SIXTH FIVE-YEAR REVIEW REPORT FOR OAKDALE DUMP SUPERFUND SITE WASHINGTON COUNTY, MINNESOTA

Prepared by

U.S. Environmental Protection Agency
Region 5
Chicago, Illinois

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Signed by: DOUGLAS BALLOTTI

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LIST OF ABBREVIATIONS & ACRONYMS

CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
C.F.R.	Code of Federal Regulations
CO	Consent Order
EPA	United States Environmental Protection Agency
FYR	Five-Year Review
ICs	Institutional Controls
IPE	Isopropyl Ether
MCL	Maximum Contaminant Level
MDH	Minnesota Department of Health
MPCA	Minnesota Pollution Control Agency
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
OU	Operable Unit
PCB	Polychlorinated Biphenyl
PFAS	Per- and polyfluoroalkyl substances
POTW	Publically Owned Treatment Works (Municipal Wastewater Treatment Plant)
ppb	Parts per Billion
PRP	Potentially Responsible Party
RAL	Recommended Allowable Limit
RAO	Remedial Action Objectives
RAP	Remedial Action Plan
ROD	Record of Decision
SACO	Settlement Agreement and Consent Order
Site	Oakdale Dump Superfund Site
SVE	Soil Vapor Extraction
UU/UE	Unlimited Use and Unrestricted Exposure
VOC	Volatile Organic Compound

I. INTRODUCTION

The purpose of a Five-Year Review (FYR) is to evaluate the implementation and performance of a remedy in order to determine if the remedy is and will continue to be protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in FYR reports such as this one. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

The United States Environmental Protection Agency (EPA) is preparing this FYR pursuant to Section 121 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This FYR is consistent with EPA regulations set forth in the National Contingency Plan (NCP) at (40 C.F.R. Section 300.430(f)(4)(ii)), and considers EPA policy.

This is the sixth FYR for the Oakdale Dump Superfund Site (Site). The triggering action for this policy review is the signature date of the previous FYR. The FYR has been prepared due to the fact that hazardous substances, pollutants, or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure (UU/UE).

The Site consists of one operable unit (OU) which is reviewed and addressed in this FYR. The Site consists of three separate non-contiguous properties (Abresch, Brockman, and Eberle) that were historically used to dispose of industrial and non-industrial wastes. No response actions were found to be necessary at the Eberle property. Response actions have been completed at the Brockman property, and response actions have been implemented and are continuing at the Abresch property.

Erik Hardin, Remedial Project Manager (RPM), EPA Region 5 led this FYR. Participants included Timothy Lockrem, Project Manager, Minnesota Pollution Control Agency (MPCA), and Kevin Madson, Environmental Engineer, 3M (the potentially responsible party or PRP). MPCA and 3M were notified of the initiation of the FYR, and the review began on 8/16/2018.

Site Background

As mentioned above, the Site consists of three properties (Abresch, Brockman, and Eberle) which are located approximately 11 miles west of downtown St. Paul, Minnesota, in the city of Oakdale, Minnesota. The approximately 55-acre Abresch property is located north and south of Highway 5 and west of Hadley Avenue. The approximately 5-acre Brockman property is located southwest of the Abresch property across Granada Avenue North. The approximately 2-acre Eberle property is located north of the Abresch property. The three properties comprising the Site are depicted on the map that is Appendix B. The Site consists of gently rolling landscape within a commercial, residential, and light industrial area of Oakdale. The Abresch property is the only portion of the Site with ongoing activities (specifically groundwater treatment). The Eberle property is a park surrounded by residential home sites. The Brockman property is in a commercial development. Portions of the Site contain marsh areas. Raleigh Creek flows through the Abresch property. The land use surrounding the Site is expected to continue as is, although additional development is expected.

The Site was utilized for the disposal of industrial and non-industrial wastes. The Abresch property was used as a waste burial and drum reclamation site from the mid-1940s until 1961. Scrap materials, plastics, resins and solvents in drums and smaller containers were disposed of in trenches in upland and wetland areas. Similar disposal methods were used at the Brockman property. The Eberle property was

used for open burning of combustible materials. Wastes were disposed onto the ground and ignited.

MPCA began investigating the three properties associated with the Site in 1980, prior to the enactment of CERCLA. Although MPCA conducted investigation activities at the Site, a formal CERCLA remedial investigation and feasibility study (RI/FS) was not conducted. MPCA identified volatile organic compounds (VOCs) in shallow residential wells in the area, including benzene at concentrations above drinking water standards, as well as drums and smaller containers of VOCs buried at the Site. MPCA also determined that soils at the Site were contaminated with isopropyl ether (IPE), acetone, polychlorinated biphenyls (PCBs), and heavy metals. During these early investigations, contaminated soil along with debris and drums were removed from burial trenches onsite.

In July 1983, the Minnesota Department of Health (MDH) issued a health risk assessment for the Site, and the Site was placed on the National Priorities List (NPL) on September 8, 1983. Though no record of decision (ROD) was issued for the Site, the clean-up remedy was prescribed in a 1983 Consent Order (CO) between EPA, MPCA, and 3M.

The results of VOC investigations conducted after the CO was issued determined that no response actions were necessary at the Eberle property. VOC investigations and follow-up actions have been completed for the Brockman property based on information presented in previous FYRs. The response actions that continue on the Abresch property are the primary focus of this FYR.

