <5 | <10 | --- | --- | --- | --- | --- | <10 | <5 | --- | --- | --- | --- | --- |
| 4-Nitrophenol | ug/L | 25 | --- | --- | <5 | <40 | --- | --- | --- | --- | --- | <40 | <5 | --- | --- | --- | --- | --- |
| 4-Nitroquinoline-1-oxide | ug/L | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| n-Nitroso-di-n-propylamine | ug/L | 5 | --- | --- | <5 | <2 | --- | --- | --- | --- | --- | <2 | <5 | --- | --- | --- | --- | --- |
| N-Nitroso-di-methylamine | ug/L | 5 | --- | --- | <5 | --- | --- | --- | --- | --- | --- | --- | <5 | --- | --- | --- | --- | --- |
| N-Nitroso-di-methylamine | ug/L | 5 | --- | --- | <5 | --- | --- | --- | --- | --- | --- | --- | <5 | --- | --- | --- | --- | --- |
| N-Nitrosodiphenylamine | ug/L | 5 | --- | --- | <5 | <5 | --- | --- | --- | --- | --- | <5 | <5 | --- | --- | --- | --- | --- |
| Pentachlorophenol | ug/L | 1 | --- | --- | <5 | <40 | --- | --- | --- | --- | --- | <40 | <5 | --- | --- | --- | --- | --- |
| Phenacetin | ug/L | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Phenanthrene | ug/L | 2 | --- | --- | <5 | <1 | --- | --- | --- | --- | --- | <1 | <5 | --- | --- | --- | --- | --- |
| Phenol | ug/L | 5 | --- | --- | <5 | **10** | --- | --- | --- | --- | --- | **10** | <5 | --- | --- | --- | --- | --- |
| 1,4-Phenylenediamine | ug/L | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Pyrene | ug/L | 5 | --- | --- | <5 | <1 | --- | --- | --- | --- | --- | <1 | <5 | --- | --- | --- | --- | --- |
| Pyridine | ug/L | 20 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1,2,4-Trichlorobenzene | ug/L | 5 | --- | --- | <5 | <2 | --- | --- | --- | --- | --- | <2 | <5 | --- | --- | --- | --- | --- |
| 2,4,5-Trichlorophenol | ug/L | 5 | --- | --- | <5 | <10 | --- | --- | --- | --- | --- | <10 | <5 | --- | --- | --- | --- | --- |
| 2,4,6-Trichlorophenol | ug/L | 4 | --- | --- | <5 | <10 | --- | --- | --- | --- | --- | <10 | <5 | --- | --- | --- | --- | --- |
| ***Halogenateds*** | ***Units*** | | | | | | | | | | | | | | | | | |
| Hexabromobenzene | ug/L | 0.02 | --- | --- | --- | <0.011 | --- | --- | --- | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- |
| Pentachlorobenzene | ug/L | 5 | --- | --- | --- | <0.011 | --- | --- | --- | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- |
| 1,2,3,4-Tetrachlorobenzene | ug/L | 5 | --- | --- | --- | <0.011 | --- | --- | --- | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- |
| 1,2,4,5-Tetrachlorobenzene | ug/L | 2 | --- | --- | --- | <0.011 | --- | --- | --- | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- |
| 1,3,5-Trichlorobenzene | ug/L | 5 | --- | --- | --- | <0.011 | --- | --- | --- | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- |

# Table B2-3A
## Summary of Analytical Results for Organic Groundwater Samples - Update 2011 Criteria
## Gage Products
## Ferndale, Michigan

| Sample Location | | Target | GMW-2 | GMW-2 | GMW-2 | GMW-2 | GMW-3 | GMW-3 | GMW-3 | GMW-3 | GMW-3 | GMW-3 | GMW-3 | GMW-3 | GMW-4 (dup) | GMW-4 | GMW-4 | GMW-4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lab Sample ID | | Method | 30184 | 46003 | 109071-0001 | | 2930-03 | 2930-09 | 23466 | 30185 | 46000 | | 109071-0002 | | 109071-0004 | 2930-04 | 2930-08 | 23468 |
| Sampled By | | Detection | WWES | WWES | WWES | MDNR | OHM | OHM | EDI | WWES | WWES | MDNR | WWES | MDNR | WWES | OHM | OHM | EDI |
| Analyzed By | | Limit | | | | | | | | | | | | | | | | |
| Sample Date | | | 12/5/89 | 8/6/90 | 11/23/92 | 11/24/92 | 9/5/85 | 3/19/86 | 8/2/89 | 12/5/89 | 8/6/90 | 11/23/92 | 11/23/92 | 11/24/92 | 11/23/92 | 9/5/85 | 3/19/86 | 8/3/89 |
| Sample Depth (Ft.) | | | | | | | | | | | | | | | | | | |
| ***PCB's*** | ***Units*** | | | | | | | | | | | | | | | | | |
| BP-6 | *ug/L* | NA | --- | --- | --- | <0.055 | --- | --- | --- | --- | --- | <0.05 | --- | --- | --- | --- | --- | --- |
| Aroclor 1016 | ug/L | 0.2 | --- | --- | --- | <0.11 | --- | --- | --- | --- | --- | <0.1 | --- | --- | --- | --- | --- | --- |
| Aroclor 1221 | ug/L | 0.2 | --- | --- | --- | <0.11 | --- | --- | --- | --- | --- | <0.1 | --- | --- | --- | --- | --- | --- |
| Aroclor 1232 | ug/L | 0.2 | --- | --- | --- | <0.11 | --- | --- | --- | --- | --- | <0.1 | --- | --- | --- | --- | --- | --- |
| Aroclor 1242 | ug/L | 0.2 | --- | --- | --- | <0.11 | --- | --- | --- | --- | --- | <0.1 | --- | --- | --- | --- | --- | --- |
| Aroclor 1248 | ug/L | 0.2 | --- | --- | --- | <0.11 | --- | --- | --- | --- | --- | <0.1 | --- | --- | --- | --- | --- | --- |
| Aroclor 1254 | ug/L | 0.2 | --- | --- | --- | <0.11 | --- | --- | --- | --- | --- | <0.1 | --- | --- | --- | --- | --- | --- |
| Aroclor 1260 | ug/L | 0.2 | --- | --- | --- | <0.11 | --- | --- | --- | --- | --- | <0.1 | --- | --- | --- | --- | --- | --- |
| Aroclor 1262 | ug/L | 0.2 | --- | --- | --- | <0.11 | --- | --- | --- | --- | --- | <0.1 | --- | --- | --- | --- | --- | --- |
| Aroclor 1268 | ug/L | 0.2 | --- | --- | --- | <0.11 | --- | --- | --- | --- | --- | <0.1 | --- | --- | --- | --- | --- | --- |
| ***Pesticides*** | ***Units*** | | | | | | | | | | | | | | | | | |
| Aldrin | ug/L | 0.01 | --- | --- | --- | <0.011 | --- | --- | --- | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- |
| alpha-BHC | ug/L | 0.05 | --- | --- | --- | <0.011 | --- | --- | --- | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- |
| beta-BHC | ug/L | 0.02 | --- | --- | --- | <0.011 | --- | --- | --- | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- |
| delta-BHC | ug/L | 0.05 | --- | --- | --- | <0.011 | --- | --- | --- | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- |
| gamma-BHC (Lindane) | ug/L | 0.03 | --- | --- | --- | <0.011 | --- | --- | --- | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- |
| a-Chlordane {J} | ug/L | 2 | --- | --- | --- | <0.011 | --- | --- | --- | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- |
| g-Chlordane {J} | ug/L | 2 | --- | --- | --- | <0.011 | --- | --- | --- | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- |
| 4-4'-DDD | ug/L | 0.1 | --- | --- | --- | <0.011 | --- | --- | --- | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- |
| 4-4'-DDE | ug/L | 0.1 | --- | --- | --- | <0.011 | --- | --- | --- | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- |
| 4-4'-DDT | ug/L | 0.02 | --- | --- | --- | <0.011 | --- | --- | --- | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- |
| Dieldrin | ug/L | 0.02 | --- | --- | --- | <0.011 | --- | --- | --- | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- |
| Endosulfan I {J} | ug/L | 0.03 | --- | --- | --- | <0.011 | --- | --- | --- | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- |
| Endosulfan II {J} | ug/L | 0.03 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Endosulfan Sulfate {J} | ug/L | 0.05 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Endrin | ug/L | 0.02 | --- | --- | --- | <0.011 | --- | --- | --- | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- |
| Endrin Aldehyde | ug/L | 0.02 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heptachlor | ug/L | 0.01 | --- | --- | --- | <0.011 | --- | --- | --- | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- |
| Heptachlor epoxide | ug/L | 0.01 | --- | --- | --- | <0.011 | --- | --- | --- | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- |
| Methoxychlor | ug/L | 0.5 | --- | --- | --- | <0.011 | --- | --- | --- | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- |
| Mirex | ug/L | 0.02 | --- | --- | --- | <0.011 | --- | --- | --- | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- |
| Pentachloronitrobenzene | ug/L | 20 | --- | --- | --- | <0.011 | --- | --- | --- | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- |
| Toxaphene | ug/L | 1 | --- | --- | --- | <0.11 | --- | --- | --- | --- | --- | <0.1 | --- | --- | --- | --- | --- | --- |
| ***Misc.*** | ***Units*** | | | | | | | | | | | | | | | | | |
| Alkalinity | ug/L | NA | --- | --- | --- | **430000** | --- | --- | --- | --- | --- | --- | --- | **64000** | --- | --- | --- | --- |
| Bicarbonate Alkalinity | ug/L | NA | --- | --- | --- | **430000** | --- | --- | --- | --- | --- | --- | --- | **64000** | --- | --- | --- | --- |
| Carbonate Alkalinity | ug/L | NA | --- | --- | --- | <5000 | --- | --- | --- | --- | --- | --- | --- | <5000 | --- | --- | --- | --- |
| Conductivity | *umho/cm* | NA | --- | --- | --- | **1605** | --- | --- | --- | --- | --- | --- | --- | **876** | --- | --- | --- | --- |
| pH | pH | NA | --- | --- | --- | **7.57** | --- | --- | --- | --- | --- | --- | --- | **8.62** | --- | --- | --- | --- |

# Table B2-3A
## Summary of Analytical Results for Organic Groundwater Samples - Update 2011 Criteria
## Gage Products
## Ferndale, Michigan

| Sample Location | | Target | GMW-4 | GMW-4 | GMW-4 | GMW-4 | GMW-4 | GMW-4 | GMW-4D | GMW-5 | GMW-5 | GMW-5 | GMW-5 | GMW-5 | GMW-5 | GMW-5 | GMW-5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lab Sample ID | | Method | 30189 | 46002 | | 109071-0003 | | 110664-0001 | 109071-0004 | 2930-05 | 2930-12 | 23469 | 30188 | 45999 | | 109071-0005 | |
| Sampled By | | Detection | WWES | WWES | MDNR | WWES | MDNR | WWES | WWES | OHM | OHM | EDI | WWES | WWES | MDNR | WWES | MDNR |
| Analyzed By | | Limit | | | | | | | | | | | | | | | |
| Sample Date | | | 12/5/89 | 8/6/90 | 11/23/92 | 11/23/92 | 11/24/92 | 8/9/93 | 11/23/92 | 9/5/85 | 3/19/86 | 8/3/89 | 12/5/89 | 8/6/90 | 11/23/92 | 11/23/92 | 11/24/92 |
| Sample Depth (Ft.) | | | | | | | | | | | | | | | | | |
| ***Volatiles*** | ***Units*** | | | | | | | | | | | | | | | | |
| Acetate | ug/L | 1000 | --- | --- | 560 BK | --- | --- | --- | --- | --- | --- | --- | --- | --- | <5 | --- | --- |
| Acetonitrile | ug/L | 50 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Acrylonitrile {I} | ug/L | 2 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Allyl Chloride | ug/L | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Benzene {I} | ug/L | 1 | <5000. | <5000 | **23** | **42** | --- | --- | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | --- |
| Bromobenzene | ug/L | 1 | --- | --- | --- | **16** | --- | --- | <1 | --- | --- | --- | --- | --- | --- | <1 | --- |
| Bromochloromethane | ug/L | 1 | --- | --- | --- | <1 | --- | --- | <1 | --- | --- | --- | --- | --- | --- | <1 | --- |
| Bromodichloromethane | ug/L | 1 | <5000. | <10000. | <10 | <1 | --- | --- | <1 | <1 | <1 | <2 | <1 | <2 | <1 | <1 | --- |
| Bromoform | ug/L | 1 | <5000. | <75000. | <10 | <1 | --- | --- | <1 | <1 | <1 | <15 | <1 | <15 | <1 | <1 | --- |
| Bromomethane | ug/L | 5 | <5000. | <50000 | <50 | <1 | --- | --- | <1 | <1 | <1 | <10 | <1 | <10 | <5 | <1 | --- |
| 2-Butanone (MEK) {I} | ug/L | 25 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| n-Butylbenzene | ug/L | 1 | --- | --- | --- | <1 | --- | --- | <1 | --- | --- | --- | --- | --- | --- | <1 | --- |
| sec-Butylbenzene | ug/L | 1 | --- | --- | --- | <1 | --- | --- | <1 | --- | --- | --- | --- | --- | --- | <1 | --- |
| Tert-Butylbenzene | ug/L | 1 | --- | --- | --- | <1 | --- | --- | <1 | --- | --- | --- | --- | --- | --- | <1 | --- |
| Carbon disulfide {I,R} | ug/L | 5 | --- | --- | <10 | --- | --- | --- | --- | --- | --- | --- | --- | --- | <5 | --- | --- |
| Carbon tetrachloride | ug/L | 1 | <5000. | <20000 | <10 | <1 | --- | --- | <1 | <1 | <1 | <4 | <1 | <4 | <1 | <1 | --- |
| Chlorobenzene {I} | ug/L | 1 | **210000** | **390000** | **62000** | **96000** | --- | --- | **86000** | **28** | **17.4** | **95** | <1 | <1 | <1 | **2.5** | --- |
| Chlorodibromomethane | ug/L | 5 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Chloroethane {I} | ug/L | 5 | <5000. | <50000. | <50 | <1 | --- | --- | <1 | <1 | <1 | <10 | <1 | <10 | <5 | <1 | --- |
| 2-Chloroethyl vinyl ether | ug/L | 10 | <5000. | <50000. | --- | --- | --- | --- | --- | <1 | <1 | <10 | <1 | <10 | --- | --- | --- |
| Chloroform | ug/L | 1 | <5000. | <5000 | <10 | <1 | --- | --- | <1 | <1 | <1 | <1 | <1 | <1 | <1 | <1 | --- |
| 1-Chlorohexane | ug/L | NA | --- | --- | --- | <1 | --- | --- | <1 | --- | --- | --- | --- | --- | --- | <1 | --- |
| Chloromethane {I} | ug/L | 5 | <5000. | <50000. | <50 | <1 | --- | --- | <1 | <1 | <1 | <10 | <1 | <10 | <5 | <1 | --- |
| 2-Chlorotoluene | ug/L | 5 | --- | --- | --- | <1 | --- | --- | <1 | --- | --- | --- | --- | --- | --- | <1 | --- |
| 4-Chlorotoluene | ug/L | 5 | --- | --- | --- | <1 | --- | --- | <1 | --- | --- | --- | --- | --- | --- | <1 | --- |
| 1,2-Dibromo-3-Chloropropane | ug/L | 0.2 | --- | --- | --- | <1 | --- | --- | <1 | --- | --- | --- | --- | --- | --- | <1 | --- |
| Dibromochloromethane | ug/L | 5 | <5000. | <15000. | <10 | <1 | --- | --- | <1 | <1 | <1 | <3 | <1 | <3 | <1 | <1 | --- |
| Ethylene dibromide | ug/L | 0.05 | --- | --- | <10 | <1 | --- | --- | <1 | --- | --- | --- | --- | --- | <1 | <1 | --- |
| Ethylene dibromide | ug/L | 0.05 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dibromomethane | ug/L | 5 | --- | --- | --- | <1 | --- | --- | <1 | --- | --- | --- | --- | --- | --- | <1 | --- |
| trans-1,4-Dichloro-2-butene | ug/L | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1,2-Dichlorobenzene | ug/L | 1 | <5000. | <75000. | **120 DMJ** | **280** | --- | --- | **290** | --- | --- | <15 | <1 | <15 | <0.5 | <1 | --- |
| 1,3-Dichlorobenzene | ug/L | 1 | <5000. | <75000. | <10 | <1 | --- | --- | <1 | --- | --- | <15 | <1 | <15 | <0.11 | <1 | --- |
| 1,4-Dichlorobenzene | ug/L | 1 | <5000. | <75000. | **17 DM** | **41** | --- | --- | <1 | --- | --- | <15 | <1 | <15 | <0.11 | <1 | --- |
| Dichlorodifluoromethane | ug/L | 5 | <5000. | <50000. | --- | <1 | --- | --- | <1 | --- | --- | <10 | <1 | <10 | --- | <1 | --- |
| 1,1-Dichloroethane {I} | ug/L | 1 | <5000. | <10000. | **71 J** | **110** | --- | --- | <1 | <1 | **10.6** | <2 | **1** | <2 | <1 | <1 | --- |
| 1,2-Dichloroethane {I} | ug/L | 1 | <5000. | <10000. | <10 | <1 | --- | --- | <1 | <1 | <1 | <2 | <1 | <2 | <1 | <1 | --- |
| 1,1-Dichloroethylene {I} | ug/L | 1 | <5000. | <10000. | <10 | --- | --- | --- | --- | <1 | <1 | <2 | <1 | <2 | <1 | --- | --- |
| cis-1,2-Dichloroethylene {I} | ug/L | 1 | <5000. | --- | **28** | **56** | --- | --- | <1 | --- | --- | --- | <1 | --- | <1 | <1 | --- |
| trans-1,2-Dichloroethylene | ug/L | 1 | <5000. | <10000. | <10 | <1 | --- | --- | <1 | <1 | <1 | <2 | <1 | <2 | <1 | <1 | --- |
| 1,2-Dichloropropane {I} | ug/L | 1 | <5000. | <15000. | <10 | <1 | --- | --- | <1 | <1 | <1 | <3 | <1 | <3 | <1 | <1 | --- |
| 1,3-Dichloropropane | ug/L | 1 | --- | --- | --- | <1 | --- | --- | <1 | --- | --- | --- | --- | --- | --- | <1 | --- |
| 2,2-Dichloropropane | ug/L | 1 | --- | --- | --- | <1 | --- | --- | <1 | --- | --- | --- | --- | --- | --- | <1 | --- |
| cis-1,3-Dichloropropene {I,J} | ug/L | 1 | --- | --- | --- | --- | --- | --- | --- | --- | <1 | --- | --- | --- | --- | --- | --- |

# Table B2-3A
## Summary of Analytical Results for Organic Groundwater Samples - Update 2011 Criteria
## Gage Products
## Ferndale, Michigan

| Sample Location | | Target | GMW-4 | GMW-4 | GMW-4 | GMW-4 | GMW-4 | GMW-4 | GMW-4D | GMW-5 | GMW-5 | GMW-5 | GMW-5 | GMW-5 | GMW-5 | GMW-5 | GMW-5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lab Sample ID | | Method | 30189 | 46002 | | 109071-0003 | | 110664-0001 | 109071-0004 | 2930-05 | 2930-12 | 23469 | 30188 | 45999 | | 109071-0005 | |
| Sampled By | | Detection | WWES | WWES | MDNR | WWES | MDNR | WWES | WWES | OHM | OHM | EDI | WWES | WWES | MDNR | WWES | MDNR |
| Analyzed By | | Limit | | | | | | | | | | | | | | | |
| Sample Date | | | 12/5/89 | 8/6/90 | 11/23/92 | 11/23/92 | 11/24/92 | 8/9/93 | 11/23/92 | 9/5/85 | 3/19/86 | 8/3/89 | 12/5/89 | 8/6/90 | 11/23/92 | 11/23/92 | 11/24/92 |
| Sample Depth (Ft.) | | | | | | | | | | | | | | | | | |
| ***Volatiles Cont.*** | ***Units*** | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1,1-Dichloropropene | ug/L | 1 | --- | --- | --- | <1 | --- | --- | <1 | --- | --- | --- | --- | --- | --- | <1 | --- |
| trans-1,3-Dichloropropene {I, J} | ug/L | 1 | <5000. | <20000. | <10 | --- | --- | --- | --- | <1 | <1 | <4 | <1 | <4 | <1 | --- | --- |
| cis-1,3-Dichloropropene {I,J} | ug/L | 1 | <5000. | <20000. | <10 | --- | --- | --- | --- | <1 | --- | <4 | <1 | <4 | <1 | --- | --- |
| 1,4-Dioxane | ug/L | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Ethyl ether | ug/L | 10 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Ethylbenzene {I} | ug/L | 1 | <5000. | **11000** | **730 PS** | **360** | --- | --- | **370** | <1 | <1 | <1 | <1 | <1 | <1 | <1 | --- |
| Formaldehyde | ug/L | 100 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Hexachloroethane | ug/L | 5 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2-Hexanone {I} | ug/L | 50 | --- | --- | **100** | --- | --- | --- | --- | --- | --- | --- | --- | --- | <5 | --- | --- |
| Iodomethane | ug/L | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Isopropyl benzene {I} | ug/L | 5 | --- | --- | --- | <1 | --- | --- | <1 | --- | --- | --- | --- | --- | --- | <1 | --- |
| p-Isopropyltoluene | ug/L | 5 | --- | --- | --- | <1 | --- | --- | <1 | --- | --- | --- | --- | --- | --- | <1 | --- |
| Methyl ethyl ketone | ug/L | 25 | --- | --- | **89** | --- | --- | --- | --- | --- | --- | --- | --- | --- | <5 | --- | --- |
| Methyl isobutyl ketone | ug/L | 50 | --- | --- | <50 | --- | --- | --- | --- | --- | --- | --- | --- | --- | <5 | --- | --- |
| 4-Methyl-2-pentanone (MIBK) {I} | ug/L | 50 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Methyl-tert-butyl ether (MTBE) | ug/L | 5 | --- | --- | <50 | --- | --- | --- | --- | --- | --- | --- | --- | --- | <5 | --- | --- |
| Methylene chloride | ug/L | 5 | <5000. | <25000. | <50 | <1 | --- | --- | <1 | <1 | <1 | <5 | <1 | <5 | <5 | <1 | --- |
| n-Propylbenzene {I} | ug/L | 1 | --- | --- | --- | <1 | --- | --- | <1 | --- | --- | --- | --- | --- | --- | <1 | --- |
| Propionitrile | ug/L | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Styrene {I} | ug/L | 1 | --- | --- | <10 | <1 | --- | --- | <1 | --- | --- | --- | --- | --- | <1 | <1 | --- |
| 1,1,1,2-Tetrachloroethane | ug/L | 1 | --- | --- | --- | <1 | --- | --- | <1 | --- | --- | --- | --- | --- | --- | <1 | --- |
| 1,1,2,2-Tetrachloroethane | ug/L | 1 | <5000. | <10000. | <10 | <1 | --- | --- | <1 | <1 | <1 | <2 | <1 | <2 | <1 | <1 | --- |
| Tetrachloroethylene | ug/L | 1 | <5000. | <10000. | **14 PS** | <1 | --- | --- | <1 | <1 | <1 | <2 | <1 | <2 | <1 | <1 | --- |
| Toluene {I} | ug/L | 1 | <5000. | **6500** | **1400 PS** | **760** | --- | --- | **790** | <1 | <1 | <1 | <1 | <1 | <1 | <1 | --- |
| 1,2,3-Trichlorobenzene | ug/L | 5 | --- | --- | <10 | <1 | --- | --- | <1 | --- | --- | --- | --- | --- | <0.11 | <1 | --- |
| 1,2,4-Trichlorobenzene | ug/L | 5 | --- | --- | 0.099 BK | <1 | --- | --- | <1 | --- | --- | --- | --- | --- | <0.11 | <1 | --- |
| 1,1,1-Trichloroethane | ug/L | 1 | <5000. | <10000. | <10 | <1 | --- | --- | <1 | <1 | <1 | <2 | <1 | <2 | <1 | <1 | --- |
| 1,1,2-Trichloroethane | ug/L | 1 | <5000. | <15000. | <10 | <1 | --- | --- | <1 | <1 | <1 | <3 | <1 | <3 | <1 | <1 | --- |
| Trichloroethylene | ug/L | 1 | <5000. | <10000. | <10 | <1 | --- | --- | <1 | <1 | <1 | <2 | <1 | <2 | <1 | <1 | --- |
| Trichlorofluoromethane | ug/L | 1 | <5000. | <15000. | --- | <1 | --- | --- | <1 | --- | <10 | <3 | <1 | <3 | --- | <1 | --- |
| 1,2,3-Trichloropropane | ug/L | 1 | --- | --- | --- | <1 | --- | --- | <1 | --- | --- | --- | --- | --- | --- | <1 | --- |
| 1,2,4-Trimethylbenzene {I} | ug/L | 1 | --- | --- | --- | **280** | --- | --- | **270** | --- | --- | --- | --- | --- | --- | <1 | --- |
| 1,3,5-Trimethylbenzene {I} | ug/L | 1 | --- | --- | --- | **98** | --- | --- | **110** | --- | --- | --- | --- | --- | --- | <1 | --- |
| Vinyl acetate | ug/L | 100 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Vinyl chloride | ug/L | 1 | <5000. | <50000. | <50 | <1 | --- | --- | <1 | <1 | <1 | <10 | <1 | <10 | <5 | <1 | --- |
| Xylene, p&m | ug/L | 2 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Xylene (Total) | ug/L | 3 | <15000. | <25000. | **1980 PS** | **920** | --- | --- | **910** | --- | --- | --- | <3 | <5 | <1 | <1 | --- |
| Xylene, o | ug/L | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Semi-Volatiles*** | ***Units*** | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Acenaphthene | ug/L | 5 | --- | --- | **1.4** | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <1 | <5 | --- |
| Acenaphthylene | ug/L | 5 | --- | --- | <1 | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <1 | <5 | --- |
| Acetophenone | ug/L | 5 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Aniline {I} | ug/L | 4 | --- | --- | --- | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | --- | <5 | --- |

# Table B2-3A
## Summary of Analytical Results for Organic Groundwater Samples - Update 2011 Criteria
## Gage Products
## Ferndale, Michigan

| Sample Location<br>Lab Sample ID<br>Sampled By<br>Analyzed By<br>Sample Date<br>Sample Depth (Ft.) | | Target Method Detection Limit | GMW-4<br>30189<br>WWES<br><br>12/5/89 | GMW-4<br>46002<br>WWES<br><br>8/6/90 | GMW-4<br><br>MDNR<br><br>11/23/92 | GMW-4<br>109071-0003<br>WWES<br><br>11/23/92 | GMW-4<br><br>MDNR<br><br>11/24/92 | GMW-4<br>110664-0001<br>WWES<br><br>8/9/93 | GMW-4D<br>109071-0004<br>WWES<br><br>11/23/92 | GMW-5<br>2930-05<br>OHM<br><br>9/5/85 | GMW-5<br>2930-12<br>OHM<br><br>3/19/86 | GMW-5<br>23469<br>EDI<br><br>8/3/89 | GMW-5<br>30188<br>WWES<br><br>12/5/89 | GMW-5<br>45999<br>WWES<br><br>8/6/90 | GMW-5<br><br>MDNR<br><br>11/23/92 | GMW-5<br>109071-0005<br>WWES<br><br>11/23/92 | GMW-5<br><br>MDNR<br><br>11/24/92 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Semi-Volatiles Cont.*** | ***Units*** | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Anthracene | ug/L | 5 | --- | --- | <1 | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <1 | <5 | --- |
| Benzidine | ug/L | 0.3 | --- | --- | <15 | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <15 | <5 | --- |
| Benzo(a)anthracene {Q} | ug/L | 1 | --- | --- | <1 | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <1 | <5 | --- |
| Benzo(a)pyrene {Q} | ug/L | 1 | --- | --- | <2 | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <2 | <5 | --- |
| Benzo(b&k)fluoranthene {Q} | ug/L | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Benzo(b)fluoranthene {Q} | ug/L | 1 | --- | --- | <2 | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <2 | <5 | --- |
| Benzo(g,h,i)perylene | ug/L | 1 | --- | --- | <5 | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <5 | <5 | --- |
| Benzo(k)fluoranthene {Q} | ug/L | 1 | --- | --- | <2 | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <2 | <5 | --- |
| Benzoic acid | ug/L | 50 | --- | --- | --- | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | --- | <5 | --- |
| Benzyl alcohol | ug/L | 50 | --- | --- | --- | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | --- | <5 | --- |
| bis(2-Chloroethoxy)methane | ug/L | 5 | --- | --- | <2 | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <2 | <5 | --- |
| bis(2-Chloroethyl)ether {I} | ug/L | 1 | --- | --- | <1 | **5** | --- | --- | <5 | --- | --- | --- | --- | --- | <1 | <5 | --- |
| bis(2-Chloroisopropyl)ether | ug/L | 5 | --- | --- | <1 | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <1 | <5 | --- |
| bis(2-Ethylhexyl)phthalate | ug/L | 5 | --- | --- | **4.7** | **8** | --- | --- | **8** | --- | --- | --- | --- | --- | <2 | <5 | --- |
| 4-Bromo diphenyl ether | ug/L | 5 | --- | --- | <2 | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <2 | <5 | --- |
| Butyl benzyl phthalate | ug/L | 5 | --- | --- | <1 | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <1 | <5 | --- |
| 4-Chloro-3-methylphenol | ug/L | 5 | --- | --- | <11 | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <10 | <5 | --- |
| 4-Chloroaniline | ug/L | 10 | --- | --- | --- | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | --- | <5 | --- |
| beta-Chloronaphthalene | ug/L | 5 | --- | --- | <2 | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <2 | <5 | --- |
| 2-Chlorophenol | ug/L | 10 | --- | --- | <11 | <5 | --- | --- | **35** | --- | --- | --- | --- | --- | <10 | <5 | --- |
| 4-Chloro diphenyl ether | ug/L | 5 | --- | --- | <1 | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <1 | <5 | --- |
| Chrysene {Q} | ug/L | 1 | --- | --- | <1 | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <1 | <5 | --- |
| Decabromodiphenyl ether | ug/L | 10 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Di-n-octyl phthalate | ug/L | 5 | --- | --- | <2 | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <2 | <5 | --- |
| Dibenzo(a,h)anthracene {Q} | ug/L | 2 | --- | --- | <5 | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <5 | <5 | --- |
| Dibenzofuran | ug/L | 4 | --- | --- | --- | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | --- | <5 | --- |
| Di-n-butyl phthalate | ug/L | 5 | --- | --- | <1 | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <1 | <5 | --- |
| 1,2-Dichlorobenzene | ug/L | 1 | --- | --- | **290J** | <5 | --- | --- | **108** | --- | --- | --- | --- | --- | <1 | <5 | --- |
| 1,3-Dichlorobenzene | ug/L | 1 | --- | --- | <0.10 | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <1 | <5 | --- |
| 1,4-Dichlorobenzene | ug/L | 1 | --- | --- | **55** | **33** | --- | --- | **17** | --- | --- | --- | --- | --- | <1 | <5 | --- |
| 3,3'-Dichlorobenzidine | ug/L | 0.3 | --- | --- | <10 | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <10 | <5 | --- |
| 2,4-Dichlorophenol | ug/L | 10 | --- | --- | <11 | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <10 | <5 | --- |
| 2,6-Dichlorophenol | ug/L | 5 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Diethyl phthalate | ug/L | 5 | --- | --- | <1 | <5 | --- | --- | <5.0 | --- | --- | --- | --- | --- | <1 | <5 | --- |
| Dimethyl phthalate | ug/L | 5 | --- | --- | <2 | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <2 | <5 | --- |
| 2,4-Dimethylphenol | ug/L | 5 | --- | --- | <11 | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <10 | <5 | --- |
| 3,3-Dimethylbenzidine | ug/L | 0.3 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2,4-Dinitrophenol | ug/L | 25 | --- | --- | <55 | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <50 | <5 | --- |
| 2,4-Dinitrotoluene | ug/L | 5 | --- | --- | <5 | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <5 | <5 | --- |
| 2,6-Dinitrotoluene | ug/L | 5 | --- | --- | <5 | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <5 | <5 | --- |
| Diphenylamine | ug/L | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1,2-Diphenylhydrazine | ug/L | 5 | --- | --- | <2 | --- | --- | --- | --- | --- | --- | --- | --- | --- | <2 | --- | --- |
| Fluoranthene | ug/L | 1 | --- | --- | **0.87T** | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <1 | <5 | --- |

# Table B2-3A
## Summary of Analytical Results for Organic Groundwater Samples - Update 2011 Criteria
## Gage Products
## Ferndale, Michigan

| Sample Location | | Target | GMW-4 | GMW-4 | GMW-4 | GMW-4 | GMW-4 | GMW-4 | GMW-4D | GMW-5 | GMW-5 | GMW-5 | GMW-5 | GMW-5 | GMW-5 | GMW-5 | GMW-5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lab Sample ID | | Method | 30189 | 46002 | | 109071-0003 | | 110664-0001 | 109071-0004 | 2930-05 | 2930-12 | 23469 | 30188 | 45999 | | 109071-0005 | |
| Sampled By | | Detection | WWES | WWES | MDNR | WWES | MDNR | WWES | WWES | OHM | OHM | EDI | WWES | WWES | MDNR | WWES | MDNR |
| Analyzed By | | Limit | | | | | | | | | | | | | | | |
| Sample Date | | | 12/5/89 | 8/6/90 | 11/23/92 | 11/23/92 | 11/24/92 | 8/9/93 | 11/23/92 | 9/5/85 | 3/19/86 | 8/3/89 | 12/5/89 | 8/6/90 | 11/23/92 | 11/23/92 | 11/24/92 |
| Sample Depth (Ft.) | | | | | | | | | | | | | | | | | |
| ***Semi-Volatiles Cont.*** | ***Units*** | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Fluorene | ug/L | 5 | --- | --- | **0.61T** | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <1 | <5 | --- |
| Hexachlorobenzene (C-66) | ug/L | 0.2 | --- | --- | <1 | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <1 | <5 | --- |
| Hexachlorobutadiene (C-46) | ug/L | 0.05 | --- | --- | <2 | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <2 | <5 | --- |
| Hexachlorocyclopentadiene (C-56) | ug/L | 5 | --- | --- | <2 | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <2 | <5 | --- |
| Hexachloroethane | ug/L | 5 | --- | --- | <1 | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <1 | <5 | --- |
| Hexachloropropene | ug/L | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Indeno(1,2,3-cd)pyrene {Q} | ug/L | 2 | --- | --- | <5 | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <5 | <5 | --- |
| Isophorone | ug/L | 5 | --- | --- | <1 | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <1 | <5 | --- |
| 2-Methyl-4,6-dinitrophenol | ug/L | 20 | --- | --- | <44 | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <40 | <5 | --- |
| 2-Methylnaphthalene | ug/L | 5 | --- | --- | --- | **33** | --- | --- | **27** | --- | --- | --- | --- | --- | --- | <5 | --- |
| 2-Methylphenol {J} | ug/L | 10 | --- | --- | <11 | **7** | --- | --- | **5** | --- | --- | --- | --- | --- | <10 | <5 | --- |
| 3-Methylphenol {J} | ug/L | 10 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4-Methylphenol {J} | ug/L | 10 | --- | --- | **46** | **40** | --- | --- | **30** | --- | --- | --- | --- | --- | <10 | <5 | --- |
| Naphthalene | ug/L | 5 | --- | --- | **84** | **56** | --- | --- | **59** | --- | --- | --- | --- | --- | <1 | <5 | --- |
| 1,4-Naphthylamine | ug/L | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1-Naphthylamine | ug/L | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2-Naphthylamine | ug/L | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2-Nitroaniline | ug/L | 25 | --- | --- | --- | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | --- | <5 | --- |
| 3-Nitroaniline | ug/L | 25 | --- | --- | --- | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | --- | <5 | --- |
| 4-Nitroaniline | ug/L | 25 | --- | --- | --- | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | --- | <5 | --- |
| Nitrobenzene {I} | ug/L | 3 | --- | --- | <2 | **16** | --- | --- | <5 | --- | --- | --- | --- | --- | <2 | <5 | --- |
| 2-Nitrophenol | ug/L | 5 | --- | --- | <11 | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <10 | <5 | --- |
| 4-Nitrophenol | ug/L | 25 | --- | --- | <44 | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <40 | <5 | --- |
| 4-Nitroquinoline-1-oxide | ug/L | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| n-Nitroso-di-n-propylamine | ug/L | 5 | --- | --- | <2 | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <2 | <5 | --- |
| N-Nitroso-di-methylamine | ug/L | 5 | --- | --- | --- | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | --- | <5 | --- |
| N-Nitroso-di-methylamine | ug/L | 5 | --- | --- | --- | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | --- | <5 | --- |
| N-Nitrosodiphenylamine | ug/L | 5 | --- | --- | <5 | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <5 | <5 | --- |
| Pentachlorophenol | ug/L | 1 | --- | --- | <44 | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <40 | <5 | --- |
| Phenacetin | ug/L | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Phenanthrene | ug/L | 2 | --- | --- | **0.57T** | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <1 | <5 | --- |
| Phenol | ug/L | 5 | --- | --- | <11 | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <10 | <5 | --- |
| 1,4-Phenylenediamine | ug/L | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Pyrene | ug/L | 5 | --- | --- | **1** | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <1 | <5 | --- |
| Pyridine | ug/L | 20 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1,2,4-Trichlorobenzene | ug/L | 5 | --- | --- | <2 | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <2 | <5 | --- |
| 2,4,5-Trichlorophenol | ug/L | 5 | --- | --- | <11 | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <10 | <5 | --- |
| 2,4,6-Trichlorophenol | ug/L | 4 | --- | --- | <11 | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <10 | <5 | --- |
| ***Halogenateds*** | ***Units*** | | | | | | | | | | | | | | | | |
| Hexabromobenzene | ug/L | 0.02 | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.011 | --- | --- |
| Pentachlorobenzene | ug/L | 5 | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.011 | --- | --- |
| 1,2,3,4-Tetrachlorobenzene | ug/L | 5 | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.011 | --- | --- |
| 1,2,4,5-Tetrachlorobenzene | ug/L | 2 | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.011 | --- | --- |
| 1,3,5-Trichlorobenzene | ug/L | 5 | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.011 | --- | --- |

# Table B2-3A
## Summary of Analytical Results for Organic Groundwater Samples - Update 2011 Criteria
## Gage Products
## Ferndale, Michigan

| Sample Location | | Target | GMW-4 | GMW-4 | GMW-4 | GMW-4 | GMW-4 | GMW-4 | GMW-4D | GMW-5 | GMW-5 | GMW-5 | GMW-5 | GMW-5 | GMW-5 | GMW-5 | GMW-5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lab Sample ID | | Method | 30189 | 46002 | | 109071-0003 | | 110664-0001 | 109071-0004 | 2930-05 | 2930-12 | 23469 | 30188 | 45999 | | 109071-0005 | |
| Sampled By | | Detection | WWES | WWES | MDNR | WWES | MDNR | WWES | WWES | OHM | OHM | EDI | WWES | WWES | MDNR | WWES | MDNR |
| Analyzed By | | Limit | | | | | | | | | | | | | | | |
| Sample Date | | | 12/5/89 | 8/6/90 | 11/23/92 | 11/23/92 | 11/24/92 | 8/9/93 | 11/23/92 | 9/5/85 | 3/19/86 | 8/3/89 | 12/5/89 | 8/6/90 | 11/23/92 | 11/23/92 | 11/24/92 |
| Sample Depth (Ft.) | | | | | | | | | | | | | | | | | |
| ***PCB's*** | ***Units*** | | | | | | | | | | | | | | | | |
| BP-6 | *ug/L* | NA | --- | --- | <0.05 | --- | --- | <0.05 | --- | --- | --- | --- | --- | --- | <0.055 | --- | --- |
| Aroclor 1016 | ug/L | 0.2 | --- | --- | <0.1 | --- | --- | <0.05 | --- | --- | --- | --- | --- | --- | <0.11 | --- | --- |
| Aroclor 1221 | ug/L | 0.2 | --- | --- | <0.1 | --- | --- | <0.05 | --- | --- | --- | --- | --- | --- | <0.11 | --- | --- |
| Aroclor 1232 | ug/L | 0.2 | --- | --- | <0.1 | --- | --- | <0.05 | --- | --- | --- | --- | --- | --- | <0.11 | --- | --- |
| Aroclor 1242 | ug/L | 0.2 | --- | --- | <0.1 | --- | --- | <0.05 | --- | --- | --- | --- | --- | --- | <0.11 | --- | --- |
| Aroclor 1248 | ug/L | 0.2 | --- | --- | <0.1 | --- | --- | <0.05 | --- | --- | --- | --- | --- | --- | <0.11 | --- | --- |
| Aroclor 1254 | ug/L | 0.2 | --- | --- | **0.39** | --- | --- | **0.21** | --- | --- | --- | --- | --- | --- | <0.11 | --- | --- |
| Aroclor 1260 | ug/L | 0.2 | --- | --- | <0.1 | --- | --- | **0.083** | --- | --- | --- | --- | --- | --- | <0.11 | --- | --- |
| Aroclor 1262 | ug/L | 0.2 | --- | --- | <0.1 | --- | --- | <0.05 | --- | --- | --- | --- | --- | --- | <0.11 | --- | --- |
| Aroclor 1268 | ug/L | 0.2 | --- | --- | <0.1 | --- | --- | <0.05 | --- | --- | --- | --- | --- | --- | <0.11 | --- | --- |
| ***Pesticides*** | ***Units*** | | | | | | | | | | | | | | | | |
| Aldrin | ug/L | 0.01 | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.011 | --- | --- |
| alpha-BHC | ug/L | 0.05 | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.011 | --- | --- |
| beta-BHC | ug/L | 0.02 | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.011 | --- | --- |
| delta-BHC | ug/L | 0.05 | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.011 | --- | --- |
| gamma-BHC (Lindane) | ug/L | 0.03 | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.011 | --- | --- |
| a-Chlordane {J} | ug/L | 2 | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.011 | --- | --- |
| g-Chlordane {J} | ug/L | 2 | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.011 | --- | --- |
| 4-4'-DDD | ug/L | 0.1 | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.011 | --- | --- |
| 4-4'-DDE | ug/L | 0.1 | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.011 | --- | --- |
| 4-4'-DDT | ug/L | 0.02 | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.011 | --- | --- |
| Dieldrin | ug/L | 0.02 | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.011 | --- | --- |
| Endosulfan I {J} | ug/L | 0.03 | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.011 | --- | --- |
| Endosulfan II {J} | ug/L | 0.03 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Endosulfan Sulfate {J} | ug/L | 0.05 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Endrin | ug/L | 0.02 | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.011 | --- | --- |
| Endrin Aldehyde | ug/L | 0.02 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heptachlor | ug/L | 0.01 | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.011 | --- | --- |
| Heptachlor epoxide | ug/L | 0.01 | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.011 | --- | --- |
| Methoxychlor | ug/L | 0.5 | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.011 | --- | --- |
| Mirex | ug/L | 0.02 | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.011 | --- | --- |
| Pentachloronitrobenzene | ug/L | 20 | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.011 | --- | --- |
| Toxaphene | ug/L | 1 | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.11 | --- | --- |
| ***Misc.*** | ***Units*** | | | | | | | | | | | | | | | | |
| Alkalinity | ug/L | NA | --- | --- | --- | --- | **518000** | --- | --- | --- | --- | --- | --- | --- | --- | --- | **485000** |
| Bicarbonate Alkalinity | ug/L | NA | --- | --- | --- | --- | **518000** | --- | --- | --- | --- | --- | --- | --- | --- | --- | **485000** |
| Carbonate Alkalinity | ug/L | NA | --- | --- | --- | --- | <5000 | --- | --- | --- | --- | --- | --- | --- | --- | --- | <5000 |
| Conductivity | *umho/cm* | NA | --- | --- | --- | --- | **1195** | --- | --- | --- | --- | --- | --- | --- | --- | --- | **1249** |
| pH | pH | NA | --- | --- | --- | --- | **6.68** | --- | --- | --- | --- | --- | --- | --- | --- | --- | **7.43** |

# Table B2-3A
## Summary of Analytical Results for Organic Groundwater Samples - Update 2011 Criteria
## Gage Products
## Ferndale, Michigan

| Sample Location | | Target | GMW-6 | GMW-6 | GMW-6 | GMW-6 | GMW-6 | GMW-7 | GMW-7 | GMW-7 | GMW-7 | GP-TMW01 | GP-TMW02 | GP-TMW02 | GP-TMW03 | P-1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lab Sample ID | | Method | 23470 | 30186 | 46004 | | 109071-0006 | 46001 | | 109071-0007 | | 124880 | 124881 | 124883 | 124882 | 109055-0001 |
| Sampled By | | Detection | EDI | WWES | WWES | MDNR | WWES | WWES | MDNR | WWES | MDNR | Horizon | Horizon | Horizon | Horizon | WWES |
| Analyzed By | | Limit | | | | | | | | | | EarthTech | EarthTech | EarthTech | EarthTech | |
| Sample Date | | | 8/3/89 | 12/5/89 | 8/8/90 | 11/24/92 | 11/24/92 | 8/6/90 | 11/23/92 | 11/23/92 | 11/24/92 | 8/10/95 | 8/10/95 | 8/10/95 | 8/10/95 | 11/19/92 |
| Sample Depth (Ft.) | | | | | | | | | | | | | | | | |
| ***Volatiles*** | ***Units*** | | | | | | | | | | | | | | | |
| Acetate | ug/L | 1000 | --- | --- | --- | 140 BK | --- | --- | 53 BK | --- | --- | <50 | <50 | <50 | <50 | **65000** |
| Acetonitrile | ug/L | 50 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Acrylonitrile {I} | ug/L | 2 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Allyl Chloride | ug/L | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Benzene {I} | ug/L | 1 | <1 | <1 | <1 | <1 | <1 | <200 | **4.5** | <1 | --- | **1.1** | <1 | <1 | <1 | **410** |
| Bromobenzene | ug/L | 1 | --- | --- | --- | --- | <1 | --- | --- | <1 | --- | --- | --- | --- | --- | <250 |
| Bromochloromethane | ug/L | 1 | --- | --- | --- | --- | <1 | --- | --- | <1 | --- | --- | --- | --- | --- | <250 |
| Bromodichloromethane | ug/L | 1 | <2 | <1 | <2 | <1 | <1 | <400 | <1 | <1 | --- | <1 | <1 | <1 | <1 | <250 |
| Bromoform | ug/L | 1 | <15 | <1 | <15 | <1 | <1 | <3000 | <1 | <1 | --- | <1 | <1 | <1 | <1 | <250 |
| Bromomethane | ug/L | 5 | <10 | <1 | <10 | <5 | <1 | <2000 | <5 | <1 | --- | <1 | <1 | <1 | <1 | <250 |
| 2-Butanone (MEK) {I} | ug/L | 25 | --- | --- | --- | --- | --- | --- | --- | --- | --- | <50 | <50 | <50 | <50 | --- |
| n-Butylbenzene | ug/L | 1 | --- | --- | --- | --- | <1 | --- | --- | <1 | --- | --- | --- | --- | --- | <250 |
| sec-Butylbenzene | ug/L | 1 | --- | --- | --- | --- | <1 | --- | --- | <1 | --- | --- | --- | --- | --- | <250 |
| Tert-Butylbenzene | ug/L | 1 | --- | --- | --- | --- | <1 | --- | --- | <1 | --- | --- | --- | --- | --- | <250 |
| Carbon disulfide {I,R} | ug/L | 5 | --- | --- | --- | <5 | --- | --- | <5 | --- | --- | <5 | <5 | <5 | <5 | --- |
| Carbon tetrachloride | ug/L | 1 | <4 | <1 | <4 | <1 | <1 | <800 | <1 | <1 | --- | <1 | <1 | <1 | <1 | **6000** |
| Chlorobenzene {I} | ug/L | 1 | **9** | **6** | **14** | <2 | <1 | **1300** | **35** | <1 | --- | **46** | <1 | <1 | <1 | <250 |
| Chlorodibromomethane | ug/L | 5 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Chloroethane {I} | ug/L | 5 | <10 | <1 | <10 | <5 | <1 | <2000 | **1700** | <1 | --- | <1 | <1 | <1 | **11** | <250 |
| 2-Chloroethyl vinyl ether | ug/L | 10 | <10 | <1 | <10 | --- | --- | <2000 | --- | --- | --- | --- | --- | --- | --- | --- |
| Chloroform | ug/L | 1 | <1 | <1 | <1 | <1 | <1 | <200 | <1 | <1 | --- | <1 | <1 | <1 | <1 | <250 |
| 1-Chlorohexane | ug/L | NA | --- | --- | --- | --- | <1 | --- | --- | <1 | --- | --- | --- | --- | --- | <250 |
| Chloromethane {I} | ug/L | 5 | <10 | <1 | <10 | <5 | <1 | <2000 | <5 | <1 | --- | <1 | <1 | <1 | <1 | <250 |
| 2-Chlorotoluene | ug/L | 5 | --- | --- | --- | --- | <1 | --- | --- | <1 | --- | --- | --- | --- | --- | <250 |
| 4-Chlorotoluene | ug/L | 5 | --- | --- | --- | --- | <1 | --- | --- | <1 | --- | --- | --- | --- | --- | <250 |
| 1,2-Dibromo-3-Chloropropane | ug/L | 0.2 | --- | --- | --- | --- | <1 | --- | --- | <1 | --- | --- | --- | --- | --- | <250 |
| Dibromochloromethane | ug/L | 5 | <3 | <1 | <3 | <1 | <1 | <600 | <1 | <1 | --- | <1 | <1 | <1 | <1 | <250 |
| Ethylene dibromide | ug/L | 0.05 | --- | --- | --- | <1 | <1 | --- | <1 | <1 | --- | --- | --- | --- | --- | <250 |
| Ethylene dibromide | ug/L | 0.05 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Dibromomethane | ug/L | 5 | --- | --- | --- | --- | <1 | --- | --- | <1 | --- | --- | --- | --- | --- | <250 |
| trans-1,4-Dichloro-2-butene | ug/L | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1,2-Dichlorobenzene | ug/L | 1 | <15 | <1 | <15 | --- | <1 | <3000 | <0.6 | <1 | --- | --- | --- | --- | --- | <250 |
| 1,3-Dichlorobenzene | ug/L | 1 | <15 | <1 | <15 | --- | <1 | <3000 | <1 | <1 | --- | --- | --- | --- | --- | <250 |
| 1,4-Dichlorobenzene | ug/L | 1 | <15 | <1 | <15 | --- | <1 | <3000 | <0.5 | <1 | --- | --- | --- | --- | --- | <250 |
| Dichlorodifluoromethane | ug/L | 5 | <10 | <1 | <10 | --- | <1 | <2000 | --- | <1 | --- | --- | --- | --- | --- | <250 |
| 1,1-Dichloroethane {I} | ug/L | 1 | <2 | <1 | <2 | **5.3 J** | <1 | <400 | **1200** | **1400** | --- | **7.8** | **11** | <1 | **5.1** | **9300** |
| 1,2-Dichloroethane {I} | ug/L | 1 | <2 | <1 | <2 | <1 | <1 | <400 | <1 | <1 | --- | <1 | <1 | <1 | <1 | <250 |
| 1,1-Dichloroethylene {I} | ug/L | 1 | <2 | <1 | <2 | <1 | --- | <400 | <1 | --- | --- | <1 | <1 | <1 | <1 | **900** |
| cis-1,2-Dichloroethylene {I} | ug/L | 1 | --- | <1 | --- | <1 | <1 | --- | **6.6** | <1 | --- | <1 | <1 | <1 | <1 | <250 |
| trans-1,2-Dichloroethylene | ug/L | 1 | <2 | <1 | <2 | <1 | <1 | <400 | <1 | <1 | --- | <1 | <1 | <1 | <1 | <250 |
| 1,2-Dichloropropane {I} | ug/L | 1 | <3 | <1 | <3 | <1 | <1 | <600 | <1 | <1 | --- | <1 | <1 | <1 | <1 | <250 |
| 1,3-Dichloropropane | ug/L | 1 | --- | --- | --- | --- | <1 | --- | --- | <1 | --- | --- | --- | --- | --- | <250 |
| 2,2-Dichloropropane | ug/L | 1 | --- | --- | --- | --- | <1 | --- | --- | <1 | --- | --- | --- | --- | --- | <250 |
| cis-1,3-Dichloropropene {I,J} | ug/L | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

# Table B2-3A
## Summary of Analytical Results for Organic Groundwater Samples - Update 2011 Criteria
## Gage Products
## Ferndale, Michigan

| Sample Location<br>Lab Sample ID<br>Sampled By<br>Analyzed By<br>Sample Date<br>Sample Depth (Ft.) | | Target<br>Method<br>Detection<br>Limit | GMW-6<br>23470<br>EDI<br><br>8/3/89 | GMW-6<br>30186<br>WWES<br><br>12/5/89 | GMW-6<br>46004<br>WWES<br><br>8/8/90 | GMW-6<br><br>MDNR<br><br>11/24/92 | GMW-6<br>109071-0006<br>WWES<br><br>11/24/92 | GMW-7<br>46001<br>WWES<br><br>8/6/90 | GMW-7<br><br>MDNR<br><br>11/23/92 | GMW-7<br>109071-0007<br>WWES<br><br>11/23/92 | GMW-7<br><br>MDNR<br><br>11/24/92 | GP-TMW01<br>124880<br>Horizon<br>EarthTech<br>8/10/95 | GP-TMW02<br>124881<br>Horizon<br>EarthTech<br>8/10/95 | GP-TMW02<br>124883<br>Horizon<br>EarthTech<br>8/10/95 | GP-TMW03<br>124882<br>Horizon<br>EarthTech<br>8/10/95 | P-1<br>109055-0001<br>WWES<br><br>11/19/92 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Volatiles Cont.*** | ***Units*** | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1,1-Dichloropropene | ug/L | 1 | --- | --- | --- | --- | <1 | --- | --- | <1 | --- | --- | --- | --- | --- | <250 |
| trans-1,3-Dichloropropene {I, J} | ug/L | 1 | <4 | <1 | <4 | <1 | --- | <800 | <1 | --- | --- | <1 | <1 | <1 | <1 | --- |
| cis-1,3-Dichloropropene {I,J} | ug/L | 1 | <4 | <1 | <4 | <1 | --- | <800 | <1 | --- | --- | <1 | <1 | <1 | <1 | --- |
| 1,4-Dioxane | ug/L | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Ethyl ether | ug/L | 10 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Ethylbenzene {I} | ug/L | 1 | <1 | <1 | <1 | <1 | <1 | **2200** | **570** | **910** | --- | <1 | <1 | <1 | <1 | **4000** |
| Formaldehyde | ug/L | 100 | --- | --- | --- | --- | --- | --- | --- | --- | --- | <0.1 | <0.1 | <0.1 | <0.1 | --- |
| Hexachloroethane | ug/L | 5 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2-Hexanone {I} | ug/L | 50 | --- | --- | --- | <5 | --- | --- | <5 | --- | --- | <50 | <50 | <50 | <50 | --- |
| Iodomethane | ug/L | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Isopropyl benzene {I} | ug/L | 5 | --- | --- | --- | --- | <1 | --- | --- | <1 | --- | --- | --- | --- | --- | <250 |
| p-Isopropyltoluene | ug/L | 5 | --- | --- | --- | --- | <1 | --- | --- | <1 | --- | --- | --- | --- | --- | <250 |
| Methyl ethyl ketone | ug/L | 25 | --- | --- | --- | **37** | --- | --- | <5 | --- | --- | --- | --- | --- | --- | **69000** |
| Methyl isobutyl ketone | ug/L | 50 | --- | --- | --- | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | --- | **620000** |
| 4-Methyl-2-pentanone (MIBK) {I} | ug/L | 50 | --- | --- | --- | --- | --- | --- | --- | --- | --- | <50 | <50 | <50 | <50 | --- |
| Methyl-tert-butyl ether (MTBE) | ug/L | 5 | --- | --- | --- | <5 | --- | --- | <5 | --- | --- | <50 | <50 | <50 | <50 | --- |
| Methylene chloride | ug/L | 5 | <5 | <1 | <5 | <5 | <1 | <1000 | 14 BK | <1 | --- | <1 | <1 | <1 | <1 | **1400** |
| n-Propylbenzene {I} | ug/L | 1 | --- | --- | --- | --- | <1 | --- | --- | <1 | --- | --- | --- | --- | --- | <250 |
| Propionitrile | ug/L | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Styrene {I} | ug/L | 1 | --- | --- | --- | <1 | <1 | --- | <1 | <1 | --- | --- | --- | --- | --- | <250 |
| 1,1,1,2-Tetrachloroethane | ug/L | 1 | --- | --- | --- | --- | <1 | --- | --- | <1 | --- | --- | --- | --- | --- | <250 |
| 1,1,2,2-Tetrachloroethane | ug/L | 1 | <2 | <1 | <2 | <1 | <1 | <400 | <1 | <1 | --- | <1 | <1 | <1 | <1 | <250 |
| Tetrachloroethylene | ug/L | 1 | <2 | <1 | <2 | <1 | <1 | <400 | **1.4** | <1 | --- | <1 | <1 | <1 | <1 | <250 |
| Toluene {I} | ug/L | 1 | <1 | <1 | <1 | <1 | <1 | **1200** | **160** | **160** | --- | <1 | <1 | <1 | <1 | **210000** |
| 1,2,3-Trichlorobenzene | ug/L | 5 | --- | --- | --- | --- | <1 | --- | <0.01 | <1 | --- | --- | --- | --- | --- | <250 |
| 1,2,4-Trichlorobenzene | ug/L | 5 | --- | --- | --- | --- | <1 | --- | <0.01 | <1 | --- | --- | --- | --- | --- | <250 |
| 1,1,1-Trichloroethane | ug/L | 1 | <2 | <1 | <2 | <1 | <1 | <400 | **110** | <1 | --- | <1 | <1 | <1 | <1 | **44000** |
| 1,1,2-Trichloroethane | ug/L | 1 | <3 | <1 | <3 | <1 | <1 | <600 | <1 | <1 | --- | <1 | <1 | <1 | <1 | <250 |
| Trichloroethylene | ug/L | 1 | <2 | <1 | <2 | <1 | <1 | <400 | **2.2** | <1 | --- | <1 | <1 | <1 | <1 | <250 |
| Trichlorofluoromethane | ug/L | 1 | <3 | <1 | <3 | --- | <1 | <600 | --- | <1 | --- | --- | --- | --- | --- | <250 |
| 1,2,3-Trichloropropane | ug/L | 1 | --- | --- | --- | --- | <1 | --- | <1 | <1 | --- | --- | --- | --- | --- | <250 |
| 1,2,4-Trimethylbenzene {I} | ug/L | 1 | --- | --- | --- | --- | <1 | --- | <1 | **130** | --- | --- | --- | --- | --- | **750** |
| 1,3,5-Trimethylbenzene {I} | ug/L | 1 | --- | --- | --- | --- | <1 | --- | <1 | <1 | --- | --- | --- | --- | --- | <250 |
| Vinyl acetate | ug/L | 100 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | **600** |
| Vinyl chloride | ug/L | 1 | <10 | <1 | <10 | <5 | <1 | <2000 | **40 J** | <1 | --- | **1.5** | <1 | <1 | <1 | <250 |
| Xylene, p&m | ug/L | 2 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Xylene (Total) | ug/L | 3 | --- | <3 | <5 | <1 | <1 | **3600** | **1730** | **2500** | --- | <3 | <3 | <3 | <3 | **18000** |
| Xylene, o | ug/L | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Semi-Volatiles*** | ***Units*** | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Acenaphthene | ug/L | 5 | --- | --- | --- | --- | <5 | --- | <1.1 | <5 | --- | --- | --- | --- | --- | <5 |
| Acenaphthylene | ug/L | 5 | --- | --- | --- | --- | <5 | --- | <1.1 | <5 | --- | --- | --- | --- | --- | <5 |
| Acetophenone | ug/L | 5 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Aniline {I} | ug/L | 4 | --- | --- | --- | --- | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <5 |

# Table B2-3A
## Summary of Analytical Results for Organic Groundwater Samples - Update 2011 Criteria
## Gage Products
## Ferndale, Michigan

| Sample Location | | Target | GMW-6 | GMW-6 | GMW-6 | GMW-6 | GMW-6 | GMW-7 | GMW-7 | GMW-7 | GMW-7 | GP-TMW01 | GP-TMW02 | GP-TMW02 | GP-TMW03 | P-1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lab Sample ID | | Method | 23470 | 30186 | 46004 | | 109071-0006 | 46001 | | 109071-0007 | | 124880 | 124881 | 124883 | 124882 | 109055-0001 |
| Sampled By | | Detection | EDI | WWES | WWES | MDNR | WWES | WWES | MDNR | WWES | MDNR | Horizon | Horizon | Horizon | Horizon | WWES |
| Analyzed By | | Limit | | | | | | | | | | EarthTech | EarthTech | EarthTech | EarthTech | |
| Sample Date | | | 8/3/89 | 12/5/89 | 8/8/90 | 11/24/92 | 11/24/92 | 8/6/90 | 11/23/92 | 11/23/92 | 11/24/92 | 8/10/95 | 8/10/95 | 8/10/95 | 8/10/95 | 11/19/92 |
| Sample Depth (Ft.) | | | | | | | | | | | | | | | | |
| ***Semi-Volatiles Cont.*** | ***Units*** | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Anthracene | ug/L | 5 | --- | --- | --- | --- | <5 | --- | <1.1 | <5 | --- | --- | --- | --- | --- | <5 |
| Benzidine | ug/L | 0.3 | --- | --- | --- | --- | <5 | --- | <17 | <5 | --- | --- | --- | --- | --- | <5 |
| Benzo(a)anthracene {Q} | ug/L | 1 | --- | --- | --- | --- | <5 | --- | <1.1 | <5 | --- | --- | --- | --- | --- | <5 |
| Benzo(a)pyrene {Q} | ug/L | 1 | --- | --- | --- | --- | <5 | --- | <2.2 | <5 | --- | --- | --- | --- | --- | <5 |
| Benzo(b&k)fluoranthene {Q} | ug/L | 1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Benzo(b)fluoranthene {Q} | ug/L | 1 | --- | --- | --- | --- | <5 | --- | <2.2 | <5 | --- | --- | --- | --- | --- | <5 |
| Benzo(g,h,i)perylene | ug/L | 1 | --- | --- | --- | --- | <5 | --- | <5.5 | <5 | --- | --- | --- | --- | --- | <5 |
| Benzo(k)fluoranthene {Q} | ug/L | 1 | --- | --- | --- | --- | <5 | --- | <2.2 | <5 | --- | --- | --- | --- | --- | <5 |
| Benzoic acid | ug/L | 50 | --- | --- | --- | --- | **84** | --- | --- | <5.0 | --- | --- | --- | --- | --- | <5 |
| Benzyl alcohol | ug/L | 50 | --- | --- | --- | --- | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | **20** |
| bis(2-Chloroethoxy)methane | ug/L | 5 | --- | --- | --- | --- | <5 | --- | <2.2 | <5 | --- | --- | --- | --- | --- | <5 |
| bis(2-Chloroethyl)ether {I} | ug/L | 1 | --- | --- | --- | --- | <5 | --- | <1.1 | <5 | --- | --- | --- | --- | --- | <5 |
| bis(2-Chloroisopropyl)ether | ug/L | 5 | --- | --- | --- | --- | <5 | --- | <1.1 | <5 | --- | --- | --- | --- | --- | <5 |
| bis(2-Ethylhexyl)phthalate | ug/L | 5 | --- | --- | --- | --- | <5 | --- | <2.2 | **7** | --- | --- | --- | --- | --- | **44** |
| 4-Bromo diphenyl ether | ug/L | 5 | --- | --- | --- | --- | <5 | --- | <2.2 | <5 | --- | --- | --- | --- | --- | <5 |
| Butyl benzyl phthalate | ug/L | 5 | --- | --- | --- | --- | <5 | --- | <1.1 | <5 | --- | --- | --- | --- | --- | <5 |
| 4-Chloro-3-methylphenol | ug/L | 5 | --- | --- | --- | --- | <5 | --- | <12 | <5 | --- | --- | --- | --- | --- | <5 |
| 4-Chloroaniline | ug/L | 10 | --- | --- | --- | --- | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <5 |
| beta-Chloronaphthalene | ug/L | 5 | --- | --- | --- | --- | <5 | --- | <2.2 | <5 | --- | --- | --- | --- | --- | <5 |
| 2-Chlorophenol | ug/L | 10 | --- | --- | --- | --- | <5 | --- | <10 | <5 | --- | --- | --- | --- | --- | <5 |
| 4-Chloro diphenyl ether | ug/L | 5 | --- | --- | --- | --- | <5 | --- | <1.1 | <5 | --- | --- | --- | --- | --- | <5 |
| Chrysene {Q} | ug/L | 1 | --- | --- | --- | --- | <5 | --- | <1.1 | <5 | --- | --- | --- | --- | --- | <5 |
| Decabromodiphenyl ether | ug/L | 10 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Di-n-octyl phthalate | ug/L | 5 | --- | --- | --- | --- | <5 | --- | <2.2 | <5 | --- | --- | --- | --- | --- | <5 |
| Dibenzo(a,h)anthracene {Q} | ug/L | 2 | --- | --- | --- | --- | <5 | --- | <5.5 | <5 | --- | --- | --- | --- | --- | <5 |
| Dibenzofuran | ug/L | 4 | --- | --- | --- | --- | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <5 |
| Di-n-butyl phthalate | ug/L | 5 | --- | --- | --- | --- | <5 | --- | <1.1 | <5 | --- | --- | --- | --- | --- | **7** |
| 1,2-Dichlorobenzene | ug/L | 1 | --- | --- | --- | --- | <5 | --- | <1.1 | <5 | --- | --- | --- | --- | --- | <5 |
| 1,3-Dichlorobenzene | ug/L | 1 | --- | --- | --- | --- | <5 | --- | <1.1 | <5 | --- | --- | --- | --- | --- | <5 |
| 1,4-Dichlorobenzene | ug/L | 1 | --- | --- | --- | --- | <5 | --- | <1.1 | <5 | --- | --- | --- | --- | --- | <5 |
| 3,3'-Dichlorobenzidine | ug/L | 0.3 | --- | --- | --- | --- | <5 | --- | <11 | <5 | --- | --- | --- | --- | --- | <5 |
| 2,4-Dichlorophenol | ug/L | 10 | --- | --- | --- | --- | <5 | --- | <12 | <5 | --- | --- | --- | --- | --- | <5 |
| 2,6-Dichlorophenol | ug/L | 5 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Diethyl phthalate | ug/L | 5 | --- | --- | --- | --- | <5 | --- | <1.1 | <5 | --- | --- | --- | --- | --- | <5 |
| Dimethyl phthalate | ug/L | 5 | --- | --- | --- | --- | <5 | --- | <2.2 | <5 | --- | --- | --- | --- | --- | <5 |
| 2,4-Dimethylphenol | ug/L | 5 | --- | --- | --- | --- | <5 | --- | **40** | **52** | --- | --- | --- | --- | --- | **38** |
| 3,3-Dimethylbenzidine | ug/L | 0.3 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2,4-Dinitrophenol | ug/L | 25 | --- | --- | --- | --- | <5 | --- | <60 | <5 | --- | --- | --- | --- | --- | <5 |
| 2,4-Dinitrotoluene | ug/L | 5 | --- | --- | --- | --- | <5 | --- | <5.5 | <5 | --- | --- | --- | --- | --- | <5 |
| 2,6-Dinitrotoluene | ug/L | 5 | --- | --- | --- | --- | <5 | --- | <5.5 | <5 | --- | --- | --- | --- | --- | <5 |
| Diphenylamine | ug/L | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1,2-Diphenylhydrazine | ug/L | 5 | --- | --- | --- | --- | --- | --- | <2.2 | --- | --- | --- | --- | --- | --- | --- |
| Fluoranthene | ug/L | 1 | --- | --- | --- | --- | <5 | --- | <1.1 | <5 | --- | --- | --- | --- | --- | <5 |

# Table B2-3A
## Summary of Analytical Results for Organic Groundwater Samples - Update 2011 Criteria
## Gage Products
## Ferndale, Michigan

| Sample Location | | Target | GMW-6 | GMW-6 | GMW-6 | GMW-6 | GMW-6 | GMW-7 | GMW-7 | GMW-7 | GMW-7 | GP-TMW01 | GP-TMW02 | GP-TMW02 | GP-TMW03 | P-1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lab Sample ID | | Method | 23470 | 30186 | 46004 | | 109071-0006 | 46001 | | 109071-0007 | | 124880 | 124881 | 124883 | 124882 | 109055-0001 |
| Sampled By | | Detection | EDI | WWES | WWES | MDNR | WWES | WWES | MDNR | WWES | MDNR | Horizon | Horizon | Horizon | Horizon | WWES |
| Analyzed By | | Limit | | | | | | | | | | EarthTech | EarthTech | EarthTech | EarthTech | |
| Sample Date | | | 8/3/89 | 12/5/89 | 8/8/90 | 11/24/92 | 11/24/92 | 8/6/90 | 11/23/92 | 11/23/92 | 11/24/92 | 8/10/95 | 8/10/95 | 8/10/95 | 8/10/95 | 11/19/92 |
| Sample Depth (Ft.) | | | | | | | | | | | | | | | | |
| ***Semi-Volatiles Cont.*** | ***Units*** | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Fluorene | ug/L | 5 | --- | --- | --- | --- | <5 | --- | <1.1 | <5 | --- | --- | --- | --- | --- | <5 |
| Hexachlorobenzene (C-66) | ug/L | 0.2 | --- | --- | --- | --- | <5 | --- | <1.1 | <5 | --- | --- | --- | --- | --- | <5 |
| Hexachlorobutadiene (C-46) | ug/L | 0.05 | --- | --- | --- | --- | <5 | --- | <2.2 | <5 | --- | --- | --- | --- | --- | <5 |
| Hexachlorocyclopentadiene (C-56) | ug/L | 5 | --- | --- | --- | --- | <5 | --- | <2.2 | <5 | --- | --- | --- | --- | --- | <5 |
| Hexachloroethane | ug/L | 5 | --- | --- | --- | --- | <5 | --- | <1.1 | <5 | --- | --- | --- | --- | --- | <5 |
| Hexachloropropene | ug/L | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Indeno(1,2,3-cd)pyrene {Q} | ug/L | 2 | --- | --- | --- | --- | <5 | --- | <5.5 | <5 | --- | --- | --- | --- | --- | <5 |
| Isophorone | ug/L | 5 | --- | --- | --- | --- | <5 | --- | <1.1 | <5 | --- | --- | --- | --- | --- | **20** |
| 2-Methyl-4,6-dinitrophenol | ug/L | 20 | --- | --- | --- | --- | <5 | --- | <48 | <5 | --- | --- | --- | --- | --- | <5 |
| 2-Methylnaphthalene | ug/L | 5 | --- | --- | --- | --- | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | **28** |
| 2-Methylphenol {J} | ug/L | 10 | --- | --- | --- | --- | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <5 |
| 3-Methylphenol {J} | ug/L | 10 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4-Methylphenol {J} | ug/L | 10 | --- | --- | --- | --- | **13** | --- | --- | <5.0 | --- | --- | --- | --- | --- | **163** |
| Naphthalene | ug/L | 5 | --- | --- | --- | --- | <5 | --- | **22** | **7** | --- | --- | --- | --- | --- | **151** |
| 1,4-Naphthylamine | ug/L | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1-Naphthylamine | ug/L | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2-Naphthylamine | ug/L | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2-Nitroaniline | ug/L | 25 | --- | --- | --- | --- | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <5 |
| 3-Nitroaniline | ug/L | 25 | --- | --- | --- | --- | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <5 |
| 4-Nitroaniline | ug/L | 25 | --- | --- | --- | --- | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <5 |
| Nitrobenzene {I} | ug/L | 3 | --- | --- | --- | --- | <5 | --- | <2.2 | <5 | --- | --- | --- | --- | --- | **260** |
| 2-Nitrophenol | ug/L | 5 | --- | --- | --- | --- | <5 | --- | <12 | <5 | --- | --- | --- | --- | --- | <5 |
| 4-Nitrophenol | ug/L | 25 | --- | --- | --- | --- | <5 | --- | <48 | <5 | --- | --- | --- | --- | --- | <5 |
| 4-Nitroquinoline-1-oxide | ug/L | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| n-Nitroso-di-n-propylamine | ug/L | 5 | --- | --- | --- | --- | <5 | --- | <2.2 | <5 | --- | --- | --- | --- | --- | <5 |
| N-Nitroso-di-methylamine | ug/L | 5 | --- | --- | --- | --- | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <5 |
| N-Nitroso-di-methylamine | ug/L | 5 | --- | --- | --- | --- | <5 | --- | --- | <5 | --- | --- | --- | --- | --- | <5 |
| N-Nitrosodiphenylamine | ug/L | 5 | --- | --- | --- | --- | <5 | --- | <5.5 | <5 | --- | --- | --- | --- | --- | <5 |
| Pentachlorophenol | ug/L | 1 | --- | --- | --- | --- | <5 | --- | <48 | <5 | --- | --- | --- | --- | --- | <5 |
| Phenacetin | ug/L | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Phenanthrene | ug/L | 2 | --- | --- | --- | --- | <5 | --- | <1.1 | <5 | --- | --- | --- | --- | --- | <5 |
| Phenol | ug/L | 5 | --- | --- | --- | --- | **10** | --- | <12 | <5 | --- | --- | --- | --- | --- | <5 |
| 1,4-Phenylenediamine | ug/L | NA | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Pyrene | ug/L | 5 | --- | --- | --- | --- | <5 | --- | <1.1 | <5 | --- | --- | --- | --- | --- | <5 |
| Pyridine | ug/L | 20 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1,2,4-Trichlorobenzene | ug/L | 5 | --- | --- | --- | --- | <5 | --- | <2.2 | <5 | --- | --- | --- | --- | --- | <5 |
| 2,4,5-Trichlorophenol | ug/L | 5 | --- | --- | --- | --- | <5 | --- | <12 | <5 | --- | --- | --- | --- | --- | <5 |
| 2,4,6-Trichlorophenol | ug/L | 4 | --- | --- | --- | --- | <5 | --- | <12 | <5 | --- | --- | --- | --- | --- | <5 |
| ***Halogenateds*** | ***Units*** | | | | | | | | | | | | | | | |
| Hexabromobenzene | ug/L | 0.02 | --- | --- | --- | --- | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- | --- |
| Pentachlorobenzene | ug/L | 5 | --- | --- | --- | --- | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- | --- |
| 1,2,3,4-Tetrachlorobenzene | ug/L | 5 | --- | --- | --- | --- | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- | --- |
| 1,2,4,5-Tetrachlorobenzene | ug/L | 2 | --- | --- | --- | --- | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- | --- |
| 1,3,5-Trichlorobenzene | ug/L | 5 | --- | --- | --- | --- | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- | --- |

# Table B2-3A
## Summary of Analytical Results for Organic Groundwater Samples - Update 2011 Criteria
## Gage Products
## Ferndale, Michigan

| Sample Location | | Target | GMW-6 | GMW-6 | GMW-6 | GMW-6 | GMW-6 | GMW-7 | GMW-7 | GMW-7 | GMW-7 | GP-TMW01 | GP-TMW02 | GP-TMW02 | GP-TMW03 | P-1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lab Sample ID | | Method | 23470 | 30186 | 46004 | | 109071-0006 | 46001 | | 109071-0007 | | 124880 | 124881 | 124883 | 124882 | 109055-0001 |
| Sampled By | | Detection | EDI | WWES | WWES | MDNR | WWES | WWES | MDNR | WWES | MDNR | Horizon | Horizon | Horizon | Horizon | WWES |
| Analyzed By | | Limit | | | | | | | | | | EarthTech | EarthTech | EarthTech | EarthTech | |
| Sample Date | | | 8/3/89 | 12/5/89 | 8/8/90 | 11/24/92 | 11/24/92 | 8/6/90 | 11/23/92 | 11/23/92 | 11/24/92 | 8/10/95 | 8/10/95 | 8/10/95 | 8/10/95 | 11/19/92 |
| Sample Depth (Ft.) | | | | | | | | | | | | | | | | |
| ***PCB's*** | ***Units*** | | | | | | | | | | | | | | | |
| BP-6 | *ug/L* | NA | --- | --- | --- | --- | --- | --- | <0.05 | --- | --- | --- | --- | --- | --- | --- |
| Aroclor 1016 | ug/L | 0.2 | --- | --- | --- | --- | --- | --- | <0.1 | --- | --- | --- | --- | --- | --- | --- |
| Aroclor 1221 | ug/L | 0.2 | --- | --- | --- | --- | --- | --- | <0.1 | --- | --- | --- | --- | --- | --- | --- |
| Aroclor 1232 | ug/L | 0.2 | --- | --- | --- | --- | --- | --- | <0.1 | --- | --- | --- | --- | --- | --- | --- |
| Aroclor 1242 | ug/L | 0.2 | --- | --- | --- | --- | --- | --- | <0.1 | --- | --- | --- | --- | --- | --- | --- |
| Aroclor 1248 | ug/L | 0.2 | --- | --- | --- | --- | --- | --- | <0.1 | --- | --- | --- | --- | --- | --- | --- |
| Aroclor 1254 | ug/L | 0.2 | --- | --- | --- | --- | --- | --- | <0.1 | --- | --- | --- | --- | --- | --- | --- |
| Aroclor 1260 | ug/L | 0.2 | --- | --- | --- | --- | --- | --- | <0.1 | --- | --- | --- | --- | --- | --- | --- |
| Aroclor 1262 | ug/L | 0.2 | --- | --- | --- | --- | --- | --- | <0.1 | --- | --- | --- | --- | --- | --- | --- |
| Aroclor 1268 | ug/L | 0.2 | --- | --- | --- | --- | --- | --- | <0.1 | --- | --- | --- | --- | --- | --- | --- |
| ***Pesticides*** | ***Units*** | | | | | | | | | | | | | | | |
| Aldrin | ug/L | 0.01 | --- | --- | --- | --- | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- | --- |
| alpha-BHC | ug/L | 0.05 | --- | --- | --- | --- | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- | --- |
| beta-BHC | ug/L | 0.02 | --- | --- | --- | --- | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- | --- |
| delta-BHC | ug/L | 0.05 | --- | --- | --- | --- | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- | --- |
| gamma-BHC (Lindane) | ug/L | 0.03 | --- | --- | --- | --- | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- | --- |
| a-Chlordane {J} | ug/L | 2 | --- | --- | --- | --- | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- | --- |
| g-Chlordane {J} | ug/L | 2 | --- | --- | --- | --- | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- | --- |
| 4-4'-DDD | ug/L | 0.1 | --- | --- | --- | --- | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- | --- |
| 4-4'-DDE | ug/L | 0.1 | --- | --- | --- | --- | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- | --- |
| 4-4'-DDT | ug/L | 0.02 | --- | --- | --- | --- | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- | --- |
| Dieldrin | ug/L | 0.02 | --- | --- | --- | --- | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- | --- |
| Endosulfan I {J} | ug/L | 0.03 | --- | --- | --- | --- | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- | --- |
| Endosulfan II {J} | ug/L | 0.03 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Endosulfan Sulfate {J} | ug/L | 0.05 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Endrin | ug/L | 0.02 | --- | --- | --- | --- | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- | --- |
| Endrin Aldehyde | ug/L | 0.02 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Heptachlor | ug/L | 0.01 | --- | --- | --- | --- | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- | --- |
| Heptachlor epoxide | ug/L | 0.01 | --- | --- | --- | --- | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- | --- |
| Methoxychlor | ug/L | 0.5 | --- | --- | --- | --- | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- | --- |
| Mirex | ug/L | 0.02 | --- | --- | --- | --- | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- | --- |
| Pentachloronitrobenzene | ug/L | 20 | --- | --- | --- | --- | --- | --- | <0.01 | --- | --- | --- | --- | --- | --- | --- |
| Toxaphene | ug/L | 1 | --- | --- | --- | --- | --- | --- | <0.1 | --- | --- | --- | --- | --- | --- | --- |
| ***Misc.*** | ***Units*** | | | | | | | | | | | | | | | |
| Alkalinity | ug/L | NA | --- | --- | --- | --- | --- | --- | --- | --- | **410000** | --- | --- | --- | --- | --- |
| Bicarbonate Alkalinity | ug/L | NA | --- | --- | --- | --- | --- | --- | --- | --- | **410000** | --- | --- | --- | --- | --- |
| Carbonate Alkalinity | ug/L | NA | --- | --- | --- | --- | --- | --- | --- | --- | <5000 | --- | --- | --- | --- | --- |
| Conductivity | *umho/cm* | NA | --- | --- | --- | --- | --- | --- | --- | --- | **847** | --- | --- | --- | --- | --- |
| pH | pH | NA | --- | --- | --- | --- | --- | --- | --- | --- | **7.22** | --- | --- | --- | --- | --- |

# Table B2-3A
## Summary of Analytical Results for Organic Groundwater Samples - Update 2011 Criteria
## Gage Products
## Ferndale, Michigan

| Sample Location | | Target | TMW-01 | TMW-03 | X (GMW-4D) |
|---|---|---|---|---|---|
| Lab Sample ID | | Method | 179278 | 179279 | |
| Sampled By | | Detection | Horizon | Horizon | MDNR |
| Analyzed By | | Limit | TriMatrix | TriMatrix | |
| Sample Date | | | 9/30/97 | 9/30/97 | 11/23/92 |
| Sample Depth (Ft.) | | | | | |
| ***Volatiles*** | ***Units*** | | | | |
| Acetate | ug/L | 1000 | <50 | <50 | 1500 BK |
| Acetonitrile | ug/L | 50 | <10 | <10 | --- |
| Acrylonitrile {I} | ug/L | 2 | --- | --- | --- |
| Allyl Chloride | ug/L | NA | --- | --- | --- |
| Benzene {I} | ug/L | 1 | <1.0 | <1.0 | **28** |
| Bromobenzene | ug/L | 1 | --- | --- | --- |
| Bromochloromethane | ug/L | 1 | <1.0 | <1.0 | --- |
| Bromodichloromethane | ug/L | 1 | <1.0 | <1.0 | <20 |
| Bromoform | ug/L | 1 | <1.0 | <1.0 | <20 |
| Bromomethane | ug/L | 5 | <1.0 | <1.0 | <100 |
| 2-Butanone (MEK) {I} | ug/L | 25 | <50 | <50 | --- |
| n-Butylbenzene | ug/L | 1 | --- | --- | --- |
| sec-Butylbenzene | ug/L | 1 | --- | --- | --- |
| Tert-Butylbenzene | ug/L | 1 | --- | --- | --- |
| Carbon disulfide {I,R} | ug/L | 5 | <5.0 | <5.0 | <100 |
| Carbon tetrachloride | ug/L | 1 | <1.0 | <1.0 | <20 |
| Chlorobenzene {I} | ug/L | 1 | **75** | <1.0 | **55000** |
| Chlorodibromomethane | ug/L | 5 | <1.0 | <1.0 | --- |
| Chloroethane {I} | ug/L | 5 | <1.0 | <1.0 | <100 |
| 2-Chloroethyl vinyl ether | ug/L | 10 | --- | --- | --- |
| Chloroform | ug/L | 1 | <1.0 | <1.0 | <20 |
| 1-Chlorohexane | ug/L | NA | --- | --- | --- |
| Chloromethane {I} | ug/L | 5 | <1.0 | <1.0 | <100 |
| 2-Chlorotoluene | ug/L | 5 | --- | --- | --- |
| 4-Chlorotoluene | ug/L | 5 | --- | --- | --- |
| 1,2-Dibromo-3-Chloropropane | ug/L | 0.2 | <1.0 | <1.0 | --- |
| Dibromochloromethane | ug/L | 5 | --- | --- | <20 |
| Ethylene dibromide | ug/L | 0.05 | --- | --- | <20 |
| Ethylene dibromide | ug/L | 0.05 | <10 | <10 | --- |
| Dibromomethane | ug/L | 5 | <1.0 | <1.0 | --- |
| trans-1,4-Dichloro-2-butene | ug/L | 1 | <5.0 | <5.0 | --- |
| 1,2-Dichlorobenzene | ug/L | 1 | <1.0 | <1.0 | **160 DMJ** |
| 1,3-Dichlorobenzene | ug/L | 1 | <1.0 | <1.0 | **0.11** |
| 1,4-Dichlorobenzene | ug/L | 1 | <1.0 | <1.0 | **23 DM** |
| Dichlorodifluoromethane | ug/L | 5 | <1.0 | <1.0 | --- |
| 1,1-Dichloroethane {I} | ug/L | 1 | <1.0 | <1.0 | **94 J** |
| 1,2-Dichloroethane {I} | ug/L | 1 | <1.0 | <1.0 | <20 |
| 1,1-Dichloroethylene {I} | ug/L | 1 | <1.0 | <1.0 | <20 |
| cis-1,2-Dichloroethylene {I} | ug/L | 1 | <1.0 | <1.0 | **37** |
| trans-1,2-Dichloroethylene | ug/L | 1 | <1.0 | <1.0 | <20 |
| 1,2-Dichloropropane {I} | ug/L | 1 | <1.0 | <1.0 | <20 |
| 1,3-Dichloropropane | ug/L | 1 | --- | --- | --- |
| 2,2-Dichloropropane | ug/L | 1 | --- | --- | --- |
| cis-1,3-Dichloropropene {I,J} | ug/L | 1 | --- | --- | --- |

