

**Michigan Department of Environmental Quality**  
Quarterly Other Cleanup Authority Report - Summary of Recent Activities and  
Response Actions  
Gelman Sciences Inc. Site  
December 4, 2018

This document provides a brief update of activities conducted from May thru September of 2018 and planned activities for the Gelman site for the remainder of 2018. Links to other historical information about the Gelman site are also provided below.

**2018 Residential Well Sampling**

**The residential and business water supply well sampling activities for 2018 were completed in August 2018. In 2018, out of 67 water supply wells sampled, none of the water supply wells exceeded the 7.2 parts per billion (ppb) criterion for 1,4-dioxane (Dioxane) in residential drinking water. Dioxane was detected in only two residential wells on the south side of Elizabeth Road at concentrations ranging from 1-2 ppb, well below the 7.2 ppb criterion. Both properties have had previous detections ranging from 1-4 ppb.**

In collaboration with the Washtenaw County Health Department (WCHD), the Michigan Department of Environmental Quality (DEQ) initiated sampling of residential and business water supply wells within and around the known Dioxane groundwater contamination plume in the 1990's as part of the monitoring activities to evaluate and abate risk of exposure to contamination above the applicable state drinking water criterion (note that there is no applicable federal criterion). Both the DEQ and the WCHD annually review which water supply wells should be sampled. The wells are sampled by WCHD, usually once per year with specific wells sampled twice per year. The 2018 sampling activities included wells along Christine Drive (last sampled in 2014), Lakeview Drive (last sampled in 2016), and Rose Drive (last sampled in 2016). As stated above WCHD was able to collect samples at 67 locations.

Washtenaw County communicates results directly to well owners and building occupants. Results (identified by address) for water supply well samples collected since 1998 and including 2018 are posted on the DEQ "Gelman Sciences, Inc. Site of Contamination Information Page" under the "Recent Analytical Data" tab which can be accessed using the link provided below.

[Recent Analytical Data](#)

**2019 Residential Well Sampling**

**For 2019, a total of 117 water supply wells are planned to be sampled as part of the ongoing residential and business water supply well sampling program. These include locations along Dexter Road (last sampled in 2017), W. Delhi Road (last sampled in 2014), and Breezewood Court (last sampled in 2014). The 2019**

sampling activities also include first time sampling of locations along W. Liberty Road, Saginaw Court, and Westview Way. The sampling activities are tentatively scheduled to begin in March 2019 and be completed by October 2019.

### **Monitoring Well Sampling**

**Gelman currently conducts sampling and analysis of approximately 300 monitoring wells (MWs) throughout the site and vicinity.**

The MWs have been installed for the specific purpose of monitoring and evaluating the Dioxane contamination in groundwater. The water from these wells is not used for drinking, irrigation or any other purpose. Specific MWs are sampled on a monthly, quarterly, semi-annual, annual, and biennial basis following DEQ approved monitoring plans for specific areas of the site identified as the Western Area, Eastern Area and the Little Lake Area. DEQ collects samples of selected MWs with Gelman (i.e. “split sampling”), periodically, as a check of the quality and accuracy of data submitted by Gelman.

From May 2018 thru September 2018 Gelman collected samples at 308 MW locations as identified below:

- May 105 MWs Sampled
- June 63 MWs Sampled
- July 51 MWs Sampled
- August 89 MWs Sampled
- September 57 MWs Sampled

Results of monitoring well samples collected by both Gelman and DEQ are posted on the DEQ “Gelman Sciences, Inc. Site of Contamination Information Page” under the “Recent Analytical Data” tab. Historic data and results since 2003 are also posted.

A 2015 map which depicts the locations of the monitoring wells can also be found on the DEQ Gelman webpage under the Maps heading (See link below).

[Monitor Well Location Map](#)

### **Current Remediation Activities**

**Current remediation activities are performed by Gelman and involve the operation of groundwater extraction wells located at the former Gelman Plant site and elsewhere in Scio Township and the City of Ann Arbor. From May thru September 2018 Gelman removed contaminated groundwater at an average rate of 473 gallons per minute from extraction wells.**

From May through September 2018 Gelman pumped and treated approximately 81,407,286 gallons of contaminated groundwater from extraction wells removing 282 pounds of Dioxane as listed below:

	<u>Extraction Wells Operated</u>	<u>Groundwater Pumped</u>	<u>Dioxane Removed</u>
May	11	19,238,145 gallons	75 pounds
June	10	20,641,976 gallons	70 pounds
July	11	21,688,478 gallons	69 pounds
August	10	19,838,687 gallons	68 pounds
September	11	20,496,882 gallons	71 pounds

Contaminated groundwater collected from the extraction wells is piped to the Gelman plant and treated using ozone and hydrogen peroxide. The treated groundwater is then discharged to a tributary of Honey Creek under a National Pollutant Discharge Elimination System (NPDES) permit issued by DEQ. The current NPDES permit became effective on February 1, 2016 and will expire on October 1, 2019. The NPDES permit establishes discharge limits for Dioxane and treatment chemicals and byproducts. The current permit's discharge limits for Dioxane are 7 ppb (monthly average) and 22 ppb (daily maximum).

Also, during the May through August 2018 period Gelman completed routine maintenance on selected extraction wells and the treatment system including plumbing upgrades in the Red Pumphouse.

Data and information about the remediation activities can be found in the monthly NPDES monitoring reports and quarterly progress reports submitted by Gelman. Mass reduction (Pounds of 1,4-Dioxane removed) in each of the aquifer systems are identified in the Gelman quarterly progress reports. Historic and current information on pumping rates of extraction wells can be found in the "Average Monthly Extraction Flow Rates" table updated and submitted quarterly by Gelman. The reports and table are posted to the DEQ Gelman web page under the "Selected Documents" tab (See link below).

#### [Selected Documents](#)

A 2015 map which depicts the locations of the extraction wells (purge wells) can also be found on the DEQ Gelman webpage under the Maps heading (See Monitor Well Location Map link on Page 2).

#### **Surface Water and Seep Sampling**

**On September 18 and 19, 2018 the DEQ continued the sampling of surface waters, including ponds, creeks, and drains in and around the site and vicinity for 1,4 dioxane. In addition, samples were collected of water in the Allen Creek Drain**

**system, including the Hanna Nature Area Creek, for additional volatile organic compound (VOC) analysis. The results of the sampling activities are summarized below:**

Surface water samples have been analyzed from:

- Allen Creek (Drain) Tributary in the southwest corner of West Park – 19 ppb. Additional VOCs were not detected
- Allen Creek (Drain) Tributary near Glendale Circle – Not Detected. Additional VOCs were not detected.
- Little Lake – 4.1 ppb
- First Sister Lake – Not Detected
- Second Sister Lake – Not Detected
- Third Sister Lake – 2.9 ppb
- Smith Pond \_West – Not Detected
- Smith Pond \_East – Not Detected
- Unnamed Tributary of Honey Creek at Jackson Rd – 3.9 ppb
- Unnamed Tributary of Honey Creek at Park Rd – 3.8 ppb
- Unnamed Tributary of Honey Creek at the Gelman Discharge outfall – 4.9 ppb
- Unnamed Tributary of Honey Creek at the Gelman Discharge outfall (immediately upstream) – 5.2 ppb
- Unnamed Tributary of Honey Creek at the Gelman Discharge outfall (upstream towards Marshy Area) – Not Detected
- Honey Creek/Huron River (HC/HR) confluence – Not Detected
- Honey Creek at Dexter Rd – 2.1 ppb
- Arbor Landing Pond – Not Detected
- West Park Pond – Not Detected
- Hanna Nature Area Creek – Not detected. Additional VOCs were not detected.

Results of surface water samples collected by both Gelman and DEQ are posted on the DEQ Gelman web page under the “Recent Analytical Data” tab (See link below). DEQ expects to meet with the Washtenaw County Water Resources commissioner’s office in the next quarter to identify next steps.

[Recent Analytical](#)

### **Recent Investigation(s)**

**No new investigations were conducted during the May through August 2018 period.**

## **Other Recent Activities**

**DEQ attended, provided information, and answered questions at five local meetings concerning the Gelman Site from May through September 2018.**

These meetings included:

- Coalition for Action on Remediation of Dioxane (CARD) Quarterly Technical Meeting, Washtenaw County Western Service Center, May 1, 2018.
- EPA/Muni-Agency Stakeholder Meeting, Scio Township Offices, May 17, 2018
- Coalition for Action on Remediation of Dioxane (CARD) Monthly Meeting, Washtenaw County Western Service Center, June 5, 2018.
- University of Michigan School for Environment and Sustainability – Policy in Practice Charette Public Event – Contamination of Ann Arbors Groundwater with 1,4 Dioxane, Ann Arbor, June 9, 2018.
- Coalition for Action on Remediation of Dioxane (CARD) Quarterly Technical Meeting, Washtenaw County Western Service Center, August 7, 2018.
- Coalition for Action on Remediation of Dioxane (CARD) Monthly Meeting, Washtenaw County Western Service Center, September 4, 2018.