Per- and polyfluoroalkyl substances (PFAS) were identified in soil and groundwater at the Site in 2004. 3M conducted an investigation of the extent and magnitude of the PFAS impacts. 3M signed a Settlement Agreement and Consent Order (SACO) in 2007 with MPCA to address the PFAS contamination at the Site. 3M's response to PFAS contamination has included the installation of additional pump-out wells and the installation of an activated carbon pre-treatment system. Although these PFAS response activities have likely resulted in an increased rate of removal of VOCs from the groundwater, PFAS-related activities are not a part of the CERCLA action at the Site and are not evaluated in this FYR.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Oakdale Dump		
EPA ID: MND980609515		
Region: 5	**State:** MN	**City/County:** Oakdale/Washington County
SITE STATUS		
NPL Status: Final		
Multiple OUs? No	**Has the Site achieved construction completion?** Yes	

REVIEW STATUS
Lead agency: State ***[If "Other Federal Agency", enter Agency name]*:**
Author name (Federal or State Project Manager): Erik Hardin
Author affiliation: EPA
Review period: 8/16/2018 - 8/5/2019
Date of site inspection: 10/11/2018
Type of review: Policy
Review number: 6
Triggering action date: 9/16/2014
Due date *(five years after triggering action date)*: 9/16/2019

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

MPCA did not conduct a formal CERCLA RI/FS nor did it issue a ROD for the Site. Thus, MPCA never created a specific list of contaminants of concern. However, MPCA did conduct an investigation, and contaminated soil and source material were removed during the investigation. Also, MDH conducted a human health risk assessment in 1983 that identified the following remaining exposure concerns:

1) Numerous VOCs and metals were identified in groundwater located on-site, including the following contaminants in concentrations exceeding applicable drinking water standards at the time:
    a. Chromium
    b. Mercury
    c. Beryllium
    d. Nickel
    e. Selenium
    f. Benzene
    g. 1,2-dichloroethylene
    h. 1,2-dichloroethane
    i. Dichloromethane
    j. Trichloroethylene

2) Two residential drinking water wells located adjacent to the Site were found to have benzene above the Primary Drinking Water Standard in the Safe Drinking Water Act at the time (6.6 parts

per billion or ppb), and two other residential wells had benzene concentrations that were just below this standard.

3) Migration of contaminated groundwater located on Site to nearby residential drinking water wells was found to be a significant threat.
4) Although solvent contamination was identified in surface waters on the Site at only trace levels, MDH recommended that direct contact with these waters be avoided because of the potential for wide variability in contaminant levels.
5) Although a number of soil contaminants (primarily metals) were identified on the Site, none were found to be above levels posing a risk through inhalation, ingestion, or crop uptake.

An ecological risk assessment has not been conducted for the Site.

Response Actions

MPCA removed some contaminated soil and source materials during the initial investigation of the Site beginning in 1980. After this initial investigation by MPCA, 3M conducted more thorough hydrogeologic investigations at the Site, resulting in recommendations that a plan be developed for the selective removal of wastes from the Abresch and Brockman portions of the Site, the multi-aquifer wells be properly abandoned, and a monitoring well network be established for a groundwater monitoring program.

As part of the 1983 CO, the parties developed a Remedial Action Plan (RAP) for the Site. Though the RAP did not specifically identify remedial action objectives (RAOs) by name, it did identify the following as the purpose for the RAP:

- to further define the extent and location of wastes on the Site;
- to delineate procedures for implementing the selective removal of waste;
- to develop disposal options;
- to carry out a monitoring program while the work is underway;
- to implement a system to control contaminated groundwater; and
- to define a long-term monitoring system to ascertain if all contaminants have been removed or confined to the Site.

The RAP included the following components of the remedy:

- Reconstruction (as a monitoring well) or abandonment of the multi-aquifer wells near the Site;
- Reconstruction (as a monitoring well) or abandonment of any other drinking water wells impacted by the Site:
- Removal of all containers and barrels of hazardous waste that were identified through the geophysical survey;
- Removal and/or treatment of heavily contaminated soils in the Abresch and Brockman properties;

- Construction and operation of a shallow groundwater pump-out system to contain contaminated groundwater (with discharge to the municipal wastewater treatment system or POTW); and
- Establishment of a long-term monitoring well network that will detect changes in groundwater quality at the Site.

3M initiated these response actions with MPCA oversight in 1985, beginning with excavation and removal of buried wastes at the Abresch and Brockman properties, sealing of 39 multi-aquifer wells, and installation of a groundwater pump-out system.

In 2007, 3M expanded its groundwater extraction system and installed an activated carbon treatment system for pre-treatment before discharge to the POTW. These groundwater enhancements were put in place as part of an agreement with MPCA to treat PFAS, which are not subject to the CERCLA action being reviewed in this FYR. However, the enhanced groundwater treatment also likely improved the treatment of VOCs that are a part of the CERCLA action being reviewed in this FYR.

In 2010, 3M and MPCA agreed to a comprehensive groundwater monitoring/sampling plan for both VOCs and PFAS. Based on previous data, the 2010 sampling plan requires 3M to monitor for the following VOCs in groundwater:

- Acetone
- Benzene
- 1,1-Dichloroethane
- 1,2-Dichloroethane
- 1,1-Dichloroethene
- cis-1,2-Dichloroethene
- trans-1,2-Dichloroethene
- Ethylbenzene
- Isopropyl ether
- Methyl ethyl ketone
- Tetrahydrofuran
- Isopropyl alcohol (2-Propanol)
- 2-Butyl alcohol
- Methyl isobutyl alcohol
- Methylene chloride
- Methyl isobutyl ketone
- Toluene

Status of Implementation

3M implemented all components of the RAP, including the following:

- Identified areas of concentrated wastes were removed and disposed of off-site in 1983 and 1984.
- A total of 39 privately owned water supply wells were sealed in 1984 to eliminate multi-aquifer migration pathways.
- A shallow groundwater extraction system constructed in 1984 continues to operate on the Site (Abresch Property) and has since functioned as designed.

Since 1985, the extraction system has removed an estimated volume of 41,900 gallons (~140 tons) of VOCs and has pumped an estimated volume 594 million gallons of groundwater during that time, as documented in the *2017 Annual VOC Groundwater Monitoring Report* (Weston, June, 2018). This report is included as Appendix C of this FYR. Data in this report also shows that the groundwater extraction system continues to control the horizontal and vertical migration of VOC impacted groundwater. Specifically, since 1985, groundwater elevations have demonstrated cones of depression

from pump-out wells throughout the Site (horizontal containment), and groundwater levels in the shallow and basal alluvium monitoring wells have maintained lower elevations than groundwater elevations in the underlying Platteville bedrock formation (vertical containment). In general, total VOC concentrations in Site monitoring wells have shown decreasing trends over time as shown by the data included in Appendix C of this report. However, groundwater contamination exists on-site above EPA's Primary Drinking Water Standards.