# Table B2-3A
## Summary of Analytical Results for Organic Groundwater Samples - Update 2011 Criteria
## Gage Products
## Ferndale, Michigan

| Sample Location | | Target | TMW-01 | TMW-03 | X (GMW-4D) |
|---|---|---|---|---|---|
| Lab Sample ID | | Method | 179278 | 179279 | |
| Sampled By | | Detection | Horizon | Horizon | MDNR |
| Analyzed By | | Limit | TriMatrix | TriMatrix | |
| Sample Date | | | 9/30/97 | 9/30/97 | 11/23/92 |
| Sample Depth (Ft.) | | | | | |
| ***Volatiles Cont.*** | ***Units*** | | --- | --- | --- |
| 1,1-Dichloropropene | ug/L | 1 | --- | --- | --- |
| trans-1,3-Dichloropropene {I, J} | ug/L | 1 | <1.0 | <1.0 | <20 |
| cis-1,3-Dichloropropene {I,J} | ug/L | 1 | <1.0 | <1.0 | <20 |
| 1,4-Dioxane | ug/L | 1 | --- | --- | --- |
| Ethyl ether | ug/L | 10 | <10 | <10 | --- |
| Ethylbenzene {I} | ug/L | 1 | <1.0 | <1.0 | **350** |
| Formaldehyde | ug/L | 100 | --- | --- | --- |
| Hexachloroethane | ug/L | 5 | <5.0 | <5.0 | --- |
| 2-Hexanone {I} | ug/L | 50 | <50 | <50 | **150** |
| Iodomethane | ug/L | 1 | <10 | <10 | --- |
| Isopropyl benzene {I} | ug/L | 5 | <1.0 | <1.0 | --- |
| p-Isopropyltoluene | ug/L | 5 | --- | --- | --- |
| Methyl ethyl ketone | ug/L | 25 | --- | --- | **150** |
| Methyl isobutyl ketone | ug/L | 50 | --- | --- | <100 |
| 4-Methyl-2-pentanone (MIBK) {I} | ug/L | 50 | <50 | <50 | --- |
| Methyl-tert-butyl ether (MTBE) | ug/L | 5 | <50 | <50 | <100 |
| Methylene chloride | ug/L | 5 | <1.0 | <1.0 | <100 |
| n-Propylbenzene {I} | ug/L | 1 | <1.0 | <1.0 | --- |
| Propionitrile | ug/L | NA | --- | --- | --- |
| Styrene {I} | ug/L | 1 | <1.0 | <1.0 | <20 |
| 1,1,1,2-Tetrachloroethane | ug/L | 1 | <1.0 | <1.0 | --- |
| 1,1,2,2-Tetrachloroethane | ug/L | 1 | <1.0 | <1.0 | <20 |
| Tetrachloroethylene | ug/L | 1 | <1.0 | <1.0 | <20 |
| Toluene {I} | ug/L | 1 | <1.0 | <1.0 | **630 PS** |
| 1,2,3-Trichlorobenzene | ug/L | 5 | --- | --- | --- |
| 1,2,4-Trichlorobenzene | ug/L | 5 | <1.0 | <1.0 | 0.11 BK |
| 1,1,1-Trichloroethane | ug/L | 1 | <1.0 | <1.0 | <20 |
| 1,1,2-Trichloroethane | ug/L | 1 | <1.0 | <1.0 | <20 |
| Trichloroethylene | ug/L | 1 | <1.0 | <1.0 | <20 |
| Trichlorofluoromethane | ug/L | 1 | <1.0 | <1.0 | --- |
| 1,2,3-Trichloropropane | ug/L | 1 | <1.0 | <1.0 | --- |
| 1,2,4-Trimethylbenzene {I} | ug/L | 1 | <1.0 | <1.0 | --- |
| 1,3,5-Trimethylbenzene {I} | ug/L | 1 | <1.0 | <1.0 | --- |
| Vinyl acetate | ug/L | 100 | <10 | <10 | --- |
| Vinyl chloride | ug/L | 1 | <1.0 | <1.0 | <100 |
| Xylene, p&m | ug/L | 2 | <2.0 | <2.0 | --- |
| Xylene (Total) | ug/L | 3 | --- | --- | **970** |
| Xylene, o | ug/L | 1 | <1.0 | <1.0 | --- |
| ***Semi-Volatiles*** | ***Units*** | | --- | --- | --- |
| Acenaphthene | ug/L | 5 | <5.0 | <5.0 | **0.97T** |
| Acenaphthylene | ug/L | 5 | <5.0 | <5.0 | <1 |
| Acetophenone | ug/L | 5 | --- | --- | --- |
| Aniline {I} | ug/L | 4 | --- | --- | --- |

# Table B2-3A
## Summary of Analytical Results for Organic Groundwater Samples - Update 2011 Criteria
## Gage Products
## Ferndale, Michigan

| Sample Location | | Target | TMW-01 | TMW-03 | X (GMW-4D) |
|---|---|---|---|---|---|
| Lab Sample ID | | Method | 179278 | 179279 | |
| Sampled By | | Detection | Horizon | Horizon | MDNR |
| Analyzed By | | Limit | TriMatrix | TriMatrix | |
| Sample Date | | | 9/30/97 | 9/30/97 | 11/23/92 |
| Sample Depth (Ft.) | | | | | |
| ***Semi-Volatiles Cont.*** | ***Units*** | | --- | --- | --- |
| Anthracene | ug/L | 5 | <5.0 | <5.0 | <1 |
| Benzidine | ug/L | 0.3 | --- | --- | <15 |
| Benzo(a)anthracene {Q} | ug/L | 1 | <5.0 | <5.0 | <1 |
| Benzo(a)pyrene {Q} | ug/L | 1 | <5.0 | <5.0 | <2 |
| Benzo(b&k)fluoranthene {Q} | ug/L | 1 | <5.0 | <5.0 | --- |
| Benzo(b)fluoranthene {Q} | ug/L | 1 | --- | --- | <2 |
| Benzo(g,h,i)perylene | ug/L | 1 | <5.0 | <5.0 | <5 |
| Benzo(k)fluoranthene {Q} | ug/L | 1 | --- | --- | <2 |
| Benzoic acid | ug/L | 50 | --- | --- | --- |
| Benzyl alcohol | ug/L | 50 | --- | --- | --- |
| bis(2-Chloroethoxy)methane | ug/L | 5 | <5.0 | <5.0 | <2 |
| bis(2-Chloroethyl)ether {I} | ug/L | 1 | <5.0 | <5.0 | <1 |
| bis(2-Chloroisopropyl)ether | ug/L | 5 | <5.0 | <5.0 | <1 |
| bis(2-Ethylhexyl)phthalate | ug/L | 5 | <5.0 | <5.0 | **3.7** |
| 4-Bromo diphenyl ether | ug/L | 5 | <5.0 | <5.0 | <2 |
| Butyl benzyl phthalate | ug/L | 5 | <5.0 | <5.0 | <1 |
| 4-Chloro-3-methylphenol | ug/L | 5 | --- | --- | <10 |
| 4-Chloroaniline | ug/L | 10 | --- | --- | --- |
| beta-Chloronaphthalene | ug/L | 5 | <5.0 | <5.0 | <2 |
| 2-Chlorophenol | ug/L | 10 | --- | --- | **22** |
| 4-Chloro diphenyl ether | ug/L | 5 | <5.0 | <5.0 | <1 |
| Chrysene {Q} | ug/L | 1 | <5.0 | <5.0 | <1 |
| Decabromodiphenyl ether | ug/L | 10 | <5.0 | <5.0 | --- |
| Di-n-octyl phthalate | ug/L | 5 | <5.0 | <5.0 | <2 |
| Dibenzo(a,h)anthracene {Q} | ug/L | 2 | <5.0 | <5.0 | <5 |
| Dibenzofuran | ug/L | 4 | --- | --- | --- |
| Di-n-butyl phthalate | ug/L | 5 | **6** | **6** | <1 |
| 1,2-Dichlorobenzene | ug/L | 1 | --- | --- | **320J** |
| 1,3-Dichlorobenzene | ug/L | 1 | --- | --- | <1 |
| 1,4-Dichlorobenzene | ug/L | 1 | --- | --- | **45** |
| 3,3'-Dichlorobenzidine | ug/L | 0.3 | --- | --- | <10 |
| 2,4-Dichlorophenol | ug/L | 10 | --- | --- | <10 |
| 2,6-Dichlorophenol | ug/L | 5 | --- | --- | --- |
| Diethyl phthalate | ug/L | 5 | <5.0 | <5.0 | <1 |
| Dimethyl phthalate | ug/L | 5 | <5.0 | <5.0 | <2 |
| 2,4-Dimethylphenol | ug/L | 5 | --- | --- | <10 |
| 3,3-Dimethylbenzidine | ug/L | 0.3 | --- | --- | --- |
| 2,4-Dinitrophenol | ug/L | 25 | --- | --- | <50 |
| 2,4-Dinitrotoluene | ug/L | 5 | <5.0 | <5.0 | <5 |
| 2,6-Dinitrotoluene | ug/L | 5 | <5.0 | <5.0 | <5 |
| Diphenylamine | ug/L | NA | --- | --- | --- |
| 1,2-Diphenylhydrazine | ug/L | 5 | <5.0 | <5.0 | <2 |
| Fluoranthene | ug/L | 1 | <5.0 | <5.0 | **0.68T** |

# Table B2-3A
## Summary of Analytical Results for Organic Groundwater Samples - Update 2011 Criteria
## Gage Products
## Ferndale, Michigan

| Sample Location<br>Lab Sample ID<br>Sampled By<br>Analyzed By<br>Sample Date<br>Sample Depth (Ft.) | | Target Method Detection Limit | TMW-01<br>179278<br>Horizon<br>TriMatrix<br>9/30/97 | TMW-03<br>179279<br>Horizon<br>TriMatrix<br>9/30/97 | X (GMW-4D)<br><br>MDNR<br><br>11/23/92 |
|---|---|---|---|---|---|
| ***Semi-Volatiles Cont.*** | ***Units*** | | --- | --- | --- |
| Fluorene | ug/L | 5 | <5.0 | <5.0 | **0.49T** |
| Hexachlorobenzene (C-66) | ug/L | 0.2 | <5.0 | <5.0 | <1 |
| Hexachlorobutadiene (C-46) | ug/L | 0.05 | <5.0 | <5.0 | <2 |
| Hexachlorocyclopentadiene (C-56) | ug/L | 5 | <5.0 | <5.0 | <2 |
| Hexachloroethane | ug/L | 5 | --- | --- | <1 |
| Hexachloropropene | ug/L | NA | --- | --- | --- |
| Indeno(1,2,3-cd)pyrene {Q} | ug/L | 2 | <5.0 | <5.0 | <5 |
| Isophorone | ug/L | 5 | <5.0 | <5.0 | <1 |
| 2-Methyl-4,6-dinitrophenol | ug/L | 20 | --- | --- | <40 |
| 2-Methylnaphthalene | ug/L | 5 | <5.0 | <5.0 | --- |
| 2-Methylphenol {J} | ug/L | 10 | --- | --- | <10 |
| 3-Methylphenol {J} | ug/L | 10 | --- | --- | --- |
| 4-Methylphenol {J} | ug/L | 10 | --- | --- | **38** |
| Naphthalene | ug/L | 5 | <5.0 | <5.0 | **79** |
| 1,4-Naphthylamine | ug/L | NA | --- | --- | --- |
| 1-Naphthylamine | ug/L | NA | --- | --- | --- |
| 2-Naphthylamine | ug/L | NA | --- | --- | --- |
| 2-Nitroaniline | ug/L | 25 | --- | --- | --- |
| 3-Nitroaniline | ug/L | 25 | --- | --- | --- |
| 4-Nitroaniline | ug/L | 25 | --- | --- | --- |
| Nitrobenzene {I} | ug/L | 3 | <5.0 | <5.0 | <2 |
| 2-Nitrophenol | ug/L | 5 | --- | --- | <10 |
| 4-Nitrophenol | ug/L | 25 | --- | --- | <40 |
| 4-Nitroquinoline-1-oxide | ug/L | NA | --- | --- | --- |
| n-Nitroso-di-n-propylamine | ug/L | 5 | <5.0 | <5.0 | <2 |
| N-Nitroso-di-methylamine | ug/L | 5 | --- | --- | --- |
| N-Nitroso-di-methylamine | ug/L | 5 | --- | --- | --- |
| N-Nitrosodiphenylamine | ug/L | 5 | <5.0 | <5.0 | <5 |
| Pentachlorophenol | ug/L | 1 | --- | --- | <40 |
| Phenacetin | ug/L | NA | --- | --- | --- |
| Phenanthrene | ug/L | 2 | <5.0 | <5.0 | **0.45T** |
| Phenol | ug/L | 5 | --- | --- | <10 |
| 1,4-Phenylenediamine | ug/L | NA | --- | --- | --- |
| Pyrene | ug/L | 5 | <5.0 | <5.0 | **0.87T** |
| Pyridine | ug/L | 20 | --- | --- | --- |
| 1,2,4-Trichlorobenzene | ug/L | 5 | --- | --- | <2 |
| 2,4,5-Trichlorophenol | ug/L | 5 | --- | --- | <10 |
| 2,4,6-Trichlorophenol | ug/L | 4 | --- | --- | <10 |
| ***Halogenateds*** | ***Units*** | | | | |
| Hexabromobenzene | ug/L | 0.02 | --- | --- | <0.01 |
| Pentachlorobenzene | ug/L | 5 | --- | --- | <0.01 |
| 1,2,3,4-Tetrachlorobenzene | ug/L | 5 | --- | --- | <0.01 |
| 1,2,4,5-Tetrachlorobenzene | ug/L | 2 | --- | --- | <0.01 |
| 1,3,5-Trichlorobenzene | ug/L | 5 | --- | --- | <0.01 |

# Table B2-3A
## Summary of Analytical Results for Organic Groundwater Samples - Update 2011 Criteria
## Gage Products
## Ferndale, Michigan

| Sample Location | | Target | TMW-01 | TMW-03 | X (GMW-4D) |
|---|---|---|---|---|---|
| Lab Sample ID | | Method | 179278 | 179279 | |
| Sampled By | | Detection | Horizon | Horizon | MDNR |
| Analyzed By | | Limit | TriMatrix | TriMatrix | |
| Sample Date | | | 9/30/97 | 9/30/97 | 11/23/92 |
| Sample Depth (Ft.) | | | | | |
| ***PCB's*** | ***Units*** | | | | |
| BP-6 | *ug/L* | NA | --- | --- | <0.05 |
| Aroclor 1016 | ug/L | 0.2 | <0.20 | <0.20 | <0.1 |
| Aroclor 1221 | ug/L | 0.2 | <0.20 | <0.20 | <0.1 |
| Aroclor 1232 | ug/L | 0.2 | <0.40 | <0.40 | <0.1 |
| Aroclor 1242 | ug/L | 0.2 | <0.20 | <0.20 | <0.1 |
| Aroclor 1248 | ug/L | 0.2 | <0.20 | <0.20 | <0.1 |
| Aroclor 1254 | ug/L | 0.2 | <0.20 | <0.20 | **0.43** |
| Aroclor 1260 | ug/L | 0.2 | <0.20 | <0.20 | <0.1 |
| Aroclor 1262 | ug/L | 0.2 | <0.20 | <0.20 | <0.1 |
| Aroclor 1268 | ug/L | 0.2 | <0.20 | <0.20 | <0.1 |
| ***Pesticides*** | ***Units*** | | | | |
| Aldrin | ug/L | 0.01 | <0.010 | <0.010 | <0.01 |
| alpha-BHC | ug/L | 0.05 | <0.010 | <0.010 | <0.01 |
| beta-BHC | ug/L | 0.02 | <0.010 | <0.010 | <0.01 |
| delta-BHC | ug/L | 0.05 | <0.010 | <0.010 | <0.01 |
| gamma-BHC (Lindane) | ug/L | 0.03 | <0.010 | <0.010 | <0.01 |
| a-Chlordane {J} | ug/L | 2 | --- | --- | <0.01 |
| g-Chlordane {J} | ug/L | 2 | --- | --- | <0.01 |
| 4-4'-DDD | ug/L | 0.1 | <0.020 | <0.020 | <0.01 |
| 4-4'-DDE | ug/L | 0.1 | <0.020 | <0.020 | <0.01 |
| 4-4'-DDT | ug/L | 0.02 | <0.020 | <0.020 | <0.04 |
| Dieldrin | ug/L | 0.02 | <0.020 | <0.020 | <0.01 |
| Endosulfan I {J} | ug/L | 0.03 | <0.010 | <0.010 | <0.01 |
| Endosulfan II {J} | ug/L | 0.03 | <0.020 | <0.020 | --- |
| Endosulfan Sulfate {J} | ug/L | 0.05 | <0.020 | <0.020 | --- |
| Endrin | ug/L | 0.02 | <0.020 | <0.020 | <0.01 |
| Endrin Aldehyde | ug/L | 0.02 | <0.020 | <0.020 | --- |
| Heptachlor | ug/L | 0.01 | <0.010 | <0.010 | <0.01 |
| Heptachlor epoxide | ug/L | 0.01 | <0.010 | <0.010 | <0.01 |
| Methoxychlor | ug/L | 0.5 | <0.50 | <0.50 | <0.01 |
| Mirex | ug/L | 0.02 | --- | --- | <0.01 |
| Pentachloronitrobenzene | ug/L | 20 | --- | --- | <0.01 |
| Toxaphene | ug/L | 1 | --- | --- | <0.1 |
| ***Misc.*** | ***Units*** | | | | |
| Alkalinity | ug/L | NA | --- | --- | --- |
| Bicarbonate Alkalinity | ug/L | NA | --- | --- | --- |
| Carbonate Alkalinity | ug/L | NA | --- | --- | --- |
| Conductivity | *umho/cm* | NA | --- | --- | --- |
| pH | pH | NA | --- | --- | --- |

**Table B2-3A**
**Summary of Analytical Results for Organic Groundwater Samples - Update 2011 Criteria**
**Gage Products**
**Ferndale, Michigan**

# Footnotes

Criteria from Part 201 RRD Memo, March 25, 2011
» Target Method Detection Limit from MDEQ-ERD Operational Memorandum #2, October 22, 2004

Results Qualifiers:
J=Estimated value or value not accurate.
T=Value reported is less than criteria of detection.
--- Parameter not analyzed
ND - Parameter not detected
Bolded value denotes parameter detected above detection limit
Shaded values exceed TMDL and Residential Drinking Water Criteria
Boxes exceed TMDL and Residential GVIIC Criteria
Double Boxes exceed TMDL and Non-Residential GVIIC Criteria
Underlined values exceed TMDL and Groundwater Contact Criteria

Criteria Qualifiers:
{A} Criterion is MI Drinking Water Standard
{E} Criterion is the aesthetic DW value
{I} Hazardous substance may exhibit the characteristic of ignitability
{J} Hazardous substance may be present in several isomer forms and shall be added together for comparison to criteria
{M} Calculated criterion is below the analytical TDL
{Q} Criteria for carcinogenic PAHs were developed using RPPs to benzo(a)pyrene
{R} Hazardous substance may exhibit the characteristic of reactivity
{S} Criterion defaults to the chemical-specfic water solubility limit
{W} Concentrations of trihalomethanes in GW must be added together to determine compliance with the MI DW standard of 100 ug/L
{AA} Comparison to these criteria may take into account an evaluation of whether the
substances are absorbed to particulates rather than dissolved in water
ID = Inadequate data to develop criterion
IP = Development of generic GSI value in process.
NA = Criterion or value is not available, or not applicable
NLL = Hazardous substance is not likely to leach under most soil conditions
NLV = Hazardous substance is not likely to volatilize under most conditions

# Table B2-3B
## Summary of Analytical Results for Inorganic Groundwater Samples - Update 2011 Criteria
## Gage Products
## Ferndale, Michigan

| Sample Location<br>Lab Sample ID<br>Sampled By<br>Analyzed By<br>Sample Date<br>Sample Depth (Ft.) | | Target Method Detection Limit | Residential Drinking Water Criteria | Groundwater Contact Criteria | GMW-1<br>253477<br>Horizon<br>TriMatrix<br>6/16/2000 | GMW-2<br>109071-0001<br>WWES<br><br>11/23/92 | GMW-2<br><br>MDNR<br><br>11/24/92 | GMW-3<br>109071-0002<br>WWES<br><br>11/23/92 | GMW-3<br><br>MDNR<br><br>11/24/92 | GMW-4 (dup)<br>109071-0004<br>WWES<br><br>11/23/92 | GMW-4<br>109071-0003<br>WWES<br><br>11/23/92 | GMW-4<br><br>MDNR<br><br>11/24/92 | GMW-5<br>109071-0005<br>WWES<br><br>11/23/92 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Inorganics*** | ***Units*** | | | | | | | | | | | | |
| Antimony | mg/L | 0.002 | 0.006 {A} | 68 | <0.002 | --- | --- | --- | --- | --- | --- | --- | --- |
| Arsenic {B} Total | mg/L | 0.005 | 0.01 {A} | 4.3 | **0.0076** | **0.12** | **0.011** | <0.06 | <0.001 | **0.063** | **0.062** | --- | **0.072** |
| Arsenic {B} Dissolved | mg/L | 0.005 | 0.01 {A} | 4.3 | --- | --- | **0.0046** | --- | <0.001 | --- | --- | --- | --- |
| Barium Total | mg/L | 0.1 | 2 {A} | 14000 | --- | **0.24** | --- | <0.2 | --- | **0.33** | **0.34** | --- | <0.2 |
| Cadmium {B} Total | mg/L | 0.001 | 0.005 {A} | 190 | **0.0008** | **0.045** | **0.002** | **0.019** | **0.008** | **0.033** | **0.034** | **0.0036** | **0.014** |
| Cadmium {B} Dissolved | mg/L | 0.001 | 0.005 {A} | 190 | --- | --- | **0.0006** | --- | **0.003** | --- | --- | **0.002** | --- |
| Calcium Total | mg/L | NA | NA | NA | --- | --- | **229** | --- | **87.1** | --- | --- | **227** | --- |
| Calcium Dissolved | mg/L | NA | NA | NA | --- | --- | **140** | --- | **68.7** | --- | --- | **213** | --- |
| Chloride | mg/L | 10 | 250 {E} | ID | --- | --- | **161** | --- | **151** | --- | --- | **30** | --- |
| Chromium, Total | mg/L | 0.01 | 0.1 {A} | 460 | <0.001 | **0.19** | **0.04** | <0.05 | **0.0019** | **0.09** | **0.09** | **0.011** | **0.16** |
| Chromium, Total Dissolved | mg/L | 0.01 | 0.1 {A} | 460 | --- | --- | **0.0084** | --- | **0.0022** | --- | --- | **0.007** | --- |
| Chromium (III) {B,H} Total | mg/L | 0.01 | 0.1 {A} | 290000 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Chromium (VI) Total | mg/L | 0.01 | 0.1 {A} | 460 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Cobalt | mg/L | 0.02 | 0.04 | 2400 | <0.10 | --- | --- | --- | --- | --- | --- | --- | --- |
| Copper {B} Total | mg/L | 0.004 | 1 {E} | 7400 | **0.0015** | **0.07** | **0.036** | <0.025 | **0.0014** | **0.06** | **0.06** | **0.032** | **0.04** |
| Copper {B} Dissolved | mg/L | 0.004 | 1 {E} | 7400 | --- | --- | **0.0074** | --- | <0.001 | --- | --- | **0.02** | --- |
| Iron Dissolved | mg/L | 0.2 | 0.3 {E} | 58000 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Lead {B} Total | mg/L | 0.003 | 0.004 {L} | ID | <0.001 | **0.062** | **0.026** | <0.003 | <0.001 | **0.073** | **0.087** | **0.047** | **0.028** |
| Lead {B} Dissolved | mg/L | 0.003 | 0.004 {L} | ID | --- | --- | **0.0051** | --- | <0.001 | --- | --- | **0.028** | --- |
| Magnesium Total | mg/L | 1 | 400 | 1000000 {D} | --- | --- | **109** | --- | **33.5** | --- | --- | **31.3** | --- |
| Magnesium Dissolved | mg/L | 1 | 400 | 1000000 {D} | --- | --- | **75** | --- | **30.2** | --- | --- | **28.8** | --- |
| Mercury, Total {B,Z} Total | mg/L | 1E-06 | 0.002 {A} | 0.056 {S} | <0.0002 | <0.001 | <0.0002 | <0.001 | <0.0002 | <0.001 | <0.001 | <0.0002 | <0.001 |
| Mercury, Total {B,Z} Dissolved | mg/L | 1E-06 | 0.002 {A} | 0.056 {S} | --- | --- | <0.0002 | --- | <0.0002 | --- | --- | <0.0002 | --- |
| Nickel Total | mg/L | 0.02 | 0.1 {A} | 74000 | **0.0063** | --- | **0.048** | --- | **0.004** | --- | --- | **0.022** | --- |
| Nickel Dissolved | mg/L | 0.02 | 0.1 {A} | 74000 | --- | --- | **0.012** | --- | **0.0042** | --- | --- | **0.015** | --- |
| Potassium Total | mg/L | NA | NA | NA | --- | --- | **5.8** | --- | **2.92** | --- | --- | **6.1** | --- |
| Potassium Dissolved | mg/L | NA | NA | NA | --- | --- | **4.25** | --- | **2.75** | --- | --- | **6.2** | --- |
| Selenium {B} Total | mg/L | 0.005 | 0.05 {A} | 970 | **0.0047** | <0.005 | --- | <0.005 | --- | <0.005 | <0.005 | --- | <0.005 |
| Silver {B} Total | mg/L | 0.0002 | 0.034 | 1500 | --- | **0.0034** | --- | **0.00061** | --- | **0.0012** | **0.0016** | --- | **0.00064** |
| Sodium Total | mg/L | 1 | 120 | 1000000 {D} | --- | --- | **120** | --- | **38.2** | --- | --- | **12.4** | --- |
| Sodium Dissolved | mg/L | 1 | 120 | 1000000 {D} | --- | --- | **114** | --- | **36.6** | --- | --- | **12.3** | --- |
| Sulfate Total | mg/L | 1 | 250 {E} | ID | --- | --- | **197** | --- | **68** | --- | --- | **22** | --- |
| Vanadium | mg/L | 0.004 | 0.0045 | 970 | <0.010 | --- | --- | --- | --- | --- | --- | --- | --- |
| Zinc {B} Total | mg/L | 0.05 | 2.4 | 110000 | --- | **0.23** | **0.207** | **0.025** | <0.004 | **4.9** | **5** | **3.64** | **1.9** |
| Zinc {B} Dissolved | mg/L | 0.05 | 2.4 | 110000 | **0.046** | --- | **0.083** | --- | **0.053** | --- | --- | **2.27** | --- |
| ***Misc.*** | ***Units*** | | | | | | | | | | | | |
| Alkalinity | ug/L | NA | NA | NA | --- | --- | **430000** | --- | **64000** | --- | --- | **518000** | --- |
| Bicarbonate Alkalinity | ug/L | NA | NA | NA | --- | --- | **430000** | --- | **64000** | --- | --- | **518000** | --- |
| Carbonate Alkalinity | ug/L | NA | NA | NA | --- | --- | <5000 | --- | <5000 | --- | --- | <5000 | --- |
| Conductivity | *umho/cm* | NA | NA | NA | --- | --- | **1605** | --- | **876** | --- | --- | **1195** | --- |
| Cyanide {R} | ug/L | 5.0 | 200 {A} | 57000 | <0.005 | | | | | | | | |
| pH | pH | NA | 6.5 to 8.5 {E} | NA | --- | --- | **7.57** | --- | **8.62** | --- | --- | **6.68** | --- |

# Table B2-3B
## Summary of Analytical Results for Inorganic Groundwater Samples - Update 2011 Criteria
## Gage Products
## Ferndale, Michigan

| Sample Location | | Target | Residential | Groundwater | GMW-5 | GMW-6 | GMW-7 | GMW-7 | P-1 | TMW-01 | TMW-03 | X (GMW-4D) | FB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lab Sample ID | | Method | Drinking | Contact | | 109071-0006 | 109071-0007 | | 109055-0001 | 179278 | 179279 | | |
| Sampled By | | Detection | Water | Criteria | MDNR | WWES | WWES | MDNR | WWES | Horizon | Horizon | MDNR | MDNR |
| Analyzed By | | Limit | Criteria | | | | | | | TriMatrix | TriMatrix | | |
| Sample Date | | | | | 11/24/92 | 11/24/92 | 11/23/92 | 11/24/92 | 11/19/92 | 9/30/97 | 9/30/97 | 11/24/92 | 11/24/92 |
| Sample Depth (Ft.) | | | | | | | | | | | | | |
| ***Inorganics*** | ***Units*** | | | | | | | | | | | | |
| Antimony | mg/L | 0.002 | 0.006 {A} | 68 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Arsenic {B} Total | mg/L | 0.005 | 0.01 {A} | 4.3 | **0.0063** | <0.06 | <0.06 | **0.014** | **0.012** | --- | --- | --- | --- |
| Arsenic {B} Dissolved | mg/L | 0.005 | 0.01 {A} | 4.3 | **0.0059** | --- | --- | **0.0083** | --- | **0.0021** | **0.005** | --- | --- |
| Barium Total | mg/L | 0.1 | 2 {A} | 14000 | --- | <0.2 | <0.2 | --- | **0.58** | --- | --- | --- | --- |
| Cadmium {B} Total | mg/L | 0.001 | 0.005 {A} | 190 | **0.0011** | **0.012** | <0.01 | **0.0007** | **0.0072** | --- | --- | **0.003** | <0.0002 |
| Cadmium {B} Dissolved | mg/L | 0.001 | 0.005 {A} | 190 | **0.0003** | --- | --- | <0.0002 | --- | <0.01 | <0.01 | --- | <0.0002 |
| Calcium Total | mg/L | NA | NA | NA | **247** | --- | --- | **142** | --- | --- | --- | **221** | <1 |
| Calcium Dissolved | mg/L | NA | NA | NA | **97.1** | --- | --- | **122** | --- | --- | --- | --- | <1 |
| Chloride | mg/L | 10 | 250 {E} | ID | **49** | --- | --- | **13** | --- | --- | --- | **39** | <1 |
| Chromium, Total | mg/L | 0.01 | 0.1 {A} | 460 | **0.02** | **0.11** | **0.09** | **0.025** | **0.21** | --- | --- | **0.011** | <0.001 |
| Chromium, Total Dissolved | mg/L | 0.01 | 0.1 {A} | 460 | **0.0037** | --- | --- | **0.0013** | --- | <0.05 | <0.05 | --- | <0.001 |
| Chromium (III) {B,H} Total | mg/L | 0.01 | 0.1 {A} | 290000 | --- | --- | --- | --- | --- | <0.05 | <0.05 | --- | --- |
| Chromium (VI) Total | mg/L | 0.01 | 0.1 {A} | 460 | --- | --- | --- | --- | --- | **0.002** | <0.001 | --- | --- |
| Cobalt | mg/L | 0.02 | 0.04 | 2400 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Copper {B} Total | mg/L | 0.004 | 1 {E} | 7400 | **0.021** | **0.12** | **0.04** | **0.026** | **0.11** | --- | --- | **0.035** | <0.001 |
| Copper {B} Dissolved | mg/L | 0.004 | 1 {E} | 7400 | **0.004** | --- | --- | **0.0023** | --- | <0.01 | <0.01 | --- | <0.001 |
| Iron Dissolved | mg/L | 0.2 | 0.3 {E} | 58000 | --- | --- | --- | --- | --- | <0.1 | **0.18** | --- | --- |
| Lead {B} Total | mg/L | 0.003 | 0.004 {L} | ID | **0.029** | **0.038** | **0.049** | **0.05** | **0.3** | --- | --- | **0.054** | <0.001 |
| Lead {B} Dissolved | mg/L | 0.003 | 0.004 {L} | ID | **0.0052** | --- | --- | **0.0064** | --- | <0.001 | <0.001 | --- | <0.001 |
| Magnesium Total | mg/L | 1 | 400 | 1000000 {D} | **132** | --- | --- | **29.7** | --- | --- | --- | **29.2** | <1 |
| Magnesium Dissolved | mg/L | 1 | 400 | 1000000 {D} | **86** | --- | --- | **21.7** | --- | --- | --- | --- | <1 |
| Mercury, Total {B,Z} Total | mg/L | 1E-06 | 0.002 {A} | 0.056 {S} | <0.0002 | <0.001 | <0.001 | <0.0002 | <0.001 | --- | --- | <0.0002 | <0.0002 |
| Mercury, Total {B,Z} Dissolved | mg/L | 1E-06 | 0.002 {A} | 0.056 {S} | <0.0002 | --- | --- | <0.0002 | --- | <0.0002 | <0.0002 | --- | <0.0002 |
| Nickel Total | mg/L | 0.02 | 0.1 {A} | 74000 | **0.056** | --- | --- | **0.057** | --- | --- | --- | **0.02** | <0.002 |
| Nickel Dissolved | mg/L | 0.02 | 0.1 {A} | 74000 | **0.036** | --- | --- | **0.039** | --- | <0.01 | <0.01 | --- | <0.002 |
| Potassium Total | mg/L | NA | NA | NA | **2.94** | --- | --- | **2.91** | --- | --- | --- | **6** | <0.1 |
| Potassium Dissolved | mg/L | NA | NA | NA | **2.04** | --- | --- | **2.67** | --- | --- | --- | --- | <0.1 |
| Selenium {B} Total | mg/L | 0.005 | 0.05 {A} | 970 | --- | <0.005 | <0.005 | --- | <0.005 | --- | --- | --- | --- |
| Silver {B} Total | mg/L | 0.0002 | 0.034 | 1500 | --- | **0.0034** | **0.00063** | --- | **0.004** | --- | --- | --- | --- |
| Sodium Total | mg/L | 1 | 120 | 1000000 {D} | **51.7** | --- | --- | **34.7** | --- | --- | --- | **11.5** | <1 |
| Sodium Dissolved | mg/L | 1 | 120 | 1000000 {D} | **50.8** | --- | --- | **34.5** | --- | --- | --- | --- | <1 |
| Sulfate Total | mg/L | 1 | 250 {E} | ID | **143** | --- | --- | **29** | --- | --- | --- | **27** | <2 |
| Vanadium | mg/L | 0.004 | 0.0045 | 970 | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Zinc {B} Total | mg/L | 0.05 | 2.4 | 110000 | **2.86** | **3.7** | **3.8** | **3.76** | **37.1** | --- | --- | **4.67** | <0.004 |
| Zinc {B} Dissolved | mg/L | 0.05 | 2.4 | 110000 | **0.58** | --- | --- | **0.88** | --- | <0.02 | <0.02 | --- | **0.026** |
| ***Misc.*** | ***Units*** | | | | | | | | | | | | |
| Alkalinity | ug/L | NA | NA | NA | **485000** | --- | --- | **410000** | --- | --- | --- | **521000** | <10000 |
| Bicarbonate Alkalinity | ug/L | NA | NA | NA | **485000** | --- | --- | **410000** | --- | --- | --- | **521000** | <10000 |
| Carbonate Alkalinity | ug/L | NA | NA | NA | <5000 | --- | --- | <5000 | --- | --- | --- | <5000 | <5000 |
| Conductivity | *umho/cm* | NA | NA | NA | **1249** | --- | --- | **847** | --- | --- | --- | **1268** | **2.6** |
| Cyanide {R} | ug/L | 5.0 | 200 {A} | 57000 | | | | | | | | | |
| pH | pH | NA | 6.5 to 8.5 {E} | NA | **7.43** | --- | --- | **7.22** | --- | --- | --- | **6.55** | --- |

**Table B2-3B**
**Summary of Analytical Results for Inorganic Groundwater Samples - Update 2011 Criteria**
**Gage Products**
**Ferndale, Michigan**

# Footnotes

Criteria from Part 201 RRD Memo, March 25, 2011
» Target Method Detection Limit from MDEQ-ERD Operational Memorandum #2, October 22, 2004

Results Qualifiers:
--- Parameter not analyzed
Bolded value denotes parameter detected above detection limit
Shaded values exceed TMDL and Residential Drinking Water Criteria

Criteria Qualifiers:
[1] Although criteria is hexavlent Chromium, results are total
{A} Criterion is MI Drinking Water Standard
{B} Background, may be substitued if higher than cleanup criterion
{D} Calculated criterion exceeds 100% hence is reduced to 100% or 1.0E+9 ppb
{E} Criterion is the aesthetic DW value
{L} Criteria for Lead are derived using a biologically based model
{S} Criterion defaults to the chemical-specfic water solubility limit
{Z} The current TDL for mercury is 0.2 ppb, however, a TDL of 5.0E-4 using U.S. EPA Method 1631, will be required after Sept. 30, 2000

# TABLE B2 - 4
## SUMMARY OF SOIL BORING INFORMATION
## Gage Products Company
## Ferndale, Michigan

| I.D Number | Installation Date | Surface Elevation | T.O.C. Elevation | Total Depth | Depth to Clay/ Fill Thickness | Top of Clay Elevation | Depth to Water | Water Elevation | Saturated Thickness | Purpose |
|---|---|---|---|---|---|---|---|---|---|---|
| SB-1 | 7/25/1989 | 637.4 | NAp | 55.0 | 2.0 | 635.4 | Dry | Dry | Dry | Provide additional delineation of top of Clay till and check for extent of saturated fill. |
| SB-2 (GMW-6) | 7/27/1989 | 635.8 | NAp | 60.0 | 3.5 | 632.3 | See GMW - 6 | | | |
| SB-3 | 7/28/1989 | 635.7 | NAp | 9.0 | 2.3 | 633.4 | Dry | Dry | Dry | |
| SB-4 | 7/28/1989 | NAv | NAp | 9.5 | 2.3 | ND | Dry | Dry | Dry | |
| SB-5 | 7/28/1989 | 636.2 | NAp | 9.5 | 1.5 | 634.7 | Dry | Dry | Dry | |
| TSB-1 | 8/3/1990 | 637.7 | NAp | 12.5 | * 11.0 | * 626.7 | 4.5 | 633.2 | * 6.5 | Investigate soil quality after UST removal. Wells drilled in or near old UST vaults. |
| TSB-2 | 8/3/1990 | 637.7 | NAp | 12.5 | * 11.0 | * 626.7 | 4.0 | 633.7 | * 7.0 | |
| TSB-3 | 8/3/1990 | 635.5 | NAp | 10.5 | * 6.0 | * 629.5 | 4.0 | 631.5 | * 2.0 | |
| TSB-4 | 8/6/1990 | NAv | NAp | 10.5 | 2.5 | NAv | Dry | Dry | Dry | |
| TSB-5 | 8/6/1990 | 636.7 | NAp | 10.5 | * 6.0 | * 630.73 | 4.2 | 632.5 | * 1.8 | |
| C-SB-1 | 7/31/1990 | 635.5 | NAp | 10.5 | 1.5 | 634.0 | Dry | Dry | Dry | Upgradient soil & GW conditions. |
| SB-8 | 2/11/1992 | 637.8 | NAp | 37.5 | 3.5 | 634.3 | Dry | Dry | Dry | Collect soil samples for classification and physical laboratory testing. |
| SB-9 | 2/11/1992 | 638.0 | NAp | 30.0 | 6.0 | 632.0 | 3.5 | 634.5 | 2.5 | |
| SB-10 | 2/10/1992 | 634.9 | NAp | 30.0 | 0.0 | 634.9 | Dry | Dry | Dry | |
| SB-11 | 2/10/1992 | 634.9 | NAp | 30.0 | 0.0 | 634.9 | Dry | Dry | Dry | |
| SB-12 | 2/12/1992 | 636.6 | NAp | 30.0 | 1.7 | 634.9 | Dry | Dry | Dry | |
| SB-14 | 2/12/1992 | 635.8 | NAp | 30.0 | 6.0 | 629.8 | 0.2 | 635.6 | 5.8 | |
| **Former Coca Cola Prope rty** | | | | | | | | | | |
| SB-1 (HAB 1) | 8/27/1993 | 636 +/- | NAp | 6.0 | 3.0 | 633 +/- | Dry | Dry | Dry | Environmental Site Assessment |
| SB-2 (HAB 2) | 8/27/1993 | 637 +/- | NAp | 5.5 | 5.0 | 632 +/- | Dry | Dry | Dry | |

NAp = Not Applicable
NAv = Not Available
ND = Not Determined
Water elevations and saturated fill thicknesses for soil borings are calculated from "depth to water" indications during drilling. *
Depth to Clay within former UST vault excavation or collection trench.

# TABLE B2-4
## SUMMARY OF SOIL BORING INFORMATION
## Gage Products Company
## Ferndale, Michigan

| I.D Number | Installation Date | Surface Elevation | T.O.C. Elevation | Total Depth | Depth to Clay/ Fill Thickness | Top of Clay Elevation | Depth to Water | Water Elevation | Saturated Thickness | Purpose |
|---|---|---|---|---|---|---|---|---|---|---|
| P-1 | 2/13/1992 | 636.8 | 636.24 | 5.5 | ND | ND | ND | ND | ND | Monitor GW levels, provide additional data on GW movement in shallow fill. (P1 to P5 pushed to completion depth, no lithology) |
| P-2 | 2/13/1992 | 636.2 | 635.67 | 6.1 | ND | ND | 2.06 | 633.61 | ND | |
| P-3 | 2/13/1992 | 636.3 | 635.80 | 6.1 | ND | ND | 0.50 | 635.30 | ND | |
| P-4 | 2/12/1992 | 637.4 | 637.21 | 5.5 | ND | ND | ND | ND | ND | |
| P-5 | 2/13/1992 | 636.0 | 635.67 | 5.5 | ND | ND | ND | ND | ND | |
| P-6 | 10/12/1993 | 638.2 | 637.90 | 9.0 | *8.5 | * 629.7 | NAv | ND | ND | Destroyed during LSF construction |
| P-6 (R) | 1/26/1995 | NAv | 637.06 | 6.2 | 5.5 | NA | 1.19 | 635.87 | ND | Replacement for P-6. |
| P-7 | 10/12/1993 | 637.6 | 637.35 | 6.0 | *5.5 | *632.1 | NAv | ND | ND | |
| P-8 | 10/12/1993 | 637.6 | 637.40 | 6.0 | 3.5 | * 634.1 | NAv | ND | ND | Monitor GW levels during pump test of GW collection trench, and subsequent general monitoring and sampling. (P-7, P-8, P-9, P-10 destroyed during LSF construction) |
| P-9 | 10/12/1993 | 637.7 | 637.51 | 6.0 | 5.5 | 632.2 | NAv | ND | ND | |
| P-10 | 10/13/1993 | 637.7 | 637.36 | 6.0 | 5.5 | 632.2 | NAv | ND | ND | |
| P-11 | 10/13/1993 | 636.2 | 635.99 | 6.0 | 3.0 | 633.2 | 1.19 | 634.80 | 1.6 | |
| P-12 | 10/13/1993 | 636.2 | 635.98 | 6.0 | 2.9 | 633.3 | 1.57 | 634.41 | 1.1 | |
| P-13 | 10/13/1993 | 636.2 | 636.07 | 6.0 | 3.3 | 632.9 | 1.65 | 634.42 | 1.5 | |
| P-14 | 10/15/1993 | 636.8 | 636.46 | 8.5 | * 8.0 | * 628.8 | 2.86 | 633.60 | * 4.8 | Located in GW collection trench |
| P-15 | 10/15/1993 | 635.9 | 635.60 | 5.5 | 3.5 | 632.4 | 1.75 | 633.85 | 1.5 | |
| P-16 | 10/15/1993 | 636.0 | 635.81 | 8.2 | * 8.0 | * 628.0 | 2.31 | 633.50 | * 5.5 | Located in GW collection trench |
| P-17 | 10/15/1993 | 635.3 | 634.83 | 5.5 | 3.5 | 631.8 | 1.25 | 633.58 | 1.8 | |
| P-18 | 10/15/1993 | 635.3 | 634.84 | 6.2 | * 6.0 | * 629.3 | 1.64 | 633.20 | * 3.9 | Located in GW collection trench |
| P-19 | 10/15/1993 | 634.9 | 634.62 | 5.2 | * 5.0 | * 629.9 | 1.26 | 633.36 | * 3.5 | Located in GW collection trench |
| P-20 | 10/15/1993 | 635.1 | 634.70 | 5.5 | 3.5 | 631.6 | 1.02 | 633.68 | 2.1 | |
| WP-1 | NAv | 635.5 | 636.18 | 6.9 | ND | ND | 4.45 | 631.73 | ND | Installed by Gage for additional GW monitoring. |
| WP-2 | NAv | 635.9 | 638.07 | 6.2 | ND | ND | 4.86 | 633.21 | ND | |

NAp = Not Applicable
NAv = Not Available
ND = Not Determined
* Depth to Clay within former UST vault excavation or collection trench.
Water level information for piezometers taken from May 1995 data.

# TABLE B2-4
## SUMMARY OF SOIL BORING INFORMATION
## Gage Products Company
## Ferndale, Michigan

| I.D Number | Installation Date | Surface Elevation | T.O.C. Elevation | Total Depth | Depth to Clay/ Fill Thickness | Top of Clay Elevation | Depth to Water | Water Elevation | Saturated Thickness | Purpose |
|---|---|---|---|---|---|---|---|---|---|---|
| GMW-1 | 7/24/1985 | 638.0 | 639.27 | 30.5 | 3.2 | 634.8 | 5.09 | 634.18 | 0.0 | Monitor GW quality and water levels. |
| GMW-2 | 7/24/1985 | 635.7 | 638.23 | 30.5 | 3.2 | 632.5 | 4.90 | 633.33 | 0.8 | |
| GMW-3 | 7/24/1985 | 635.1 | 637.20 | 30.5 | 0.0 | 635.1 | 6.23 | 630.97 | 0.0 | |
| GMW-4 | 7/25/1985 | 639.7 | 639.89 | 15.5 | 5.2 | 634.5 | NAv | NAv | NAv | Abandoned |
| GMW-5 | 7/25/1985 | 637.4 | 639.06 | 15.5 | 3.2 | 634.2 | NAv | NAv | NAv | Abandoned |
| GMW-4 (R) | 7/28/1989 | 639.6 | 639.87 | 14.5 | 5.2 | 634.4 | 4.16 | 635.71 | 1.3 | Re-drill of GMW-4 |
| GMW-5 (R) | 7/27/1989 | 637.1 | 638.95 | 10.5 | 3.2 | 633.9 | 3.23 | 635.72 | 1.8 | Re-drill of GMW-5 |
| GMW-6 | 7/27/1989 | 635.8 | 635.49 | 9.5 | 3.5 | 632.3 | 1.02 | 634.47 | 2.2 | Investigate soil and GW quality |
| GMW-7 | 7/31/1990 | 638.3 | 637.87 | 16.5 | 4.0 | 634.3 | 1.92 | 635.95 | 1.7 | |

Water level information for monitoring wells (GMW's) taken from May 1995 data.

# Table B2-5
## Summary of Analytical Results for Effluent from the Ground Water Collection Trench
## Gage Products, Ferndale, Michigan
*Units as Given*

| Sample Identification:<br>Sample Date:<br>Laboratory ID:<br>Sampled By: | | Target Method Detection Limit | Residential Drinking Water Criteria | Groundwater Contact Criteria | Effluent #1<br>10/18/1993<br>111131-0001<br>WWES | Effluent #2<br>10/18/1993<br>111131-0002<br>WWES | Effluent #3<br>10/19/1993<br>111139-0001<br>WWES | Effluent #4<br>10/19/1993<br>111139-0002<br>WWES | Effluent #5<br>10/20/1993<br>111150-0001<br>WWES | Effluent #6<br>10/20/1993<br>111150-0002<br>WWES |
|---|---|---|---|---|---|---|---|---|---|---|
| ***Semi-Volatiles*** | ***Units*** | | | | | | | | | |
| Acenaphthene | µg/l | | | | ND | ND | ND | ND | ND | ND |
| Acenaphthylene | µg/l | | | | ND | ND | ND | ND | ND | ND |
| Aniline | µg/l | | | | ND | ND | ND | ND | ND | ND |
| Anthracene | µg/l | | | | ND | ND | ND | ND | ND | ND |
| Benzidine | µg/l | | | | ND | ND | ND | ND | ND | ND |
| Benzo(a)Anthracene | µg/l | | | | ND | ND | ND | ND | ND | ND |
| Benzo(a)Pyrene | µg/l | | | | ND | ND | ND | ND | ND | ND |
| Benzo(b)Fluoranthene | µg/l | | | | ND | ND | ND | ND | ND | ND |
| Benzo(k)Fluoranthene | µg/l | | | | ND | ND | ND | ND | ND | ND |
| Benzoic Acid | µg/l | 50 | 32000 | 3.5E+6 {S} | ND | ND | ND | ND | **15** | **18** |
| Benzo(ghi)Perylene | µg/l | | | | ND | ND | ND | ND | ND | ND |
| Benzyl Alcohol | µg/l | 50 | 10000 | 4.4E+7 {S} | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 |
| Bis(2-Chloroethoxy)methane | µg/l | | | | ND | ND | ND | ND | ND | ND |
| Bis(2-Chloroethyl)ether | µg/l | | | | ND | ND | ND | ND | ND | ND |
| Bis(2-Chloroisopropyl)ether | µg/l | | | | ND | ND | ND | ND | ND | ND |
| Bis(2-Ethylhexyl)phthalate | µg/l | 5 | 6.0 {A} | 320 {AA} | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 |
| 4-Bromodiphenyl ether | µg/l | | | | ND | ND | ND | ND | ND | ND |
| Butylbenzylphthalate | µg/l | | | | ND | ND | ND | ND | ND | ND |
| 4-Chloroaniline | µg/l | | | | ND | ND | ND | ND | ND | ND |
| 4-Chloro-3-Methylphenol | µg/l | | | | ND | ND | ND | ND | ND | ND |
| 2-Chloronaphthalene | µg/l | | | | ND | ND | ND | ND | ND | ND |
| 2-Chlorophenol | µg/l | | | | ND | ND | ND | ND | ND | ND |
| 4-Chlorodiphenyl ether | µg/l | | | | ND | ND | ND | ND | ND | ND |
| Chrysene | µg/l | | | | ND | ND | ND | ND | ND | ND |
| Dibenzo(a,h)Anthracene | µg/l | | | | ND | ND | ND | ND | ND | ND |
| Dibenzofuran | µg/l | | | | ND | ND | ND | ND | ND | ND |
| 1,2-Dichlorobenzene | µg/l | 1 | 600 {A} | 1.6E+5 {S} | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 |
| 1,3-Dichlorobenzene | µg/l | 1 | 6.6 | 2000 | ND | ND | ND | ND | ND | ND |
| 1,4-Dichlorobenzene | µg/l | 1 | 75 {A} | 6400 | ND | ND | ND | <5.0 | ND | <5.0 |
| 2,4-Dichlorophenol | µg/l | | | | ND | ND | ND | ND | ND | ND |
| 3,3'-Dichlorobenzidine | µg/l | | | | ND | ND | ND | ND | ND | ND |

**Table B2-5**
**Summary of Analytical Results for Effluent from the Ground Water Collection Trench**
**Gage Products, Ferndale, Michigan**
*Units as Given*

| Sample Identification:<br>Sample Date:<br>Laboratory ID:<br>Sampled By: | | Target Method Detection Limit | Residential Drinking Water Criteria | Groundwater Contact Criteria | Effluent #1<br>10/18/1993<br>111131-0001<br>WWES | Effluent #2<br>10/18/1993<br>111131-0002<br>WWES | Effluent #3<br>10/19/1993<br>111139-0001<br>WWES | Effluent #4<br>10/19/1993<br>111139-0002<br>WWES | Effluent #5<br>10/20/1993<br>111150-0001<br>WWES | Effluent #6<br>10/20/1993<br>111150-0002<br>WWES |
|---|---|---|---|---|---|---|---|---|---|---|
| ***Semi-Volatiles Continued*** | ***Units*** | | | | | | | | | |
| Diethylphthalate | µg/l | | | | ND | ND | ND | ND | ND | ND |
| 2,4-Dimethylphenol | µg/l | 5 | 370 | 5.2E+5 | ND | ND | **15** | **14** | **15** | **13** |
| Dimethylphthalate | µg/l | | | | ND | ND | ND | ND | ND | ND |
| Di-n-Butylphthalate | µg/l | 5 | 880 | 11000 {S} | <5.0 | ND | ND | ND | ND | ND |
| 4,6-Dinitro-2-Methylphenol | µg/l | | | | ND | ND | ND | ND | ND | ND |
| 2,4-Dinitrophenol | µg/l | | | | ND | ND | ND | ND | ND | ND |
| 2,4-Dinitrotoluene | µg/l | | | | ND | ND | ND | ND | ND | ND |
| 2,6-Dinitrotoluene | µg/l | | | | ND | ND | ND | ND | ND | ND |
| Di-n-Octylphthalate | µg/l | | | | ND | ND | ND | ND | ND | ND |
| Fluoranthene | µg/l | | | | ND | ND | ND | ND | ND | ND |
| Fluorene | µg/l | | | | ND | ND | ND | ND | ND | ND |
| Hexachlorobenzene | µg/l | | | | ND | ND | ND | ND | ND | ND |
| Hexachlorobutadiene | µg/l | | | | ND | ND | ND | ND | ND | ND |
| Hexachlorocyclopentadiene | µg/l | | | | ND | ND | ND | ND | ND | ND |
| Hexachloroethane | µg/l | | | | ND | ND | ND | ND | ND | ND |
| Indeno(1,2,3-c,d)Pyrene | µg/l | | | | ND | ND | ND | ND | ND | ND |
| Isophorone | µg/l | | | | ND | ND | ND | ND | ND | ND |
| Naphthalene | µg/l | 5 | 520 | 31000 {S} | **72** | **89** | **93** | **95** | **71** | **94** |
| Nitrobenzene | µg/l | | | | ND | ND | ND | ND | ND | ND |
| 2-Methylnaphthalene | µg/l | 5 | 260 | 25000 {S} | **37** | **40** | **53** | **54** | **41** | **44** |
| 2-Methylphenol | µg/l | 10 | 370 | 8.1E+5 | **26** | **27** | **20** | **16** | **24** | **22** |
| 4-Methylphenol | µg/l | 10 | 370 | 8.1E+5 | **16** | **24** | **34** | **34** | **38** | **41** |
| 2-Nitroaniline | µg/l | | | | ND | ND | ND | ND | ND | ND |
| 3-Nitroaniline | µg/l | | | | ND | ND | ND | ND | ND | ND |
| 4-Nitroaniline | µg/l | | | | ND | ND | ND | ND | ND | ND |
| 2-Nitrophenol | µg/l | | | | ND | ND | ND | ND | ND | ND |
| 4-Nitrophenol | µg/l | | | | ND | ND | ND | ND | ND | ND |
| N-Nitrosodimethylamine | µg/l | | | | ND | ND | ND | ND | ND | ND |
| N-Nitrosodiphenylamine | µg/l | | | | ND | ND | ND | ND | ND | ND |
| N-Nitroso-di-n-Propylamine | µg/l | | | | ND | ND | ND | ND | ND | ND |
| Pentachlorophenol | µg/l | | | | ND | ND | ND | ND | ND | ND |
| Phenanthrene | µg/l | 2 | 52 | 1000 {S} | <5.0 | ND | ND | ND | ND | ND |

**Table B2-5**
**Summary of Analytical Results for Effluent from the Ground Water Collection Trench**
**Gage Products, Ferndale, Michigan**
*Units as Given*

| Sample Identification: | | Target | Residential | Groundwater | Effluent #1 | Effluent #2 | Effluent #3 | Effluent #4 | Effluent #5 | Effluent #6 |
|---|---|---|---|---|---|---|---|---|---|---|
| Sample Date: | | Method | Drinking | Contact | 10/18/1993 | 10/18/1993 | 10/19/1993 | 10/19/1993 | 10/20/1993 | 10/20/1993 |
| Laboratory ID: | | Detection | Water | Criteria | 111131-0001 | 111131-0002 | 111139-0001 | 111139-0002 | 111150-0001 | 111150-0002 |
| Sampled By: | | Limit | Criteria | | WWES | WWES | WWES | WWES | WWES | WWES |
| ***Semi-Volatiles Continued*** | ***Units*** | | | | | | | | | |
| Phenol | µg/l | 5 | 4400 | 2.9E+7 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 |
| Pyrene | µg/l | | | | ND | ND | ND | ND | ND | ND |
| 1,2,4-Trichlorobenzene | µg/l | | | | ND | ND | ND | ND | ND | ND |
| 2,4,5-Trichlorophenol | µg/l | | | | ND | ND | ND | ND | ND | ND |
| 2,4,6-Trichlorophenol | µg/l | | | | ND | ND | ND | ND | ND | ND |
| 1,2-Diphenylhydrazine | µg/l | | | | ND | ND | ND | ND | ND | ND |
| Azobenzene | µg/l | | | | --- | --- | --- | --- | ND | --- |
| ***Phenols*** | ***Units*** | | | | | | | | | |
| 4-Chloro-3-methylphenol | µg/l | | | | --- | --- | --- | --- | ND | --- |
| 2-Chlorophenol | µg/l | | | | --- | --- | --- | --- | ND | --- |
| 2,4-Dichlorophenol | µg/l | | | | --- | --- | --- | --- | ND | --- |
| 2,4-Dimethylphenol | µg/l | 5 | 370 | 5.2E+5 | --- | --- | --- | --- | **15** | --- |
| 4,6-Dinitro-2-methylphenol | µg/l | | | | --- | --- | --- | --- | ND | --- |
| 2,4-Dinitrophenol | µg/l | | | | --- | --- | --- | --- | ND | --- |
| 2-Methylphenol | µg/l | 10 | 370 | 8.1E+5 | --- | --- | --- | --- | **24** | --- |
| 4-Methylphenol | µg/l | 10 | 370 | 8.1E+5 | --- | --- | --- | --- | **38** | --- |
| 2-Nitrophenol | µg/l | | | | --- | --- | --- | --- | ND | --- |
| 4-Nitrophenol | µg/l | | | | --- | --- | --- | --- | ND | --- |
| Pentachlorophenol | µg/l | | | | --- | --- | --- | --- | ND | --- |
| Phenol | µg/l | 5 | 4400 | 2.9E+7 | --- | --- | --- | --- | <5.0 | --- |
| 2,4,5-Trichlorophenol | µg/l | | | | --- | --- | --- | --- | ND | --- |
| 2,4,6-Trichlorophenol | µg/l | | | | --- | --- | --- | --- | ND | --- |
| ***Volatiles*** | ***Units*** | | | | | | | | | |
| Acetone | µg/l | 50 | 730 | 3.1E+7 | --- | --- | --- | --- | **2100** | --- |
| Benzene | µg/l | 1 | 5.0 {A} | 11000 | **63** | **65** | **74** | **77** | **77** | **82** |
| Bromobenzene | µg/l | | | | ND | ND | ND | ND | ND | ND |
| Bromochloromethane | µg/l | | | | ND | ND | ND | ND | ND | ND |
| Bromodichloromethane | µg/l | | | | ND | ND | ND | ND | ND | ND |
| Bromoform | µg/l | | | | ND | ND | ND | ND | ND | ND |
| Bromomethane | µg/l | | | | ND | ND | ND | ND | ND | ND |
| n-Butylbenzene | µg/l | | | | ND | ND | ND | ND | ND | ND |
| s-Butylbenzene | µg/l | | | | ND | ND | ND | ND | ND | ND |

**Table B2-5**
**Summary of Analytical Results for Effluent from the Ground Water Collection Trench**
**Gage Products, Ferndale, Michigan**
*Units as Given*

| Sample Identification:<br>Sample Date:<br>Laboratory ID:<br>Sampled By: | | Target Method Detection Limit | Residential Drinking Water Criteria | Groundwater Contact Criteria | Effluent #1<br>10/18/1993<br>111131-0001<br>WWES | Effluent #2<br>10/18/1993<br>111131-0002<br>WWES | Effluent #3<br>10/19/1993<br>111139-0001<br>WWES | Effluent #4<br>10/19/1993<br>111139-0002<br>WWES | Effluent #5<br>10/20/1993<br>111150-0001<br>WWES | Effluent #6<br>10/20/1993<br>111150-0002<br>WWES |
|---|---|---|---|---|---|---|---|---|---|---|
| ***Volatiles Continued*** | ***Units*** | | | | | | | | | |
| t-Butylbenzene | µg/l | | | | ND | ND | ND | ND | ND | ND |
| Carbon disulfide | µg/l | | | | --- | --- | --- | --- | ND | --- |
| Carbon Tetrachloride | µg/l | | | | ND | ND | ND | ND | ND | ND |
| Chlorobenzene | µg/l | 1 | 100 {A} | 86000 | **81** | **110** | **120** | **110** | **110** | **120** |
| Chlorodibromomethane | µg/l | | | | ND | ND | ND | ND | ND | ND |
| Chloroethane | µg/l | 5 | 430 | 4.4E+5 | **2400** | **3000** | **3200** | **3100** | **2100** | **2400** |
| Chloroform | µg/l | | | | ND | ND | ND | ND | ND | ND |
| 1-Chlorohexane | µg/l | | | | ND | ND | ND | ND | ND | ND |
| Chloromethane | µg/l | | | | ND | ND | ND | ND | ND | ND |
| 2-Chlorotoluene | µg/l | | | | ND | ND | ND | ND | ND | ND |
| 4-Chlorotoluene | µg/l | | | | ND | ND | ND | ND | ND | ND |
| 1,2-Dibromo-3-chloropropane | µg/l | | | | ND | ND | ND | ND | ND | ND |
| 1,2-Dibromoethane | µg/l | | | | ND | ND | ND | ND | ND | ND |
| Dibromomethane | µg/l | | | | ND | ND | ND | ND | ND | ND |
| 1,2-Dichlorobenzene | µg/l | | | | ND | ND | ND | ND | ND | ND |
| 1,3-Dichlorobenzene | µg/l | | | | ND | ND | ND | ND | ND | ND |
| 1,4-Dichlorobenzene | µg/l | | | | ND | ND | ND | ND | ND | ND |
| Dichlorodifluoromethane | µg/l | | | | ND | ND | ND | ND | ND | ND |
| 1,2-Dichloroethane | µg/l | 1 | 5.0 {A} | 19000 | **190** | **190** | **210** | **210** | **37** | ND |
| 1,1-Dichloroethane | µg/l | 1 | 880 | 2.4E+6 | **150** | **380** | **740** | **1000** | **1200** | **1400** |
| 1,1-Dichloroethene | µg/l | | | | ND | ND | ND | ND | ND | ND |
| cis-1,2-Dichloroethylene | µg/l | 1 | 70 {A} | 2.0E+5 | **22** | **84** | **250** | **390** | **430** | **610** |
| trans-1,2-Dichloroethylene | µg/l | | | | ND | ND | ND | ND | ND | ND |
| 1,2-Dichloropropane | µg/l | | | | ND | ND | ND | ND | ND | ND |
| 1,3-Dichloropropane | µg/l | | | | ND | ND | ND | ND | ND | ND |
| 2,2-Dichloropropane | µg/l | | | | ND | ND | ND | ND | ND | ND |
| 1,1-Dichloropropene | µg/l | | | | ND | ND | ND | ND | ND | ND |
| cis-1,3-Dichloropropene | µg/l | | | | --- | --- | --- | --- | ND | --- |
| trans-1,3-Dichloropropene | µg/l | | | | --- | --- | --- | --- | ND | --- |
| Ethylbenzene | µg/l | 1 | 74 {E} | 1.7E+5 {S} | **900** | **990** | **970** | **980** | **950** | **1000** |
| Hexachlorobutadiene | µg/l | | | | ND | ND | ND | ND | ND | ND |
| 2-Hexanone | µg/l | | | | --- | --- | --- | --- | ND | --- |

# Table B2-5
## Summary of Analytical Results for Effluent from the Ground Water Collection Trench
## Gage Products, Ferndale, Michigan
*Units as Given*

| Sample Identification:<br>Sample Date:<br>Laboratory ID:<br>Sampled By: | | Target Method Detection Limit | Residential Drinking Water Criteria | Groundwater Contact Criteria | Effluent #1<br>10/18/1993<br>111131-0001<br>WWES | Effluent #2<br>10/18/1993<br>111131-0002<br>WWES | Effluent #3<br>10/19/1993<br>111139-0001<br>WWES | Effluent #4<br>10/19/1993<br>111139-0002<br>WWES | Effluent #5<br>10/20/1993<br>111150-0001<br>WWES | Effluent #6<br>10/20/1993<br>111150-0002<br>WWES |
|---|---|---|---|---|---|---|---|---|---|---|
| ***Volatiles Continued*** | ***Units*** | | | | | | | | | |
| Isopropylbenzene (Cumene) | µg/l | 5 | 800 | 56000 {S} | **34** | **43** | **42** | **44** | **43** | ND |
| p-Isopropyltoluene | µg/l | | | | ND | ND | ND | ND | ND | ND |
| Methyl ethyl ketone | µg/l | 25 | 13000 | 2.4E+8 {S} | --- | --- | --- | --- | <1000 | --- |
| Methyl isobutyl ketone | µg/l | 50 | 1800 | 1.3E+7 | --- | --- | --- | --- | **9200** | --- |
| Methyl tert-butyl ether | µg/l | | | | --- | --- | --- | --- | ND | --- |
| Methylene Chloride | µg/l | 5 | 5.0 {A} | 2.2E+5 | **44** | **59** | **76** | **78** | ND | ND |
| Naphthalene | µg/l | 5 | 520 | 31000 {S} | **160** | **210** | **220** | **230** | **250** | **250** |
| N-propylbenzene | µg/l | 1 | 80 | 15000 | **46** | **60** | **56** | **65** | **63** | **62** |
| Styrene | µg/l | | | | ND | ND | ND | ND | ND | ND |
| 1,1,1,2-Tetrachloroethane | µg/l | | | | ND | ND | ND | ND | ND | ND |
| 1,1,2,2-Tetrachloroethane | µg/l | | | | ND | ND | ND | ND | ND | ND |
| Tetrachloroethylene | µg/l | | | | ND | ND | ND | ND | ND | ND |
| Toluene | µg/l | 1 | 790 {E} | 5.3E+5 {S} | **5100** | **7800** | **8100** | **8000** | **7900** | **8400** |
| 1,2,3-Trichlorobenzene | µg/l | | | | ND | ND | ND | ND | ND | ND |
| 1,2,4-Trichlorobenzene | µg/l | | | | ND | ND | ND | ND | ND | ND |
| 1,1,1-Trichloroethane | µg/l | 1 | 200 {A} | 1.3E+6 {S} | ND | ND | **73** | **260** | **490** | **740** |
| 1,1,2-Trichloroethane | µg/l | | | | ND | ND | ND | ND | ND | ND |
| Trichloroethylene | µg/l | | | | ND | ND | ND | ND | ND | ND |
| Trichlorofluoromethane | µg/l | | | | ND | ND | ND | ND | ND | ND |
| 1,2,3-Trichloropropane | µg/l | | | | ND | ND | ND | ND | ND | ND |
| 1,2,4-Trimethylbenzene | µg/l | 1 | 63 {E} | 56000 {S} | **970** | **1300** | **1300** | **1400** | **1300** | ND |
| 1,3,5-Trimethylbenzene | µg/l | 1 | 72 {E} | 61000 {S} | **300** | **380** | **380** | **430** | **370** | **410** |
| Vinyl Chloride | µg/l | 1 | 2.0 {A} | 1000 | **66** | **140** | **410** | **570** | **180** | **540** |
| Xylenes (o,m & p), total | µg/l | 3 | 280 {E} | 1.9E+5 {S} | **3800** | **4300** | **4300** | **4200** | **3900** | **4300** |
| ***Inorganics*** | ***Units*** | | | | | | | | | |
| Arsenic | µg/l | 5 | 10 {A} | 4300 | **4.8** | **9.1** | **9.8** | **10** | **8.6** | **7.3** |
| Barium | µg/l | 100 | 2000 {A} | 1.4E+7 | **320** | **340** | **370** | **370** | **380** | **410** |
| Cadmium | µg/l | 1 | 5.0 {A} | 1.9E+5 | **0.77** | ND | <0.20 | <0.20 | <0.20 | ND |
| Calcium | mg/l | NA | NA | NA | --- | --- | --- | --- | **100** | --- |
| Chloride | mg/l | 10 | 250 {E} | ID | --- | --- | --- | --- | **73** | --- |
| Chromium | µg/l | | | | ND | ND | ND | ND | ND | ND |
| Copper | µg/l | | | | ND | ND | ND | ND | ND | ND |

**Table B2-5**
**Summary of Analytical Results for Effluent from the Ground Water Collection Trench**
**Gage Products, Ferndale, Michigan**
*Units as Given*

| Sample Identification:<br>Sample Date:<br>Laboratory ID:<br>Sampled By: | | Target Method Detection Limit | Residential Drinking Water Criteria | Groundwater Contact Criteria | Effluent #1<br>10/18/1993<br>111131-0001<br>WWES | Effluent #2<br>10/18/1993<br>111131-0002<br>WWES | Effluent #3<br>10/19/1993<br>111139-0001<br>WWES | Effluent #4<br>10/19/1993<br>111139-0002<br>WWES | Effluent #5<br>10/20/1993<br>111150-0001<br>WWES | Effluent #6<br>10/20/1993<br>111150-0002<br>WWES |
|---|---|---|---|---|---|---|---|---|---|---|
| ***Inorganics Continued*** | ***Units*** | | | | | | | | | |
| Iron | mg/l | 0.2 | 0.3 {E} | 58000 | --- | --- | --- | --- | **23** | --- |
| Lead | µg/l | 3 | 4.0 {L} | ID | **22** | **4.7** | **4.2** | **5.8** | **4.6** | **6.3** |
| Magnesium | mg/l | 1 | 400 | 1000000 {D} | --- | --- | --- | --- | **26** | --- |
| Mercury | µg/l | 0.001 | 2.0 {A} | 56 {S} | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 | <0.2 |
| Nickel | mg/l | | | | --- | --- | --- | --- | ND | --- |
| Potassium | mg/l | NA | NA | NA | --- | --- | --- | --- | **10** | --- |
| Selenium | µg/l | 5 | 50 {A} | 9.7E+5 | ND | ND | ND | ND | <5.0 | <5.0 |
| Silver | µg/l | 0.2 | 34 | 1.5E+6 | <0.50 | <0.50 | ND | ND | ND | <0.50 |
| Sodium | mg/l | 1 | 120 | 1000000 {D} | --- | --- | --- | --- | **40** | --- |
| Sulfate | mg/l | 1 | 250 {E} | ID | --- | --- | --- | --- | **6.5** | --- |
| Zinc | µg/l | 50 | 2400 | 1.1E+8 | **310** | **60** | **50** | **50** | **60** | **60** |
| Alkalinity | mg/l | NA | NA | NA | --- | --- | --- | --- | **460** | --- |
| Bicarbonate Alk as HCO3 | mg/l | NA | NA | NA | --- | --- | --- | --- | **460** | --- |
| ***Pesticides*** | ***Units*** | | | | | | | | | |
| Aldrin | µg/l | | | | --- | --- | --- | --- | ND | --- |
| a-BHC | µg/l | | | | --- | --- | --- | --- | ND | --- |
| b-BHC | µg/l | | | | --- | --- | --- | --- | ND | --- |
| d-BHC | µg/l | | | | --- | --- | --- | --- | ND | --- |
| g-BHC (lindane) | µg/l | | | | --- | --- | --- | --- | ND | --- |
| Chlordane | µg/l | | | | --- | --- | --- | --- | ND | --- |
| 4,4-DDD | µg/l | | | | --- | --- | --- | --- | ND | --- |
| 4,4-DDE | µg/l | | | | --- | --- | --- | --- | ND | --- |
| 4,4-DDT | µg/l | | | | --- | --- | --- | --- | ND | --- |
| Dieldrin | µg/l | | | | --- | --- | --- | --- | ND | --- |
| Endosulfan I | µg/l | | | | --- | --- | --- | --- | ND | --- |
| Endosulfan II | µg/l | | | | --- | --- | --- | --- | ND | --- |
| Endosulfan sulfate | µg/l | | | | --- | --- | --- | --- | ND | --- |
| Endrin | µg/l | | | | --- | --- | --- | --- | ND | --- |
| Endrin aldehyde | µg/l | | | | --- | --- | --- | --- | ND | --- |
| Heptachlor | µg/l | | | | --- | --- | --- | --- | ND | --- |
| Heptachlor epoxide | µg/l | | | | --- | --- | --- | --- | ND | --- |
| Methoxychlor | µg/l | | | | --- | --- | --- | --- | ND | --- |

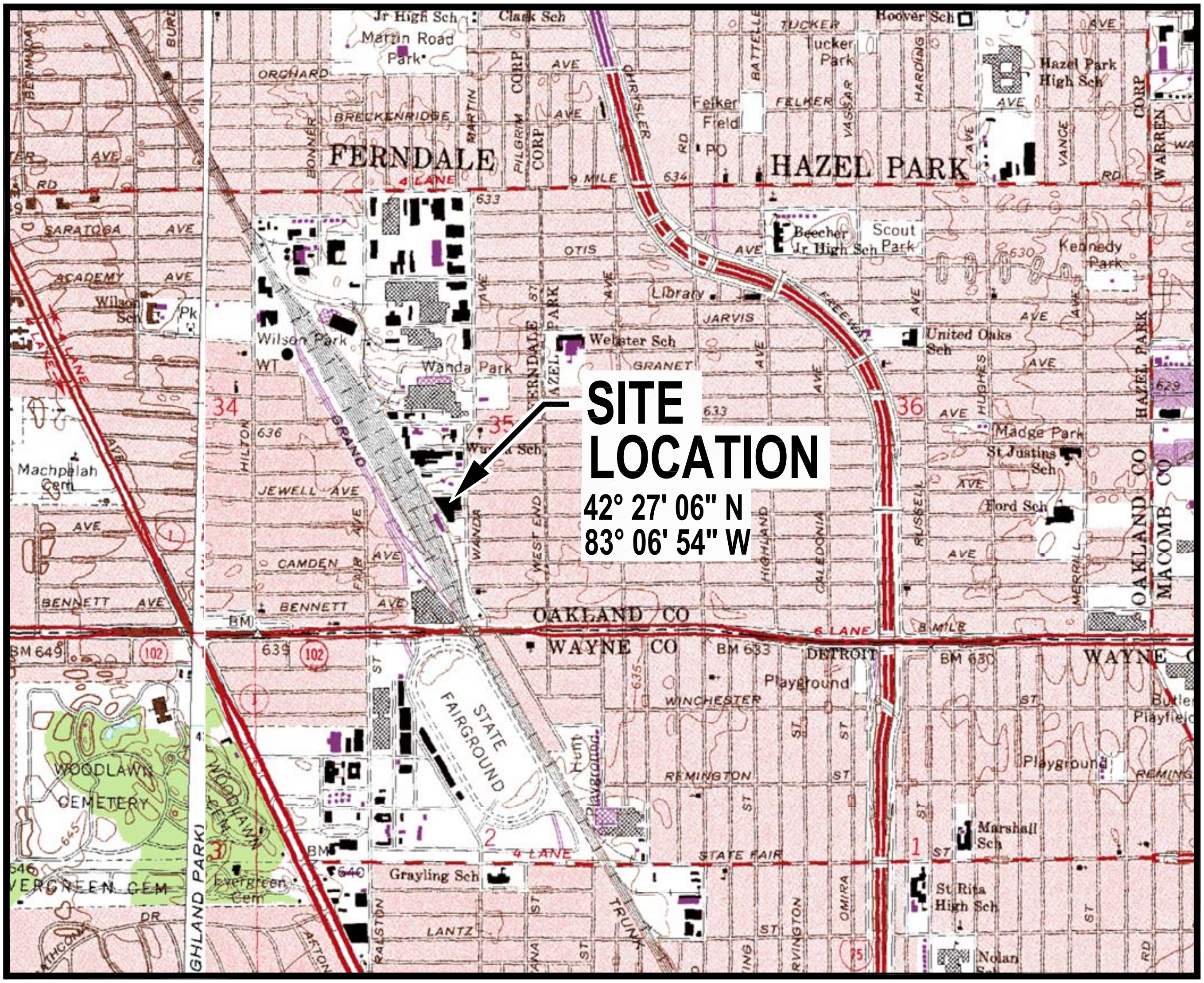
**Table B2-5**
**Summary of Analytical Results for Effluent from the Ground Water Collection Trench**
**Gage Products, Ferndale, Michigan**
*Units as Given*

| Sample Identification:<br>Sample Date:<br>Laboratory ID:<br>Sampled By: | | Target Method Detection Limit | Residential Drinking Water Criteria | Groundwater Contact Criteria | Effluent #1<br>10/18/1993<br>111131-0001<br>WWES | Effluent #2<br>10/18/1993<br>111131-0002<br>WWES | Effluent #3<br>10/19/1993<br>111139-0001<br>WWES | Effluent #4<br>10/19/1993<br>111139-0002<br>WWES | Effluent #5<br>10/20/1993<br>111150-0001<br>WWES | Effluent #6<br>10/20/1993<br>111150-0002<br>WWES |
|---|---|---|---|---|---|---|---|---|---|---|
| ***Pesticides*** | ***Units*** | | | | | | | | | |
| Toxaphene | µg/l | | | | --- | --- | --- | --- | ND | --- |
| Aroclor 1016 | µg/l | | | | --- | --- | --- | --- | ND | --- |
| Aroclor 1221 | µg/l | | | | --- | --- | --- | --- | ND | --- |
| Aroclor 1232 | µg/l | | | | --- | --- | --- | --- | ND | --- |
| Aroclor 1242 | µg/l | | | | --- | --- | --- | --- | ND | --- |
| Aroclor 1248 | µg/l | | | | --- | --- | --- | --- | ND | --- |
| Aroclor 1254 | µg/l | | | | --- | --- | --- | --- | ND | --- |
| Aroclor 1260 | µg/l | | | | --- | --- | --- | --- | ND | --- |

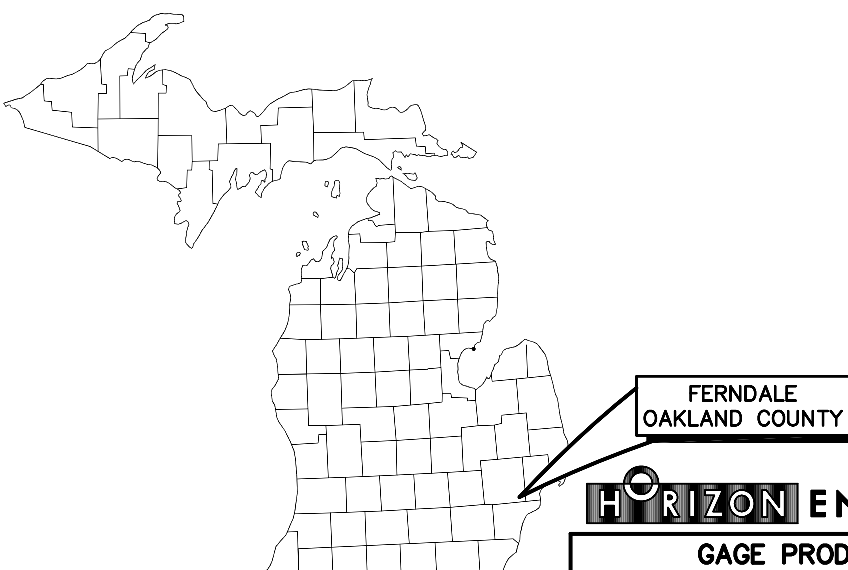
»Shaded values exceed Residential Drinking Water Criteria
NA = Not available
--- = not analyzed
ID = Insufficient data to calculate a criterion
ND = Not detected

# Figures

GAG0101SLM03




TAKEN FROM 7.5 MINUTE SERIES TOPOGRAPHIC MAP
ROYAL OAK AND HIGHLAND PARK QUADRANGLES
SCALE: 1" = 2000'




NORTH

0 1000 2000 4000

SCALE IN FEET

HORIZON ENVIRONMENTAL

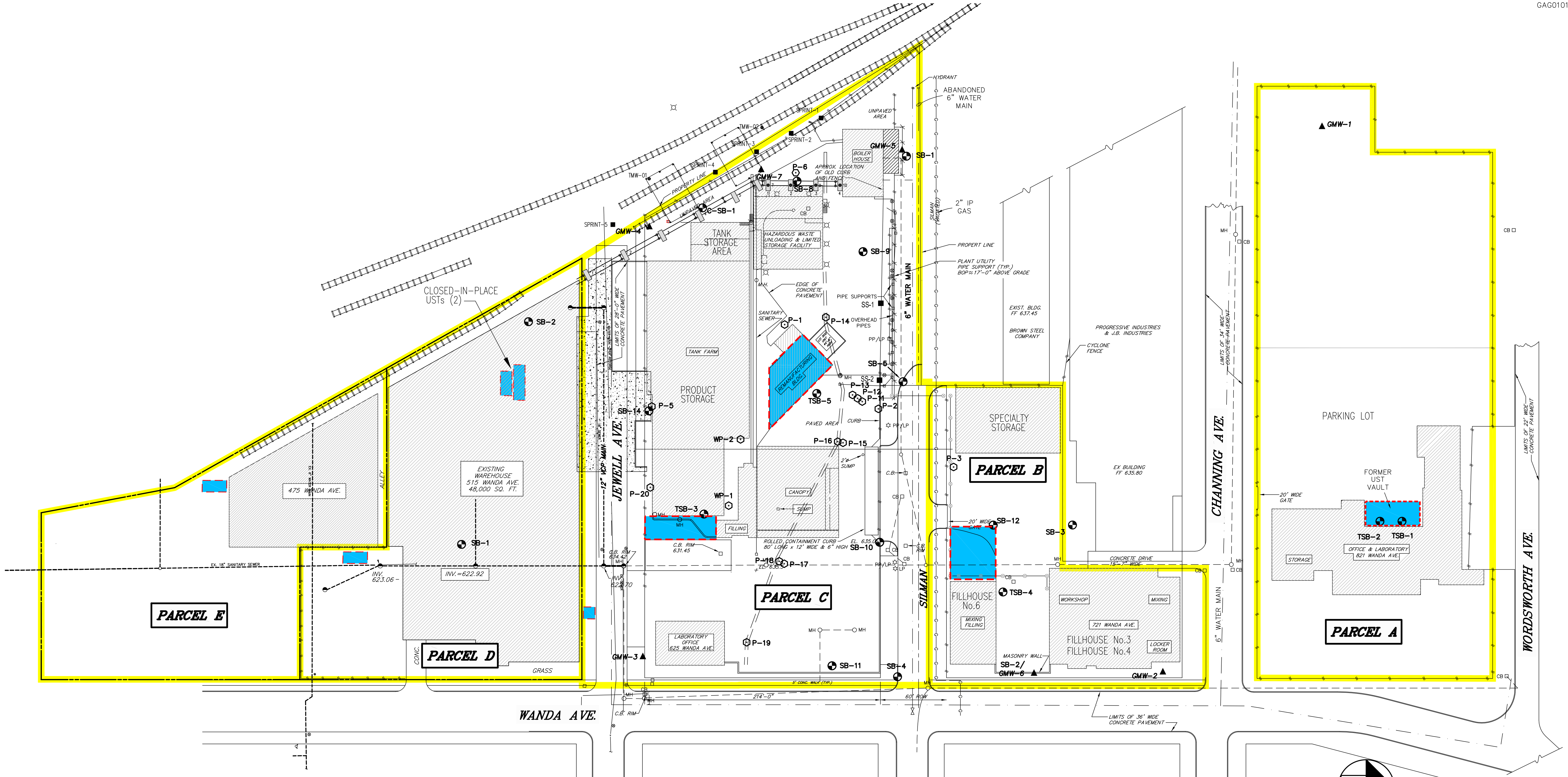
PROJECT NUMBER:
GAG–0101

GAGE PRODUCTS COMPANY
821 WANDA AVENUE, FERNDALE, MICHIGAN

SITE LOCATION MAP

Figure
B2-1

JANUARY 2013




# LEGEND:

- EXISTING STRUCTURES OWNED BY GAGE
- OTHER EXISTING STRUCTURES
- PROPERTY LINES
- PROPERTY LINES & FENCE
- PROPOSED FENCE (AT EXIST. PROPERTY LINES)
- ▲ – MONITORING WELL LOCATION
- PIEZOMETER LOCATION
- SOIL BORING LOCATION
- PP/LP – POWER POLE/LIGHT POLE
- CB – CATCH BASIN
- MH – MANHOLE
- 2" IP GAS LINE
- 6" WATER MAIN
- ABANDONED 6" WATER MAIN
- STORM SEWER
- GROUND WATER COLLECTION TRENCH
- 5 – PIPE TRESTLE FOUNDATION EXCAVATION WITHOUT SOIL SAMPLE
- 9 – PIPE TRESTLE FOUNDATION EXCAVATION WITH SOIL SAMPLE BY HORIZON (SAMPLE SPLIT WITH MDEQ)
- 3 – MDEQ SPLIT SAMPLE NUMBER
- SPRINT-3 – SPRINT LINE SOIL SAMPLE BY HORIZON
- SS-1 – ELECTRICAL TRENCH SAMPLE LOCATION
- FORMER UNDERGROUND STORAGE TANK AREA