## **Recent Court Actions**

The court ordered confidential negotiations to modify the current Consent Judgement are on-going. The negotiating parties include Gelman, DEQ, the City of Ann Arbor, Washtenaw County, Scio Township, and the Huron River Watershed Council.

## **Stakeholders Issues**

The EPA has identified stakeholder issues of concern to the DEQ Project Manager and has requested the DEQ list and track the issues in quarterly reports. Previous and new issues and requests for information are listed below. DEQ has provided initial answers and discussions where possible and will continue to provide information about the issues in future reports as new data and information is made available and evaluated.

## **Previous Issues**

- 1) EPA is evaluating the potential for Per- and Polyfluoroalkyl Substances (PFAS) contamination at sites around the country.
- Evaluate whether PFAS contamination could be associated with releases from the Gelman Facility.

***DEQ has requested that Gelman review its records to determine if PFAS was used in the manufacturing processes and provide copies of any such records which indicate use of PFAS. Concurrently DEQ is***

***developing a scope of work to conduct sampling of selected monitoring wells on the Gelman Site property as a next step to evaluate whether PFAS should be identified as a contaminant of concern at the Gelman Site. Data and information will be presented after completion of any sampling activities.***

***Update – Gelman has informed the DEQ that the file review is complete and that they did not identify significant use of PFAS containing substances at the Gelman Site. DEQ has requested that Gelman document the file review in a written summary.***

***In addition, the DEQ continues its response to this emerging contaminant throughout the state including within the Huron River Watershed. DEQ began sampling intensively on the Huron River due to the City of Ann Arbor (City) detecting PFAS in the Huron River, which is the main source of the City's drinking water, and the discovery of perfluorooctanesulfonic acid (PFOS) in the river at concentrations greater than the Rule 57 water quality standard of 11 parts per trillion (ppt) of PFOS. Information on the work completed thus far within the Huron River Watershed with respect to PFAS can be found at the link below:***

**[Huron River Watershed PFAS Information](#)**

***Additionally, the DEQ Water Resources Division recently obtained effluent samples from various locations within the Huron River Watershed, including from the outfall of the existing Gelman treatment system, as part of the ongoing investigation with respect to PFAS within the Huron River Watershed. Results will be made available when laboratory analysis is completed.***

- 2) EPA points out that it is important to understand the risks posed by soil and sediment contaminated with Dioxane stemming from the Gelman facility. If there are elevated concentrations in those media, that could be an indication of an ongoing source to groundwater and/or surface water. Data from those areas are also essential for any evaluation of risk due to direct contact and/or ingestion exposure for human or ecological exposures. Discuss the following:
  - Soil/sediment sampling results for borings collected at Gelman owned parcels through the present, on the original Gelman parcel (including split parcels) and on any nearby parcels that may have been impacted by Gelman's contamination.
  - Discuss the risks those levels of 1,4-dioxane pose to human receptors.

***As stated above, Gelman has voluntarily conducted additional sampling of soils and groundwater on and adjacent to the site property. The DEQ***

***is expecting a report summarizing the investigation once Gelman has completed compiling and evaluating the site investigation information and data. This information will be used, as appropriate, to evaluate risk due to direct contact and/or ingestion exposure for human or ecological exposures.***

***Update – No new information about the on-property site investigation data and information.***

3) It is important to clearly define the groundwater migration pathways at the facility. Discuss the following:

- How the historical sampling and well log data for wells in the deeper aquifers at the Gelman site including Gelman's own supply wells informs characterization of the plume.

***There are numerous reports on file (See Selected Documents on the DEQ Gelman Webpage) detailing the evolution of both Gelman and DEQ conceptual site models (CSMs) for the site. Many monitoring wells, residential wells and other wells have been used to characterize and monitor the site, which is situated in a complex hydrogeological setting.***

***There are currently three approved monitoring plans to implement the court-selected remedy within systems (portions of the site) as identified in the most recent Third Amendment to the Consent Judgement (effective March 8, 2011). The systems are currently identified as the "Little Lake Area System", the "Western Area System" (area west of Wagner Road), and the "Eastern Area System" (area east of Wagner Road).***

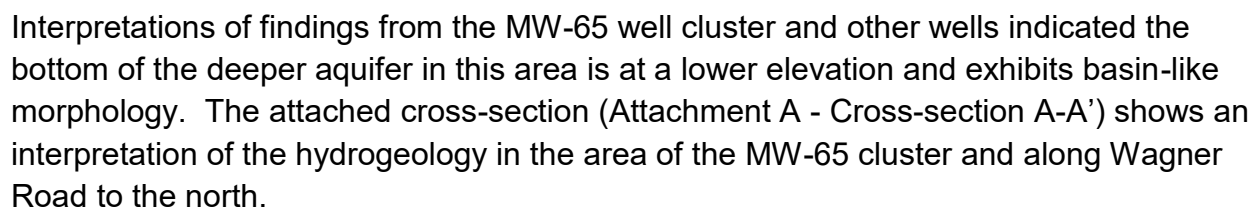
***DEQ had requested that Gelman provide a summary of the historic investigations and data used to evaluate the groundwater contamination in at the site. The Gelman summary is provided below:***

### **Gelman Provided Summary**

Gelman operated two deeper production wells to supply their manufacturing operations, one on the south side of Building 1 (Well 1) and one on the near the southeast corner of Building 1 (Well 2). These wells were deeper wells, with screens positioned between 146 and 177 feet below ground level. Gelman's investigations into all aquifers on the former Gelman property, including the deeper aquifers where the former supply wells were screened, have been extensive. Numerous reports have been prepared on finding from these investigations. One of the reports discussing the eastern portion of the site near the former Gelman production wells is titled *Performance Review Wagner Road Interim Response*, Pall Life Sciences, March 2007. Review of this report along with

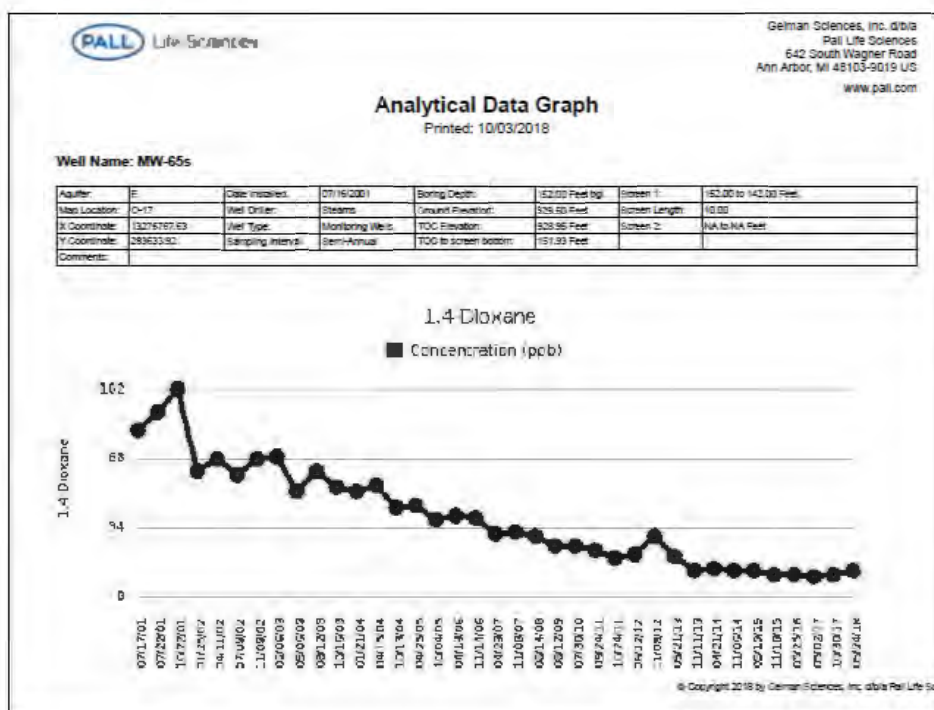


Deep monitoring wells were drilled near Gelman's former production wells as part of extensive investigations into of the deeper (Unit E) aquifer. This investigation involved the installation of numerous monitoring wells, including MW-65s, MW-65i, MW-65s and MW-68, which were all installed in 2001.





The highest 1,4-dioxane concentration found at the MW-65 well cluster was approximately 800 ug/L detected in MW-65d in 2001, right after this well was installed. The shallower two wells in the MW-65 cluster had lower initial 1,4-dioxane concentrations in sampled groundwater. Water quality graphs for these wells are provided below. Groundwater flow mapping since 2001 has shown groundwater in the deeper aquifer in this area is flowing north/northeast into the Prohibition Zone (PZ). An early potentiometric surface map is provided below.