Institutional Controls

A ROD was never issued for the Site. Instead, EPA, MPCA, and 3M entered into a CO in 1983 that prescribed the required response actions to be implemented. The 1983 CO did not include detailed requirements concerning institutional controls (ICs). However, groundwater contamination exists on-site above levels allowing for UU/UE, and portions of the Site have only been cleaned up to industrial or commercial levels. A summary of the implemented and planned ICs for the Site is listed in Table 1 and are further discussed below.

Though a specific IC map has not been created, the map in Appendix B serves to delineate the Site based on different IC needs. The groundwater at the Abresch Property is still above levels allowing for UU/UE and all groundwater use should be prohibited at this portion of the Site until cleanup levels are reached.[1] ICs should also limit the future use of the Abresch Property to commercial or industrial because of the soil cleanup levels achieved. Similarly, ICs should limit the future use of the Brockman Property to light industrial use. No ICs are needed at the Eberle Property. EPA recommends that a map depicting current conditions of the Site and areas that do not allow for UU/UE be developed in the IC Follow-up Actions discussed below.

ICs, in the form of restrictive covenants, have been identified in the previous FYRs as the preferred IC for the Site due to their ability to run with the land and help ensure future protectiveness of human health and the environment. The 2007 SACO includes the requirement for appropriate ICs be in place for the Site. A draft environmental restrictive covenant was completed by 3M and submitted to MPCA for review. According to MPCA, the environmental restrictive covenant will include requirements for continued operation of the groundwater treatment system, as well as continued groundwater monitoring for both relevant VOCs and PFAS compounds.

The response action performance standards for groundwater are the Safe Drinking Water Act MCLs for public water supplies and the MDH Recommended Allowable Limits (RALs) for contaminants of concern. Once those levels are met, the Abresch property is expected to attain UU/UE standards for groundwater, though property usage restrictions may still apply based on the soil cleanup levels achieved. The cleanup of the Brockman property assumes that the Site can be used for light industrial purposes, and the 3M-owned portions of Brockman property will be covered in the environmental covenant. The Eberle property did not require any response actions because it already met UU/UE standards.

[1] MPCA expects that PFAS cleanup levels in the 2007 SACO will take longer to achieve than that of the VOCs that were the subject of the 1983 CO.

Current Status of Access and Institutional Controls

Even though all needed ICs have not yet been implemented and based on inspections and interviews, EPA is not aware of any uses of the Site or contaminated media which are inconsistent with the objectives to be achieved by the ICs.

The portion of the Abresch property south of Highway 7 is fenced. The fence north of Highway 7 was removed after the soil response action to address PFAS impacted soils was completed. A portion of the Brockman property is under commercial reuse. The remaining vacant portions of the Brockman property are owned by 3M. The Eberle property is currently a city park and never required access restrictions.

MPCA is responsible for periodic inspections and oversight over 3M's operation and maintenance (O&M) activities. MPCA notified the surrounding community of the contaminated groundwater and need for limited exposure at the Site by connecting residences to city water supplies. In March 2007, MDH issued a Special Well Construction Area notice that prohibits nearby residents from constructing, maintaining, sealing, or disturbing drinking water wells without prior approval by MDH. A copy of the Special Well Construction Area Notice is included in Appendix D. In addition, Washington County has issued rules to limit installation of new drinking water wells and requires notification of these restrictions be communicated with property transfers.

Follow-up Actions

EPA recommends that 3M amend the O&M Plan to document long-term stewardship procedures. Long-term stewardship procedures should describe at a minimum: (1) monitoring activities and schedules; (2) responsibilities for performing each task; (3) reporting requirements; and (4) a process for addressing any potential IC issues that may arise during the reporting period.

EPA recommends that MPCA develop an ICs map for the Site during the next review period.

MPCA has informed EPA that it is currently reviewing the draft Environmental Restrictive Covenant and that once the Environmental Restrictive Covenant is signed by the appropriate parties, it will be recorded at the Washington County Recorder's Office.

Long-Term Stewardship and Land Use Plans

Long-term protectiveness at the Site requires compliance with effective ICs to assure the remedy continues to function as intended. Since compliance with ICs is necessary to assure the long-term protectiveness of the remedy, planning for long-term stewardship is required. Long-term stewardship will ensure that effective ICs are maintained, monitored and enforced, and that the remedy continues to function as intended with regard to ICs. With MPCA oversight, 3M will review and revise the O&M Plan, as needed, to ensure long-term stewardship procedures are in place. The O&M Plan will include regular reviews of ICs at the Site and annual certifications to MPCA that ICs are in-place and effective. Additionally, use of a communications plan and use of a one-call system should be explored as part of O&M activities at the Site.

Table 1: Summary of Planned and/or Implemented ICs

Media, engineered controls, and areas that do not support UU/UE based on current conditions	ICs Needed	Specific ICs Called for in Decision Documents	Impacted Parcel(s)	IC Objective	Title of IC Instrument Implemented and Date (or planned)
Groundwater	Yes	No	Brockman and Abresch portions of Site.	Restrict construction, maintenance, sealing, or disturbance of groundwater wells.	Planned: IC plan will evaluate 2007 MDH designation; determine if additional ICs are needed/required. Implemented: Washington County Special Well Construction Area was established pursuant to MN. Rules Part 4725.3650 MN. Stat. Section 1031.236 requires sellers to disclose special well construction areas (under review).
Soil & Groundwater	Yes	No	Areas A, B, C, D of Abresch portion of Site.	Prohibit construction, excavation, or placement of any structure or any other item. Prohibit installation of any drinking water wells on the property.	Planned: MPCA is reviewing a draft environmental restrictive covenant from 3M that was drafted in accordance with the 2007 SACO. MPCA intends to ensure this covenant will meet all IC needs for both the 2007 SACO and for the CERCLA/VOC action at the Site.
Soil & Groundwater	Yes	No	Brockman portion of Site.	Current use is commercial and wooded. Prohibit installation of any drinking water wells on the property.	Same as Abresch Portion of Site.
Surface Water	Under Review	Under Review	Brockman and Abresch portions of Site.	This is under evaluation to determine if the use of surface water should be restricted.	Under Review
Other Response Action Components	Under Review	Under Review	Brockman and Abresch portions of Site.	Prohibit Inconsistent Uses and protect the integrity of the remedy components.	Under Review

Systems Operations/Operation & Maintenance

3M continues to operate a groundwater extraction system at the Abresch Property to prevent groundwater contamination from migrating beyond the Site. As part of this remedy implementation, 3M conducts quarterly and semi-annual groundwater monitoring as well as depth to water measurements in monitoring wells at the Abresch Property.