HORIZON ENVIRONMENTAL

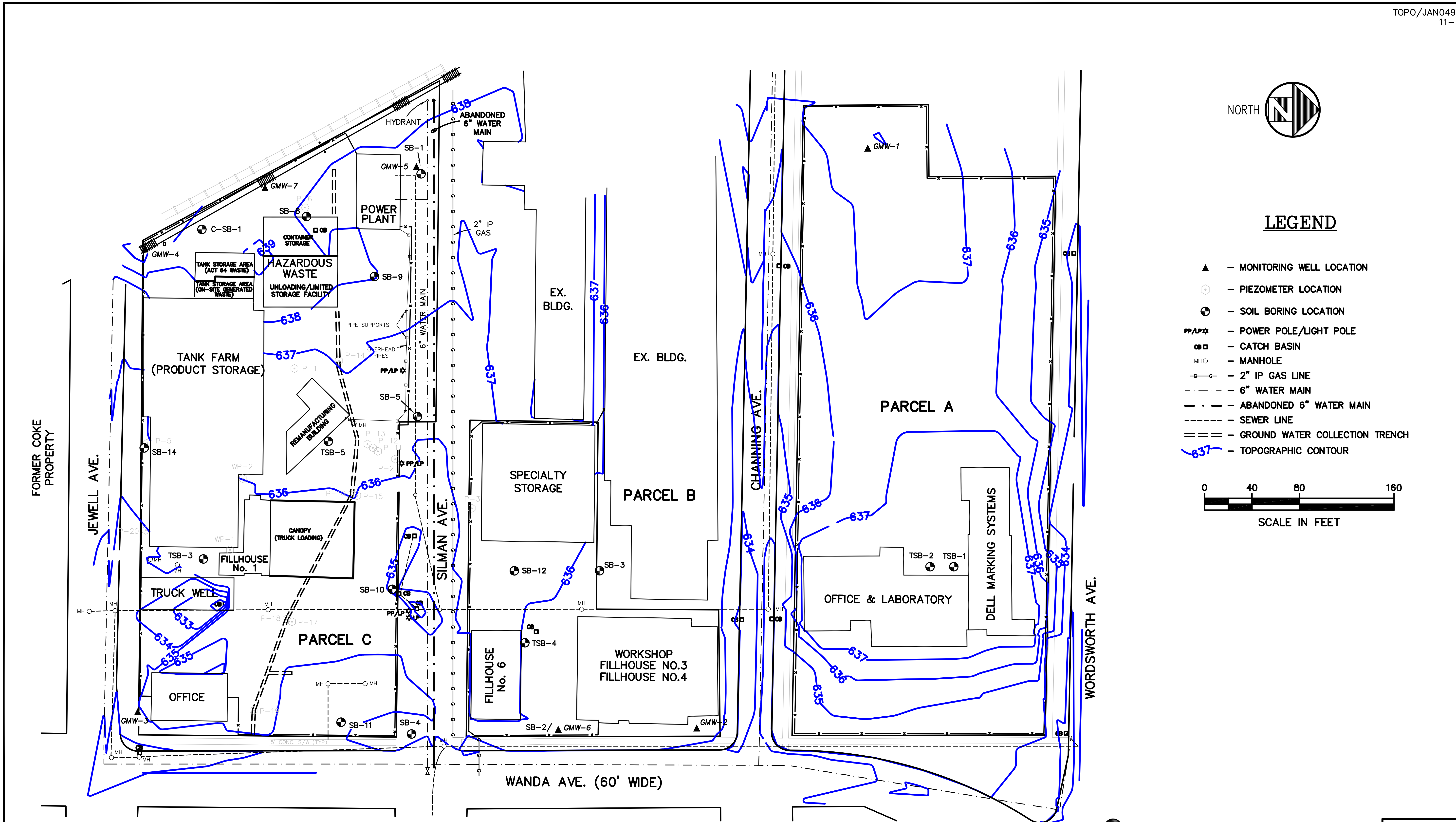
PROJECT NUMBER: GAG-0101

**Gage Products**
**Ferndale, Michigan**

SITE MAP

Figure B2-2

FEBRUARY 2012




**HORIZON ENVIRONMENTAL**

PROJECT NUMBER: **GAG-0101**

**GAGE PRODUCTS COMPANY**
FERNDALE, MICHIGAN

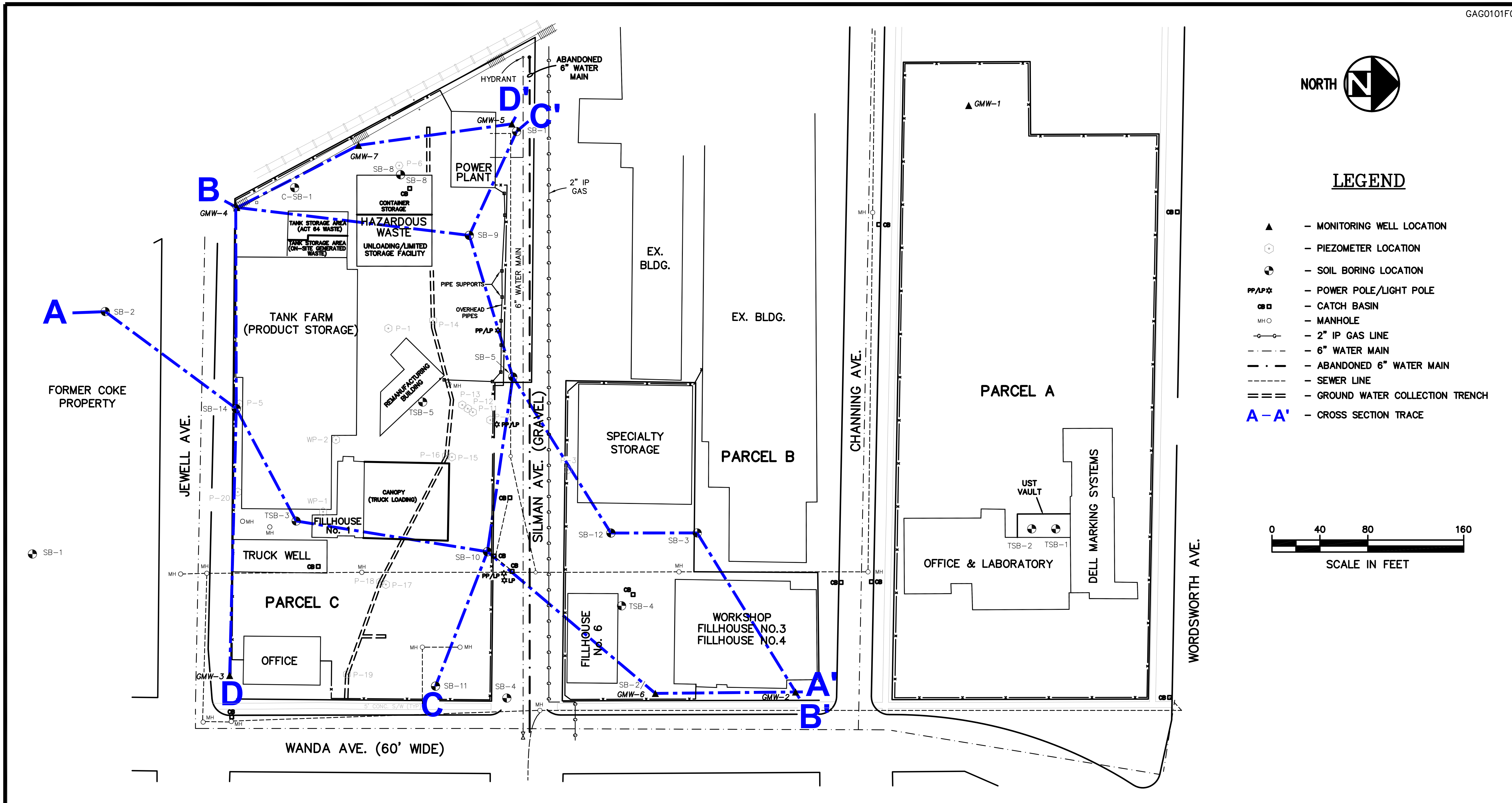
Figure B2-3

**SITE ELEVATION CONTOUR MAP**

DECEMBER, 1998

J:\Lvanproyen\DWGS\GAG\rfi\topo.dwg, 1/17/2013 11:04:41 AM

GAG0101F09




**HORIZON ENVIRONMENTAL**

PROJECT NUMBER: GAG–0104

**GAGE PRODUCTS COMPANY**
FERNDALE, MICHIGAN

Figure B2-4

# CROSS SECTION TRACE MAP

FEBRUARY 2012

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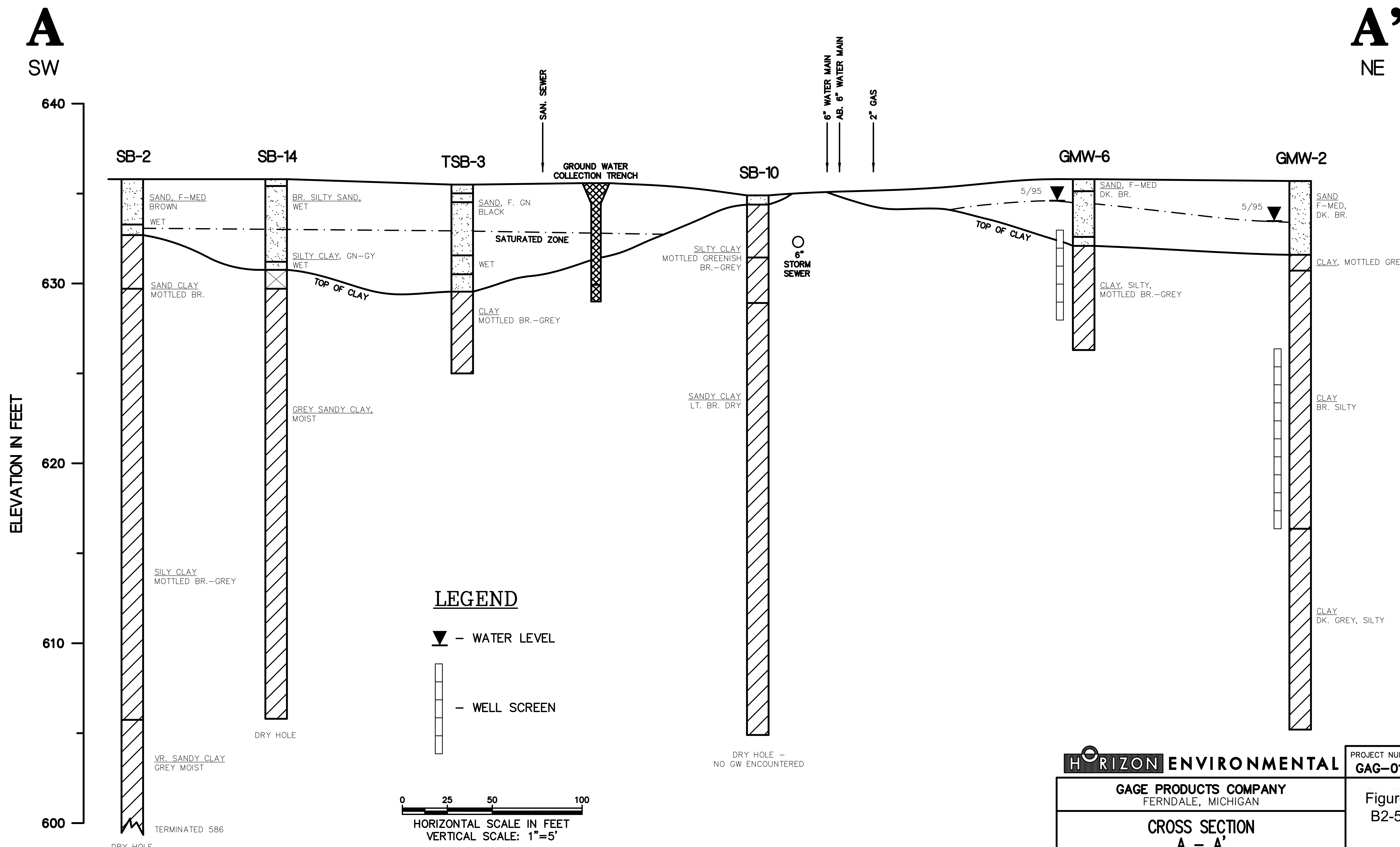



HORIZON ENVIRONMENTAL

PROJECT NUMBER:
GAG-0101

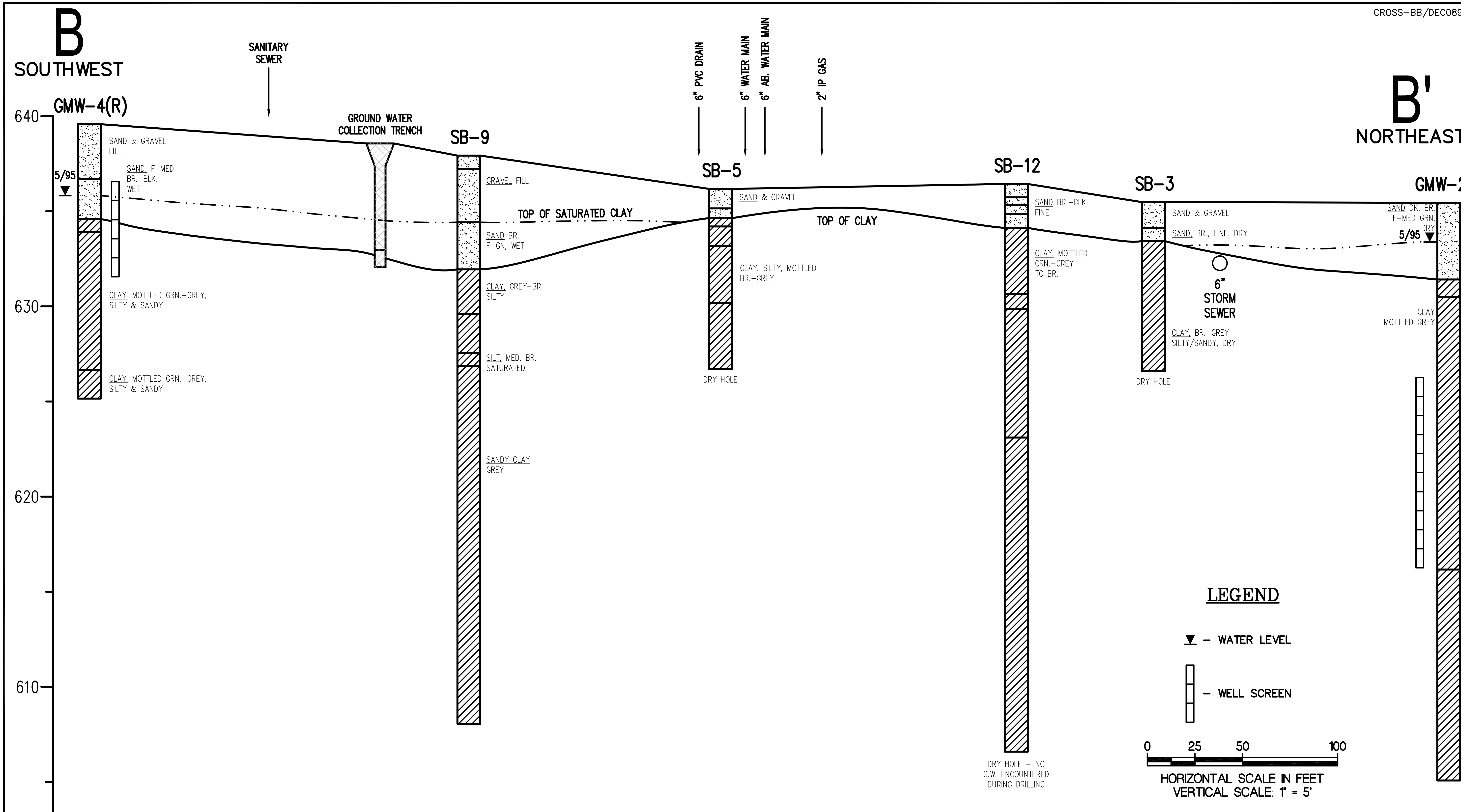
GAGE PRODUCTS COMPANY
FERNDALE, MICHIGAN

CROSS SECTION
A - A'

Figure
B2-5

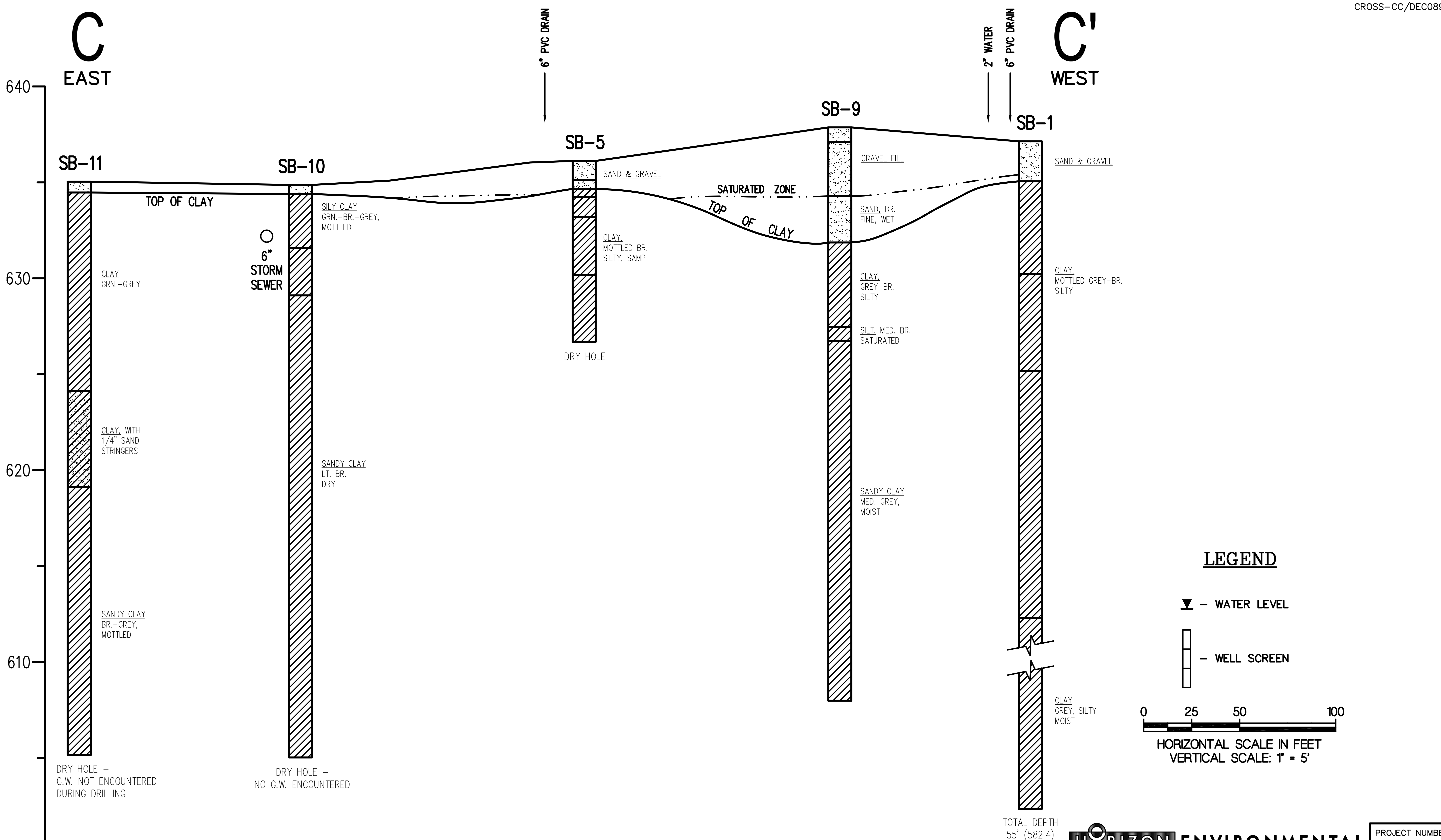
FEBRUARY 2012

CROSS-BB/DEC0898



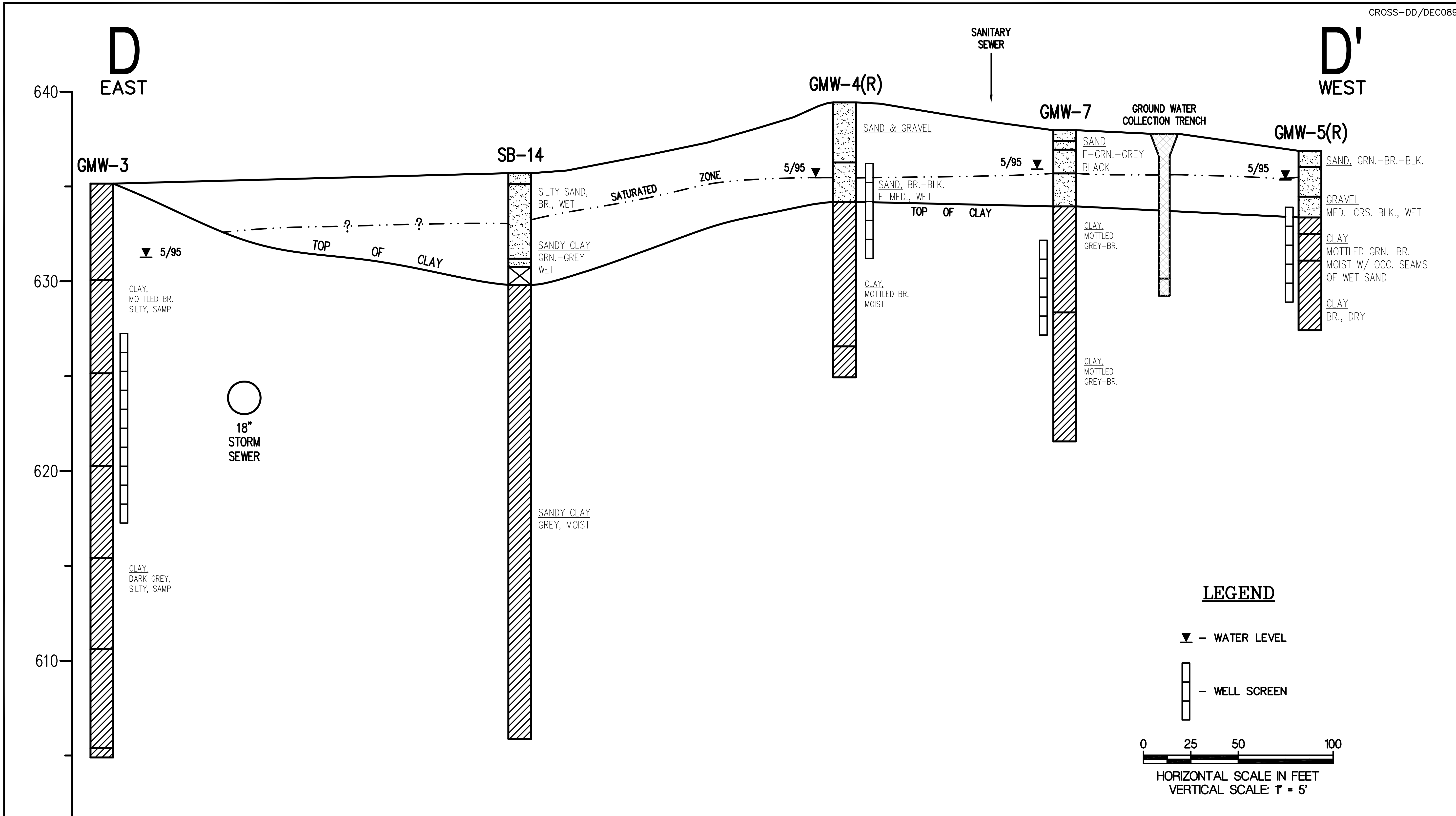

HORIZON ENVIRONMENTAL

| | |
|---|---|
| GAGE PRODUCTS COMPANY<br>FERNDALE, MICHIGAN | PROJECT NUMBER:<br>GAG-0101 |
| CROSS SECTION<br>B – B' | Figure<br>B2-6<br>DECEMBER, 1998 |




HORIZON ENVIRONMENTAL

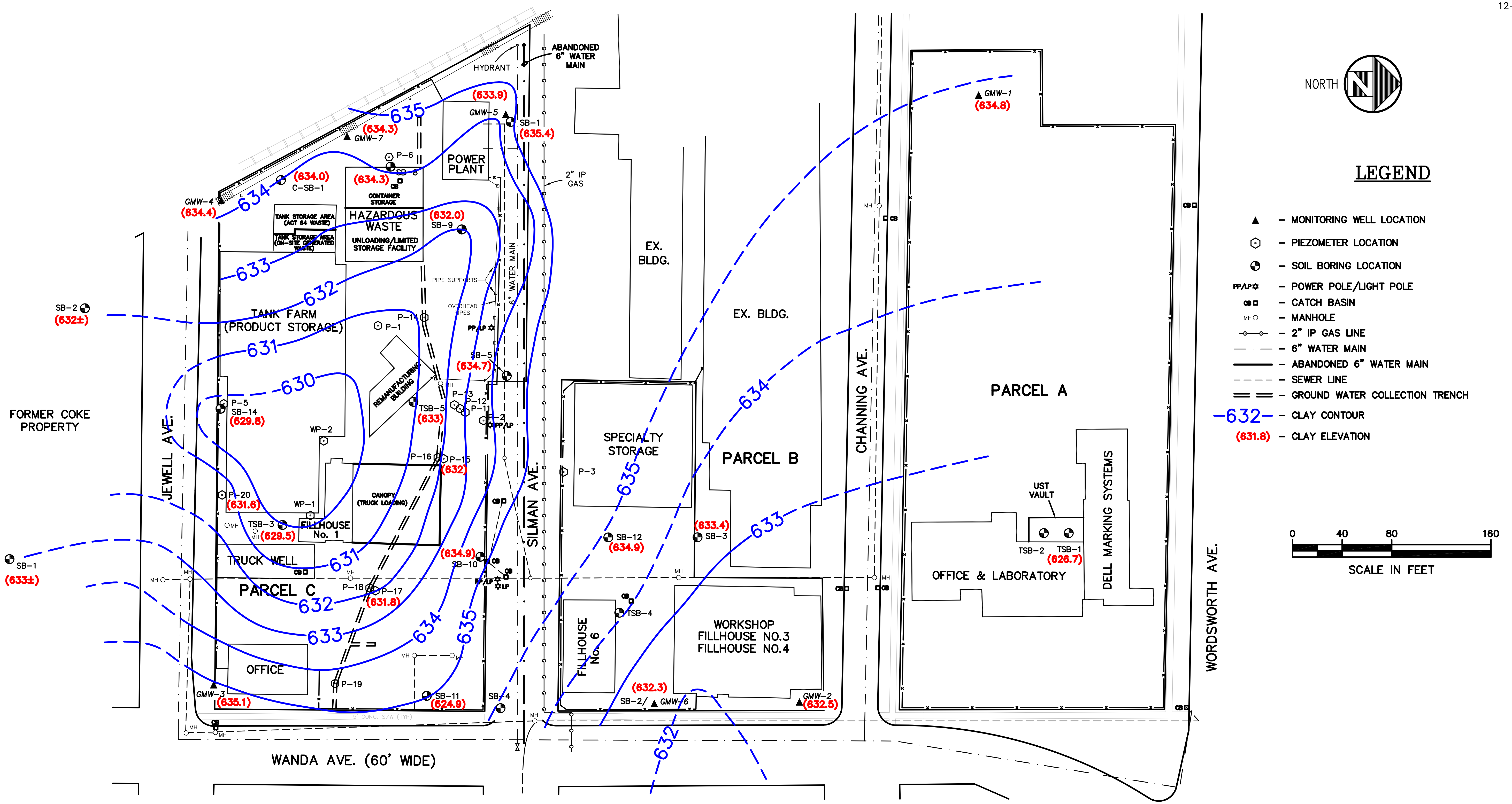
| PROJECT NUMBER: GAG-0101 |
|---|
| GAGE PRODUCTS COMPANY<br>FERNDALE, MICHIGAN |
| CROSS SECTION C – C' |
| Figure B2-7 |
| DECEMBER, 1998 |




HORIZON ENVIRONMENTAL

| | |
|---|---|
| | PROJECT NUMBER: GAG-0101 |
| GAGE PRODUCTS COMPANY<br>FERNDALE, MICHIGAN | Figure B2-8 |
| CROSS SECTION<br>D – D' | DECEMBER, 1998 |

CLAY/DEC2898
11-5
12-4




P-6
P-14
P-16
P-18
P-19
LOCATED IN GROUND WATER COLLECTION TRENCH

P-1 THROUGH P-5 WERE DRIVEN, NO LITHOLOGIC INFORMATION AVAILABLE.

DATA NOT QUANTITATIVELY HONORED:
TSB-1 THROUGH TSB-5: LOCATED IN FORMER UST VAULTS

HORIZON ENVIRONMENTAL

GAGE PRODUCT COMPANY
FERNDALE, MICHIGAN

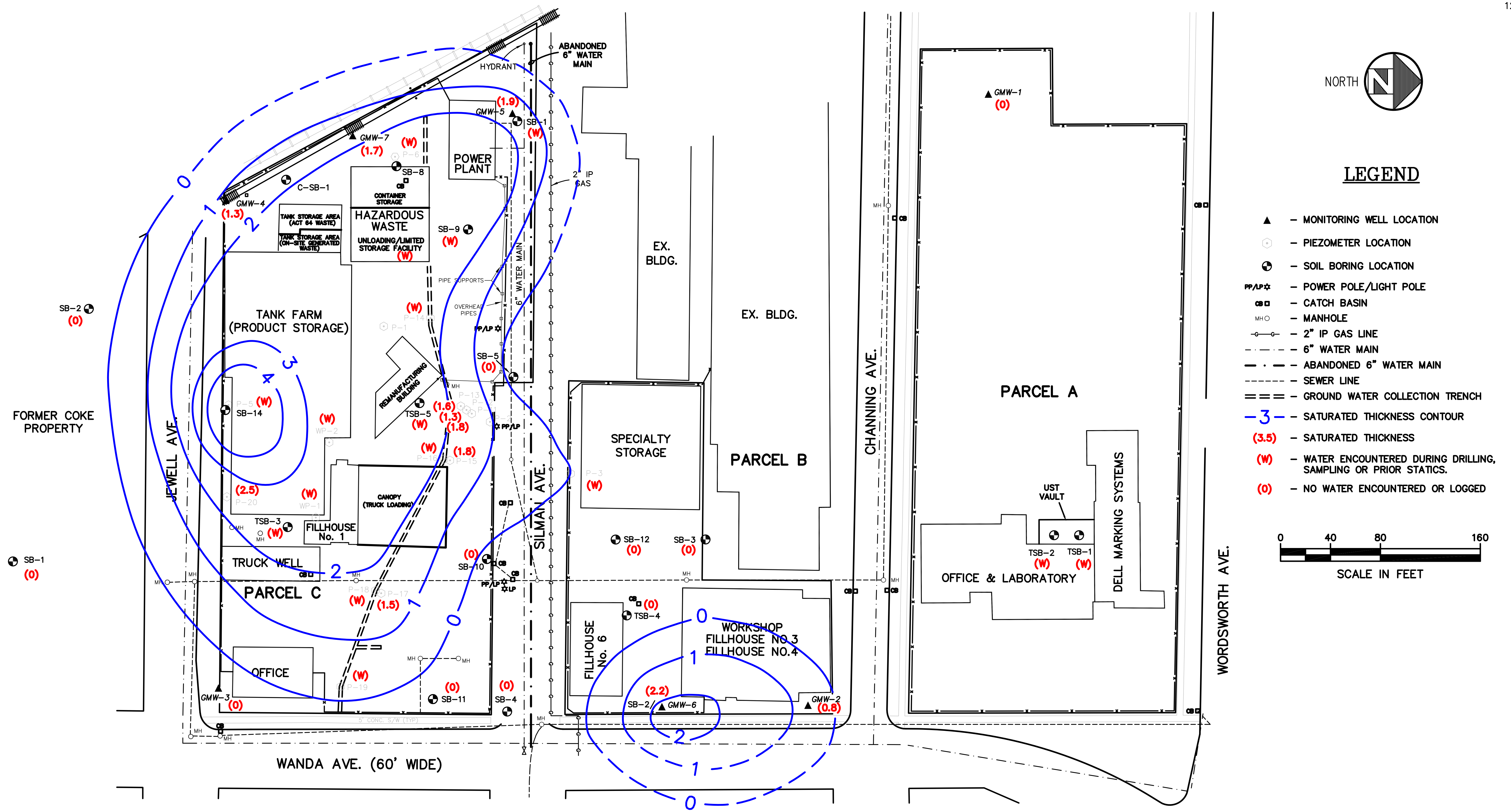
SURFACE CONTOUR MAP OF THE CLAY TILL UNIT

PROJECT NUMBER: GAG–0101

Figure B2-9

DECEMBER, 1998

S-THICK/JAN0499
11-5
12-4




DATA NOT QUANTITATIVELY HONORED:

TSB-1 THROUGH TSB-5: LOCATED IN FORMER UST VAULTS

P-6
P-14
P-16
P-18
P-19

LOCATED IN GROUND WATER COLLECTION TRENCH

HORIZON ENVIRONMENTAL

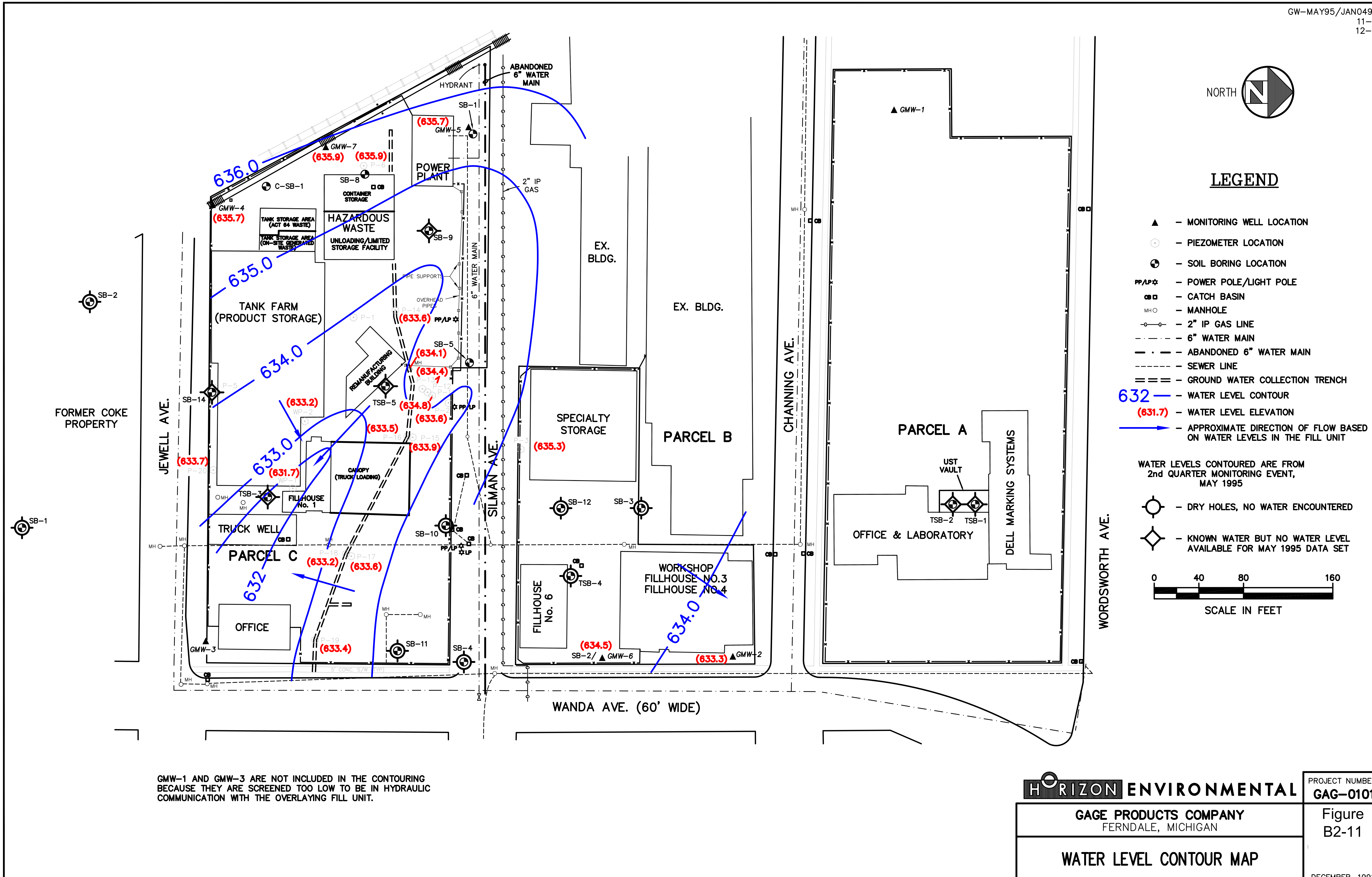
GAGE PRODUCTS COMPANY
FERNDALE, MICHIGAN

SATURATED THICKNESS FROM 2nd QUARTER MONITORING RESULTS

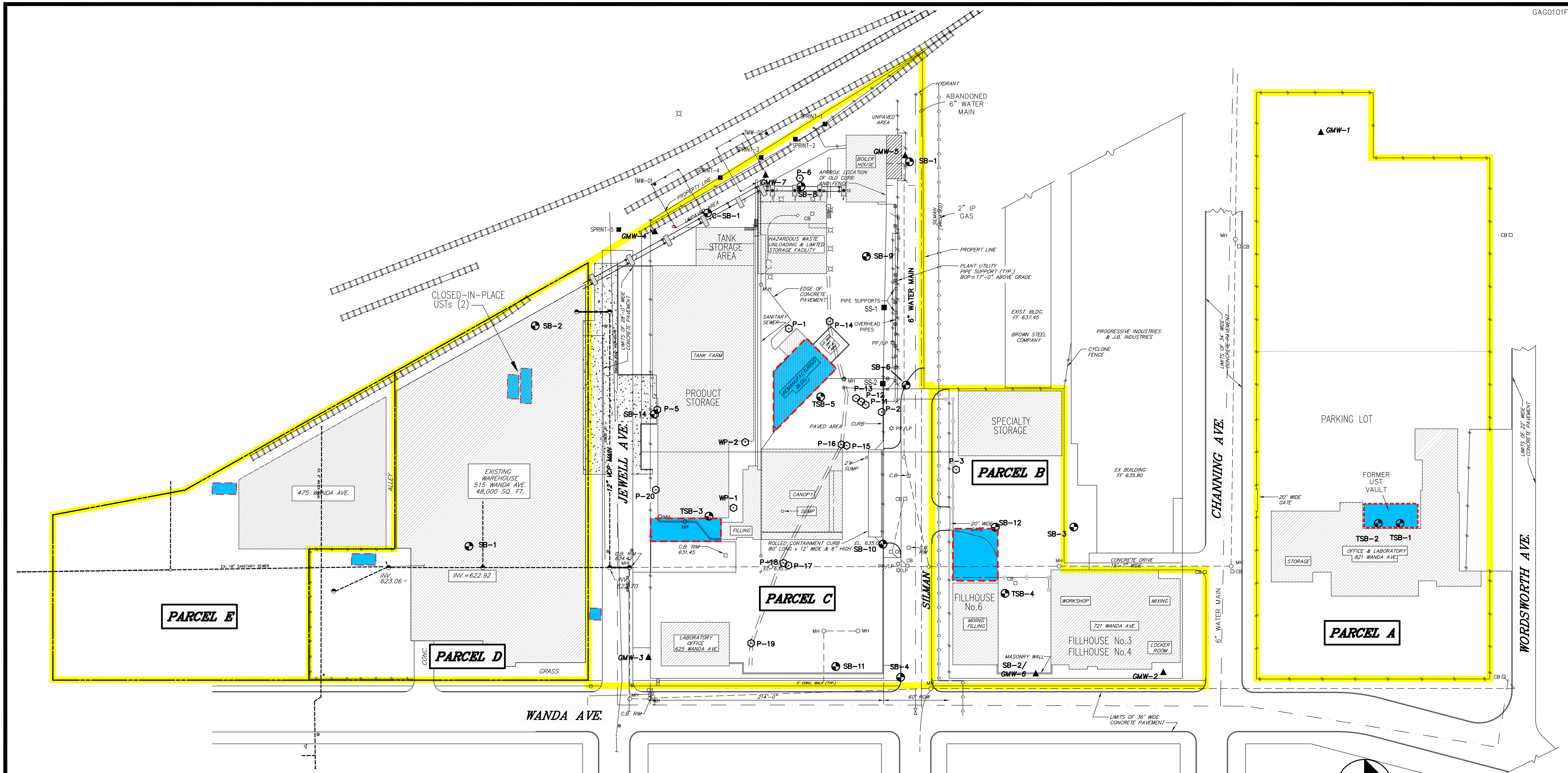
PROJECT NUMBER: GAG-0101

Figure B2-10

DECEMBER, 1998


GW-MAY95/JAN0499
11-5
12-4
NORTH
LEGEND
– MONITORING WELL LOCATION
– PIEZOMETER LOCATION
– SOIL BORING LOCATION
– POWER POLE/LIGHT POLE
– CATCH BASIN
– MANHOLE
– 2" IP GAS LINE
– 6" WATER MAIN
– ABANDONED 6" WATER MAIN
– SEWER LINE
– GROUND WATER COLLECTION TRENCH
632 – WATER LEVEL CONTOUR
(631.7) – WATER LEVEL ELEVATION
– APPROXIMATE DIRECTION OF FLOW BASED ON WATER LEVELS IN THE FILL UNIT
WATER LEVELS CONTOURED ARE FROM 2nd QUARTER MONITORING EVENT, MAY 1995
– DRY HOLES, NO WATER ENCOUNTERED
– KNOWN WATER BUT NO WATER LEVEL AVAILABLE FOR MAY 1995 DATA SET
0 40 80 160
SCALE IN FEET
FORMER COKE PROPERTY
JEWELL AVE.
SILMAN AVE.
CHANNING AVE.
WORDSWORTH AVE.
WANDA AVE. (60' WIDE)
TANK FARM (PRODUCT STORAGE)
HAZARDOUS WASTE
UNLOADING/LIMITED STORAGE FACILITY
CONTAINER STORAGE
TANK STORAGE AREA (ACT 64 WASTE)
TANK STORAGE AREA (ON-SITE GENERATED WASTE)
POWER PLANT
REMANUFACTURING BUILDING
CANOPY (TRUCK LOADING)
FILLHOUSE No. 1
TRUCK WELL
PARCEL C
OFFICE
SPECIALTY STORAGE
EX. BLDG.
PARCEL B
FILLHOUSE No. 6
WORKSHOP
FILLHOUSE NO.3
FILLHOUSE NO.4
PARCEL A
UST VAULT
OFFICE & LABORATORY
DELL MARKING SYSTEMS
ABANDONED 6" WATER MAIN
HYDRANT
2" IP GAS
6" WATER MAIN
PIPE SUPPORTS
OVERHEAD PIPES
636.0
635.0
634.0
633.0
632
634.0
(635.7) (635.9) (635.9) (635.7) (633.6) (634.1) (634.4) (634.8) (633.6) (633.9) (633.5) (633.2) (633.7) (631.7) (633.2) (633.6) (633.4) (635.3) (634.5) (633.3)
GMW-1 GMW-2 GMW-3 GMW-4 GMW-5 GMW-6 GMW-7
SB-1 SB-2 SB-3 SB-4 SB-5 SB-8 SB-9 SB-10 SB-11 SB-12 SB-14 C-SB-1 SB-2/
TSB-1 TSB-2 TSB-3 TSB-4 TSB-5
GMW-1 AND GMW-3 ARE NOT INCLUDED IN THE CONTOURING BECAUSE THEY ARE SCREENED TOO LOW TO BE IN HYDRAULIC COMMUNICATION WITH THE OVERLAYING FILL UNIT.
HORIZON ENVIRONMENTAL
PROJECT NUMBER: GAG-0101
GAGE PRODUCTS COMPANY
FERNDALE, MICHIGAN
WATER LEVEL CONTOUR MAP
Figure B2-11
DECEMBER, 1998

GAG0101F10




## LEGEND:

- EXISTING STRUCTURES OWNED BY GAGE
- OTHER EXISTING STRUCTURES
- PROPERTY LINES
- PROPERTY LINES & FENCE
- PROPOSED FENCE (AT EXIST. PROPERTY LINES)
- ▲ – MONITORING WELL LOCATION
- – PIEZOMETER LOCATION
- – SOIL BORING LOCATION
- PP/LP – POWER POLE/LIGHT POLE
- CB – CATCH BASIN
- MH – MANHOLE
- – 2" IP GAS LINE
- – 6" WATER MAIN
- – ABANDONED 6" WATER MAIN
- – STORM SEWER
- – GROUND WATER COLLECTION TRENCH
- 5 – PIPE TRESTLE FOUNDATION EXCAVATION WITHOUT SOIL SAMPLE
- 9 – PIPE TRESTLE FOUNDATION EXCAVATION WITH SOIL SAMPLE BY HORIZON (SAMPLE SPLIT WITH MDEQ)
- 3 – MDEQ SPLIT SAMPLE NUMBER
- SPRINT-3 ■ – SPRINT LINE SOIL SAMPLE BY HORIZON
- SS-1 ■ – ELECTRICAL TRENCH SAMPLE LOCATION
- – FORMER UNDERGROUND STORAGE TANK AREA

HORIZON ENVIRONMENTAL

**Gage Products**
Ferndale, Michigan

UTILITY MAP

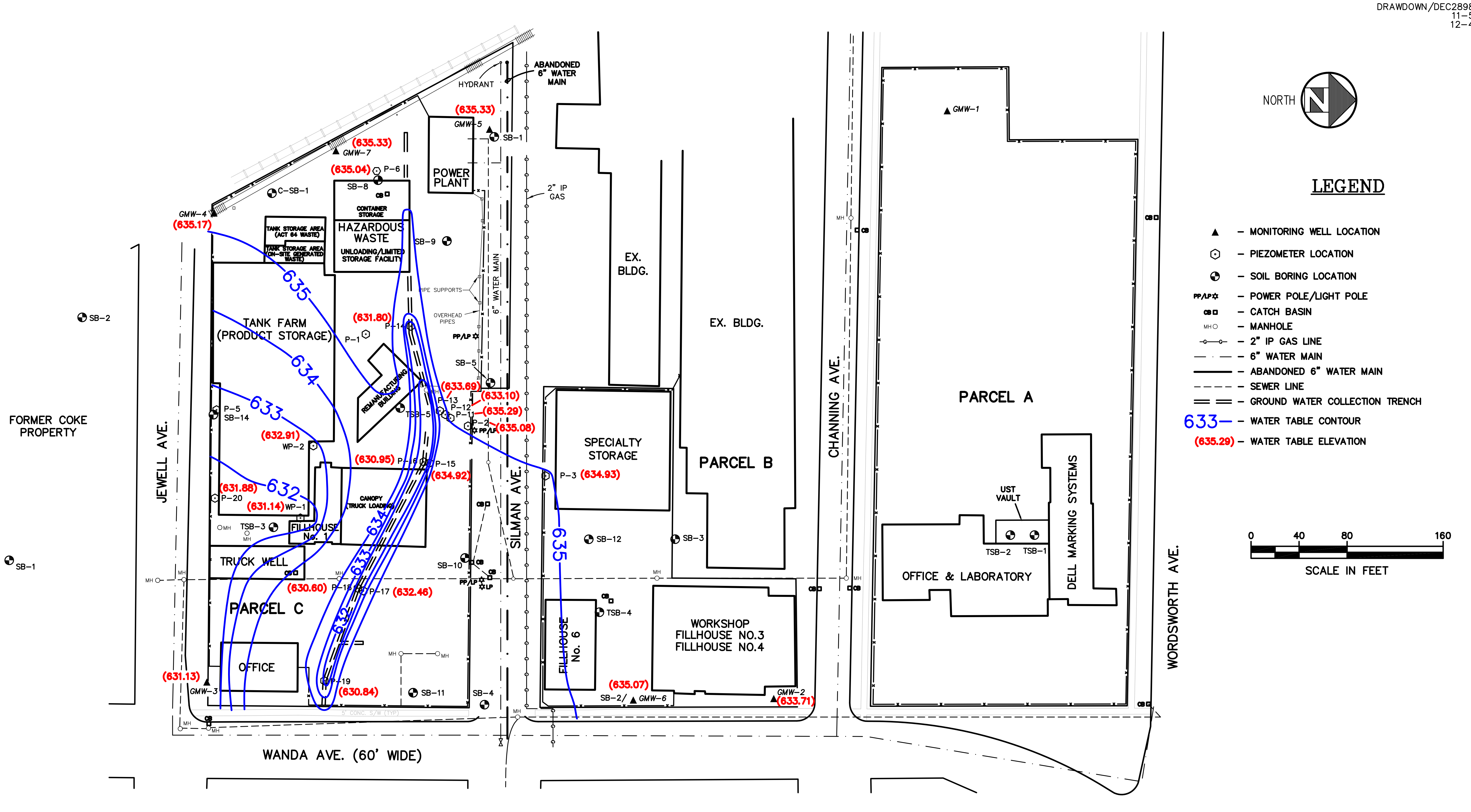
PROJECT NUMBER: GAG-0101

Figure B2-12

FEBRUARY 2012

J:\Lvanprooyen\DWGS\GAG\0101\GAG0101F10.dwg, 1/17/2013 11:20:07 AM

DRAWDOWN/DEC2898
11-5
12-4




P-6
P-14
P-16
P-18
P-19
LOCATED IN GROUND WATER COLLECTION TRENCH

HORIZON ENVIRONMENTAL

PROJECT NUMBER: GAG-0101

GAGE PRODUCT COMPANY
FERNDALE, MICHIGAN

Figure B2-13

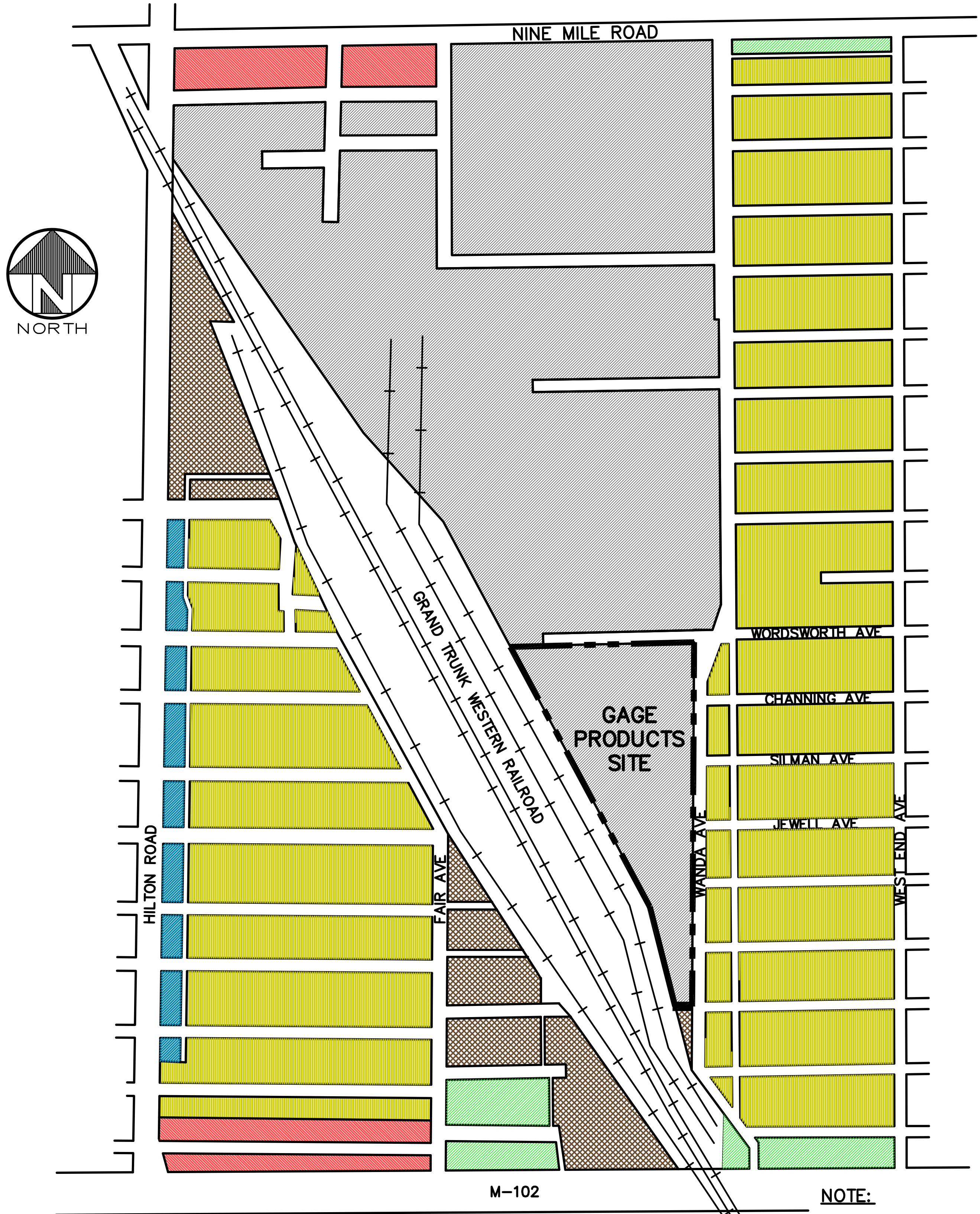
WATER TABLE CONTOUR MAP
DRAWDOWN PHASE WATER LEVELS

DECEMBER, 1998

J:\Lvanprooyen\DWGS\GAG\rfi\DRAWDOWN.dwg, 1/17/2013 11:20:34 AM

J:\Lvanprooyen\DWGS\GAG\0110\GAG0110Z01.dwg, 1/17/2013 11:21:13 AM

GAG0101Z01




NOTE:
INFORMATION OBTAINED FROM THE CITY OF FERNDALE ZONING MAP PRINTED NOVEMBER, 1986.

LEGEND

- RESIDENTIAL ZONE
- COMMERCIAL ZONE
- GENERAL INDUSTRIAL
- LIGHT INDUSTRIAL
- OFFICE SERVICE
- MIXED USE 2

HORIZON ENVIRONMENTAL

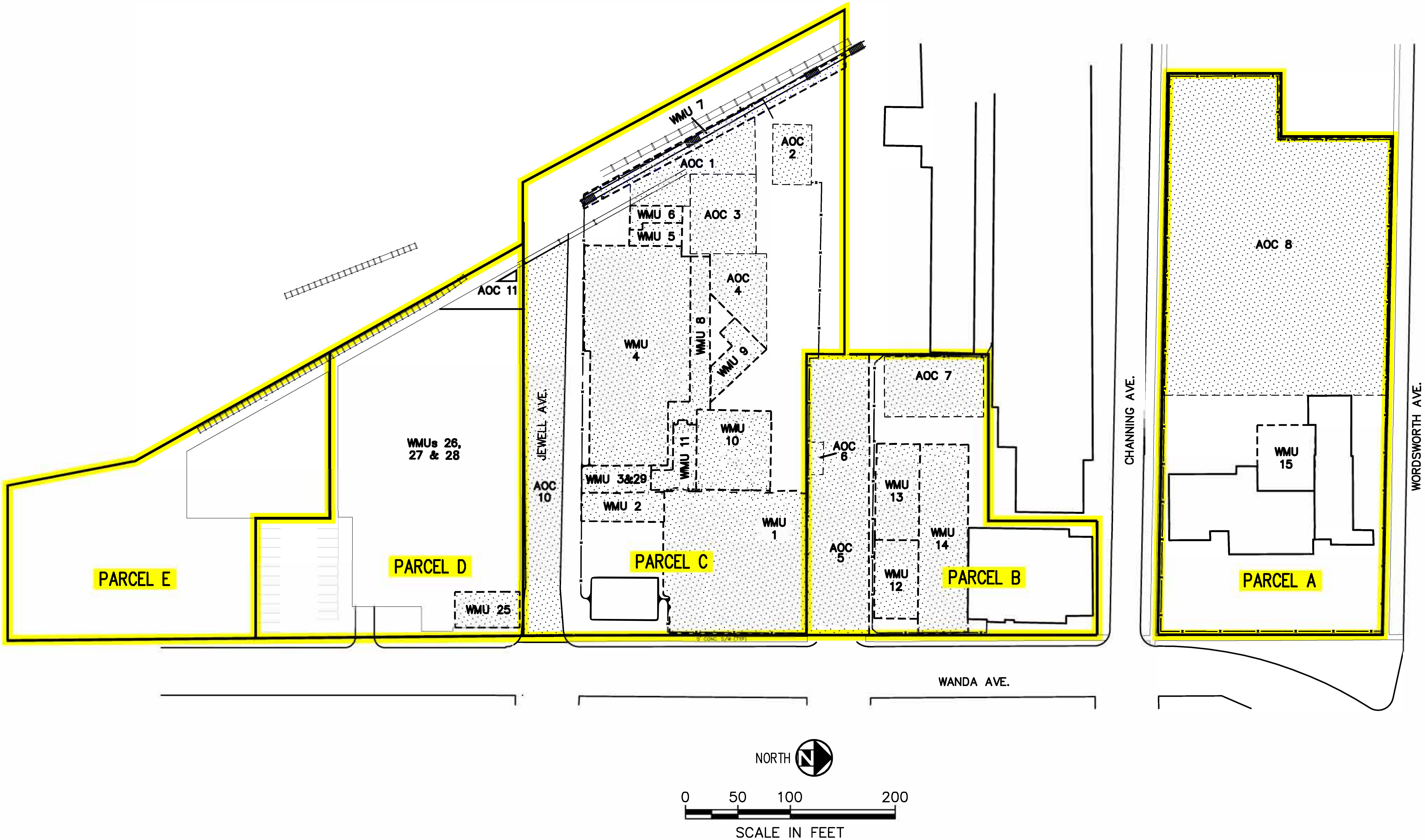
PROJECT NUMBER: GAG-0110

GAGE PRODUCTS COMPANY
FERNDALE, MICHIGAN

ZONING DESIGNATIONS OF SURROUNDING PROPERTIES

Figure B2-14

JANUARY 2013




## WASTE MANAGEMENT UNITS

| | |
|---|---|
| WMU 1 | TOTE AND DRUM STORAGE AREA |
| WMU 2 | TRUCK WELL |
| WMU 3 | FORMER UNDERGROUND STORAGE TANK AREA BY THE TRUCK WELL |
| WMU 4 | BULK TANK STORAGE AREA |
| WMU 5 | GENERATED HAZARDOUS WASTE STORAGE AREA |
| WMU 6 | LIMITED STORAGE AREA TANKS |
| WMU 7 | RAILROAD LOADING/UNLOADING AREA |
| WMU 8 | FORMER PIPING AREA |
| WMU 9 | FORMER UNDERGROUND STORAGE TANK AREA BY FILL HOUSE 2 |
| WMU 10 | TANK WAGON LOADING/UNLOADING AREA |
| WMU 11 | FILL HOUSE 1 |
| WMU 12 | FILL HOUSE 6 |
| WMU 13 | FORMER UNDERGROUND STORAGE TANK AREA BY FILL HOUSE 6 |
| WMU 14 | TANKER OFF-LOADING AREA |
| WMU 15 | FORMER UNDERGROUND STORAGE TANK AREA ON PARCEL A |
| WMU 25 | FLOOR DRAINS THAT CONNECT TO THE POTW |
| WMU 26 | PAINT ROOMS WITH PAINT FILTERS PRESENT |
| WMU 27 | THE MECHANICAL ROOM |
| WMU 28 | ASBESTOS IN FLOOR AND CEILING TILES AND PIPE WRAPS |
| WMU 29 | TOTE EMPTYING AREA |

## AREAS OF CONCERN

| | |
|---|---|
| AOC 1 | FORMER GENERATED HAZARDOUS WASTE STORAGE AREA |
| AOC 2 | FORMER STORAGE AREA AT THE BOILER BUILDING |
| AOC 3 | BACK STORAGE AREA |
| AOC 4 | FORMER STEAM-OUT AND STORAGE AREA |
| AOC 5 | UNPAVED AREA OF SILMAN AVE. |
| AOC 6 | SILMAN AVE. SEWERS |
| AOC 7 | COVERED STORAGE AREA |
| AOC 8 | OPEN AREA ON PARCEL A |
| AOC 9 | FILL MATERIAL IN SEWER TRENCHES (NOT DEPICTED) |
| AOC 10 | JEWELL AVENUE |
| AOC 11 | SOIL WEST OF 515 BUILDING |

Updated September 2024

**Figure 1 B2-15**

**LOCATIONS OF WASTE MANAGEMENT UNITS AND AREAS OF CONCERN**

Gage Products Company
Ferndale, Michigan

BARR

4771 50th Street SE
Grand Rapids, MI 49512

# Appendices

# Appendix B2-1

## Soil Boring/Well Logs

27-1N-11E
Royal Oak Twp., (Oakland Co.)

TD 1064 in Bois Blanc
Waste Disposal Well

Reichhold Chemicals, Incorporated

Fee No. 2

B. D. No. 64

Drilling Contractor: O. O. Corseant (Cable)

Location: NW¼ SW¼ NE¼ section 27, T 1N, R 11E
1630.46' from north and 499.64' from west line of quarter section

Elevation: 640 feet above sea level

Record by: B. L. Champion from driller's log & incomplete samples 7-1060

| | Thickness (Feet) | Depth (Feet) |
|---|---|---|
| **PLEISTOCENE:** | | |
| Drift: | | |
| Sand | 7 | 7 |
| Clay with gravel imbedded | 103 | 110 |
| Gravel & clay | 18 | 128 |
| **MISSISSIPPIAN-DEVONIAN:** | | |
| Antrim: | | |
| Shale, black with a few spore cases (fresh water 185) | 74 | 202 |
| **DEVONIAN:** | | |
| Traverse formation: | | |
| Shale, gray, calcareous | 20 | 222 |
| Traverse limestone: | | |
| Dolomite, brown-buff to light gray, broken crystalline, with some porosity; trace of glauconite | 14 | 236 |
| Dolomite, buff to light brown & gray-brown, broken crystalline to very fine grained, with a little porosity; considerable chert, buff to white, dense (salt water 240) | 9 | 245 |
| Shale, gray, calcareous | 12 | 257 |
| Limestone, gray, mostly very fine grained, argillaceous in part; some chert, gray, dense | 23 | 280 |
| Shale, gray, calcareous with a little limestone | 25 | 305 |
| No sample- driller's log; shale, blue | 80 | 385 |
| Shale, gray & limestone, gray, fossiliferous (bryozoa) | 52 | 437 |
| Limestone, gray, very fine grained, argillaceous in part | 13 | 450 |
| | (228) | |
| Dundee: | | |
| Limestone, buff-gray, very fine grained, with stylolitic partings; minor pinpoint porosity (salt water 500) | 150 | 600 |
| Detroit River: | | |
| Dolomite, brown-buff, very fine grained, with some pinpoint porosity; trace white anhydrite | 5 | 605 |
| Dolomite, brown-buff to gray-buff, very fine granular with some pinpoint porosity & considerable anhydrite; a little gypsum | 9 | 614 |
| Dolomite, gray-buff, oolitic, with a little pinpoint porosity; trace of anhydrite | 12 | 626 |

GEOLOGICAL SURVEY NO.

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

# WATER WELL AND PUMP RECORD

Royal Oak

PERMIT NUMBER

**1 LOCATION OF WELL**

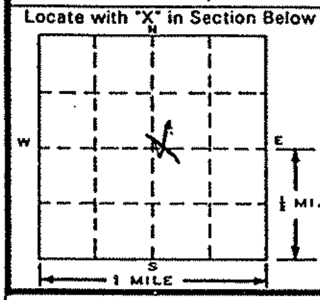
| County | Township Name | Fraction | Section Number | Town Number | Range Number |
|---|---|---|---|---|---|
| OAKLAND | ~~Wixom~~ | NE1/4 NE1/4 NE1/4 | 27 | 1 N/S | 11 E/W |

Distance And Direction From Road Intersection

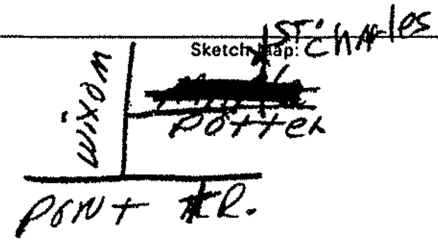
790 St. Charles

Street Address & City of Well Location

Locate with "X" in Section Below




Sketch Map:




**3 OWNER OF WELL:** Charles Neidererim

Address 790 St. Charles

Address Same As Well Location? [X] Yes [ ] No

**4 WELL DEPTH: (completed)** 57 ft. Date of Completion 5-9-86

**5** [X] Cable tool [ ] Rotary [ ] Driven [ ] Dug [ ] Hollow rod [ ] Auger [ ] Jetted [ ]

**6 USE:** [X] Domestic [ ] Type I Public [ ] Type III Public [ ] Irrigation [ ] Type IIa Public [ ] Heat pump [ ] Test Well [ ] Type IIb Public [ ]

**7 CASING:** Diameter [X] Steel [X] Threaded [ ] Plastic [ ] Welded

4 in. to 53 ft. depth

___ in. to ___ ft. depth

Height: Above/~~Below~~ Surface 1 ft.

Weight 11 lbs./ft.

Grouted Drill Hole Diameter ___ in. to ___ ft. depth; ___ in. to ___ ft. depth

Drive Shoe [X] Yes [ ] No

**2 FORMATION DESCRIPTION**

| FORMATION DESCRIPTION | THICKNESS OF STRATUM | DEPTH TO BOTTOM OF STRATUM |
|---|---|---|
| Yellow clay sand & gravel | 30 | 30 |
| B clay & gravel | 12 | 42 |
| Grey water ~~[illegible]~~ gravel | 15 | 57 |

USE A 2ND SHEET IF NEEDED

**8 SCREEN:** [ ] Not Installed

Type Stain Diameter 4"

Slot/Gauze 15 Length 4'

Set between 53 ft. and 57 ft.

FITTINGS: [X] K-Packer [ ] Lead Packer [ ] Bremer Check [ ] Blank above screen 1 ft. Other ___

**9 STATIC WATER LEVEL:** 9 ft. below land surface [ ] Flow

**10 PUMPING LEVEL:** below land surface

30 ft. after 3 hrs. pumping at 20 G.P.M.

___ ft. after ___ hrs. pumping at ___ G.P.M.

**11 WELL HEAD COMPLETION:** [X] Pitless adapter [ ] 12" above grade [ ] Basement offset [ ] Approved pit

**12 WELL GROUTED?** [ ] No [ ] Yes From ___ to ___ ft.

[ ] Neat cement [ ] Bentonite [ ] Other ___

No. of bags of cement ___ Additives ___

**13 Nearest source of possible contamination**

Type Septic Distance E ft. Direction 75

Well disinfected upon completion? [X] Yes [ ] No

**14 PUMP:** [ ] Not Installed [ ] Pump Installation Only

Manufacturer's name McDonald

Model number ___ HP 1/2 Volts 230

Length of Drop Pipe 30 ft. capacity 10 G.P.M.

TYPE: [X] Submersible [ ] Jet

PRESSURE TANK: Manufacturer's name #20 Nolan

Model number ___ Capacity ___ Gallons

**15. Remarks, elevation, source of data, etc.**

RECEIVED Dept. of Public He...

...26 1986

Bureau of Environmental ... Health

**16. WATER WELL CONTRACTOR'S CERTIFICATION:**

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Brighton Drilling 687

REGISTERED BUSINESS NAME REGISTRATION NO.

Address 2800 Pleasant Vy

Signed C. Kuhl Date 11-1-86

AUTHORIZED REPRESENTATIVE

D67d 2/84

GEOLOGICAL SURVEY COPY

Authority: Act 368 PA 1978

Completion: Required

Penalty: Conviction of a violation of any provision is a

GEOLOGICAL SURVEY SAMPLE No.

# WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

**1 LOCATION OF WELL**

County: Oakland
Twp.: Royal Oak
Fraction: NE¼ NE¼ NE¼
Section No.: 25
Town: 1 N
Range: 11 E

Distance And Direction from Road Intersections: S. W. Corner of 10 Mile and Dequindre

OWNER No.

Street address & City of Well Location

**3 OWNER OF WELL:** Hazel Park Racing Assoc. Inc.
Address: 650 E. 10 Mile Road
Hazel Park, Michigan

**2**

| FORMATION | THICKNESS OF STRATUM | DEPTH TO BOTTOM OF STRATUM |
|---|---|---|
| Fill | 19' | 19' |
| Gray Clay | 65' | 84' |
| Hardpan | 13' | 97' |
| Clay | 12' | 109' |
| Putty Sand | 12' | 121' |
| Hard Clay | 11' | 132' |
| Fine Sand | 6' | 138' |
| Coarse Sand | 7' | 145' |

**4 WELL DEPTH: (completed)** 145 ft. Date of Completion 2-23-67

**5** [x] Cable tool [ ] Rotary [ ] Driven [ ] Dug [ ] Hollow rod [ ] Jetted [ ] Bored [ ]

**6 USE:** [ ] Domestic [ ] Public Supply [ ] Industry [x] Irrigation [ ] Air Conditioning [ ] Commercial [ ] Test Well [ ]

**7 CASING:** Threaded [x] Welded [ ]
Diam. 6 in. to 134½ ft. Depth
in. to ft. Depth
Height: Above/~~Below~~ surface 6 ft.
Weight 19.45 lbs/ft.
Drive Shoe? Yes [x] No [ ]

**8 SCREEN:**
Type Johnson Stainless Dia.: 6"
Slot/~~Gauze~~ top 5' #10, Btoom 5' # 85 Length 10'
Set between 131 ft. and 145 ft.
Fittings: 5" xx 23" nipple

**9 STATIC WATER LEVEL**
56 ft. below land surface

**10 PUMPING LEVEL** below land surface
117 ft. after 16 hrs. pumping 50 g.p.m.
ft. after hrs. pumping g.p.m.

**11 WATER QUALITY** in Parts Per Million:
Iron (Fe) 2.0 Chlorides (Cl) 85.5
Hardness 68.4

**12 WELL HEAD COMPLETION:** [ ] In Approved Pit [x] Pitless Adapter [ ] 12" Above Grade

**13 GROUTING:**
Well Grouted? [ ] Yes [x] No
Material: [ ] Neat Cement [ ]
Depth: From ft. to ft.

**14 SANITARY:** UNKOWN
Nearest Source of possible contamination
feet Direction Type
Well disinfected upon completion [x] Yes [ ] No

**15 PUMP:**
Manufacturer's Name Jacuzzi
Model Number 2S6A5T HP 2
Length of Drop Pipe 117 ft. capacity 15 G.P.M.
Type: [x] Submersible [ ] [ ] Jet [ ] Reciprocating

**16 Remarks, elevation, source of data, etc.**

INFO. BY DRILLER. ITEM NO.

CORRECTED BY:

ADDITION BY:

**17 WATER WELL CONTRACTOR'S CERTIFICATION:**
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

O. O. Corsaut Inc. — REGISTERED BUSINESS NAME
0025 — REGISTRATION NO.
Address 15101 W. 11 Mile Road, Oak Park 48010
Signed Owen Corsaut — AUTHORIZED REPRESENTATIVE
Date June 13, 1967

D67D 100M 6-66

GEOLOGICAL SURVEY COPY

**OHM**



| | |
|---|---|
| JOB NO. 2930 | BORE HOLE NO. GMW-1 |
| PROJECT Gage Products | LOCATION Ferndale, MI |
| DRILLING CONTRACTOR C.T.I. | DRILLING EQUIPMENT Hollow Stem Auger |
| HYDROGEOLOGIST J. Barone/D. Youngblade | DRILLER R. Near |
| DATE START/TIME 7/24/85 0855 — DATE FINISH/TIME 7-24-85 1110 | SURFACE ELEVATION — TOTAL DEPTH (Back filled to 15') 30.5' |
| WELL CASING Flush joint 2" PVC — SCREEN TYPE Flush Joint 2" PVC | LENGTH 10' — SLOT 0.010 |

| GROUND WATER | | | | | CASING | CORE | SAMPLER | TUBE |
|---|---|---|---|---|---|---|---|---|
| DATE | TIME | DEPTH | WEATHER | TYPE | PVC | | Split spoon | |
| 7-25-85 | 0745 | DRY | | DIAMETER | 2" | | 2" | |
| | | | | HAMMER WEIGHT | | | 140 lb | |
| | | | | FALL | | | | |

REMARKS TOC elevation 104.68'

## BORE HOLE LOG

| DEPTH | SAMPLE NO. | BLOW COUNT PER 6" | RECOVERY | LITHOLOGIC DESCRIPTION | REMARKS | GRAPHIC LOG |
|---|---|---|---|---|---|---|
| | SS 1 1.0-2.5' | 2-2-3 | 10 | Med. to dark brown clayey, silty med. grained SAND with some organic fragments. Slightly damp and loose very low molding or plasticity | USCS Class SC | |
| 5 | SS 2 4.0-5.5' | 5-9-12 | 18 | Med. olive brown and light to med. grey silty CLAY. Moderate to high plasticity. Damp. Strong odor of organics. Some root fragments. | CL | |
| 10 | SS 3 9.0-10.5 | 6-16-23 | 18 | Med. to dark olive brown fine silty CLAY with trace gravel. Mottled med. brown. Low plasticity-friable. Slightly damp. Slight odor of organics. | CL | |
| 15 | SS 4 14.0-15.5 | 7-11-13 | 12 | Med. to dark grey, fine silty CLAY. Trace gravel. Med. plasticity. No odor. Damp | CL | |
| 20 | SS 5 19.0-20.5' | 6-8-12 | 11 | Med. to dark grey-brown silty CLAY, trace fine gravel. High plasticity. Damp. no odor. | CL | |
| 25 | SS 6 24.0-25.5' | 6-9-12 | 18 | Med. to dark grey-brown silty CLAY. Med. to high plasticity. No odor. | CL | |
| 30 | SS 7 29.0-30.5 | 8-11-13 | 15 | | | |

OHM



BORE HOLE NO. GMW-1

JOB NO 2930

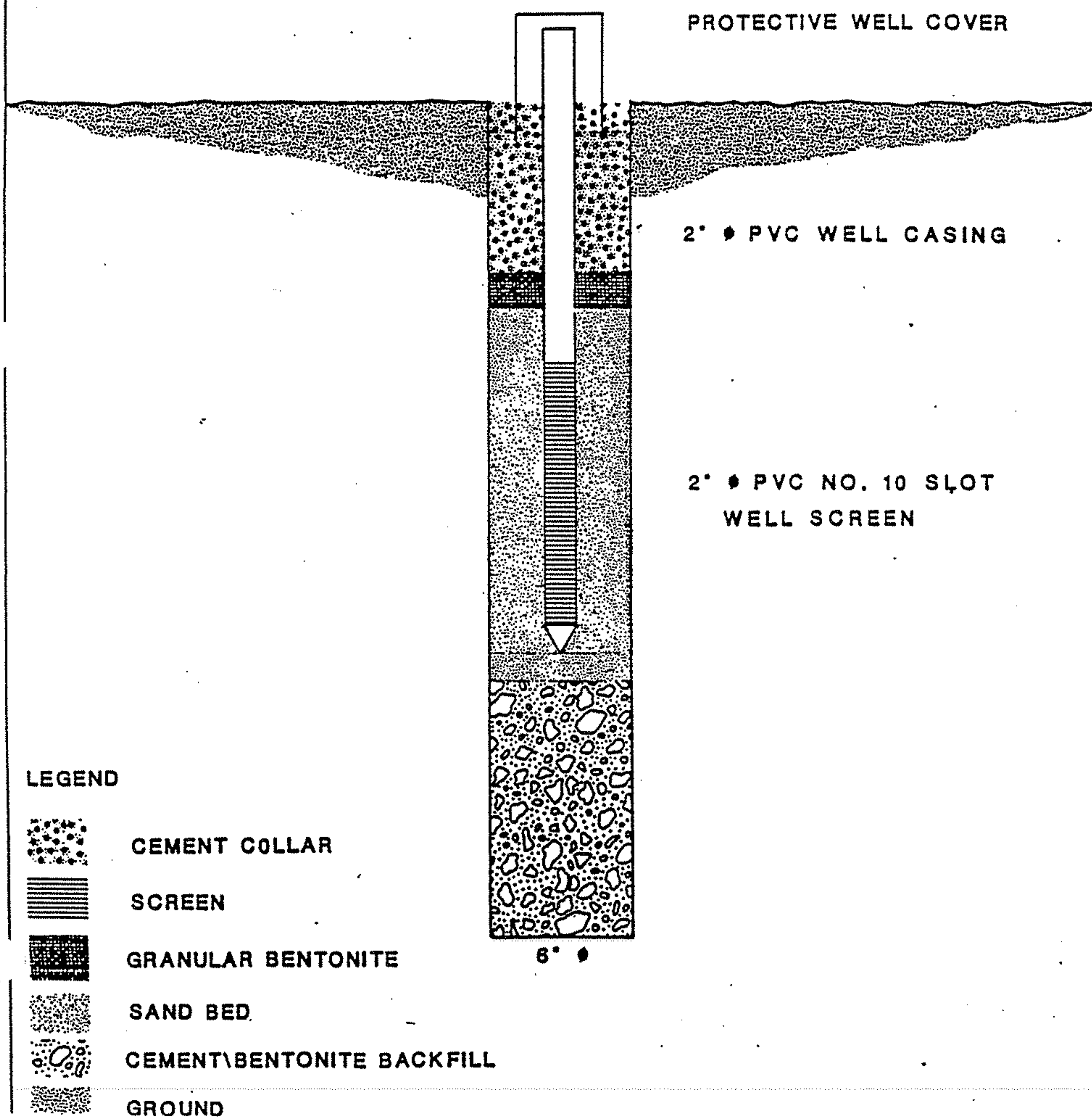
PROJECT Gage Products

LOCATION Ferndale, MI

REMARKS

| DEPTH | SAMPLE NO. | BLOW COUNT PER 6" | RECOV-ERY | LITHOLOGIC DESCRIPTION | REMARKS | GRAPHIC LOG |
|---|---|---|---|---|---|---|
| 30 | | | | Med. to dark grey-brown silty CLAY, trace gravel. Med. to high plasticity damp, no odor. | USCS CLASS CL | End of Borin |
| 35 | | | | | | |

| | | |
|---|---|---|
| PROJECT # 2930 | O.H.M.<br>EMERGENCY RESPONSE and<br>ENVIRONMENTAL RESTORATION | WELL # 1 |
| CLIENT<br>GAGE PRODUCTS | | BORING # |
| | DRILLING LOG | FIGURE NO. |



# OHM



BORE HOLE NO. GMW-2

| | |
|---|---|
| NO. 2930 | |
| PROJECT Gage Products | LOCATION Ferndale, MI |
| DRILLING CONTRACTOR C.T.I. | DRILLING EQUIPMENT Hollow Stem Auger |
| HYDROGEOLOGIST J. Barone/D. Youngblade | DRILLER R. Near |
| DATE START/TIME 7-24-85 1255 / DATE FINISH/TIME 7-24-85 1512 | SURFACE ELEVATION / TOTAL DEPTH (Backfilled to 15') 30.5 |
| WELL CASING Flush Joint 2" PVC / SCREEN TYPE Flush Joint 2" PVC | LENGTH 10' / SLOT 0.010 |

GROUND WATER

| DATE | TIME | DEPTH | WEATHER |
|---|---|---|---|
| 7-25-85 | 0750 | 7.96' | |
| | | | |
| | | | |

| | CASING | CORE | SAMPLER | TUBE |
|---|---|---|---|---|
| TYPE | PVC | | Split spoon | |
| DIAMETER | 2" | | 2" | |
| HAMMER WEIGHT | | | 140 lb | |
| FALL | | | | |

REMARKS TOC Elevation 103.22'

BORE HOLE LOG

| DEPTH | SAMPLE NO. | BLOW COUNT PER 6" | RECOVERY | LITHOLOGIC DESCRIPTION | REMARKS | GRAPHIC LOG |
|---|---|---|---|---|---|---|
| | SS 1 1.0-2.5' | 9-14-13 | 9 | Dark brown, silty, med. to fine SAND, dry friable, some organic matter, twigs, no odor. | USCS CLASS SM | |
| 5 | SS 2 4.0-5.5' | 2-3-5 | 18 | Mottled grey silty CLAY, trace of fine gravel. med. to high plasticity. Damp. Slight odor of organics. Split spoon slightly wet. | CL | |
| 10 | SS 3 9.0-10.5' | 4-8-7 | 6 | Mottled brown fine silty CLAY. Med. to high plasticity. Damp. No odor. | CL | |
| 15 | SS 4 14.0-15.5' | 7-9-10 | 18 | Med. to dark grey silty CLAY. Med. to high plasticity. Damp. No odor. | CL | |
| 20 | SS 5 19.0-20.5' | 5-8-12 | 18 | Dark grey silty CLAY, trace med. gravel. Med. to high plasticity. No odor. Damp | CL | |
| 25 | SS 6 24.0-25.5' | 5-9-11 | 18 | Dark grey silty CLAY, some med. to coarse gravel. Med to high plasticity. No odor. Damp. | CL | |

OHM



BORE HOLE NO. GMW-2

JOB NO 2930

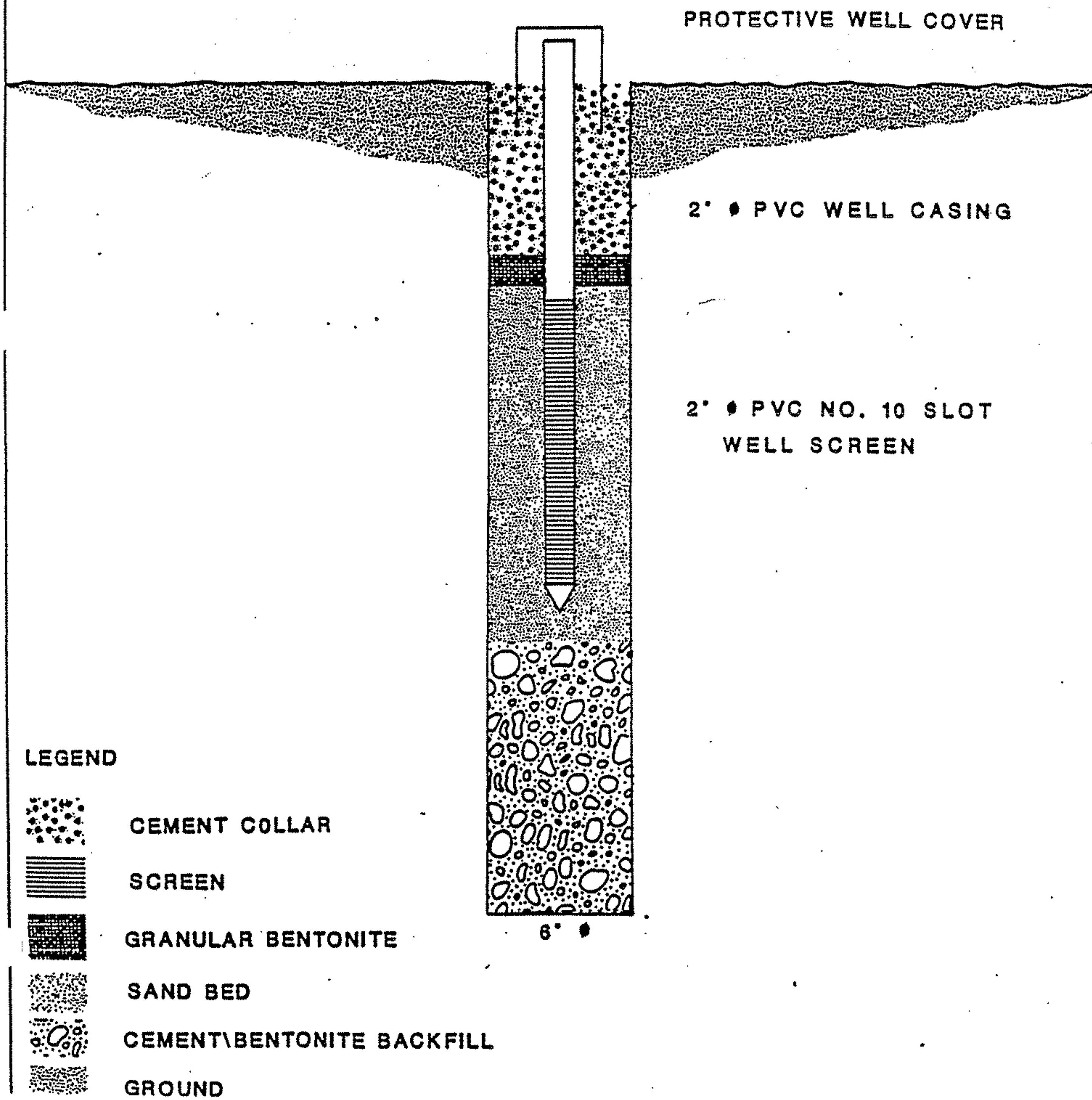
OJECT Gage Products

LOCATION Ferndale, MI

REMARKS

| DEPTH | SAMPLE NO. | BLOW COUNT PER 6" | RECOV-ERY | LITHOLOGIC DESCRIPTION | REMARKS | GRAPHIC LOG |
|---|---|---|---|---|---|---|
| 30 | SS 7 | 7-11 | | Dark grey silty CLAY, some med.-coarse gravel. Med. to high plasticity. Damp. No odor. | USGS CLASS CL | EOB |
| 35 | | | | | | |

| | | |
|---|---|---|
| PROJECT # 2930 | O.H.M. | WELL # 2 |
| CLIENT | EMERGENCY RESPONSE and ENVIRONMENTAL RESTORATION | BORING # |
| GAGE PRODUCTS | DRILLING LOG | FIGURE NO. |



OHM



| | |
|---|---|
| B NO. 2930 | BORE HOLE NO. GMW-3 |
| PROJECT Gage Products | LOCATION Ferndale, MI |
| DRILLING CONTRACTOR C.T.I. | DRILLING EQUIPMENT Hollow Stem Auger |
| HYDROGEOLOGIST J. Barone/D. Youngblade | DRILLER R. Near |
| DATE START/TIME 7-24-85 1535; DATE FINISH/TIME 7-24-85 1735 | SURFACE ELEVATION; TOTAL DEPTH 30.5' (Backfilled to 15') |
| WELL CASING Flush Joint 2" PVC; SCREEN TYPE Flush Joint 2" PVC | LENGTH 10'; SLOT 0.010 |

| GROUND WATER | | | | | CASING | CORE | SAMPLER | TUBE |
|---|---|---|---|---|---|---|---|---|
| DATE | TIME | DEPTH | WEATHER | TYPE | PVC | | Split spoon | |
| 7-25-85 | 0800 | 9.48' | | DIAMETER | 2" | | 2" | |
| | | | | HAMMER WEIGHT | | | 140 lb | |
| | | | | FALL | | | | |

REMARKS TOC Elevation - 1-2.56

## BORE HOLE LOG

| DEPTH | SAMPLE NO. | BLOW COUNT PER 6" | RECOVERY | LITHOLOGIC DESCRIPTION | REMARKS | GRAPHIC LOG |
|---|---|---|---|---|---|---|
| | SS 1 1.0-2.5' | 4-4-7 | 6 | Mottled brown silty CLAY with some sand and gravel. Med. Plasticity. Little organic odor. Slightly damp. | USCS CLASS CL | |
| 5 | SS 2 4.0-5.5' | 4-5-6 | 16 | Mottled brown silty CLAY, trace med. gravel. Low to med. plasticity. Damp | CL | |
| 10 | SS 3 9.0-10.5' | | | Light brown silty CLAY, some med. sand and gravel. Low to med. plasticity. Black mottled. No odor. Damp. | CL | |
| 15 | SS 4 14.0-15.5' | | | Dark grey silty CLAY, trace fine gravel. ~~Med.~~ to high plasticity. No odor. Damp. | CL | |
| 20 | SS 5 19.0-20.5' | | | Dark grey silty CLAY, some med. gravel. Med. Plasticity. Damp. No odor. | CL | |
| 25 | SS 6 24.0-25.5' | | | Dark grey silty CLAY, some med. to coarse gravel. Med. to high plasticity. No odor. Damp | CL | |
| 30 | | | | | | |