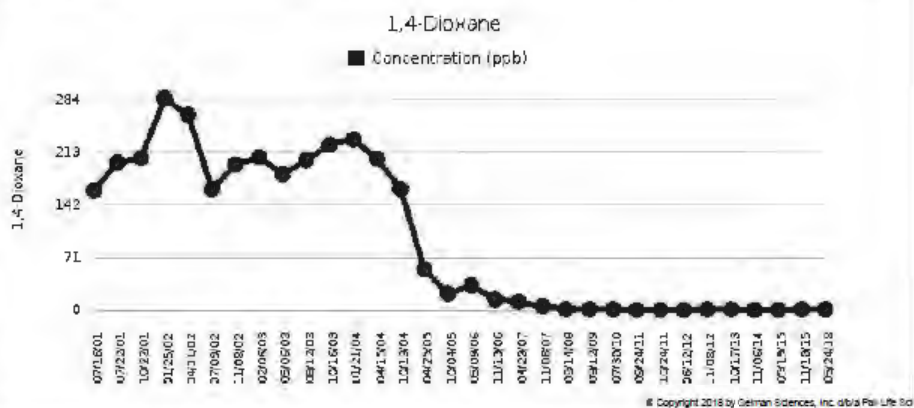


## Analytical Data Graph

Printed: 10/03/2018

Well Name: MW-65i

Aquifer:	E	Date Installed:	07/13/2001	Boring Depth:	217.00 Feet bgl	Screen 1:	211.00 to 221.00 Feet
Map Location:	C-17	Well Driller:	Stearns	Ground Elevation:	829.50 Feet	Screen Length:	10.00
X Coordinate:	13276779.63	Well Type:	Monitoring Wells	TGC Elevation:	838.87 Feet	Screen 2:	NA to N/A Feet
Y Coordinate:	283638.82	Sampling Interval:	Semi-Annual	TGC to screen bottom:	210.85 Feet		
Comments:							

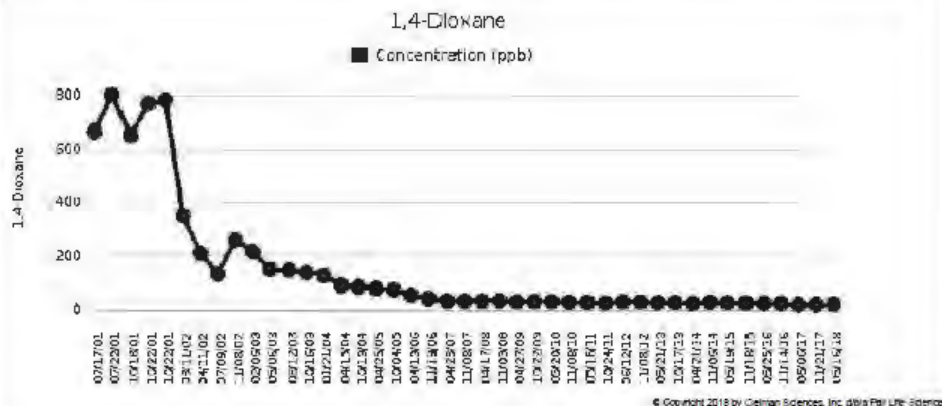


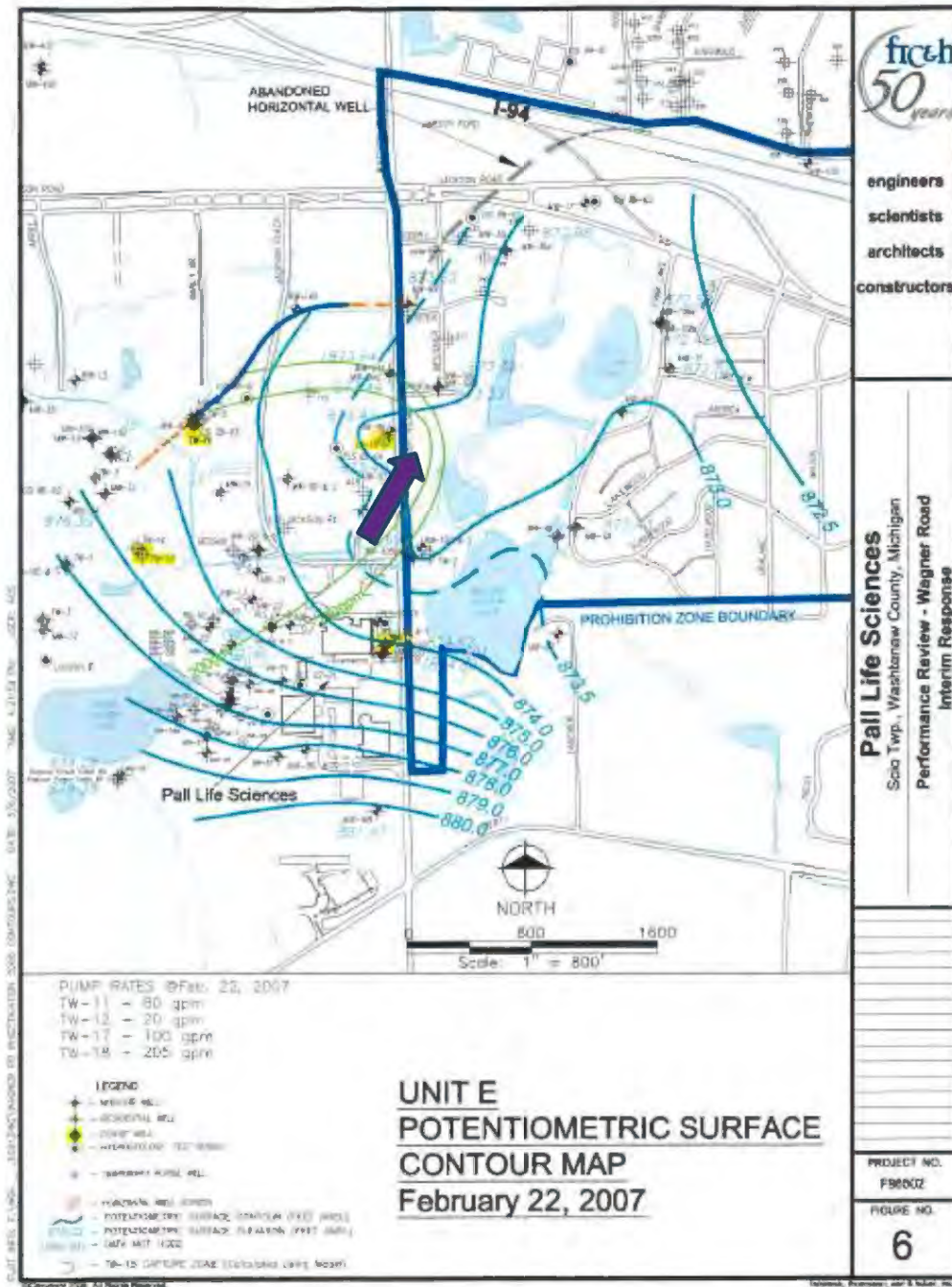
## Analytical Data Graph

Printed: 10/03/2018

Well Name: MW-65d

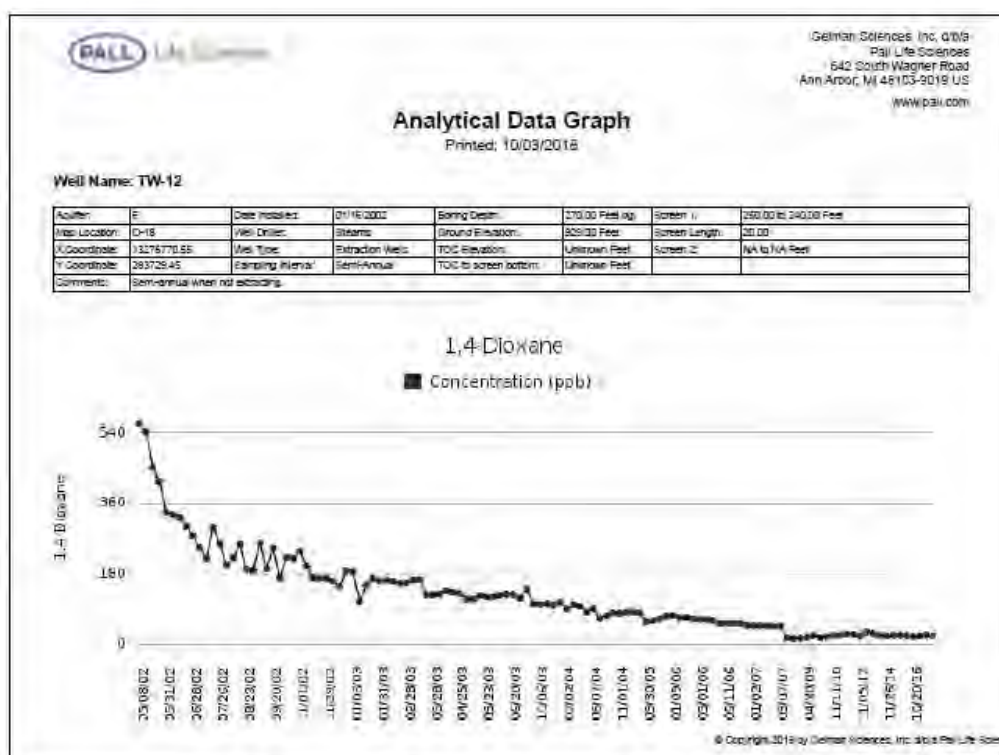
Aquifer:	E	Date Installed:	07/12/2001	Boring Depth:	278.00 Feet bgl	Screen 1:	262.00 to 261.90 Feet
Map Location:	C-17	Well Driller:	Stearns	Ground Elevation:	829.20 Feet	Screen Length:	10.00
X Coordinate:	13175766.63	Well Type:	Monitoring Wells	TGC Elevation:	838.49 Feet	Screen 2:	NA to N/A Feet
Y Coordinate:	283648.32	Sampling Interval:	Semi-Annual	TGC to screen bottom:	261.97 Feet		
Comments:							