3M conducts ongoing O&M of the groundwater extraction system. Maintenance is performed to reduce the amounts of biological growth and particulate matter that accumulate in the wells before flow is restricted. Containment system maintenance includes: 1) cleaning, repairing, or replacing pumps and flow meters, 2) chemical well treatment, and 3) cleaning discharge lines. The system is inspected by 3M or its consultant to monitor and maintain the groundwater extraction system.

No substantial issues with operational practices were identified during this reporting period.

III. PROGRESS SINCE THE LAST REVIEW

This section includes the protectiveness determinations and statements from the last FYR as well as the recommendations from the last FYR and the current status of those recommendations.

Table 2: Protectiveness Determinations/Statements from the 2014 FYR

OU #	Protectiveness Determination	Protectiveness Statement
OU1/Sitewide	Short-term Protective	The remedy at the Oakdale Dump Site is currently protective of human health and the environment in the short term. Exposure pathways to soil and groundwater at the Site are being controlled because source areas of soil contamination have been removed, and groundwater is controlled by the groundwater extraction system and by the abandonment of impacted wells. However, in order for the remedy to be protective in the long- term, the following actions need to be taken: 1) implementation of ICs and 2) further evaluation for potential vapor intrusion pathways in the vicinity of the Site. Additional response actions to address PFC contamination in groundwater at the Site will enhance protectiveness as extracted groundwater will be treated with carbon prior to discharge to the sanitary sewer system.

Table 3: Status of Recommendations from the 2014 FYR

OU #	Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
OU1 /Site wide	Institutional Controls are not currently in place for the Site.	Institutional controls should be implemented.	Ongoing	MPCA is reviewing a draft environmental restrictive covenant from 3M. EPA will review the covenant once complete to determine if it meets the IC needs for the Site.	
OU1 /Site wide	Potential vapor risk to adjacent receptors.	Complete soil vapor sampling to evaluate the potential vapor risks to adjacent receptors.	Completed	3M conducted a study, which MPCA approved, and the study determined that vapor intrusion is not occurring. However, to reduce the potential risk for future vapor intrusion exposures, 3M voluntarily installed a soil vapor extraction (SVE) system on the Abresch property.	4/6/2017
OU1 /Site wide	The 1983 CO required 30 years of operation which will be met in 2015	The 1983 CO requirements should be reviewed relative to current required Site operations and revised as necessary for the Site to remain protective beyond this 30-year period.	Completed	The requirements of the 1983 CO were reviewed and it was determined that the requirement for continued operation of the groundwater extraction system until VOC clean up standards are met is covered by the 1983 CO.	9/3/2019

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Involvement & Site Interviews

A public notice was made available by a newspaper posting in the *Oakdale/Lake Elmo Review* on 7/31/2019, stating that there was a FYR underway and inviting the public to submit any comments to EPA. No comments have been received. The results of the review and the report will be made available at the Site information repository at MPCA headquarters located at 520 Lafayette Road North in St. Paul, Minnesota 55155-4194 and online at: https://www.epa.gov/superfund/search-superfund-five-year-reviews.

Data Review

EPA reviewed the 2013, 2014, 2015, 2016, and 2017 Annual VOC Groundwater Annual Monitoring Reports (AMR) for the Site for this FYR, and these reports are available for review on EPA's website for the Site (http://www.epa.gov/superfund/oakdale-dump). The 2018 VOC AMR was not available for review while this report was being developed. The 2017 VOC AMR is included as Appendix C of this FYR.

Since treatment of the groundwater at the Site began in 1985, an estimated 140 tons of VOCs have been removed by the extraction system, which has pumped over 594 million gallons of groundwater during that time. The current network of groundwater extraction wells consists of twenty pumping wells (PW-1, PW-3, PW-4, PW-6, PW-10, PW-11, and PW-14 through PW-26). Originally, eleven wells extracted groundwater. Three of the wells were converted to monitoring wells (PW-7, PW-8 and PW-9 in 2003) and one (PW-5) was sealed based on data gathered during the first ~15 years of operation. An additional 13 groundwater extraction wells (PW-14 through PW-26) were installed in 2008 and 2011 as part of the remedial action for PFAS being conducted under the 2007 SACO.

The 2013-2017 VOC AMRs demonstrate that the groundwater treatment system continues to remove VOCs from groundwater, though at a decreasing rate. The groundwater treatment system initially removed VOC concentrations at the highest rates after its startup in 1985. Around 1992, the rate of VOC removal began to occur at a decreasing rate. This was to be expected because VOC concentrations in the groundwater decrease while the rate of groundwater removal remains consistent. Figure 4-1 of Appendix C is a graphical representation of the rates of VOC removal and groundwater removal as a function of time.

According to the data in Appendix C, some VOCs in groundwater remain above drinking water standards. For example, benzene was found to be as high as 1,600 ppb during this sampling event, compared to its federal drinking water standard (maximum contamination level or MCL) of 5 ppb. Tables 3-2 through 3-6 in Appendix C are the results of VOC sampling at the extraction and monitoring wells on the Site.

The data in the 2013-2017 VOC AMRs demonstrate that the hydraulic control exhibited by the treatment system is effective and consistent. Figures 3-5 through 3-12 of Appendix C are contour maps of the alluvial (upper) aquifer and demonstrate the horizontally gradient control exhibited by the pumping action of the extraction wells. Figure 3-4 of Appendix C is a graphical representation of the hydraulic head pressures exhibited by wells in the lower alluvial wells (lower portion of the upper aquifer) compared to the hydraulic head pressures exhibited by wells in the Platteville formation (lower aquifer). The lower hydraulic head pressures in the wells in the lower alluvial aquifer compared to those of the wells in the Platteville formation results in an upward vertical gradient. The overall resulting effect is that groundwater contamination is contained to the Site.