# OHM



BORE HOLE NO. GMW-3

JOB NO 2930

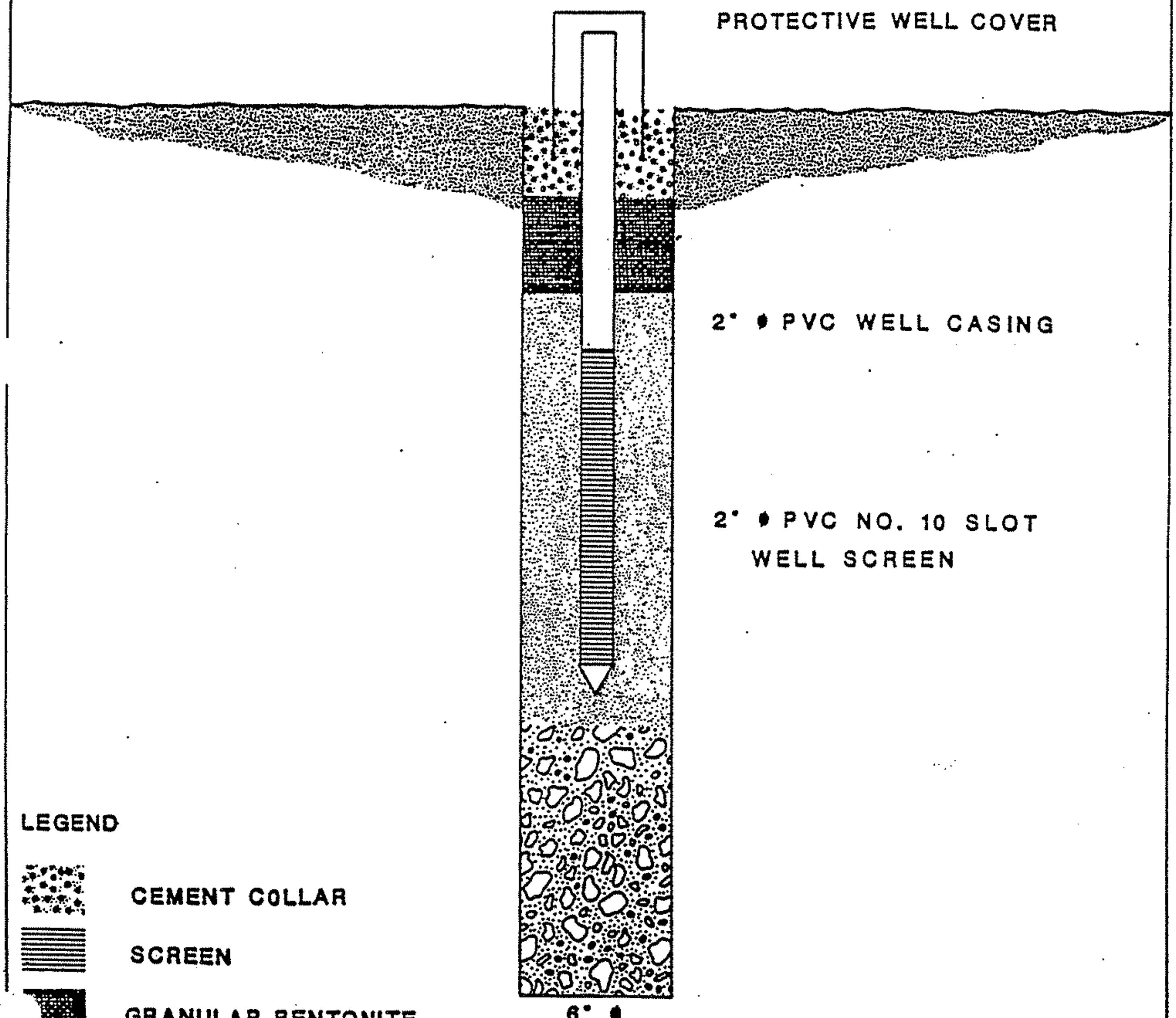
PROJECT Gage Products

LOCATION Ferndale, MI

REMARKS

| DEPTH | SAMPLE NO. | BLOW COUNT PER 6" | RECOV-ERY | LITHOLOGIC DESCRIPTION | REMARKS | GRAPHIC LOG |
|---|---|---|---|---|---|---|
| 30 | SS 7<br>29.0-<br>30.5 | 7-9-15 | 18 | Dark grey silty CLAY, some med. to coarse gravel. Med. plasticity. Damp. No odor. | USCS CLASS<br>CL | EOB |
| 35 | | | | | | |

| | | |
|---|---|---|
| PROJECT # 2930 | O.H.M. EMERGENCY RESPONSE and ENVIRONMENTAL RESTORATION | WELL # 3 |
| CLIENT GAGE PRODUCTS | | BORING # |
| | DRILLING LOG | FIGURE NO. |




LEGEND

CEMENT COLLAR

SCREEN

GRANULAR BENTONITE

SAND BED

CEMENT\BENTONITE BACKFILL

GROUND

# OHM

PAGE 1 OF 1

BORE HOLE NO. GMW-4

| | |
|---|---|
| JOB NO. 2930 | |
| PROJECT Gage Products | LOCATION Ferndale, MI |
| DRILLING CONTRACTOR C.T.I. | DRILLING EQUIPMENT Hollow Stem Auger |
| HYDROGEOLOGIST J. Barone/D. Youngblade | DRILLER R. Near |
| DATE START/TIME 7-25-85 0956 / DATE FINISH/TIME 7-25-85 1103 | SURFACE ELEVATION / TOTAL DEPTH 15.5' |
| WELL CASING Flush Joint 2" PVC / SCREEN TYPE Flush Joint 2" PVC | LENGTH 10' / SLOT 0.010 |

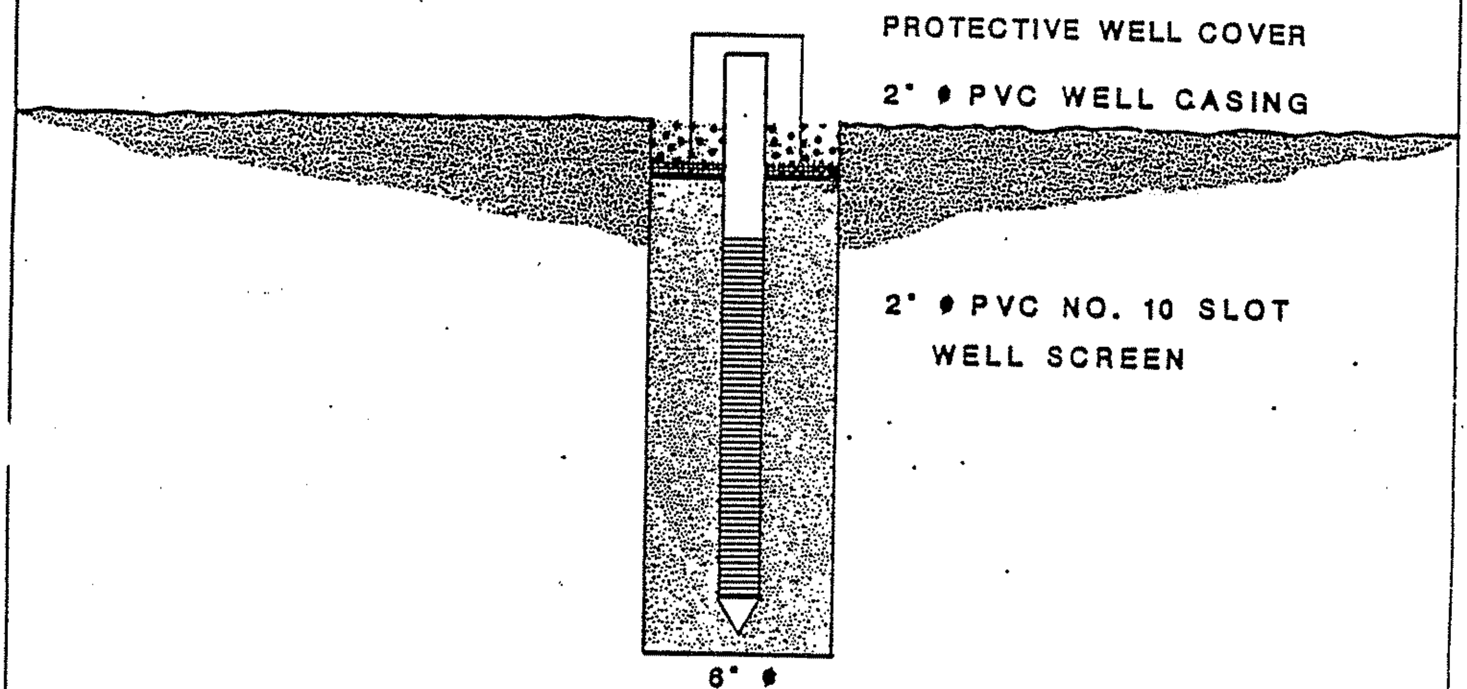
| GROUND WATER | | | | | CASING | CORE | SAMPLER | TUBE |
|---|---|---|---|---|---|---|---|---|
| DATE | TIME | DEPTH | WEATHER | TYPE | PVC | | Split spoon | |
| 7-26-85 | | 5.08 | | DIAMETER | 2" | | 2" | |
| | | | | HAMMER WEIGHT | | | 140 lb | |
| | | | | FALL | | | | |

REMARKS TOC Elevation - 106.03'

## BORE HOLE LOG

| DEPTH | SAMPLE NO. | BLOW COUNT PER 6" | RECOVERY | LITHOLOGIC DESCRIPTION | REMARKS | GRAPHIC LOG |
|---|---|---|---|---|---|---|
| | SS 1 1.0-2.5' | 3-3-3 | 6 | Black and dark brown silty, fine to coarse SAND. Friable. Dmap. Some glass shards. No odor. | USCS CLASS SM | |
| 5 | SS 2 4.0-~~10.5'~~ 5.5 | 1-1-2 | 6 | Top 3" - dark grey silty, fine to coarse SAND. Med. to high plasticity. Wet at 5'. Bottom 3" - dark grey silty CLAY. High plasticity. Strong odor of organic solvents | SM/CL | |
| 10 | SS 3 9.0-10.5 | 7-14-22 | 9 | Mottled dark grey/light brown silty CLAY, some med. gravel. Low to med. plasticity. Slightly damp. Slight organic solvent odor. | CL | |
| 15 | SS 4 14.0-15.5 | 8-16-21 | 18 | Dark grey silty CLAY, trace med. gravel. Low to med. plasticity. Slight organic solvent odor. Damp | CL | EOB |
| 20 | | | | | | |
| 30 | | | | | | |

| PROJECT # 2930 | O.H.M. EMERGENCY RESPONSE and ENVIRONMENTAL RESTORATION | WELL # 4 |
|---|---|---|
| CLIENT GAGE PRODUCTS | | BORING # |
| | DRILLING LOG | FIGURE NO. |




LEGEND

CEMENT COLLAR

SCREEN

GRANULAR BENTONITE

SAND BED

CEMENT\BENTONITE BACKFILL

GROUND

# OHM

PAGE 1 OF 1

BORE HOLE NO. GMW-5

| | | | |
|---|---|---|---|
| JOB NO. 2930 | | | |
| PROJECT Gage Products | | LOCATION Ferndale, MI | |
| DRILLING CONTRACTOR C.T.I. | | DRILLING EQUIPMENT Hollow Stem Auger | |
| HYDROGEOLOGIST J. Barone/D. Youngblade | | DRILLER R. Near | |
| DATE START/TIME 7-25-85 1126 | DATE FINISH/TIME 7-25-85 1220 | SURFACE ELEVATION | TOTAL DEPTH 15.5' |
| WELL CASING Flush Joint 2" PVC | SCREEN TYPE Flush Joint 2" PVC | LENGTH 10' | SLOT 0.010 |

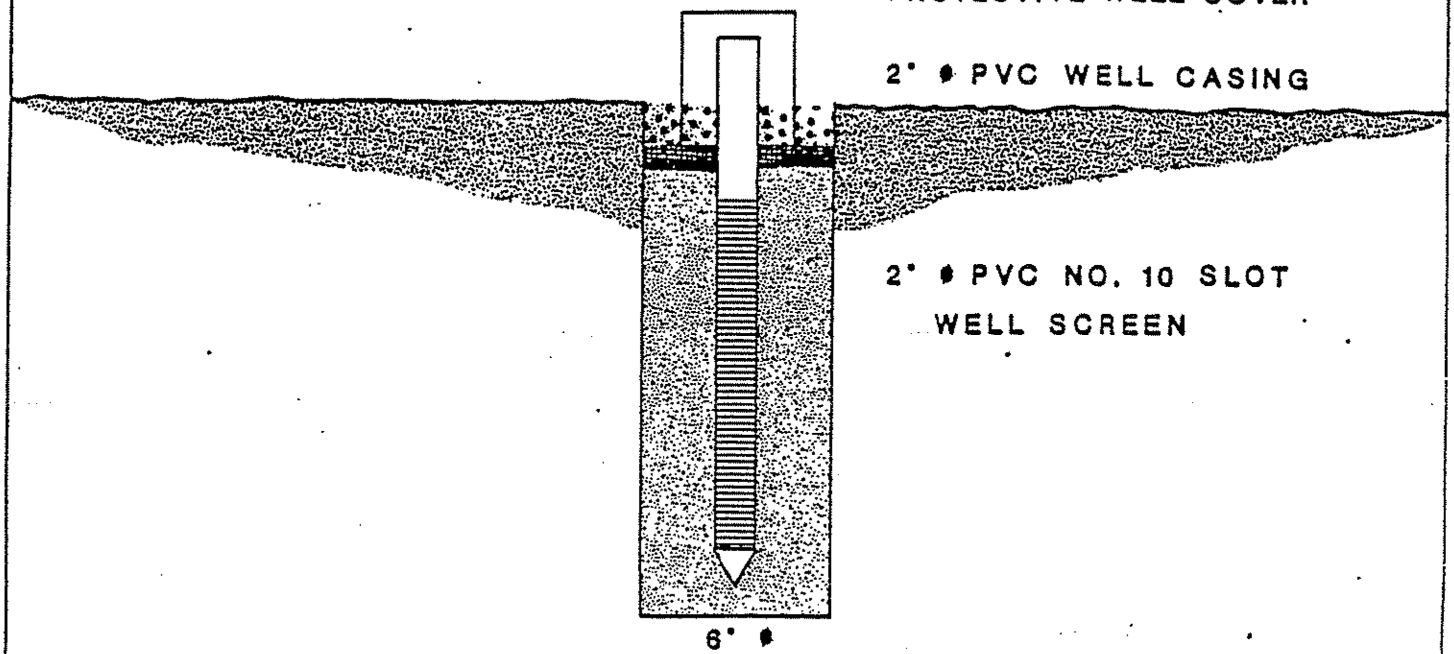
| GROUND WATER | | | | | CASING | CORE | SAMPLER | TUBE |
|---|---|---|---|---|---|---|---|---|
| DATE | TIME | DEPTH | WEATHER | TYPE | PVC | | Split spoon | |
| 7-26-85 | | 2.69 | | DIAMETER | 2" | | 2" | |
| | | | | HAMMER WEIGHT | | | 140 lb | |
| | | | | FALL | | | | |

REMARKS TOC Elevation - 103.98

## BORE HOLE LOG

| DEPTH | SAMPLE NO. | BLOW COUNT PER 6" | RECOVERY | LITHOLOGIC DESCRIPTION | REMARKS | GRAPHIC LOG |
|---|---|---|---|---|---|---|
| | SS 1 1.0-2.5' | 3-5-1 | 4 | Dark brown, med. SAND and SILT, with some fine gravel. Damp. Low to med. plasticity. Slight organic solvent odor. Water at 2.5' | USCS CLASS SM | |
| 5 | SS 2 4.0-5.5' | 3-7-12 | 18 | Mottled grey-brown silty CLAY, some med. gravel. Low to med. plasticity. Slightly damp. | CL | |
| 10 | SS 3 9.0-15.5 | 11020-28 | 15 | Mottled brown silty CLAY, trace fine gravel Low to Med. Plasticity. No odor. Slightly damp. | CL | |
| 15 | SS 4 14.0-15.5 | 5-11-15 | 12 | Dark grey silty CLAY, trace med.-fine gravel. Med. plasticity. Damp. No odor. | | EOB |
| 20 | | | | | | |

| | | |
|---|---|---|
| PROJECT # 2930 | O.H.M.<br>EMERGENCY RESPONSE and<br>ENVIRONMENTAL RESTORATION | WELL # 5 |
| CLIENT<br>GAGE PRODUCTS | | BORING # |
| | DRILLING LOG | FIGURE NO. |




LEGEND

CEMENT COLLAR

SCREEN

GRANULAR BENTONITE

SAND BED

CEMENT\BENTONITE BACKFILL

GROUND

EDI Engineering & Science

Page: 1 of 1
Well/Boring No. GMW-4
Client: Gage Products
Project No.: 21073

# Well/Boring Log Sheet

| County | Township | Fraction | Section | T | R |
|---|---|---|---|---|---|
| | | 1/4 1/4 1/4 | | | |

**Contractor** CTI & Associates
Address: Novi, MI
313-473-7530
Equipment: CME 45C Mounted on Wood Tiger Tracked
Supervisor: EDI-Ed Culver

**Drilling Method(s)** **Depth**
8" HSA 4 1/4" ID

**Grouting/Seal**

| Depth To | Material/Method |
|---|---|
| 0-0.8 | Concrete |

**Development**

**Screen**
Manufacturer:
Material: S. Steel
Model:
Slot/Gauge: 10 slot Dia.: 2"
Length: 2 x 60 x 66
Depth Set: 3' To: 8'
From Ground

| Dia. | Type | Depth Set |
|---|---|---|
| 2" | Galv. | +2 To -3' |
| | | To |

**Date**
Started: 7/28/89 Finished: 7/28/89

**Elevation**
Casing: TOC 639.87
Ground: 639.64
Ref. Pt.: USGS

**Water Level** 4.67' Ft. Below TOC
Measure On: 9/2/89 with steel tape and chalk

**Location**

**Remarks** Pulled old GMW-4, grouted/abandoned, (cement grout) Backfilled auger hole with sand pack from 13' up to 8' then set well.

| Thickness | Depth to Base | LITHOLOGIC DESCRIPTION | Sample Depth | Hnu Ambient | Hnu Sample | Blow Counts 1st 6" | 2nd 6" | 3rd 6" |
|---|---|---|---|---|---|---|---|---|
| 3 | 3 | Sand and Gravel, rubble, fill | 2-3.5 | 1.2 | 0 | 1 | 1 | 1 |
| 2.2 | 5.2 | Sand, fine to medium, dirty brown to black, clayey, wet, slight odor, soft | 3.5-5 | 1.6 | 1.2 | 1 | 1 | 2 |
| .6 | 5.8 | Clay, silty, sandy, mottled brown to dirty brown, moist, odor | 5-6.5 | 1.8 | 50 | 4 | 6 | 5 |
| 7.2 | 13 | Clay, silty, sandy, pebbles, mottled brown to gray, traces of root structures, strong odor, moist | 8-9.5 | 1.6 | 80 | 5 | 7 | 8 |
| 1.5+ | 14.5 | Clay, silty, sandy, occasional pebble, mottled brown to gray, moist, very firm, no odor | 13-14.5 | 1.6 | 1.2 | 10 | 16 | 18 |

**EDI Engineering & Science**

Page: 1 of 1
Well/Boring No. GMW-5
Client: Gage Products
Project No.: 21073

# Well/Boring Log Sheet

| County | Township | Fraction | Section | T | R |
|---|---|---|---|---|---|
| | | 1/4 1/4 1/4 | | | |

**Contractor** CTI & Associates
Address: Novi, MI
313-473-7530
Equipment: CME 45C Mounted on Wood Tiger Tracked
Supervisor: EDI-Ed Culver

**Drilling Method(s)** **Depth**
8" HSA 4 1/4" ID 8'

**Grouting/Seal**

| Depth To | Material/Method |
|---|---|
| 0-0.8 | Concrete |
| 0.8-2 | Benseal |

**Development**

**Screen**
Manufacturer:
Material: S. Steel
Model:
Slot/Gauge: 10 slot Dia.: 2"
Length: 2 x 60 x 66
Depth Set: 3' To: 8'
From Ground

| Dia. | Type | Depth Set |
|---|---|---|
| 2" | Galv. | +2 To -3' |
| | | To |

**Date**
Started: 7/27/89 Finished: 7/27/89

**Elevation**
Casing: TOC 638.95
Ground: 637.07
Ref. Pt.: USGS

**Water Level** 3.96' Ft. Below TOC
Measure On: 9/2/89 with steel tape and chalk

**Location**

**Remarks** Sand pack around well screen up to 1" above top of screen with #4 sand.
Total depth 10.5 TOC

| Thick-ness | Depth to Base | LITHOLOGIC DESCRIPTION | Sample Depth | Hnu Ambient | Hnu Sample | Blow Counts 1st 6" | 2nd 6" | 3rd 6" |
|---|---|---|---|---|---|---|---|---|
| 1 | 1 | Sand and Gravel, some rubble, organics | 0-1.5 | .2 | 13 | - | - | - |
| 1.5 | 2.5 | Sand, fine, silt, greenish brown to black, clay binder, root structure, dry | 1.5-3 | .2 | 1 | - | - | - |
| 0.7 | 3.2 | Gravel, medium to coarse, black, wet | 3-4.5 | .2 | 0 | - | - | - |
| 1.3 | 4.5 | Clay, silty, sandy, mottled greenish brown, pebbles, soft, moist | 4.5-6 | .2 | 0 | - | - | - |
| 1.5 | 6 | Clay, silty, sand, mottled brown to gray, occasional pebble, soft, moist, seams of wet sand | 8-9.5 | - | - | 15 | 16 | 22 |
| 3.5+ | 9.5 | Clay, brown, very sandy, silty, pebbles, very firm, dry | | | | | | |

EDI Engineering & Science

Page: 1 of 1
Well/Boring No. GMW-6
Client: Gage Products
Project No.: 21073

# Well/Boring Log Sheet

| County | Township | Fraction 1/4 1/4 1/4 | Section | T | R |
|---|---|---|---|---|---|
| | | | | | |

Contractor CTI & Associates
Address: Novi, MI
313-473-7530
Equipment: CME 45C Mounted on Wood Tiger Tracked
Supervisor: EDI-Ed Culver

Drilling Method(s) Depth
8" HSA 4 1/4" ID

Grouting/Seal
Depth To Material/Method
0-0.5 Concrete
0.5-1.5 Benseal

Development

**Screen**
Manufacturer:
Material: S. Steel
Model:
Slot/Gauge: 10 slot Dia.: 2"
Length: 2 x 60 x 66
Depth Set: 2.5' To: 7.5'

Dia. Type Depth Set
2" Galv. 0 To -2.5
To

Remarks

**Date**
Started: 7/27/89 Finished: 7/27/89

**Elevation**
Casing: TOC 635.53
Ground: 635.73
Ref. Pt.: USGS

Water Level 2.43' Ft. Below TOC
Measure On:
8/2/89 with steel tape and chalk

Location

| Thick-ness | Depth to Base | LITHOLOGIC DESCRIPTION | Sample Depth | Hnu Ambient | Hnu Sample | Blow Counts 1st 6" | Blow Counts 2nd 6" | Blow Counts 3rd 6" |
|---|---|---|---|---|---|---|---|---|
| .5 | .5 | Concrete | 0.5-2 | 1.8 | 0 | - | - | - |
| 2.5 | 3 | Sand, fine to medium, dark brown, moist | 2-3.5 | 1.6 | 0 | - | - | - |
| .5 | 3.5 | Sand, fine to medium, clayey, brown, wet | 3.5-5 | 1.6 | 0 | 3 | 8 | 11 |
| 2.5 | 6 | Clay, silty, trace sand, mottled brown to gray, dry | 8-9.5 | - | - | 6 | 11 | 15 |
| 3.5 | 9.5 | Clay, silty, sandy pebbles, mottled brown to gray, dry, very firm | | | | | | |

**WW Engineering & Science, Inc.**
Environmental Services Division

Page: 1 of 1
Well/Boring No. GMW-7
Client: Gage Products
Project No.: 21275

# Well/Boring Log Sheet

| County | Township | Fraction 1/4 1/4 1/4 | Section | T | R |
|---|---|---|---|---|---|
| | | | | | |

**Contractor** Stearns Drilling
Address: Dutton, MI
616-698-7770
Equipment: CME - 550
Dennis & Jeff
Supervisor: Ed Culver

**Screen**
Manufacturer: Johnson
Material: Stainless Steel
Model: Water mark
Slot/Gauge: 7 slot Dia.: 2"
Length: 2 x 60 x 65
Depth Set: 6' To: 11'

**Date**
Started: 7/31/90 Finished: 7/31/90

**Elevation**
Casing: 637.87
Ground: 638.3
Ref. Pt.: USGS

**Drilling Method(s)** **Depth**
8" HSA 4 1/4" ID 16.5

| Dia. | Type | Depth Set | |
|---|---|---|---|
| 2" | galv. | .3' | To 5.7' |
| | | | To |

Water Level 4.80 Ft. Below TOC
Measure On: 8/6/90

**Grouting/Seal**

| Depth To | Material/Method |
|---|---|
| 0 - 0.5 | Concrete |

**Location**

**Remarks** Ambient OVA 6 ppm

**Development**
4 gals. bailed

| Thickness (feet) | Depth to Base (feet) | LITHOLOGIC DESCRIPTION | Sample Depth | Blow Counts 6" | Blow Counts 12" | Blow Counts 18" | Sample OVA (ppm) |
|---|---|---|---|---|---|---|---|
| 0.5 | 0.5 | Railroad ballast | 0.0 - 1.5 | 2 | 1 | 10 | 9 |
| 0.5 | 1.0 | Sand fine black | 2.0 - 3.3 | 2 | 1 | 1 | 30 |
| 1.5 | 2.5 | Sand fine black some rubble & trash odor | 4.0 - 5.5 | 2 | 2 | 4 | 150 |
| 1.5 | 4.0 | Sand fine gray very clayey moist odor | 6.0 - 7.5 | 6 | 11 | 13 | 15 |
| 5.5 | 9.5 | Clay mottled gray to brown sandy odor | 10.0 - 11.5 | 4 | 8 | 14 | 15 |
| 7.0+ | 16.5 | Clay gray sandy pebbles trace odor | 15.0 - 16.5 | 3 | 6 | 9 | 5 |

HORIZON ENVIRONMENTAL


Boring No.: GMW-7 Replacement
Completed Well No.: GMW-7R
Client: Gage Products
Project No.: GAG-0103
Date: Started: 6/16/00 Finished: 6/16/00
Time: Started: 10:35 am Finished:

# Well/Boring Log Sheet

| State | County | Township | Fraction | Section | T | R |
|---|---|---|---|---|---|---|
| | | | | | | |

**Contractor:** BEST
Address: Okemos, MI
Equipment: Simco EP 200
Crew Chief: Rick Brye
Horizon Supervisor: Ed Culver

| Drilling Method(s) | Depth |
|---|---|
| 7" HSA 3 ¼" ID | 6.0' |

Ground Surface Elevation (ft.):
TOC Elevation (ft.)
Datum (ft.):
Static Water Level: 4' +/-
Reference:

| Grout/Seal Depth/to | Material/Method |
|---|---|
| 0.5' | Bentonite |

**Location:** 11.5' northwest of the southwest corner of ramp retaining wall and 8.2' southeast of the northern most support column for containment canopy.

Construction: X Abandonment: Additional Field Notes: Log Books: Computer File:

| Thickness (feet) | Depth to Base (feet) | USCS* | Lithologic Description | Sample Depth | Blow Counts 6" | 12" | 18" | 24" | Headspace | Background |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.5 | 0.5 | FILL | Limestone Ballast | 0.0-3.0 | - | - | - | - | 0.0 | 0.0 |
| 1.5 | 2.0 | SP | Sand, fine, brown | 3.0-5.0 | | | | | 0.0 | 0.0 |
| 2.0 | 4.0 | SP | Sand, fine, dark brown to black, wet | 5.0-6.0 | | | | | 0.0 | 0.0 |
| 2.0 | 6.0 | CL | Clay, dark gray, very sandy, moist, trace odor | | | | | | | |
| 1.0 | 7.0 | CL | Clay, gray, sandy, moist | | | | | | | |
| | | | Well screened 1-6' below grade surface | | | | | | | |

* = The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

**HORIZON ENVIRONMENTAL**

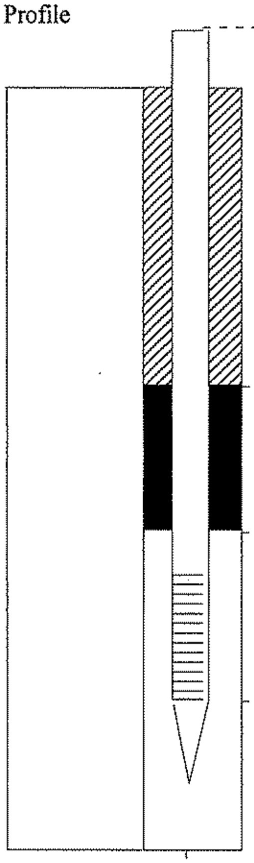
Project Name: Gage Products

Project Number: GAG-0103

## Log of Well Installation

Well Number: GMW-7R

Generalized Subsurface Profile



| Field | Value |
|---|---|
| Length of Casing Above Ground Surface | 0.3' |
| Concrete Cap | |
| Depth to Top of Grout or Backfill | N/A |
| Material (Backfill) | |
| Depth to Top of Bentonite Pellets | 0.0' |
| Depth to Top of Filter Pack | 0.5' |
| Type: | #7 Filter Pack |
| Depth to Bottom of Well Screen | 6.0' |
| Borehole Backfill Material | Filter Pack |
| Total Depth of Borehole | 7.0' |

Top of Casing Elevation (feet): 

### Water Level Data

| Date | Time | Water Level | Elevation |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |

Development: 

Survey Reference: 

**Well Casing**

| | |
|---|---|
| Diameter: | 2" |
| Total Length: | 1.0' |
| Material: | PVC |
| Cap Type: | J-Plug |

**Well Screen**

| | |
|---|---|
| Diameter: | 2" |
| Length: | 5' |
| Slot/Type: | 10 slot |
| Material: | PVC |

**Protective Well Casing**

| | |
|---|---|
| Material: | Cast Iron Dia. 8" |
| Height Above Ground: | 0.5' |
| Lock Type: | |

**General Notes:**

HORIZON ENVIRONMENTAL


Boring No.: SB-01-00
Completed Well No.:
Client: Gage Products
Project No.: GAG-0103
Date: Started: 6/16/00 Finished: 6/16/00
Time: Started: Finished:

# Well/Boring Log Sheet

| State | County | Township | Fraction | Section | T | R |
|---|---|---|---|---|---|---|
| | | | | | | |

**Contractor:** BEST
Address: Okemos, MI

Equipment: Simco EP 200
Crew Chief: Rick Brye
Horizon Supervisor: Ed Culver

| Drilling Method(s) | Depth |
|---|---|
| Geoprobe Macro | 12.0' |

Ground Surface Elevation (ft.):
TOC Elevation (ft.)
Datum (ft.):
Static Water Level: Dry Hole
Reference:

| Grout/Seal Depth/to | Material/Method |
|---|---|
| 12.0' | Benseal |

**Location:** Jewell Avenue 77' west and 5' north of centerline of Jewell & Wanda. 60' east of sewer manhole just south of truck well.

Construction: X Abandonment: ☐ Additional Field Notes: Log Books: ☐ Computer File: ☐

| Thickness (feet) | Depth to Base (feet) | USCS* | Lithologic Description | Sample Depth | Blow Counts 6" | 12" | 18" | 24" | Headspace | Background |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.5 | 0.5 | NA | Concrete | 0.0-4.0 | - | - | - | - | 0.0 | 0.0 |
| 0.5 | 1.0 | GM | Sand & gravel | 4.0-8.0 | - | - | - | - | 0.0 | 0.0 |
| 10.3 | 11.3 | CL | Clay, grayish brown | 8.0-12.0 | - | - | - | - | 0.0 | 0.0 |
| 0.7 | 12.0 | CL | Clay, gray, sandy, firm | | | | | | | |

* = The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

EDI Engineering & Science

Page: 1 of 1
Well/Boring No. SB-1
Client: Gage Products
Project No.: 21073

# Well/Boring Log Sheet

| County | Township | Fraction 1/4 1/4 1/4 | Section | T | R |
|---|---|---|---|---|---|
| | | | | | |

Contractor: CTI & Associates
Address: Novi, MI
313-473-7530
Equipment: CME 45C Mounted on Wood Tiger Tracked
Supervisor: EDI-Ed Culver

**Drilling Method(s)** **Depth**
8" HSA 4 1/4" ID 53.5

**Grouting/Seal**
Depth To Material/Method
0-55 Cement/Bent. Slurry

**Development**
N/A

**Screen**
Manufacturer: N/A
Material:
Model:
Slot/Gauge: Dia.:
Length:
Depth Set: To:

Dia. Type Depth Set
N/A To
To

**Date**
Started: 7/25/89 Finished: 7/26/89

**Elevation**
Casing:
Ground:
Ref. Pt.:

**Water Level** dry hole Ft. Below
Measure On:
Measured through auger on completion

**Location**

**Remarks**
Breakdown at 25' depth, clutch repair left side 4 pm 7/25, return 2 pm 7/26
3' of water in augers overnight, seepage through auger joints from shallow wet zone at ~3'

| Thickness | Depth to Base | LITHOLOGIC DESCRIPTION | Sample Depth | Hnu Ambient | Hnu Sample | Blow Counts 1st 6" | 2nd 6" | 3rd 6" |
|---|---|---|---|---|---|---|---|---|
| 2 | 2 | Sand and Gravel, some rubble | 3-5 | .4 | 6 | - | - | - |
| 3 | 5 | Clay | 8.5-10 | .4 | 0 | 5 | 11 | 20 |
| 2 | 7 | Clay | 18.5-20 | .4 | 0 | 3 | 8 | 12 |
| 5 | 12 | Clay, silty, trace sand, pebbles, mottled brown to gray, firm, fill | 28.5-30 | - | - | 4 | 8 | 13 |
| 13 | 25 | Clay, silty, trace sand, pebbles, gray, firm, fill, | 38.5-40 | - | - | 6 | 9 | 13 |
| 7.5 | 32.5 | Clay, silty, trace sand, occasional pebble, gray, firm, fill, moist | 53.5-55 | - | - | 3 | 6 | 6 |
| 1 | 33.5 | Soft Zone | | | | | | |
| 21.5+ | 55 | Clay, trace silt, trace sand, occasional pebble, gray, firm, fill, moist | | | | | | |

**EDI Engineering & Science**



Well/Boring No. SB-2
Client: Gage Products
Project No.: 21073

# Well/Boring Log Sheet

| County | Township | Fraction 1/4 1/4 1/4 | Section | T | R |
|---|---|---|---|---|---|
| | | | | | |

**Contractor** CTI & Associates
Address: Novi, MI
313-473-7530
Equipment: CME 45C Mounted on Wood Tiger Tracked
Supervisor: EDI-Ed Culver

**Drilling Method(s)** **Depth**
8" HSA 3 1/4" ID

**Grouting/Seal**
Depth To Material/Method
0-55 Cement/Bent. Slurry

**Development**
N/A

**Screen**
Manufacturer: N/A
Material:
Model:
Slot/Gauge: Dia.:
Length:
Depth Set: To:

Dia. Type Depth Set
- N/A To
To

**Remarks**

**Date**
Started: 7/27/89 Finished: 7/27/89

**Elevation**
Casing:
Ground:
Ref. Pt.:

**Water Level** Ft. Below
Measure On:

**Location**

| Thick-ness | Depth to Base | LITHOLOGIC DESCRIPTION | Sample Depth | Hnu Ambient | Hnu Sample | Blow Counts 1st 6" | 2nd 6" | 3rd 6" |
|---|---|---|---|---|---|---|---|---|
| 0.5 | 0.5 | Sand and Gravel | 18.5-20 | | | 6 | 9 | 12 |
| 2.5 | 3 | Sand, medium to fine, dirty brown, clayey | 28.5-30 | | | 10 | 12 | 14 |
| 0.5 | 3.5 | Sand, fine to medium, dirty brown, clayey, wet | 38.5-40 | | | 13 | 10 | 14 |
| 2.5 | 6 | Clay, sandy, pebbles, mottled dirty brown, moist | 48.5-50 | | | 5 | 6 | 6 |
| 6 | 12 | Clay, silty, sandy, pebbles, mottled brown to gray, firm, dry | 58.5-60 | | | 5 | 8 | 10 |
| 18 | 30 | Clay, silty, sandy, occasional pebble, gray, firm, moist | | | | | | |
| 5 | 35 | Clay, very sandy, pebbles, gray, very firm, moist | | | | | | |
| 2 | 37 | Clay, very sandy, pebbles, gray, moist, lenses of wet sand | | | | | | |
| 10 | 47 | Clay, sandy, pebbles, gray, moist, firm | | | | | | |
| 8 | 55 | Clay, gray, moist, very plastic, soft | | | | | | |
| 5+ | 60 | Clay, gray, moist, plastic, soft | | | | | | |

EDI Engineering & Science

Page: 1 of 1
Well/Boring No. SB-3
Client: Gage Products
Project No.: 21073

# Well/Boring Log Sheet

| County | Township | Fraction | Section | T | R |
|---|---|---|---|---|---|
| | | 1/4 1/4 1/4 | | | |

**Contractor** CTI & Associates
Address: Novi, MI
313-473-7530
Equipment: CME 45C Mounted on Wood Tiger Tracked
Supervisor: EDI-Ed Culver

**Drilling Method(s)** **Depth**
8" HSA 4 1/4" ID

**Grouting/Seal**
Depth To Material/Method
0-9 Nat Soils

**Development**
N/A

**Screen**
Manufacturer: N/A
Material:
Model:
Slot/Gauge: Dia.:
Length:
Depth Set: To:

Dia. Type Depth Set
N/A To
To

**Remarks**

**Date**
Started: 7/28/89 Finished: 7/28/89

**Elevation**
Casing:
Ground:
Ref. Pt.:

**Water Level** dry hole Ft. Below
Measure On:

**Location**

| Thick-ness | Depth to Base | LITHOLOGIC DESCRIPTION | Sample Depth | Hnu Ambient | Hnu Sample | Blow Counts 1st 6" | 2nd 6" | 3rd 6" |
|---|---|---|---|---|---|---|---|---|
| 1.5 | 1.5 | Sand and Gravel, rubble | 2-3.5 | 1.2 | 0 | - | - | - |
| .8 | 2.3 | Sand, fine, brown, dry | 3.5-5 | 1.2 | 0 | 6 | 7 | 9 |
| 6.7 | 9 | Clay, silty, sandy, mottled, brown to gray, firm, dry | 7.5-9 | - | - | 4 | 11 | 14 |

# EDI Engineering & Science

Page: 1 of 1
Well/Boring No. SB-4
Client: Gage Products
Project No.: 21073

# Well/Boring Log Sheet

| County | Township | Fraction 1/4 1/4 1/4 | Section | T | R |
|---|---|---|---|---|---|
| | | | | | |

**Contractor** CTI & Associates
Address: Novi, MI
313-473-7530
Equipment: CME 45C Mounted on Wood Tiger Tracked
Supervisor: EDI-Ed Culver

**Drilling Method(s)** **Depth**
8" HSA 4 1/4" ID

**Grouting/Seal**
Depth To Material/Method
0-9.5 Nat Soils/Benseal

**Development**
N/A

**Screen**
Manufacturer: N/A
Material:
Model:
Slot/Gauge: Dia.:
Length:
Depth Set: To:

Dia. Type Depth Set
N/A To
To

**Remarks**

**Date**
Started: 7/28/89 Finished: 7/28/89

**Elevation**
Casing:
Ground:
Ref. Pt.:

**Water Level** dry hole Ft. Below
Measure On:

**Location**

| Thick-ness | Depth to Base | LITHOLOGIC DESCRIPTION | Sample Depth | Hnu Ambient | Hnu Sample | Blow Counts 1st 6" | 2nd 6" | 3rd 6" |
|---|---|---|---|---|---|---|---|---|
| 1 | 1 | Topsoil | 2-3.5 | - | - | - | - | - |
| 1.3 | 2.3 | Sand, fine to medium, black, clayey, some rubble | 3.5-5 | .4 | 0 | 4 | 6 | 6 |
| .7 | 3 | Clay, silty, mottled brown to dirty brown, some organic odor, moist, soft | 6.5-8 | .4 | 0 | 6 | 9 | 15 |
| 3 | 6 | Clay, silty, mottled brown to gray, moist, firm | 8-9.5 | .4 | 0 | 8 | 15 | 21 |
| 1.5 | 7.5 | Clay, silty, mottled brown to gray, moist, firm, occasional seam of wet silt | | | | | | |
| 2 | 9.5 | Clay, silty, sandy, pebbles, mottled brown to gray, dry, very firm | | | | | | |

**WW Engineering & Science**
Environmental Services


Well/Boring No. HAB-1 SB-1
Client: Gage
Project No.: 83284.13
Date: Started: 08/27/93 Finished: 08/27/93
Time: Started: 11:15 am Finished: 12:20 pm

# Well/Boring Log Sheet

| State | County | Township | Fraction | Section | T | R |
|---|---|---|---|---|---|---|
| MI | Oakland | Ferndale | NW 1/4 SW 1/4 | 35 | 1N | 11E |

Contractor: WWES
Address: 39209 W. 6 Mile Rd
Livonia, MI 48152
Equipment: Hand Auger
Crew Chief:
WW Supervisor: Andy Kivari

Location: Inside building, inside paint booth ath the former Coca-Cola plant located at Wanda and Jewell St.

| Drilling Method(s) | Depth |
|---|---|
| 3 " Hand Auger | 6.0' |

Ground Surface Elevation (feet):

**Grouting/Seal**

| Depth/To | Material/Method |
|---|---|
| 0.0-0.6' | Concrete |
| 0.6-6.0' | Soil Cuttings |

Remarks:

Water Level: ______ ft. Below ______

| Thick-ness (feet) | Depth to base (feet) | USCS * | Lithologic Description |
|---|---|---|---|
| 0.5 | 0.5 | Other | Concrete |
| 1.1 | 1.6 | Other | FILL:SAND, Fine, Light Brown to Gray, No odor |
| 0.4 | 2.0 | Other | FILL:SAND, Fine, Dark Brown, No Odor, Dry |
| 1.0 | 3.0 | Other | FILL:SAND, Fine, Yellow to Brown, Dry, No Odor |
| 3.0 | 6.0 | CL | CLAY, Some Silt, Trace Sand, Dry, Stiff, No Odor |
| | | | EOB @ 6.0 ' |

| Sample Depth | Blow Counts 6" | 12" | 18" | 24" | PID Headspace | PID Background |
|---|---|---|---|---|---|---|
| 0.0- 2.0' | - | - | - | - | 149.0 | 0.0 |
| 2.0- 4.0' | - | - | - | - | 125.0 | 0.0 |
| 4.0- 6.0' | - | - | - | - | 53.6 | 0.0 |

* = The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

**WW Engineering & Science**
Environmental Services

Page: 1 of 1
Well/Boring No. HAB-2 SB-2
Client: Gage
Project No.: 83284.13
Date: Started: 08/27/93 Finished: 08/27/93
Time: Started: 12:30 pm Finished: 01:20 pm

# Well/Boring Log Sheet

| State | County | Township | Fraction | Section | T | R |
|---|---|---|---|---|---|---|
| MI | Oakland | Ferndale | NW 1/4 SW 1/4 | 35 | 1N | 11E |

Contractor: WWES
Address: 39209 W. 6 Mile Rd
Livonia, MI 48152
Equipment: Hand Auger
Crew Chief:
WW Supervisor: Andy Kivari

Location: West of building, outside near railroad tracks at former Coca-Cola plant located at Wanda and Jewell

| Drilling Method(s) | Depth |
|---|---|
| 3 " Hand Auger | 5.5' |

Ground Surface Elevation (feet):

Grouting/Seal

| Depth/To | Material/Method |
|---|---|
| 0.0-5.5' | Soil Cuttings |

Remarks: Wood debris at 5 foot. Obstruction in borehole at 5.5 feet. Broke auger bit.

Water Level: ______ ft. Below ______

| Thick-ness (feet) | Depth to base (feet) | USCS * | Lithologic Description |
|---|---|---|---|
| 0.5 | 0.5 | Other | FILL:GRAVEL, Medium to Coarse |
| 0.5 | 1.0 | Other | FILL:SAND, Fine, Little Silt, Trace Medium Gravel Light Brown, Dry |
| 4.0 | 5.0 | Other | FILL:CLAY and SILT, Little Sand, Light Brown, Iron Staining/Mottling, Stiff, Dry to Moist |
| 5.5 | 5.5 | CL | CLAY, Little Fine Sand, Gray, Mottling, Soft, Moist |
| | | | EOB @ 5.5 ' |

| Sample Depth | Blow Counts 6" | 12" | 18" | 24" | PID Headspace | PID Background |
|---|---|---|---|---|---|---|
| 0.0- 2.0' | - | - | - | - | 226.0 | 0.0 |
| 2.0- 4.0' | - | - | - | - | 396.0 | 0.0 |

* = The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

**EDI Engineering & Science**

Page: 1 of 1
Well/Boring No. SB-5
Client: Gage Products
Project No.: 21073

# Well/Boring Log Sheet

| County | Township | Fraction 1/4 1/4 1/4 | Section | T | R |
|---|---|---|---|---|---|
| | | | | | |

**Contractor** CTI & Associates
Address: Novi, MI
313-473-7530
Equipment: CME 45C Mounted on Wood Tiger Tracked
Supervisor: EDI-Ed Culver

**Drilling Method(s)** **Depth**
8" HSA 4 1/4" ID 8'

**Grouting/Seal**
Depth To Material/Method
0-9.5 Nat Soils/Benseal

**Development**
N/A

**Screen**
Manufacturer: N/A
Material:
Model:
Slot/Gauge: Dia.:
Length:
Depth Set: To:

Dia. Type Depth Set
N/A To
To

**Remarks**

**Date**
Started: 7/28/89 Finished: 7/28/89

**Elevation**
Casing:
Ground:
Ref. Pt.:

**Water Level** dry hole Ft. Below
Measure On:

**Location**

| Thick-ness | Depth to Base | LITHOLOGIC DESCRIPTION | Sample Depth | Hnu Ambient | Hnu Sample | Blow Counts 1st 6" | Blow Counts 2nd 6" | Blow Counts 3rd 6" |
|---|---|---|---|---|---|---|---|---|
| 1 | 1 | Sand and Gravel, moist | 2-3.5 | 1 | 400 | - | - | - |
| .5 | 1.5 | Concrete rubble | 3.5-5 | 1 | 100 | 3 | 5 | 8 |
| .5 | 2 | Clay, silty, dirty brown, strong gasoline odors | 8-9.5 | 1 | 10 | 15 | 25 | 30 |
| 1.5 | 3.5 | Clay, silty, sandy, mottled brown to gray, some dirty organic lenses, strong gasoline odors | | | | | | |
| 2.5 | 6 | Clay, silty, mottled brown to gray, moist, firm, strong gasoline odor | | | | | | |
| 3.5 | 9.5 | Clay, silty, sandy, occasional pebble, mottled brown to gray, dry, very firm, slight odor | | | | | | |

**WW Engineering & Science, Inc.**
Environmental Services Division

Page: 1 of 1
Well/Boring No. TSB-1
Client: Gage Products
Project No.: 21275

# Well/Boring Log Sheet

| County | Township | Fraction 1/4 1/4 1/4 | Section | T | R |
|---|---|---|---|---|---|
| | | | | | |

**Contractor** Stearns Drilling
Address: Dutton, MI
616-698-7770
Equipment: CME - 550
Dennis & Jeff
Supervisor: Ed Culver

**Drilling Method(s)** **Depth**
8" HSA 4 1/4" ID 11.0'

**Grouting/Seal**

| Depth To | Material/Method |
|---|---|
| 0 - 0.5 | Concrete |
| 0.5 - 2.0 | Benseal & Soils |
| 2.0 - 3.0 | Benseal |
| 3.0 - 11.0 | Benseal & Soils |

**Development**
N/A

**Screen**
Manufacturer: N/A
Material:
Model:
Slot/Gauge: Dia.:
Length:
Depth Set: To:

| Dia. | Type | Depth Set |
|---|---|---|
| N/A | | To |
| | | To |

**Date**
Started: 8/3/90 Finished: 8/3/90

**Elevation**
Casing:
Ground:
Ref. Pt.:

**Water Level** 4.5± Ft. Below concrete
Measure On:

**Location** West of office/Lab Bldg.

**Remarks** Ambient OVA 1.5 ppm

| Thick-ness | (feet) Depth to Base | LITHOLOGIC DESCRIPTION | Sample Depth | Blow Counts 6" | 12" | 18" | Sample OVA (ppm) |
|---|---|---|---|---|---|---|---|
| 0.5 | 0.5 | Concrete | 0.5 - 2.0 | - | - | - | 1 |
| 3.0 | 3.5 | Sand fine brown concrete rubble | 2.0 - 3.5 | 7 | 5 | 1 | 1 |
| 3.0 | 6.5 | Sand fine dirty brown clayey moist pebbles some rubble | 4.0 - 5.5 | 4 | 4 | 1 | 4 |
| 1.5 | 8.0 | Clay dirty brown very sandy very soft | *6.0 - 7.5 | - | - | - | 4 |
| 3.0 | 11.0 | Sand fine to med dirty brown wet | *9.0 - 10.5 | - | - | - | 4 |
| 1.5 | 12.5 | Clay brown sandy pebbles | 11.0 - 12.5 | 10 | 10 | 13 | 4 |

* Note very soft 1/2 blow per foot

**WW Engineering & Science, Inc.**
Environmental Services Division


Well/Boring No. TSB-2
Client: Gage Products
Project No.: 21275

# Well/Boring Log Sheet

| County | Township | Fraction | Section | T | R |
|---|---|---|---|---|---|
| | | 1/4 1/4 1/4 | | | |

**Contractor** Stearns Drilling
Address: Dutton, MI
616-698-7770
Equipment: CME - 550
Dennis & Jeff
Supervisor: Ed Culver

**Drilling Method(s)** **Depth**
8" HSA 4 1/4" ID 12.5'

**Grouting/Seal**
Depth To Material/Method
0 - 0.5 Concrete
0.5 - 2.0 Benseal & Soils
2.0 - 4.0 Benseal
4.0 - 10.0 Benseal & Soils

**Development**
N/A

**Screen**
Manufacturer: N/A
Material:
Model:
Slot/Gauge: Dia.:
Length:
Depth Set: To:

Dia. Type Depth Set
N/A To
To

**Date**
Started: 8/3/90 Finished: 8/3/90

**Elevation**
Casing:
Ground:
Ref. Pt.:

**Water Level** 4'± Ft. Below concrete
Measure On:

**Location** West of office/Lab Bldg.

**Remarks** Ambient OVA 6 ppm

| Thick-ness | (feet) Depth to Base | LITHOLOGIC DESCRIPTION | Sample Depth | Blow Counts 6" | 12" | 18" | Sample OVA (ppm) |
|---|---|---|---|---|---|---|---|
| 0.5 | 0.5 | Concrete | 0.5 - 2.0 | 4 | 2 | 2 | 15 |
| 2.0 | 3.0 | Sand fine to med brown | 2.0 - 3.5 | - | - | - | 200 |
| | | Sand fine to med clayey brown wet | 4.0 - 5.5 | 0 | 1 | 2 | 100 |
| 2.0 | 5.0 | Clay brown to dirty brown very sandy moist | 6.0 - 7.5 | 2 | 1 | 1 | 30 |
| 6.0 | 11.0 | Sand fine to med dirty brown wet | 9.0 - 10.5 | - | - | - | 100 |
| 1.5 | 12.5 | Clay brown sandy pebbles | 11.0 - 12.5 | 7 | 10 | 13 | 50 |

**WW Engineering & Science, Inc.**
Environmental Services Division

Page: 1 of 1
Well/Boring No. TSB-3
Client: Gage Products
Project No.: 21275

# Well/Boring Log Sheet

| County | Township | Fraction 1/4 1/4 1/4 | Section | T | R |
|---|---|---|---|---|---|
| | | | | | |

**Contractor** Stearns Drilling
Address: Dutton, MI
616-698-7770
Equipment: CME - 550
Dennis & Jeff
Supervisor: Ed Culver

**Drilling Method(s)** **Depth**
8" HSA 4 1/4" ID 9.0'

**Grouting/Seal**

| Depth To | Material/Method |
|---|---|
| 0 - 0.5 | Concrete |
| 0.5 - 10.5' | Benseal & Natural Soils |

**Development**
N/A

**Screen**
Manufacturer: N/A
Material:
Model:
Slot/Gauge: Dia.:
Length:
Depth Set: To:

Dia. Type Depth Set
N/A To
To

**Remarks** Ambient OVA 9 ppm

**Date**
Started: 8/3/90 Finished: 8/3/90

**Elevation**
Casing:
Ground:
Ref. Pt.:

**Water Level** 4.0' Ft. Below concrete
Measure On:

**Location** East of Tank Farm

| Thick-ness | (feet) Depth to Base | LITHOLOGIC DESCRIPTION | Sample Depth | Blow Counts 6" | 12" | 18" | Sample OVA (ppm) |
|---|---|---|---|---|---|---|---|
| 0.5 | 0.5 | Concrete | 0.5 - 2.0 | 2 | 1 | 2 | 150 |
| 0.5 | 1.0 | Sand fine to med brown | 2.0 - 3.5 | 1 | 1 | 1 | .15% |
| 3.0 | 4.0 | Sand fine black odor bits of plastic sheeting | *4.0 - 5.5 | - | - | - | .2% |
| 1.0 | 5.0 | Sand fine to med black wet odor | 6.0 - 7.5 | 5 | 8 | 9 | .50 |
| 1.0 | 6.0 | Pea stone wet (pieces of underdrain PVC) | 9.0 - 10.5 | 4 | 7 | 10 | .50 |
| 4.5 | 10.5 | Clay mottled brown to gray sandy pebbles | | | | | |
| | | * no sample | | | | | |

**WW Engineering & Science, Inc.**
Environmental Services Division


Well/Boring No. TSB-4
Client: Gage Products
Project No.: 21275

# Well/Boring Log Sheet

| County | Township | Fraction 1/4 1/4 1/4 | Section | T | R |
|---|---|---|---|---|---|
| | | | | | |

**Contractor** Stearns Drilling
Address: Dutton, MI
616-698-7770
Equipment: CME - 550
Dennis & Jeff
Supervisor: Ed Culver

**Drilling Method(s)** **Depth**
8" HSA 4 1/4" ID 9.0'

**Grouting/Seal**
Depth To Material/Method
0 - 0.5 Concrete
0.5 - 10.5' Benseal & Natural Soils

**Development**
N/A

**Screen**
Manufacturer: N/A
Material:
Model:
Slot/Gauge: Dia.:
Length:
Depth Set: To:

Dia. Type Depth Set
N/A To
To

**Remarks** Ambient HNU 9 ppm

**Date**
Started: 8/6/90 Finished: 8/6/90

**Elevation**
Casing:
Ground:
Ref. Pt.:

**Water Level** dry hole Ft. Below
Measure On:

**Location** N of mixing/filling bldg.

| Thick-ness | (feet) Depth to Base | LITHOLOGIC DESCRIPTION | Sample Depth | Blow Counts 6" | 12" | 18" | Sample HNU (ppm) |
|---|---|---|---|---|---|---|---|
| 0.5 | 0.5 | Concrete | 0.5 - 2.0 | 2 | 2 | 3 | 6* |
| 2.0 | 2.5 | Sand fine greenish brown | 2.0 - 3.5 | 2 | 4 | 4 | 12* |
| 2.5 | 5.0 | Clay mottled brown to gray sandy | 4.0 - 5.5 | 3 | 6 | 7 | 11 |
| 5.5 | 10.5 | Clay mottled brown sandy pebbles | 6.0 - 7.5 | 4 | 10 | 14 | 7* |
| | | | 9.0 - 10.5 | 5 | 11 | 14 | 5* |
| | | *Sample Collected | | | | | |

**WW Engineering & Science, Inc.**
Environmental Services Division


Well/Boring No. C-SB-1
Client: Gage Products
Project No.: 21275

# Well/Boring Log Sheet

| County | Township | Fraction | Section | T | R |
|---|---|---|---|---|---|
| | | 1/4 1/4 1/4 | | | |

**Contractor** Stearns Drilling
Address: Dutton, MI
616-698-7770
Equipment: CME - 550
Dennis & Jeff
Supervisor: Ed Culver

**Drilling Method(s)** **Depth**
8" HSA 4 1/4" ID 9.0

**Grouting/Seal**
Depth To Material/Method
0 - 10.5 Benseal & Nat. Soils

**Development**
N/A

**Screen**
Manufacturer: N/A
Material:
Model:
Slot/Gauge: Dia.:
Length:
Depth Set: To:

Dia. Type Depth Set
N/A To
To

**Remarks** Ambient OVA 7 ppm

**Date**
Started: 7/31/90 3:40 pm Finished: 7/31/90 4:00 pm

**Elevation**
Casing:
Ground:
Ref. Pt.:

**Water Level** dry hole Ft. Below
Measure On:

**Location**

| Thick-ness | (feet) Depth to Base | LITHOLOGIC DESCRIPTION | Sample Depth | Blow Counts 6" | 12" | 18" | Sample OVA (ppm) |
|---|---|---|---|---|---|---|---|
| 0.8 | 0.8 | Railroad ballast | 0.0 - 1.5 | - | - | - | - |
| 0.7 | 1.5 | Sand fine black some trash odor | 3.0 - 4.5 | 3 | 1 | 2 | .5% |
| 7.0 | 8.5 | Clay mottled gray to brown trace sand solvent odor | 6.0 - 7.5 | 2 | 3 | 3 | 30 |
| 2.0+ | 10.5 | Clay brown sandy trace odor | 9.0 - 10.5 | 5 | 11 | 17 | 15 |

**WW Engineering & Science, Inc.**
Environmental Services Division

Page: 1 of 1
Well/Boring No. TSB-5
Client: Gage Products
Project No.: 21275

# Well/Boring Log Sheet

| County | Township | Fraction | Section | T | R |
|---|---|---|---|---|---|
| | | 1/4 1/4 1/4 | | | |

**Contractor** Stearns Drilling
Address: Dutton, MI
616-698-7770
Equipment: CME - 550
Dennis & Jeff
Supervisor: Ed Culver

**Drilling Method(s)** **Depth**
8" HSA 4 1/4" ID 9.0'

**Grouting/Seal**
Depth To Material/Method
0 - 0.5 Concrete
0.5 - 10.5' Benseal & Natural Soils

**Development**
N/A

**Screen**
Manufacturer: N/A
Material:
Model:
Slot/Gauge: Dia.:
Length:
Depth Set: To:

Dia. Type Depth Set
N/A To
To

**Date**
Started: 8/6/90 Finished: 8/6/90

**Elevation**
Casing:
Ground:
Ref. Pt.:

**Water Level** 4.2' Ft. Below concrete
Measure On:

**Location** NE of Roll House (remanufacturing)

**Remarks** Ambient HNU 2 ppm

| Thickness | (feet) Depth to Base | LITHOLOGIC DESCRIPTION | Sample Depth | Blow Counts 6" | Blow Counts 12" | Blow Counts 18" | Sample HNU (ppm) |
|---|---|---|---|---|---|---|---|
| 0.6 | 0.6 | Concrete | 0.5 - 2.0 | 14 | 20 | 6 | 50* |
| 0.6 | 1.2 | Sand fine black | 2.0 - 3.5 | 3 | 2 | 2 | 140* |
| 0.6 | 1.8 | Gravel | 4.0 - 5.5 | 1 | 2 | 1 | 15* |
| 1.2 | 3.0 | Sand fine black | 6.0 - 7.5 | 4 | 6 | 7 | 7* |
| 3.0 | 6.0 | Sand fine dirty brown clayey wet | 9.0 - 10.5 | 7 | 11 | 13 | 5* |
| 2.0 | 8.0 | Clay brownish gray silty odor | | | | | |
| 2.5+ | 10.5 | Clay gray sandy pebbles | | | | | |
| | | *Sample Collected | | | | | |

WW Engineering & Science, Inc.

# Log of Boring



Project No. 83284

Client Gage Products Company
Location 625 Wanda Ave. Ferndale, Michigan
Logged By M. Vincent
Driller R. Christensen
Contractor Stearns Drilling

Boring Designation SB-8
Start Date 2-11-92 Completed 2-11-92
Ground Surface Elevation: 637.8 based on U.S.G.S. datum

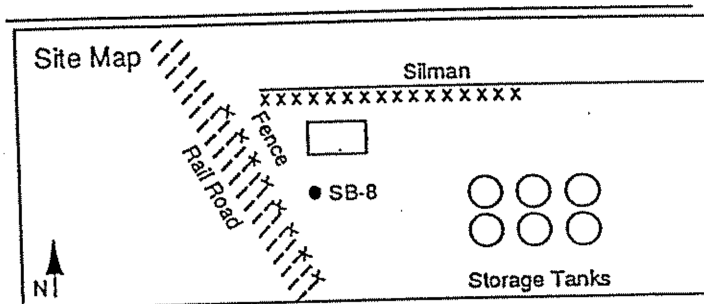
| Drilling Method(s) | Depth Range |
|---|---|
| 4.25 inch I.D. Hollow Stem Auger 8 inch O.D. | 0.0-37.5 feet |

| Sampling Method(s) | Depth Range |
|---|---|
| 2 inch O.D. Split Spoon | 0.0-37.5 feet 2.5 foot interval |

| Grouting Material/Method | Depth Range |
|---|---|
| Portland Cement and Bentonite | 0.0-37.5 feet |

Ground-Water Data
Ground water was not encountered during drilling.

General Notes
Unified Soil Classification System is presented in brackets [ ].
"NT" = Not Tested




| Borehole Depth (feet) | Sample Type and Number | Depth of Sample Tip (feet) | Sample Recovered (inches) | Hammer Blows (6-inch Intervals) | Standard Penetration (N) | Natural Moisture Content (%) | Field Data PID Reading (ppm) | Graphic Log | Depth Below Ground Surface (feet) | Subsurface Description |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 0.0 | CEMENT |
| 1 | | | | | | | | | 0.7 | ROAD GRAVEL - FILL |
| 2 | SS-1 | 2.5 | 11 | 2 2 3 | 5 | 15.8 | 1001 | | 1.2 | Loose Black SILTY SAND, trace clay, gravel and organics, moist, odor [SM] |
| 3 | | | | | | | | | 3.5 | Medium Gray CLAY, trace silt and fine gravel, moist, odor |
| 4, 5 | SS-2 | 5.0 | 15 | 2 2 5 | 7 | NT | 575 | | | |
| 6 | | | | | | | | | 6.0 | Medium Gray and Light Brown Mottled SANDY CLAY, some silt, trace gravel, moist, slight odor [CL] |
| 7 | SS-3 | 7.5 | 13 | 3 3 4 | 7 | NT | 423 | | | |
| 8, 9 | | | | | | | | | 9.0 | Very Stiff |
| 10 | SS-4 | 10.0 | 18 | 4 9 14 | 23 | 12.7 | 87.6 | | | |
| 11 | | | | | | | | | 11.5 | Hard |
| 12 | SS-5 | 12.5 | 18 | 10 16 27 | 43 | NT | 64.7 | | | |
| 13, 14 | | | | | | | | | | |
| 15 | SS-6 | 15.0 | 17 | 9 15 21 | 36 | NT | 69.7 | | | |
| 16 | | | | | | | | | 16.0 | Very Stiff Gray SANDY CLAY, some silt, trace gravel, moist [CL] |
| 17 | SS-7 | 17.5 | 17 | 10 17 24 | 41 | NT | 0.0 | | | |
| 18, 19 | | | | | | | | | | |
| 20 | SS-8 | 20.0 | 17 | 4 7 10 | 17 | NT | 0.0 | | | |

WW Engineering & Science, Inc.

# Log of Boring



Project No. 83284

Client: Gage Products Company

Location: 625 Wanda Ave. Ferndale, Michigan

Notes:

Boring Designation: SB-8

Start Date: 2-11-92 Completed: 2-11-92

Ground Surface Elevation: 637.8 based on U.S.G.S. datum

| Borehole Depth (feet) | Sample Type and Number | Depth of Sample Tip (feet) | Sample Recovered (Inches) | Hammer Blows (6-Inch Intervals) | Standard Penetration (N) | Natural Moisture Content (%) | Field Data PID Reading (ppm) | Graphic Log | Depth Below Ground Surface (feet) | Subsurface Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 21 | | | | | | | | | | Very Stiff Gay SANDY CLAY, some silt, trace gravel, moist [CL] |
| 22 | SS-9 | 22.5 | 18 | 10 / 16 / 23 | 39 | NT | 0.0 | | | |
| 23 | | | | | | | | | | |
| 24 | | | | | | | | | | |
| 25 | SS-10 | 25.0 | 16 | 4 / 8 / 10 | 18 | NT | 0.0 | | | |
| 26 | | | | | | | | | | |
| 27 | SS-11 | 27.5 | 18 | 9 / 11 / 14 | 25 | NT | 0.0 | | | |
| 28 | | | | | | | | | | |
| 29 | | | | | | | | | | |
| 30 | SS-12 | 30.0 | 18 | 4 / 7 / 10 | 17 | NT | 0.0 | | | |
| 31 | | | | | | | | | | |
| 32 | SS-13 | 32.5 | 18 | 7 / 9 / 18 | 27 | NT | 0.0 | | | |
| 33 | | | | | | | | | | |
| 34 | | | | | | | | | | |
| 35 | SS-14 | 35.0 | 18 | 4 / 7 / 10 | 17 | NT | 0.0 | | (35.0) | Shelby Tube sample collected, 30 inch recovery |
| 36 | | | | | | | | | | |
| 37 | ST-1 | 37.5 | | | | 15.2 | | | | |
| 38 | | | | | | | | | | END OF BORING AT 37.5 FEET |

Figure

WW Engineering & Science, Inc.

# Log of Boring

Project No. 83284

Client: Gage Products Company
Location: 625 Wanda Ave. Ferndale, Michigan
Logged By: M. Vincent
Driller: R. Christensen
Contractor: Stearns Drilling

Boring Designation: SB-9
Start Date: 2-11-92 Completed: 2-11-92
Ground Surface Elevation: 638.0 based on U.S.G.S. datum.

| Drilling Method(s) | Depth Range |
|---|---|
| 4.25 inch I.D. Hollow Stem Auger 8 inch O.D. | 0.0-30.0 feet |

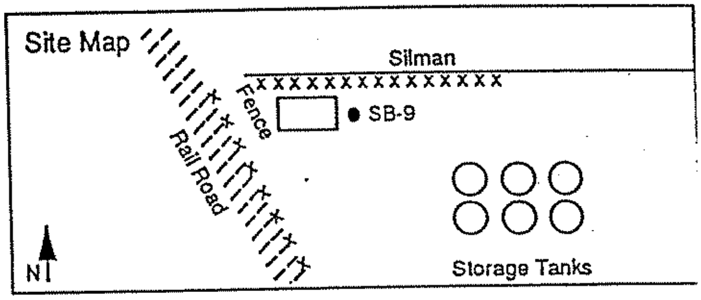
| Sampling Method(s) | Depth Range |
|---|---|
| 2 inch O.D. Split Spoon | 0.0-30.0 feet 2.5 foot interval |

| Grouting Material/Method | Depth Range |
|---|---|
| Portland Cement and Bentonite | 0.0-30.0 feet |

Ground-Water Data
Ground water was not encountered during drilling.

General Notes
Unified Soil Classification System is presented in brackets [ ]
"NT" = Not Tested

Site Map




| Borehole Depth (feet) | Sample Type and Number | Depth of Sample Tip (feet) | Sample Recovered (inches) | Hammer Blows (6-Inch Intervals) | Standard Penetration (N) | Natural Moisture Content (%) | Field Data PID Reading (ppm) | Graphic Log | Depth Below Ground Surface (feet) | Subsurface Description |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 0.0 | CONCRETE |
| 1 | | | | | | | | | 0.7 | ROAD GRAVEL - FILL, odor |
| 2 | SS-1 | 2.5 | 7 | 6 4 | 10 | NT | 201 | | | |
| 3 | | | | | | | | | 3.5 | Loose Brown Fine SAND, rubble, wet, slight odor |
| 4 | | | | 4 4 2 | | | | | | |
| 5 | SS-2 | 5.0 | 12 | | 6 | NT | 298 | | | |
| 6 | | | | 9 8 11 | | | | | 6.0 | Very Stiff Gray and Brown SILTY CLAY, moist |
| 7 | SS-3 | 7.5 | 16 | | 19 | NT | 53.8 | | | |
| 8 | | | | | | | | | 8.5 | Very Stiff Brown SILTY CLAY, gray mottling, trace fine gravel, most |
| 9 | | | | 4 9 14 | | | | | | |
| 10 | SS-4 | 10.0 | 15 | | 23 | NT | 32.6 | | 10.5 | Medium Compact Brown SILT, saturated |
| 11 | | | | 9 11 12 | | | | | 11.2 | Medium Compact Gray SANDY CLAY, some silt, trace gravel, moist [CL] |
| 12 | SS-5 | 12.5 | 16 | | 23 | NT | 0.0 | | | |
| 13 | | | | | | | | | | |
| 14 | | | | 4 8 11 | | | | | | |
| 15 | SS-6 | 15.0 | 17 | | 19 | 10.6 | 0.0 | | | |
| 16 | | | | 7 12 19 | | | | | | (16.0) Hard |
| 17 | SS-7 | 17.5 | 17 | | 31 | NT | 0.0 | | | |
| 18 | | | | | | | | | | |
| 19 | | | | 4 7 8 | | | | | | |
| 20 | SS-8 | 20.0 | 14 | | 15 | NT | 0.0 | | | |

WW Engineering & Science, Inc.

# Log of Boring



Project No. 83284

Client Gage Products Company

Location 625 Wanda Ave. Ferndale, Michigan

Notes

Boring Designation SB-9

Start Date 2-11-92 Completed 2-11-92

Ground Surface Elevation: 638.0 based on U.S.G.S. datum.

| Borehole Depth (feet) | Sample Type and Number | Depth of Sample Tip (feet) | Sample Recovered (inches) | Hammer Blows (6-Inch Intervals) | Standard Penetration (N) | Natural Moisture Content (%) | Field Data PID Reading (ppm) | Graphic Log | Depth Below Ground Surface (feet) | Subsurface Description |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Hard Gray SANDY CLAY, some silt, trace gravel, moist [CL] |
| 21 | | | | | | | | | | |
| 22 | SS-9 | 22.5 | 12 | 9 / 17 / 26 | 43 | NT | 0.0 | | | |
| 23 | | | | | | | | | | |
| 24 | | | | | | | | | | |
| 25 | SS-10 | 25.0 | 18 | 4 / 7 / 13 | 20 | NT | 0.0 | | | |
| 26 | | | | | | | | | | |
| 27 | SS-11 | 27.5 | 18 | 7 / 13 / 18 | 31 | NT | 0.0 | | | |
| 28 | | | | | | | | | | |
| 29 | | | | | | | | | | |
| 30 | SS-12 | 30.0 | 18 | 4 / 7 / 10 | 17 | NT | 0.0 | | | END OF BORING AT 30.0 FEET |
| 31 | | | | | | | | | | |
| 32 | | | | | | | | | | |
| 33 | | | | | | | | | | |
| 34 | | | | | | | | | | |
| 35 | | | | | | | | | | |
| 36 | | | | | | | | | | |
| 37 | | | | | | | | | | |
| 38 | | | | | | | | | | |

Figure

**WW Engineering & Science, Inc.**

# Log of Boring

Project No. 83284

Client: Gage Products Company
Location: 625 Wanda Ave. Ferndale, Michigan
Logged By: M. Vincent
Driller: R. Christensen
Contractor: Stearns Drilling

Boring Designation: SB-10
Start Date: 2-10-92 Completed: 2-10-92
Ground Surface Elevation: 634.9 based on U.S.G.S. datum.

| Drilling Method(s) | Depth Range |
|---|---|
| 4.25 inch I.D. Hollow Stem Auger 8 inch O.D. | 0.0-30.0 feet |

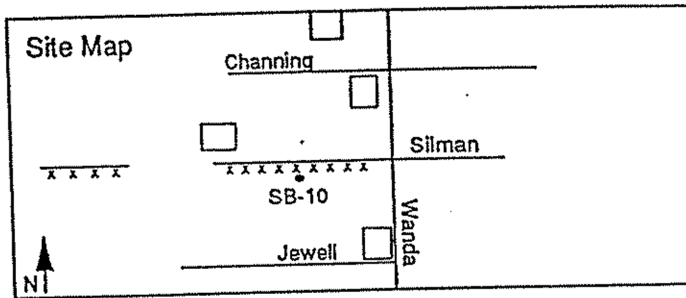
| Sampling Method(s) | Depth Range |
|---|---|
| 2 inch O.D. Split Spoon | 0.0-30.0 feet 2.5 foot interval |

| Grouting Material/Method | Depth Range |
|---|---|
| Portland Cement and Bentonite | 0.0-30.0 feet |

Ground-Water Data
Ground water was not encountered during drilling.

General Notes
Unified Soil Classification System is presented in brackets [ ]
"NT" = Not Tested

Site Map




| Borehole Depth (feet) | Sample Type and Number | Depth of Sample Tip (feet) | Sample Recovered (inches) | Hammer Blows (6-Inch Intervals) | Standard Penetration (N) | Natural Moisture Content (%) | Field Data PID Reading (ppm) | Graphic Log | Depth Below Ground Surface (feet) | Subsurface Description |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 0.0 | CONCRETE |
| 1 | | | | | | | | | 0.5 | Medium Greenish Brown Gray Mottled SILTY CLAY, trace fine sand and fine gravel, moist, anerobic odor |
| 2 | SS-1 | 2.5 | 8 | 2 / 2 / 3 | 5 | NT | 187 | | | |
| 3 | | | | | | | | | | |
| 4 | | | | | | | | | 3.5 | Very Stiff Greenish Gray and Brown Mottled SILTY CLAY, trace fine gravel, moist, slight anerobic odor |
| 5 | SS-2 | 5.0 | 14 | 3 / 7 / 11 | 18 | NT | 57.1 | | | |
| 6 | | | | | | | | | 6.0 | Hard Light Brown SANDY CLAY, some silt, trace gravel, dry [CL] |
| 7 | SS-3 | 7.5 | 17 | 9 / 16 / 23 | 39 | 13.4 | 39.8 | | | |
| 8 | | | | | | | | | | |
| 9 | | | | | | | | | | |
| 10 | SS-4 | 10.0 | 18 | 6 / 14 / 20 | 34 | NT | 6.7 | | | |
| 11 | | | | | | | | | | (11.0) Gray with brown mottling |
| 12 | SS-5 | 12.5 | 14 | 8 / 14 / 15 | 29 | NT | 1.1 | | | |
| 13 | | | | | | | | | | |
| 14 | | | | | | | | | | |
| 15 | SS-6 | 15.0 | 15 | 4 / 6 / 9 | 15 | NT | 1.0 | | | |
| 16 | | | | | | | | | | |
| 17 | SS-7 | 17.5 | 15 | 7 / 12 / 18 | 30 | NT | 0.0 | | | (17.5) Shelby Tube Sample Collected 30 inch recovery |
| 18 | | | | | | | | | | |
| 19 | | | | | | | | | | |
| 20 | ST-1 | 20.0 | | | | 13.7 | | | | |

WW Engineering & Science, Inc.

# Log of Boring

Project No. 83284

Client Gage Products Company
Location 625 Wanda Ave. Ferndale, Michigan
Notes

Boring Designation SB-10
Start Date 2-10-92 Completed 2-10-92
Ground Surface Elevation: 634.9 based on U.S.G.S. datum.

| Borehole Depth (feet) | Sample Type and Number | Depth of Sample Tip (feet) | Sample Recovered (inches) | Hammer Blows (6-Inch Intervals) | Standard Penetration (N) | Natural Moisture Content (%) | Field Data PID Reading (ppm) | Graphic Log | Depth Below Ground Surface (feet) | Subsurface Description |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | Hard Light Brown SANDY CLAY, some silt, trace gravel, dry [CL] |
| 21 | | | | | | | | | | |
| 22 | | | | | | | | | | |
| 23 | | | | | | | | | | |
| 24 | | | | | | | | | | |
| 25 | SS-8 | 25.0 | 16 | 4 / 7 / 9 | 16 | NT | 0.0 | | | |
| 26 | | | | | | | | | | |
| 27 | | | | | | | | | | |
| 28 | | | | | | | | | | |
| 29 | | | | | | | | | | |
| 30 | SS-9 | 30.0 | 17 | 4 / 7 / 11 | 17 | NT | 0.0 | | | END OF BORING AT 30.0 FEET |
| 31 | | | | | | | | | | |
| 32 | | | | | | | | | | |
| 33 | | | | | | | | | | |
| 34 | | | | | | | | | | |
| 35 | | | | | | | | | | |
| 36 | | | | | | | | | | |
| 37 | | | | | | | | | | |
| 38 | | | | | | | | | | |

Figure

WW Engineering & Science, Inc.

# Log of Boring



Project No. 83284

Client: Gage Products Company
Location: 625 Wanda Ave. Ferndale, Michigan
Logged By: M. Vincent
Driller: R. Christensen
Contractor: Stearns Drilling

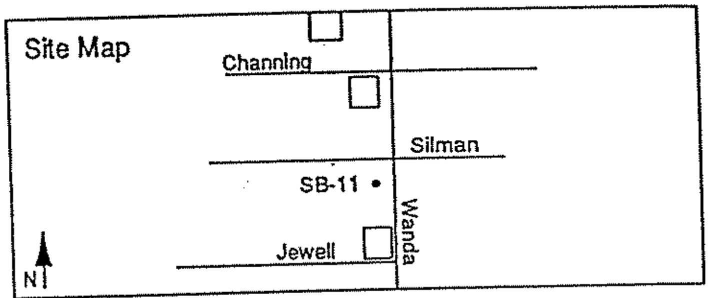
Boring Designation: SB-11
Start Date: 2-10-92 Completed: 2-10-92
Ground Surface Elevation: 634.9 based on U.S.G.S. datum.

| Drilling Method(s) | Depth Range |
|---|---|
| 4.25 inch I.D. Hollow Stem Auger 8 inch O.D. | 0.0-30.0 feet |

| Sampling Method(s) | Depth Range |
|---|---|
| 2 inch O.D. Split Spoon | 0.0-30.0 feet 2.5 foot interval |

| Grouting Material/Method | Depth Range |
|---|---|
| Portland Cement and Bentonite | 0.0-30.0 feet |

Ground-Water Data
Ground water was not encountered during drilling.




General Notes
Unified Soil Classification System is presented in brackets [ ]
"NT" = Not Tested

| Borehole Depth (feet) | Sample Type and Number | Depth of Sample Tip (feet) | Sample Recovered (Inches) | Hammer Blows (6-inch Intervals) | Standard Penetration (N) | Natural Moisture Content (%) | Field Data PID Reading (ppm) | Graphic Log | Depth Below Ground Surface (feet) | Subsurface Description |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 0.0 | CONCRETE |
| | | | | | | | | | 0.6 | Stiff Greenish Gray CLAY, trace silt, damp, slight odor and staining |
| 1 | | | | | | | | | | |
| 2 | SS-1 | 2.5 | 16 | 3 4 5 | 9 | NT | 190 | | | |
| 3 | | | | | | | | | 3.5 | Stiff Brown and Gray Mottled SANDY CLAY, some silt, trace gravel, moist [CL] |
| 4 | | | | | | | | | | |
| 5 | SS-2 | 5.0 | 15 | 2 4 7 | 11 | NT | 64.3 | | | |
| 6 | | | | | | | | | | |
| 7 | SS-3 | 7.5 | 17 | 9 7 14 | 21 | NT | 78.2 | | | |
| 8 | | | | | | | | | | |
| 9 | | | | | | | | | | |
| 10 | SS-4 | 10.0 | 17 | 4 8 17 | 25 | NT | 76.9 | | | |
| 11 | | | | | | | | | | (11.0) Random sand lenses approximately 1/4 inch thick |
| 12 | SS-5 | 12.5 | 16 | 6 11 15 | 26 | NT | 53.3 | | | |
| 13 | | | | | | | | | | |
| 14 | | | | | | | | | | |
| 15 | SS-6 | 15.0 | 15 | 5 8 10 | 18 | NT | 23.5 | | | |
| 16 | | | | | | | | | | (16.0) No sand lenses |
| 17 | SS-7 | 17.5 | 16 | 6 9 15 | 24 | NT | 34.7 | | | |
| 18 | | | | | | | | | | |
| 19 | | | | | | | | | | |
| 20 | SS-8 | 20.0 | 14 | 4 6 10 | 26 | NT | 47.8 | | | |

WW Engineering & Science, Inc.

# Log of Boring

Project No. 83284

Client Gage Products Company
Location 625 Wanda Ave. Ferndale, Michigan
Notes

Boring Designation SB-11
Start Date 2-10-92 Completed 2-10-92
Ground Surface Elevation: 634.9 based on U.S.G.S. datum.

| Borehole Depth (feet) | Sample Type and Number | Depth of Sample Tip (feet) | Sample Recovered (Inches) | Hammer Blows (6-Inch Intervals) | Standard Penetration (N) | Natural Moisture Content (%) | Field Data PID Reading (ppm) | Graphic Log | Depth Below Ground Surface (feet) | Subsurface Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 21 | | | | 7 | | | | | | Stiff Brown and Gray Mottled SANDY CLAY, some silt, trace gravel, moist [CL] |
| | | | | 8 | | | | | | |
| 22 | SS-9 | 22.5 | 17 | 13 | 21 | NT | 7.7 | | | |
| 23 | | | | | | | | | | |
| 24 | | | | 5 | | | | | | |
| | | | | 7 | | | | | | |
| 25 | SS-10 | 25.0 | 18 | 9 | 16 | NT | 3.5 | | | |
| 26 | | | | 5 | | | | | | |
| | | | | 7 | | | | | | |
| 27 | SS-11 | 27.5 | 18 | 13 | 20 | NT | 0.3 | | | |
| 28 | | | | 3 | | | | | | |
| 29 | | | | 5 | | | | | | |
| 30 | SS-12 | 30.0 | 14 | 9 | 14 | 15.0 | 0.0 | | | END OF BORING AT 30.0 FEET |
| 31 | | | | | | | | | | |
| 32 | | | | | | | | | | |
| 33 | | | | | | | | | | |
| 34 | | | | | | | | | | |
| 35 | | | | | | | | | | |
| 36 | | | | | | | | | | |
| 37 | | | | | | | | | | |
| 38 | | | | | | | | | | |

Figure

Project No. 83284

**WW Engineering & Science, Inc.**

# Log of Boring

Client: Gage Products Company
Location: 625 Wanda Ave. Ferndale, Michigan
Logged By: M. Vincent
Driller: R. Christensen
Contractor: Stearns Drilling

Boring Designation: SB-12
Start Date: 2-12-92 Completed: 2-12-92

Ground Surface Elevation: 636.6 based on U.S.G.S. datum.

| Drilling Method(s) | Depth Range |
|---|---|
| 4.25 inch I.D. Hollow Stem Auger 8 inch O.D. | 0.0-30.0 feet |

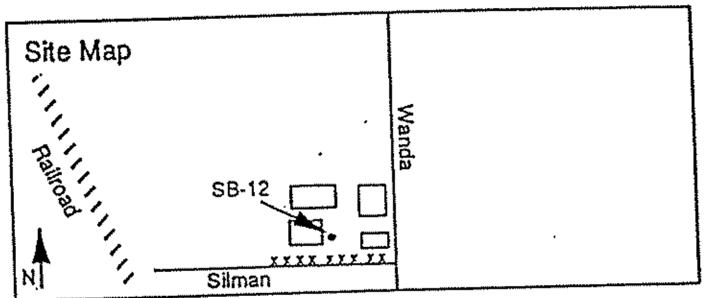
| Sampling Method(s) | Depth Range |
|---|---|
| 2 inch O.D. Split Spoon | 0.0-30.0 feet<br>2.5 foot interval |

| Grouting Material/Method | Depth Range |
|---|---|
| Portland Cement and Bentonite | 0.0-30.0 feet |

Ground-Water Data
Ground water was not encountered during drilling.

General Notes
Unified Soil Classification System is presented in brackets [ ]
"NT" = Not Tested

Site Map




| Borehole Depth (feet) | Sample Type and Number | Depth of Sample Tip (feet) | Sample Recovered (Inches) | Hammer Blows (6-Inch Intervals) | Standard Penetration (N) | Natural Moisture Content (%) | Field Data PID Reading (ppm) |
|---|---|---|---|---|---|---|---|
| 0-2.5 | SS-1 | 2.5 | 17 | 5, 6, 4 | 10 | NT | 17.4 |
| 2.5-5 | SS-2 | 5.0 | 15 | 4, 6, 9 | 15 | NT | 2.3 |
| 5-7.5 | SS-3 | 7.5 | 16 | 3, 7, 13 | 20 | NT | 1.0 |
| 7.5-10 | SS-4 | 10.0 | 18 | 6, 9, 21 | 30 | NT | 0.3 |
| 10-12.5 | SS-5 | 12.5 | 18 | 8, 15, 24 | 39 | 12.5 | 0.3 |
| 12.5-15 | SS-6 | 15.0 | 18 | 4, 7, 11 | 18 | NT | 0.5 |
| 15-17.5 | SS-7 | 17.5 | 18 | 8, 12, 18 | 30 | NT | 0.0 |
| 17.5-20 | SS-8 | 20.0 | 18 | 4, 6, 10 | 16 | NT | 0.0 |

| Depth Below Ground Surface (feet) | Subsurface Description |
|---|---|
| 0.0 | CONCRETE |
| 0.7 | Loose Black Fine SAND, dry, slight odor |
| 1.3 | Loose Brown Fine SAND, slightly moist, no odor |
| 1.7 | Stiff Greenish Gray and Brown Mottled CLAYEY SILT, dry, no odor |
| 2.5 | Stiff Greenish Gray and Brown Mottled CLAY, trace silt and fine gravel, moist, no odor |
| 6.0 | Stiff Brown and Gray Mottled CLAYEY SILT, moist, no odor |
| 6.8 | Stiff Brown and Gray Mottled CLAYEY SILT, some sand, moist, no odor [CL]<br>(8.5) Very Stiff, trace fine gravel |
| 13.5 | Very Stiff Gray SANDY CLAY, some silt trace gravel, moist, plastic, no odor [CL] |

WW Engineering & Science, Inc.