Based on these findings, Gelman proposed to install an extraction well (TW-12) near (hydraulically downgradient of) the MW-65 well cluster. The objective of installing an extraction well in this area was to reduce 1,4-dioxane levels in the groundwater. TW-12 was put on line in May of 2002 and operated until July of 2007. Gelman also eventually installed the MW-105 well cluster in 2006 to monitor for downgradient migration of 1,4-dioxane from this area.

Gelman anticipated that 1,4-dioxane concentrations in this basin-like feature identified by drilling at MW-65 would respond quickly to extraction. These predictions were correct. Extraction at TW-12 resulted in a rapid decline of 1,4-dioxane in this area, dropping from maximum concentrations of approximately 500 ug/L to low asymptotic levels in approximately 5 years. Similar declines in 1,4-dioxane concentrations were observed in MW-65 wells with no indication of rebound since extraction from TW-12 ceased. Downgradient well MW-105d has also declined in response to extraction, although 1,4-dioxane concentrations have become asymptotic in groundwater sampled from this well. The most recent 1,4-dioxane concentration in groundwater sampled from this well in September of 2018 was 210 ug/L.





1,4-Dioxane levels found the MW-65 cluster/TW-12 area were considerably lower than those observed in the main portion of the deeper (Unit E) plume, where initial concentrations approached 4,000 ug/L. The area around the MW-65 cluster/TW-12 area has never been considered a significant contributing area to the deeper 1,4-dioxane plume that has migrated eastward into the PZ.

To summarize, 1,4-dioxane in the deeper aquifer from the MW-65 cluster/TW-12 location (the area of the former Gelman production wells) flows northeast into the PZ, which is allowed under the Consent Judgement. 1,4-Dioxane concentrations in this area were significantly reduced by operation of TW-12 and have remained low since extraction from TW-12 was terminated in 2007.

4) There are concerns that analysis of the plume at 465 Dupont may not adequately characterize the behavior of the plume in the area and whether or not the results are representative of the shallow or deep aquifer. Discuss the following:

- How data were used to analyze the plume at 465 Dupont, with a focus on how well screen levels were used to define the plume in the area

***Again, there are multiple reports on file (See Selected Documents on the DEQ Gelman Webpage) which provide details on the CSM utilized by Gelman to evaluate the groundwater contamination in the Dupont Circle area and adjacent Evergreen area. The reports include the PLS May 2007 Evergreen System Review; the PLS June 2007 Evergreen Work Plan; the PLS August 2007 Dupont Work Plan. DEQ work plan and***



***report review responses in 2008 also provide information on the investigations, data and evaluations.***

***DEQ has requested that Gelman provide a summary of the historic investigations and data used to evaluate the groundwater contamination in the area of 465 Dupont. The Gelman summary is provided below:***

### **Gelman Provided Summary**

465 Dupont and the area around this former residential well have been the focus of significant investigations by Gelman. Key investigations were presented in two reports.

1. *Evergreen System Dupont Area Investigation, Pall Life Sciences, April 2008*
2. *Report on Water Level Testing Under Reduced Flow Conditions, Pall Life Sciences, Evergreen Area, March 2009*

In addition to these two reports, numerous potentiometric surface and isoconcentration maps have been prepared for this area (approximately 20 sets). This area has been described in several other reports prepared for the Evergreen System by Gelman. We recommend that the readers familiarize themselves with this body of work.

Gelman has developed a robust monitoring system north and northwest of the Dupont Circle area. Many of the wells in this system were installed after the 2008-2009 reports. This monitoring system now includes the following monitoring wells: MW-54s, MW-54d, MW-55, MW-121s, MW-121d, MW129s, MW-129i, MW-129d, MW120s, MW-120d, MW-123s, MW-123d, MW-130s, MW-130i, and MW-130d. All of these monitoring wells were installed by Gelman after discussions with MDEQ about their design and placement. The data from these wells confirm the conclusions of the above reports regarding groundwater flow and contaminant transport.





the deeper portion of the aquifer was hydraulically connected to the LB extraction system, and that the 1,4-dioxane present in the Dupont area flows to the east toward the operating extraction wells. The report of the 2009 testing was reviewed by an independent consultant, GeoTrans, Inc., on behalf of the City of Ann Arbor. GeoTrans prepared a letter report from Douglas J. Sutton, PhD., PE to the City of Ann Arbor dated July 17, 2009. The GeoTrans findings were generally consistent with Gelman's findings: "In summary, based on the limited data provided in the Water Level Testing report, it appears likely that groundwater in the Evergreen Area will continue to migrate to the east and likely merge with the Unit E plume, even in the absence of pumping from LB-1, LB-3 and AE-3."

Data from an extensive array of monitoring wells continues to demonstrate the plume is well within the established Prohibition Zone (PZ) and there is no indication that the plume migrates directly to the northwest or north. Low-levels of 1,4-dioxane found in some of the monitoring wells north of the Dupont area (north of Dexter Ann Arbor Road) are interpreted to be the result of dispersion/diffusion as the plume turns east toward the Evergreen extraction wells.

These interpretations are corroborated by findings from residential well data. There has been extensive residential well sampling completed by Washtenaw County and the MDEQ (see map below). 1,4-Dioxane was not detected in any residential well north or northwest of the Dupont area. 1,4-Dioxane has been detected in the Dupont area for over two decades and reached a concentration of nearly 1,700 ug/L. The Evergreen plume has been present in the Evergreen Subdivision for three decades and reached concentrations of over 4,000 ug/L. If there was a northern migration pathway from the Dupont area, it would have manifested itself by now, in either the monitoring wells or a residential well.