The 2017 Vapor Sampling Summary Report for the Former Oakdale Disposal Site was also reviewed for this FYR. The sampling conducted as part of this study found that not only did none of the soil vapor samples exceed Minnesota's default sub-slab action level (the indoor air screening values with a 33 times sub-slab to indoor air attenuation factor), but only two soil vapor samples exceeded (marginally) Minnesota's actual indoor air screening value without any attenuation factor. Despite these results, 3M voluntarily installed an SVE system at the northern portion of the Abresch property to insure that soil vapors would not pose a threat in the future.

Site Inspection

The inspection of the Site was conducted on 10/11/2018. In attendance were Erik Hardin, RPM, EPA, Timothy Lockrem, Project Manager, MPCA, and Kevin Madson, Environmental Engineer, 3M. The purpose of the inspection was to assess the protectiveness of the remedy. Appendix E contains the Site Inspection Checklist.

The monitoring wells, extraction wells, piezometers, and fencing on the Abresch portion of the Site were observed to be in good condition. The groundwater treatment facility appeared to be well maintained and was functioning in general accordance with the operations plan based on discussions with Mr. Madson of 3M.

No issues were noted during the inspection.

V. TECHNICAL ASSESSMENT

QUESTION A: Is the remedy functioning as intended by the decision documents?

Question A Summary:

Yes, the remedy is functioning as intended. The selected remedy required removal of concentrated areas of waste, sealing of multi-aquifer wells, operation of a groundwater containment and extraction system, and development of a groundwater monitoring network.

- Identified areas of concentrated wastes were removed and disposed of off-site in 1983 and 1984.
- A total of 39 privately owned water supply wells were sealed in 1984 to eliminate multi-aquifer migration pathways.
- A shallow groundwater extraction system constructed in 1984 continues to operate on the Site and is functioning as designed. Data reviewed for this FYR as discussed in the Data Review Section indicates that the extraction system is controlling the horizontal and vertical movement of VOCs in the affected aquifers. The concentration of VOCs in the extracted groundwater continues to show a downward trend.

No substantial issues with operational practices were identified during this review period. System maintenance is performed regularly, and operational issues have been addressed promptly. Fencing is in place surrounding the active extraction well area of the southern part of the Abresch property.

ICs have not been fully implemented. ICs need to be developed to restrict land use and protect site infrastructure at the Abresch and Brockman Properties. Although not all ICs have been implemented, there are currently no known uses of the Site which would be considered inconsistent with the objectives to be achieved by the ICs.

> The RAP attached to the 1983 CO required that 3M continuously operate the groundwater monitoring system associated with the groundwater extraction system "for thirty years unless it can be demonstrated to the satisfaction of the MPCA Commissioner and U.S. EPA with the monitoring well data that the sites no longer significantly impacts the area ground water and surface water." The RAP further states, "An annual review will be conducted by representatives of the MPCA, EPA, and 3M to determine the effectiveness of the pump out system and the need for continued operation of the system." In 2015, the groundwater monitoring system had been operated for thirty years. Concentrations of several VOCs continue to exceed their respective drinking water standards in 2017. Cessation of the groundwater monitoring system does not appear warranted at this time based on available information relative to the requirements of the

1983 CO. Therefore, a requirement to continue monitoring the groundwater extraction system should be established in a new legal document or a modification of the 1983 CO.

QUESTION B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

Question B Summary:

The intent of the remedy is to address VOC contamination through groundwater containment, not aquifer restoration. The purposes of the RAP under the 1983 CO that serve as RAOs will remain valid because additional receptors to VOC-contaminated groundwater have not been identified at or downgradient of the Site. The concentration of VOCs in groundwater has continued to generally decline during the past five years.

During the previous FYR period, the exposure pathway at the northern part of the Abresch portion of the Site changed due to excavation of PFAS and VOC contaminated wastes to depths up to approximately 16 feet below ground surface. Clean fill, about 4 feet or more in thickness, was placed over the entire excavated area. The fence surrounding the north part of the property was removed because the removal of the wastes and subsequent backfilling eliminated potential for contact exposure to the waste materials.

QUESTION C: Has any other information come to light that could call into question the protectiveness of the remedy?

No.

Issues and Recommendations Identified in the Five-Year Review:

OU(s): OU1/Site-wide	**Issue Category: Institutional Controls**			
	Issue: Institutional controls are not currently in place for the Site.			
	Recommendation: Institutional controls should be implemented.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA/State	9/15/2020

OU(s): OU1/Site-wide	Issue Category: Remedy Performance			
	Issue: 1983 CO requires monitoring of the groundwater treatment system for 30 years.			
	Recommendation: A requirement to continue monitoring the groundwater treatment system should be established in a new legal document or a modification of the 1983 CO.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	EPA/State	EPA/State	9/15/2021

OU(s): OU1/Sitewide	Issue Category: Institutional Controls			
	Issue: The 1983 CO did not include specific ICs as a component of the remedy.			
	Recommendation: A decision document should be issued requiring ICs as part of the remedy.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	EPA/State	EPA/State	9/15/2021

OU(s): OU1/Sitewide	Issue Category: Institutional Controls			
	Issue: Procedures are not in place to ensure long-term stewardship of ICs at the Site.			
	Recommendation: Amend the O&M Plan to document long-term stewardship procedures. Long-term stewardship procedures should describe at a minimum: (1) monitoring activities and schedules; (2) responsibilities for performing each task; (3) reporting requirements; and (4) a process for addressing any potential IC issues that may arise during the reporting period.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA/State	9/15/2020

OTHER FINDINGS

In addition, the following is a recommendation that was identified during the FYR and might promote beneficial reuse of the Site, but does not affect current or future protectiveness:

Upon implementation of appropriate ICs, as per the 2007 SACO between 3M and MPCA, EPA and MPCA may consider partial deletion of the Brockman and Eberle portions of the Site from the NPL.

VII. PROTECTIVENESS STATEMENT

OU1 & Sitewide Protectiveness Statement
Protectiveness Determination: Short-term Protective
Protectiveness Statement: The remedy at the Oakdale Dump Site currently protects human health and the environment because exposure pathways to soil and groundwater at the Site are being controlled. Source areas of soil contamination have been removed, and groundwater is controlled by the groundwater extraction system and by the abandonment of impacted wells. However, in order for the remedy to be protective in the long-term, the following actions need to be taken to ensure protectiveness: -ICs implemented at the site that adequately restrict use/activity; -a requirement to continue monitoring the groundwater treatment system should be established in a new legal document or a modification of the 1983 CO; -a decision document should be issued requiring ICs as part of the remedy; and - the O&M Plan should be amended to document long-term stewardship procedures.