# Log of Boring

Project No. 83284

Client Gage Products Company
Location 625 Wanda Ave. Ferndale, Michigan
Notes

Boring Designation SB-12
Start Date 2-12-92 Completed 2-12-92
Ground Surface Elevation: 636.6 based on U.S.G.S. datum.

| Borehole Depth (feet) | Sample Type and Number | Depth of Sample Tip (feet) | Sample Recovered (inches) | Hammer Blows (6-Inch Intervals) | Standard Penetration (N) | Natural Moisture Content (%) | Field Data PID Reading (ppm) | Graphic Log | Depth Below Ground Surface (feet) | Subsurface Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 21 | | | | 12 18 21 | | | | | | Very Stiff Gray SANDY CLAY, some silt trace gravel, moist, plastic, no odor [CL] |
| 22 | SS-9 | 22.5 | 18 | | 39 | NT | 0.0 | | | |
| 23 | | | | | | | | | | |
| 24 | | | | 5 8 12 | | | | | | |
| 25 | SS-10 | 25.0 | 18 | | 20 | 13.5 | 0.0 | | | |
| 26 | | | | | | | | | | |
| 27 | SS-11 | 27.5 | 18 | 10 12 17 | 29 | NT | 0.0 | | | |
| 28 | | | | | | | | | | |
| 29 | | | | 4 4 10 | | | | | | |
| 30 | SS-12 | 30.0 | 18 | | 14 | NT | 0.0 | | | END OF BORING AT 30.0 FEET |
| 31 | | | | | | | | | | |
| 32 | | | | | | | | | | |
| 33 | | | | | | | | | | |
| 34 | | | | | | | | | | |
| 35 | | | | | | | | | | |
| 36 | | | | | | | | | | |
| 37 | | | | | | | | | | |
| 38 | | | | | | | | | | |

Figure

WW Engineering & Science, Inc.

# Log of Boring

Project No. 83284

Client: Gage Products Company
Location: 625 Wanda Ave. Ferndale, Michigan
Logged By: M. Vincent
Driller: R. Christensen
Contractor: Stearns Drilling

Boring Designation: SB-14
Start Date: 2-12-92 Completed: 2-12-92
Ground Surface Elevation: 635.8 based on U.S.G.S. datum.

| Drilling Method(s) | Depth Range |
|---|---|
| 4.25 inch I.D. Hollow Stem Auger 8 inch O.D. | 0.0-30.0 feet |

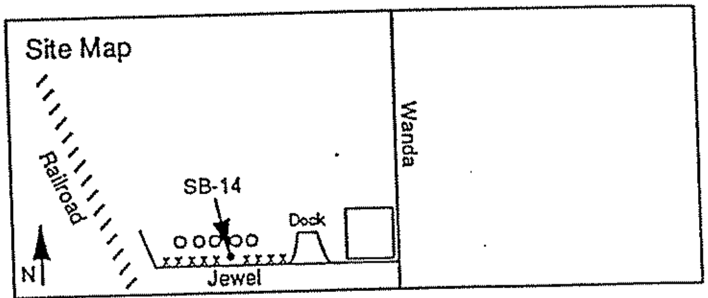
| Sampling Method(s) | Depth Range |
|---|---|
| 2 inch O.D. Split Spoon | 0.0-30.0 feet 2.5 foot interval |

| Grouting Material/Method | Depth Range |
|---|---|
| Portland Cement and Bentonite | 0.0-30.0 feet |

Ground-Water Data
Ground water was not encountered during drilling.

General Notes
Unified Soil Classification System is presented in brackets [ ]
"NT" = Not Tested

Site Map




| Borehole Depth (feet) | Sample Type and Number | Depth of Sample Tip (feet) | Sample Recovered (Inches) | Hammer Blows (6-Inch Intervals) | Standard Penetration (N) | Natural Moisture Content (%) | Field Data PID Reading (ppm) |
|---|---|---|---|---|---|---|---|
| 0-2.5 | SS-1 | 2.5 | 11 | 2 / 2 / 2 | 4 | NT | 0.0 |
| 2.5-5 | SS-2 | 5.0 | 15 | 1 / 1 / 2 | 3 | 20.0 | 348 |
| 5-7.5 | SS-3 | 7.5 | 14 | 2 / 6 / 8 | 14 | NT | 0.5 |
| 7.5-10 | SS-4 | 10.0 | 13 | 4 / 7 / 13 | 20 | NT | 0.2 |
| 10-12.5 | SS-5 | 12.5 | 7 | 12 / 15 / 19 | 34 | NT | 0.0 |
| 12.5-15 | SS-6 | 15.0 | 14 | 4 / 7 / 11 | 18 | NT | 0.0 |
| 15-17.5 | SS-7 | 17.5 | 17 | 7 / 13 / 16 | 29 | 14.4 | 0.0 |
| 17.5-20 | SS-8 | 20.0 | 17 | 3 / 6 / 8 | 14 | NT | 0.0 |

| Depth Below Ground Surface (feet) | Subsurface Description |
|---|---|
| 0.0 | ASPHALT |
| 0.2 | Very Loose Brown SILTY SAND, some clay, trace gravel, wet, no odor |
| 4.5 | Very Soft Greenish Gray SANDY CLAY, wet, very plastic, odor [CL] |
| 5.0 | Auger Refusal - Moved South Towards Jewel 4' - New Boring |
| 6.0 | Stiff Gray, SANDY CLAY, some silt, trace gravel, moist, no odor [CL] |

Figure

Project No. 83284

WW Engineering & Science, Inc.

# Log of Boring

Client: Gage Products Company
Location: 625 Wanda Ave. Ferndale, Michigan
Notes:

Boring Designation: SB-14
Start Date: 2-12-92 Completed: 2-12-92
Ground Surface Elevation: 635.8 based on U.S.G.S. datum.

| Borehole Depth (feet) | Sample Type and Number | Depth of Sample Tip (feet) | Sample Recovered (inches) | Hammer Blows (6-Inch Intervals) | Standard Penetration (N) | Natural Moisture Content (%) | Field Data PID Reading (ppm) | Graphic Log | Depth Below Ground Surface (feet) | Subsurface Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 21 | | | | 5 | | | | | | Stiff Gray, SANDY CLAY, some silt, trace gravel, moist, no odor [CL] |
| 22 | SS-9 | 22.5 | 17 | 9 / 13 | 22 | NT | 0.0 | | | |
| 23 | | | | | | | | | | |
| 24 | | | | 3 / 7 | | | | | | |
| 25 | SS-10 | 25.0 | 18 | 9 | 16 | NT | 0.0 | | | |
| 26 | | | | 6 | | | | | | |
| 27 | SS-11 | 27.5 | 18 | 10 / 13 | 23 | NT | 0.0 | | | |
| 28 | | | | | | | | | | |
| 29 | | | | 4 / 6 | | | | | | |
| 30 | SS-12 | 30.0 | 18 | 10 | 16 | NT | 0.0 | | | END OF BORING AT 30.0 FEET |
| 31 | | | | | | | | | | |
| 32 | | | | | | | | | | |
| 33 | | | | | | | | | | |
| 34 | | | | | | | | | | |
| 35 | | | | | | | | | | |
| 36 | | | | | | | | | | |
| 37 | | | | | | | | | | |
| 38 | | | | | | | | | | |

Figure

WW Engineering & Science, Inc.

Project Name: Gage Products Company
Ferndale, Michigan
Project No.: 83284

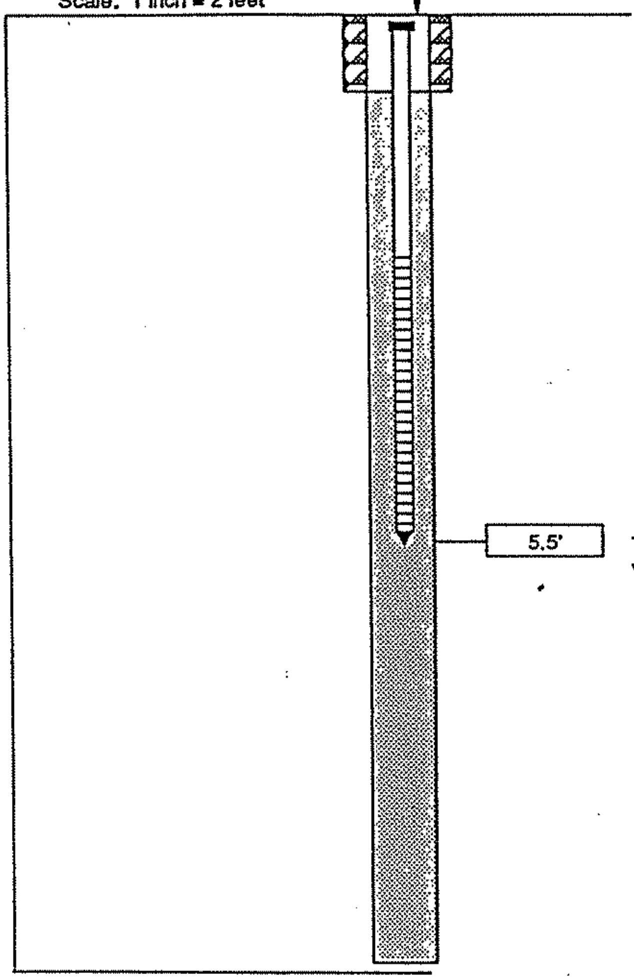
# Log of Piezometer Installation

Well Designation: P-1

Date(s) of Installation: 2-13-92 To 2-13-92

Generalized Subsurface Profile

Scale: 1 inch = 2 feet




| | |
|---|---|
| Ground Surface Elevation: | 636.80 |
| Top of Casing Elevation: | 636.24 |
| Screen Tip Elevation: | 630.64 |

**Casing**

- Diameter: 1.25 inches
- Total Length: 2.5 feet
- Material: Galvanized Steel
- Cap (Y/N) Galvanized Steel

**Screen**

- Diameter: 1.25 inches
- Length: 3 feet
- Mesh: 0.07 inch
- Material: Stainless Steel
- Screen Plug (Y/N): Drive Point

**Protective Casing Cover**

- Material: Steel
- Diameter: 6.5 inches
- Length: 10 inches
- Depth Below Ground: Flush
- Lock (Y/N): 2 Bolts-1/2 inch

Inspector: M. Vincent/J. Judge

Driller: R. Christensen

Contractor: Stearns Drilling

Drilling Equipment: CME 55 with hollow-stem augers

Screen Filter Material: Native Soils

Grout Backfill Material: NA

Other materials used: NA

## Water Level Data

Datum:

| Date | Water Level Elevation |
|---|---|
| | |
| | |
| | |
| | |

General Notes: Piezometer installed into 2 foot deep borehole and pushed to completion.

WW Engineering & Science, Inc.

Project Name: Gage Products Company
Ferndale, Michigan
Project No.: 83284

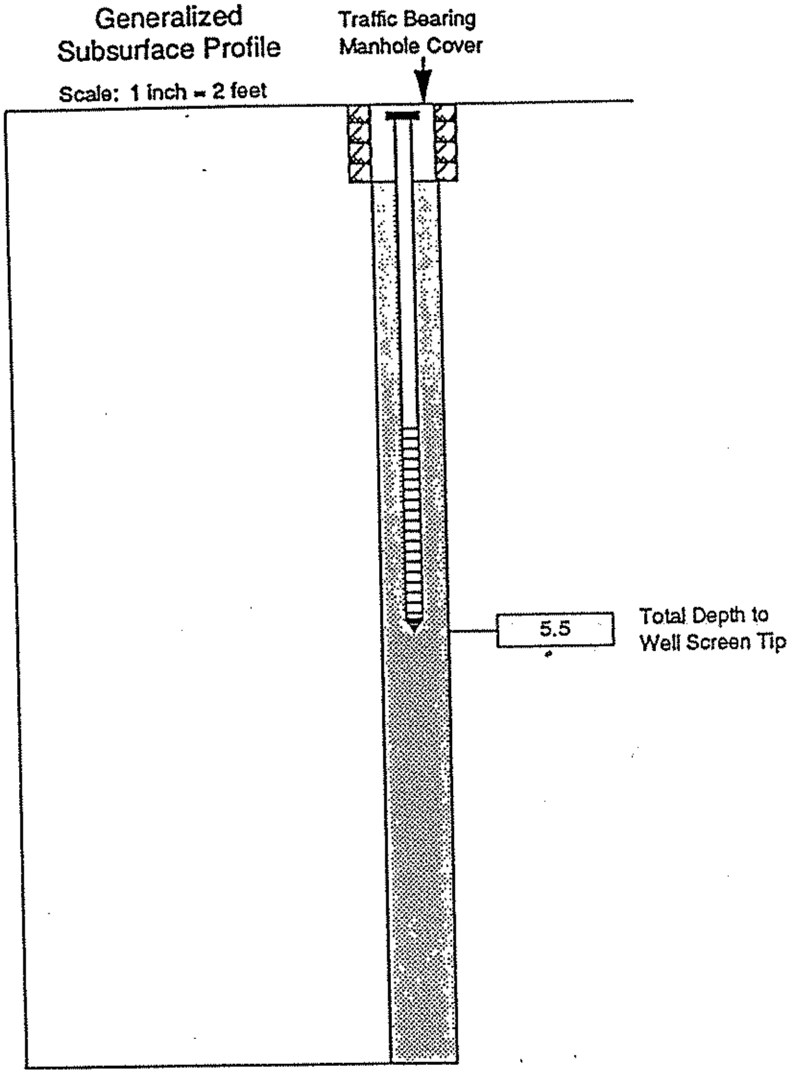
# Log of Piezometer Installation

Well Designation: P-2

Date(s) of Installation: 2-13-92 To 2-13-92

Generalized Subsurface Profile

Scale: 1 inch = 2 feet




Ground Surface Elevation: 636.20

Top of Casing Elevation: 635.67

Screen Tip Elevation: 630.07

**Casing**
- Diameter: 1.25 inches
- Total Length: 2.5 feet
- Material: Galvanized Steel
- Cap (Y/N) Galvanized Steel

**Screen**
- Diameter: 1.25 inches
- Length: 3 feet
- Mesh: 0.07 inch
- Material: Stainless Steel
- Screen Plug (Y/N): Drive Point

**Protective Casing Cover**
- Material: Steel
- Diameter: 6.5 inches
- Length: 10 inches
- Depth Below Ground: Flush
- Lock (Y/N): 2 Bolts-1/2 inch

Inspector: M. Vincent
Driller: R. Christensen
Contractor: Stearns Drilling
Drilling Equipment: CME 55 with hollow-stem augers

Screen Filter Material: Native Soils
Grout Backfill Material: NA

Other materials used: NA

## Water Level Data

Datum:

| Date | Water Level Elevation |
| --- | --- |
| | |
| | |
| | |
| | |

General Notes: Piezometer installed into 2 foot deep borehole and pushed to completion.

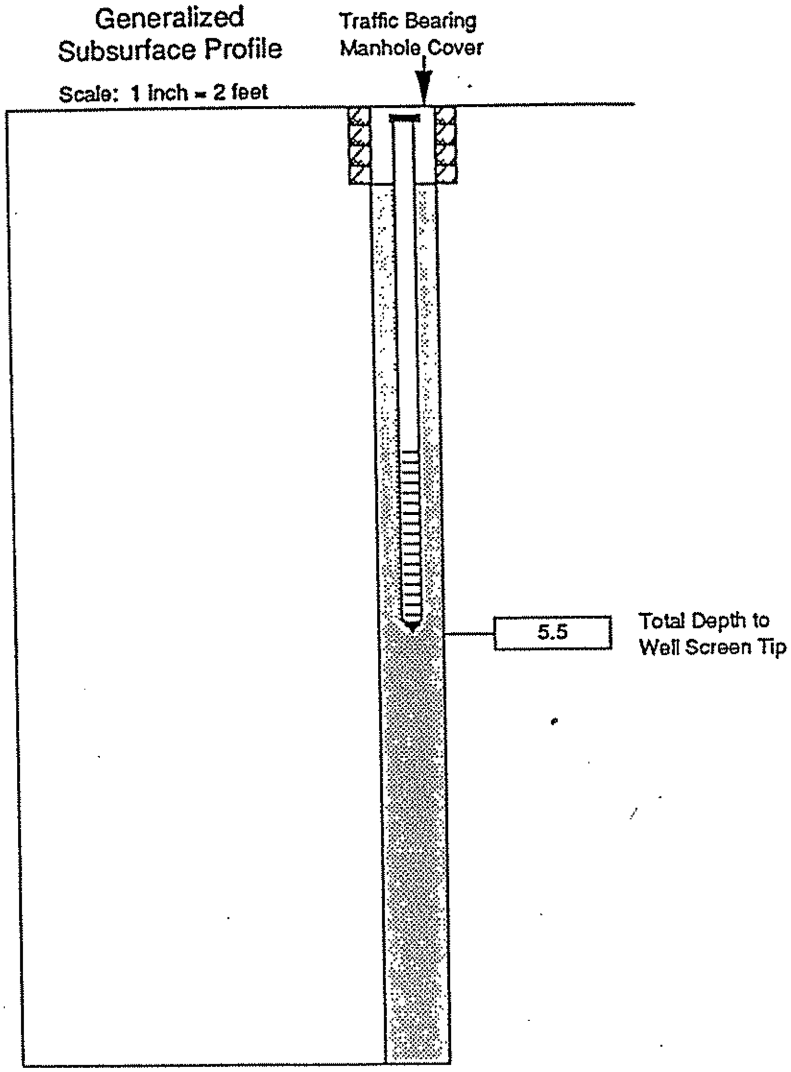
WW Engineering & Science, Inc.

Project Name: Gage Products Company
Ferndale, Michigan
Project No.: 83284

# Log of Piezometer Installation

Well Designation: P-3

Date(s) of Installation: 2-13-92 To 2-13-92




Ground Surface Elevation: 636.30

Top of Casing Elevation: 635.80

Screen Tip Elevation: 630.20

**Casing**

- Diameter: 1.25 inches
- Total Length: 2.5 feet
- Material: Galvanized Steel
- Cap (Y/N) Galvanized Steel

**Screen**

- Diameter: 1.25 inches
- Length: 3 feet
- Mesh: 0.07 inch
- Material: Stainless Steel
- Screen Plug (Y/N): Drive Point

**Protective Casing Cover**

- Material: Steel
- Diameter: 6.5 inches
- Length: 10 inches
- Depth Below Ground: Flush
- Lock (Y/N): 2 Bolts-1/2 inch

Inspector: M. Vincent
Driller: R. Christensen
Contractor: Stearns Drilling
Drilling Equipment: CME 55 with hollow-stem augers

Screen Filter Material: Native Soils
Grout Backfill Material: NA

Other materials used: NA

## Water Level Data

Datum:

| Date | Water Level Elevation |
|---|---|
| | |
| | |
| | |
| | |

General Notes: Piezometer installed into 2 foot deep borehole and pushed to completion.

Project Name: Gage Products Company
Ferndale, Michigan

**WW Engineering & Science, Inc.**

Project No.: 83284

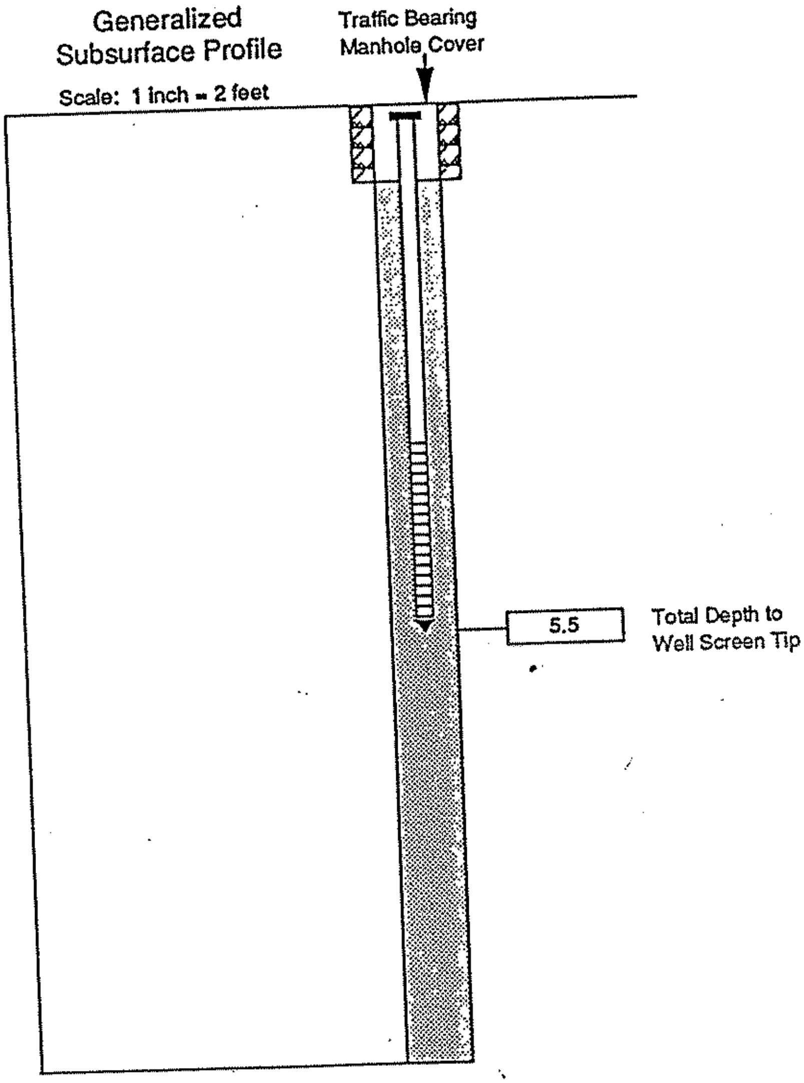
# Log of Piezometer Installation

Well Designation: P-4

Date(s) of Installation: 2-12-92 To 2-12-92

Generalized Subsurface Profile

Scale: 1 inch = 2 feet




Ground Surface Elevation: 637.40

Top of Casing Elevation: 637.21

Screen Tip Elevation: 631.61

**Casing**

Diameter: 1.25 inches

Total Length: 2.5 feet

Material: Galvanized Steel

Cap (Y/N) Galvanized Steel

**Screen**

Diameter: 1.25 inches

Length: 3 feet

Mesh: 0.07 inch

Material: Stainless Steel

Screen Plug (Y/N): Drive Point

**Protective Casing Cover**

Material: Steel

Diameter: 6.5 inches

Length: 10 inches

Depth Below Ground: Flush

Lock (Y/N): 2 Bolts-1/2 inch

Inspector: M. Vincent

Driller: R. Christensen

Contractor: Stearns Drilling

Drilling Equipment: CME 55 with hollow-stem augers

Screen Filter Material: Native Soils

Grout Backfill Material: NA

Other materials used: NA

## Water Level Data

Datum:

| Date | Water Level Elevation |
|---|---|
| | |
| | |
| | |
| | |

General Notes: Piezometer installed into 2 foot deep borehole and pushed to completion.

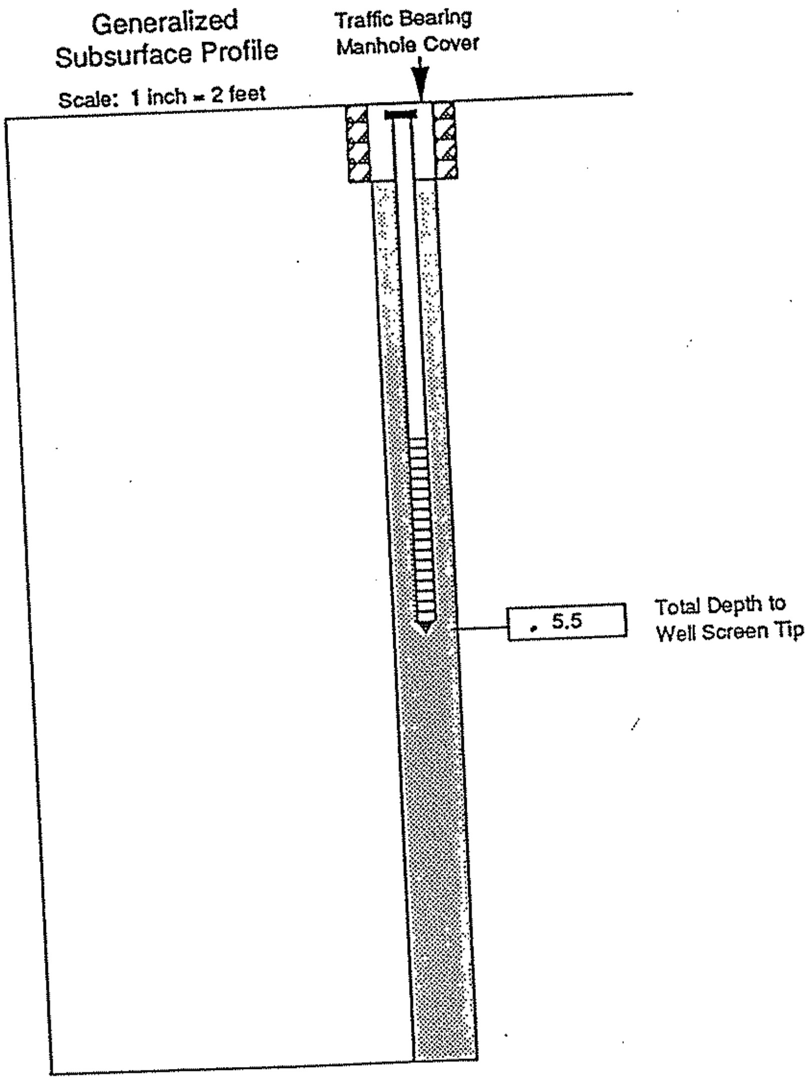
WW Engineering & Science, Inc.

Project Name: Gage Products Company
Ferndale, Michigan
Project No.: 83284

# Log of Piezometer Installation

Well Designation: P-5
Date(s) of Installation: 2-13-92 To 2-13-92

Generalized Subsurface Profile
Scale: 1 inch = 2 feet




| | |
|---|---|
| Ground Surface Elevation: | 636.00 |
| Top of Casing Elevation: | 635.67 |
| Screen Tip Elevation: | 630.07 |

**Casing**
- Diameter: 1.25 inches
- Total Length: 2.5 feet
- Material: Galvanized Steel
- Cap (Y/N) Galvanized Steel

**Screen**
- Diameter: 1.25 inches
- Length: 3 feet
- Mesh: 0.07 inch
- Material: Stainless Steel
- Screen Plug (Y/N): Drive Point

**Protective Casing Cover**
- Material: Steel
- Diameter: 6.5 inches
- Length: 10 inches
- Depth Below Ground: Flush
- Lock (Y/N): 2 Bolts-1/2 inch

Inspector: M. Vincent
Driller: R. Christensen
Contractor: Stearns Drilling
Drilling Equipment: CME 55 with hollow-stem augers

Screen Filter Material: Native Soils
Grout Backfill Material: NA

Other materials used: NA

## Water Level Data

Datum:

| Date | Water Level Elevation |
|---|---|
| | |
| | |
| | |
| | |

General Notes: Piezometer installed into 2 foot deep borehole and pushed to completion.

**WW Engineering & Science**
Environmental Services



Well/Boring No. P-6
Client: Gage Products Co.
Project No.: 83575.00
Date: Started: 10/12/93 Finished: 10/12/93
Time: Started: 01:50 pm Finished: 02:20 pm

# Well/Boring Log Sheet

| State | County | City | Fraction | Section | T | R |
|---|---|---|---|---|---|---|
| MI | Oakland | Ferndale | SE 1/4 NW 1/4 | 35 | 1N | 11E |

Contractor: CTI & Associates
Address: 46585 Grand River Ave.
Novi, MI 48374
Equipment: CME 45
Crew Chief: D. Arquette
WW Supervisor: M. Nederveld

Location: South side of power plant; west side of parcel C, approximately 165 feet west of collection sump

| Drilling Method(s) | Depth |
|---|---|
| 4 1/4 " Hollow Stem Auger | 9.0' |

Ground Surface Elevation (feet): 638.2

**Grouting/Seal**

| Depth/To | Material/Method |
|---|---|
| 0.0-0.5' | Concrete |
| 0.5-1.0' | Bentonite |
| 1.0-8.5' | #5 Silica Sand |

Water Level: 2.9 ft. Below Grade

Remarks: Piezometer located in northern ground water collection trench.

| Thickness (feet) | Depth to base (feet) | USCS * | Lithologic Description |
|---|---|---|---|
| 0.7 | 0.7 | Other | Concrete |
| 3.3 | 4.0 | Other | FILL:SAND, Fine, Little Fine to Coarse Gravel, Clay, Trace Debris (Brick, Glass), Black, Wet, Odor |
| 4.5 | 8.5 | Other | TRENCH FILL:PEA GRAVEL, Black, Wet, Odor |
| 0.5 | 9.0 | CL | CLAY, Some Silt, Trace Coarse Sand, Brown and Gray Mottling, Moist, Slight Odor |
| | | | EOB @ 9.0 ' |

| Sample Depth | Blow Counts 6" | 12" | 18" | 24" | PID Headspace | PID Background |
|---|---|---|---|---|---|---|
| 3.0- 5.0' | - | 3 | 2 | 1 | - | - |
| 5.0- 7.0' | 1 | 2 | 2 | 2 | - | - |
| 7.0- 9.0' | 2 | 1 | 1 | 4 | 33.9 | 3.7 |

* = The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

WW Engineering & Science
Environmental Services

Project Name: Gage Products Co.

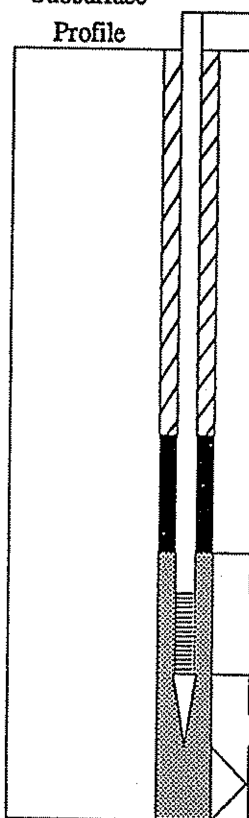
Project No: 83575.00

# Log of Well Installation

Well Number: P-6

Top of Casing Elevation (feet): 637.90

Generalized Subsurface Profile



Flush — Length of Casing Above Ground Surface

Concrete Cap (Y)

0.5 ' — Depth to Top of Grout or Backfill

Material (Grout or Backfill): Bentonite

1.0 ' — Depth to Top of Filter Pack

Type #5 Silica Sand

8.5 ' — Depth to Bottom of Well Screen

Natural Cave in — Borehole Backfill Material

9.0 ' — Total Depth of Borehole

**Water Level Data**

| Date | Time | Water Level | Elevation |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

Development: Polyethylene Bailer

Survey Reference: USGS

**Well Casing**
- Diameter: 2.0 "
- Total Length: 3.5 '
- Material: Schedule 40 PVC
- Cap Type: Compression

**Well Screen**
- Diameter: 2.0 "
- Length: 5.0 '
- Slot/Type: 10 - Slot
- Material: Schedule 40 PVC

**Protective well casing**
- Material: Cast Iron Dia. 7.0 "
- Height Above Ground: Flush
- Lock Type: Master P506

General Notes:

# Horizon Environmental

Page: 1 of 1
Boring No.: P-6 Replacement
Completed Well No.:
Client: Gage Products
Project No.: GAG-0104
Date: Started: 1/26/95 Finished: 1/26/95
Time: Started: Finished:

## Well/Boring Log Sheet

| State | County | City | Fraction | Section | T | R |
|---|---|---|---|---|---|---|
| MI | | City of Ferndale | | | | |

Contractor: Horizon Environmental
Address: 4595 Broadmoor SE Suite 200
Grand Rapids, MI 49512
Equipment: Hand Auger
Crew Chief:
Horizon Supervisor: M. Potter

| Drilling Method(s) | Depth |
|---|---|
| 3 1/4" Hand Auger | 6.2' |
| | |

Ground Surface Elevation (feet):
TOC Elevation (feet) 637.06
Datum (feet)
Static Water Level:
Reference:

Location:

Grouting/Seal

| Depth/To | Material/Method |
|---|---|
| | |

Description:

Sketch:

Construction: X Abandonment:

Additional Field Notes: Log Book Computer File

| Thickness (feet) | Depth to Base (feet) | USCS* | Lithologic Description | Sample Depth | Blow Counts 6" | 12" | 18" | 24" | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 3.0 | 3.0 | | Sand & gravel, moist, brown (fill), trace glass, plastic | | | | | | | |
| | | | & metal (wet below 2'). | | | | | | | |
| 2.5 | 5.5 | | Silt, some clay, wet, green-brown mottled. | | | | | | | |
| 0.7+ | 6.2+ | | Clay, some silt, moist, green brown mottled. | | | | | | | |
| | | | | | | | | | | |
| | | | 6.2' Bottom of Boring | | | | | | | |

* = The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

**HORIZON ENVIRONMENTAL**

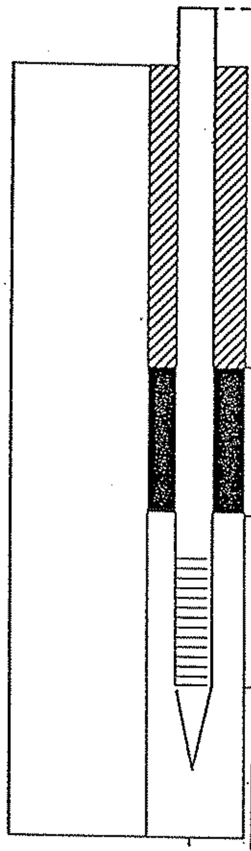
Project Name: Gage Products - Hydraulic Mon.

Project Number: GAG-0103

## Log of Well Installation

Well Number: P-6 Replacement

Generalized Subsurface Profile



| Value | Item |
|---|---|
| Flush | Length of Casing Above Ground Surface |
| None | Depth to Top of Grout or Backfill |
| | Material (Grout or Backfill) |
| 0.8' | Depth to Top of Pellets |
| 1.8' | Depth to Top of Filter Pack; Type: Si Sand |
| 6.0' | Depth to Bottom of Well Screen |
| Cave-in | Borehole Backfill Material |
| 6.2' | Total Depth of Borehole |

Top of Casing Elevation (feet): 637.06

### Water Level Data

| Date | Time | Water Level | Elevation |
|---|---|---|---|
| 1/26/95 | 3:40 PM | 1.03 | 636.03 |
| 1/26/95 | 4:30 PM | 1.03 | 636.03 |
| | | | |
| | | | |

Development:

Survey Reference:

**Well Casing**
- Diameter: 2"
- Total Length: 3.0'
- Material: PVC
- Cap Type: J-Plug

**Well Screen**
- Diameter: 2"
- Length: 3'
- Slot/Type: 10 Slot
- Material: PVC

**Protective Well Casing**
- Material: Steel Dia. 9"
- Height Above Ground: Flush
- Lock Type: P-506

**General Notes:**

**WW Engineering & Science**
Environmental Services

Page: 1 of 1
Well/Boring No. P-7
Client: Gage Products Co.
Project No.: 83575.00
Date: Started: 10/12/93 Finished: 10/12/9
Time: Started: 03:05 pm Finished: 03:38 p

# Well/Boring Log Sheet

| State | County | City | Fraction | Section | T | R |
|---|---|---|---|---|---|---|
| MI | Oakland | Ferndale | SE 1/4 NW 1/4 | 35 | 1N | 11E |

Contractor: CTI & Associates
Address: 46585 Grand River Ave.
Novi, MI 48374
Equipment: CME 45
Crew Chief: D. Arquette
WW Supervisor: M. Nederveld

Location: Approximately 105 feet west of collection sump

| Drilling Method(s) | Depth |
|---|---|
| 4 1/4 " Hollow Stem Auger | 6.0' |

Ground Surface Elevation (feet): 637.6

Grouting/Seal

| Depth/To | Material/Method |
|---|---|
| 0.0-0.5' | Concrete |
| 0.5-1.0' | Bentonite |
| 1.0-6.0' | #5 Silica Sand |

Water Level: 2.2 ft. Below Grade

Remarks: Piezometer located in northern ground water collection trench.

| Thickness (feet) | Depth to base (feet) | USCS * | Lithologic Description |
|---|---|---|---|
| 0.8 | 0.8 | Other | Concrete |
| 4.7 | 5.5 | Other | FILL: SAND, Fine, Some Clay and Fine to Coarse Gravel, Black, Wet, Odor |
| | | | Pea Gravel in Cuttings |
| 0.5 | 6.0 | CL | CLAY, Some Silt, Little Sand, Gray with Green Tint, Moist |
| | | | EOB @ 6.0' |

| Sample Depth | Blow Counts 6" | 12" | 18" | 24" | PID Headspace | PID Background |
|---|---|---|---|---|---|---|
| 1.0- 3.0' | 11 | 7 | 8 | 8 | 729.0 | 3.4 |
| 4.0- 6.0' | 1 | 1 | 1 | 2 | 57.6 | 7.3 |

* = The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

WW Engineering & Science
Environmental Services

Project Name: Gage Products Co.

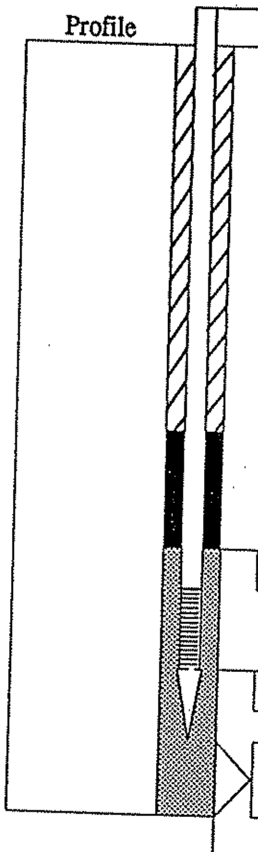
Project No: 83575.00

# Log of Well Installation

Well Number: P-7

Top of Casing Elevation (feet): 637.35

Generalized Subsurface Profile



Length of Casing Above Ground Surface: Flush

Concrete Cap (Y)

Depth to Top of Grout or Backfill: 0.5 '

Material (Grout or Backfill): Bentonite

Depth to Top of Filter Pack: 1.0 '

Type #5 Silica Sand

Depth to Bottom of Well Screen: 6.0 '

Borehole Backfill Material: N/A

Total Depth of Borehole: 6.0 '

**Water Level Data**

| Date | Time | Water Level | Elevation |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

Development: Polyethylene Bailer

Survey Reference: USGS

Well Casing
- Diameter: 2.0 "
- Total Length: 1.0 '
- Material: Schedule 40 PVC
- Cap Type: Compression

Well Screen
- Diameter: 2.0 "
- Length: 5.0 '
- Slot/Type: 10 - Slot
- Material: Schedule 40 PVC

Protective well casing
- Material: Cast Iron Dia. 7.0 "
- Height Above Ground: Flush
- Lock Type: Master P506

General Notes:

**WW Engineering & Science**
Environmental Services

Page: 1 of 1
Well/Boring No. P-8
Client: Gage Products Co.
Project No.: 83575.00
Date: Started: 10/12/93 Finished: 10/12/93
Time: Started: 02:25 pm Finished: 02:45 pm

# Well/Boring Log Sheet

| State | County | City | Fraction | Section | T | R |
|---|---|---|---|---|---|---|
| MI | Oakland | Ferndale | SE 1/4 NW 1/4 | 35 | 1N | 11E |

Contractor: CTI & Associates
Address: 46585 Grand River Ave.
Novi, MI 48374
Equipment: CME 45
Crew Chief: D. Arquette
WW Supervisor: M. Nederveld

Location: Approximately 105 feet west of collection sump

| Drilling Method(s) | Depth |
|---|---|
| 4 1/4 " Hollow Stem Auger | 6.0' |

Ground Surface Elevation (feet): 637.6

**Grouting/Seal**

| Depth/To | Material/Method |
|---|---|
| 0.0-0.5' | Concrete |
| 0.5-1.0' | Bentonite |
| 1.0-6.0' | #5 Silica Sand |

Remarks:

Water Level: 2.2 ft. Below Grade

| Thick-ness (feet) | Depth to base (feet) | USCS * | Lithologic Description |
|---|---|---|---|
| 0.6 | 0.6 | Other | Concrete |
| 2.9 | 3.5 | Other | FILL:SAND, Fine, Some Clay and Fine to Coarse Gravel, Trace Debris, Black, Moist, Odor |
| 2.5 | 6.0 | CL | CLAY, Trace Fine Sand and Silt, Gray with Brown Mottling, Slight Green Tint, Moist |
| | | | EOB @ 6.0 ' |

| Sample Depth | Blow Counts 6" | 12" | 18" | 24" | PID Headspace | PID Background |
|---|---|---|---|---|---|---|
| 1.0- 3.0' | 8 | 15 | 9 | 7 | 372 | 3.7 |
| 4.0- 6.0' | 1 | 1 | 2 | 4 | 119 | 3.6 |

* = The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

**WW Engineering & Science**
**Environmental Services**

Project Name: Gage Products Co.

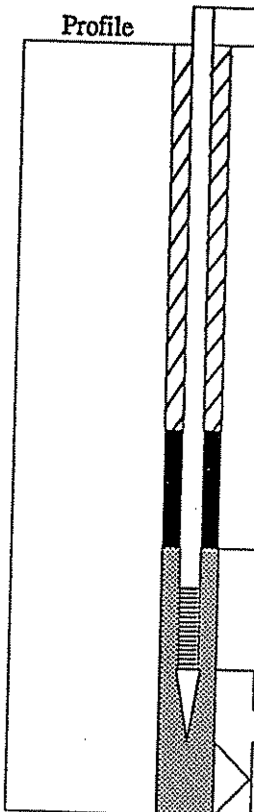
Project No: 83575.00

# Log of Well Installation

Well Number: P-8

Top of Casing Elevation (feet): 637.40

Generalized Subsurface Profile



Length of Casing Above Ground Surface: Flush

Concrete Cap (Y)

Depth to Top of Grout or Backfill: 0.5 '

Material (Grout or Backfill): Bentonite

Depth to Top of Filter Pack: 1.0 '

Type: #5 Silica Sand

Depth to Bottom of Well Screen: 6.0 '

Borehole Backfill Material: N/A

Total Depth of Borehole: 6.0 '

**Water Level Data**

| Date | Time | Water Level | Elevation |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

Development: Polyethylene Bailer

Survey Reference: USGS

**Well Casing**
- Diameter: 2.0 "
- Total Length: 1.0 '
- Material: Schedule 40 PVC
- Cap Type: Compression

**Well Screen**
- Diameter: 2.0 "
- Length: 5.0 '
- Slot/Type: 10 - Slot
- Material: Schedule 40 PVC

**Protective well casing**
- Material: Cast Iron Dia. 7.0 "
- Height Above Ground: Flush
- Lock Type: Master P506

General Notes:

**WW Engineering & Science**
Environmental Services

Page: 1 of 1
Well/Boring No. P-9
Client: Gage Products Co.
Project No.: 83575.00
Date: Started: 10/12/93 Finished: 10/12/9
Time: Started: 04:00 pm Finished: 04:54 p

# Well/Boring Log Sheet

| State | County | City | Fraction | Section | T | R |
|---|---|---|---|---|---|---|
| MI | Oakland | Ferndale | SE 1/4 NW 1/4 | 35 | 1N | 11E |

**Contractor:** CTI & Associates
**Address:** 46585 Grand River Ave.
Novi, MI 48374
**Equipment:** CME 45
**Crew Chief:** D. Arquette
**WW Supervisor:** M. Nederveld

**Location:** Approximately 105 feet west of collection sump

| Drilling Method(s) | Depth |
|---|---|
| 4 1/4 " Hollow Stem Auger | 6.0' |

Ground Surface Elevation (feet): 637.7

**Grouting/Seal**

| Depth/To | Material/Method |
|---|---|
| 0.0-0.5' | Concrete |
| 0.5-1.0' | Bentonite |
| 1.0-6.0' | #5 Silica Sand |

Water Level: 2.1 ft. Below Grade

**Remarks:**

| Thickness (feet) | Depth to base (feet) | USCS * | Lithologic Description |
|---|---|---|---|
| 0.8 | 0.8 | Other | Concrete |
| 4.7 | 5.5 | Other | FILL:CLAY and SAND, Fine, Some Fine to Coarse Gravel, Black, Wet, Odor |
| 0.5 | 6.0 | CL | CLAY, Some Sand, Fine, Gray with Green Tint, Moist |
| | | | EOB @ 6.0 ' |

| Sample Depth | Blow Counts 6" | 12" | 18" | 24" | PID Headspace | PID Background |
|---|---|---|---|---|---|---|
| 1.0- 3.0' | 3 | 5 | 9 | 9 | 453 | 4.1 |
| 4.0- 6.0' | 1 | 2 | 3 | 4 | 58.6 | 4.0 |

* = The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

**WW Engineering & Science**
**Environmental Services**

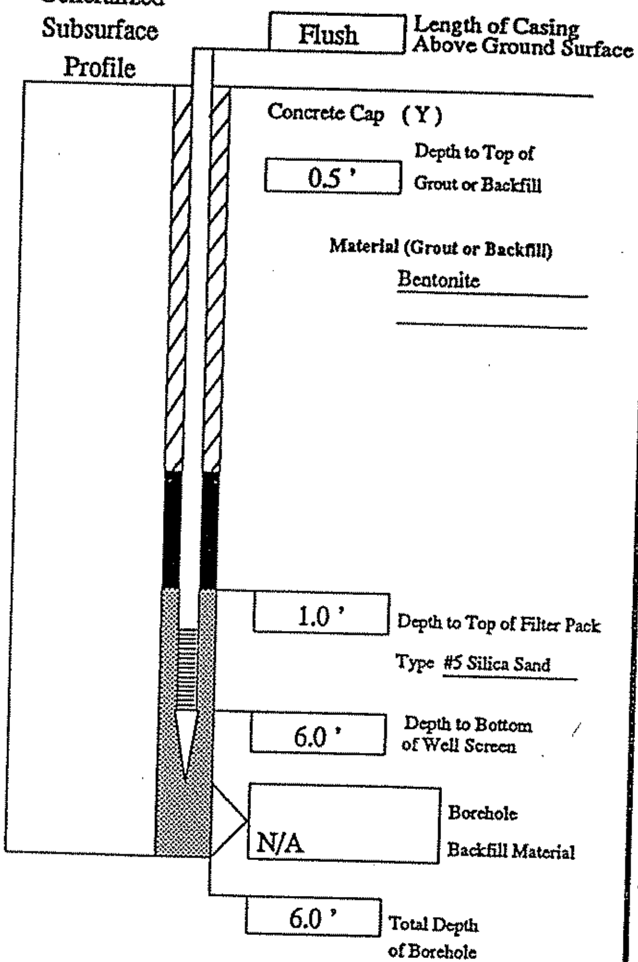
Project Name: Gage Products Co.

Project No: 83575.00

# Log of Well Installation

Well Number: P-9

Top of Casing Elevation (feet): 637.51




**Water Level Data**

| Date | Time | Water Level | Elevation |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

Development: Polyethylene Bailer

Survey Reference: USGS

**Well Casing**
- Diameter: 2.0 "
- Total Length: 1.0 '
- Material: Schedule 40 PVC
- Cap Type: Compression

**Well Screen**
- Diameter: 2.0 "
- Length: 5.0 '
- Slot/Type: 10 - Slot
- Material: Schedule 40 PVC

**Protective well casing**
- Material: Cast Iron Dia. 7.0 "
- Height Above Ground: Flush
- Lock Type: Master P506

General Notes:

**WW Engineering & Science**
Environmental Services

Page: 1 of 1
Well/Boring No. P-10
Client: Gage Products Co.
Project No.: 83575.00
Date: Started: 10/13/93 Finished: 10/13/93
Time: Started: 08:50 am Finished: 09:20 am

# Well/Boring Log Sheet

| State | County | City | Fraction | Section | T | R |
|---|---|---|---|---|---|---|
| MI | Oakland | Ferndale | SE 1/4 NW 1/4 | 35 | 1N | 11E |

Contractor: CTI & Associates
Address: 46585 Grand River Ave.
Novi, MI 48374
Equipment: CME 45
Crew Chief: D. Arquette
WW Supervisor: M. Nederveld

Location: Approximately 105 feet west of collection sump

| Drilling Method(s) | Depth |
|---|---|
| 4 1/4 " Hollow Stem Auger | 6.0' |

Ground Surface Elevation (feet): 637.7

**Grouting/Seal**

| Depth/To | Material/Method |
|---|---|
| 0.0-0.5' | Concrete |
| 0.5-1.0' | Bentonite |
| 1.0-6.0' | #5 Silica Sand |

Water Level: 2.5 ft. Below Grade

Remarks:

| Thickness (feet) | Depth to base (feet) | USCS * | Lithologic Description |
|---|---|---|---|
| 0.7 | 0.7 | Other | Concrete |
| 4.8 | 5.5 | Other | FILL: SAND and CLAY, Fine, Some Fine to Coarse Gravel, Black, Wet, Odor |
| 0.5 | 6.0 | CL | CLAY, Some Sand, Gray with Green Tint, Moist |
| | | | EOB @ 6.0' |

| Sample Depth | Blow Counts 6" | 12" | 18" | 24" | PID Headspace | PID Background |
|---|---|---|---|---|---|---|
| 1.0- 3.0' | 3 | 4 | 3 | 4 | 641 | 6.3 |
| 4.0- 6.0' | 3 | 5 | 6 | 4 | 34.6 | 2.6 |

* = The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

WW Engineering & Science
Environmental Services

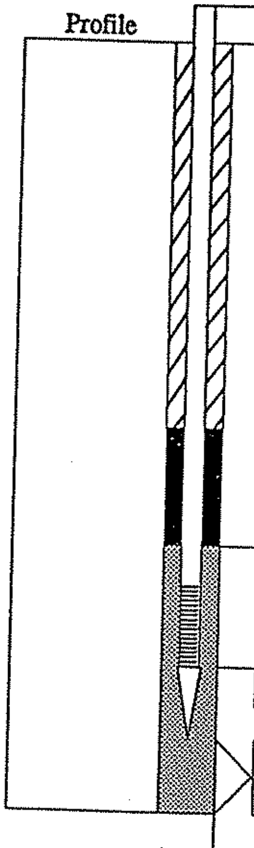
Project Name: Gage Products Co.

Project No: 83575.00

# Log of Well Installation

Well Number: P-10

Generalized Subsurface Profile



Length of Casing Above Ground Surface: Flush

Concrete Cap (Y)

Depth to Top of Grout or Backfill: 0.5 '

Material (Grout or Backfill): Bentonite

Depth to Top of Filter Pack: 1.0 '

Type: #5 Silica Sand

Depth to Bottom of Well Screen: 6.0 '

Borehole Backfill Material: N/A

Total Depth of Borehole: 6.0 '

Top of Casing Elevation (feet): 637.36

**Water Level Data**

| Date | Time | Water Level | Elevation |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

Development: Polyethylene Bailer

Survey Reference: USGS

**Well Casing**
- Diameter: 2.0 "
- Total Length: 1.0 '
- Material: Schedule 40 PVC
- Cap Type: Compression

**Well Screen**
- Diameter: 2.0 "
- Length: 5.0 '
- Slot/Type: 10 - Slot
- Material: Schedule 40 PVC

**Protective well casing**
- Material: Cast Iron Dia. 7.0 "
- Height Above Ground: Flush
- Lock Type: Master P506

General Notes:

**WW Engineering & Science**
Environmental Services



Well/Boring No. P-11
Client: Gage Products Co.
Project No.: 83575.00
Date: Started: 10/13/93 Finished: 10/13/93
Time: Started: 11:30 am Finished: 12:05 pm

# Well/Boring Log Sheet

| State | County | City | Fraction | Section | T | R |
|---|---|---|---|---|---|---|
| MI | Oakland | Ferndale | SE 1/4 NW 1/4 | 35 | 1N | 11E |

Contractor: CTI & Associates
Address: 46585 Grand River Ave.
Novi, MI 48374
Equipment: CME 45
Crew Chief: D. Arquette
WW Supervisor: M. Nederveld

Location: Approximately 20 feet northeast of collection sump

| Drilling Method(s) | Depth |
|---|---|
| 4 1/4 " Hollow Stem Auger | 6.0' |

Ground Surface Elevation (feet): 636.2

**Grouting/Seal**

| Depth/To | Material/Method |
|---|---|
| 0.0-0.5' | Concrete |
| 0.5-1.0' | Bentonite |
| 1.0-6.0' | #5 Silica Sand |

Remarks:

Water Level: -- ft. Below Grade

| Thick-ness (feet) | Depth to base (feet) | USCS * | Lithologic Description |
|---|---|---|---|
| 0.7 | 0.7 | Other | Concrete |
| 2.3 | 3.0 | Other | FILL:CLAY and SAND, Fine, Trace Fine to Medium Gravel, Metal Debris, Black, Moist, Odor |
| 3.0 | 6.0 | CL | CLAY, Some Silt, Trace Fine Gravel, Gray with Green Tint, Moist |
| | | | EOB @ 6.0 ' |

| Sample Depth | Blow Counts 6" | 12" | 18" | 24" | PID Headspace | PID Background |
|---|---|---|---|---|---|---|
| 1.0- 3.0' | 5 | 11 | 10 | 4 | 1378 | 2.9 |
| 4.0- 6.0' | 7 | 10 | 13 | 13 | 9.9 | 2.1 |

* = The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

WW Engineering & Science
Environmental Services

Project Name: Gage Products Co.

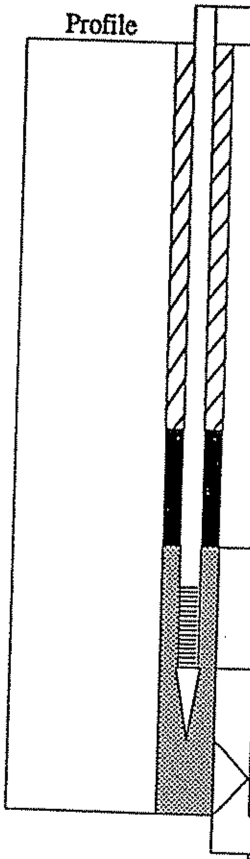
Project No: 83575.00

# Log of Well Installation

Well Number: P-11

Top of Casing Elevation (feet): 635.99

Generalized Subsurface Profile



Length of Casing Above Ground Surface: Flush

Concrete Cap (Y)

Depth to Top of Grout or Backfill: 0.5 '

Material (Grout or Backfill): Bentonite

Depth to Top of Filter Pack: 1.0 '

Type: #5 Silica Sand

Depth to Bottom of Well Screen: 6.0 '

Borehole Backfill Material: N/A

Total Depth of Borehole: 6.0 '

**Water Level Data**

| Date | Time | Water Level | Elevation |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

Development: Polyethylene Bailer

Survey Reference: USGS

**Well Casing**
- Diameter: 2.0 "
- Total Length: 1.0 '
- Material: Schedule 40 PVC
- Cap Type: Compression

**Well Screen**
- Diameter: 2.0 "
- Length: 5.0 '
- Slot/Type: 10 - Slot
- Material: Schedule 40 PVC

**Protective well casing**
- Material: Cast Iron Dia. 7.0 "
- Height Above Ground: Flush
- Lock Type: Master P506

General Notes:

WW Engineering & Science
Environmental Services


Well/Boring No. P-12
Client: Gage Products Co.
Project No.: 83575.00
Date: Started: 10/13/93 Finished: 10/13/93
Time: Started: 10:45 am Finished: 11:24 am

# Well/Boring Log Sheet

| State | County | City | Fraction | Section | T | R |
|---|---|---|---|---|---|---|
| MI | Oakland | Ferndale | SE 1/4 NW 1/4 | 35 | 1N | 11E |

Contractor: CTI & Associates
Address: 46585 Grand River Ave.
Novi, MI 48374
Equipment: CME 45
Crew Chief: D. Arquette
WW Supervisor: M. Nederveld

Location: Approximately 15 feet northeast of collection sump

| Drilling Method(s) | Depth |
|---|---|
| 4 1/4 " Hollow Stem Auger | 6.0' |

Ground Surface Elevation (feet): 636.2

**Grouting/Seal**

| Depth/To | Material/Method |
|---|---|
| 0.0-0.5' | Concrete |
| 0.5-1.0' | Bentonite |
| 1.0-6.0' | #5 Silica Sand |

Remarks:

Water Level: -- ft. Below Grade

| Thickness (feet) | Depth to base (feet) | USCS * | Lithologic Description |
|---|---|---|---|
| 0.6 | 0.6 | Other | Concrete |
| 2.3 | 2.9 | Other | FILL: CLAY and SAND, Fine, Debris, Dark Brown, Moist |
| 3.1 | 6.0 | CL | CLAY, Some Silt, Trace Fine Gravel, Gray with Green Tint, Moist |
| | | | EOB @ 6.0 ' |

| Sample Depth | Blow Counts 6" | 12" | 18" | 24" | PID Headspace | PID Background |
|---|---|---|---|---|---|---|
| 1.0- 3.0' | 8 | 11 | 11 | 8 | 45.9 | 4.3 |
| 4.0- 6.0' | 8 | 13 | - | - | 6.9 | 3.8 |

* = The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

**WW Engineering & Science**
**Environmental Services**

Project Name: Gage Products Co.

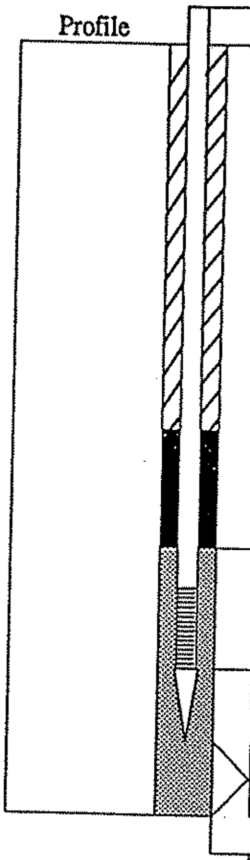
Project No: 83575.00

# Log of Well Installation

Well Number: P-12

Top of Casing Elevation (feet): 635.98

Generalized Subsurface Profile



Length of Casing Above Ground Surface: Flush

Concrete Cap (Y)

Depth to Top of Grout or Backfill: 0.5 '

Material (Grout or Backfill): Bentonite

Depth to Top of Filter Pack: 1.0 '

Type #5 Silica Sand

Depth to Bottom of Well Screen: 6.0 '

Borehole Backfill Material: N/A

Total Depth of Borehole: 6.0 '

**Water Level Data**

| Date | Time | Water Level | Elevation |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

Development: Polyethylene Bailer

Survey Reference: USGS

**Well Casing**
- Diameter: 2.0 "
- Total Length: 1.0 '
- Material: Schedule 40 PVC
- Cap Type: Compression

**Well Screen**
- Diameter: 2.0 "
- Length: 5.0 '
- Slot/Type: 10 - Slot
- Material: Schedule 40 PVC

**Protective well casing**
- Material: Cast Iron Dia. 7.0 "
- Height Above Ground: Flush
- Lock Type: Master P506

General Notes:

**WW Engineering & Science**
Environmental Services



Well/Boring No. P-13
Client: Gage Products Co.
Project No.: 83575.00
Date: Started: 10/13/93 Finished: 10/13/93
Time: Started: 10:00 am Finished: 10:40 am

# Well/Boring Log Sheet

| State | County | City | Fraction | Section | T | R |
|---|---|---|---|---|---|---|
| MI | Oakland | Ferndale | SE 1/4 NW 1/4 | 35 | 1N | 11E |

Contractor: CTI & Associates
Address: 46585 Grand River Ave.
Novi, MI 48374
Equipment: CME 45
Crew Chief: D. Arquette
WW Supervisor: M. Nederveld

Location: Approximately 10 feet northeast of collection sump

| Drilling Method(s) | Depth |
|---|---|
| 4 1/4 " Hollow Stem Auger | 6.0' |

Ground Surface Elevation (feet): 636.2

**Grouting/Seal**

| Depth/To | Material/Method |
|---|---|
| 0.0-0.5' | Concrete |
| 0.5-1.0' | Bentonite |
| 1.0-6.0' | #5 Silica Sand |

Remarks:

Water Level: -- ft. Below Grade

| Thickness (feet) | Depth to base (feet) | USCS * | Lithologic Description |
|---|---|---|---|
| 0.6 | 0.6 | Other | Concrete |
| 2.7 | 3.3 | Other | FILL:SAND and CLAY, Fine, Trace Debris, Black, Moist |
| 2.7 | 6.0 | CL | CLAY, Some Silt, Trace Fine Gravel, Gray with Green Tint, Moist |
| | | | EOB @ 6.0 ' |

| Sample Depth | Blow Counts 6" | 12" | 18" | 24" | PID Headspace | PID Background |
|---|---|---|---|---|---|---|
| 1.0- 3.0' | 4 | 9 | 11 | 10 | 59.4 | 7.1 |
| 4.0- 6.0' | 7 | 11 | 12 | 13 | 15.2 | 5.8 |

* = The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

WW Engineering & Science
Environmental Services

Project Name: Gage Products Co.

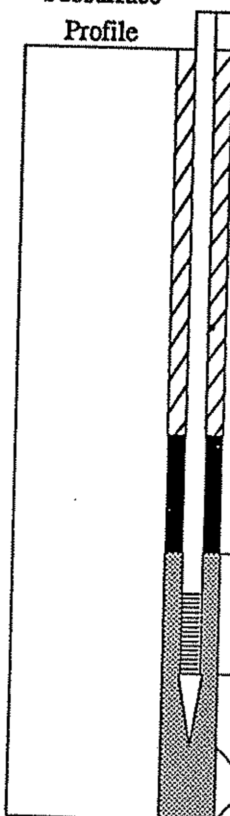
Project No: 83575.00

# Log of Well Installation

Well Number: P-13

Top of Casing Elevation (feet): 636.07

Generalized Subsurface Profile



Length of Casing Above Ground Surface: Flush

Concrete Cap (Y)

Depth to Top of Grout or Backfill: 0.5 '

Material (Grout or Backfill): Bentonite

Depth to Top of Filter Pack: 1.0 '

Type #5 Silica Sand

Depth to Bottom of Well Screen: 6.0 '

Borehole Backfill Material: N/A

Total Depth of Borehole: 6.0 '

Water Level Data

| Date | Time | Water Level | Elevation |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

Development: Polyethylene Bailer

Survey Reference: USGS

**Well Casing**
- Diameter: 2.0 "
- Total Length: 1.0 '
- Material: Schedule 40 PVC
- Cap Type: Compression

**Well Screen**
- Diameter: 2.0 "
- Length: 5.0 '
- Slot/Type: 10 - Slot
- Material: Schedule 40 PVC

**Protective well casing**
- Material: Cast Iron Dia. 7.0 "
- Height Above Ground: Flush
- Lock Type: Master P506

General Notes:

**WW Engineering & Science**
Environmental Services

Page: 1 of 1
Well/Boring No. P-14
Client: Gage Products Co.
Project No.: 83575.00
Date: Started: 10/15/93 Finished: 10/15/9
Time: Started: 11:10 am Finished: 11:40 a

# Well/Boring Log Sheet

| State | County | City | Fraction | Section | T | R |
|---|---|---|---|---|---|---|
| MI | Oakland | Ferndale | SE 1/4 NW 1/4 | 35 | 1N | 11E |

Contractor: WWES
Address: 14496 Sheldon Rd.
Plymouth, MI 48170
Equipment: Power Auger
Crew Chief:
WW Supervisor: M. Nederveld

Location: Approximately 60 feet west of collection sump

| Drilling Method(s) | Depth |
|---|---|
| Power Auger | 3.0' - 8.5' |

Ground Surface Elevation (feet): 636.8

**Grouting/Seal**

| Depth/To | Material/Method |
|---|---|
| 0.0-0.5' | Concrete |
| 0.5-1.0' | Bentonite |
| 1.0-3.0' | Sand |
| 3.0-8.5' | Cave In - Pea Gravel |

Water Level: 3.0 ft. Below Grade

Remarks: Area excavated to 3 feet below grade. Piezometer located in northern ground water collection trench. Water in trench prohibited gathering soil samples for headspace analysis.

| Thick-ness (feet) | Depth to base (feet) | USCS * | Lithologic Description | Blow Counts: Sample Depth | 6" | 12" | 18" | 24" | PID: Headspace | PID: Background |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.7 | 0.7 | Other | Concrete | | | | | | | |
| 2.3 | 3.0 | Other | FILL:CLAY and SAND, Some Debris, Black, Moist | | | | | | | |
| 5.0 | 8.0 | Other | TRENCH FILL: PEA GRAVEL | | | | | | | |
| 0.5 | 8.5 | CL | CLAY, Some Silt, Gray, Moist | | | | | | | |
| | | | | | | | | | | |
| | | | EOB @ 8.5' | | | | | | | |

* = The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

**WW Engineering & Science**
**Environmental Services**

Project Name: Gage Products Co.

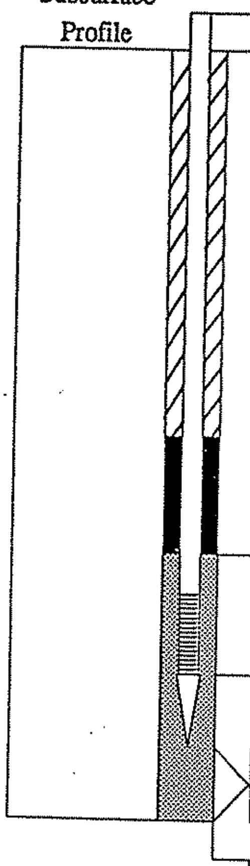
Project No: 83575.00

# Log of Well Installation

Well Number: P-14

Top of Casing Elevation (feet): 636.46

Generalized Subsurface Profile



Flush — Length of Casing Above Ground Surface

Concrete Cap (Y)

0.5 ' — Depth to Top of Grout or Backfill

Material (Grout or Backfill): Bentonite

1.0 ' — Depth to Top of Filter Pack

Type #5 Silica Sand

8.0 ' — Depth to Bottom of Well Screen

Pea Gravel — Borehole Backfill Material

8.5 ' — Total Depth of Borehole

**Water Level Data**

| Date | Time | Water Level | Elevation |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

Development: Polyethylene Bailer

Survey Reference: USGS

**Well Casing**

- Diameter: 2.0 "
- Total Length: 3.0 '
- Material: Schedule 40 PVC
- Cap Type: Compression

**Well Screen**

- Diameter: 2.0 "
- Length: 5.0 '
- Slot/Type: 10 - Slot
- Material: Schedule 40 PVC

**Protective well casing**

- Material: Cast Iron Dia. 7.0 "
- Height Above Ground: Flush
- Lock Type: Master P506

General Notes:

**WW Engineering & Science**
**Environmental Services**

Page: 1 of 1
Well/Boring No. P-15
Client: Gage Products Co.
Project No.: 83575.00
Date: Started: 10/15/93 Finished: 10/15/9
Time: Started: 01:40 pm Finished: 02:50 p

# Well/Boring Log Sheet

| State | County | City | Fraction | Section | T | R |
|---|---|---|---|---|---|---|
| MI | Oakland | Ferndale | SE 1/4 NW 1/4 | 35 | 1N | 11E |

Contractor: WWES
Address: 14496 Sheldon Rd.
Plymouth, MI 48170
Equipment: Power Auger
Crew Chief:
WW Supervisor: M. Nederveld

Location: Approximately 50 feet east of collection sump

| Drilling Method(s) | Depth |
|---|---|
| Power Auger | 3.0' - 5.5' |

Ground Surface Elevation (feet): 635.9

**Grouting/Seal**

| Depth/To | Material/Method |
|---|---|
| 0.0-0.2' | Concrete |
| 0.2-4.3' | #5 Silica Sand |

Water Level: 3.0 ft. Below Grade

Remarks: Area excavated to 3.0 feet below grade. Piezometer located 5.0 feet north of collection trench. Water flowing from collection trench flooded bore hole and prohibited collection of soil samples for headspace analysis.

| Thickness (feet) | Depth to base (feet) | USCS * | Lithologic Description | Blow Counts: Sample Depth | 6" | 12" | 18" | 24" | PID: Headspace | PID: Background |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.7 | 0.7 | Other | Concrete | | | | | | | |
| 2.8 | 3.5 | Other | FILL: CLAY and SAND, Some Debris, Black, Moist | | | | | | | |
| 2.0 | 5.5 | CL | CLAY, Some Silt, Gray, Moist | | | | | | | |
| | | | EOB @ 5.5' | | | | | | | |

* = The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

WW Engineering & Science
Environmental Services

Project Name: Gage Products Co.

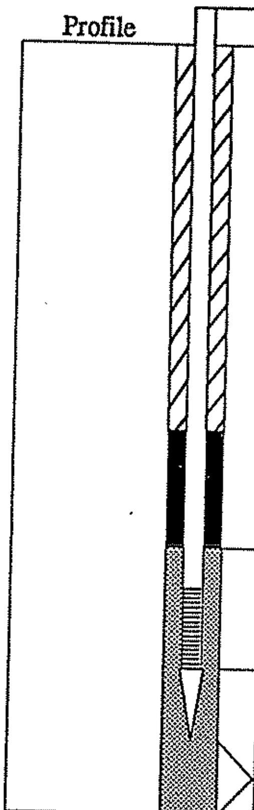
Project No: 83575.00

# Log of Well Installation

Well Number: P-15

Top of Casing Elevation (feet): 635.60

Generalized Subsurface Profile



Flush — Length of Casing Above Ground Surface

Concrete Cap (Y)

0.2 ' — Depth to Top of Grout or Backfill

Material (Grout or Backfill)

0.2 ' — Depth to Top of Filter Pack

Type #5 Silica Sand

4.3 ' — Depth to Bottom of Well Screen

Cave In — Borehole Backfill Material

5.5 ' — Total Depth of Borehole

**Water Level Data**

| Date | Time | Water Level | Elevation |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

Development: Polyethylene Bailer

Survey Reference: USGS

**Well Casing**
- Diameter: 2.0 "
- Total Length: 0.2 '
- Material: Schedule 40 PVC
- Cap Type: Compression

**Well Screen**
- Diameter: 2.0 "
- Length: 4.3 '
- Slot/Type: 10 - Slot
- Material: Schedule 40 PVC

**Protective well casing**
- Material: Cast Iron Dia. 7.0 "
- Height Above Ground: Flush
- Lock Type: Master P506

General Notes:

**WW Engineering & Science**
Environmental Services

Page: 1 of 1
Well/Boring No. P-16
Client: Gage Products Co.
Project No.: 83575.00
Date: Started: 10/15/93 Finished: 10/15/93
Time: Started: 01:00 pm Finished: 01:35 pm

# Well/Boring Log Sheet

| State | County | Township | Fraction | Section | T | R |
|---|---|---|---|---|---|---|
| MI | Oakland | Ferndale | SE 1/4 NW 1/4 | 35 | 1N | 11E |

**Contractor:** WWES
**Address:** 14496 Sheldon Rd.
Plymouth, MI 48170
Equipment: Power Auger
Crew Chief:
WW Supervisor: M. Nederveld

**Location:** Approximately 50 feet east of collection sump

| Drilling Method(s) | Depth |
|---|---|
| Power Auger | 3.0' - 8.2' |

Ground Surface Elevation (feet): 636.00

**Grouting/Seal**

| Depth/To | Material/Method |
|---|---|
| 0.0-0.5' | Concrete |
| 0.5-1.0' | Bentonite |
| 1.0-3.5' | #5 Silica Sand |
| 3.5-8.2' | Cave In - Pea Gravel |

Water Level: 2.5 ft. Below Grade

Remarks: Area excavated to 3.0 feet below grade. Piezometer located in northern ground water collection trench. Water in collection trench prohibited gathering soil samples for head space analysis.

| Thick-ness (feet) | Depth to base (feet) | USCS * | Lithologic Description | Blow Counts: Sample Depth | 6" | 12" | 18" | 24" | PID: Headspace | PID: Background |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.7 | 0.7 | Other | Concrete | | | | | | | |
| 2.8 | 3.5 | Other | FILL:CLAY and SAND, Some Debris, Black, Wet | | | | | | | |
| 4.5 | 8.0 | Other | TRENCH FILL:PEA GRAVEL, Wet | | | | | | | |
| 0.2 | 8.2 | CL | CLAY, Some Silt, Gray, Moist | | | | | | | |
| | | | EOB @ 8.2' | | | | | | | |

* = The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

WW Engineering & Science
Environmental Services

Project Name: Gage Products Co.

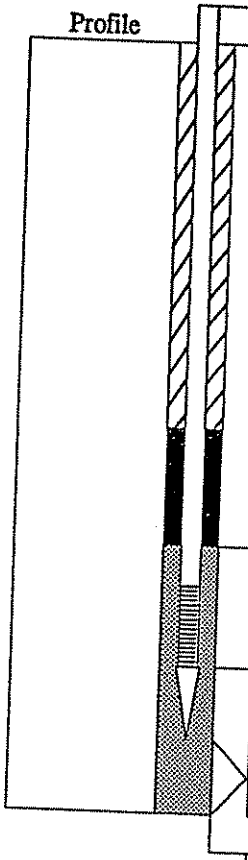
Project No: 83575.00

# Log of Well Installation

Well Number: P-16

Top of Casing Elevation (feet): 635.81

Generalized Subsurface Profile



Length of Casing Above Ground Surface: Flush

Concrete Cap (Y)

Depth to Top of Grout or Backfill: 0.5 '

Material (Grout or Backfill): Bentonite

Depth to Top of Filter Pack: 1.0 '

Type #5 Silica Sand

Depth to Bottom of Well Screen: 7.3 '

Borehole Backfill Material: Pea Gravel

Total Depth of Borehole: 8.2 '

**Water Level Data**

| Date | Time | Water Level | Elevation |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

Development: Polyethylene Bailer

Survey Reference: USGS

**Well Casing**
- Diameter: 2.0 "
- Total Length: 2.3 '
- Material: Schedule 40 PVC
- Cap Type: Compression

**Well Screen**
- Diameter: 2.0 "
- Length: 5.0 '
- Slot/Type: 10 - Slot
- Material: Schedule 40 PVC

**Protective well casing**
- Material: Cast Iron Dia. 7.0 "
- Height Above Ground: Flush
- Lock Type: Master P506

General Notes:

**WW Engineering & Science**
Environmental Services

Page: 1 of 1
Well/Boring No. P-17
Client: Gage Products Co.
Project No.: 83575.00
Date: Started: 10/15/93 Finished: 10/15/93
Time: Started: 03:50 pm Finished: 04:30 pm

# Well/Boring Log Sheet

| State | County | City | Fraction | Section | T | R |
|---|---|---|---|---|---|---|
| MI | Oakland | Ferndale | SE 1/4 NW 1/4 | 35 | 1N | 11E |

Contractor: WWES
Address: 14496 Sheldon Rd.
Plymouth, MI 48170
Equipment: Power Auger
Crew Chief:
WW Supervisor: M. Nederveld

Location: Approximately 20 feet east of truck canopy

| Drilling Method(s) | Depth |
|---|---|
| Power Auger | 3.0' - 5.5' |

Ground Surface Elevation (feet): 635.3

**Grouting/Seal**

| Depth/To | Material/Method |
|---|---|
| 0.0-0.3' | Concrete |
| 0.3-5.3' | #5 Silica Sand |

Water Level: 3.0 ft. Below Grade

Remarks: Area excavated to 3.0 feet below grade. Water flowing from collection trench flooded bore hole and prohibited collection of soil samples for headspace analysis.

| Thick-ness (feet) | Depth to base (feet) | USCS * | Lithologic Description | Blow Counts: Sample Depth | 6" | 12" | 18" | 24" | PID: Headspace | PID: Background |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.7 | 0.7 | Other | Concrete | | | | | | | |
| 2.8 | 3.5 | Other | FILL:CLAY and SAND, Some Debris, Black, Moist | | | | | | | |
| 2.0 | 5.5 | CL | CLAY, Some Silt, Gray, Moist | | | | | | | |
| | | | EOB @ 5.5' | | | | | | | |

* = The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

**WW Engineering & Science**
**Environmental Services**

Project Name: Gage Products Co.

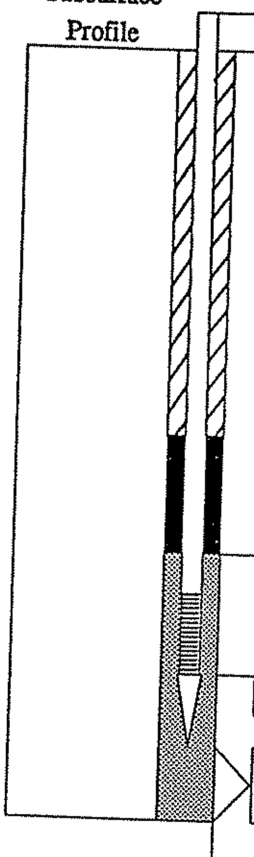
Project No: 83575.00

# Log of Well Installation

Well Number: P-17

Top of Casing Elevation (feet): 634.83

Generalized Subsurface Profile



Length of Casing Above Ground Surface: Flush

Concrete Cap (Y)

Depth to Top of Grout or Backfill: 0.3 '

Material (Grout or Backfill): N/A

Depth to Top of Filter Pack: 0.3 '

Type: #5 Silica Sand

Depth to Bottom of Well Screen: 5.3 '

Borehole Backfill Material: N/A

Total Depth of Borehole: 5.5 '

**Water Level Data**

| Date | Time | Water Level | Elevation |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

Development: Polyethylene Bailer

Survey Reference: USGS

**Well Casing**

- Diameter: 2.0 "
- Total Length: 0.3 '
- Material: Schedule 40 PVC
- Cap Type: Compression

**Well Screen**

- Diameter: 2.0 "
- Length: 5.0 '
- Slot/Type: 10 - Slot
- Material: Schedule 40 PVC

**Protective well casing**

- Material: Cast Iron Dia. 7.0 "
- Height Above Ground: Flush
- Lock Type: Master P506

General Notes:

**WW Engineering & Science**
Environmental Services



Well/Boring No. P-18
Client: Gage Products Co.
Project No.: 83575.00
Date: Started: 10/15/93 Finished: 10/15/93
Time: Started: 03:20 pm Finished: 03:50 pm

# Well/Boring Log Sheet

| State | County | City | Fraction | Section | T | R |
|---|---|---|---|---|---|---|
| MI | Oakland | Ferndale | SE 1/4 NW 1/4 | 35 | 1N | 11E |

Contractor: WWES
Address: 14496 Sheldon Rd.
Plymouth, MI 48170
Equipment: Power Auger
Crew Chief:
WW Supervisor: M. Nederveld

Location: Approximately 20 feet east of truck canopy

| Drilling Method(s) | Depth |
|---|---|
| Power Auger | 3.0' - 6.2' |

Ground Surface Elevation (feet): 635.3

**Grouting/Seal**

| Depth/To | Material/Method |
|---|---|
| 0.0-0.3' | Concrete |
| 0.3-5.3' | #5 Silica Sand |
| 5.3-6.2' | Cave In - Pea Gravel |

Water Level: 3.0 ft. Below Grade

Remarks: Area excavated to 3.0 feet below grade. Piezometer located in northern collection trench. Water in collection trench prohibited gathering soil samples for head space analysis.

| Thick-ness (feet) | Depth to base (feet) | USCS * | Lithologic Description | Blow Counts Sample Depth | 6" | 12" | 18" | 24" | PID Headspace | PID Background |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.7 | 0.7 | Other | Concrete | | | | | | | |
| 2.3 | 3.0 | Other | FILL:CLAY and SAND, Some Debris, Black, Moist | | | | | | | |
| 3.0 | 6.0 | Other | TRENCH FILL:PEA GRAVEL | | | | | | | |
| 0.2 | 6.2 | CL | CLAY, Some Silt, Gray, Moist | | | | | | | |
| | | | EOB @ 6.2' | | | | | | | |

* = The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

WW Engineering & Science
Environmental Services

Project Name: Gage Products Co.

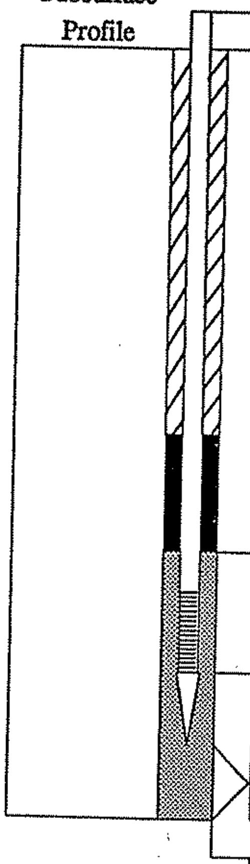
Project No: 83575.00

# Log of Well Installation

Well Number: P-18

Top of Casing Elevation (feet): 634.84

Generalized Subsurface Profile



Flush — Length of Casing Above Ground Surface

Concrete Cap (Y)

0.3 ' — Depth to Top of Grout or Backfill

Material (Grout or Backfill): N/A

0.3 ' — Depth to Top of Filter Pack

Type #5 Silica Sand

5.3 ' — Depth to Bottom of Well Screen

Pea Gravel — Borehole Backfill Material

6.2 ' — Total Depth of Borehole

**Water Level Data**

| Date | Time | Water Level | Elevation |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

Development: Polyethylene Bailer

Survey Reference: USGS

Well Casing
- Diameter: 2.0 "
- Total Length: 0.3 '
- Material: Schedule 40 PVC
- Cap Type: Compression

Well Screen
- Diameter: 2.0 "
- Length: 5.0 '
- Slot/Type: 10 - Slot
- Material: Schedule 40 PVC

Protective well casing
- Material: Cast Iron Dia. 7.0 "
- Height Above Ground: Flush
- Lock Type: Master P506

General Notes:

**WW Engineering & Science**
Environmental Services

Page: 1 of 1
Well/Boring No. P-19
Client: Gage Products Co.
Project No.: 83575.00
Date: Started: 10/15/93 Finished: 10/15/93
Time: Started: 05:00 pm Finished: 05:30 pm

# Well/Boring Log Sheet

| State | County | City | Fraction | Section | T | R |
|---|---|---|---|---|---|---|
| MI | Oakland | Ferndale | SE 1/4 NW 1/4 | 35 | 1N | 11E |

**Contractor:** WWES
**Address:** 14496 Sheldon Rd.
Plymouth, MI 48170
Equipment: Power Auger
Crew Chief:
WW Supervisor: M. Nederveld

**Location:** Approximately 30 feet north of office/laboratory

| Drilling Method(s) | Depth |
|---|---|
| Power Auger | 3.0' - 5.2' |

Ground Surface Elevation (feet): 634.9

**Grouting/Seal**

| Depth/To | Material/Method |
|---|---|
| 0.0-0.2' | Concrete |
| 0.2-2.5' | #5 Silica Sand |
| 2.5-5.2' | Cave In - Pea Gravel |

Water Level: 2.5 ft. Below Grade

Remarks: Area excavated to 3.0 feet below grade. Piezometer located in northern ground water collection trench. Water in collection trench prohibited gathering soil samples for headspace analysis.

| Thickness (feet) | Depth to base (feet) | USCS * | Lithologic Description |
|---|---|---|---|
| 0.7 | 0.7 | Other | Concrete |
| 1.8 | 2.5 | Other | FILL: SAND and CLAY, Some Debris, Black, Moist |
| 2.5 | 5.0 | Other | TRENCH FILL:PEA GRAVEL |
| 0.2 | 5.2 | CL | CLAY, Some Silt, Gray, Moist |
| | | | EOB @ 5.2' |

| Sample Depth | Blow Counts 6" | 12" | 18" | 24" | PID Headspace | PID Background |
|---|---|---|---|---|---|---|

* = The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

WW Engineering & Science
Environmental Services

Project Name: Gage Products Co.

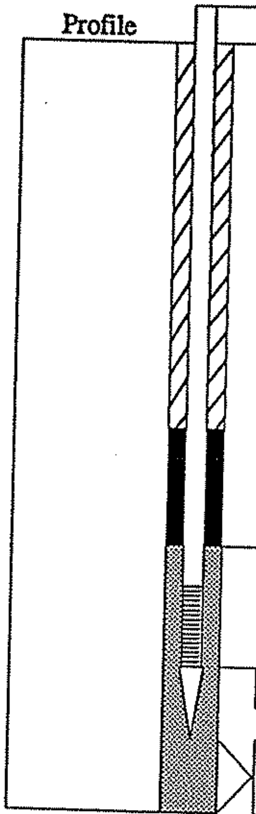
Project No: 83575.00

# Log of Well Installation

Well Number: P-19

Top of Casing Elevation (feet): 634.62

Generalized Subsurface Profile



Flush — Length of Casing Above Ground Surface

Concrete Cap (Y)

0.2' — Depth to Top of Grout or Backfill

Material (Grout or Backfill)

0.2' — Depth to Top of Filter Pack

Type #5 Silica Sand

4.7' — Depth to Bottom of Well Screen

Pea Gravel — Borehole Backfill Material

5.2' — Total Depth of Borehole

**Water Level Data**

| Date | Time | Water Level | Elevation |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

Development: None

Survey Reference: USGS

Well Casing
- Diameter: 2.0"
- Total Length: 0.2'
- Material: Schedule 40 PVC
- Cap Type: Compression

Well Screen
- Diameter: 2.0"
- Length: 4.5'
- Slot/Type: 10 - Slot
- Material: Schedule 40 PVC

Protective well casing
- Material: Cast Iron Dia. 7.0"
- Height Above Ground: Flush
- Lock Type: Master P506

General Notes:

# WW Engineering & Science
## Environmental Services

Page: 1 of 1
Well/Boring No. P-20
Client: Gage Products Co.
Project No.: 83575.00
Date: Started: 10/15/93 Finished: 10/15/93
Time: Started: 11:40 am Finished: 12:20 pm

# Well/Boring Log Sheet

| State | County | City | Fraction | Section | T | R |
|---|---|---|---|---|---|---|
| MI | Oakland | Ferndale | SE 1/4 NW 1/4 | 35 | 1N | 11E |

Contractor: WWES
Address: 14496 Sheldon Rd.
Plymouth, MI 48170
Equipment: Power Auger
Crew Chief:
WW Supervisor: M. Nederveld

Location: Southern property boundary 25 feet west and 6 feet south of southeast tank farm wall

| Drilling Method(s) | Depth |
|---|---|
| Power Auger | 5.5' |
| Hand Auger | 5.5' |

Ground Surface Elevation (feet): 635.1

**Grouting/Seal**

| Depth/To | Material/Method |
|---|---|
| 0.0-0.2' | Concrete |
| 0.2-5.2' | #5 Silica Sand |

Water Level: -- ft. Below Grade

Remarks: Hand Auger used to sample soils at 1.0 foot intervals to confirm soil type.

| Thickness (feet) | Depth to base (feet) | USCS * | Lithologic Description |
|---|---|---|---|
| 0.2 | 0.2 | Other | ASPHALT |
| 0.3 | 0.5 | Other | SAND and GRAVEL |
| 3.0 | 3.5 | ML | SAND, Some Clay, Moist, Gray |
| 2.0 | 5.5 | CL | CLAY, Trace Silt, Brown, Moist |
| | | | |
| | | | EOB @ 5.5' |

| Sample Depth | Blow Counts 6" | 12" | 18" | 24" | PID Headspace | PID Background |
|---|---|---|---|---|---|---|
| 0.0- 1.0' | - | - | - | - | 7.8 | 2.1 |
| 1.0- 2.0' | - | - | - | - | 9.4 | 1.7 |
| 2.0- 3.0' | - | - | - | - | 6.8 | 2.0 |
| 3.0- 4.0' | - | - | - | - | 7.4 | 2.0 |
| 4.0- 5.0' | - | - | - | - | 6.6 | 1.9 |
| 5.0- 5.5' | - | - | - | - | 5.8 | 1.8 |

* = The USCS symbol assigned is based on visual and manual observations and not on tests performed in the laboratory.