**Additional Water Supply Well Sampling for 1,4-Dioxane**  
Scio Township, Washtenaw County, Michigan  
April 2016

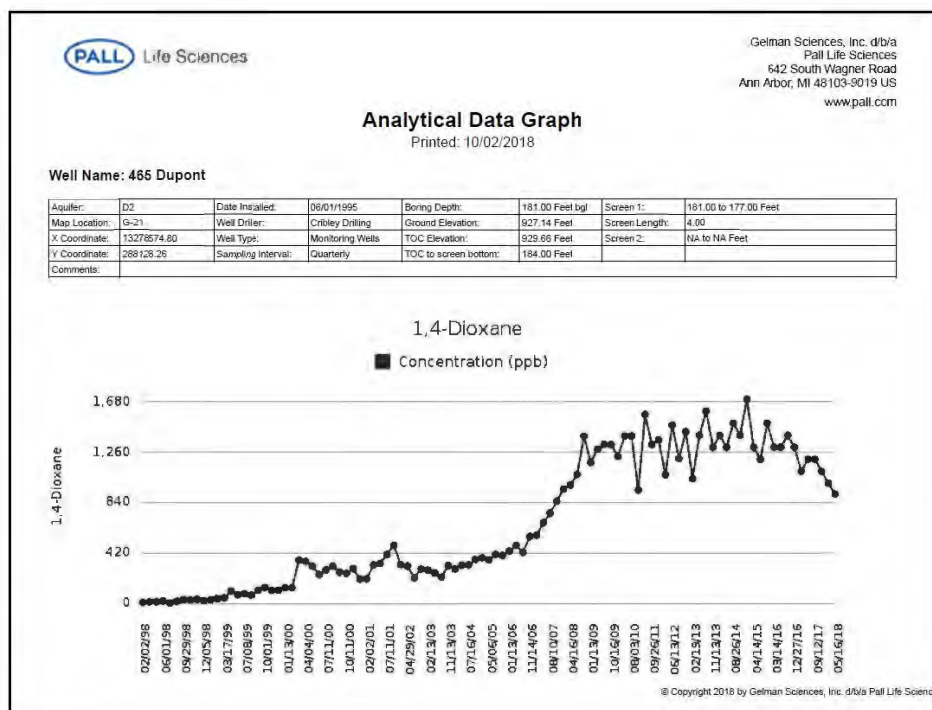


Some have suggested a linkage between the Dupont area and 1,4-dioxane on Elizabeth Drive. There is no scientific basis for such an interpretation. For over 30 years, there is been routine monitoring of groundwater at residential wells on Elizabeth Drive. 1,4-Dioxane was first discovered in this area in 1992, although one unreproducible detection of 1,4-dioxane was identified in a groundwater sample from 3600 Elizabeth in 1986. Low levels of 1,4-dioxane have been periodically detected in groundwater sampled from two wells on Elizabeth Drive, 3563 and 3573 Elizabeth. The data indicate 1,4-dioxane in groundwater samples from 3563 Elizabeth peaked in 2006 with a concentration of 4 ug/L and have been declining since that time. Concentrations of 1,4-dioxane in groundwater sampled from 3573 Elizabeth peaked around 3 ug/L in the years 1999-2001 and have declined ever since. 1,4-Dioxane has not been detected in groundwater sampled from this residential location since 2006. Over 30 years of monitoring data from wells in the Elizabeth Drive area suggest 1,4-dioxane levels are stable. If there were a linkage to the Dupont area, 1,4-dioxane concentrations at Elizabeth Drive would have increased over time consistent with the plume behavior observed at Dupont. There are no data to support

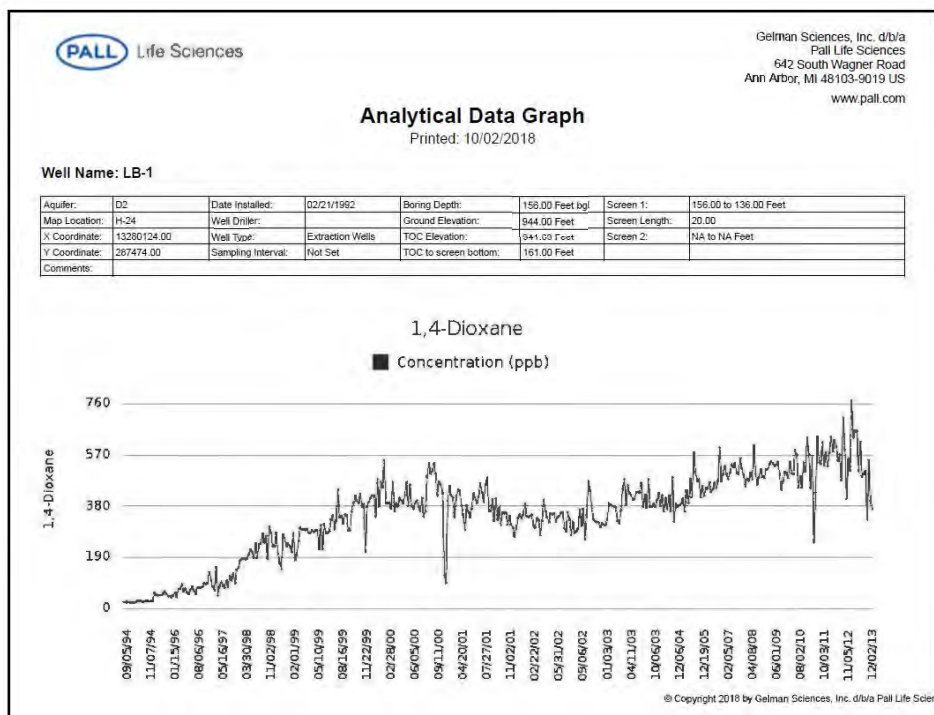
higher concentrations of 1,4-dioxane associated with the Dupont area will reach this area in the future.

465 Dupont is a former residential well that has been used by Gelman for water quality monitoring. 1,4-Dioxane concentrations at this location were gradually increasing beginning in the late 1990s, then significantly increased starting in 2005-2006. The later increase represented a secondary and deeper plume of 1,4-dioxane that arrived in the Dupont area. The two time-separated peaks are shown on the time vs. concentration graph for LB-1, a long running extraction well east of Dupont.

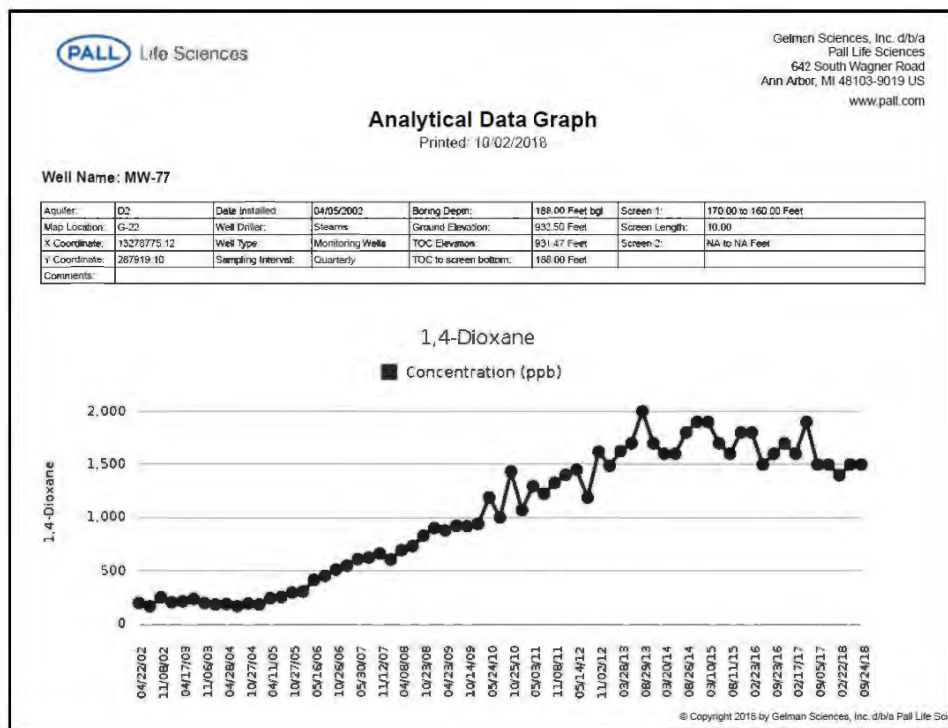
1,4-Dioxane concentrations at 465 Dupont have been steady or decreasing since at least 2013, and now are on a steep decline.







A similar trend in 1,4-dioxane concentrations has also been observed at MW-77, a well nearby 465 Dupont. Concentrations in groundwater sampled from this well have also plateaued and are declining.



It has been pointed out that hydrogeological cross sections prepared by Gelman's former consultant FTC&H used an elevation for 465 Dupont that was too high. This is correct. Cross-sections prepared by FTC&H have shown the ground elevation at 465 Dupont to be approximately 840 feet (NAVD88). The correct elevation should be approximately 827 feet (NAVD88), a 13-foot difference. The basis for this elevation discrepancy is not clear, but perhaps relates to the significantly varying topography in the Dupont Circle area.

In any event, lowering the screen in the cross-sections by 13-feet makes no significant difference in interpretations for this area. This well was not installed as a monitoring well, but rather, as a residential well. Whether the well is completed at a depth exhibiting the highest 1,4-dioxane concentrations is unknown. Because of the uncertainties of using a residential well for monitoring, Gelman drilled nearby MW-77 in order to have a monitoring well in the vicinity of 465 Dupont to allow for the collection of more detailed aquifer information, including Vertical Aquifer Samples (VAS).

- 5) 1,4-dioxane contamination in the near surface groundwater can pose a risk through exposure pathways other than the consumption of drinking water. Discuss the following:

- The status of the sampling and characterization of the shallow groundwater and seeps within the prohibition zone.
  - Detail historical sampling activities targeting the near surface groundwater within the prohibition zone and in the Scio Township area.