VIII. NEXT REVIEW

The next FYR report for the Oakdale Dump Superfund Site is required five years from the completion date of this review.

APPENDIX A – REFERENCE LIST

1) 1983 Consent Order between EPA, MPCA, and 3M.
2) 2007 Settlement Agreement and Consent Order between MPCA and 3M (for PFAS)
3) 2013 Annual VOC Groundwater Monitoring Report for the Oakdale Site prepared by Weston on behalf of 3M.
4) 2014 Annual VOC Groundwater Monitoring Report for the Oakdale Site prepared by Weston on behalf of 3M.
5) 2014 FYR for the Oakdale Dump Site
6) 2015 Annual VOC Groundwater Monitoring Report for the Oakdale Site prepared by Weston on behalf of 3M.
7) 2016 Annual VOC Groundwater Monitoring Report for the Oakdale Site prepared by Weston on behalf of 3M.
8) 2017 Annual VOC Groundwater Monitoring Report for the Oakdale Site prepared by Weston on behalf of 3M.
9) 2017 Vapor Sampling Summary Report for the Former 3M Oakdale Disposal Site prepared by Arcadis on behalf of 3M.

APPENDIX B

Oakdale Dump Site

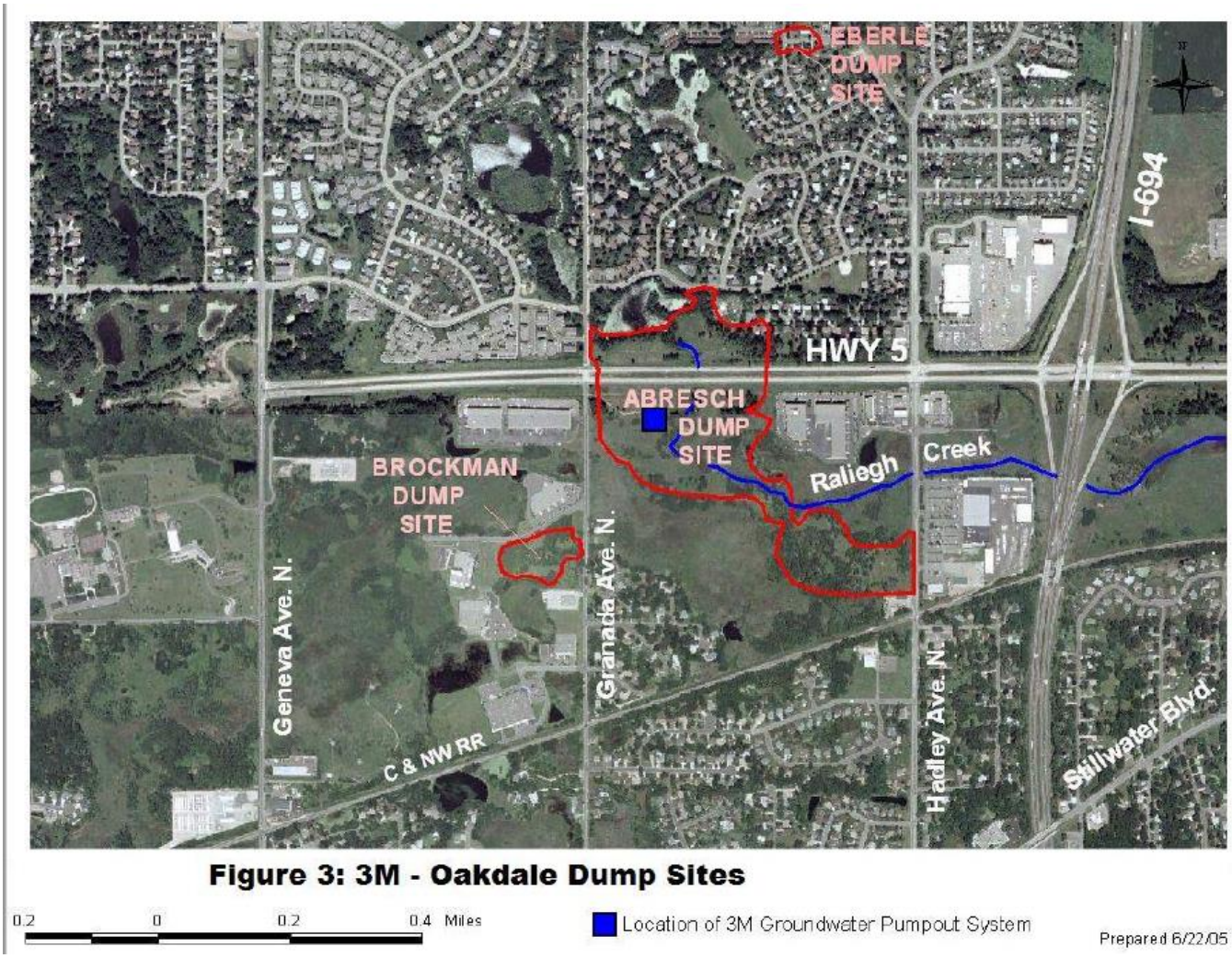

Figure 3: 3M - Oakdale Dump Sites

APPENDIX C

2017 Annual VOC Groundwater Monitoring Report for the Oakdale Site

3M Environment, Health, Safety, and Sustainability

3M Center 224-5W-17
St. Paul, MN 55144-1000

June 6, 2018

Mr. Gary Krueger
Supervisor, Site Remediation and Redevelopment Section
Remediation Division
Minnesota Pollution Control Agency (MPCA)
520 Lafayette Road North
St. Paul, MN 55155

Re: Former 3M Oakdale Disposal Site
Administrative Order by Consent and Response Order by Consent, July 26, 1983
2017 Annual VOC Groundwater Monitoring Report

Dear Mr. Krueger,

Enclosed is one (1) hardcopy of the subject report. An electronic copy of the report will be delivered via email. The report contains a summary of the data collected at the Site in 2017 to evaluate the groundwater pumpout system performance.