**WW Engineering & Science**
**Environmental Services**

Project Name: Gage Products Co.

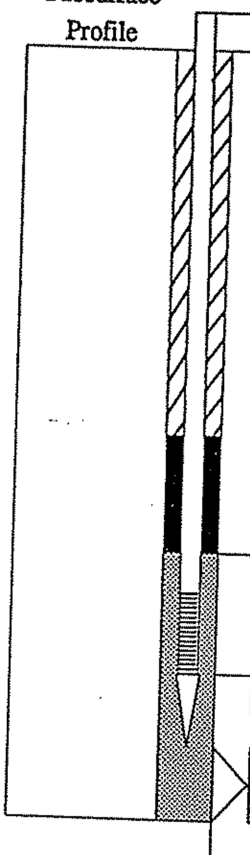
Project No: 83575.00

# Log of Well Installation

Well Number: P-20

Top of Casing Elevation (feet): 634.70

Generalized Subsurface Profile



Length of Casing Above Ground Surface: Flush

Concrete Cap (Y)

Depth to Top of Grout or Backfill: 0.2

Material (Grout or Backfill)

Depth to Top of Filter Pack: 0.2 '

Type #5 Silica Sand

Depth to Bottom of Well Screen: 5.2 '

Borehole Backfill Material: N/A

Total Depth of Borehole: 5.5 '

**Water Level Data**

| Date | Time | Water Level | Elevation |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

Development: Polyethylene Bailer

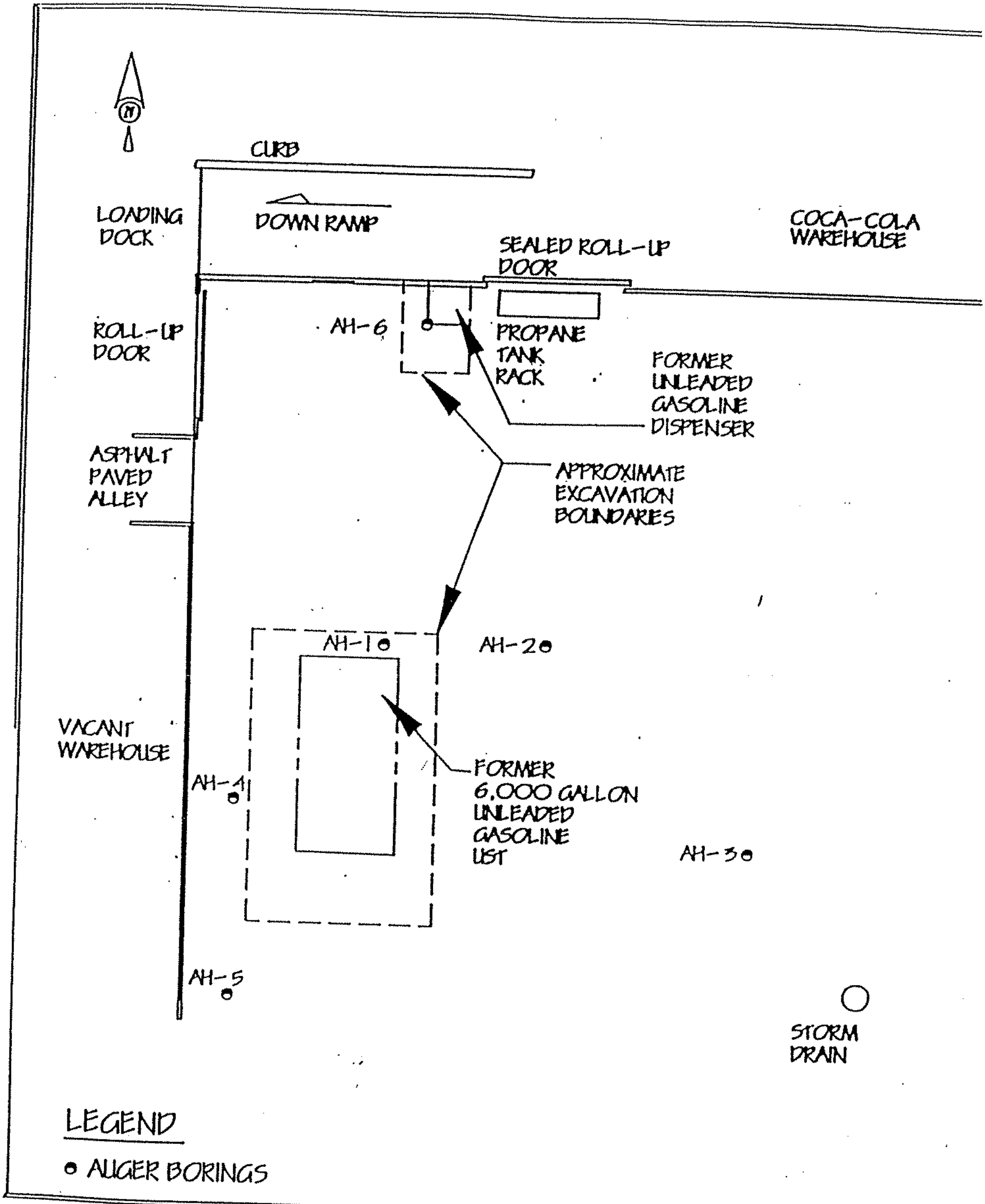
Survey Reference: USGS

Well Casing
- Diameter: 2.0 "
- Total Length: 0.2 '
- Material: Schedule 40 PVC
- Cap Type: Compression

Well Screen
- Diameter: 2.0 "
- Length: 5.0 '
- Slot/Type: 10 - Slot
- Material: Schedule 40 PVC

Protective well casing
- Material: Cast Iron Dia. 7.0 "
- Height Above Ground: Flush
- Lock Type: Master P506

General Notes:




THE TRAVERSE GROUP
EASTERN OPERATIONS
3772 Plaza Drive
Ann Arbor, Michigan 48108
(313) 747-9300
FAX: (313) 747-9288

5 0 5 10
SCALE: 1" = 10'

FIGURE 2
SITE SKETCH
COCA-COLA ENTERPRISES
FERNDALE FACILITY
515 WANDA, FERNDALE, MI
02-18-93
AM

C0952C

THE TRAVERSE GROUP

TRAVERSE [cut off]
2525 Aero Park D[cut off]
Traverse City, Mic[cut off]
(616) 947-2033

PROJECT: Ferndale Distributor Facility
BORING/WELL NUMBER: AH[cut off]
LOCATION: Ferndale, Michigan
SURFACE ELEVATION: N/[cut off]
CLIENT: Coca Cola
TOP OF CASING ELEVATIO[cut off]
PROJECT NUMBER: 952
STATIC WATER LEVEL: N/[cut off]
DRILLER: Mark Leask
HELPER: Dale Wilson
DEVELOPMENT METHOD: N[cut off]
INSTALLATION DATE: 2/10/93
WEATHER: Snowy 30°

| DEPTH (feet) | SAMPLE LOCATION | SAMPLE TYPE | SAMPLE METHOD | GRAPHIC LOG | SOIL CLASS |
|---|---|---|---|---|---|
| 0 | | | | | Asphalt |
| 0–4 | | | | | [Asphalt to about 4 ft] |
| 4–10 | | | | | Cobbles |
| 5–7 | X | Soil | Split Spoon | | |
| 10 | | | | | Clay, Brown with Trace Fine Sand |
| 10–12 | X | Soil | Split Spoon | | End of Boring at 10 Feet |

Depth scale: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15

Signature: Ann Markstrom

THE TRAVERS[cut off] GROUP

PROJECT: Ferndale Distributor F[cut off]
LOCATION: Ferndale, Michigan
CLIENT: Coca Cola
PROJECT NUMBER: 952
DRILLER: Mark Leask
INSTALLATION DATE: 2/10/93

| DEPTH (feet) | SAMPLE LOCATION | SAMPLE TYPE | SAMPLE [cut off] |
|---|---|---|---|
| 5–7 | X | Soil | Spl[cut off] Spo[cut off] |
| 10–12 | X | Soil | Spli[cut off] Spoo[cut off] |

Depth scale: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15

Signature: Ann M[cut off]

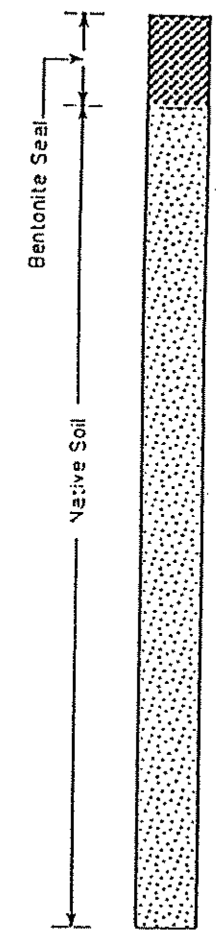
THE TRAVERSE GROUP

TRAVERSE DRILLING
2525 Aero Park Drive
Traverse City, Michigan 49684
(616) 947-2033 FAX: (616) 947-3629

PROJECT: Ferndale Distributor Facility
BORING/WELL NUMBER: AH-2
LOCATION: Ferndale, Michigan
SURFACE ELEVATION: N/A
CLIENT: Coca Cola
TOP OF CASING ELEVATION: N/A
PROJECT NUMBER: 952
STATIC WATER LEVEL: N/A
DRILLER: Mark Leask
HELPER: Dale Wilson
DEVELOPMENT METHOD: N/A
INSTALLATION DATE: 2/18/03
WEATHER: Snowy 30°

| DEPTH (feet) | SAMPLE LOCATION | SAMPLE TYPE | SAMPLE METHOD | GRAPHIC LOG | SOIL CLASS |
|---|---|---|---|---|---|
| 1 | | | | | Concrete |
| 2 | | | | | |
| 3 | | | | | Medium Sand, Tan |
| 4 | | | | | |
| 5 | | | | | Sandy Clay, Brown |
| 6 | | Soil | Split Spoon | | |
| 7 | | | | | |
| 8 | | | | | |
| 9 | | | | | |
| 10 | | | | | Clay, Gray |
| 11 | | Soil | Split Spoon | | End of Boring at 10 Feet |
| 12 | | | | | |
| 13 | | | | | |
| 14 | | | | | |
| 15 | | | | | |

WELL DIAGRAM




Signature: Ann Markstrom

THE TRAVERSE GROUP

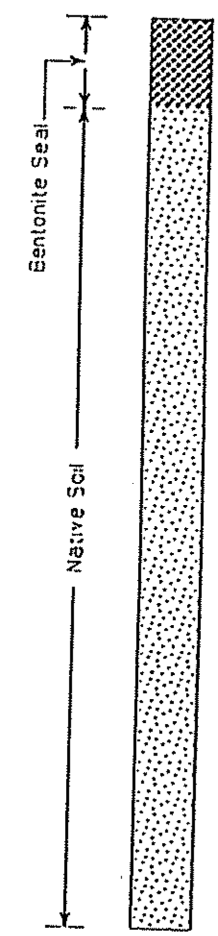
TRAVERSE DRILLING
2525 Aero Park Drive
Traverse City, Michigan 49684
(616) 947-2033 FAX: (616) 947-3629

PROJECT: Ferndale Distributor Facility
LOCATION: Ferndale, Michigan
CLIENT: Coca Cola
PROJECT NUMBER: 952
DRILLER: Mark Leask HELPER: Dale Wilson
INSTALLATION DATE: 2/18/93

BORING/WELL NUMBER: AH-4
SURFACE ELEVATION: N/A
TOP OF CASING ELEVATION: N/A
STATIC WATER LEVEL: N/A
DEVELOPMENT METHOD: N/A
WEATHER: Snowy 30'

| DEPTH (feet) | SAMPLE LOCATION | SAMPLE TYPE | SAMPLE METHOD | GRAPHIC LOG | SOIL CLASS |
|---|---|---|---|---|---|
| 0 | | | | | Asphalt |
| 1 | | | | | |
| 2 | | | | | |
| 3 | | | | | |
| 4 | | | | | Clayey Sand, Brown |
| 5 | | | | | Clay, Brown with Trace Fine Sand |
| 6 | | Soil | Split Spoon | | |
| 7 | | | | | |
| 8 | | | | | |
| 9 | | | | | |
| 10 | | | | | Clay, Gray |
| 11 | | Soil | Split Spoon | | End of Boring at 10 Feet |
| 12 | | | | | |
| 13 | | | | | |
| 14 | | | | | |
| 15 | | | | | |

WELL DIAGRAM




Signature: Ann Markstrom

THE TRAVERSE GROUP

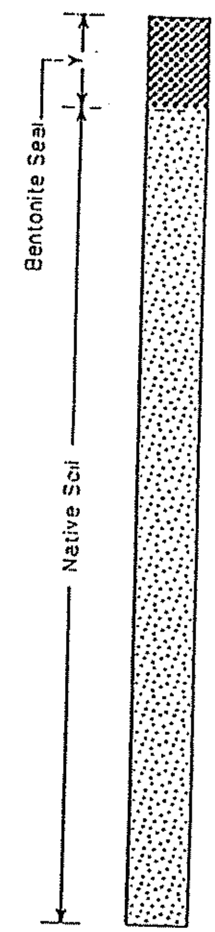
TRAVERSE DRILLING
2525 Aero Park Drive
Traverse City, Michigan 49684
(616) 947-2033 FAX: (616) 947-3629

PROJECT Ferndale Distributor Facility
LOCATION Ferndale, Michigan
CLIENT Coca Cola
PROJECT NUMBER 952
DRILLER Mark Leask HELPER Dale Wilson
INSTALLATION DATE 2/10/93

BORING/WELL NUMBER AH-5
SURFACE ELEVATION N/A
TOP OF CASING ELEVATION N/A
STATIC WATER LEVEL N/A
DEVELOPMENT METHOD N/A
WEATHER Snowy 30°

| DEPTH (feet) | SAMPLE LOCATION | SAMPLE TYPE | SAMPLE METHOD | GRAPHIC LOG | SOIL CLASS |
|---|---|---|---|---|---|
| 0 | | | | | Asphalt |
| 1 | | | | | |
| 2 | | | | | |
| 3 | | | | | |
| 4 | | | | | Clayey Sand, Brown |
| 5 | | | | | Clay, Brown with Trace Fine Sand |
| 6 | | Soil | Split Spoon | | |
| 7 | | | | | |
| 8 | | | | | |
| 9 | | | | | |
| 10 | | | | | Clay, Gray |
| 11 | | Soil | Split Spoon | | End of Boring at 10 Feet |
| 12 | | | | | |
| 13 | | | | | |
| 14 | | | | | |
| 15 | | | | | |

WELL DIAGRAM




Signature Ann Marketon

THE TRAVERSE GROUP

TRAVERSE DRILLING
2525 Aero Park Drive
Traverse City, Michigan 49684
(616) 947-2033 FAX: (616) 947-3629

PROJECT Ferndale Distributor Facility

BORING/WELL NUMBER AH-8

LOCATION Ferndale, Michigan

SURFACE ELEVATION N/A

CLIENT Coca Cola

TOP OF CASING ELEVATION N/A

PROJECT NUMBER 952

STATIC WATER LEVEL N/A

DRILLER Mark Leask HELPER Dale Wilson

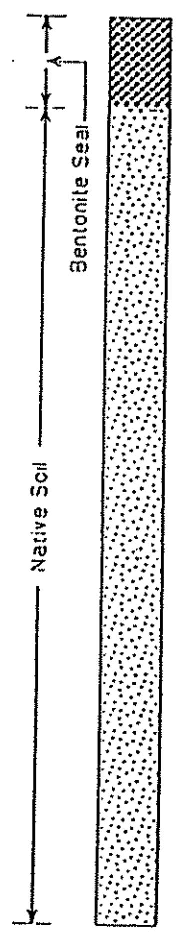
DEVELOPMENT METHOD N/A

INSTALLATION DATE 2/18/93

WEATHER Snowy 30°

| DEPTH (feet) | SAMPLE LOCATION | SAMPLE TYPE | SAMPLE METHOD | GRAPHIC LOG | SOIL CLASS |
|---|---|---|---|---|---|
| 0 | | | | | Asphalt |
| 3 | | | | | Medium Sand, Tan with Gravel |
| 5–7 | X | Soil | Split Spoon | | |
| 6 | | | | | Clay, Brown with Trace Fine Sand |
| 10 | | | | | Clay, Gray |
| 10–12 | X | Soil | Split Spoon | | End of Boring at 10 Feet |

WELL DIAGRAM




Signature Ann Markstrom

# Appendix B2-2

## Soil Test Data

# FALLING-HEAD PERMEABILITY TEST

DATE 8/16/89

. ROJECT Gage

ORING NO. Test # 1 53.5 ' to 55.0

Technician R. Voruganti Computed By R. Voruganti Ehecked By James H. Tellam, P.E.

:ple or Specimen No.

| | | | | | |
|---|---|---|---|---|---|
| Tare plus dry soil | | 223.0 | Diameter of specimen, cm | D | 3.429 |
| Tare | | 119.0 | Area of specimen, sq cm | A | 9.2347 |
| Dry Soil | $W_s$ | 104.0 | Initial height of specimen, cm | L | 7.62 |
| ecific gravity assume | G | 2.70 | Initial vol of spec, cc = AL | V | 70.368 |
| l. of solids, cc = $W_s$ ÷ G | $V_s$ | 385.18 | Initial void ratio = $(V - V_s) \div V_s$ | e | 0.826 |
| ea of standpipe, sq cm | a | 0.915 | Constant = $(2.303 \times a) \div A$ | C | .22819 |

| Test No. | | 1 | | 2 | | 3 | |
|---|---|---|---|---|---|---|---|
| ight of specimen, cm | L | 7.62 | | | | | |
| atio = $(AL - V_s) \div V_s$ | e | 0.826 | | | | | |
| | | 1a | 1b | 2a | 2b | 3a | 3b |
| itial time 8/15/89 | $t_o$ | 5:45 | | | | | |
| al time 8/15/89 | $t_f$ | 5:45pm | | | | | |
| apsed time, sec = $t_f - t_o$ | t | 90000 | | | | | |
| tial head, cm | $h_o$ | 124 | | | | | |
| al head, cm | $h_f$ | 121 | | | | | |
| $(h_o \div h_f)$ | | .0106363 | | | | | |
| er temperature, °C | T | 20 | | | | | |
| cosity correction factor(1) | $R_T$ | 1 | | | | | |
| fficient of permeability,(2) n/sec | $k_{20}$ | $2.055 \times 10^{-7}$ | | | | | |
| | Avg | | | | | | |

) Correction factor for viscosity of water at 20 C obtained from table VII-1.

) $$k_{20} = 2.303 \frac{a}{A} \frac{L}{t} \log \frac{h_o}{h_f} \times R_T = \frac{C\ L}{t} \log \frac{h_o}{h_f} \times R_T .$$

$$k_{20} = \frac{2.303 \times 0.915 \times 7.62 \ [\log 124/121] \times 1}{9.2347 \times 90{,}000} = 2.055 \times 10^{-7}$$

**FALLING-HEAD PERMEABILITY TEST**

DATE 8-9-89 8-10-89 8-11-89

PROJECT Gage

BORING NO. GMW 6 8' to 9.5

Technician R. Voruganti Computed By R. Voruganti Ehecked By James H. Tellam, P.E.

ample or Specimen No.

| | | | | | | |
|---|---|---|---|---|---|---|
| Wt in Grams | Tare plus dry soil | | 264.60 | Diameter of specimen, cm | D | 3.429 |
| | Tare | | 114.8 | Area of specimen, sq cm | A | 9.2347 |
| | Dry Soil | $W_s$ | 149.8 | Initial height of specimen, cm | L | 7.62 |
| ecific gravity assume | | G | 2.70 | Initial vol of spec, cc = AL | V | 70.368 |
| ol of solids, cc = $W_s \div G$ | | $V_s$ | 55.48 | Initial void ratio = $(V - V_s) \div V_s$ | e | .02683 |
| ea of standpipe, sq cm | | a | 0.915 | Constant = $(2.303 \times a) \div A$ | C | 0.2281877 |

| Test No. | | 1 | | 2 | | 3 | |
|---|---|---|---|---|---|---|---|
| eight of specimen, cm | L | 7.62 | | | | | |
| ratio = $(AL - V_s) \div V_s$ | e | 0.2683 | | | | | |
| | | 1a | 1b | 2a | 2b | 3a | 3b |
| itial time 8/9/89 | $t_o$ | 9:20am | | | | | |
| nal time 8/10/89 | $t_f$ | 4:30pm | | | | | |
| apsed time, sec = $t_f - t_o$ | t | 108600 | | | | | |
| itial head, cm | $h_o$ | 123 | | | | | |
| nal head, cm | $h_f$ | 110 | | | | | |
| $(h_o \div h_f)$ | | .0485124 | | | | | |
| ter temperature, °C | T | 20C | | | | | |
| scosity correction factor(1) | $R_T$ | 1 | | | | | |
| fficient of permeability,(2) m/sec | $k_{20}$ | $7.76 \times 10^{-7}$ | | | | | |
| | Avg | | | | | | |

) Correction factor for viscosity of water at 20 C obtained from table VII-1.

$$k_{20} = 2.303 \frac{a}{A} \frac{L}{t} \log \frac{h_o}{h_f} \times R_T = \frac{C\,L}{t} \log \frac{h_o}{h_f} \times R_T .$$

$$K20 = \frac{2.303 \times 0.915 \times 762 \times [\log 123/110] \times 1}{9.2347 \times 108600} = 7.76 \times 10^{-7}$$

emarks:

# FALLING-HEAD PERMEABILITY TEST

DATE 8/7/89

ROJECT Gage

BORING NO. GMW -5 8' - 9.5'

Technician R. Voruganti Computed By R. Voruganti Checked By James H. Tellam, P.E.

mple or Specimen No.

| | | | | | |
|---|---|---|---|---|---|
| Tare plus dry soil | | 271.28 | Diameter of specimen, cm | D | 3.429 |
| Tare | | 120.21 | Area of specimen, sq cm | A | 9.2347 |
| Dry Soil | $W_s$ | 151.07 | Initial height of specimen, cm | L | 7.62 |
| ecific gravity assume | G | 124.0 | Initial vol of spec, cc = AL | V | 70.368 |
| l of solids, cc = $W_s$ + G | $V_s$ | 55.952 | Initial void ratio = $(V - V_s) + V_s$ | e | 0.2576 |
| ea of standpipe, sq cm | a | 0.915 | Constant = $(2.303 \times a) + A$ | C | 0.22818 |

| Test No. | | 1 | | 2 | | 3 | |
|---|---|---|---|---|---|---|---|
| ight of specimen, cm | L | 7.62 | | | | | |
| ratio = $(AL - V_s) + V_s$ | e | | | | | | |
| | | 1a | 1b | 2a | 2b | 3a | 3b |
| tial time 8/7/89 | $t_o$ | 2:50pm | | | | | |
| al time 8/9/89 | $t_f$ | 9:05am | | | | | |
| psed time, sec = $t_f - t_o$ | t | 152100 | | | | | |
| tial head, cm | $h_o$ | 124.0 | | | | | |
| al head, cm | $h_f$ | 115.2 | | | | | |
| $(h_o + h_f)$ | | .0319672 | | | | | |
| r temperature, °C | T | 20 | | | | | |
| cosity correction factor(1) | $R_T$ | 1 | | | | | |
| fficient of permeability,(2) /sec | $k_{20}$ | $3.65 \times 10^{-7}$ | | | | | |
| | Avg | | | | | | |

Correction factor for viscosity of water at 20 C obtained from table VII-1.

$$k_{20} = 2.303 \frac{a}{A}\frac{L}{t} \log \frac{h_o}{h_f} \times R_T = \frac{C\,L}{t} \log \frac{h_o}{h_f} \times R_T .$$

$$\frac{2.303 \times 0.915 \times 7.62 \,[\log 124.0/115.2] \times 1}{9.2347 \times 152100} \quad 3.655 \times 10^{-7}$$

sample 3

# FALLING-HEAD PERMEABILITY TEST

DATE 8/10/89 8/14/89

PROJECT Gage

BORING NO. Test hole 2 58.5 to 60.0

Technician R. Voruganti Computed By R. Voruganti Checked By James H. Tellam, P.E.

ample or Specimen No.

| | | | | | |
|---|---|---|---|---|---|
| Tare plus dry soil | | 235.32 | Diameter of specimen, cm | D | 3.249 |
| Tare | | 115.65 | Area of specimen, sq cm | A | 9.2347 |
| Dry Soil assume | $W_s$ | 119.67 | Initial height of specimen, cm | L | 7.62 |
| ecific gravity | G | 2.70 | Initial vol of spec, cc = AL | V | 70.368 |
| l of solids, cc = $W_s$ + G | $V_s$ | 44.32 | Initial void ratio = $(V - V_s) + V_s$ | e | 0.587 |
| ea of standpipe, sq cm | a | 0.915 | Constant = $(2.303 \times a) + A$ | C | 0.22818 |

| Test No. | | 1 | | 2 | | 3 | |
|---|---|---|---|---|---|---|---|
| ight of specimen, cm | L | 7.62 | | | | | |
| tio = $(AL - V_s) + V_s$ | e | 0.587 | | | | | |
| | | 1a | 1b | 2a | 2b | 3a | 3b |
| itial time 8/10/89 | $t_o$ | 4:45pm | | | | | |
| al time 8/14/89 | $t_f$ | 8:45pm | | | | | |
| apsed time, sec = $t_f - t_o$ | t | 316800 | | | | | |
| tial head, cm | $h_o$ | 124 | | | | | |
| al head, cm | $h_f$ | 118 | | | | | |
| $(h_o + h_f)$ | | .0215397 | | | | | |
| er temperature, °C | T | 20 | | | | | |
| cosity correction factor(1) | $R_T$ | 1 | | | | | |
| fficient of permeability,(2) m/sec | $k_{20}$ | 1.18 x | $10^{-7}$ | | | | |
| | Avg | | | | | | |

) Correction factor for viscosity of water at 20 C obtained from table VII-1.

) $k_{20} = 2.303 \frac{a}{A} \frac{L}{t} \log \frac{h_o}{h_f} \times R_T = \frac{C\ L}{t} \log \frac{h_o}{h_f} \times R_T$.

$$\frac{2303 \times 0.915 \times 7.62 \times [124/118] \times 1}{9.2347 \times 316800} = 1.18 \times 10^{-7}$$

job # 90-0889

# FALLING-HEAD PERMEABILITY TEST

DATE 8/15/89

PROJECT Gage

BORING NO. test hole # 1 28.5' to 30.0'

Technician R. Voruganti Computed By R. Voruganti Checked By James H. Tellam, P.E.

ample or Specimen No.

| | | | | | |
|---|---|---|---|---|---|
| Wt in grams: Tare plus dry soil | | 247.68 | Diameter of specimen, cm | D | 3.429 |
| Tare | | 120.34 | Area of specimen, sq cm | A | 9.2347 |
| Dry Soil | $W_s$ | 127.34 | Initial height of specimen, cm | L | 7.62 |
| pecific gravity assume | G | 2.70 | Initial vol of spec, cc = AL | V | 70.368 |
| ol of solids, cc = $W_s$ + G | $V_s$ | 47.1629 | Initial void ratio = $(V - V_s) \div V_s$ | e | 0.4920 |
| rea of standpipe, sq cm | a | 0.915 | Constant = $(2.303 \times a) \div A$ | C | 0.22819 |

| Test No. | | 1 | | 2 | | 3 | |
|---|---|---|---|---|---|---|---|
| eight of specimen, cm | L | 7.62 | | | | | |
| ratio = $(AL - V_s) \div V_s$ | e | 0.4920 | | | | | |
| | | 1a | 1b | 2a | 2b | 3a | 3b |
| itial time 8/14/89 | $t_o$ | 9:00am | | | | | |
| nal time 8/15/89 | $t_f$ | 5.30pm | | | | | |
| apsed time, sec = $t_f - t_o$ | t | 117000 | | | | | |
| itial head, cm | $h_o$ | 124 | | | | | |
| nal head, cm | $h_f$ | 119 | | | | | |
| $3(h_o \div h_f)$ | | .0178747 | | | | | |
| ter temperature, °C | T | 20C | | | | | |
| scosity correction factor(1) | $R_T$ | 1 | | | | | |
| efficient of permeability,(2) cm/sec | $k_{20}$ | $2.656 \times 10^{-7}$ | | | | | |
| | Avg | $2.656 \times 10^{-7}$ | | | | | |

(1) Correction factor for viscosity of water at 20 C obtained from table VII-1.

(2) $k_{20} = 2.303 \frac{a}{A}\frac{L}{t} \log \frac{h_o}{h_f} \times R_T = \frac{C\,L}{t} \log \frac{h_o}{h_f} \times R_T$.

$$\frac{2.303 \times 0.915 \times 7.62\ [\log 124/119] \times 1}{9.2347 \times 117000} = 2.656 \times 10^{-7}$$

# GENERAL SOIL SAMPLE NOTES

Unless noted, all terms utilized herein refer to the "Standard Definitions" presented in ASTM D 653.

Standard Penetration Test (ASTM D 1586) - A 2.0-inch outside-diameter, 1 $^3/_8$-inch inside-diameter split barrel sampler is driven into undisturbed soil by means of a 140-pound weight falling freely through a vertical distance of 30 inches. The sampler is normally driven three successive 6-inch increments. The total number of blows required for the final 12 inches of penetration is the Standard Penetration Resistance (N).

## COHESIVE SOILS *

| CONSISTENCY | APPROXIMATE RANGE OF (N) |
|---|---|
| Very Soft | 0-2 |
| Soft | 3-4 |
| Medium | 5-8 |
| Stiff | 9-15 |
| Very Stiff | 16-30 |
| Hard | 31-50 |
| Very Hard | Over 50 |

## COHESIONLESS SOILS

| DENSITY CLASSIFICATION | APPROXIMATE RANGE OF (N) |
|---|---|
| Very Loose | 0-4 |
| Loose | 5-10 |
| Medium Compact | 11-30 |
| Compact | 31-50 |
| Very Compact | Over 50 |

* If clay content is sufficient so that clay dominates soil properties, clay becomes the principal noun with the other major soil constituent as modifier, i.e., silty clay. Other minor soil constituents may be included in accordance with the classification breakdown for cohesionless soils, i.e., silty clay, trace of sand, little gravel.

## CLASSIFICATION

The major soil constituent is the principal noun, i.e., sand, silt, gravel. The second major soil constituent and other minor constituents are reported as follows:

| Second Major Constituent (percent by weight) | Minor Constituents (percent by weight) |
|---|---|
| Trace - 1 to 11 percent | Trace - 1 to 11 percent |
| Adjective - 12 to 35 percent (clayey, silty, etc.) | Little - 12 to 22 percent |
| | Some - 23 to 33 percent |
| And - Over 35 percent | |

## PARTICLE SIZES

| | |
|---|---|
| Boulders | - Greater than 12 inches (305 mm) |
| Cobbles | - 3 inches (76.2mm) to 12 inches (305mm) |
| Gravel-Coarse | - $^3/_4$ inches (19.05mm) to 3 inches (76.2mm) |
| Gravel-Fine | - No. 4, $^3/_{16}$ inches (4.75mm) to $^3/_4$ inches (19.05mm) |
| Sand-Coarse | - No. 10 (2.00mm) to No. 4 (4.75mm) |
| Sand-Medium | - No. 40 (0.425mm) to No. 10 (2.00mm) |
| Sand-Fine | - No. 200 (0.074mm) to No. 40 (0.425mm) |
| Silt | - 0.005mm to 0.074mm |
| Clay | - Less than 0.005mm |

## SAMPLE AND TESTING DESIGNATIONS

AS - Auger Sample - Directly from Auger Flight.
SS - Split Spoon Sample
LS - Split Spoon Sample (S) with Liner Insert 3 Inches in Length.
ST - Shelby Tube Sample - 3-Inch Diameter Unless Otherwise Noted.
PS - Piston Sample - 3-Inch Diameter Unless Otherwise Noted.
S - Miscellaneous Samples (Bottle or Bag).
RC - Rock Core - NX Core Unless Otherwise Noted.

SSW - Soil Sample Collected from an Excavation Wall
SSF - Soil Sample Collected from an Excavation Floor
WS - Water Sample

SB - Soil Boring
TB - Test Boring
HAB - Hand Auger Boring
TP - Test Pit
MW - Monitoring Well
OW - Observation Well
P - Piezometer

# SUMMARY GRAIN SIZE ANALYSIS

JOB: GAGE PRODUCTS COMPANY   Project No: 83284.00
METHODS: ASTM D422, D4318, D2487, D5084 and D2216

| SAMPLE NUMBER | DEPTH (ft) | LAB NUMBER | TEXTURE (PERCENT FINER) SIEVE #4 4.75 mm | #10 2.00 mm | #35 #### mm | #60 #### mm | #120 0.125 mm | #200 0.075 mm | HYDROMETER 0.050 mm | 0.005 mm | 0.002 mm | ATTERBERG LIMITS LL | PL | PI | CLASSIFICATION UNIFIED | PERMEABILITY K (cm/sec) | MOISTURE (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SB-8 | 1.0-2.5 | 9202089 | 95.9 | 90.2 | 73.8 | 53.8 | 32.3 | 19.3 | 15.2 | 8.2 | 5.9 | NONPLASTIC | | | SM | | 15.3 |
| SB-8 | 6.5-10.0 | 9202090 | 97.1 | 94.1 | 89.0 | 82.4 | 71.8 | 63.3 | 60.1 | 36.0 | 26.5 | 28.0 | 14.5 | 13.6 | CL | | 12.7 |
| SB-8 | 35.0-37.5 | 9202099 | 98.4 | 96.0 | 91.0 | 85.1 | 74.9 | 66.8 | 62.2 | 35.5 | 27.2 | 24.7 | 12.7 | 12.0 | CL | 2.0E-08 | 15.2 |
| SB-9 | 13.5-15.0 | 9202091 | 98.3 | 95.2 | 89.4 | 82.3 | 71.1 | 62.1 | 58.2 | 32.5 | 25.3 | 23.2 | 12.1 | 11.1 | CL | | 10.6 |
| SB-9 | 26.0-27.5 | 9202092 | 96.4 | 94.0 | 88.9 | 82.9 | 73.3 | 65.8 | 61.5 | 36.8 | 28.2 | 25.5 | 13.0 | 12.5 | CL | | 13.4 |
| SB-10 | 6.0-7.5 | 9202093 | 96.4 | 91.4 | 84.3 | 78.3 | 69.1 | 61.9 | 58.0 | 35.0 | 26.0 | 30.2 | 14.7 | 15.5 | CL | | 13.4 |
| SB-10 | 17.5-20.0 | 9202100 | 97.6 | 95.3 | 90.7 | 85.1 | 75.7 | 68.3 | 63.0 | 41.0 | 30.2 | 25.9 | 13.7 | 12.3 | CL | 1.2E-08 | 13.7 |
| SB-11 | 28.5-30.0 | 9202094 | 99.0 | 95.9 | 91.1 | 85.2 | 75.1 | 67.2 | 63.5 | 36.7 | 28.8 | 25.4 | 12.6 | 12.8 | CL | | 15.0 |
| SB-12 | 11.0-12.5 | 9202095 | 96.7 | 94.3 | 90.0 | 84.5 | 75.4 | 68.2 | 63.0 | 38.2 | 29.2 | 31.5 | 15.0 | 16.5 | CL | | 12.5 |
| SB-12 | 23.5-25.0 | 9202096 | 97.2 | 94.9 | 90.7 | 85.1 | 75.9 | 68.4 | 65.8 | 40.2 | 31.7 | 26.9 | 13.1 | 13.8 | CL | | 13.5 |
| SB-14 | 3.5-5.0 | 9202097 | 97.8 | 95.8 | 91.4 | 83.5 | 67.0 | 51.6 | 46.5 | 25.5 | 19.8 | 25.3 | 14.6 | 10.7 | CL | | 20.0 |
| SB-14 | 16.0-17.5 | 9202098 | 95.7 | 93.0 | 88.5 | 82.8 | 73.3 | 65.8 | 61.8 | 37.5 | 27.8 | 25.9 | 13.2 | 12.6 | CL | | 14.4 |

SUMMARY O. CS

JOB: GAGE PRODUCTS COMPANY Project No: 83284.00
METHODS: ASTM D2216, D2927, and D854

| SAMPLE NUMBER | DEPTH (ft) | LAB NUMBER | MOISTURE (%) | WET DENSITY (lbs/ft3) | DRY DENSITY (lbs/ft3) | SPECIFIC GRAVITY (G at 20C) |
|---|---|---|---|---|---|---|
| SB-9 | 1.0-2.5 | 9202079 | 14.1 | Disturbed Sample | | 2.03 |
| SB-9 | 3.5-5.0 | 9202080 | 19.2 | Disturbed Sample | | 2.08 |
| SB-9 | 6.0-7.5 | 9202081 | 19.9 | 122.9 | 102.5 | 2.04 |
| SB-9 | 8.5-10.0 | 9202082 | 15.7 | 139.6 | 120.6 | 2.22 |
| SB-9 | 11.0-12.5 | 9202083 | 26.1 | 137.3 | 108.9 | 2.09 |
| SB-9 | 16.0-17.5 | 9202084 | 11.5 | 146.5 | 131.4 | 2.28 |
| SB-9 | 18.5-20.0 | 9202085 | 12.1 | 148.6 | 132.5 | 2.30 |
| SB-9 | 21.0-22.5 | 9202086 | 12.4 | 142.5 | 126.8 | 2.29 |
| SB-9 | 23.5-25.0 | 9202087 | 13.1 | 143.9 | 127.2 | 2.27 |
| SB-9 | 28.5-30.0 | 9202088 | 13.6 | 137.0 | 120.6 | 2.25 |

WW Engineering & Science
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# GRAIN SIZE DATA

WW ENGINEERING & SCIENCE INC.
GRAIN SIZE ANALYSIS    A.S.T.M. D-422

Project: GAGE PRODUCTS CO.    Identification: SB - 8 1.0-2.5
Lab No. 9202089

132.90 = Air dry wt. of total sample selected for analysis.
50.00 = Air dry wt. of sample selected for hydrometer analysis.
131.71 = Dry wt. of total sample selected for analysis.
49.50 = Dry wt. of sample selected for hydrometer analysis.

HYGROSCOPIC MOISTURE

16.69 = wt. of wet soil + container 16.54 = wt. of dry soil + container
1.60 = wt. of container
1.0 = % hygroscopic moisture    0.99006= moisture factor

SIEVE ANALYSIS (cumulative weights)

GRAVEL (greater than 2 MM)

| Sieve Size | Weight Retained | % Passing |
|---|---|---|
| 4.75 | 5.34 | 95.9 |
| 2.00 | 12.93 | 90.2 |

SAND (from hydrometer sediment)

| Sieve Size | Weight Retained | Ttl. Sample % Passing |
|---|---|---|
| 0.500 | 9.02 | 73.8 |
| 0.250 | 19.97 | 53.8 |
| 0.125 | 31.80 | 32.3 |
| 0.075 | 38.90 | 19.3 |

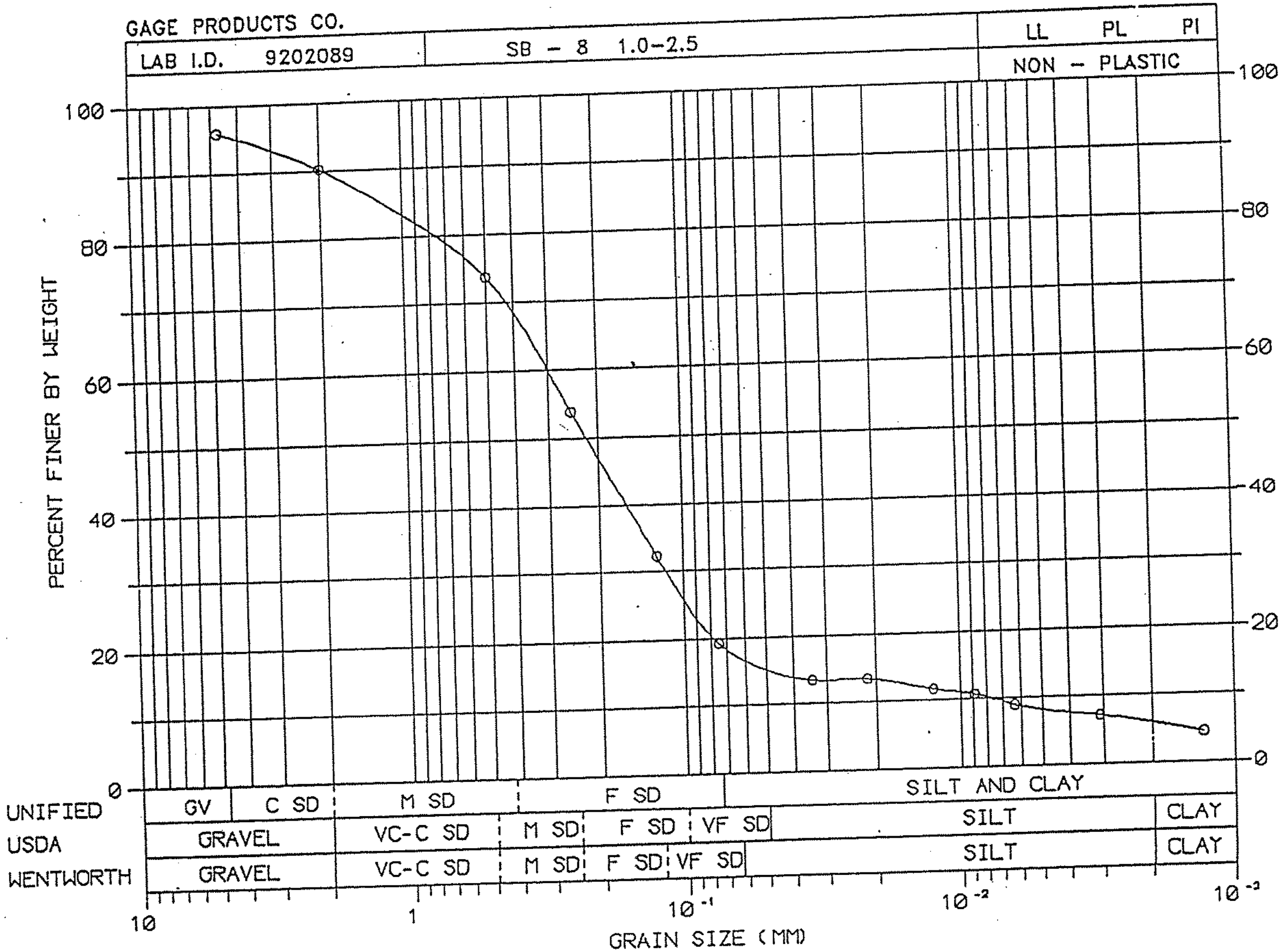
HYDROMETER ANALYSIS

9:30AM = Time sedimentation begins    Meniscus correction = 1

| Elapsed Time (min.) t | Temp. (deg.C) | Initial Hydro. Reading Ra | Zero Corr. | Dia. (MM) D | Total Sample Percent Passing |
|---|---|---|---|---|---|
| 2 | 23.5 | 12.5 | 5.0 | 0.03416 | 13.5 |
| 5 | 23.5 | 12.5 | 5.0 | 0.02160 | 13.5 |
| 15 | 23.5 | 11.5 | 5.0 | 0.01254 | 11.7 |
| 30 | 23.5 | 11.0 | 5.0 | 0.00890 | 10.8 |
| 60 | 23.5 | 10.0 | 5.0 | 0.00633 | 9.0 |
| 250 | 23.5 | 9.0 | 5.0 | 0.00312 | 7.2 |
| 1440 | 23.5 | 7.5 | 5.0 | 0.00131 | 4.5 |

ATTERBERG LIMITS    A.S.T.M D-4318
Liquid limit, Plastic Limit, Plasticity Index

This sample is NONPLASTIC



GAGE PRODUCTS CO.
LAB I.D. 9202089
SB - 8 1.0-2.5
LL PL PI
NON - PLASTIC
100
80
60
40
20
0
PERCENT FINER BY WEIGHT
UNIFIED
USDA
WENTWORTH
GV
C SD
M SD
F SD
SILT AND CLAY
GRAVEL
VC-C SD
M SD
F SD
VF SD
SILT
CLAY
GRAVEL
VC-C SD
M SD
F SD
VF SD
SILT
CLAY
10
1
10 -1
10 -2
10 -3
GRAIN SIZE (MM)

WW ENGINEERING & SCIENCE INC.
GRAIN SIZE ANALYSIS A.S.T.M. D-422

Project: GAGE PRODUCTS CO. Identification: SB - 8 8.5-10.0
Lab No. 9202090

226.60 = Air dry wt. of total sample selected for analysis.
50.00 = Air dry wt. of sample selected for hydrometer analysis.
224.57 = Dry wt. of total sample selected for analysis.
49.52 = Dry wt. of sample selected for hydrometer analysis.

HYGROSCOPIC MOISTURE

20.50 = wt. of wet soil + container 20.32 = wt. of dry soil + container
1.60 = wt. of container
1.0 = % hygroscopic moisture 0.99048= moisture factor

SIEVE ANALYSIS (cumulative weights)

GRAVEL (greater than 2 MM)

| Sieve Size | Weight Retained | % Passing |
|---|---|---|
| 4.75 | 6.51 | 97.1 |
| 2.00 | 13.24 | 94.1 |

SAND (from hydrometer sediment)

| Sieve Size | Weight Retained | Ttl. Sample % Passing |
|---|---|---|
| 0.500 | 2.71 | 89.0 |
| 0.250 | 6.16 | 82.4 |
| 0.125 | 11.75 | 71.8 |
| 0.075 | 16.20 | 63.3 |

HYDROMETER ANALYSIS

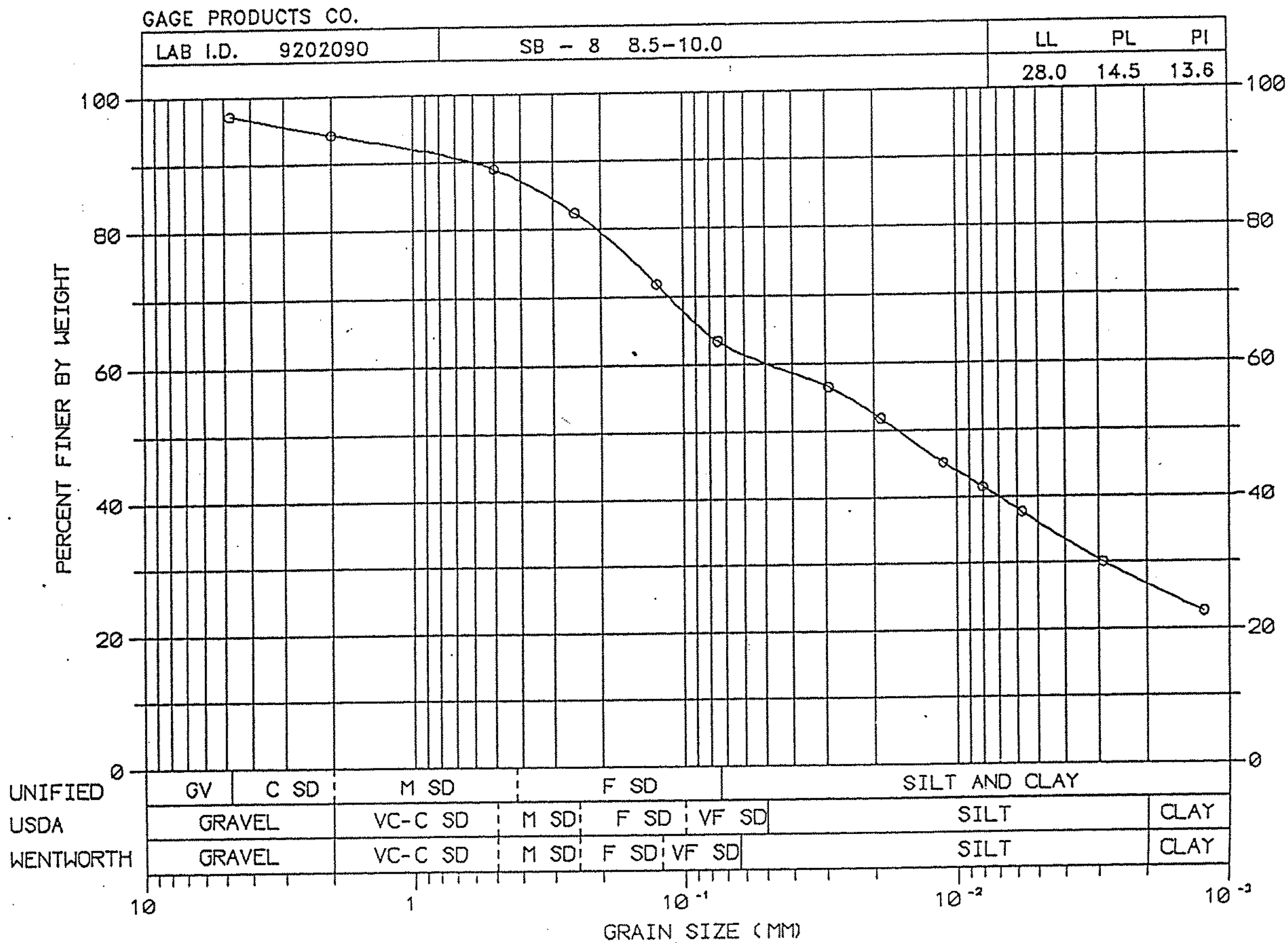
9:32AM = Time sedimentation begins Meniscus correction = 1

| Elapsed Time (min.) t | Temp. (deg.C) | Initial Hydro. Reading Ra | Zero Corr. | Dia. (MM) D | Total Sample Percent Passing |
|---|---|---|---|---|---|
| 2 | 23.5 | 35.0 | 5.0 | 0.02933 | 56.4 |
| 5 | 23.5 | 32.5 | 5.0 | 0.01891 | 51.7 |
| 15 | 23.5 | 29.0 | 5.0 | 0.01121 | 45.1 |
| 30 | 23.5 | 27.0 | 5.0 | 0.00804 | 41.4 |
| 60 | 23.5 | 25.0 | 5.0 | 0.00576 | 37.6 |
| 250 | 23.5 | 21.0 | 5.0 | 0.00290 | 30.1 |
| 1440 | 23.5 | 17.0 | 5.0 | 0.00124 | 22.6 |

ATTERBERG LIMITS A.S.T.M D-4318
Liquid limit, Plastic Limit, Plasticity Index

| | PL | 34 blows | 24 blows | 15 blows |
|---|---|---|---|---|
| wet soil + container wt. | 19.76 | 25.05 | 25.86 | 28.14 |
| dry soil + container wt. | 19.26 | 23.07 | 23.64 | 25.27 |
| container wt. | 15.81 | 15.73 | 15.73 | 15.71 |
| percent moisture | 14.5 | 27.0 | 28.1 | 30.0 |

Liquid Limit = 28.0 Plastic Limit = 14.5 Plasticity Index = 13.6



GAGE PRODUCTS CO.
LAB I.D. 9202090
SB - 8 8.5-10.0
LL PL PI
28.0 14.5 13.6
PERCENT FINER BY WEIGHT
100
80
60
40
20
0
UNIFIED
USDA
WENTWORTH
GV
C SD
M SD
F SD
SILT AND CLAY
GRAVEL
VC-C SD
M SD
F SD
VF SD
SILT
CLAY
10
1
$10^{-1}$
$10^{-2}$
$10^{-3}$
GRAIN SIZE (MM)

WW ENGINEERING & SCIENCE INC.
GRAIN SIZE ANALYSIS A.S.T.M. D-422

Project: GAGE PRODUCTS CO. Identification: SB - 8 35.0-37.5
Lab No. 9202099

378.50 = Air dry wt. of total sample selected for analysis.
50.00 = Air dry wt. of sample selected for hydrometer analysis.
376.27 = Dry wt. of total sample selected for analysis.
49.69 = Dry wt. of sample selected for hydrometer analysis.

HYGROSCOPIC MOISTURE

30.85 = wt. of wet soil + container 30.67 = wt. of dry soil + container
1.58 = wt. of container
0.6 = % hygroscopic moisture 0.99385= moisture factor

SIEVE ANALYSIS (cumulative weights)

GRAVEL (greater than 2 MM)

| Sieve Size | Weight Retained | % Passing |
|---|---|---|
| 4.75 | 6.04 | 98.4 |
| 2.00 | 15.18 | 96.0 |

SAND (from hydrometer sediment)

| Sieve Size | Weight Retained | Ttl. Sample % Passing |
|---|---|---|
| 0.500 | 2.59 | 91.0 |
| 0.250 | 5.63 | 85.1 |
| 0.125 | 10.92 | 74.9 |
| 0.075 | 15.12 | 66.8 |

HYDROMETER ANALYSIS

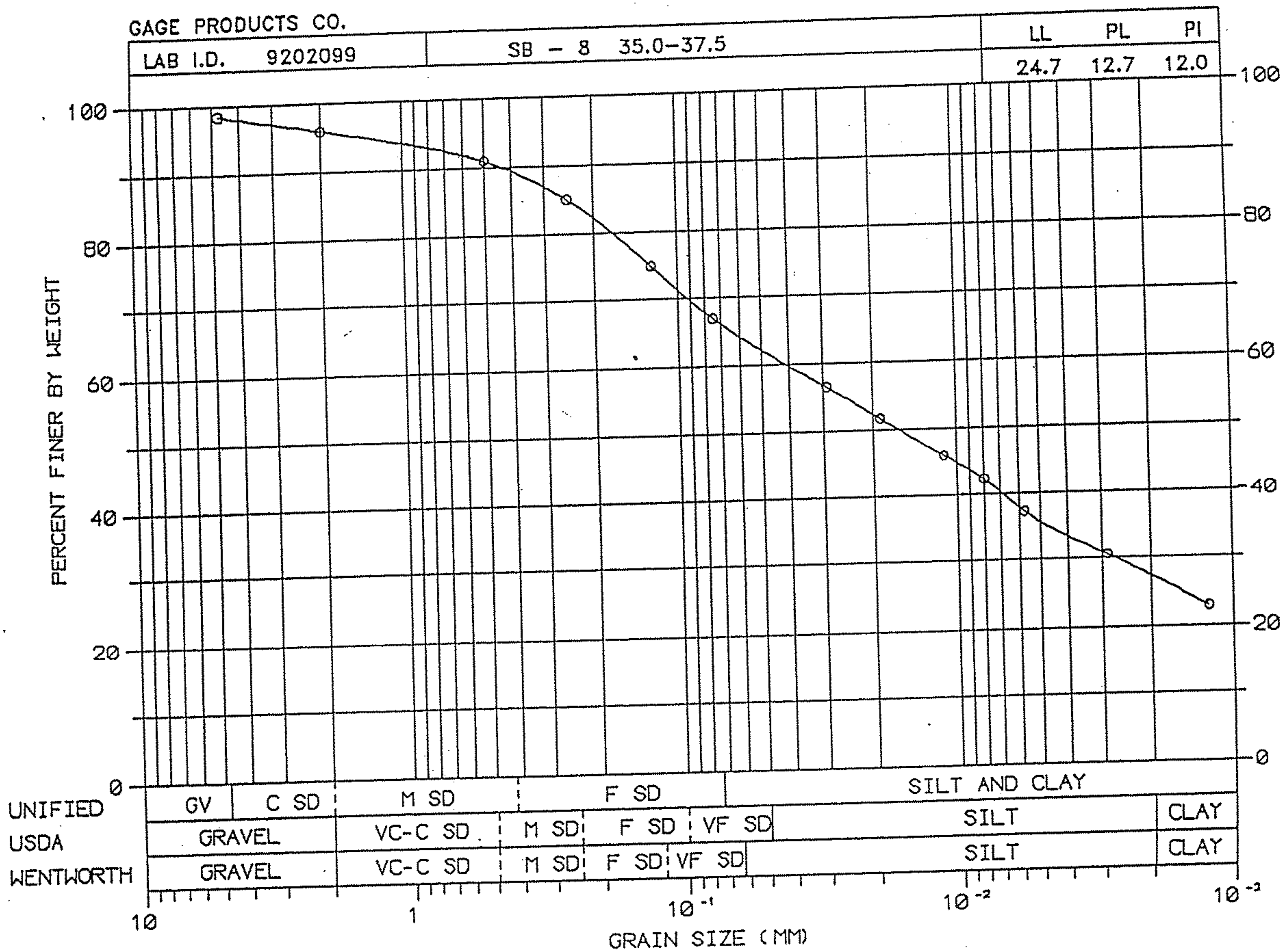
12:00PM = Time sedimentation begins Meniscus correction = 1

| Elapsed Time (min.) t | Temp. (deg.C) | Initial Hydro. Reading Ra | Zero Corr. | Dia. (MM) D | Total Sample Percent Passing |
|---|---|---|---|---|---|
| 2 | 24.0 | 34.5 | 5.0 | 0.02928 | 56.4 |
| 5 | 24.0 | 32.0 | 5.0 | 0.01888 | 51.6 |
| 15 | 24.0 | 29.0 | 5.0 | 0.01114 | 45.9 |
| 30 | 24.0 | 27.0 | 5.0 | 0.00799 | 42.1 |
| 60 | 24.0 | 24.5 | 5.0 | 0.00575 | 37.3 |
| 250 | 24.0 | 21.0 | 5.0 | 0.00288 | 30.6 |
| 1440 | 24.0 | 17.0 | 5.0 | 0.00123 | 22.9 |

ATTERBERG LIMITS A.S.T.M D-4318
Liquid limit, Plastic Limit, Plasticity Index

| | PL | 33 blows | 19 blows | 10 blows |
|---|---|---|---|---|
| wet soil + container wt. | 18.45 | 24.18 | 24.21 | 26.15 |
| dry soil + container wt. | 18.18 | 22.62 | 22.52 | 23.92 |
| container wt. | 16.06 | 16.12 | 15.88 | 15.83 |
| percent moisture | 12.7 | 24.0 | 25.5 | 27.6 |

Liquid Limit = 24.7 Plastic Limit = 12.7 Plasticity Index = 12.0


GAGE PRODUCTS CO.
LAB I.D. 9202099
SB - 8 35.0-37.5
LL PL PI
24.7 12.7 12.0
PERCENT FINER BY WEIGHT
100
80
60
40
20
0
UNIFIED
USDA
WENTWORTH
GV
C SD
M SD
F SD
SILT AND CLAY
GRAVEL
VC-C SD
M SD
F SD
VF SD
SILT
CLAY
10
1
$10^{-1}$
$10^{-2}$
$10^{-3}$
GRAIN SIZE (MM)

WW ENGINEERING & SCIENCE INC.
GRAIN SIZE ANALYSIS A.S.T.M. D-422

Project: GAGE PRODUCTS CO. Identification: SB - 9 13.5-15.0
Lab No. 9202091

254.00 = Air dry wt. of total sample selected for analysis.
50.00 = Air dry wt. of sample selected for hydrometer analysis.
252.75 = Dry wt. of total sample selected for analysis.
49.74 = Dry wt. of sample selected for hydrometer analysis.

HYGROSCOPIC MOISTURE

22.91 = wt. of wet soil + container 22.80 = wt. of dry soil + container
1.58 = wt. of container
0.5 = % hygroscopic moisture 0.99484= moisture factor

SIEVE ANALYSIS (cumulative weights)

GRAVEL (greater than 2 MM)

| Sieve Size | Weight Retained | % Passing |
|---|---|---|
| 4.75 | 4.40 | 98.3 |
| 2.00 | 12.11 | 95.2 |

SAND (from hydrometer sediment)

| Sieve Size | Weight Retained | Ttl. Sample % Passing |
|---|---|---|
| 0.500 | 3.02 | 89.4 |
| 0.250 | 6.74 | 82.3 |
| 0.125 | 12.62 | 71.1 |
| 0.075 | 17.32 | 62.1 |

HYDROMETER ANALYSIS

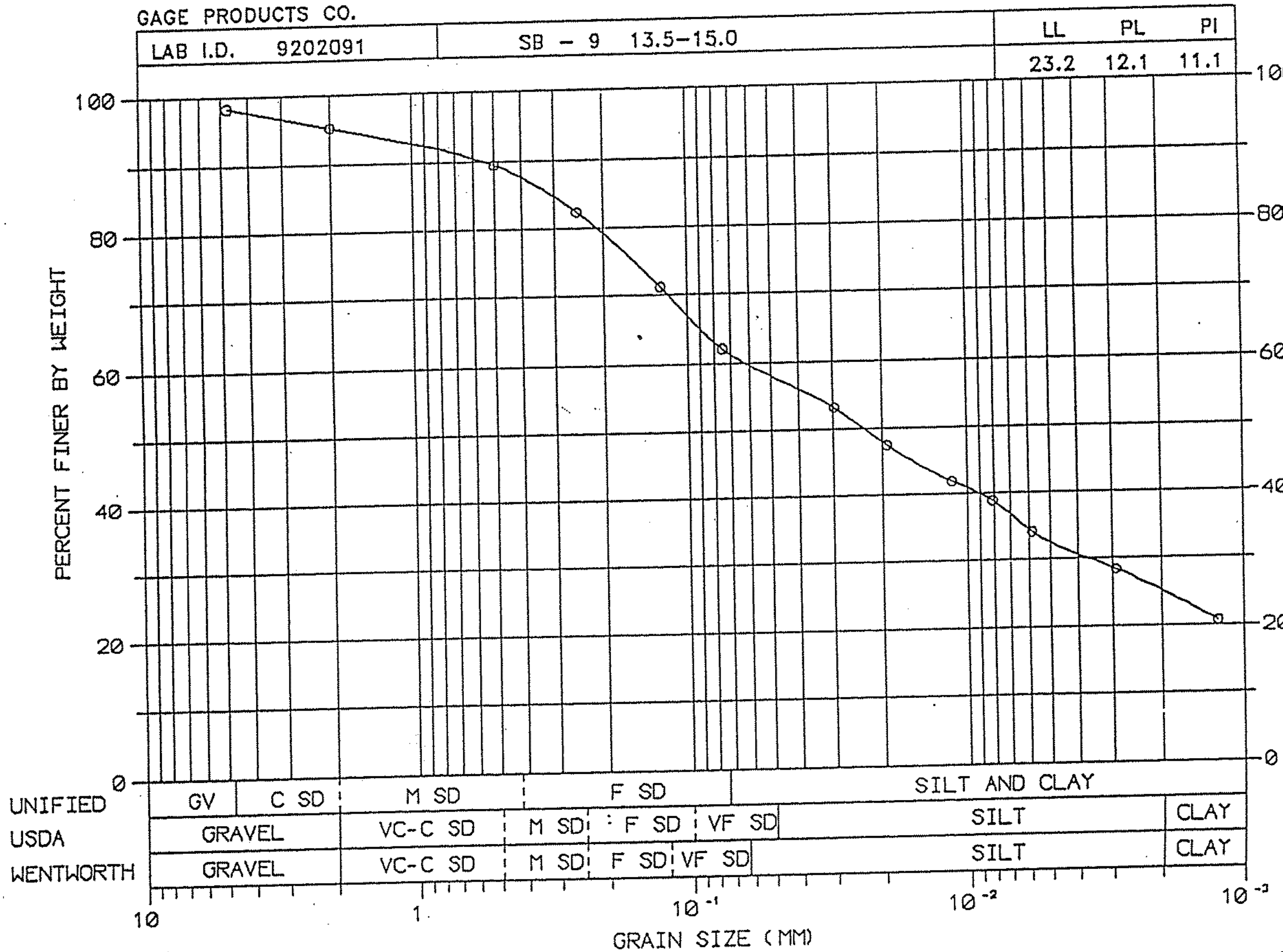
9:34AM = Time sedimentation begins Meniscus correction = 1

| Elapsed Time (min.) t | Temp. (deg.C) | Initial Hydro. Reading Ra | Zero Corr. | Dia. (MM) D | Total Sample Percent Passing |
|---|---|---|---|---|---|
| 2 | 23.5 | 33.0 | 5.0 | 0.02979 | 53.1 |
| 5 | 23.5 | 30.0 | 5.0 | 0.01927 | 47.4 |
| 15 | 23.5 | 27.0 | 5.0 | 0.01137 | 41.7 |
| 30 | 23.5 | 25.5 | 5.0 | 0.00812 | 38.8 |
| 60 | 23.5 | 23.0 | 5.0 | 0.00584 | 34.1 |
| 250 | 23.5 | 20.0 | 5.0 | 0.00292 | 28.4 |
| 1440 | 23.5 | 16.0 | 5.0 | 0.00125 | 20.8 |

ATTERBERG LIMITS A.S.T.M D-4318
Liquid limit, Plastic Limit, Plasticity Index

| | PL | 30 blows | 18 blows | 10 blows |
|---|---|---|---|---|
| wet soil + container wt. | 21.08 | 26.57 | 25.42 | 26.50 |
| dry soil + container wt. | 20.54 | 24.61 | 23.51 | 24.22 |
| container wt. | 16.07 | 15.83 | 15.55 | 15.63 |
| percent moisture | 12.1 | 22.3 | 24.0 | 26.5 |

Liquid Limit = 23.2 Plastic Limit = 12.1 Plasticity Index = 11.1


GAGE PRODUCTS CO.
LAB I.D. 9202091
SB - 9 13.5-15.0
LL PL PI
23.2 12.1 11.1
PERCENT FINER BY WEIGHT
100
80
60
40
20
0
UNIFIED
GV
C SD
M SD
F SD
SILT AND CLAY
USDA
GRAVEL
VC-C SD
M SD
F SD
VF SD
SILT
CLAY
WENTWORTH
GRAVEL
VC-C SD
M SD
F SD
VF SD
SILT
CLAY
10
1
$10^{-1}$
$10^{-2}$
$10^{-3}$
GRAIN SIZE (MM)

WW ENGINEERING & SCIENCE INC.

GRAIN SIZE ANALYSIS

A.S.T.M. D-422

Project: GAGE PRODUCTS CO.

Identification: SB - 9 26.0-27.5
Lab No. 9202092

211.00 = Air dry wt. of total sample selected for analysis.
50.00 = Air dry wt. of sample selected for hydrometer analysis.
209.76 = Dry wt. of total sample selected for analysis.
49.69 = Dry wt. of sample selected for hydrometer analysis.

HYGROSCOPIC MOISTURE

22.47 = wt. of wet soil + container 22.34 = wt. of dry soil + container
1.62 = wt. of container
0.6 = % hygroscopic moisture 0.99377= moisture factor

SIEVE ANALYSIS (cumulative weights)

GRAVEL (greater than 2 MM)

| Sieve Size | Weight Retained | % Passing |
|---|---|---|
| 4.75 | 7.50 | 96.4 |
| 2.00 | 12.50 | 94.0 |

SAND (from hydrometer sediment)

| Sieve Size | Weight Retained | Ttl. Sample % Passing |
|---|---|---|
| 0.500 | 2.74 | 88.9 |
| 0.250 | 5.88 | 82.9 |
| 0.125 | 10.96 | 73.3 |
| 0.075 | 14.94 | 65.8 |

HYDROMETER ANALYSIS

9:36AM = Time sedimentation begins Meniscus correction = 1

| Elapsed Time (min.) t | Temp. (deg.C) | Initial Hydro. Reading Ra | Zero Corr. | Dia. (MM) D | Total Sample Percent Passing |
|---|---|---|---|---|---|
| 2 | 23.5 | 35.5 | 5.0 | 0.02922 | 57.1 |
| 5 | 23.5 | 34.0 | 5.0 | 0.01870 | 54.3 |
| 15 | 23.5 | 30.0 | 5.0 | 0.01113 | 46.8 |
| 30 | 23.5 | 28.0 | 5.0 | 0.00798 | 43.1 |
| 60 | 23.5 | 25.5 | 5.0 | 0.00574 | 38.4 |
| 250 | 23.5 | 22.0 | 5.0 | 0.00288 | 31.9 |
| 1440 | 23.5 | 17.5 | 5.0 | 0.00123 | 23.4 |

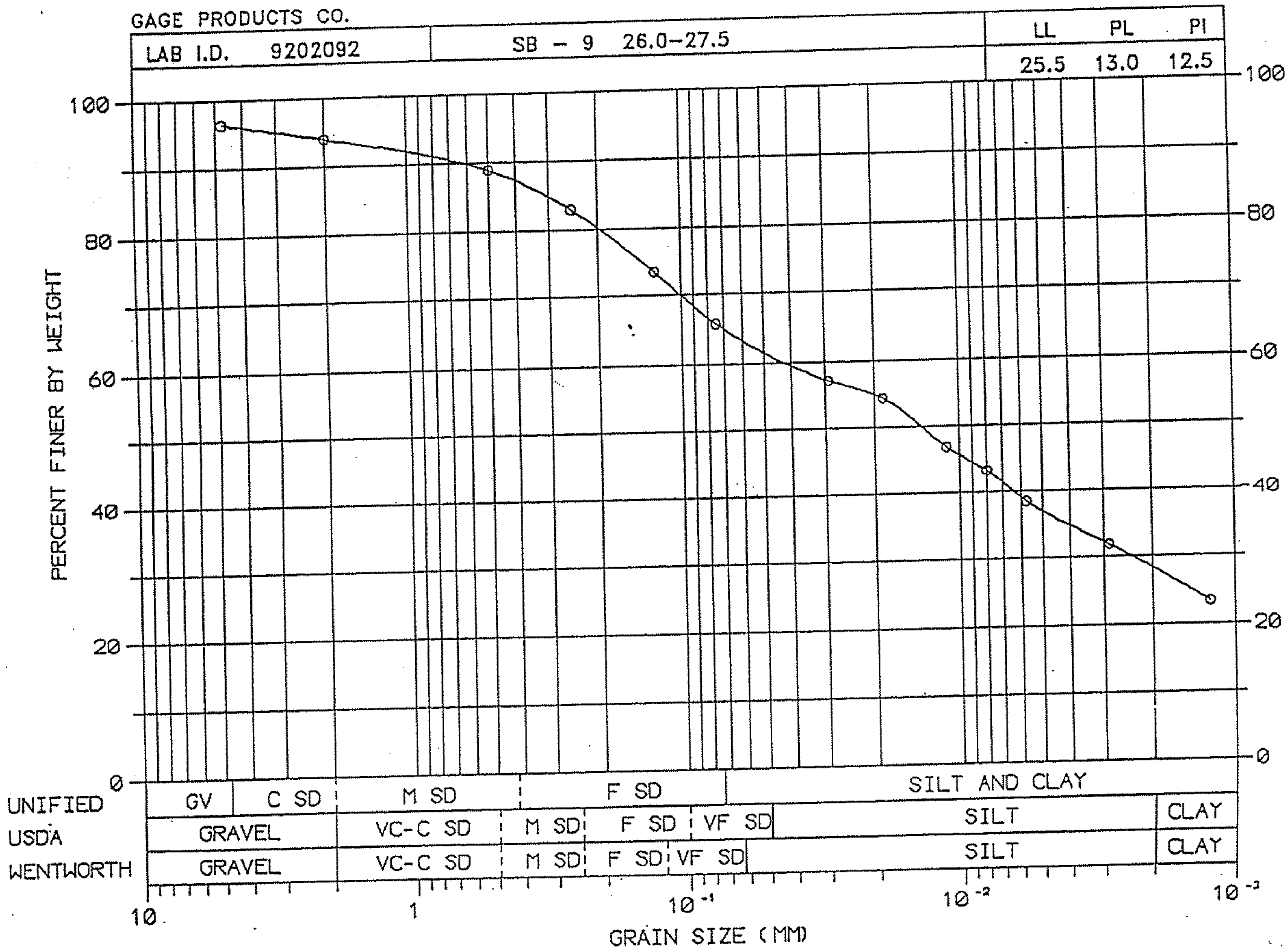
ATTERBERG LIMITS

A.S.T.M D-4318

Liquid limit, Plastic Limit, Plasticity Index

| | PL | 40 blows | 26 blows | 11 blows |
|---|---|---|---|---|
| wet soil + container wt. | 19.39 | 25.01 | 25.48 | 25.54 |
| dry soil + container wt. | 18.98 | 23.28 | 23.53 | 23.46 |
| container wt. | 15.82 | 16.06 | 15.82 | 16.12 |
| percent moisture | 13.0 | 24.0 | 25.3 | 28.3 |

Liquid Limit = 25.5 Plastic Limit = 13.0 Plasticity Index = 12.5


GAGE PRODUCTS CO.
LAB I.D. 9202092
SB - 9 26.0-27.5
LL PL PI
25.5 13.0 12.5
PERCENT FINER BY WEIGHT
100
80
60
40
20
0
UNIFIED
USDA
WENTWORTH
GV
C SD
M SD
F SD
SILT AND CLAY
GRAVEL
VC-C SD
M SD
F SD
VF SD
SILT
CLAY
10
1
$10^{-1}$
$10^{-2}$
$10^{-3}$
GRAIN SIZE (MM)

WW ENGINEERING & SCIENCE INC.
GRAIN SIZE ANALYSIS    A.S.T.M. D-422

Project: GAGE PRODUCTS CO.    Identification: SB - 10 6.0-7.5
Lab No. 9202093

233.10 = Air dry wt. of total sample selected for analysis.
50.00 = Air dry wt. of sample selected for hydrometer analysis.
231.15 = Dry wt. of total sample selected for analysis.
49.54 = Dry wt. of sample selected for hydrometer analysis.

HYGROSCOPIC MOISTURE

21.27 = wt. of wet soil + container 21.09 = wt. of dry soil + container
1.63 = wt. of container
0.9 = % hygroscopic moisture    0.99084= moisture factor

SIEVE ANALYSIS (cumulative weights)

GRAVEL (greater than 2 MM)

| Sieve Size | Weight Retained | % Passing |
|---|---|---|
| 4.75 | 8.25 | 96.4 |
| 2.00 | 19.86 | 91.4 |

SAND (from hydrometer sediment)

| Sieve Size | Weight Retained | Ttl. Sample % Passing |
|---|---|---|
| 0.500 | 3.86 | 84.3 |
| 0.250 | 7.11 | 78.3 |
| 0.125 | 12.07 | 69.1 |
| 0.075 | 15.99 | 61.9 |

HYDROMETER ANALYSIS

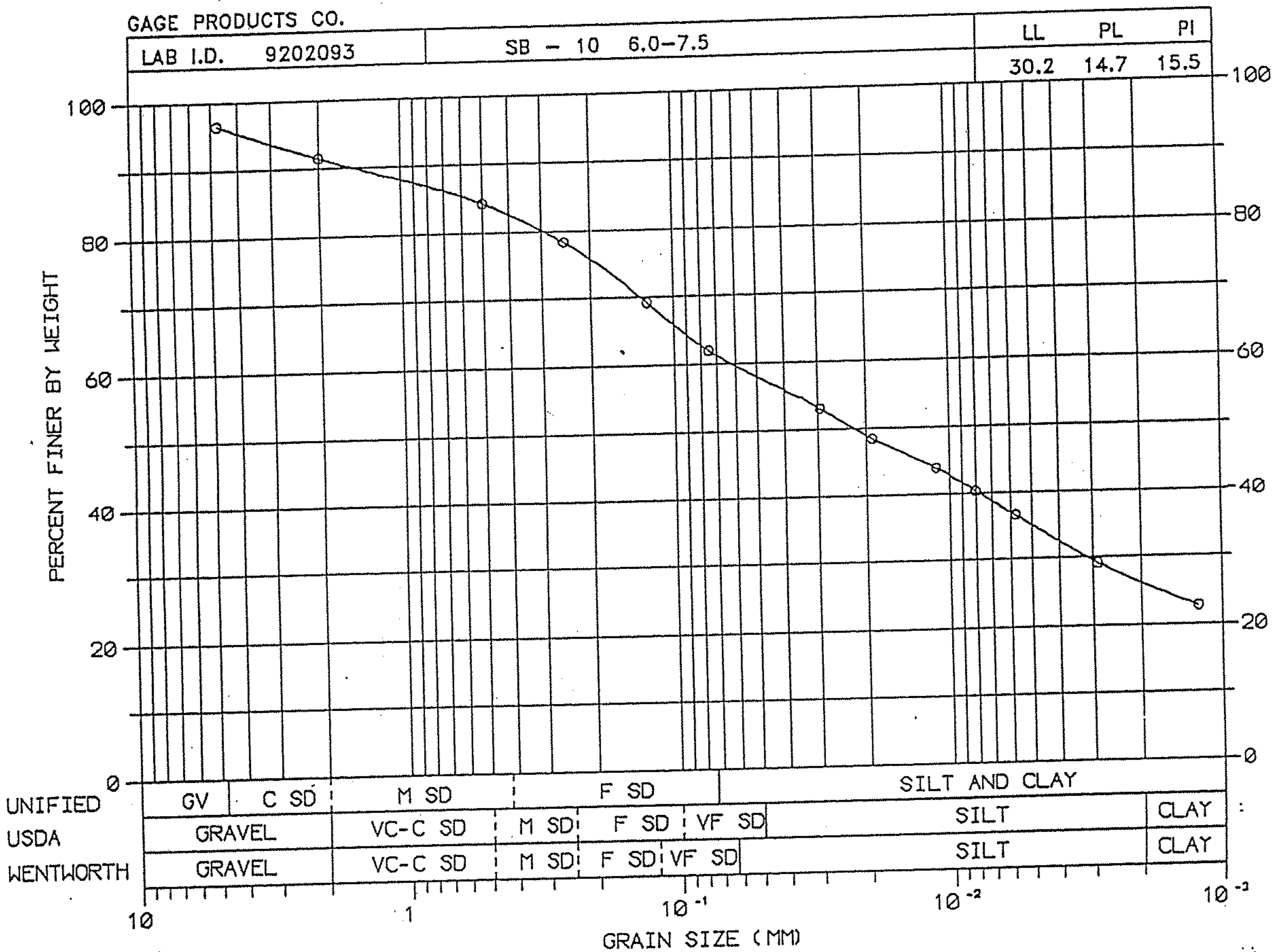
9:38AM = Time sedimentation begins    Meniscus correction = 1

| Elapsed Time (min.) t | Temp. (deg.C) | Initial Hydro. Reading Ra | Zero Corr. | Dia. (MM) D | Total Sample Percent Passing |
|---|---|---|---|---|---|
| 2 | 23.5 | 34.0 | 5.0 | 0.02956 | 53.0 |
| 5 | 23.5 | 31.5 | 5.0 | 0.01906 | 48.4 |
| 15 | 23.5 | 29.0 | 5.0 | 0.01121 | 43.8 |
| 30 | 23.5 | 27.0 | 5.0 | 0.00804 | 40.2 |
| 60 | 23.5 | 25.0 | 5.0 | 0.00576 | 36.5 |
| 250 | 23.5 | 21.0 | 5.0 | 0.00290 | 29.2 |
| 1440 | 23.5 | 17.5 | 5.0 | 0.00123 | 22.8 |

ATTERBERG LIMITS    A.S.T.M D-4318
Liquid limit, Plastic Limit, Plasticity Index

| | PL | 35 blows | 23 blows | 10 blows |
|---|---|---|---|---|
| wet soil + container wt. | 19.78 | 24.95 | 24.91 | 23.05 |
| dry soil + container wt. | 19.28 | 22.90 | 22.77 | 21.15 |
| container wt. | 15.88 | 15.73 | 15.68 | 15.68 |
| percent moisture | 14.7 | 28.6 | 30.2 | 34.7 |

Liquid Limit = 30.2  Plastic Limit = 14.7  Plasticity Index = 15.5



GAGE PRODUCTS CO.
LAB I.D. 9202093
SB - 10 6.0-7.5
LL PL PI
30.2 14.7 15.5
PERCENT FINER BY WEIGHT
100
80
60
40
20
0
UNIFIED
USDA
WENTWORTH
GV
C SD
M SD
F SD
SILT AND CLAY
GRAVEL
VC-C SD
M SD
F SD
VF SD
SILT
CLAY
10
1
$10^{-1}$
$10^{-2}$
$10^{-3}$
GRAIN SIZE (MM)

WW ENGINEERING & SCIENCE INC.
GRAIN SIZE ANALYSIS

A.S.T.M. D-422

Project: GAGE PRODUCTS CO.

Identification: SB - 10 17.5-20.0
Lab No. 9202100

400.90 = Air dry wt. of total sample selected for analysis.
50.00 = Air dry wt. of sample selected for hydrometer analysis.
398.50 = Dry wt. of total sample selected for analysis.
49.69 = Dry wt. of sample selected for hydrometer analysis.

HYGROSCOPIC MOISTURE

22.26 = wt. of wet soil + container 22.13 = wt. of dry soil + container
1.59 = wt. of container
0.6 = % hygroscopic moisture 0.99371= moisture factor

SIEVE ANALYSIS (cumulative weights)

GRAVEL (greater than 2 MM)

| Sieve Size | Weight Retained | % Passing |
|---|---|---|
| 4.75 | 9.46 | 97.6 |
| 2.00 | 18.66 | 95.3 |

SAND (from hydrometer sediment)

| Sieve Size | Weight Retained | Ttl. Sample % Passing |
|---|---|---|
| 0.500 | 2.41 | 90.7 |
| 0.250 | 5.33 | 85.1 |
| 0.125 | 10.23 | 75.7 |
| 0.075 | 14.08 | 68.3 |

HYDROMETER ANALYSIS

12:04PM = Time sedimentation begins

Meniscus correction = 1

| Elapsed Time (min.) t | Temp. (deg.C) | Initial Hydro. Reading Ra | Zero Corr. | Dia. (MM) D | Total Sample Percent Passing |
|---|---|---|---|---|---|
| 2 | 24.0 | 35.0 | 5.0 | 0.02916 | 57.0 |
| 5 | 24.0 | 33.5 | 5.0 | 0.01866 | 54.1 |
| 15 | 24.0 | 30.0 | 5.0 | 0.01106 | 47.5 |
| 30 | 24.0 | 28.0 | 5.0 | 0.00793 | 43.7 |
| 60 | 24.0 | 27.0 | 5.0 | 0.00565 | 41.8 |
| 250 | 24.0 | 23.0 | 5.0 | 0.00285 | 34.2 |
| 1440 | 24.0 | 18.5 | 5.0 | 0.00122 | 25.6 |

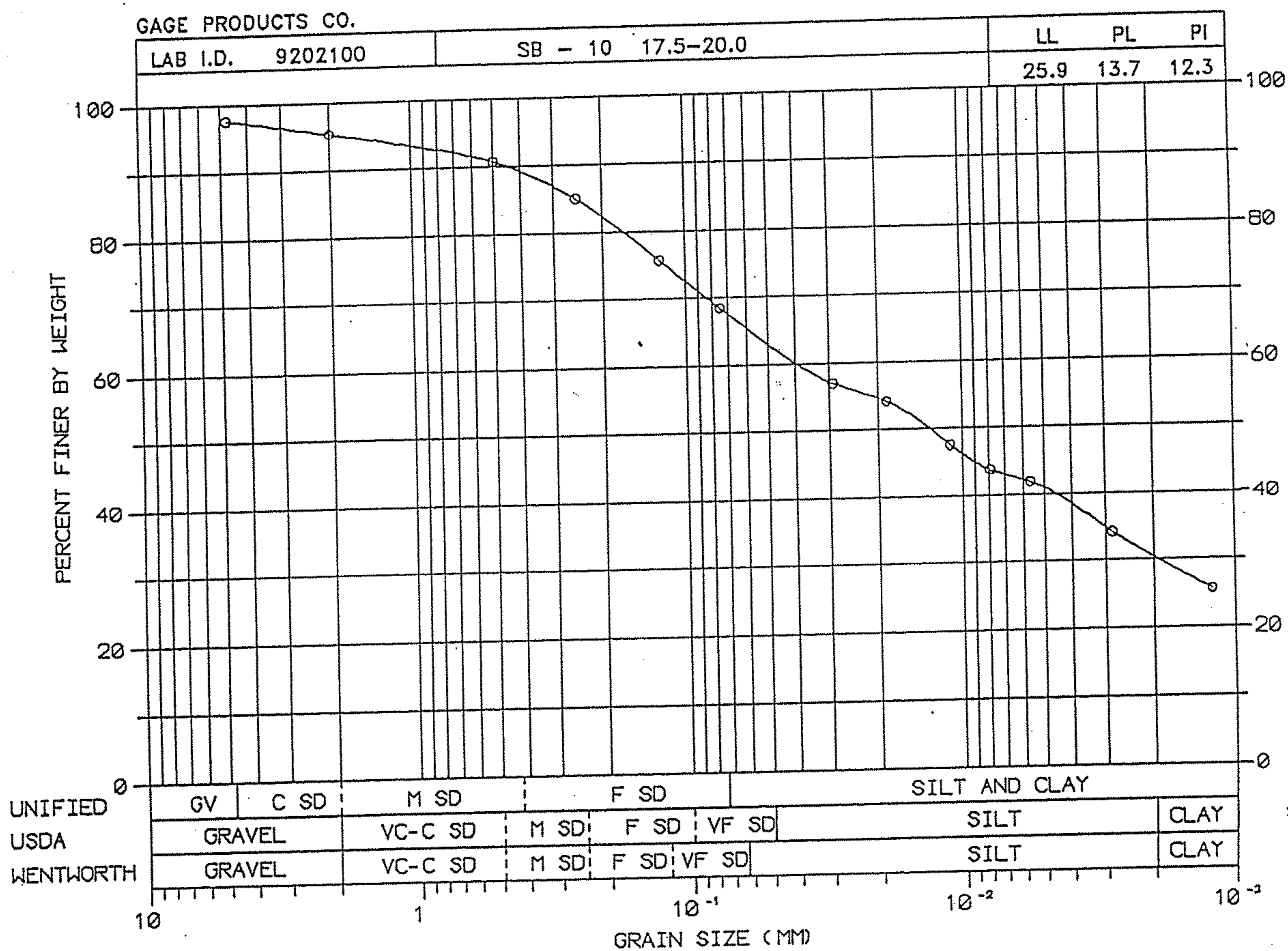
ATTERBERG LIMITS

A.S.T.M D-4318

Liquid limit, Plastic Limit, Plasticity Index

| | PL | 38 blows | 21 blows | 12 blows |
|---|---|---|---|---|
| wet soil + container wt. | 18.48 | 22.49 | 24.22 | 23.98 |
| dry soil + container wt. | 18.16 | 21.16 | 22.40 | 22.15 |
| container wt. | 15.82 | 15.81 | 15.55 | 15.63 |
| percent moisture | 13.7 | 24.9 | 26.6 | 28.1 |

Liquid Limit = 25.9 Plastic Limit = 13.7 Plasticity Index = 12.3


GAGE PRODUCTS CO.
LAB I.D. 9202100
SB - 10 17.5-20.0
LL PL PI
25.9 13.7 12.3
PERCENT FINER BY WEIGHT
100
80
60
40
20
0
UNIFIED
USDA
WENTWORTH
GV
C SD
M SD
F SD
SILT AND CLAY
GRAVEL
VC-C SD
M SD
F SD
VF SD
SILT
CLAY
10
1
$10^{-1}$
$10^{-2}$
$10^{-3}$
GRAIN SIZE (MM)

WW ENGINEERING & SCIENCE INC.
GRAIN SIZE ANALYSIS A.S.T.M. D-422

Project: GAGE PRODUCTS CO. Identification: SB - 11 28.5-30.0
Lab No. 9202094

225.60 = Air dry wt. of total sample selected for analysis.
50.00 = Air dry wt. of sample selected for hydrometer analysis.
224.31 = Dry wt. of total sample selected for analysis.
49.70 = Dry wt. of sample selected for hydrometer analysis.