*Gelman conducted a shallow groundwater investigation, within the prohibition zone and in Scio Township, using a DEQ developed work plan in October 2016. The report presenting the data and information can be viewed at [Shallow Groundwater Investigation](#). In summary, twenty-seven soil borings were installed in parts of the City of Ann Arbor and Scio Township using Geoprobe drilling and sampling techniques. Groundwater was encountered in 16 of the 27 soil borings and sampled using temporary monitoring wells. Groundwater was not encountered, within a depth of 20 feet below ground level, in the remaining 11 soil borings. Depth to shallow groundwater is important because, following the proposed risk-based assumptions for Dioxane for the volatilization to indoor air pathway, shallow contaminated groundwater has a lower acceptable risk-based screening number than deep contaminated groundwater. The study was designed to focus on this shallow groundwater to address concerns expressed by the community who were*



*afraid that shallow groundwater may be contaminated and pose an unacceptable risk.*

*Dioxane was detected in shallow groundwater at two boring locations in the investigation area at concentrations ranging from 1.9-3.3 ppb. Both locations are within the Prohibition Zone of the Eastern Area of the Gelman Site in the City of Ann Arbor. The concentrations of Dioxane detected in the shallow groundwater were less than the DEQ Tier 1 vapor intrusion screening level of 29 ppb identified in the emergency rule adopted shortly after the time of the investigation, and significantly less than the 1,900 ppb screening level for shallow groundwater identified in the current proposed rules package. The concentrations detected were also below the EPA Regional Screening Level (RSL) of 4.6 ppb. This RSL considers a combined exposure through the ingestion, dermal contact, and inhalation pathways.*

*Based upon an evaluation of all the data and information collected during the shallow groundwater investigation, including groundwater elevations, concentrations in both deep and shallow groundwater in that area, and proposed and current regulatory criteria and screening levels, the concentrations of Dioxane detected in the shallow groundwater in the investigation area currently do not pose an unacceptable risk for the volatilization to indoor air pathway to residences and buildings. Additional comparisons of concentrations of Dioxane detected in shallow groundwater to EPA RSLs for specific pathway exposures, such as inhalation (Inhalation RSL-11 ppb) and skin contact (Dermal RSL-2,300 ppb), also indicate that Dioxane in shallow groundwater in the investigation areas currently does not pose an unacceptable risk.*

***Update – No new information or discussion.***

- Provide the status of any upcoming sampling of shallow groundwater and/or seeps.

*As stated above current data and information indicates that Dioxane in shallow groundwater currently does not pose an unacceptable risk and that further investigations are not immediately warranted at this time. DEQ has stated that evaluation of data and information will be ongoing and that additional investigation activities will be identified and completed as needed to evaluate unacceptable risks.*

*The DEQ will continue sampling surface waters, including ponds, creeks, and drains in and around the site and vicinity to identify any potential contamination. As stated and discussed above, DEQ collected samples from the following surface water bodies in September 2018:*

- Allen Creek (Drain) Tributary near Glendale Circle
- Allen Creek (Drain) Tributary in the southwest corner of West Park
- Little Lake
- First Sister Lake
- Second Sister Lake
- Third Sister Lake
- Smith Pond \_West
- Smith Pond \_ East
- Little Lake
- Unnamed Tributary of Honey Creek at Jackson Rd
- Unnamed Tributary of Honey Creek at Park Rd
- Unnamed Tributary of Honey Creek at the Gelman Discharge outfall
- Unnamed Tributary of Honey Creek at the Gelman Discharge outfall (upstream)
- Unnamed Tributary of Honey Creek at the Gelman Discharge outfall (upstream towards Marshy Area)
- Honey Creek/Huron River (HC/HR) confluence
- Honey Creek at Dexter Rd
- Arbor Landing Pond
- West Park Pond
- Hanna Nature Area Creek

6) Michigan has identified the potential risk that the groundwater plume poses to surface water bodies in the vicinity of the 1,4-dioxane plume.

- a. Provide the status of the evaluation the risks posed by this groundwater to surface water (GSI) pathway.

*As discussed in an earlier progress report the Water Quality Values (WQV i.e. GSI criteria) for 1,4 dioxane were updated to 3.5 ppb for surface waters that are protected as a source of drinking water (Human Cancer Value [HCV] – drink) and 280 ppb for surface waters that are not protected as a drinking water sources (HCV non-drink). At this time these changes do not affect the groundwater remedy that is being implemented by Gelman under the current CJ overseen by the DEQ and the Washtenaw Circuit Court. The current CJ does not require Gelman to directly address the GSI, in part because the previous GSI criteria were much higher and were not included in the court-ordered remedy. Because of the ongoing court ordered confidential CJ modification negotiations DEQ cannot speculate on how the changed GSI criteria may affect the Gelman remedy in the future.*

- b. List those surface water bodies, including Barton Pond that could potentially be impacted by the plume.

*Specific surface water bodies that have been sampled and will continue to be sampled are identified earlier in this report. Current data and information indicates that Barton Pond is not likely to be impacted from groundwater contamination migrating from the Gelman Site. In addition the current CJ requires groundwater sampling of the monitoring well system that is in place. The ongoing sampling of the monitoring well system would detect any changes to the groundwater contamination well before those changes could impact Barton Pond.*

***Update – No new information or discussion.***

## 7) Ecological Exposure

Provide the status of Ecological exposure evaluation. Discuss the following:

- Historic and current soil, sediment and surface water sampling results of the wetlands area near the Gelman facility, with focus on 1,4-dioxane results.
- Near surface water potential exposure and associated screening levels. Evaluation of ecological risks posed by contamination which stems from the Gelman facility. Include a discussion of potential ecological receptors.

*As stated above, Gelman has voluntarily conducted additional sampling of soils and groundwater on and adjacent to the site property. The DEQ is expecting a report summarizing the investigation once Gelman has completed compiling and evaluating the site investigation information and data. This information will be used, as appropriate, to evaluate ecological exposures.*

***Update – No new information about the on-property site investigation data and information.***

*In addition, Gelman has identified that three ecological evaluations have been completed historically for the site and vicinity. A fourth ecological evaluation was conducted by the MDNR-Surface Water Quality Division. These evaluations are listed below.*

- *Vegetation in the Marshy Area – In summary Gelman retained a botanist, S.N. Stephenson, to evaluate the flora of the Marshy Area. This assessment was completed in 1988. His findings were reported in a June 16, 1988 memo titled “Description of 1,4-dioxane contaminated property at Gelman Sciences, 600 South Wagner Road, Ann Arbor Michigan”.*

- *Aquatic Life in the Marshy Area, the Sisters Lake Drain and Third Sister Lake – Two studies were completed by Gelman on the biota of the Sisters Lake Drain/Honey Creek system as listed below.*
  - *Wiley, M.J., and J.S. Diana, 1989. An evaluation of the ecological impact of long-term chronic exposure of the biota of Honey Creek to 1,4-dioxane. Report to: Braithwaite Consultants, Ann Arbor, MI*
  - *Wiley, M.J., and J.S. Diana, 1989. Sub lethal effects of tissue uptake of 1,4-dioxane. Report to: Braithwaite Consultants, Inc, Ann Arbor, MI*
- *Honey Creek Area Biological Survey - In summary a biological survey of Honey Creek and water sampling of First, Second and Third Sister Lakes was conducted in November 1987 with additional sampling of the creeks and adjacent peat lakes in December 1987. The purpose of the survey and sampling was to determine the surface water concentrations of 1,4-dioxane and obtain data on macro-invertebrate communities. Staff Report - Great Lakes and Environmental Assessment Section, Surface water Quality Division, January 1995.*

*DEQ has posted copies of the historical ecological evaluations listed above on the DEQ Gelman web page in the “Selected Documents” tab. See link below.*

#### [Selected Documents](#)

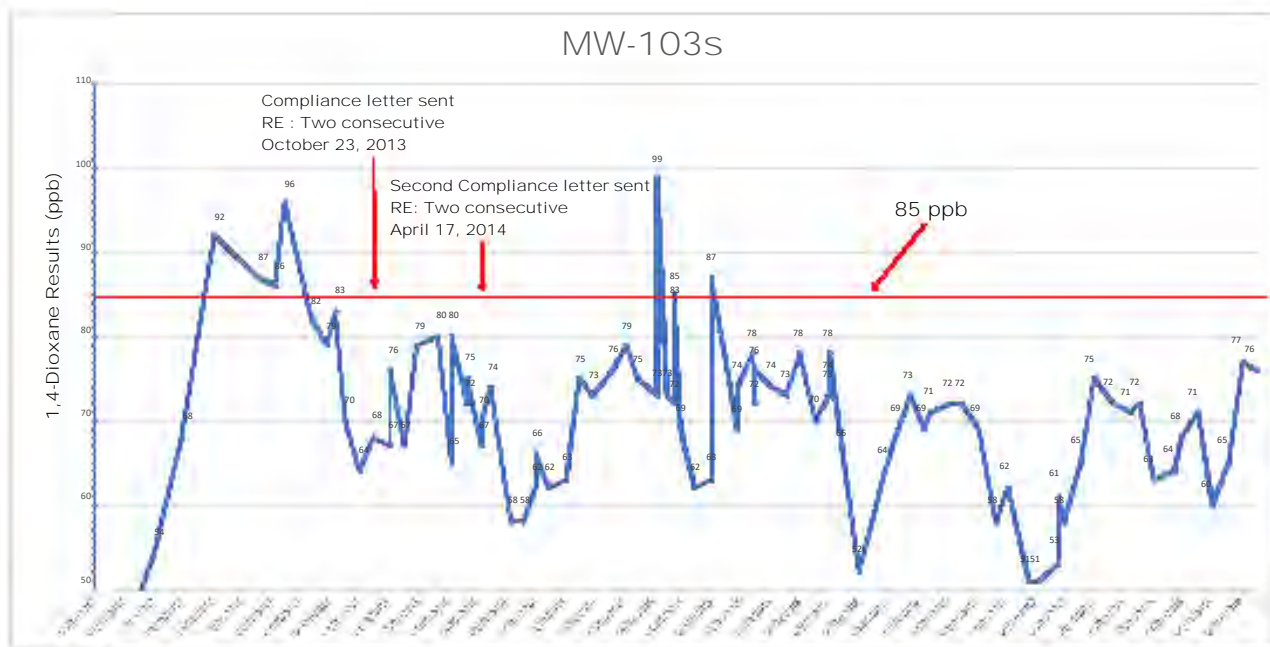
*In addition, Michigan WQVs promulgated under Part 31 of Act 451 serve as GSI criteria and are meant to be protective for the most restrictive aquatic or human health receptors. With the change in the WQV (GSI criteria) DEQ will initiate the review of current data and information to evaluate the eco-risk from contaminated groundwater discharging to surface waters.*