A separate report will be submitted for monitoring activities related to perfluorochemicals at the former 3M Oakdale Disposal Site.

Please contact me by phone at 651-737-3614 or by email at kmadson@mmm.com with any questions, comments, or concerns.

Sincerely,

Kevin Madson, EIT
Advanced Environmental Engineer
3M Corporate Environmental Programs

Enclosure

cc: Jai Kesari, Weston, (electronic)
David Cairns, Weston, (electronic)
Jim Kotsmith, 3M, (electronic)
D. Erik Hardin, USEPA, (hardcopy)
Patrick Sarafolean, MDH, (hardcopy)
Brian Backmeier, City of Oakdale, (hardcopy)
Evan Divas, MDH, (w/o enclosure)
Jessica Collin-Pilarski, Washington County, (w/o enclosure)
John Hanson, Valley Branch Watershed District, (w/o enclosure)
Bradley Lindaman, Ramsey-Washington Metro Watershed District, (w/o enclosure)
Harvey Thorleifson, MN Geological Survey, (w/o enclosure)
Randy Ellingboe, MDH, (w/o enclosure)
Chuck Ahl, City of Maplewood, (w/o enclosure)
Dan Boxrude, Short, Elliot & Hendrickson, (w/o enclosure)
Emma White, Metropolitan Council Environmental Services, (w/o enclosure)

2017 ANNUAL VOLATILE ORGANIC COMPOUND (VOC) GROUNDWATER MONITORING REPORT FOR THE OAKDALE SITE

OAKDALE, MINNESOTA

June 2018

Prepared for:

3M Company
St. Paul, Minnesota 55144

Prepared by:

Weston Solutions, Inc.
West Chester, Pennsylvania 19380

W.O. No. 02181.202.039.0002

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1. INTRODUCTION

Since 1980, the 3M Company (3M) has cooperated with the Minnesota Pollution Control Agency (MPCA) in the investigation and remediation of the Oakdale Site in Oakdale, Minnesota. The Oakdale Site consists of three former waste disposal areas, identified as the Abresch, Brockman and Eberle areas, that had received wastes from the 3M St. Paul area facilities; the 3M Cottage Grove, Minnesota, facility; and other companies/entities from the 1940s to 1960. Investigations and any follow-up actions have been previously completed for the Brockman and Eberle areas. The subject of this 2017 Annual Volatile Organic Compound (VOC) Groundwater Monitoring Report is the Abresch area, which will be referred to as the Site.

1.1 VOLATILE ORGANIC COMPOUND REMEDIAL ACTIVITIES

In the early 1980s, 3M conducted an investigation to characterize the presence of VOCs in various environmental media and to develop an understanding of the Site hydrogeology. In July 1983, 3M entered into a Consent Order (U.S. EPA, 1983) with the MPCA and the United States Environmental Protection Agency (U.S. EPA) to perform remedial actions at the Site. Subsequently, 3M removed waste materials and associated soils from the Site and, in 1985, installed a groundwater pumpout system to contain and remove shallow groundwater affected by VOCs at, and adjacent to, suspected source areas. 3M has operated the groundwater pumpout system continuously since 1985 to remediate the shallow groundwater affected by the VOCs.

In 2003, 3M and MPCA agreed to implement modifications to the VOC groundwater extraction program and corresponding monitoring plan based on the first 17 years of operation of the groundwater remediation system. As shown on Figure 1-1, the 2003 modification of the VOC monitoring program designated the following areas associated with the VOC pumpout system:

- Area A – The area upgradient of six pumpout wells (i.e., PW1, PW2, PW3, PW4, PW6 and PW11) on the central portion of the Site.

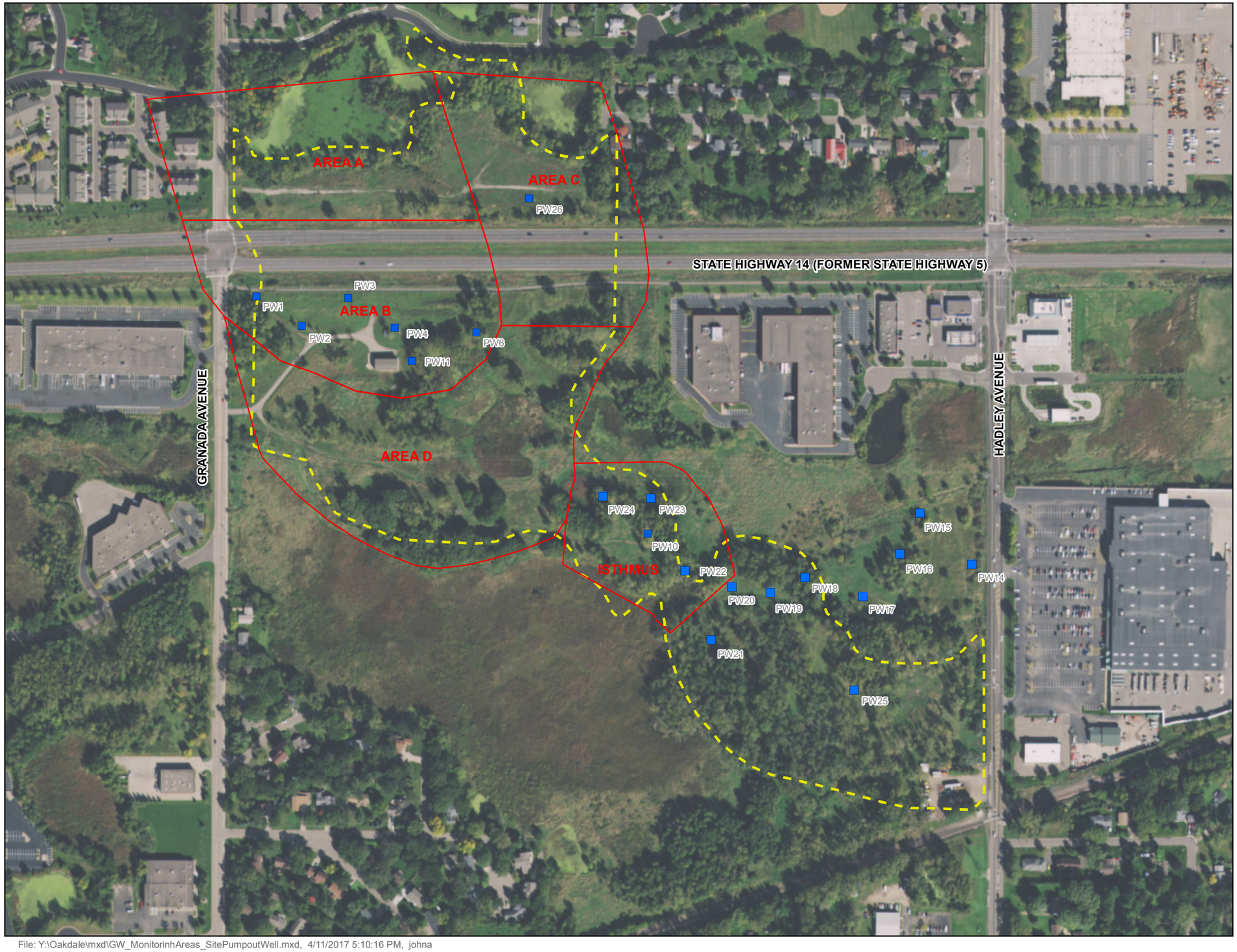
- Area B – The area associated with six pumpout wells (i.e., PW1, PW2, PW3, PW4, PW6 and PW11) on the western portion of the Site.
- Area C – The area associated with the three pumpout wells (i.e., PW7, PW8 and PW9) that were shut down in 2003 on the eastern portion of the Site.
- Area D – The area where changes in groundwater quality and elevation in the upper alluvium are evaluated relative to the cessation of pumpout wells PW7, PW8 and PW9 in 2003.
- Isthmus Area – The area associated with pumpout well PW10.