HYGROSCOPIC MOISTURE

23.43 = wt. of wet soil + container 23.30 = wt. of dry soil + container
1.65 = wt. of container
0.6 = % hygroscopic moisture 0.99403= moisture factor

SIEVE ANALYSIS (cumulative weights)

GRAVEL (greater than 2 MM)

| Sieve Size | Weight Retained | % Passing |
|---|---|---|
| 4.75 | 2.33 | 99.0 |
| 2.00 | 9.22 | 95.9 |

SAND (from hydrometer sediment)

| Sieve Size | Weight Retained | Ttl. Sample % Passing |
|---|---|---|
| 0.500 | 2.48 | 91.1 |
| 0.250 | 5.54 | 85.2 |
| 0.125 | 10.79 | 75.1 |
| 0.075 | 14.86 | 67.2 |

HYDROMETER ANALYSIS

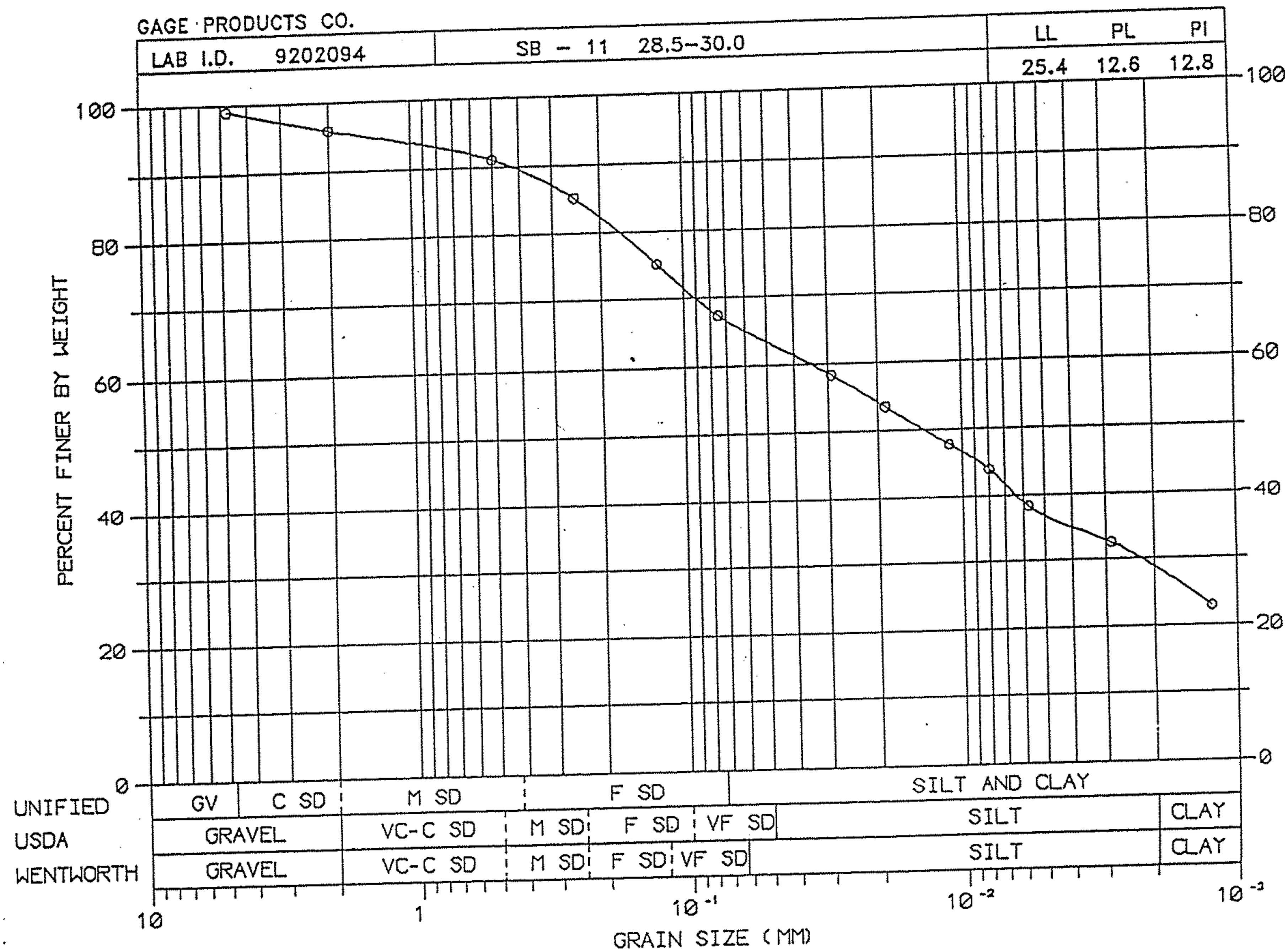
9:40AM = Time sedimentation begins Meniscus correction = 1

| Elapsed Time (min.) t | Temp. (deg.C) | Initial Hydro. Reading Ra | Zero Corr. | Dia. (MM) D | Total Sample Percent Passing |
|---|---|---|---|---|---|
| 2 | 23.5 | 35.5 | 5.0 | 0.02922 | 58.3 |
| 5 | 23.5 | 33.0 | 5.0 | 0.01884 | 53.5 |
| 15 | 23.5 | 30.0 | 5.0 | 0.01113 | 47.7 |
| 30 | 23.5 | 28.0 | 5.0 | 0.00798 | 43.9 |
| 60 | 23.5 | 25.0 | 5.0 | 0.00576 | 38.2 |
| 250 | 23.5 | 22.0 | 5.0 | 0.00288 | 32.5 |
| 1440 | 23.5 | 17.0 | 5.0 | 0.00124 | 22.9 |

ATTERBERG LIMITS A.S.T.M D-4318
Liquid limit, Plastic Limit, Plasticity Index

| | PL | 28 blows | 16 blows | 12 blows |
|---|---|---|---|---|
| wet soil + container wt. | 20.20 | 26.48 | 30.20 | 24.73 |
| dry soil + container wt. | 19.73 | 24.39 | 27.21 | 22.82 |
| container wt. | 16.01 | 15.95 | 16.07 | 16.01 |
| percent moisture | 12.6 | 24.8 | 26.8 | 28.0 |

Liquid Limit = 25.4 Plastic Limit = 12.6 Plasticity Index = 12.8



GAGE PRODUCTS CO.
LAB I.D. 9202094
SB - 11 28.5-30.0
LL PL PI
25.4 12.6 12.8
PERCENT FINER BY WEIGHT
100
80
60
40
20
0
UNIFIED
USDA
WENTWORTH
GV
C SD
M SD
F SD
SILT AND CLAY
GRAVEL
VC-C SD
M SD
F SD
VF SD
SILT
CLAY
10
1
$10^{-1}$
$10^{-2}$
$10^{-3}$
GRAIN SIZE (MM)

WW ENGINEERING & SCIENCE INC.
GRAIN SIZE ANALYSIS    A.S.T.M. D-422

Project: GAGE PRODUCTS CO.    Identification: SB - 12  11.0-12.5
Lab No. 9202095

190.80 = Air dry wt. of total sample selected for analysis.
50.00 = Air dry wt. of sample selected for hydrometer analysis.
189.22 = Dry wt. of total sample selected for analysis.
49.56 = Dry wt. of sample selected for hydrometer analysis.

HYGROSCOPIC MOISTURE

22.15 = wt. of wet soil + container 21.97 = wt. of dry soil + container
1.59 = wt. of container
0.9 = % hygroscopic moisture    0.99125= moisture factor

SIEVE ANALYSIS (cumulative weights)

GRAVEL (greater than 2 MM)

| Sieve Size | Weight Retained | % Passing |
|---|---|---|
| 4.75 | 6.26 | 96.7 |
| 2.00 | 10.73 | 94.3 |

SAND (from hydrometer sediment)

| Sieve Size | Weight Retained | Ttl. Sample % Passing |
|---|---|---|
| 0.500 | 2.29 | 90.0 |
| 0.250 | 5.18 | 84.5 |
| 0.125 | 9.93 | 75.4 |
| 0.075 | 13.71 | 68.2 |

HYDROMETER ANALYSIS

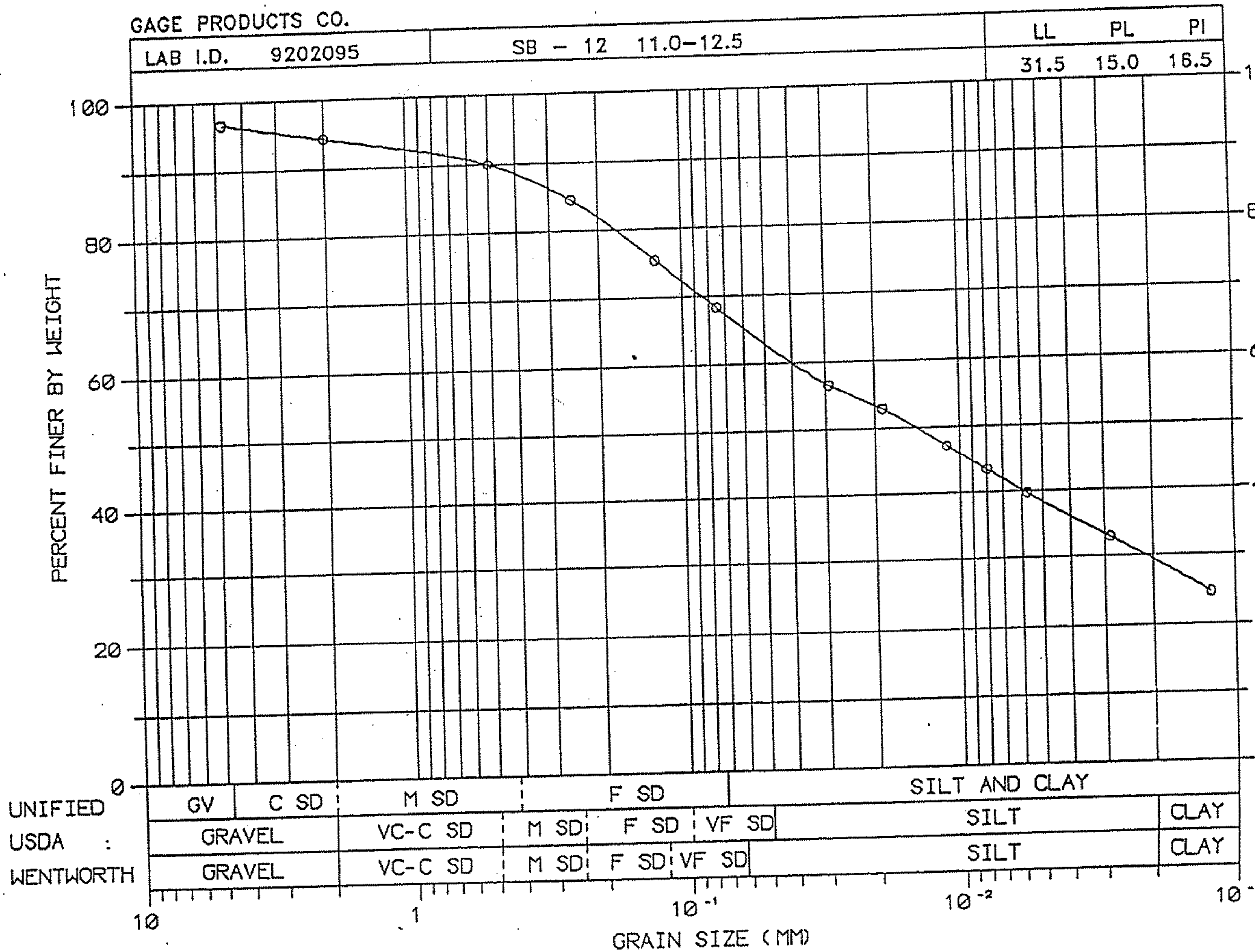
9:42AM = Time sedimentation begins    Meniscus correction = 1

| Elapsed Time (min.) t | Temp. (deg.C) | Initial Hydro. Reading Ra | Zero Corr. | Dia. (MM) D | Total Sample Percent Passing |
|---|---|---|---|---|---|
| | | | | | 56.5 |
| 2 | 23.5 | 35.0 | 5.0 | 0.02933 | 52.8 |
| 5 | 23.5 | 33.0 | 5.0 | 0.01884 | 47.1 |
| 15 | 23.5 | 30.0 | 5.0 | 0.01113 | 43.3 |
| 30 | 23.5 | 28.0 | 5.0 | 0.00798 | 39.6 |
| 60 | 23.5 | 26.0 | 5.0 | 0.00572 | 33.0 |
| 250 | 23.5 | 22.5 | 5.0 | 0.00287 | 24.5 |
| 1440 | 23.5 | 18.0 | 5.0 | 0.00123 | |

ATTERBERG LIMITS    A.S.T.M D-4318
Liquid limit, Plastic Limit, Plasticity Index

| | PL | 40 blows | 17 blows | 11 blows |
|---|---|---|---|---|
| wet soil + container wt. | 20.21 | 22.76 | 25.08 | 24.18 |
| dry soil + container wt. | 19.67 | 21.15 | 22.77 | 21.98 |
| container wt. | 16.07 | 15.73 | 15.77 | 15.64 |
| percent moisture | 15.0 | 29.7 | 33.0 | 34.7 |

Liquid Limit = 31.5   Plastic Limit = 15.0   Plasticity Index = 16.5


GAGE PRODUCTS CO.
LAB I.D. 9202095
SB – 12 11.0–12.5
LL PL PI
31.5 15.0 16.5
PERCENT FINER BY WEIGHT
100
80
60
40
20
0
UNIFIED
GV
C SD
M SD
F SD
SILT AND CLAY
USDA :
GRAVEL
VC-C SD
M SD
F SD
VF SD
SILT
CLAY
WENTWORTH
GRAVEL
VC-C SD
M SD
F SD
VF SD
SILT
CLAY
10
1
$10^{-1}$
$10^{-2}$
$10^{-3}$
GRAIN SIZE (MM)

WW ENGINEERING & SCIENCE INC.
GRAIN SIZE ANALYSIS
A.S.T.M. D-422

Project: GAGE PRODUCTS CO.
Identification: SB - 12 23.5-25.0
Lab No. 9202096

220.90 = Air dry wt. of total sample selected for analysis.
50.00 = Air dry wt. of sample selected for hydrometer analysis.
219.66 = Dry wt. of total sample selected for analysis.
49.70 = Dry wt. of sample selected for hydrometer analysis.

## HYGROSCOPIC MOISTURE

23.48 = wt. of wet soil + container 23.35 = wt. of dry soil + container
1.58 = wt. of container
0.6 = % hygroscopic moisture 0.99406= moisture factor

## SIEVE ANALYSIS (cumulative weights)

GRAVEL (greater than 2 MM)

| Sieve Size | Weight Retained | % Passing |
|---|---|---|
| 4.75 | 6.21 | 97.2 |
| 2.00 | 11.19 | 94.9 |

SAND (from hydrometer sediment)

| Sieve Size | Weight Retained | Ttl. Sample % Passing |
|---|---|---|
| 0.500 | 2.19 | 90.7 |
| 0.250 | 5.11 | 85.1 |
| 0.125 | 9.97 | 75.9 |
| 0.075 | 13.87 | 68.4 |

## HYDROMETER ANALYSIS

9:44AM = Time sedimentation begins
Meniscus correction = 1

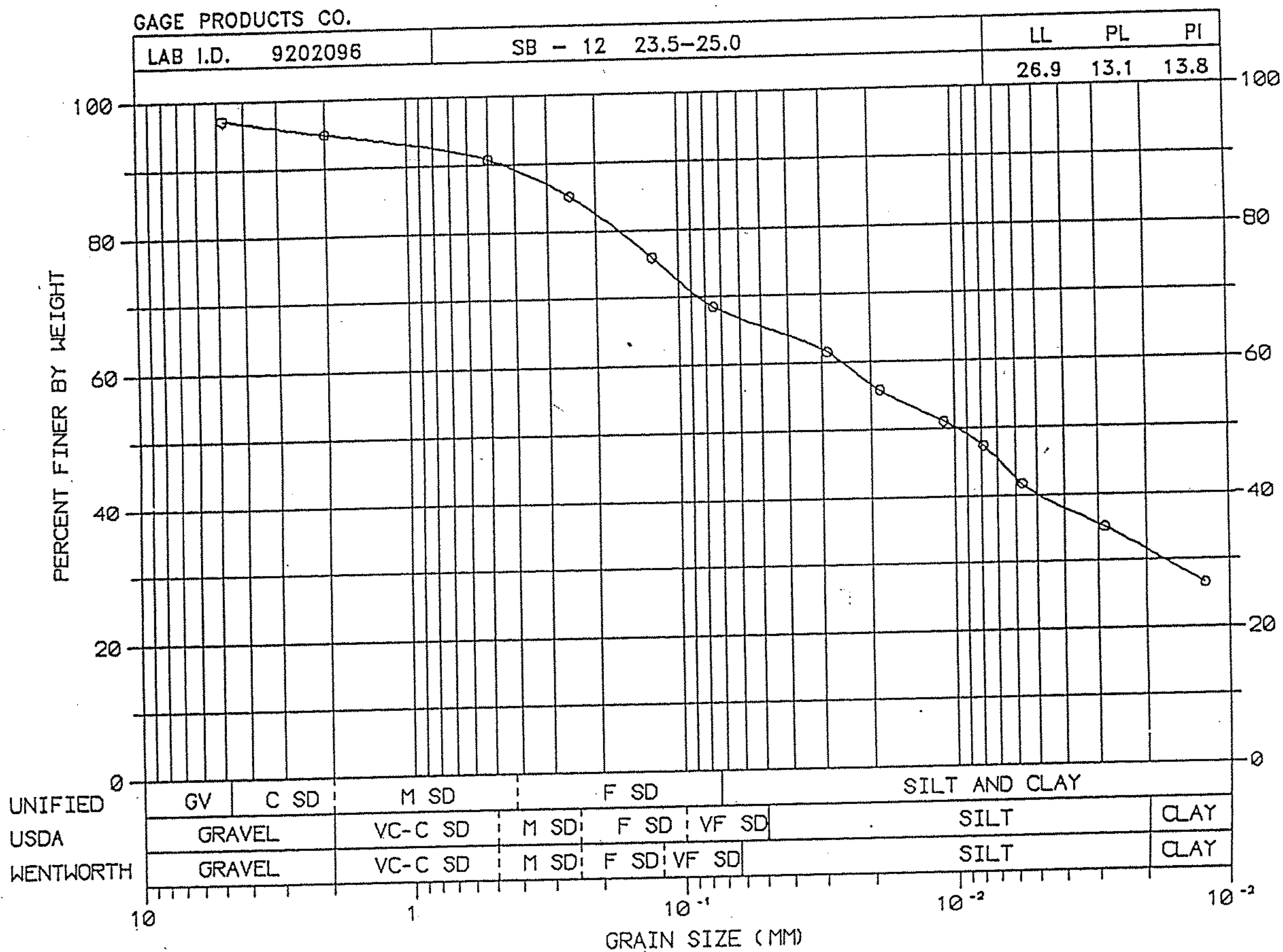
| Elapsed Time (min.) t | Temp. (deg.C) | Initial Hydro. Reading Ra | Zero Corr. | Dia. (MM) D | Total Sample Percent Passing |
|---|---|---|---|---|---|
| 2 | 23.5 | 37.5 | 5.0 | 0.02874 | 61.4 |
| 5 | 23.5 | 34.5 | 5.0 | 0.01862 | 55.8 |
| 15 | 23.5 | 32.0 | 5.0 | 0.01096 | 51.0 |
| 30 | 23.5 | 30.0 | 5.0 | 0.00787 | 47.3 |
| 60 | 23.5 | 27.0 | 5.0 | 0.00568 | 41.6 |
| 250 | 23.5 | 23.5 | 5.0 | 0.00285 | 35.0 |
| 1440 | 23.5 | 19.0 | 5.0 | 0.00122 | 26.5 |

## ATTERBERG LIMITS
A.S.T.M D-4318

Liquid limit, Plastic Limit, Plasticity Index

| | PL | 39 blows | 21 blows | 11 blows |
|---|---|---|---|---|
| wet soil + container wt. | 19.98 | 25.19 | 24.80 | 25.93 |
| dry soil + container wt. | 19.52 | 23.31 | 22.92 | 23.66 |
| container wt. | 16.01 | 15.95 | 16.07 | 16.01 |
| percent moisture | 13.1 | 25.5 | 27.4 | 29.7 |

Liquid Limit = 26.9 Plastic Limit = 13.1 Plasticity Index = 13.8


GAGE PRODUCTS CO.
LAB I.D. 9202096
SB - 12 23.5-25.0
LL PL PI
26.9 13.1 13.8
PERCENT FINER BY WEIGHT
100
80
60
40
20
0
UNIFIED
USDA
WENTWORTH
GV
C SD
M SD
F SD
SILT AND CLAY
GRAVEL
VC-C SD
M SD
VF SD
SILT
CLAY
10
1
$10^{-1}$
$10^{-2}$
$10^{-3}$
GRAIN SIZE (MM)

WW ENGINEERING & SCIENCE INC.
GRAIN SIZE ANALYSIS A.S.T.M. D-422

Project: GAGE PRODUCTS CO. Identification: SB - 14 3.5-5.0
Lab No. 9202097

217.30 = Air dry wt. of total sample selected for analysis.
50.00 = Air dry wt. of sample selected for hydrometer analysis.
215.56 = Dry wt. of total sample selected for analysis.
49.58 = Dry wt. of sample selected for hydrometer analysis.

HYGROSCOPIC MOISTURE

24.01 = wt. of wet soil + container 23.82 = wt. of dry soil + container
1.32 = wt. of container
0.8 = % hygroscopic moisture 0.99163= moisture factor

SIEVE ANALYSIS (cumulative weights)

GRAVEL (greater than 2 MM)

| Sieve Size | Weight Retained | % Passing |
|---|---|---|
| 4.75 | 4.74 | 97.8 |
| 2.00 | 9.04 | 95.8 |

SAND (from hydrometer sediment)

| Sieve Size | Weight Retained | Ttl. Sample % Passing |
|---|---|---|
| 0.500 | 2.26 | 91.4 |
| 0.250 | 6.35 | 83.5 |
| 0.125 | 14.89 | 67.0 |
| 0.075 | 22.89 | 51.6 |

HYDROMETER ANALYSIS

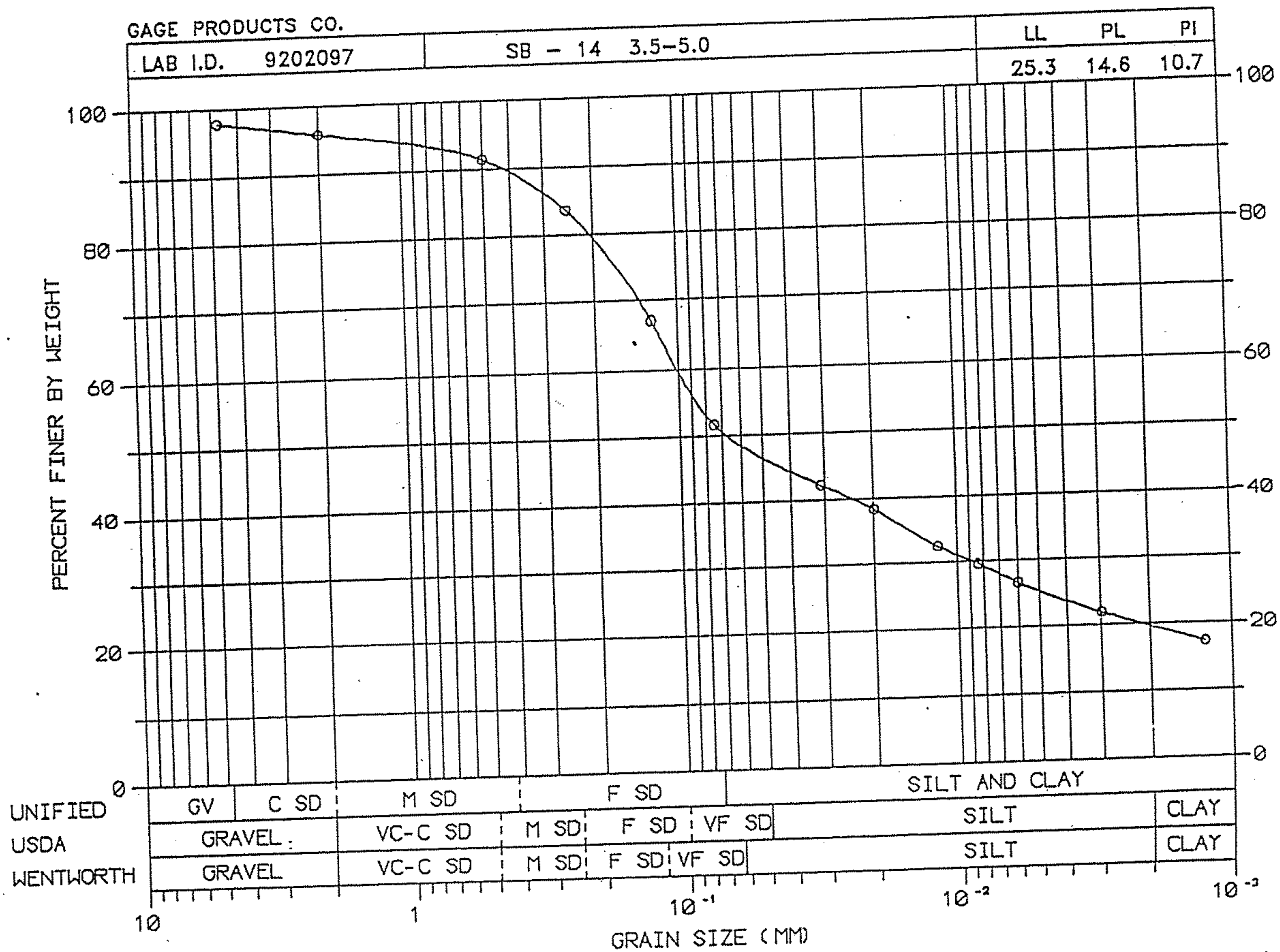
9:46AM = Time sedimentation begins Meniscus correction = 1

| Elapsed Time (min.) t | Temp. (deg.C) | Initial Hydro. Reading Ra | Zero Corr. | Dia. (MM) D | Total Sample Percent Passing |
|---|---|---|---|---|---|
| 2 | 23.5 | 27.0 | 5.0 | 0.03113 | 42.1 |
| 5 | 23.5 | 25.0 | 5.0 | 0.01996 | 38.3 |
| 15 | 23.5 | 22.0 | 5.0 | 0.01176 | 32.5 |
| 30 | 23.5 | 20.5 | 5.0 | 0.00840 | 29.7 |
| 60 | 23.5 | 19.0 | 5.0 | 0.00599 | 26.8 |
| 250 | 23.5 | 16.5 | 5.0 | 0.00298 | 22.0 |
| 1440 | 23.5 | 14.0 | 5.0 | 0.00126 | 17.2 |

ATTERBERG LIMITS A.S.T.M D-4318
Liquid limit, Plastic Limit, Plasticity Index

| | PL | 37 blows | 26 blows | 12 blows |
|---|---|---|---|---|
| wet soil + container wt. | 20.16 | 24.69 | 24.10 | 23.59 |
| dry soil + container wt. | 19.64 | 22.96 | 22.41 | 21.87 |
| container wt. | 16.07 | 15.73 | 15.76 | 15.64 |
| percent moisture | 14.6 | 23.9 | 25.4 | 27.6 |

Liquid Limit = 25.3 Plastic Limit = 14.6 Plasticity Index = 10.7



GAGE PRODUCTS CO.
LAB I.D. 9202097
SB - 14 3.5-5.0
LL PL PI
25.3 14.6 10.7
PERCENT FINER BY WEIGHT
100
80
60
40
20
0
UNIFIED
USDA
WENTWORTH
GV
C SD
M SD
F SD
SILT AND CLAY
GRAVEL
VC-C SD
M SD
F SD
VF SD
SILT
CLAY
10
1
10 -1
10 -2
10 -3
GRAIN SIZE (MM)

WW ENGINEERING & SCIENCE INC.
GRAIN SIZE ANALYSIS — A.S.T.M. D-422

Project: GAGE PRODUCTS CO.

Identification: SB - 14 16.0-17.5
Lab No. 9202098

216.10 = Air dry wt. of total sample selected for analysis.
50.00 = Air dry wt. of sample selected for hydrometer analysis.
214.90 = Dry wt. of total sample selected for analysis.
49.70 = Dry wt. of sample selected for hydrometer analysis.

HYGROSCOPIC MOISTURE

23.42 = wt. of wet soil + container 23.29 = wt. of dry soil + container
1.64 = wt. of container
0.6 = % hygroscopic moisture 0.99403= moisture factor

SIEVE ANALYSIS (cumulative weights)

GRAVEL (greater than 2 MM)

| Sieve Size | Weight Retained | % Passing |
|---|---|---|
| 4.75 | 9.18 | 95.7 |
| 2.00 | 15.00 | 93.0 |

SAND (from hydrometer sediment)

| Sieve Size | Weight Retained | Ttl. Sample % Passing |
|---|---|---|
| 0.500 | 2.41 | 88.5 |
| 0.250 | 5.46 | 82.8 |
| 0.125 | 10.52 | 73.3 |
| 0.075 | 14.56 | 65.8 |

HYDROMETER ANALYSIS

9:48AM = Time sedimentation begins
Meniscus correction = 1

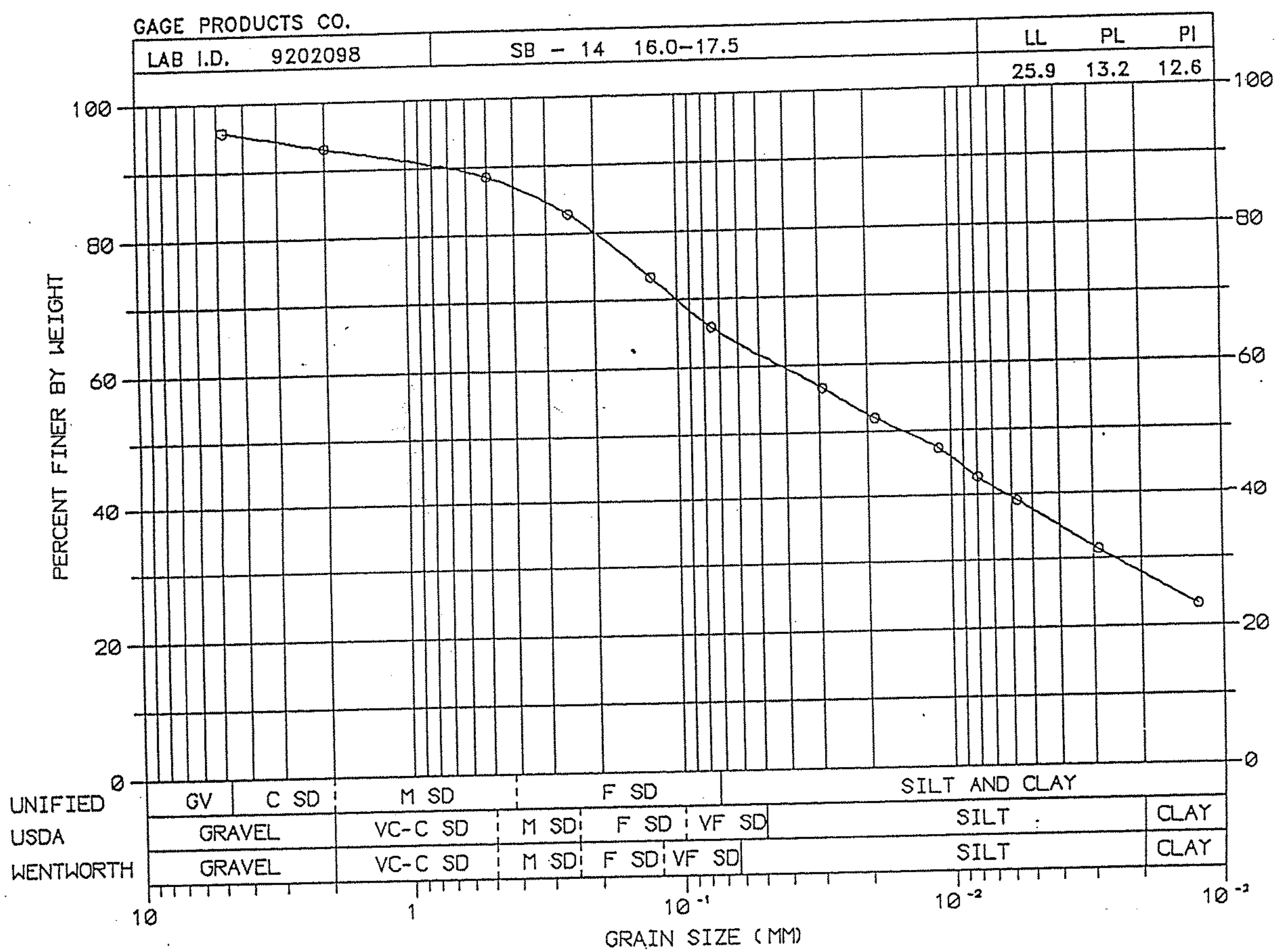
| Elapsed Time (min.) t | Temp. (deg.C) | Initial Hydro. Reading Ra | Zero Corr. | Dia. (MM) D | Total Sample Percent Passing |
|---|---|---|---|---|---|
| 2 | 23.5 | 35.5 | 5.0 | 0.02922 | 56.5 |
| 5 | 23.5 | 33.0 | 5.0 | 0.01884 | 51.9 |
| 15 | 23.5 | 30.5 | 5.0 | 0.01108 | 47.2 |
| 30 | 23.5 | 28.0 | 5.0 | 0.00798 | 42.6 |
| 60 | 23.5 | 26.0 | 5.0 | 0.00572 | 38.9 |
| 250 | 23.5 | 22.0 | 5.0 | 0.00288 | 31.5 |
| 1440 | 23.5 | 17.5 | 5.0 | 0.00123 | 23.2 |

ATTERBERG LIMITS — A.S.T.M D-4318

Liquid limit, Plastic Limit, Plasticity Index

| | PL | 40 blows | 23 blows | 15 blows |
|---|---|---|---|---|
| wet soil + container wt. | 19.32 | 23.48 | 23.34 | 22.83 |
| dry soil + container wt. | 18.94 | 21.96 | 21.76 | 21.29 |
| container wt. | 16.07 | 15.73 | 15.68 | 15.73 |
| percent moisture | 13.2 | 24.4 | 26.0 | 27.7 |

Liquid Limit = 25.9 Plastic Limit = 13.2 Plasticity Index = 12.6



GAGE PRODUCTS CO.
LAB I.D. 9202098
SB - 14 16.0-17.5
LL PL PI
25.9 13.2 12.6
PERCENT FINER BY WEIGHT
100
80
60
40
20
0
UNIFIED
USDA
WENTWORTH
GV
C SD
M SD
F SD
SILT AND CLAY
GRAVEL
VC-C SD
M SD
F SD
VF SD
SILT
CLAY
10
1
$10^{-1}$
$10^{-2}$
$10^{-3}$
GRAIN SIZE (MM)

# PERMEABILITY DATA

# PERMEABILITY TEST REPORT

JOB: GAGE PRODUCTS COMPANY
--- Project Number 83284.00

LAB NO. 9202099

APPROVED BY: *Daryl T. Schulz*

DATE: 3/11/92

METHOD: ASTM D5084 - Falling head utilizing back pressure and confining pressure.

TEST CONDITIONS: Back pressure 40 and 30 psi; Confining pressure 45 psi; Gradient 66.7 to 63.2; Tap water permeant.

FORMULA:

$$K = \frac{a\ L}{A\ t} \ln \frac{Ho}{Hf}$$

SAMPLE DATA:

| Boring | Depth (ft) | a (cm2) | L (cm) | D (cm) | A (cm2) | V (cm3) | Natural Moisture (%) | Dry Density (lb/ft3) |
|---|---|---|---|---|---|---|---|---|
| SB-8 | 35.0-37.5 | 0.70 | 9.20 | 7.20 | 40.71 | 374.6 | 15.2 | 128.2 |

TEST DATA:

| P1o (mm Hg) | P2o (mm Hg) | h1o (mm H2O) | h2o (mm H2O) | P1f (mm Hg) | P2f (mm Hg) | h1f (mm H2O) | h2f (mm H2O) | Po P2o-P1o (mm Hg) | Pf P2f-P1f (mm Hg) | ho h1o-h2o (mm) | Ho (cm) | hf h1f-h2f (mm) | Hf (cm) | t (secs) | K (cm/sec) | Reported K (cm/sec) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 168 | 582 | 476 | 154 | 168 | 582 | 413 | 215 | 414 | 414 | 322 | 593.6 | 198 | 581.2 | 168420 | 2.0E-08 | |
| 168 | 582 | 645 | 132 | 167 | 583 | 615 | 163 | 414 | 416 | 513 | 614.0 | 452 | 607.9 | 78420 | 2.0E-08 | |
| 167 | 583 | 615 | 163 | 170 | 580 | 581 | 196 | 416 | 410 | 452 | 605.2 | 385 | 598.5 | 90480 | 1.9E-08 | 2.0E-08 |

EXPLANATION:

a - Standpipe area
L - Sample length
D - Sample diameter
A - Sample area
P1o - Initial manometer reading, left side
P2o - Initial manometer reading, right side
h1o - Initial standpipe level, left side
h2o - Initial standpipe level, right side
P1f - Final manometer reading, left side
P2f - Final manometer reading, right side
h1f - Final standpipe level, left side
h2f - Final standpipe level, right side
Po - Initial pressure difference
Pf - Final pressure difference
ho - Initial standpipe difference
Ho - Initial head difference
hf - Final standpipe level difference
Hf - Final head difference
t - Time from initial to final measurements
K - Permeability

# PERMEABILITY TEST REPORT

JOB: GAGE PRODUCTS COMPANY
Project Number 83284.00

LAB NO. 9202100

APPROVED BY: Dayl T Schulz

DATE: 3/13/92

METHOD: ASTM D5084 - Falling head utilizing back pressure and confining pressure.

TEST CONDITIONS: Back pressure 40 and 30 psi; Confining pressure 45 psi; Gradient 60.2 to 58.3; Tap water permeant.

FORMULA:

$$K = \frac{a\,L}{A\,t} \ln \frac{Ho}{Hf}$$

SAMPLE DATA:

| Boring | Depth (ft) | a (cm2) | L (cm) | D (cm) | A (cm2) | V (cm3) | Natural Moisture (%) | Dry Density (lb/ft3) |
|---|---|---|---|---|---|---|---|---|
| SB-10 | 17.5-20.0 | 0.70 | 10.60 | 7.20 | 40.71 | 431.6 | 13.7 | 119.1 |

TEST DATA:

| P1o (mm Hg) | P2o (mm Hg) | h1o (mm H2O) | h2o (mm H2O) | P1f (mm Hg) | P2f (mm Hg) | h1f (mm H2O) | h2f (mm H2O) | Po P2o-P1o (mm Hg) | Pf P2f-P1f (mm Hg) | ho h1o-h2o (mm) | Ho (cm) | hf h1f-h2f (mm) | Hf (cm) | t (secs) | K (cm/sec) | Reported K (cm/sec) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 305 | 753 | 496 | 112 | 311 | 747 | 477 | 132 | 448 | 436 | 384 | 637.8 | 345 | 633.9 | 90420 | 1.2E-08 | |
| 311 | 747 | 477 | 132 | 311 | 747 | 457 | 154 | 436 | 436 | 345 | 625.7 | 303 | 621.5 | 99000 | 1.2E-08 | |
| 311 | 747 | 457 | 154 | 311 | 747 | 440 | 171 | 436 | 436 | 303 | 621.5 | 269 | 618.1 | 82260 | 1.2E-08 | 1.2E-08 |

EXPLANATION:

a - Standpipe area
L - Sample length
D - Sample diameter
A - Sample area
P1o - Initial manometer reading, left side
P2o - Initial manometer reading, right side
h1o - Initial standpipe level, left side
h2o - Initial standpipe level, right side
P1f - Final manometer reading, left side
P2f - Final manometer reading, right side
h1f - Final standpipe level, left side
h2f - Final standpipe level, right side
Po - Initial pressure difference
Pf - Final pressure difference
ho - Initial standpipe difference
Ho - Initial head difference
hf - Final standpipe level difference
Hf - Final head difference
t - Time from initial to final measurements
K - Permeability

WW Engineering & Science

# Appendix B2-3

## Material Stored

## Fuels and Fuel Additives

| | |
|---|---|
| HR0001 | Alkylate |
| HR0002 | Benzene |
| HR0003 | Ethylbenzene |
| HR0004 | Natural Gasoline |
| HR0005 | Heavy Straight Run |
| HR0006 | Catcracked |
| HR0007 | MSo Peerless |
| HR0008 | Valero Diesel |
| HR0009 | Solvent 200 |
| HR0010 | Ofa 77000 |
| HR0011 | Blue Dye |
| HR0012 | Oga 293A |
| HR0013 | 40 Pale Oil |
| HR0014 | Isopentane |
| HR0015 | Cyclohexane |
| HR0016 | FRN / Pre Flash |
| HR0017 | Diisobutylene |
| HR0018 | Shellsol B Ht |
| HR0019 | Shellsol D38 |
| HR0020 | Shellsol D60 |
| HR0021 | Hexene |
| HR0022 | EEE, EPA Tier II / |
| HR0023 | SME 100 Biodiesel |
| HR0024 | Nalco 5403 |
| HR0025 | Hitec 4733 |
| HR0026 | Hitec 4705 |
| HR0027 | Oil Green M2 |
| HR0028 | Dci-4A |
| HR0029 | 100 Pale Oil/Nytex |
| HR0030 | Age 400 / FRS / #1 |
| HR0031 | 2007 Diesel Cert |
| HR0032 | Valero High Sulfur |
| ***HR0033*** | ***F-173 Diesel (0.05% S)*** |
| HR0034 | Aromatic 200 |
| HR0035 | MTBE |
| ***HR0036*** | ***Euro V E5 Gasoline (HF0773)*** |
| HR0037 | MSo Calumet |
| HR0038 | Isopar G |
| HR0039 | Infineum R696 |
| HR0040 | Purple Dye |
| HR0041 | Orange Dye |
| HR0042 | Ditert-Butyl Disulfide |
| ***HR0044*** | ***XE-M4CX322-M Summer (HF0075)*** |
| HR0045 | Oga 402 |
| HR0046 | Yellow Dye |
| HR0047 | Nalco 5375 |
| HR0048 | Diethylene Glycol |
| HR0049 | Red Dye |
| HR0051 | RME |
| HR0052 | Exxsol D80 |
| HR0053 | Isopar H |
| HR0054 | Isopar M |
| HR0055 | LPA Solvent |
| HR0056 | Isooctane |
| HR0057 | Isopar E |
| HR0058 | Unadditized Ethanol |
| HR0059 | N-Hexane |
| HR0060 | Cda-20 Ethanol |
| ***HR0061*** | ***Xylene*** |
| ***HR0062*** | ***Toluene*** |
| ***HR0063*** | ***Aromatic 100*** |
| ***HR0064*** | ***Aromatic 150*** |
| HR0065 | N-Butane |
| HR0066 | Isobutane |
| HR0067 | Isopar C |
| ***HR0068*** | ***Fuel Grade Ethanol*** |
| HR0069 | Stadis 450 |
| HR0070 | M-Pyrol |
| HR0071 | Isopar L |
| ***HR0072*** | ***70% T-Butyl Hydroperoxide*** |
| ***HR0073*** | ***Isoprene 99%*** |
| HR0074 | DMA 54 |
| HR0079 | Tetramer M |

## Fragrances

| | |
|---|---|
| CO0023 | Rain Fresh Fg#0126 |
| CO0024 | Orange Fragrance |
| CO0025 | Vanilla Fragrance |
| CO0027 | Apple Lemon Exp |

## *Dyes*

| | |
|---|---|
| DY0002 | D15003 Chromatint Blue |
| DY0003 | L84020 Liquitint Violet |
| ***DY0010*** | ***15870 Oil Violet*** |
| ***DY0011*** | ***D12005/40 Fiber Orange*** |
| ***DY0016*** | ***Liquitint Green*** |
| DY0027 | Luconyl 1252 Yellow |
| DY0029 | M93020 Chromatint Red |
| ***DY0087*** | ***Oil Orange M2*** |
| ***DY0098*** | ***Oil Blue B*** |

## Esters

| | |
|---|---|
| ES0001 | Ektapro EEP |
| ES0002 | Ethyl Acetate 99% |
| ES0003 | Isopropyl Acetate |
| ***ES0006*** | ***Isobutyl Acetate*** |
| ES0007 | Normal Butyl Acetate |
| ES0010 | Polysolv Ee Acetate |
| ES0011 | Polysolv Eb Acetate |
| ES0013 | Polysolv Db Acetate |
| ES0015 | Isobutyl Isobutyrate |
| ES0016 | 2-Ethyl Hexyl Acetate |
| ES0017 | Ektasolv Pm Acetate |
| ES0018 | Dibasic Esters |
| ES0025 | N-Pentyl Propionate |
| ES0031 | Tert Butyl Acetate |
| ES0034 | Propyl Propionate |
| ES0036 | Stepan SBO-ME |
| ES0038 | N-Butyl Propionate |
| ***ES0045*** | ***Dimethyl Carbonate*** |
| ***ES0098*** | ***Primary Amyl Acetate*** |

## Fuel Additives

| | |
|---|---|
| FA0001 | Methyl Tert-Butyl Ether |
| FA0002 | Lauroyl Peroxide |
| FA0005 | Thiophene 902 |
| FA0007 | Methyl Tetrahydrofuran |
| FA0016 | 70% T-Butyl Hydroperoxide |
| FA0017 | Copper Naphthenate Conc. |
| FA0019 | Sulfur, Elemental |
| FA0020 | Cumene Hydroperoxide, 80-90% |
| FA0021 | Acetaldehyde |
| FA0023 | Tert-Butyl Disulfide |
| FA0030 | Techron Concentrate |
| FA0032 | Cda-21 Alcohol, No DCI |
| FA0033 | Thianaphthene, 95-99% |
| FA0034 | 1-Hexene |
| FA0035 | 1-Octene |
| FA0036 | Isoprene, 99% |
| FA0037 | Piperylene Tech, 90% Isomers |
| FA0038 | EthyleneDiamine Free Base |
| FA0039 | Aromatic 150, Naphthalene Depleted |
| ***FA0040*** | ***ADC Diesel Fuel Additive Conc.*** |
| FA0041 | Ethanol, Denatured, Cda-20 |
| FA0042 | 4-Ethyl Phenol 99% |
| FA0043 | Styrene, 99% |
| FA0044 | 2,5-Dimethylaniline, 99% |
| FA0045 | Iso 12103-1, A2 Fine Test Dust |
| FA0046 | Copper Stearate |
| ***FA0047*** | ***Stadis 450 Conductivity Improv*** |
| FA0048 | AO-37 Fuel Antioxidant |
| FA0049 | DCI-4A Fuel Corrosion Inhibitor |
| FA0051 | Octane Supreme 130 W/TEL |
| FA0052 | N-Butyl Mercaptan |
| FA0053 | Quicksilver TC-W3 Premium Oil |
| ***FA0054*** | ***DMA-580 Gasoline Additive*** |
| ***FA0056*** | ***ADM 017608 No-DCI Fuel Ethanol*** |
| FA0057 | DCI-11 Corrosion Inhibitor |

### Fuels and Fuel Additives

| | |
|---|---|
| HR0081 | Exsol D60 |
| ***HR0084*** | ***Methanol*** |
| HR0085 | 60 Pale Oil |
| HR0086 | HF 648 Xe-M4Cx727-A |
| HR0087 | Tolad 9308 |
| ***HR0088*** | ***n-Mercaptan Sulfur*** |
| ***HR0089*** | ***Elemental Sulfur*** |
| HR0090 | Dimethyl Hexadiene |
| HR0091 | Pyrrole |
| HR0092 | Dma-4 |
| ***HR0093*** | ***EEE Lube Cert Gasoline*** |
| HR0094 | N-Heptane |
| HR0095 | MSo Sterling |
| HR0097 | Cyclopentane 70 % |
| ***HR0098*** | ***SVGM2*** |
| HR0100 | ZDDP, OS#29802AF, 1 |
| HR0101 | Dry Ethanol |
| HR0102 | Eastman Bioextend |
| HR0103 | Keropur 3131 |
| HR0104 | Marathon #2 Diesel |
| HR0105 | Exxon Aromatic 100 |
| HR0106 | Exxon Aromatic 150 |
| HR0107 | Iso-Hexane |
| HR0108 | n-Pentane |
| HR0109 | HiTEC 4103 Cetane |
| HR0110 | Tenox 21 Additive |
| HR0111 | Magiesol 62 Oil |
| ***HR0112*** | ***ECD-LS*** |
| HR0113 | Cupric Acetate |
| ***HR0114*** | ***Marathon #2 ULSD - Red*** |
| ***HR0115*** | ***Super Dry FG Ethanol, 0.05% Water*** |
| ***HR0116*** | ***Piperylene*** |
| ***HR0117*** | ***Dimethyl Disulfide*** |
| ***HR0118*** | ***Thiophene*** |
| ***HR0119*** | ***Thianaphthene 95-99%*** |
| ***HR0120*** | ***Sodium Chloride*** |
| ***HR0121*** | ***Sulfuric Acid 93%*** |
| ***HR0122*** | ***Acetic Acid*** |
| ***HR0123*** | ***Sodium Sulfate*** |
| ***HR0124*** | ***Lauroyl Peroxide*** |
| ***HR0125*** | ***Isododecane*** |
| ***HR0126*** | ***STIHL HP Ultra 2 Cycle Oil*** |
| ***HR0127*** | ***Iso-Butanol*** |
| ***HR0128*** | ***n-Butanol*** |
| ***HR0129*** | ***Iso-Hexane*** |
| ***HR0130*** | ***HITEC 3000 Octane Booster*** |
| ***HR0131*** | ***Sodium Bicarbonate*** |
| ***HR0132*** | ***Formic Acid*** |
| ***HR0133*** | ***HITEC 3000 24.4% MMT Conc.*** |
| ***HR0134*** | ***Suncoast ULSD*** |
| ***HR0135*** | ***Afton Fuel Base*** |
| ***HR0136*** | ***n-Butyl Mercaptan*** |
| ***HR0137*** | ***Undenatured Ethanol*** |
| ***HR0138*** | ***IVD Polymer Solution*** |
| ***HR0139*** | ***Acetaldehyde*** |
| ***HR0140*** | ***Ethyl Acetate*** |
| ***HR0141*** | ***INEOS Iso-octane*** |
| ***HR0142*** | ***HF0523 2 ppm Sulfur Diesel MS*** |
| ***HR0143*** | ***Nalco EC5407A*** |
| ***HR0144*** | ***EU Ultra Low Sulfur, NE590*** |
| ***HR0150*** | ***BP IBE20 Fuel*** |
| ***HR0151*** | ***BASF Invigerate 1*** |
| ***HR0152*** | ***Bio-Based Butanol*** |
| ***HR0153*** | ***Tri-Isobutylene Concentrate*** |
| ***HR0154*** | ***M-Xylene*** |
| ***HR0155*** | ***HF0088 XE-M4CX610-85C Gasoline*** |
| ***HR0156*** | ***HF0476, 10.5 RVP Gasoline*** |
| ***HR0157*** | ***HF1213 TF-1 + 20% Ethanol*** |
| ***HR0158*** | ***HF0036 Brazillian E-22 Replica Fuel*** |
| ***HR0159*** | ***HF0770 Baseline 87 Octane Summer*** |

### Fuel Additives

| | |
|---|---|
| FA0058 | CD20 Ethanol No DCI |
| ***FA0059*** | ***Dimethyl Sulfide, >99%*** |
| ***FA0062*** | ***Full Range Reformate*** |
| FA0063 | Heavy Reformate |
| FA0064 | FCC 1 |
| FA0065 | FCC 2 |
| FA0066 | Cvec Fuel Ethanol W/CARBOB |
| FA0067 | Propionic Acid, 99.5% |
| ***FA0068*** | ***1-Hexanethiol(Hexyl Mercaptan)*** |
| FA0072 | OLI-9070.x Additive |
| ***FA0073*** | ***Dimethyl Sulfide*** |
| ***FA0074*** | ***OGA 72003*** |
| ***FA0075*** | ***Bio Stable ® 401*** |
| ***FA0076*** | ***Infineum Additive IDN 6709*** |
| ***FA0077*** | ***DTDM 4,4-Dithiodimorpholine*** |
| ***FA0078*** | ***Copper (II) Acetate*** |
| ***FA0079*** | ***Reagent Grade Alcohol 200 Proof*** |
| ***FA0080*** | ***Undenatured Ethanol*** |
| ***FA0081*** | ***Butyric Acid*** |
| ***FA0082*** | ***1-Chloronaphthalene 90%*** |
| ***FA0083*** | ***MMT (Hitec 3000)*** |
| ***FA0084*** | ***PPD 2151 ie1*** |
| ***FA0085*** | ***Afton R10012020 PIB CDA Additive*** |
| ***FA0086*** | ***Decanoic Acid*** |
| ***FA0087*** | ***ASTM D87 Paraffin Wax MP58-62 C*** |

### Glycol Ether and Glycol

| | |
|---|---|
| GE0003 | Polysolv EB |
| GE0004 | Propyl Proposal |
| GE0006 | Polysolv DB |
| GE0007 | Polysolv PM |
| GE0008 | Polysolv DPM |
| GE0009 | Ektasol EP |
| GE0013 | Hexyl Cellosolve |
| GE0015 | Glycol Ether TPM |
| GL0001 | Ethylene Glycol |
| GL0003 | Propylene Glycol |
| GL0012 | 1,3-Butylene Glycol |

### Inorganic

| | |
|---|---|
| IN0002 | Deionized Water |
| IN0003 | Sodium Metasilicate |
| IN0004 | Caustic Soda Flake |
| IN0006 | Trisodium Phosphate |
| IN0007 | City Water |
| IN0010 | Dipotassium Phosphate, Anhydrous |
| IN0011 | Sulfuric Acid 93% |
| ***IN0019*** | ***Nitric Acid 68%*** |
| IN0021 | Sodium Gluconate |
| IN0022 | Dissolvine 120 |
| IN0023 | Caustic Potash 45% |
| IN0024 | Sodium Metaborate |
| IN0025 | Caustic Soda 50% |
| IN0026 | Na4-Edta Salt |
| IN0030 | Soda Ash Lite |
| IN0031 | Caustic Potash 100% |
| ***IN0032*** | ***Hydrogen Peroxide 35%*** |
| ***IN0035*** | ***Hydrochloric Acid 20 Deg Baum*** |
| ***IN0039*** | ***Sodium Nitrate 98.6-100%*** |
| ***IN0050*** | ***Phosphoric Acid 75%*** |

### Ketones

| | |
|---|---|
| KE0001 | Acetone |
| KE0002 | Methyl Ethyl Ketone |
| KE0004 | Methyl Isobutyl Ketone |
| KE0006 | Methyl N-Amyl Ketone |
| KE0007 | Diisobutyl Ketone |
| KE0008 | Diacetone Alcohol |

***HR0160*** ***JP-4 MIL-DTL 5624***
***HR0161*** ***Caron BOB***
***HR0162*** ***Cherry BOB***

## Fuels and Fuel Additives

| | |
|---|---|
| ***HR0163*** | ***Drakesol 205*** |
| ***HR0164*** | ***Formic Acid Reagent Grade*** |
| ***HR0165*** | ***RON 98 Winter Gasoline*** |
| ***HR0166*** | ***HF0762 XE-M4CX735-B10-B*** |
| ***HR0167*** | ***High Altitude Emission Fuel*** |
| ***HR0168*** | ***Carb Phase II Regular Summer*** |
| ***HR0169*** | ***XE-M4CX354-A Cat Dyno Aging*** |
| ***HR0170*** | ***XE-M4CX580-A*** |
| ***HR7771*** | ***TOP Cut, Processed Alkylate*** |
| ***HR7772*** | ***BOTTOM Cut, Processed Alkylate*** |
| HH0001 | JP-4 Mil-T-5624 |
| HH0004 | JP-5 Mil-T-5624 |
| HH0005 | JP-8 Mil-T-83133 |
| ***HH0010*** | ***California Phase II Fuel*** |
| HH0011 | California Phase III Fuel |
| TX0000 | Premium Unleaded |
| TX0002 | Regular Unleaded |
| TX0003 | Indolene Clear |
| TX0012 | Diesel Fuel #2, Low |
| TX0013 | Diesel Fuel #2, Off |
| ***TX0014*** | ***Diesel Fuel #1, Low Sulfur*** |
| TX0016 | Diesel Fuel #2, |
| TX0023 | Biodiesel Fuel B100 |
| TX0042 | UTG-91 91 Ron Test Gasoline |
| TX0043 | Chevron 7# RVP Test |
| ***TX0044*** | ***Premium Unleaded Gasoline*** |
| TX0045 | 91 RON Test Fuel, 8 |
| TX0052 | En 590 Diesel |
| TX0053 | Diesel Euro Iv |
| TX0054 | Diesel 2007 |
| TX0055 | Diesel 0.05 Ls |
| TX0057 | En 14214 RME |
| ***TX0058*** | ***Sunoco GT 100 Unleaded*** |
| ***TX0061*** | ***CEC RF 08-A-85 Prem. Gasoline*** |
| ***TX0062*** | ***VP Streetblaze 100 Racing Fuel*** |
| ***TX0063*** | ***CARBOB Gasoline*** |
| ***TX0064*** | ***Natural Gasoline*** |
| TX0065 | HF 523 2PPM Sulfur |
| TX0066 | Soygold Biodiesel |
| ***TX0069*** | ***Premium Unleaded Gas w/Ethanol*** |
| ***TX0070*** | ***Alkylate*** |
| ***TX0071*** | ***Light CC Naphtha*** |
| ***TX0075*** | ***Customer Supplied Infineum Biodiesels*** |
| ***TX0076*** | ***Swedish MK-1 Diesel*** |
| ***TX0077*** | ***PBOB Premium Blend Stock*** |
| ***TX0079*** | ***RBOB 85 Octane Gasoline*** |

## Additives

| | |
|---|---|
| AD0008 | Troykyd D-999 |
| AD0015 | Phosphoric Acid 85% |
| AD0018 | Cobratec 99 |
| AD0037 | Formic Acid |
| AD0040 | Tinuvin292 Hals Lt |
| AD0043 | Tributoxyethyl Phosphate |
| AD0053 | Sodium Benzoate |
| AD0054 | Sodium Citrate |
| AD0060 | Armohib 31 |
| AD0062 | Solvent Mask |
| AD0075 | Release Agent |

## Salts

| | |
|---|---|
| NA0001 | Sodium Chloride |
| NA0002 | Sodium Sulfate |
| NA0003 | Sodium Bicarbonate |
| NA0004 | Sodium Carbonate |
| NA0011 | Sodium Acetate |
| NA0012 | Potassium Sulfate |
| NA0013 | Potassium Acetate |
| ***NA0014*** | ***Magnesium Sulfate Heptahydrate*** |
| ***NA0015*** | ***Zinc Acetate Dihydrate*** |
| ***NA0026*** | ***Silver Nitrate*** |

## Organic

| | |
|---|---|
| OC0012 | Glacial Acetic Acid |
| OC0014 | M-Pyrol (N-Methyl Pyrrolidone) |
| OC0017 | Heptanoic Acid |
| OC0019 | Oleic Acid |
| OC0022 | Glycolic Acid |
| OC0024 | Lactic Acid 88% |
| OC0025 | Gluconic Acid 50% |
| OC0034 | 50% Citric Acid |

## Resins

| | |
|---|---|
| RB0010 | Paraloid B-66 100% |
| RB0013 | Asphalt A-260 |
| RB0014 | Select 300 |
| ***RB0015*** | ***GP Pulverized*** |
| RB0018 | Indopol H-8 |
| RB0020 | 14402 Penreco Snow |
| RB0021 | DW 19 S 55 Cutback |
| RB0053 | Parapol 1300 |
| RW0026 | Flexbond 149 PSA |
| RW0030 | D Solution |
| RW0039 | Carboset 515 |
| RW0040 | Acusol 505N Polymer |
| RW0041 | Carboset 527 |
| RW0042 | Carbowax Polyethylene |
| RW0044 | Binder Agent |
| RW0045 | Airflex 410 |
| RW0048 | Air Flex 809 |
| RW0060 | Carboset PL-958 |
| RW0062 | Flexbond 150 Psa |
| RW0064 | Boothcoat 5201 |

## Surfactants

| | |
|---|---|
| ***SDI0001*** | ***Surfactant/Blue Dye/Water*** |
| SW0005 | Miranol Fbs |
| SW0010 | R & R 551 Lecithin |
| SW0016 | Victawet 12 |
| SW0017 | Tritron X-100 |
| SW0020 | Polytergent Sl-62 |
| SW0027 | Igepal Co-210 |
| SW0029 | Tergitol Tmn-3 |
| SW0030 | Tergitol Tmn-6 |
| SW0031 | Pluronic L62D |
| SW0032 | Strodex Pk-90 |
| SW0033 | Ucon Lubricant |
| SW0037 | Igepal |
| SW0045 | Mackazoline Cy |
| SW0047 | Surfonic Lf-17 |
| SW0049 | Berol 840 |
| SW0050 | Ag 6202 Glucoside |
| SW0055 | Mackamide S |
| SW0049 | Berol 840 |
| SW0050 | Ag 6202 Glucoside |
| SW0055 | Mackamide S |
| SW0057 | Berol 226 |

SW0063 Sxs-40
SW0065 Alfonic 810-4.5
***SW0070 Mirachem 500***
SW0072 N-Octyl-2-Pyrrolidone
SW0073 Macat Ao-8

## Aromatic/Aliphatic Hydrocarbons

AH0002 Gagesol B,
AH0003 Shellsol Heptane
***AH0005 VM&P Naphtha***
AH0006 Mineral Spirits,
AH0007 135 Mineral Spirits
AH0009 #142 Solvent
AH0010 Odorless Mineral Oil
AH0011 Isopar M/Sol Trol
AH0012 ***Draketex 50 White Mineral Oil***
***AH0013 MFO 24 White Mineral Oil***
AH0016 Mineral Seal Oil
AH0017 Exxsol D80
AH0020 Diisobutylene
AH0022 Isopar G (Exxon)
AH0023 Isopar C
AH0024 n-Heptane
AH0025 Isooctane
AH0026 Drakeol 19
AH0029 Isopar E
AH0031 Varsol 110 Fluid
AH0032 Normal Butane, Dip
AH0033 ***Solvent Degreaser & Cleaner***
AH0034 n-Pentane
AH0035 Isopentane
AH0036 Cyclopentane 70%
AH0037 Isobutane
***AH0038 n-Octane***
***AH0039 Cyclohexane***
***AH0040 Shellsol D40***
***AH0041 Hygold***
***AH0045 Benzene***
***AH0050 Ethylbenzene***
AH0051 Toluene
AH0052 Xylene
AH0053 ***Aromatic 100 Solvent***
AH0054 ***Aromatic 150 Solvent***
AH0055 #10 Solvent/Aromatic 200
***AH0056 Naphthalene 98%***
AH0058 Citgo Vm&P Naphtha
***AH0059 Calumet 360 Mineral Spirits***
AH0060 Mil-C-7024 Type II
***AH0061 Hynap N60HT Naphthenic Oil***
***AH0062 Isopentane (Bulk)***
AH0070 D-Limonene
AH0090 Shellwax 100

## Alcohols

AL0001 Methanol
***AL0003 Denatured Ethanol, 95%***
AL0004 Isopropyl Alcohol, 99%
AL0005 Normal Propyl Alcohol
AL0007 Isobutyl Alcohol
***AL0009 Isopropyl Alcohol, 91%***
AL0010 2-Ethyl Hexanol
AL0011 Normal Butyl Alcohol
AL0013 Tertiary Butyl Alcohol
AL0014 Tecsol #3 Anhydrous
AL0015 Benzyl Alcohol
AL0016 Furfuryl Alcohol
AL0017 Primary Amyl Alcohol
AL0021 Fuel Grade Ethanol

## Thickeners

TH0005 Acrysol Ase-60
TH0009 Bentone Ew
TH0011 Acrysol Tt-615
TH0012 Bentone Lt
TH0015 Hydroxyethylcellulose
TH0019 Nisso Hpc-H
TH0020 Jaguar Hp-120
TH0023 Methocel K15M
TH0028 Polyphobe 107
TH0030 Bentone Sd-3

## Miscellaneous

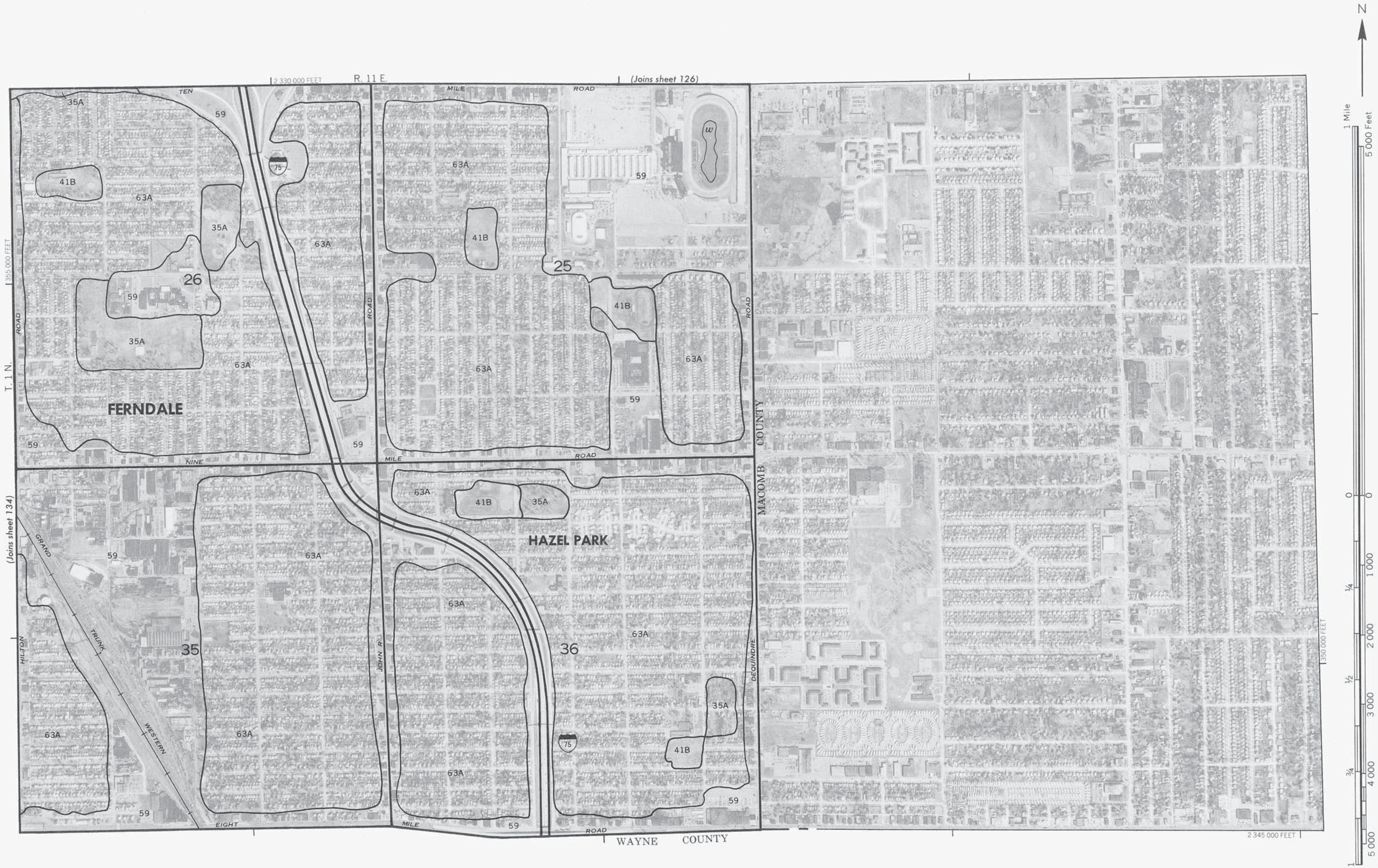
AO0012 Alox 2028
DS0003 Glycerine 96-100%
EP0003 Wilklay Rp 80
EP0019 Vicron 15-15 (Calcium Carbonate)
EP0027 Tecture 1200
EP0029 Filler
EP0035 T1200G
***EP0036 Texture 1200N***
***EP0037 Texture 1200A***
***EP0038 Propyltex 30***
PB0001 Monarch 120
PL0004 Santicizer 160
PL0014 Di-Butyl Phthalate
PL0017 Benzoflex 9-88
PW0001 Rhd6X Or R-Cr40 (Titanium Dioxide)
RA0041 Ucar 441 Acrylic Latex
RA0049 Ucar 441 Acrylic Latex
RA0051 Rhoplex 1531
NA0025 Kathon Lx 1.5%
***NA0006 Sodium Hypochlorite 15%***

## Amines

AM0006 Di-Methyl-Ethanol
AM0007 Aqua Ammonia 28%
AM0010 Triethanolamine
AM0013 Monoethanolamine
AM0014 Amine Cs-1135
AM0015 AMP 95
AM0016 Isopropylaminoethane
AM0018 Ethoxylated Amine

# Appendix B2-4

## Soil Survey Data




This map is compiled on 1976 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

## SOIL LEGEND

Map symbols consist of numbers or a combination of numbers and letters. The initial numbers represent the kind of soil. A capital letter following these numbers indicates the class of slope. Symbols without a slope letter are for nearly level soils or miscellaneous areas.

| SYMBOL | NAME | SYMBOL | NAME |
|---|---|---|---|
| 10B | Marlette sandy loam, 1 to 6 percent slopes | 40B | Udorthents, loamy, undulating |
| 10C | Marlette sandy loam, 6 to 12 percent slopes | 40C | Udorthents, loamy, rolling |
| 10D | Marlette loam, 12 to 18 percent slopes | 41B | Aquents, sandy and loamy, undulating |
| 10E | Marlette loam, 18 to 35 percent slopes | 42 | Pits |
| 11B | Capac sandy loam, 0 to 4 percent slopes | 43 | Sloan-Marlette association |
| 12 | Brookston and Colwood loams | 44B | Riddles sandy loam, 1 to 6 percent slopes |
| 13B | Oshtemo-Boyer loamy sands, 0 to 6 percent slopes | 44C | Riddles sandy loam, 6 to 12 percent slopes |
| 13C | Oshtemo-Boyer loamy sands, 6 to 12 percent slopes | 44D | Riddles sandy loam, 12 to 18 percent slopes |
| 13E | Oshtemo-Boyer loamy sands, 12 to 40 percent slopes | 45B | Arkport loamy fine sand, 2 to 6 percent slopes |
| 14B | Oakville fine sand, 0 to 6 percent slopes | 45C | Arkport loamy fine sand, 6 to 12 percent slopes |
| 14C | Oakville fine sand, 6 to 18 percent slopes | 45D | Arkport loamy fine sand, 12 to 25 percent slopes |
| 15B | Spinks loamy sand, 0 to 6 percent slopes | 46A | Dixboro loamy fine sand, 0 to 3 percent slopes |
| 15C | Spinks loamy sand, 6 to 12 percent slopes | 47B | Fox-Riddles sandy loams, 1 to 6 percent slopes |
| 15E | Spinks loamy sand, 12 to 35 percent slopes | 47C | Fox-Riddles sandy loams, 6 to 12 percent slopes |
| 17A | Wasepi sandy loam, 0 to 3 percent slopes | 48 | Gilford sandy loam |
| 18B | Fox sandy loam, 1 to 6 percent slopes | 49 | Cohoctah fine sandy loam |
| 18C | Fox sandy loam, 6 to 12 percent slopes | 50B | Udipsamments, undulating |
| 18D | Fox sandy loam, 12 to 25 percent slopes | 50D | Udipsamments, rolling to steep |
| 19 | Sebewa loam | 51B | Leoni gravelly sandy loam, 1 to 6 percent slopes |
| 20B | Glynwood loam, 2 to 6 percent slopes | 51C | Leoni gravelly sandy loam, 6 to 12 percent slopes |
| 20C | Glynwood loam, 6 to 12 percent slopes | 52A | Selfridge loamy sand, 0 to 3 percent slopes |
| 23B | Sisson fine sandy loam, 1 to 6 percent slopes | 53A | Tedrow loamy sand, 0 to 3 percent slopes |
| 23C | Sisson fine sandy loam, 6 to 12 percent slopes | 54A | Matherton sandy loam, 0 to 3 percent slopes |
| 25B | Owosso sandy loam, 1 to 6 percent slopes | 56A | Urban land-Blount-Lenawee complex, 0 to 3 percent slopes |
| 25C | Owosso sandy loam, 6 to 12 percent slopes | 59 | Urban land |
| 26 | Sloan silt loam | 60B | Urban land-Marlette complex, 0 to 8 percent slopes |
| 27 | Houghton and Adrian mucks | 60C | Urban land-Marlette complex, 8 to 15 percent slopes |
| 31B | Metea loamy sand, 0 to 6 percent slopes | 60D | Urban land-Marlette complex, 15 to 25 percent slopes |
| 31C | Metea loamy sand, 6 to 12 percent slopes | 61A | Urban land-Capac complex, 0 to 3 percent slopes |
| 32B | Blount loam, 0 to 4 percent slopes | 62B | Urban land-Spinks complex, 0 to 8 percent slopes |
| 33 | Lenawee silty clay loam | 62C | Urban land-Spinks complex, 8 to 15 percent slopes |
| 34B | Kibbie fine sandy loam, 0 to 4 percent slopes | 63A | Urban land-Thetford complex, 0 to 3 percent slopes |
| 35A | Thetford loamy fine sand, 0 to 3 percent slopes | 67B | Ormas loamy sand, 0 to 6 percent slopes |
| 36A | Metamora sandy loam, 0 to 3 percent slopes | 67C | Ormas loamy sand, 6 to 12 percent slopes |
| 38 | Napoleon muck | 68 | Cohoctah-Fox association |
| 39 | Granby loamy sand | 69 | Thomas muck |

# CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

## CULTURAL FEATURES

BOUNDARIES

- National, state or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline & neatline

AD HOC BOUNDARY (label)

- Small airport, airfield, park, oilfield, cemetery, or flood pool — Davis Airstrip; FLOOD POOL LINE

STATE COORDINATE TICK

LAND DIVISION CORNERS (sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEMS & DESIGNATIONS

- Interstate — 79
- Federal — 410
- State — 52
- County, farm or ranch — 378

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad

DAMS

- Large (to scale)
- Medium or small — water; w

PITS

- Gravel pit
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban areas)
- Church
- School
- Indian mound (label) — Indian Mound
- Located object (label) — Tower
- Tank (label) — GAS
- Wells, oil or gas
- Windmill
- Kitchen midden

## WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
- Double-line (label) — CANAL
- Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial — water; w
- Intermittent — int; i

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

## SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS — 10B 62C

ESCARPMENTS

- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

GULLY

DEPRESSION OR SINK

SOIL SAMPLE SITE (normally not shown) — S

MISCELLANEOUS

- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot
- Pond area
- Sanitary Landfill up to 40 acres in size
- Loamy spot up to 3 acres in size
- Organic soil up to 3 acres in size

# Appendix B2-5

## Community Relations Plan

# COMMUNITY RELATIONS PLAN

## RCRA Facility Investigation

## at

## GAGE PRODUCTS COMPANY
## FERNDALE, MICHIGAN
## U.S. EPA ID Number MID 055-338-801

*Prepared for:*

Gage Products Company
625 Wanda Avenue
Ferndale, Michigan 48220

*Prepared by:*

Horizon Environmental
4771 – 50th Street, Suite One
Grand Rapids, Michigan 49512

Revision 2: January 1999
Revision 2 - Update: February 2012

HORIZON ENVIRONMENTAL

***PAGE***

## COMMUNITY RELATIONS PLAN

# 1.0 COMMUNITY RELATIONS PLAN

## 1.1 PURPOSE AND SCOPE

The purpose of this Community Relations Plan (CRP) is to establish a mechanism by which members of the interested public may obtain information concerning the RCRA Corrective Action Program being implemented at the Gage Products Company in Ferndale, Michigan. The CRP identifies facility and regulatory agency representatives who may be contacted with questions or concerns and describes the creation and location of repositories for relevant documents. Relevant documents will include any of the work plans or written reports submitted to the Michigan Department of (Environmental Quality (MDEQ) pursuant to the terms and conditions of the RCRA Corrective Action Plan provisions (Attachment I) of the facility's Limited Storage Facility License.

## 1.2 LOCATIONS OF AVAILABLE INFORMATION

Documents pertaining to the corrective action program being implemented at the facility can be reviewed and copied for a fee at the following locations:

Michigan Department of Environmental Quality
Waste Management Division
525 West Allegan Street
Lansing, Michigan 48909
Hours: 8:00AM-5:00 PM, Monday-Friday, except legal holidays
Contact: Mr. Dan Dailey (517) 335-6610

The local public repository of the corrective action documents is:

Ferndale Public Library
222 East Nine Mile Road
Ferndale, Michigan

Documents will also be available for review, by appointment, at the facility.

Gage Products Company
625 Wanda Avenue
Ferndale, Michigan 48220
Hours: By appointment
Contact: Ms. Sharon Stahl (248) 541-3824

## 1.3 CONTACT PERSONS

Comments and requests relating to the implementation of the Corrective Action Program at the facility may be directed to the following representatives:

1. Mr. Dan Dailey
   Waste Management Division
   Michigan Department of Environmental Quality
   P.O. Box 30473
   Lansing, Michigan 48909-7973
   (517) 335-6610

## 1.4 PUBLIC PARTICIPATION

In addition to making documents generally available to the public for review, the RCRA Corrective Action Program also provides for formal public participation at the time a final corrective measure, if necessary, is being considered at a facility. The public will be notified in a local paper as to the time and place of a public hearing:

# Appendix B2-6

## Health and Safety Plan

# HEALTH AND SAFETY PLAN

## RCRA Facility Investigation

**at**

**GAGE PRODUCTS COMPANY**
**FERNDALE, MICHIGAN**
**U.S. EPA ID Number MID 005-388-801**

*Prepared for:*

Gage Products Company
625 Wanda Avenue
Ferndale, Michigan 48220

*Prepared by:*

Horizon Environmental
4771 – 50th Street, Suite One
Grand Rapids, Michigan 49512

Revision 2: January 1999
Revision 2 - Update: February 2012

HORIZON ENVIRONMENTAL

# HORIZON ENVIRONMENTAL CORPORATION
# SITE HEALTH & SAFETY PLAN

## INTRODUCTION

This document describes the health and safety guidelines and procedures developed for The field activities associated with a RCRA Facility Investigation - Release Assessment at the Gage Products Company facility in Ferndale, MI. Soil and/or groundwater samples will be collected around solid waste management units (SWMUs) and other areas of concern to determine the absence or presence of a release to the environment.

Gage Products Company is a solvent blending and paint production facility. Gage's facility is located within the City of Ferndale in a light industrial/residential area served by municipal water and sewer, and with natural gas and electrical utility lines.

The guidelines and procedures contained herein are based on the best available information at the time of this plan's preparation. Specific requirements will be revised when and if new information is received or conditions change significantly from original indications. All work will be coordinated through the Horizon Project Manager and will be performed in accordance with the provisions, guidelines, and procedures of this Site Health & Safety Plan (SHSP), and the requirements of OSHA's Hazardous Waste Operations and Emergency Response (HAZWOPER) standard (29 CFR 1910.120).

## A. GENERAL INFORMATION

Client: Gage Products Company

Project Number: GAG-0101

Site/Property Identification: 625 Wanda Avenue, Ferndale, Michigan 48220

Address:

Plan Prepared by/Date: Karen Hathaway, February 2012

Plan Reviewed by/Date: Charlene McGue, February 2012

Planned Tasks (attach additional sheets, if necessary): Install borings and wells using hand and mobile augering equipment

Expected Start Date and Duration of Project: 3 weeks in spring/summer 2012

Expected Hours of Operation: 8:00AM - 5:00 PM

Will Subcontractors Be Used (if yes, for which tasks)? Drilling

## B. SAFETY, MANAGEMENT & OTHER PERSONNEL

Indicate name, company/agency affiliation, address and telephone number.

Project Manager:

Charlene McGue
Horizon Environmental
4771 – 50th Street SE, Suite One
Grand Rapids, Michigan 49512
(616)544-3210 (office)
(616)893-0304 (mobile)

Site Health and Safety Officer:

Eric Kimber
Horizon Environmental
(See above address)
(616)446-8522 (mobile)

Director of Corporate Health and Safety:

Bill Farrell
Horizon Environmental
4771 – 50th Street SE, Suite One
Grand Rapids, Michigan 49512
(616) 554-3210 (office)
(616) 246-6552 (home)

Other Contacts (please indicate):

## C. MATERIAL CHARACTERIZATION

Hazardous Material Types: Liquid [X] Solid [X] Sludge [ ] Gas [ ]

Corrosive [ ] Ignitable [ ] Radioactive [ ]
Volatile [ X ] Toxic [ X ] Reactive [ ]
Unknown [ ]

Source and kind of release: UST, pipeline, and other operational releases

Unusual Features (terrain, power lines, underground utilities, other): Terrain uneven and ground may be wet: slip, trip, and fall potential

Have utilities been identified and clearly marked by appropriate utility personnel? Utilities will be marked by Miss Dig (800/252-1133) and/or by Gage Products staff.

## D. CHEMICAL DATA

Table D.1 - Known/Suspected Site Chemicals Present: **Neither soils nor groundwater should be contacted without the personal protective equipment mandated in this site health and safety plan. Representative chemicals are listed in Table D.1**

| Chemicals | Concentration* (include units) | | |
|---|---|---|---|
| | Soil | Ground Water | Other |
| B-T-E-X, MDNR Scan 1 compounds, 2-butanone (methyl ethyl ketone), methyl t-butyl ether, methyl isobutyl ketone, acetone, 2-hexanone, carbon disulfide. | | | |
| | | | |

Table D.2 - Known/Estimated Site Chemical Exposure Guidelines: **This table lists standards for compounds not included in the attached chemical summaries.**

| Chemical | OSHA Air Standards | | | Other (TLV, REL) | Known or Suspected Carcinogen? |
|---|---|---|---|---|---|
| | PEL | STEL | Skin | | |
| Carbon disulfide | 10 | - | x | | |
| 2-hexanone | 5 | 75 | - | | |
| Methyl t-butyl ether | 40 | - | - | | yes |
| | | | | | |
| | | | | | |

Table D.3 - Acute Exposure. **Chemical summaries attached list exposure symptoms and first aid measures for nearly all compounds included.**

| **Chemical:** | **Carbon disulfide** | |
|---|---|---|
| **Exposure Route** | **Acute Exposure Symptoms** | **First Aid** |
| Inhalation | dizziness, headache, sleeplessness | Give respiratory support |
| Skin Contact | Parkinson-like syndrome; ocular changes; coronary heart disease; gastritis; kidney, liver damage; eye, skin burns, dermatitis | Wash with soap and water immediately |
| Eye Contact | burning sensation | Irrigate immediately |
| Ingestion | psychosis; polyneuropathy | Provide immediate medical attention. |

## E. SECURITY/SAFETY SPECIFICATIONS

Identify Site Security (e.g. perimeter fences, guard shacks): Grounds are fenced.

Established Work Zones:
N.A. Refer to site location and site plan maps

Anticipated Level of Personal Protective Equipment Required:

Level D [ X ]with potential upgrde to level C: If level C, don full-face respirator with HEPA/organic vapor cartridges if airborne VOC's persist at 5 ppm or higher above background using a PID. Evacuate site at persistent PID readings above 50 ppm.
Level C [ ]
Level B [ ]

Personal Protective Equipment (PPE) Specifications: Level D: hard hat, steel-toed shoes, protective eyewear including side shields, silver shield overgloves (nitrile overgloves may be substituted but watch for any sign of chemical deterioration potentially due to ketone or ketone-fuel mixtures; ketones-fuels are not expected to be present as free-phase organics or in sufficiently high aqueous concentrations to cause such deterioration).