- 8) At least one stakeholder has asserted that Gelman was in violation of the current CJ with regard to concentrations of 1,4-dioxane found in MW-103s. Specifically, that concentrations detected in MW-103s, in excess of 85 ppb, trigger the requirement for Gelman to conduct additional investigation activities around MW-103s and submit a contingency plan on how Gelman proposes to address the possible migration of 1,4-dioxane outside the Prohibition Zone (PZ).

***DEQ has reviewed the claims from the stakeholders and determined that Gelman was not in violation of the current CJ requirements at MW-103s. A more in-depth discussion of the MW-103s evaluation will be presented in a future progress report.***

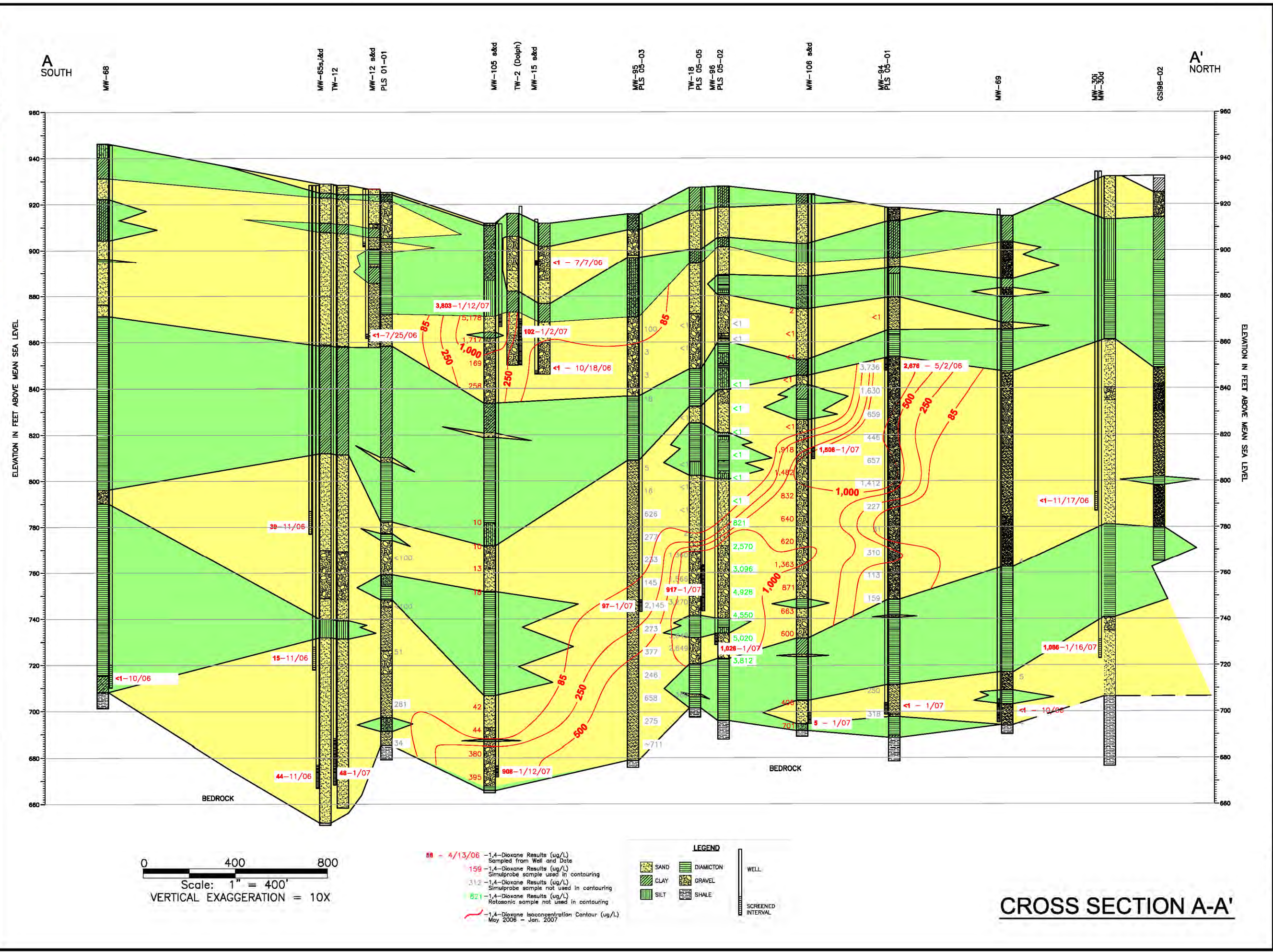
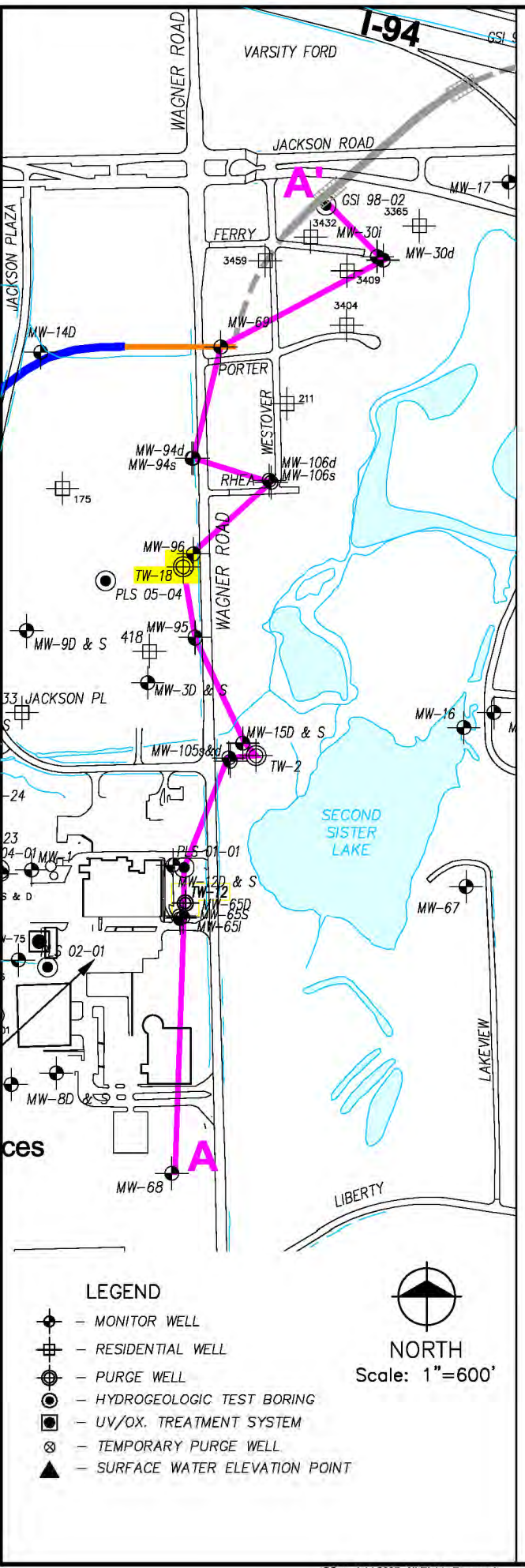
*Update – The current CJ does not specifically identify trigger requirements for MW-103s. Compliance with the CJ is determined at the PZ boundary,*

not MW-103s. In response to discussions with Gelman and information provided by Gelman related to DEQ questions and concerns about the increasing concentrations of 1,4-dioxane observed in MW-103s DEQ issued compliance guidance letters in October 2013 and April 2014. Both compliance letters identify the detection of 1,4-dioxane at concentrations above 85 ppb in MW-103s for two consecutive months as the trigger requirement for submittal of a contingency plan. The contingency plan must outline how Gelman proposes to address possible migration of 1,4-dioxane outside the Prohibition Zone to ensure protection of public health and safety. As can be seen on the figure below, the concentrations of 1,4-dioxane observed in MW-103s have not been greater than 85 ppb for two consecutive months since the issuance of the compliance letters. DEQ will continue to review information from MW-103s and adjacent wells to evaluate compliance with the CJ.

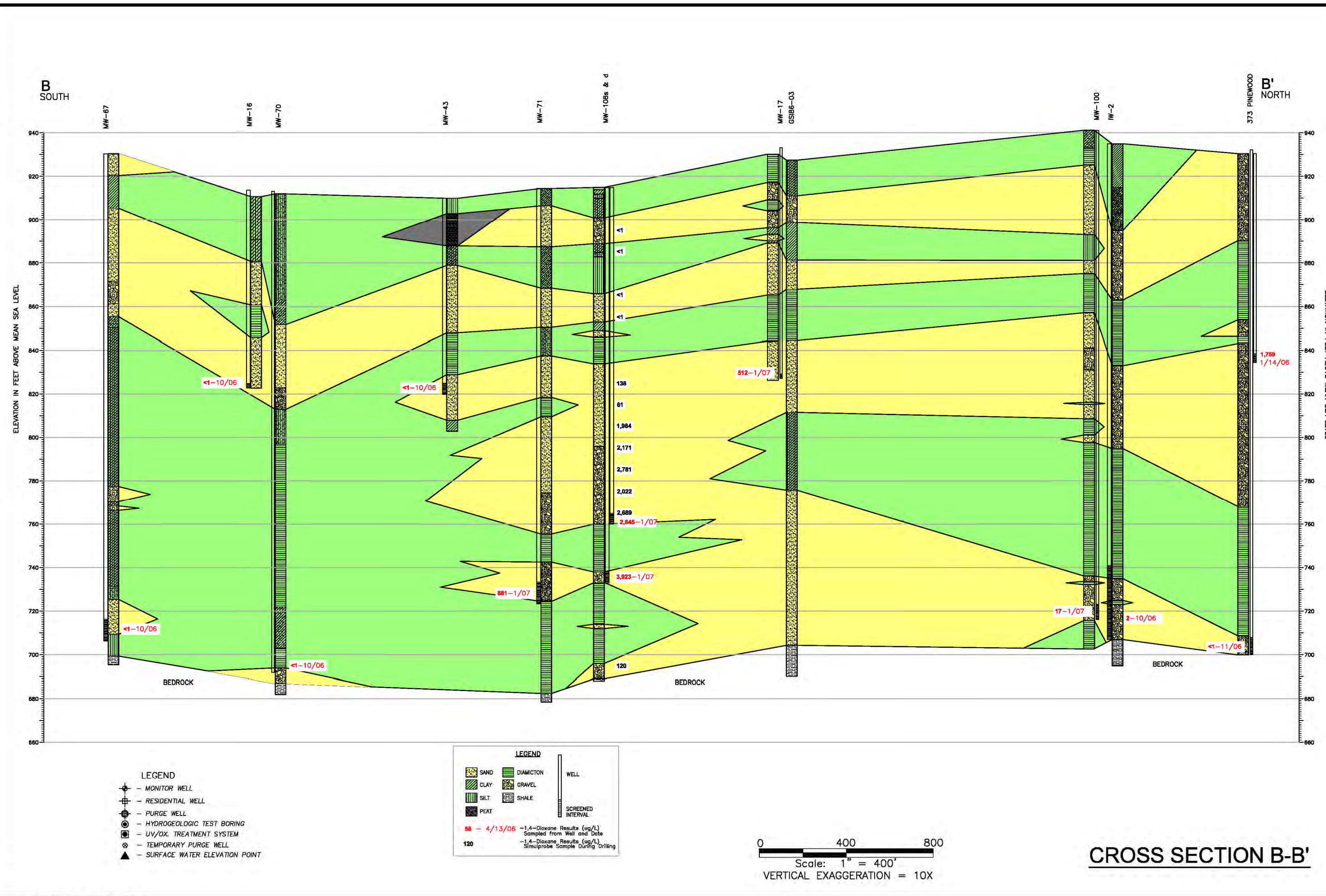
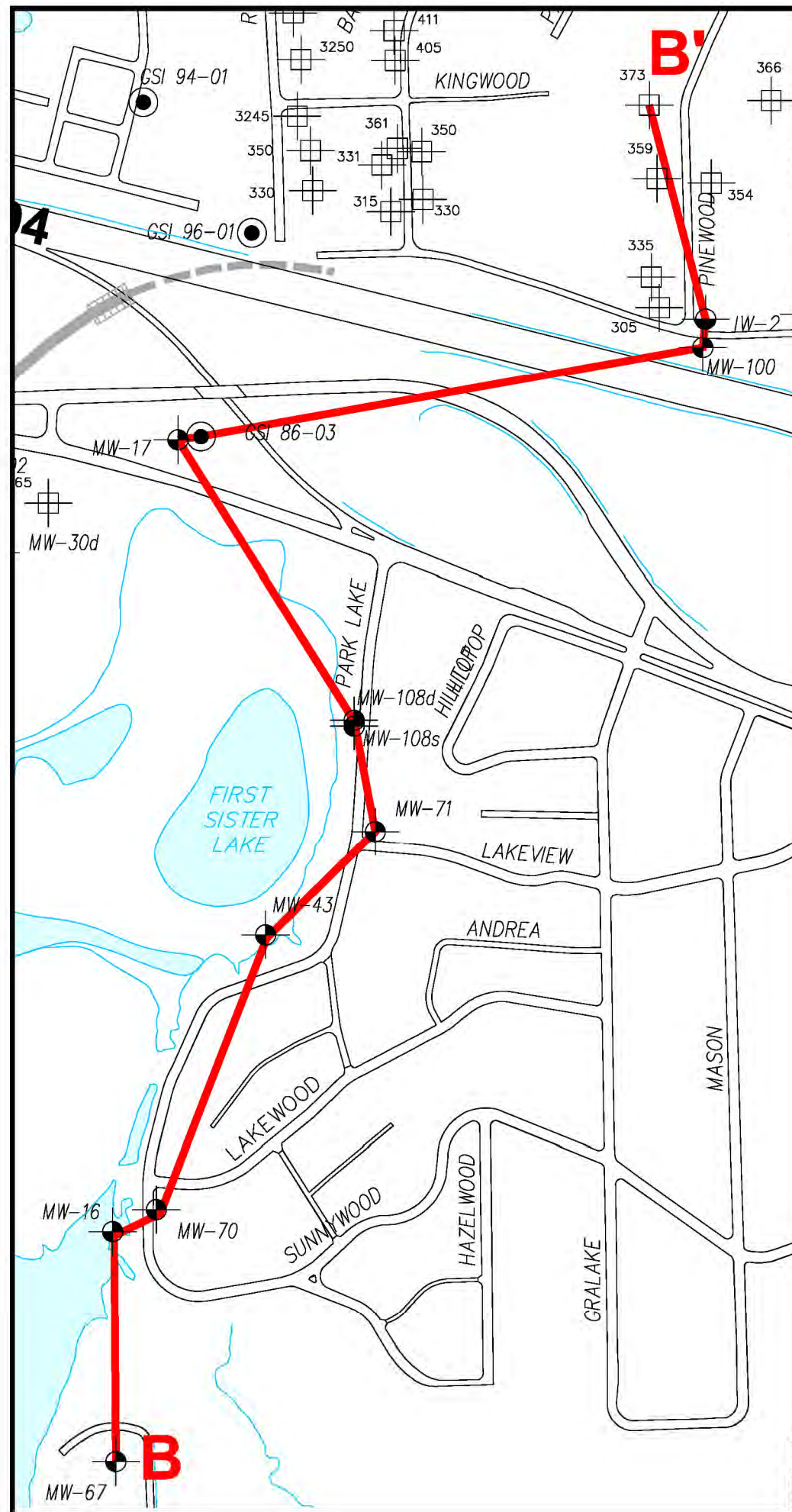


## Appendix A









**CROSS SECTION B-B'**

**fic&h**  
engineers  
scientists  
architects  
constructors

fishback, thompson,  
carr & huber, inc.  
Hard copy is  
intended to be  
11"x17" when  
plotted. Scale(s)  
indicated and  
graphic quality may  
not be accurate for  
any other size.

**Pail Life Sciences**  
Soc Twp., Washtenaw County, Michigan  
Performance Review - Wagner Road  
Interim Response

PROJECT NO.  
F96502  
FIGURE NO.  
**3**