Will Level B PPE Be Available at the Site? Yes

Table E.1 - Monitoring Requirements:

| Instrument | Location/Zone to be Monitored (e.g. Breathing Zone, Ambient Air) | Frequency |
|---|---|---|
| PID | Breathing Zone | 5-minute intervals |
| | | |
| | | |
| | | |

Identify Anticipated Safe Work Procedures Used On Site:

Confined Space Entry* [ ] Hot Work* [ ]
Excavation/Trenching [ ] Drill Rig Operation [X]
Other (please identify) [ ] ______

***permit required**

Special Client Work Procedures: None

Is Site Map Attached? Yes

Table E.2 - Project Team:

| Team Member | Responsibility | Training Required | Fit Tested |
|---|---|---|---|
| Horizon Field Staff | Field Coordinator | 40-hour Hazwoper | |
| | | | |
| | | | |

## F. EMERGENCY RESPONSE

On-Site Resources (if yes, please indicate location or source):

Water Supply [X] Eyewash station or bottles with field vehicle
Telephone [X] With field vehicle
Radio [ ]
Other [X ] First aid kit with field vehicle

Emergency Contacts (location, telephone number):

| | |
|---|---|
| Police Department: | Ferndale Police Department<br>310 E. Nine Mile Road<br>Ferndale, Michigan 48220<br>Emergency Phone: 911<br>Non-Emergency Phone: (248) 541-3650 |
| Hospital: | Beaumont Hospital<br>3601 W. 13 Mile Road<br>Royal Oak, MI 48073<br>Phone: (248) 898-5000 |
| Ambulance: | 911 |
| Fire Department: | Ferndale Fire Department<br>1635 Livernois<br>Ferndale, Michigan 48220<br>Emergency Phone: 911<br>Non-Emergency Phone: (248) 546-2510 |
| Poison Control Center: | (800) POISON 1 [(800) 764-7661] |

**Emergency response should be conducted by the responding emergency service. Employees trained in first aid and CPR may render the same as Good Samaritans.**

Hospital Route: From site travel north on Wanda Avenue to 9 Mile Road. Turn left (west) onto 9 Mile Road and travel to Woodward Avenue. Turn right (north) onto Woodward Avenue and travel approximately four miles to 13 Mile Road. Follow signs at 13 Mile Road for emergency room entrance.

See Attached

## SHSP Review Acknowledgment Form

I have been informed, understand and will abide by the procedures set forth in the Site Health and Safety Plan and any Amendments for the Gage Products RCRA Facility Investigation.

| Printed Name | Signature | Representing | Date |
|---|---|---|---|
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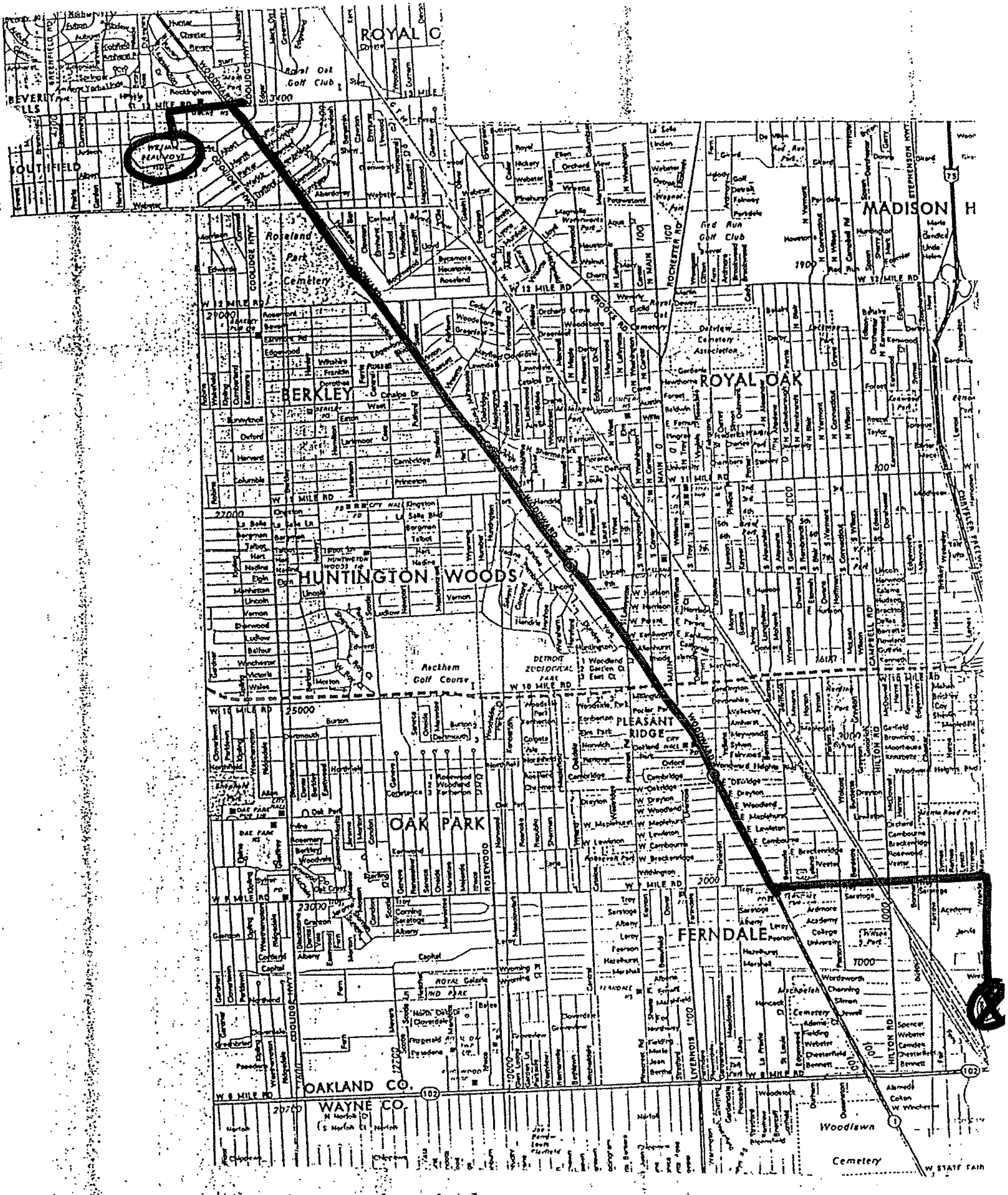


Directions to hospital:
From site travel north on Wanda Avenue to 9 Mile Road. Turn left (west) onto 9 Mile Road and travel to Woodward Avenue. Turn right (north) onto Woodward Avenue and travel approximatel four miles to 13 Mile Road. Follow signs at 13 Mile Road for emergency room entrance.

**Volatile and Semi-Volatile Compounds**

<u>Acetone</u>

Acetone is a respiratory tract irritant and CNS depressant. Symptoms that are typically seen with CNS depressants include disturbed vision, dizziness, headache, loss of appetite, vomiting, drowsiness, fatigue, and numbness of the extremities. High enough concentrations can produce cardiac arrhythmias, visual disturbances, or narcosis. Chronic overexposure can lead to liver and/or kidney damage.

Prolonged or repeated skin contact with acetone can cause moderate irritation, and, as with other organic solvents, can cause defatting and drying of the skin. This can lead to dermatitis and subsequent irritation. Acetone is not absorbed through intact skin in significant amounts; however, cracking of the skin can result and lead to increased systemic uptake. Acetone that enters the body through the skin can then cause systemic effects similar to those seen from inhalation or ingestion.

First Aid Procedures:

Inhalation - Remove person to fresh air. If breathing is difficult, seek immediate medical attention.
Skin Contact - Flush skin with large amounts of water. If irritation persists, call a physician.
Eye Contact - Irrigate with water for 15 minutes. If irritation persists, call a physician.
Ingestion - Seek prompt medical attention. Induce vomiting only at the instruction of a physician.

**OSHA: PEL = 1000 ppm**
**ACGIH: TLV = 750, STEL = 1000 ppm**

Benzene

Exposure to moderate to high levels of benzene causes CNS depression. Typical signs of benzene intoxication include drowsiness, dizziness, headache, vertigo, anorexia, visual disturbances, and delirium and may proceed to loss of consciousness. Moderate exposures can also cause eye and respiratory irritation. High levels of exposure can cause dyspnea and inebriation with euphoria and tinnitus (ringing in the ears) and can rapidly lead to a deep anesthesia. Without treatment, respiratory arrest rapidly ensues, often with muscular twitching and convulsions. Extremely high levels of benzene can also cause cardiac sensitization and arrhythmia.

The health effect of greatest concern associated with benzene is irreversible damage to the hematopoietic (blood forming) system. Chronic benzene exposure has been identified as causing leukemia and aplastic anemia. The bone marrow stops producing red blood cells. The immune system is also compromised due to reduced bone marrow function.

Benzene can be absorbed through the skin in significant amounts. Skin contact can cause moderate irritation, and, as with other organic solvents, can cause defatting and drying of the skin. This can lead to dermatitis and subsequent irritation. Cracking of the skin can result and lead to increased systemic uptake. Benzene that enters the body through the skin can then cause systemic effects similar to those seen from inhalation or ingestion.

First Aid Procedures:

Inhalation - Remove person to fresh air. If breathing is difficult, seek immediate medical attention.

Skin Contact - Flush skin with large amounts of water. If irritation persists, call a physician.

Eye Contact - Irrigate with water for 15 minutes. If irritation persists, call a physician.

Ingestion - Induce vomiting immediately as directed by medical personnel. Seek prompt medical attention.

**OSHA: PEL = 1 ppm, STEL = 5 ppm, cancer hazard**
**ACGIH: TLV = 0.1 ppm, "skin" notation, confirmed human carcinogen (A1)**
**Other: NTP, IARC human carcinogen**

2-Butanone (Methyl Ethyl Ketone)

MEK is a colorless, volatile liquid with a characteristic acetone-like odor. Odor thresholds have been reported as low as 2 ppm. High concentrations (>100 ppm) are irritating to the eyes, nose and throat. Prolonged exposure to vapors may produce CNS depression and narcosis.

Prolonged or repeated skin contact may defat skin and produce dermatitis. MEK is readily absorbed by all routes of exposure. Studies have reported outbreaks of peripheral neuropathy in workers exposed to MEK and methyl n-butyl ketone. It is also suggested that MEK may predispose the liver to injury from hepatotoxins.

First Aid Procedures:

Inhalation - Remove person to fresh air. If breathing is difficult, seek immediate medical attention.

Skin Contact - Flush skin with large amounts of water. If irritation persists, call a physician.

Eye Contact - Irrigate with water for 15 minutes. If irritation persists, call a physician.

Ingestion - Seek prompt medical attention. Induce vomiting only at the instruction of a physician.

**OSHA: PEL = 200 ppm**
**ACGIH: TLV = 200 ppm,STEL = 300 ppm**

Calcium Hydroxide

Calcium hydroxide is a caustic solid, often found in solution, which causes burns to the eyes and skin upon contact. Inhalation of excessive amounts of the dust or mist of calcium hydroxide may cause respiratory tract irritation or pulmonary edema. Symptoms of overexposure include coughing, congestion, wheezing and difficulty breathing, and fluid in the lungs. Ingestion may cause damage to gastrointestinal, esophageal, and oral tissues, blood disorders, or adverse effects on the liver and kidneys.

First Aid Procedures:

Inhalation - Remove person to fresh air. If breathing is difficult, seek immediate medical attention.

Skin Contact - Immediately flush skin with large amounts of water while removing contaminated clothing. Seek immediate medical attention.

Eye Contact - Immediately irrigate eyes with large amounts of water. Seek immediate medical attention.

Ingestion - Seek prompt medical attention. Do not induce vomiting. Drink 2 glasses of water.

**OSHA: PEL = none established**
**ACGIH: TLV = 5 $mg/m^3$**

## Carbon tetrachloride

Carbon tetrachloride, also known as tetrachloromethane," is a respiratory tract irritant and CNS depressant. Symptoms that are typically seen with CNS depressants include disturbed vision, dizziness, headache, loss of appetite, vomiting, drowsiness, fatigue, and numbness of the extremities. High enough concentrations can produce narcosis, cardiac arrhythmias, visual disturbances, chemical pneumonitis, and pulmonary edema.

Chronic overexposure to carbon tetrachloride can lead to kidney damage, liver damage, lung damage, and blood changes.. Carbon tetrachloride is also listed as a suspected human carcinogen causing liver tumors in laboratory animal studies.

Skin contact with carbon tetrachloride can cause mild irritation. As with other organic solvents, it can cause defatting and drying of the skin. This can lead to dermatitis and further irritation. Carbon tetrachloride can also be absorbed through intact skin in significant amounts. Drying and cracking of the skin can lead to further systemic uptake.. Carbon tetrachloride that enters the body through the skin can then cause systemic effects similar to those seen from inhalation.

First Aid Procedures:

Inhalation - Remove person to fresh air. If breathing is difficult, seek immediate medical attention.

Skin Contact - Flush skin with large amounts of water. If irritation persists, call a physician.

Eye Contact - Irrigate with water for 15 minutes. Call a physician.

Ingestion - Do not indice vomiting. Drink 2 glases of water. Call a physician.

**OSHA: PEL = 10 ppm, 25 ppm ceiling, 200 ppm maximum peak**
**ACGIH: TLV = 5 ppm, STEL = 10 ppm, "skin" notation, animal carcinogen (A3)**
**Other: NTP anticipated human carcinogen, IARC possible human carcinogen**

Chlorobenzene

Chlorobenzene, also known a phenyl chloride, is a CNS depressant with symptoms including dizziness, drowsiness, muscular weakness, incoordination, fatigue, blurred vision, emotional changes, psychosis, trouble speaking, headache, giddiness, heart rhythm disturbances, tremors and convulsions. It is irritating to the eyes and respiratory tract. Symptoms may include coughing, congestion, irritation of throat, tightness of chest, wheezing and difficulty breathing.

Chlorobenzene is toxic by inhalation and ingestion with bone marrow depression, kidney and liver damage possible. Symptoms of kidney damage may include reduced urine volume, loss of appetite, weight gain, red urine, back pain, painful urination and lethargy. Symptoms of liver damage may include yellow skin, tenderness of abdomen, abdominal distention, lethargy, fever and death.

First Aid Procedures:

Inhalation - Remove person to fresh air. If breathing is difficult, seek immediate medical attention.

Skin Contact - Flush skin with large amounts of water. If irritation persists, call a physician.

Eye Contact - Irrigate with water for 15 minutes. If irritation persists, call a physician.

Ingestion - Seek prompt medical attention. Induce vomiting only at the instruction of a physician.

**OSHA: PEL = 75 ppm**
**ACGIH: TLV = 10 ppm**

Chloroform

Trichloromethane, more commonly known as chloroform, is a respiratory tract irritant and CNS depressant. Symptoms that are typically seen with CNS depressants include disturbed vision, dizziness, headache, loss of appetite, vomiting, drowsiness, fatigue, and numbness of the extremities. High enough concentrations can produce narcosis, cardiac arrhythmias, visual disturbances, chemical pneumonitis, and pulmonary edema.

Chronic overexposure to chloroform can lead to liver damage, kidney damage, lung damage, and blood changes. It has also been associated with cardiac sensitization and is a suspect carcinogen, believed to cause liver, kidney, and thyroid cancer.

Skin contact with chloroform can cause moderate irritation. As with other organic solvents, it can cause defatting and drying of the skin. This can lead to dermatitis and further irritation. Chloroform is not absorbed through intact skin in significant amounts. However, drying and cracking of the skin can result and lead to further systemic uptake. Chloroform that enters the body through the skin can then cause systemic effects similar to those seen from inhalation.

First Aid Procedures:

Inhalation - Remove person to fresh air. If breathing is difficult, seek immediate medical attention.

Skin Contact - Flush skin with large amounts of water. If irritation persists, call a physician.

Eye Contact - Irrigate with water for 15 minutes. If irritation persists, call a physician.

Ingestion - Do not induce vomiting. Drink 2 glasses of water. Call a physician.

**OSHA: PEL = 50 ppm ceiling**

**ACGIH: TLV = 10 ppm, suspected human carcinogen**

**Other: NTP anticipated human carcinogen, IARC possible human carcinogen**

Chloromethane

Chloromethane, also known as methyl chloride, is a respiratory tract irritant and CNS depressant. Symptoms that are typically seen with CNS depressants include disturbed vision, dizziness, headache, loss of appetite, vomiting, drowsiness, fatigue, and numbness of the extremities. High enough concentrations can produce cardiac arrhythmias, visual disturbances, narcosis, chemical pneumonitis, and pulmonary edema. Chronic overexposure can lead to damage to the gastrointestinal tract, liver damage, kidney damage, lung damage, and destruction of red blood cells with bone marrow depression. Methyl chloride has also been associated with testicular atrophy and decreased fertility.

Skin contact with methyl chloride can cause severe irritation and chemical burns to the skin. As with other organic solvents, it can cause defatting and drying of the skin. This can lead to dermatitis an further irritation. Methyl chloride can also be absorbed through intact skin in significant amounts. Drying and cracking of the skin lead to further systemic uptake. Methyl chloride that enters the body through the skin can then cause systemic effects similar to those seen from inhalation.

Contact with liquid methyl chloride is not anticipated because it generally is found in its gaseous form (b.p.=-12F) at the temperatures expected. Methyl chloride that is exposed to air during the excavation work would also be expected to evaporate and dissipate very quickly during typical wind conditions.

First Aid Procedures:

Inhalation - Remove person to fresh air. If breathing is difficult, seek immediate medical attention.
Skin Contact - Flush skin with large amounts of water. If irritation persists, call a physician.
Eye Contact - Irrigate with water for 15 minutes. If irritation persists, call a physician.
Ingestion - No anticipated first aid required.

**OSHA: PEL = 100 ppm, 200 ppm ceiling, 300 ppm maximum peak**
**ACGIH: TLV = 50 ppm, STEL = 100 ppm, "skin" notation.**

1,1-Dichloroethane

1,1-Dichloroethane is believed to have very limited toxic properties. At high enough concentrations, it is a CNS depressant, having been formerly used as an anesthetic. Symptoms that are typically seen with CNS depressants include disturbed vision, dizziness, headache, loss of appetite, vomiting, drowsiness, fatigue, and numbness of the extremities. Extremely high concentrations can produce cardiac arrhythmias, visual disturbances, narcosis, chemical pneumonitis, and pulmonary edema.

First Aid Procedures:

Inhalation - Remove person to fresh air. If breathing is difficult, seek immediate medical attention.

Skin Contact - Flush skin with large amounts of water. If irritation persists, call a physician.

Eye Contact - Irrigate with water for 15 minutes. If irritation persists, call a physician.

Ingestion - Seek prompt medical attention. Induce vomiting only at the instruction of a physician.

**OSHA: PEL = 100 ppm**
**ACGIH: TLV = 100 ppm**

## 1,2-Dichloroethane

1,2-Dichloroethane, also known as ethylene dichloride, is a respiratory tract irritant and CNS depressant. Symptoms that are typically seen with CNS depressants include disturbed vision, dizziness, headache, loss of appetite, vomiting, drowsiness, fatigue, and numbness of the extremities. High enough concentrations can produce cardiac arrhythmias, visual disturbances, narcosis, chemical pneumonitis, and pulmonary edema. Chronic overexposure can lead to damage to the gastrointestinal tract, liver damage, kidney damage, lung damage, and destruction of red blood cells with bone marrow depression. 1,2-Dichloroethane is also suspected by some of the advising agencies of causing cancer in a number of target organs in laboratory animals.

Skin contact with 1,2-dichloroethane can cause moderate irritation. As with other organic solvents, it can cause defatting and drying of the skin. This can lead to dermatitis and further irritation. 1,2-Dichloroethane can also be absorbed through intact skin in significant amounts. Drying and cracking of the skin lead to further systemic uptake. 1,2-Dichloroethane that enters the body through the skin can then cause systemic effects similar to those seen from inhalation.

First Aid Procedures:

Inhalation - Remove person to fresh air. If breathing is difficult, seek immediate medical attention.

Skin Contact - Flush skin with large amounts of water. If irritation persists, call a physician.

Eye Contact - Irrigate with water for 15 minutes. Seek immediate medical attention.

Ingestion - Seek prompt medical attention. Induce vomiting only at the instruction of a physician.

**OSHA: PEL = 50 ppm, 100 ppm ceiling, 200 ppm maximum peak**
**ACGIH: TLV = 10 ppm**
**Other: NTP anticipated human carcinogen, IARC possible human carcinogen**

1,1-Dichloroethylene

1,1-Dichloroethylene, also known as vinylidene chloride, is a respiratory tract irritant and CNS depressant. Symptoms that are typically seen with CNS depressants include disturbed vision, dizziness, headache, loss of appetite, vomiting, drowsiness, fatigue, and numbness of the extremities. High enough concentrations can produce decreasing respiration rate, a marked decrease in blood pressure, muscle relaxation, an absence of eye reflexes, or narcosis. Chronic overexposure can lead to liver and/or kidney damage.

Prolonged or repeated skin contact with 1,1-dichloroethylene can cause moderate irritation, and, as with other organic solvents, can cause defatting and drying of the skin. This can lead to dermatitis and subsequent irritation. 1,1-Dichloroethylene is not absorbed through intact skin in significant amounts; however, cracking of the skin can result and lead to increased systemic uptake. 1,1-Dichloroethylene that enters the body through the skin can then cause systemic effects similar to those seen from inhalation or ingestion.

First Aid Procedures:

Inhalation - Remove person to fresh air. If breathing is difficult, seek immediate medical attention.
Skin Contact - Flush skin with large amounts of water. If irritation persists, call a physician.
Eye Contact - Irrigate with water for 15 minutes. If irritation persists, call a physician.
Ingestion - Do not induce vomiting. Drink 2 glasses of water. Call a physician.

**OSHA: No PEL established for compound**
**ACGIH: TLV = 5 ppm, STEL = 20 ppm**

1,2-Dichloroethylene (cis and Trans Isomers)

1,2-Dichloroethylene is a respiratory tract irritant and CNS depressant. Symptoms that are typically seen with CNS depressants include disturbed vision, dizziness, headache, loss of appetite, vomiting, drowsiness, fatigue, and numbness of the extremities. High enough concentrations can produce decreasing respiration rate, a marked decrease in blood pressure, muscle relaxation, an absence of eye reflexes, or narcosis. Chronic overexposure may lead to liver and/or kidney damage, but this is not believed to be a common occurrence.

Prolonged or repeated skin contact with 1,2-dichloroethylene can cause moderate irritation, and, as with other organic solvents, can cause defatting and drying of the skin. This can lead to dermatitis and subsequent irritation. 1,2-Dichloroethylene is not absorbed through intact skin in significant amounts; however, cracking of the skin can result and lead to increased systemic uptake. 1,2-Dichloroethylene that enters the body through the skin can then cause systemic effects similar to those seen from inhalation or ingestion.

First Aid Procedures:

Inhalation - Remove person to fresh air. If breathing is difficult, seek immediate medical attention.
Skin Contact - Flush skin with large amounts of water. If irritation persists, call a physician.
Eye Contact - Irrigate with water for 15 minutes. If irritation persists, call a physician.
Ingestion - Do not induce vomiting. Drink two glasses of water. Call a physician.

**OSHA: PEL = 200 ppm**
**ACGIH: TLV = 200 ppm**

Dicyclopentadiene

Dicyclopentadiene, also known as DCPD, is a respiratory tract irritant and a skin irritant. High enough concentrations can cause loss of coordination. Chronic overexposure can lead to kidney damage and lung damage. Skin contact with DCPD can cause mild irritation.

First Aid Procedures:

Inhalation - Remove person to fresh air. Seek immediate medical attention.

Skin Contact - Flush skin with large amounts of water. Seek immediate medical attention.

Eye Contact - Irrigate with water for 15 minutes. Seek immediate medical attention.

Ingestion - Seek prompt medical attention. Induce vomiting only at the instruction of a physician.

**OSHA: PEL = none established**
**ACGIH: TLV = 5 ppm**

Ethylbenzene

Exposure to moderate to high levels of ethylbenzene causes CNS depression. Typical signs of ethylbenzene intoxication include drowsiness, dizziness, headache, vertigo, anorexia, visual disturbances, and delirium and may proceed to loss of consciousness. Moderate exposures can also cause eye and respiratory irritation. High levels of exposure can cause dyspnea and inebriation with euphoria and can rapidly lead to a deep anesthesia. Chronic overexposure can result in liver or kidney damage, and possible blood disorders.

Skin contact can cause moderate irritation, and, as with other organic solvents, can cause defatting and drying of the skin. This can lead to dermatitis and subsequent irritation. Ethylbenzene is not absorbed through the intact skin in significant amounts; however, cracking of the skin can result and lead to increased systemic uptake. Ethylbenzene that enters the body through the skin can then cause systemic effects similar to those seen from inhalation or ingestion.

First Aid Procedures:

Inhalation - Remove person to fresh air. If breathing is difficult, seek immediate medical attention.

Skin Contact - Flush skin with large amounts of water. If irritation persists, call a physician.

Eye Contact - Irrigate with water for 15 minutes. If irritation persists, call a physician.

Ingestion - Do not induce vomiting. Drink two glasses of water. Call a physician immediately.

**OSHA: PEL = 100 ppm**
**ACGIH: TLV = 100 ppm, STEL = 125 ppm**

Formamide

Formamide is an upper respiratory tract and skin irritant. Chronic overexposure can lead to adverse effects on the liver and kidneys. It has also been associated with embryo toxicity and fetotoxicity by the oral, topical and inhalation routes of exposure.

Skin contact with formamide can cause mild irritation. As with other organic solvents, it can cause defatting and drying of the skin. This can lead to dermatitis and further irritation. Formamide can also be absorbed through intact skin in significant amounts. Drying and cracking of the skin can lead to further systemic uptake.. Formamide that enters the body through the skin can then cause systemic effects similar to those seen from inhalation.

First Aid Procedures:

Inhalation - Remove person to fresh air. If breathing is difficult, seek immediate medical attention.

Skin Contact - Flush skin with large amounts of water. If irritation persists, call a physician.

Eye Contact - Irrigate with water for 15 minutes. If irritation persists, call a physician.

Ingestion - Do not induce vomiting. Drink two glasses of water. Call a physician immediately.

**OSHA: PEL = none established**
**ACGIH: TLV = 10 ppm, "skin" notation**

Hexachlorobenzene

Hexachlorobenzene is toxic to humans upon acute exposure with health effects characteristic of porphyria (porphyrin in the blood). Symptoms include excessive excretion of porphyrins, abdominal pain and neurological disturbances. An acute attack may be precipitated by excessive use of alcohol or barbiturates. No serious illnesses or changes of liver function were reported in manufacturing plant workers exposed to vapors of hexachlorobenzene over a 40-year period.

First Aid Procedures:

Inhalation - Remove person to fresh air. Seek immediate medical attention.

Skin Contact - Flush skin with large amounts of water. Seek immediate medical attention.

Eye Contact - Irrigate with water for 15 minutes. Seek immediate medical attention.

Ingestion - Seek prompt medical attention. Induce vomiting only at the instruction of a physician.

**OSHA: PEL = none established**
**ACGIH: TLV = none established**
**Other: NTP anticipated human carcinogen, IARC possible human carcinogen**

Hexachlorobutadiene

Hexachlorobutadiene, also known as HCBD, is a respiratory tract irritant. Chronic overexposure can lead to kidney and liver damage. Hexachlorobutadiene is also listed as a suspected human carcinogen causing kidney tumors in laboratory animal studies.

First Aid Procedures:

- Inhalation - Remove person to fresh air. Seek immediate medical attention.
- Skin Contact - Flush skin with large amounts of water. Seek immediate medical attention.
- Eye Contact - Irrigate with water for 15 minutes. Seek immediate medical attention.
- Ingestion - Seek prompt medical attention. Induce vomiting only at the instruction of a physician.

**OSHA: PEL = none established**
**ACGIH: TLV = 0.02 ppm, "skin" notation, suspected human carcinogen.**

Hexachlorocyclopentadiene

Hexachlorocyclopentadiene is a lacrimator and severe respiratory irritant. High enough concentrations can produce severe pulmonary edema. Chronic overexposure can lead to changes in the brain, heart, liver, adrenal glands and kidneys.

Skin contact with hexachlorocyclopentadiene can cause severe irritation. It has also been reported that hexachlorocyclopentadiene can be absorbed through intact skin.

First Aid Procedures:

Inhalation - Remove person to fresh air. Seek immediate medical attention.

Skin Contact - Flush skin with large amounts of water. Seek immediate medical attention.

Eye Contact - Irrigate with water for 15 minutes. Seek immediate medical attention.

Ingestion - Induce vomiting immediately as directed by medical personnel. Seek immediate medical attention.

**OSHA: PEL = none established**
**ACGIH: TLV = 0.01 ppm**

Petroleum Distillates - Low Boiling Fraction

This class of compounds are complex hydrocarbon mixtures which can be obtained from the petroleum light distillate or low boiling fraction of crude oil. They include gasolines, petroleum ether, rubber solvent, VM & P naphtha, petroleum spirits, Stoddard solvent, 140_ flash naptha, aromatic petroleum napthas, thinners and naphthenic aromatic solvents. They are generally flammable, and present inhalation and skin contact hazards upon exposure.

Acute effects include CNS depression and mucous membrane irritation. Typical symptoms include headaches, blurred vision, dizziness and nausea. Reported responses to selected concentrations of gasoline vapor are: 160-270 ppm causes eye and throat irritation in several hours; 500-900 ppm causes eye, nose and throat irritation, and dizziness in 1 hour; and 2000 ppm produces mild anesthesia in 30 minutes. There are reports of toxic neuritis (nerve inflammation) after exposures to gasoline. Chronic exposure to Stoddard solvent has been associated with kidney damage in laboratory animals. Minimal evidence of serious health effects has been reported in industrial and domestic workers exposed to Stoddard solvent, other than its defatting and irritating effects on the skin. VM & P naphtha is reported to be a mild eye and nose irritant.

First Aid Procedures:

Inhalation - Remove person to fresh air. If breathing is difficult, seek immediate medical attention.

Skin Contact - Flush skin with large amounts of water. If irritation persists, call a physician.

Eye Contact - Irrigate with water for 15 minutes. If irritation persists, call a physician.

Ingestion - Do not induce vomiting. Drink two glasses of water. Call a physician immediately.

| | **OSHA** | **ACGIH** |
|---|---|---|
| **Gasoline** | **NE** | **TLV = 300 ppm, STEL 500 ppm** |
| **Rubber Solvent** | **NE** | **TLV = 400 ppm** |
| **VM & P Naphtha** | **NE** | **TLV = 300 ppm** |
| **Stoddard Solvent** | **PEL = 500 ppm** | **TLV = 100 ppm** |

Petroleum Hydrocarbons - Lubricating Stock Distillates

This class of compounds includes paraffins, lubricating motor and aviation oils, hydraulic fluids, and cutting oils. The petroleum waxes are physiologically inert, although wax fumes are mild eye, nose and throat irritants. Lubricating oils present minimal oral and dermal toxicities with the oral LD50 in rodents above 10 g/kg and dermal LD50 greater than 15 g/kg. Inhalation of lubricating oils is not a problem, unless misting occurs. Frequent and prolonged direct skin contact may produce skin irritation and dermatitis, probably due to the presence of certain additives.

Cutting oils, including the water-insoluble, water-soluble and synthetic fluids are generally of low-order toxicity. Additives found in cutting oils have caused common dermal problems, such as contact dermatitis. Approximately one percent of the population may be affected.

First Aid Procedures:

Inhalation - Remove person to fresh air. If breathing is difficult, seek immediate medical attention.

Skin Contact - Flush skin with large amounts of water. If irritation persists, call a physician.

Eye Contact - Irrigate with water for 15 minutes. If irritation persists, call a physician.

Ingestion - Do not induce vomiting. Drink two glasses of water. Call a physician immediately.

**OSHA: PEL = 5 mg/m$^3$ (as oil mist)**
**ACGIH: TLV = 5 mg/m$^3$ (as oil mist)**

Phenol

The health effects from phenol exposure are characterized by potential acute illness. It is readily absorbed through the skin which represents the primary route of entry. Fatalities have occurred in workers after gross skin contact. Phenol is also toxic upon ingestion. An oral dose of 1 gram may be fatal to man. Ingestion causes intense burning of the mouth and throat followed by abdominal pain.

Chronic phenol poisoning is characterized by digestive disturbances, nervous disorders, and possible skin eruptions. Extensive damage to the liver and kidneys follows and is usually fatal.

First Aid Procedures:

Inhalation - Remove person to fresh air. If breathing is difficult, seek immediate medical attention.

Skin Contact - Flush skin with large amounts of water for at least 15 minutes. Seek immediate medical attention.

Eye Contact - Irrigate with water for 15 minutes. Seek immediate medical attention.

Ingestion - Induce vomiting immediately as directed by medical personnel. Seek immediate medical attention.

**OSHA: PEL = 5 ppm, "skin" notation**
**ACGIH: TLV = 5 ppm, "skin" notation**

Phthalates

This class of chemicals generally occur in liquid form with high boiling ranges and very low vapor pressures. The later characteristic contributes to its high stability. The phthalates do not present a dermal hazard, are not absorbed through the skin, and are not appreciable toxic by inhalation. Eye irritation may occur in certain phthalates (dimethyl phthalate) upon contact. Accidental ingestion has caused nausea, vomiting, dizziness and headaches.

First Aid Procedures:

Inhalation - Remove person to fresh air. If breathing is difficult, seek immediate medical attention.

Skin Contact - Flush skin with large amounts of water. If irritation persists, call a physician.

Eye Contact - Irrigate with water for 15 minutes. Seek immediate medical attention.

Ingestion - Seek prompt medical attention. Induce vomiting only at the instruction of a physician.

| | OSHA | ACGIH | Other |
|---|---|---|---|
| **Di-sec Octyl Phthalate (Di-2-ethylhexyl phthalate)** | **PEL = 5mg/m$^3$** | **TLV = 5 mg/m$^3$ STEL = 10mg/m$^3$** | **NTP anticipated human carcinogen, IARC possible human carcinogen** |
| **Dibutyl Phthalate** | **PEL = 5 mg/m$^3$** | **TLV = 5 mg/m$^3$** | |
| **Diethyl Phthalate** | **NE** | **TLV = 5 mg/m$^3$** | |
| **Dimethyl Phthalate** | **PEL = 5 mg/m$^3$** | **TLV = 5 mg/m$^3$** | |

Polyarylhydrocarbons (PAH's)

Acenaphthene, Acenaphthylene, Anthracene, Benzo(a)Anthracene, Benzo(a)Pyrene, Benzo(b)Fluoranthene, Benzo(g,h,i)Perylene, Benzo(k)Fluoranthene, Chrysene, Dibenz(a,h)Anthracene, Fluoranthene, Fluorene, Indeno(1,2,3-cd)Pyrene, Naphthalene, Phenanthrene, Pyrene, and derivatives.

The PAH's are characterized by their polycyclic ring structures and varying molecular weights. Low molecular weight PAH's (anthracene, fluorene, naphthalene, phenanthrene) are generally considered to present less of a health risk than those of greater molecular weight (benz(a)anthracene, chrysene, benzo(a)pyrene, benzo(e)pyrene). Many of these higher molecular weight compounds and their derivatives are known to be carcinogenic.

Human exposures usually involve complex mixtures, rather than a single PAH compound. Typical exposures occur as polluted air due to cigarette smoke, vehicle exhaust, and domestic energy emissions.

A majority of PAH studies have involved benzo(a)pyrene (BAP) due to its wide distribution and high biological activity. Results have indicated BAP to be a positive animal and suspect human carcinogen. It has also been shown to be both teratogenic and mutagenic in laboratory animals.

First Aid Procedures:

Inhalation - Remove person to fresh air. If breathing is difficult, seek immediate medical attention.

Skin Contact - Flush skin with large amounts of water. If irritation persists, call a physician.

Eye Contact - Irrigate with water for 15 minutes. Seek immediate medical attention.

Ingestion - Seek prompt medical attention. Induce vomiting only at the instruction of a physician.

**No specific workplace standards have been established for PAH's. It is generally accepted to use the coal tar pitch volatiles-benzene soluble fraction standard of 0.2 mg/m3 when evaluating air samples. It is reported that approximately 10% of coal tar pitch volatiles consist of polycyclic hydrocarbons. The ACGIH recognizes coal tar pitch volatiles as a confirmed human carcinogen (A1 designation).**

Sodium Hydroxide

Sodium hydroxide is a caustic solid which causes burns and ulceration to eyes and skin upon contact. Inhalation of excessive amounts of sodium hydroxide may cause irritation, chemical pneumonitis, pulmonary edema, and lung damage. Symptoms can include difficulty breathing, coughing, tightness of chest, and coughing up blood. Ingestion may cause damage to gastrointestinal, esophageal, and oral tissues.

First Aid Procedures:

Inhalation - Remove person to fresh air. If breathing is difficult, seek immediate medical attention.

Skin Contact - Immediately flush skin with large amounts of water while removing contaminated clothing. Seek immediate medical attention.

Eye Contact - Immediately irrigate eyes with large amounts of water. Seek immediate medical attention.

Ingestion - Seek prompt medical attention. Do not induce vomiting. Drink two glasses of water.

OSHA: PEL = 2 $mg/m^3$
ACGIH: TLV = 2 $mg/m^3$

## Sulfuric Acid

Sulfuric acid is a corrosion liquid causing burns and destruction to the eyes and skin upon contact. Inhalation of low to moderate concentrations of sulfuric acid mist can cause irritation, chemical pneumonitis, pulmonary edema, and lung damage. Symptoms of overexposure include tightness of the chest, congestion, difficulty breathing, fluid in lungs, and coughing up blood. Ingestion of sulfuric acid can cause damage to gastrointestinal, esophageal, and oral tissues.

First Aid Procedures:

Inhalation - Remove person to fresh air. If breathing is difficult, seek immediate medical attention.

Skin Contact - Immediately flush skin with large amounts of water while removing contaminated clothing. Seek immediate medical attention.

Eye Contact - Immediately irrigate eyes with large amounts of water. Seek immediate medical attention.

Ingestion - Seek prompt medical attention. Do not induce vomiting. Drink two glasses of water.

**OSHA: PEL = 1 mg/m$^3$**
**ACGIH: TLV = 1 mg/m$^3$**

1,1,1-Trichloroethane

Methyl chloroform (1,1,1-trichloroethane), like may of the chlorinated hydrocarbon solvents, is a CNS depressant. At high levels of exposure it is reported to cause sensitization of the heart to epinephrine. The vapors are irritating to the eye and respiratory tract at high levels. A number of studies have been performed looking for organ damage or other long term effects, but to date none have been documented.

Skin contact does not cause significant irritation, but, as with other organic solvents, can cause defatting and drying of the skin. This can lead to dermatitis and subsequent irritation. Cracking of the skin can result and lead to systemic uptake. Methyl chloroform that enters the body in this way can then cause systemic effects, such as CNS depression, similar to those seen from inhalation or ingestion.

First Aid Procedures:

Inhalation - Remove person to fresh air. If breathing is difficult, seek immediate medical attention.
Skin Contact - Flush skin with large amounts of water. If irritation persists, call a physician.
Eye Contact - Irrigate with water for 15 minutes. If irritation persists, call a physician.
Ingestion - Do not induce vomiting. Drink 2 glasses of water. Call a physician.

**OSHA: PEL = 350 ppm**
**ACGIH: TLV = 350 ppm, STEL = 450 ppm**

Trichloroethylene

Trichloroethylene is a respiratory tract irritant and CNS depressant. Symptoms that are typically seen with CNS depressants include disturbed vision, dizziness, headache, loss of appetite, vomiting, drowsiness, fatigue, and numbness of the extremities. High enough concentrations can produce cardiac arrhythmias, visual disturbances, or narcosis. Chronic overexposure can lead to peripheral neuropathy, damage to the lungs, liver, and/or kidneys, low blood pressure, and possibly blood disorders.

Prolonged or repeated skin contact with trichloroethylene can cause moderate irritation, and, as with other organic solvents, can cause defatting and drying of the skin. This can lead to dermatitis and subsequent irritation. Trichloroethylene is not absorbed through intact skin in significant amounts; however, cracking of the skin can result and lead to increased systemic uptake. Trichloroethylene that enters the body through the skin can then cause systemic effects similar to those seen from inhalation or ingestion.

First Aid Procedures:

Inhalation - Remove person to fresh air. If breathing is difficult, seek immediate medical attention.
Skin Contact - Flush skin with large amounts of water. If irritation persists, call a physician.
Eye Contact - Irrigate with water for 15 minutes. If irritation persists, call a physician.
Ingestion - Do not induce vomiting. Drink 2 glasses of water. Call a physician.

**OSHA: PEL = 100 ppm, 200 ppm ceiling, 300 ppm maximum peak**
**ACGIH: TLV = 50 ppm, STEL = 100 ppm, not suspected as a human carcinogen (A5)**

Tetrachloroethylene

Tetrachloroethylene, also known as perchloroethylene, or "perc," is a respiratory tract irritant and CNS depressant. Symptoms that are typically seen with CNS depressants include disturbed vision, dizziness, headache, loss of appetite, vomiting, drowsiness, fatigue, and numbness of the extremities. High enough concentrations can produce narcosis, cardiac arrhythmias, visual disturbances, chemical pneumonitis, and pulmonary edema. Chronic overexposure to tetrachloroethylene can cause damage to the liver, kidney, and lungs. In addition, some authorities list tetrachloroethylene as a suspect cancer causing agent. This has not yet been confirmed, however, and is not universally accepted as true.

Skin contact with tetrachloroethylene can cause moderate irritation. As with other organic solvents, it can cause defatting and drying of the skin. This can lead to dermatitis and further irritation. Tetrachloroethylene is not absorbed through intact skin in significant amounts; however, drying and cracking of the skin can result and lead to further systemic uptake. Tetrachloroethylene that enters the body through the skin can then cause systemic effects similar to those seen from inhalation.

First Aid Procedures:

Inhalation - Remove person to fresh air. If breathing is difficult, seek immediate medical attention.

Skin Contact - Flush skin with large amounts of water. If irritation persists, call a physician.

Eye Contact - Irrigate with water for 15 minutes. If irritation persists, call a physician.

Ingestion - Seek prompt medical attention. Induce vomiting only at the instruction of a physician.

**OSHA: PEL = 100 ppm, 200 ppm ceiling, 300 ppm maximum peak**
**ACGIH: TLV = 25 ppm, STEL = 100 ppm, animal carcinogen (A3)**
**Other: IARC possible human carcinogen**

Toluene

Exposure to moderate to high levels of toluene causes CNS depression. Typical signs of toluene intoxication include drowsiness, dizziness, headache, vertigo, anorexia, visual disturbances, and delirium and may proceed to loss of consciousness. Moderate exposures can also cause eye and respiratory irritation. High levels of exposure can cause dyspnea and inebriation with euphoria and can rapidly lead to a deep anesthesia. Without treatment, respiratory arrest rapidly ensues, often with muscular twitching and convulsions. Extremely high levels of toluene can also cause cardiac sensitization and arrhythmia.

Skin contact can cause moderate irritation, and, as with other organic solvents, can cause defatting and drying of the skin. This can lead to dermatitis and subsequent irritation. Toluene is not absorbed through the intact skin in significant amounts; however, cracking of the skin can result and lead to increased systemic uptake. Toluene that enters the body through the skin can then cause systemic effects similar to those seen from inhalation or ingestion.

First Aid Procedures:

Inhalation - Remove person to fresh air. If breathing is difficult, seek immediate medical attention.

Skin Contact - Flush skin with large amounts of water. If irritation persists, call a physician.

Eye Contact - Irrigate with water for 15 minutes. If irritation persists, call a physician.

Ingestion - Do not induce vomiting. Drink two glasses of water. Call a physician immediately.

**OSHA: PEL = 200 ppm, 300 ppm ceiling, 500 ppm maximum peak**
**ACGIH: TLV = 50 ppm, "skin" notation**

Vinyl Chloride

Vinyl chloride is a respiratory irritant that causes CNS and respiratory depression. It can cause cardiac sensitization with subsequent ventricular fibrillation. Pulmonary abnormalities have included dyspnea (shortness of breath), asthma, pneumoconiosis (fibrotic lung disease), and pulmonary edema. It is also believed to cause respiratory sensitization.

Chronic exposures have been associated with damage to the heart, lungs, liver, kidneys, gastrointestinal tract, reproductive system, and blood and blood-forming organs. A peculiarity of vinyl chloride monomer is the degenerative damage it causes to bones and connective tissues.

Vinyl chloride is listed by the ACGIH as a "confirmed human carcinogen." It has been associated with cancers of the liver, lungs, brain, and lymphatic system.

Skin contact with vinyl chloride can cause severe irritation and contact sensitization. As with other organic solvents, it can cause defatting and drying of the skin. This can lead to dermatitis and further irritation. Vinyl chloride is not absorbed through intact skin in significant amounts; however, drying and cracking of the skin can result and lead to further systemic uptake. Vinyl chloride that enters the body through the skin can then cause systemic effects similar to those seen from inhalation.

First Aid Procedures:

Inhalation - Remove person to fresh air. If breathing is difficult, seek immediate medical attention.
Skin Contact - Flush skin with large amounts of water. If irritation persists, call a physician.
Eye Contact - Irrigate with water for 15 minutes. Call physician immediately.
Ingestion - No anticipated first aid required.

**OSHA: PEL = 1 ppm, STEL = 5 ppm, cancer suspect agent**
**ACGIH: TLV = 5 ppm, confirmed human carcinogen (A1)**
**Other: NTP, IARC human carcinogen**

Xylene

Inhalation of xylene in high concentrations can cause a flushing or reddening of the face, a feeling of increased body heat, and CNS excitation followed by depression, confusion, and coma. Other symptoms of overexposure include disturbed vision, dizziness, headache, tremors, salivation, cardiac stress, impaired memory, flatulence, loss of appetite, extreme fatigue, and respiratory distress. Inhalation of extremely high concentrations has caused sudden deaths, believed to be due to cardiac sensitization to epinephrine and resultant ventricular fibrillation and respiratory arrest.

Other potential health effects of acute high concentration exposures have included severe respiratory irritation, lung congestion, pulmonary edema, g.i. tract disturbances, and liver, kidney, and nervous system damage.

Xylene can be absorbed through the skin in significant amounts. Skin contact does not cause significant irritation, but, as with other organic solvents, can cause defatting and drying of the skin. This can lead to dermatitis and subsequent irritation. Cracking of the skin can result and lead to increased systemic uptake. Xylene that enters the body through the skin can then cause systemic effects similar to those seen from inhalation or ingestion.

First Aid Procedures:

Inhalation - Remove person to fresh air. If breathing is difficult, seek immediate medical attention.
Skin Contact - Flush skin with large amounts of water. If irritation persists, call a physician.
Eye Contact - Irrigate with water for 15 minutes. If irritation persists, call a physician.
Ingestion - Seek prompt medical attention. Induce vomiting only at the instruction of a physician.

**OSHA: PEL = 100 ppm**
**ACGIH: TLV = 100 ppm, STEL = 150 ppm**

METALS

## Chromium

The toxicity of chromium is dependent on the valence state of the compound. Exposure to hexavalent chromium causes dermatitis, skin ulcers, perforation of the nasal septum and inflammation of the larynx and liver. The dermatitis is a sensitization reaction. Ulcers and nasal septum perforation are due to chromate ion and chromic acid. Bronchogenic tumors have been reported in individuals exposed to chromates.

First Aid Procedures:

Inhalation - Remove person to fresh air. If breathing is difficult, seek immediate medical attention.

Skin Contact - Wash skin with soap and large amounts of water. Remove contaminated clothing. If irritation persists, call a physician.

Eye Contact - Irrigate with water for 15 minutes. If irritation persists, call a physician.

Ingestion - Do not induce vomiting. Drink two glasses of water. Call a physician.

| | OSHA | ACGIH | Other |
|---|---|---|---|
| Chromium | 1 $mg/m^3$ | 0.5 $mg/m^3$ | |
| Chromium (II) Compounds | 0.5 $mg/m^3$ | 0.5 $mg/m^3$ | |
| Chromium (III) Compounds | 0.5 $mg/m^3$ | 0.5 $mg/m^3$ | |
| Chromium (VI) Compounds | 1 mg/10 $m^3$ ceiling | 0.5 $mg/m^3$, confirmed human carcinogen (A1) - certain water insoluble compounds | NTP human carcinogen |

Copper

Copper is absorbed by ingestion and inhalation. Symptoms of acute poisoning include salivation, nausea, vomiting, gastric pain, and "metal fume fever" characterized by dryness and irritation of the throat, coughing, a feeling of general malaise and fatique, chills, and pains in the muscles and joints.

Chronic over exposure to copper can lead to nasal ulcerations and bleeding, and blood disorders. Skin contact may cause an allergic skin reaction in sensitive individuals.

First Aid Procedures:

Inhalation - Remove person to fresh air. If breathing is difficult, seek immediate medical attention.

Skin Contact - Flush skin with large amounts of water. If irritation persists, call a physician.

Eye Contact - Irrigate with water for 15 minutes. If irritation persists, call a physician.

Ingestion - Seek prompt medical attention. Induce vomiting only at the instruction of a physician.

**OSHA: PEL = 0.1 mg/m$^3$ fume, 1.0 mg/m$^3$ as dust/mist**
**ACGIH: TLV = 1 mg/m$^3$**

## Lead

Lead is absorbed into the body by inhalation and ingestion. Generally, it is not absorbed through the skin. Once absorbed into the blood stream, lead is distributed to various organs and body tissues throughout the body. A certain amount will be excreted out of the body.

Lead is a potent, systemic poison which serves no known bodily function. In large enough doses, it is fatal within a matter of days. Acute lead poisoning is characterized by encephalopathy which can develop to seizures, coma and death. Chronic poisoning from lower doses may take a similar path, although an extended period of time is required to develop the effects.

Chronic overexposures may damage blood-forming, nervous, urinary, and reproductive systems. Common symptoms include loss of appetite, metallic taste in the mouth, anxiety, constipation, nausea, pallor, excessive fatigue, weakness, insomnia, headache, nervous irritability, muscle and joint pain, fine tremors, numbness, dizziness, hyperactivity and colic. Kidney disease may also develop upon excessive lead exposure, with few symptoms prior to permanent damage.

First Aid Procedures:

Inhalation - Remove person to fresh air. If breathing is difficult, seek immediate medical attention.

Skin Contact - Flush skin with large amounts of water. If irritation persists, call a physician.

Eye Contact - Irrigate with water for 15 minutes. If irritation persists, call a physician.

Ingestion - Seek prompt medical attention. Induce vomiting only at the instruction of a physician.

**OSHA: PEL = 0.05 mg/m$^3$. Action Level = 0.03 mg/m$^3$.**
**ACGIH: TLV = 0.15 mg/m$^3$**
**Other: IARC possible human carcinogen (Group 2B). NTP anticipated human carcinogen.**

## Nickel

Dermatitis, also called "nickel itch", is the most frequent health effect due to nickel. It occurs from direct contact with metals containing nickel. Inhalation of nickel dust or fume can cause irritation of the respiratory tract, pulmonary edema, and allergic respiratory reaction. Symptoms of acute exposure include difficulty breathing, coughing, tightness of the chest and fluid in the lungs. Repeated or prolonged over exposure can lead to damage of the nasal cavity, pneumoconiosis, fibrosis, and immune system impairment. Nickel has also been shown to cause tumors in animal studies.

First Aid Procedures:

Inhalation - Remove person to fresh air. If breathing is difficult, seek immediate medical attention.

Skin Contact - Wash skin with soap and large amounts of water. Remove contaminated clothing. If irritation persists, call a physician.

Eye Contact - Irrigate with water for 15 minutes. If irritation persists, call a physician.

Ingestion - Seek prompt medical attention. Induce vomiting only at the instruction of a physician.

**OSHA: PEL = 1.0 mg/$m^3$**
**ACGIH: TLV = 1.0 mg/$m^3$**
**Other: NTP anticipated human carcinogen. IARC human carcinogen (Group 1)**

## OTHER HAZARDOUS MATERIALS

### Asbestos

Asbestos is a generic term that applies to a group of naturally occurring, hydrated minerals that are separable into fibers.

Chronic exposure to asbestos fibers has been shown to cause cancer of the lungs and mesothelioma, or thickening of the lining of the lungs. Inhalation of asbestos fibers can cause respiratory irritation. Symptoms include coughing, tightness of the chest, and difficulty breathing. Chronic effects however, may not manifest themselves for up to 30 years after exposure.

First Aid Procedures:

- Inhalation - Remove person to fresh air. If breathing is difficult, seek immediate medical attention.
- Skin Contact - Wash skin with soap and large amounts of water. If irritation persists, call a physician.
- Eye Contact - Irrigate with water for 15 minutes. If irritation persists, call a physician.
- Ingestion - No need for first aid is anticipated.

**OSHA: PEL = 0.2 fibers/cc. Confirmed cancer and lung disease hazard.**
**ACGIH: TLV = 0.2 fibers/cc. Confirmed human carcinogen.**
**Other: NTP human carcinogen.**

Brine

Brine is a sodium chloride and water solution, usually containing other salts also. Most natural brines are found in subterranean wells, desert lakes, and the ocean. Sodium chloride concentrations generally range from 3 to 20%.

Contact with the eyes or skin may cause mild to moderate irritation. Inhalation may cause irritation of the respiratory system. Ingestion of brine may cause irritation of gastrointestinal tissues and high blood pressure, which is characterized by dizziness, red skin coloration, and unconsciousness.

First Aid Procedures:

Inhalation - Remove person to fresh air. If breathing is difficult, seek immediate medical attention.

Skin Contact - Flush skin with large amounts of water. If irritation persists, call a physician.

Eye Contact - Irrigate with water for 15 minutes. If irritation persists, call a physician.

Ingestion - Seek prompt medical attention. Induce vomiting only at the instruction of a physician.

**OSHA: PEL = none established.**
**ACGIH: TLV = none established.**

Hydrochloric Acid

Hydrochloric acid (HCL), also known as muriatic acid, is a corrosive liquid causing burns to the eyes and skin upon contact. Inhalation of high levels of concentrated HCL can cause irritation, pulmonary edema and lung damage with symptoms of tightness in the chest, difficulty breathing, and fluid in the lungs. Chronic overexposure may cause anemia, liver effects, or emphysema. Ingestion of HCL can cause corrosion and damage to gastro-intestinal tissues.

First Aid Procedures:

Inhalation - Remove person to fresh air. If breathing is difficult, seek immediate medical attention.

Skin Contact - Immediately flush skin with large amounts of water while removing contaminated clothing. Seek immediate medical attention.

Eye Contact - Immediately irrigate eyes with large amounts of water. Seek immediate medical attention.

Ingestion - Seek prompt medical attention. Do not induce vomiting. Drink two glasses of water.

**OSHA: PEL = 5 ppm (7 mg/m$^3$) as a ceiling limit**
**ACGIH: TLV = 1 mg/m$^3$**

Isopropyl Benzene

Isopropyl Benzene, also known as cumene, is very irritating to the respiratory tract. Symptoms include coughing, congestion, irritation of throat, tightness of chest, wheezing and difficulty breathing. It is also a CNS depressant with symptoms including dizziness, drowsiness, muscular weakness, incoordination, fatigue, blurred vision, emotional changes, psychosis, trouble speaking, headache, giddiness, heart rhythm disturbances, tremors and convulsions. Isopropyl benzene is both an eye and skin irritant with symptoms including redness, swelling, pain and tearing of the eye; and redness, swelling, itching and dryness of the skin.. It is also absorbed through the skin.

Chronic exposures may produce liver and kidney damage. Symptoms may include reduced urine volume, loss of appetite, weight gain, red urine, back pain, painful urination, lethargy, yellow skin, tenderness of abdomen, fever and death.

First Aid Procedures:

Inhalation - Remove person to fresh air. If breathing is difficult, seek immediate medical attention.

Skin Contact - Flush skin with large amounts of water. If irritation persists, call a physician.

Eye Contact - Irrigate with water for 15 minutes. If irritation persists, call a physician.

Ingestion - Induce vomiting IMMEDIATELY as directed by medical personnel. Seek immediate medical attention.

**OSHA: PEL = 50 PPM, "skin" notation**
**ACGIH: TLV = 50 ppm, "skin" notation**

Methylene Chloride

Exposure to moderate to high levels of methylene chloride, also called dichloromethane or methylene dichloride, causes CNS depression. Typical signs of methylene chloride intoxication include drowsiness, dizziness, headache, vertigo, visual disturbances, and delirium and may proceed to loss of consciousness. Moderate exposures can also cause severe eye irritation and respiratory irritation. High levels of exposure can cause dyspnea and inebriation with euphoria and can rapidly lead to a deep anesthesia. Without treatment, respiratory arrest rapidly ensues, often with muscular twitching and convulsions.

Skin contact can cause severe irritation or burns, and, as with other organic solvents, can cause defatting and drying of the skin. This can lead to dermatitis and subsequent irritation. Methylene chloride is not absorbed through the intact skin in significant amounts; however, cracking of the skin can result and lead to increased systemic uptake. Methylene chloride that enters the body through the skin can then cause systemic effects similar to those seen from inhalation or ingestion.

Chronic or long term effects from methylene chloride may include blood disorders and heart effects, along with liver and kidney damage. Methylene chloride has been listed as a potential cancer hazard by the NTP and IARC causing lung, liver, and mammary tumors by the inhalation route of exposure in laboratory animals.

First Aid Procedures:

Inhalation - Remove person to fresh air. If breathing is difficult, seek immediate medical attention.
Skin Contact - Flush skin with large amounts of water. If irritation persists, call a physician.
Eye Contact - Irrigate with water for 15 minutes. If irritation persists, call a physician.
Ingestion - Do not induce vomiting. Drink two glasses of water. Call a physician.

**OSHA: PEL = 500 ppm (25 ppm proposed), 1000 ppm ceiling, 2000 ppm maximum peak**
**ACGIH: TLV = 50 ppm, suspected human carcinogen (A2)**
**Other: IARC possible human carcinogen**

4-Methyl-2-Pentanone (Methyl Isobutyl Ketone)

MIBK is a clear liquid with a characteristic sweet, sharp odor. The odor threshold has been reported to be approximately 0.10 ppm. Exposure to high vapor concentrations irritate the eyes, nose and throat. Prolonged exposure may produce symptoms of weakness, headache, nausea, light headedness, vomiting, dizziness, and incoordination.

Repeated skin contact may produce dermatitis due to defatting properties. Eye contact may produce painful irritation. Chronic exposure may lead to kidney and/or liver damage.

First Aid Procedures:

Inhalation - Remove person to fresh air. If breathing is difficult, seek immediate medical attention.

Skin Contact - Flush skin with large amounts of water. If irritation persists, call a physician.

Eye Contact - Irrigate with water for 15 minutes. If irritation persists, call a physician.

Ingestion - Do not induce vomiting. Drink 2 glasses of water. Call a physician.

**OSHA: PEL = 100 ppm**
**ACGIH: TLV = 50 ppm, STEL = 75 ppm**

## Naphthalene

Naphthalene commonly occurs as white, crystalline flakes which has a strong coal tar odor. The flakes volatilize appreciable at room temperature. Inhalation may cause headache, loss of appetite and nausea. Optical neuritis, injuries to the cornea and liver damage have also been reported. Naphthalene vapors may also be irritating to the eyes.

First Aid Procedures:

- Inhalation - Remove person to fresh air. If breathing is difficult, seek immediate medical attention.
- Skin Contact - Flush skin with large amounts of water. If irritation persists, call a physician.
- Eye Contact - Irrigate with water for 15 minutes. If irritation persists, call a physician.
- Ingestion - Induce vomiting immediately as directed by medical personnel. Seek immediate medical attention.

**OSHA: PEL = 10 ppm**
**ACGIH: TLV = 10 ppm, STEL = 15 ppm**

PCB's

Exposure may result in acne, respiratory irritation, and liver injury. The characteristic chloracne condition has been reported in workers exposed at concentrations of 0.1 $mg/m^3$. Accidental ingestion studies have reported acne form eruptions, eye discharges, swelling of the upper eyelids, hyperpigmentation of the skin and nails, chloracne, and distinctive hair follicles in victims. Fever, hearing difficulties, muscle spasms, headache, vomiting and diarrhea were also reported. Studies have also suggested PCB's to be potential carcinogens.

First Aid Procedures:

Inhalation - Remove person to fresh air. If breathing is difficult, seek immediate medical attention.

Skin Contact - Flush skin with large amounts of water. If irritation persists, call a physician.

Eye Contact - Irrigate with water for 15 minutes. If irritation persists, call a physician.

Ingestion - Seek prompt medical attention. Induce vomiting only at the instruction of a physician.

**OSHA: PEL = 1 $mg/m^3$ (42% chlorine)/PEL = 0.5 $mg/m^3$ (54% chlorine), "skin" notation**

**ACGIH: TLV = 1 $mg/m^3$ (42% chlorine)/PEL = 0.5 $mg/m^3$ (54% chlorine), "skin" notation**

**Other: NTP anticipated human carcinogen**

Pentane

Pentane is a respiratory tract irritant and a CNS depressant. Symptoms that are typically seen with CNS depressants include disturbed vision, dizziness, headache, loss of appetite, vomiting, drowsiness, fatigue, and numbness of the extremities. High enough concentrations can produce visual disturbances and narcosis.

Skin contact with pentane can cause moderate irritation. As with other organic solvents, it can cause defatting and drying of the skin. This can lead to dermatitis and further irritation. Pentane is not absorbed through intact skin in significant amounts; however, drying and cracking of the skin can result and lead to further systemic uptake.

First Aid Procedures:

- Inhalation - Remove person to fresh air. If breathing is difficult, seek immediate medical attention.
- Skin Contact - Flush skin with large amounts of water. If irritation persists, call a physician.
- Eye Contact - Irrigate with large amounts of water. If irritation persists, call a physician.
- Ingestion - Seek prompt medical attention. Induce vomiting only at the instruction of a physician.

**OSHA: PEL = 1000 ppm**
**ACGIH: TLV = 600 ppm, STEL = 750 ppm**

# Appendix B2-7

## Environmental Indicator Forms

# DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

DEQ adapted to Word 8/07

**RCRA Corrective Action Environmental Indicator (EI) RCRAInfo Code (CA725)**
**Current Human Exposures Under Control**

**Facility Name:** **Gage Products Company**
**Facility Address:** **625 Wanda Avenue**
**Facility EPA ID #:** **MID 005-388-801**

1. Has **all** available relevant/significant information on known and reasonably suspected releases to soil, ground water, surface water/sediments, and air, subject to Resource Conservation Recovery Act of 1976 (RCRA) Corrective Action (e.g., waste management unit [WMU], regulated unit [RU], and area of concern [AOC]), been **considered** in this EI determination?

   ☒ If yes – check here and continue with #2 below.

   ☐ If no – reevaluate existing data, or

   ☐ If data are not available, skip to #6 and enter "IN" (more information needed) status code.

**BACKGROUND**

**Definition of Environmental Indicators (for the RCRA Corrective Action)**
EIs are measures being used by the RCRA Corrective Action Program to go beyond programmatic activity measures (reports received and approved, etc.) to track changes in the quality of the environment. The two EIs developed to date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated ground water. An EI for nonhuman (ecological) receptors is intended to be developed in the future.

**Definition of "Current Human Exposures Under Control" EI**
A positive "Current Human Exposures Under Control" EI determination ("YE" status code) indicates that there are no "unacceptable" human exposures to "contamination" (i.e., contaminants in concentrations in excess of appropriate risk-based levels) that can be reasonably expected under current land- and ground water-use conditions (for all "contamination" subject to RCRA Corrective Action at or from the identified facility [i.e., site-wide]).

**Relationship of EI to Final Remedies**
While final remedies remain the long-term objective of the RCRA Corrective Action Program the EIs are near-term objectives that are currently being used as program measures for the Government Performance and Results Act of 1993 (GPRA). The "Current Human Exposures Under Control" EIs are for reasonably expected human exposures under current land- and ground water-use conditions ONLY and do not consider potential future land- or ground water-use conditions or ecological receptors. The RCRA Corrective Action Program's overall mission to protect human health and the environment requires that final remedies address these issues (i.e., potential future human exposure scenarios, future land and ground water uses, and ecological receptors).

**Duration/Applicability of EI Determinations**
EI determinations status codes should remain in the RCRAInfo national database ONLY as long as they remain true (i.e., RCRAInfo status codes must be changed when the regulatory authorities become aware of contrary information).

2. Are ground water, soil, surface water, sediments, or air **media** known or reasonably suspected to be **"contaminated"1** above appropriately protective risk-based "levels" (applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action (from WMUs, RUs or AOCs)?

| | Yes | No | ? | Rationale/Key Contaminants |
|---|---|---|---|---|
| Ground water | ☒ | ☐ | ☐ | Ground water is not in an aquifer, however ground water concentrations exceed GCC |
| Air (indoors)2 | ☒ | ☐ | ☐ | Ground water and soil concentrations exceed GVIIC and SVIIC, respectively. |
| Surface Soil (e.g., <2ft) | ☒ | ☐ | ☐ | Surface soil concentrations exceed DCC. |
| Surface Water | ☐ | ☒ | ☐ | Surface water not present. |
| Sediment | ☐ | ☒ | ☐ | Sediment not present. |
| Subsurf. Soil (e.g., >2ft) | ☒ | ☐ | ☐ | Subsurface Soil concentrations exceed DCC. |
| Air (outdoors) | ☐ | ☒ | ☐ | Soil or ground water concentrations do not exceed VSIC. |

☐ If no (for all media) – skip to #6, and enter "YE", status code after providing or citing appropriate "levels" and referencing sufficient supporting documentation demonstrating that these "levels" are not exceeded.

☒ If yes (for any media) – continue after identifying key contaminants in each "contaminated" medium, citing appropriate "levels" (or provide an explanation for the determination that the medium could pose an unacceptable risk), and referencing supporting documentation.

☐ If unknown (for any media) – skip to #6 and enter "IN" status code.

Rationale and Reference(s):

The facilities assessment of known nature and extent of contaminations is discussed in Section O-B of this attachment. A summary of analytical results is presented in Table O-1 and Table O-2. Key contaminants (those exceeding applicable criteria) include VOCs as listed on Tables O-A and O-2A.

3. Are there **complete pathways** between "contamination" and human receptors such that exposures can be reasonably expected under the current (land- and ground water-use) conditions?

Summary Exposure Pathway Evaluation Table

1"Contamination" and "contaminated" describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriately protective risk-based "levels" (for the media, that identify risks within the acceptable risk range).

2Recent evidence (from the Colorado Department of Public Health and Environment, and others) suggests that unacceptable indoor air concentrations are more common in structures above ground water with volatile contaminants than previously believed. This is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration necessary to be reasonably certain that indoor air (in structures located above [and adjacent to] ground water with volatile contaminants) does not present unacceptable risks.

Potential **Human Receptors** (Under Current Conditions)

| **Contaminated Media** | **Residents** | **Workers** | **Day-Care** | **Construction** | **Trespassers** | **Recreation** | **Food3** |
|---|---|---|---|---|---|---|---|
| Ground water | **NO** | **NO** | **NO** | **NO** | | | **NO** |
| Air (indoors) | **NO** | **NO** | **NO** | | | | |
| Soil (surface, e.g., <2 ft) | **NO** | **NO** | **NO** | **NO** | **NO** | **NO** | **NO** |
| ~~Surface Water~~ | ____ | ____ | | | ____ | ____ | ____ |
| ~~Sediment~~ | ____ | ____ | | | ____ | ____ | ____ |
| Soil (subsurface e.g., >2 ft) | | | | **NO** | | | |
| Air (outdoors) | **NO** | **NO** | **NO** | **NO** | **NO** | | |

Instructions for Summary Exposure Pathway Evaluation Table:

A. Strike-out specific Media including Human Receptors' spaces for Media which are not "contaminated" as identified in #2 above.

B. Enter "yes" or "no" for potential "completeness" under each "Contaminated" Media – Human Receptor Combination (Pathway).

Note: In order to focus the evaluation to the most probable combinations some potential "Contaminated" Media – Human Receptor combinations (Pathways) do not have check spaces ("__"). While these combinations may not be probable in most situations they may be possible in some settings and should be added as necessary.

☒ If no (Pathways are not complete for any contaminated media-receptor combination) – skip to #6, and enter "YE" status code, after explaining and/or referencing conditions(s) in-place, whether natural or man-made, preventing a complete exposure pathway from each contaminated medium (e.g., use optional Pathway Evaluation Work Sheet to analyze major pathways).

☐ If yes (Pathways are complete for any "Contaminated" Media – Human Receptor combination) – continue after providing supporting explanation.

☐ If unknown (for any "Contaminated" Media – Human Receptor combination) – skip to #6 and enter "IN" status code.

Rationale and Reference(s)

Potential exposure pathways are not complete due to facility controls and operational procedures designed to limit human exposure to environmental media and are conditions of the facility operating license.

4. Can the **exposures** from any of the complete Pathways identified in #3 be reasonably expected to be **"significant"4** (i.e., potentially "unacceptable" because exposures can be reasonably expected to be: (1) greater in magnitude [intensity, frequency and/or duration] than assumed in the derivation of the acceptable "levels" [used to identify the "contamination"]; or (2) the combination of exposure magnitude [perhaps even though low] and contaminant concentrations [that may be substantially above the acceptable "levels"] could result in greater

3Indirect Pathway/Receptor (vegetables, fruits, crops, meat and dairy products, fish, shellfish, etc.).

4If there is any question on whether the identified exposures are "significant" (i.e., potentially "unacceptable") consult a human health Risk Assessment specialist with appropriate education, training and experience.

than acceptable risks)? NOT APPLICABLE

☐ If no (exposures can not be reasonably expected to be significant [i.e., potentially "unacceptable"] for any complete exposure pathway) – skip to #6 and enter "YE" status code after explaining and/or referencing documentation justifying why the exposures (from each of the complete pathways) to "contamination" (identified in #3) are not expected to be "significant".

☐ If yes (exposures could be reasonably expected to be "significant" [i.e., potentially "unacceptable"] for any complete exposure pathway) – continue after providing a description (of each potentially "unacceptable" exposure pathway) and explaining and/or referencing documentation justifying why the exposures (from each of the remaining complete pathways) to "contamination" (identified in #3) are not expected to be "significant."

☐ If unknown (for any complete pathway) - skip to #6 and enter "IN" status code.

Rationale and Reference(s):

5. Can the "significant" **exposures** (identified in #4) be shown to be within **acceptable** limits?
NOT APPLICABLE

☐ If yes (all "significant" exposures have been shown to be within acceptable limits) – continue and enter "YE" after summarizing <u>and</u> referencing documentation justifying why all "significant" exposures to "contamination" are within acceptable limits (e.g., a site-specific Human Health Risk Assessment).

☐ If no (there are current exposures that can be reasonably expected to be "unacceptable") – continue and enter "NO" status code after providing a description of each potentially "unacceptable" exposure.

☐ If unknown (for any potentially "unacceptable" exposure) – continue and enter "IN" status code.

Rationale and Reference(s):

6. Check the appropriate RCRAInfo status codes for the Current Human Exposures Under Control EI Code (CA725), obtain supervisory signature and date on the EI determination below, and attach appropriate supporting documentation as well as a map of the facility.

☐ YE – Yes, "Current Human Exposures Under Control" has been verified. Based on a review of the information contained in this EI Determination, "Current Human Exposures" are expected to be "Under Control" at the _____ facility, EPA ID # _____, located at _____ under current and reasonably expected conditions. This determination will be reevaluated when the agency/state becomes aware of significant changes at the facility.

☐ NO – "Current Human Exposures" are NOT "Under Control."

☐ IN – More information is needed to make a determination.

Completed by: ______________________________________ Date: (type date)
(type name)
(type title)
Office of Waste Management and Radiological Protection
Michigan Department of Environmental Quality
517- -

Supervisor: ______________________________________ Date: (type date)
(type name)
(type title)
Office of Waste Management and Radiological Protection
Michigan Department of Environmental Quality
517- -

Locations where references may be found:
Hazardous Waste Section facility files at:
Office of Waste Management and Radiological Protection
Michigan Department of Environmental Quality
525 West Allegan Street
Lansing, Michigan 48933

Contact e-mail addresses:
(type name) - (type e-mail)
(type name) - (type e-mail)

**Final Note:** The human exposures EI is a qualitative screening of exposures and the determinations within this document should not be used as the sole basis for restricting the scope of more detailed (e.g., site-specific) assessments of risk.

## DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

DEQ adapted to Word 8/07

**RCRA Corrective Action Environmental Indicator (EI) RCRAInfo Code (CA750)**
**Migration of Contaminated Ground Water Under Control**

**Facility Name:** **Gage Products Company**
**Facility Address:** **625 Wanda Avenue**
**Facility EPA ID #:** **MID 005-388-801**

1. Has **all** available relevant/significant information on known and reasonably suspected releases to the ground water media, subject to RCRA Corrective Action (e.g., from waste management units (WMU), regulated units (RU), and areas of concern (AOC)), been **considered** in this EI determination?

   ☒ If yes - check here and continue with #2 below.

   ☐ If no - reevaluate existing data, or

   ☐ **I**f data are not available, skip to #8 and enter "IN" (more information needed) status code.

**BACKGROUND**

**Definition of Environmental Indicators (for the RCRA Corrective Action)**
EIs are measures being used by the RCRA Corrective Action Program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EIs developed to-date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated ground water. An EI for nonhuman (ecological) receptors is intended to be developed in the future.

**Definition of "Migration of Contaminated Ground water Under Control" EI**
A positive "Migration of Contaminated Ground Water Under Control" EI determination ("YE" status code) indicates that the migration of "contaminated" ground water has stabilized and that monitoring will be conducted to confirm that contaminated ground water remains within the original "area of contaminated ground water" (for all ground water "contamination" subject to RCRA Corrective Action at or from the identified facility [i.e., site-wide]).

**Relationship of EI to Final Remedies**
While final remedies remain the long-term objective of the RCRA Corrective Action Program the EIs are near-term objectives that are currently being used as program measures for the Government Performance and Results Act of 1993, (GPRA). The "Migration of Contaminated Ground Water Under Control" EI pertains ONLY to the physical migration (i.e., further spread) of contaminated ground water and contaminants within ground water (e.g., nonaqueous phase liquids or NAPLs). Achieving this EI does not substitute for achieving other stabilization or final remedy requirements and expectations associated with sources of contamination and the need to restore, wherever practicable, contaminated ground water to be suitable for its designated current and future uses.

**Duration/Applicability of EI Determinations**
EI determinations status codes should remain in the RCRAInfo national database ONLY as long as they remain true (i.e., RCRAInfo status codes must be changed when the regulatory authorities become aware of contrary information).

2. Is **ground water** known or reasonably suspected to be **"contaminated"**[1] above appropriately

protective “levels” (i.e., applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action, anywhere at, or from, the facility?

☒ If yes - continue after identifying key contaminants, citing appropriate “levels,” and referencing supporting documentation.

☐ If no - skip to #8 and enter “YE” status code, after citing appropriate “levels,” and referencing supporting documentation to demonstrate that ground water is not “contaminated.”

☐ If unknown - skip to #8 and enter “IN” status code.

Rationale and Reference(s):

Historical analytical data for facility ground water were compared to cleanup criteria developed by the MDEQ for non-residential properties pursuant to Part 201 of Act 451. A summary of the historical analytical data for the facility’s ground water is provided on Tables O-3. A summary of analytical data for the “effluent” (i.e., ground water) collected from the ground water collection trench is provided on Table O-5. Sample locations are shown on Figure O-2 (effluent samples were collected from the center catch basin of the ground water collection trench).

The analytical data for the facility’s ground water were compared to ground water contact criteria and ground water volatilization to indoor air criteria because the facility’s ground water is perched (i.e., not in an aquifer), occurs in isolated low spots (i.e., is not laterally continuous) and Rule 299.5709(4) of the Michigan Administrative Code allows ground water not in an aquifer to be addressed by the application of soil cleanup criteria.

As shown on Tables 6 through 8, results for the water samples collected from monitoring wells GMW-4 and GMW-7, located in the western portion of Parcel C, and the effluent from the collection trench contained volatile organic compounds above the residential and non-residential risk-based criteria (drinking water, ground water volatilization to indoor air and ground water contact criteria). These areas are delineated to the west by the results of the soil and ground water sampling on the Grand Trunk Switching Yard including the temporary monitoring wells (TMW-01 through TMW-03). No other ground water samples from the site contained chemical concentrations above these criteria. Most notably, results for the temporary and permanent monitoring wells located along the eastern property line at Wanda Avenue were below residential and non-residential risk-based criteria including residential drinking water criteria.

3. Has the **migration** of contaminated ground water **stabilized** (such that contaminated ground water is expected to remain within “existing area of contaminated ground water”[2] as defined by the monitoring locations designated at the time of this determination)?

☐ If yes - continue, after presenting or referencing the physical evidence (e.g., ground water sampling/measurement/migration barrier data) and rationale why contaminated ground water is expected to remain within the (horizontal or vertical) dimensions of the “existing area of ground water contamination”[2].

☐ If no (contaminated ground water is observed or expected to migrate beyond the designated locations defining the “existing area of ground water contamination”[2]) – skip to #8 and enter “NO” status code, after providing an explanation.

☒ If unknown - skip to #8 and enter “IN” status code.

Rationale and Reference(s):

4. Does “contaminated” ground water **discharge** into **surface water** bodies?

   ☐ If yes - continue after identifying potentially affected surface water bodies.

   ☐ If no - skip to #7 (and enter a “YE” status code in #8, if #7 = yes) after providing an explanation and/or referencing documentation supporting that ground ater “contamination” does not enter surface water bodies.

   ☐ If unknown - skip to #8 and enter “IN” status code.

Rationale and Reference(s):

5. Is the **discharge** of “contaminated” ground water into surface water likely to be **“insignificant”** (i.e., the maximum concentration[3] of each contaminant discharging into surface water is less than 10 times their appropriate ground water “level,” and there are no other conditions [e.g., the nature, and number, of discharging contaminants, or environmental setting], that significantly increase the potential for unacceptable impacts to surface water, sediments, or eco-systems at these concentrations)?

   ☐ If yes - skip to #7 (and enter “YE” status code in #8 if #7 = yes), after documenting: (1) the maximum known or reasonably suspected concentration[3] of key contaminants discharged above their ground water “level,” the value of the appropriate “level(s),” and if there is evidence that the concentrations are increasing; and (2) provide a statement of professional judgment/explanation (or reference documentation) supporting that the discharge of ground water contaminants into the surface water is not anticipated to have unacceptable impacts to the receiving surface water, sediments, or eco-system.

   ☐ If no - (the discharge of “contaminated” ground water into surface water is potentially significant) - continue after documenting: (1) the maximum known or reasonably suspected concentration[3] of each contaminant discharged above its ground water “level,” the value of the appropriate “level(s),” and if there is evidence that the concentrations are increasing; and (2) for any contaminants discharging into surface water in concentrations[3] greater than 100 times their appropriate ground water “levels,” the estimated total amount (mass in kg/yr) of each of these contaminants that are being discharged (loaded) into the surface water body (at the time of the determination), and identify if there is evidence that the amount of discharging contaminants is increasing.

   ☐ If unknown - enter “IN” status code in #8.

Rationale and Reference(s):

6. Can the **discharge** of “contaminated” ground water into surface water be shown to be “**currently acceptable**” (i.e., not cause impacts to surface water, sediments or eco-systems that should not be allowed to continue until a final remedy decision can be made and implemented[4])?

   ☐ If yes - continue after either: (1) identifying the final remedy decision incorporating these conditions, or other site-specific criteria (developed for the protection of the site’s surface water, sediments, and eco-systems), and referencing supporting documentation demonstrating that these criteria are not exceeded by the discharging ground water; OR (2) providing or referencing an interim-assessment,[5] appropriate to the potential for impact, that shows the discharge of ground water contaminants into the surface water is (in the opinion of a trained specialists, including ecologist) adequately protective of receiving surface water, sediments, and eco-systems, until such time when a full assessment and final remedy decision can be made. Factors that should be considered in the interim-assessment (where appropriate to help identify the impact associated with discharging ground water) include: surface water body size, flow, use/classification/habitats and contaminant loading limits, other sources of surface water/sediment contamination, surface water and sediment sample results and comparisons to available and appropriate surface water and sediment “levels,” as well as any other factors, such as effects on ecological receptors (e.g., via bio-assays/benthic surveys or site-specific ecological Risk Assessments), that the overseeing regulatory agency would deem appropriate for making the EI determination.

☐ If no - (the discharge of “contaminated” ground water can not be shown to be “**currently acceptable**”) - skip to #8 and enter “NO” status code, after documenting the currently unacceptable impacts to the surface water body, sediments, and/or eco-systems.

☐ If unknown - skip to 8 and enter “IN” status code.

Rationale and Reference(s):

7. Will ground water **monitoring**/measurement data (and surface water/sediment/ecological data, as necessary) be collected in the future to verify that contaminated ground water has remained within the horizontal (or vertical, as necessary) dimensions of the “existing area of contaminated ground water?”

   ☐ If yes - continue after providing or citing documentation for planned activities or future sampling/measurement events. Specifically identify the well/measurement locations which will be tested in the future to verify the expectation (identified in #3) that ground water contamination will not be migrating horizontally (or vertically, as necessary) beyond the “existing area of ground water contamination.”

   ☐ If no - enter “NO” status code in #8.

   ☐ If unknown - enter “IN” status code in #8.

Rationale and Reference(s):

8. Check the appropriate RCRAInfo status codes for the Migration of Contaminated Ground Water Under Control EI (event code CA750), obtain supervisor signature and date on the EI determination below, and (attach appropriate supporting documentation as well as a map of the facility.

   ☐ YE - Yes, “Migration of Contaminated Ground Water Under Control” has been verified. Based on a review of the information contained in this EI determination, it has been determined that the “Migration of Contaminated Ground water” is “Under Control” at the facility, EPA ID # , located at . Specifically, this determination indicates that the migration of “contaminated” ground water is under control, and that monitoring will be conducted to confirm that contaminated ground water remains within the “existing area of contaminated ground water.” This determination will be reevaluated when the agency/state becomes aware of significant changes at the facility.

   ☐ NO - Unacceptable migration of contaminated ground water is observed or expected.

   ☒ IN - More information is needed to make a determination.

Completed by: ______________________________________________ Date (type date)
(type name)
(type title)
Office of Waste Management and Radiological Protection
Michigan Department of Environmental Quality
517- -

Supervisor: ______________________________________________ Date (type date)
(type name)
(type title)
Office of Waste Management and Radiological Protection
Michigan Department of Environmental Quality

Locations where references may be found:
Hazardous Waste Section facility files at:
Office of Waste Management and Radiological Protection
Michigan Department of Environmental Quality
525 West Allegan Street
Lansing, Michigan 48933

Contact e-mail addresses:

(type name) - (type e-mail)
(type name) - (type e-mail)

# Appendix B2-8

## Property Notice

DAWDA, MANN, MULCAHY & SADLER, PLC

COUNSELORS AT LAW

39533 WOODWARD AVENUE, SUITE 200
BLOOMFIELD HILLS, MICHIGAN 48304-2815
(248) 642-3700 FAX (248) 642-7791
email@dmms.com



November 9, 2000

WRITER'S DIRECT DIAL NUMBER

(248) 642-8699
E-MAIL: SZAMLER@DMMS.COM

**VIA UPS OVERNIGHT MAIL**
Mr. Clay Spencer
Michigan Department of Environmental Quality
WMD - Hazardous Waste Program Section
608 West Allegan
Lansing, Michigan 48933

**Re: Gage Corporation/Gage Products**

Dear Mr. Spencer:

I have enclosed a copy of the recorded Notice Regarding Statutory Obligations Applicable to Property for Gage Products Company and The Gage Corporation of Delaware.

Should you have any questions or comments, please do not hesitate to contact me.

Very truly yours,

DAWDA, MANN, MULCAHY & SADLER, P.L.C.

Sherwin E. Zamler

SEZ/ker
Encl.
cc: Mr. Thomas Randazzo (w/ encl.)

O:\SEZ\GAGE\110900.LTR

283768

COPY

LIBER 22001 PAGE 79
$9.00 MISC RECORDING
$2.00 REMONUMENTATION
11/09/2000 11:37:34 A.M. RECEIPT# 79246
PAID RECORDED - OAKLAND COUNTY
G. WILLIAM CADDELL, CLERK/REGISTER OF DEEDS

NOTICE REGARDING STATUTORY
OBLIGATIONS APPLICABLE TO PROPERTY

The Gage Corporation of Delaware, the owner of the property described in Exhibit A hereto (the "Property"), is filing this notice with the Register of Deeds for Oakland County, Michigan, pursuant to State of Michigan Administration Rule R299.9525 entitled Notice Requirements.

The Property has been used to manage hazardous waste and is subject to the corrective action requirements of Part 111 of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (Act 451) and the Resource Conservation and Recovery Act, 42 USC, Section 6901 et seq., amended by the 1984 Hazardous And Solid Waste Amendments.

IN WITNESS HEREOF, The Gage Corporation of Delaware, has caused these presents to be executed this 9th day of November, 2000.

WITNESSES: (Print name below signatures)

Jeanette E. Waldrop

Jeanette E. Waldrop

Yelena Paykina

THE GAGE CORPORATION OF DELAWARE

By: Thomas Randazzo

Thomas Randazzo
Vice Pres./General Counsel

STATE OF MICHIGAN )
)
COUNTY OF OAKLAND )

On this 9th day of November, 2000, before me appeared Thomas Randazzo, to me personally known, who, being by me duly sworn, did state that he is a the Vice President and General Counsel of The Gage Corporation of Delaware, a Delaware corporation, and that the seal affixed to the foregoing instrument is the corporate seal of the corporation and the instrument was signed and sealed on behalf of the corporation by authority of its Board of Directors and that said Thomas Randazzo acknowledged the instrument to be the free act and deed of the corporation.

K Raley

Notary Public

K RALEY
NOTARY PUBLIC OAKLAND CO., MI
MY COMMISSION EXPIRES Jun 9, 2004

This Notice drafted by:
Patrick Ennis, Esq.
39533 Woodward, Suite 200
Bloomfield Hills, Michigan 48304

Return Notice to:
Patrick Ennis, Esq.
39533 Woodward, Suite 200
Bloomfield Hills, Michigan 48304

Exhibit A

Legal Description:

T1N, R11E, Section 35, Somerset Subdivision, part or all of Lots 257 to 282 inclusive, part of vacated Spencer Avenue and all of vacated alleys adjacent to same, all being described as beginning at the Northeast corner of Lot 266, thence South 01 degrees 12 minutes 00 seconds West 254.80 feet, thence North 89 degrees 59 minutes 00 seconds West 120.35 feet, thence North 00 degrees 01 minutes 00 seconds East 77.65 feet, thence North 89 degrees 59 minutes 00 seconds West 169.89 feet, to easterly right of way line of Grand Trunk Western Railroad, thence North 29 degrees 11 minutes 00 seconds West 202.87 feet, thence South 89 degrees 59 minutes 00 seconds East 383.80 feet to point of beginning, also ½ of vacated Jewell Avenue adjacent to same. Commonly known as 515 Wanda, City of Ferndale, Oakland County, Michigan. Sidwell number 25-35-329-001.