For consistency with previous reports, these designations are maintained in this report. As shown on Figure 1-1, thirteen additional groundwater pumpout wells (PW14 through PW26) were installed as part of the perfluorochemical (PFC) Remedial Design/Response Action (RD/RA) Plan for the Site (WESTON, 2009). These pumpout wells are primarily located in the southeast Site area, although three wells (PW22, PW23 and PW24) are located in the isthmus area and one well (PW26) is located in Area C. These wells provided additional containment and removal of VOCs in these areas of the Site.

1.2 PURPOSE OF THE GROUNDWATER VOC MONITORING REPORT

A groundwater monitoring program was developed in response to Part 8.0 of Exhibit A of the 1983 Consent Order. The purposes of the monitoring program are to "assess the effectiveness of the remedial program, detect any future contaminant migration into deeper aquifers, and to prevent any further exposure of harmful quantities of chemicals to the public that are presently being encountered in the shallow groundwater beneath the Oakdale Site."

In November 2010, 3M submitted a comprehensive site-wide PFC and VOC Groundwater and Surface Water Sampling Plan (Sampling Plan) to the MPCA (WESTON, 2010). The VOC monitoring program in the Sampling Plan remained the same as previously implemented. This annual report, prepared by Weston Solutions, Inc. (WESTON®) for 3M, is consistent with the annual report requirements described in the "Final Groundwater Monitoring Plan, Oakdale Disposal Sites" dated March 1985 (Barr, 1985).



Legend

- Inferred Limits of the Site Area
- Groundwater Monitoring Areas
- Pumpout Well

Imagery Source: ESRI Imagery Mapping Service, 2013

N W E S

0 300 600 Feet

Figure 1-1

Groundwater Monitoring Areas and Site Pumpout Wells

Oakdale Site
Oakdale, Minnesota

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2. MONITORING PROGRAM

2.1 GENERAL

The results discussed in this report provide a summary of the groundwater quality and groundwater elevation monitoring program for the VOC groundwater pumpout system at the Site. Monthly discharge reports for the groundwater pumpout system were prepared and sent to the City of Oakdale. A copy of each of these monthly discharge reports for 2017 is provided in Appendix A.

A network of groundwater pumpout wells has been in operation in the central area of the Site (south of Highway 14 (former Highway 5)) since the mid-1980s; this original network currently consists of six operating groundwater pumpout wells (PW1, PW2, PW3, PW4, PW6 and PW11) completed within unconsolidated sediments comprising the upper and lower alluvium aquifer. One other groundwater pumpout well (PW10) that is part of the original network is located in the central (isthmus) area of the Site. Twelve additional alluvial aquifer pumpout wells (PW14 through PW25) were installed in the central and southeast area of the Site in 2008 as part of the PFC RD/RA Plan at the Site. One additional alluvial aquifer pumpout well (PW26) was installed north of Highway 14 in September 2011 after soil excavation activities were completed in this area for the RD/RA program. The Site well locations are shown on Figure 2-1, and the regional monitoring well network is shown on Figure 2-2.

Table 2-1 contains a listing of the wells in the existing monitoring well network at the Site with the MPCA-approved wells to be sampled for VOCs and depth-to-groundwater measurements in 2017. As shown in Table 2-1, water level readings are taken quarterly from all monitoring wells/piezometers, with the single exception of a private well (W80). Well W80 is used for agricultural/irrigation purposes only and is not accessible to collect depth-to-groundwater measurements. Depth-to-groundwater measurements in pumpout wells are recorded when possible. VOC samples are collected from four wells (W26R, PW7, PW8 and PW9) on a semi-annual basis (performed in June and October/November 2017), and from 23 additional wells during the annual sampling round performed in October/November 2017.

2.2 SAMPLE COLLECTION AND ANALYSIS

Semiannual groundwater sampling for VOCs was conducted by WESTON on June 14, 2017, and October 31-November 2, 2017. All VOC samples were analyzed by Pace Analytical Services, Inc., Minneapolis, Minnesota. The planned water quality sampling at monitoring well W30 was not conducted since this well was dry during the October/November 2017 annual sampling event. Nine monitoring wells (W28, W29, W31, W33, W215, W2008, W2009, W2010 and W6102) were purged dry and sampled after recharging during the October/November 2017 event. No other modifications to the Field Sampling Plan were made during either semiannual sampling event. Sampling methods and analytical procedures are presented in the May 2003 QAPP (Barr Engineering Company, 2003).

As specified in the Sampling Plan, groundwater samples are collected and analyzed for two separate lists of VOC analytes. The VOC lists are as follows:

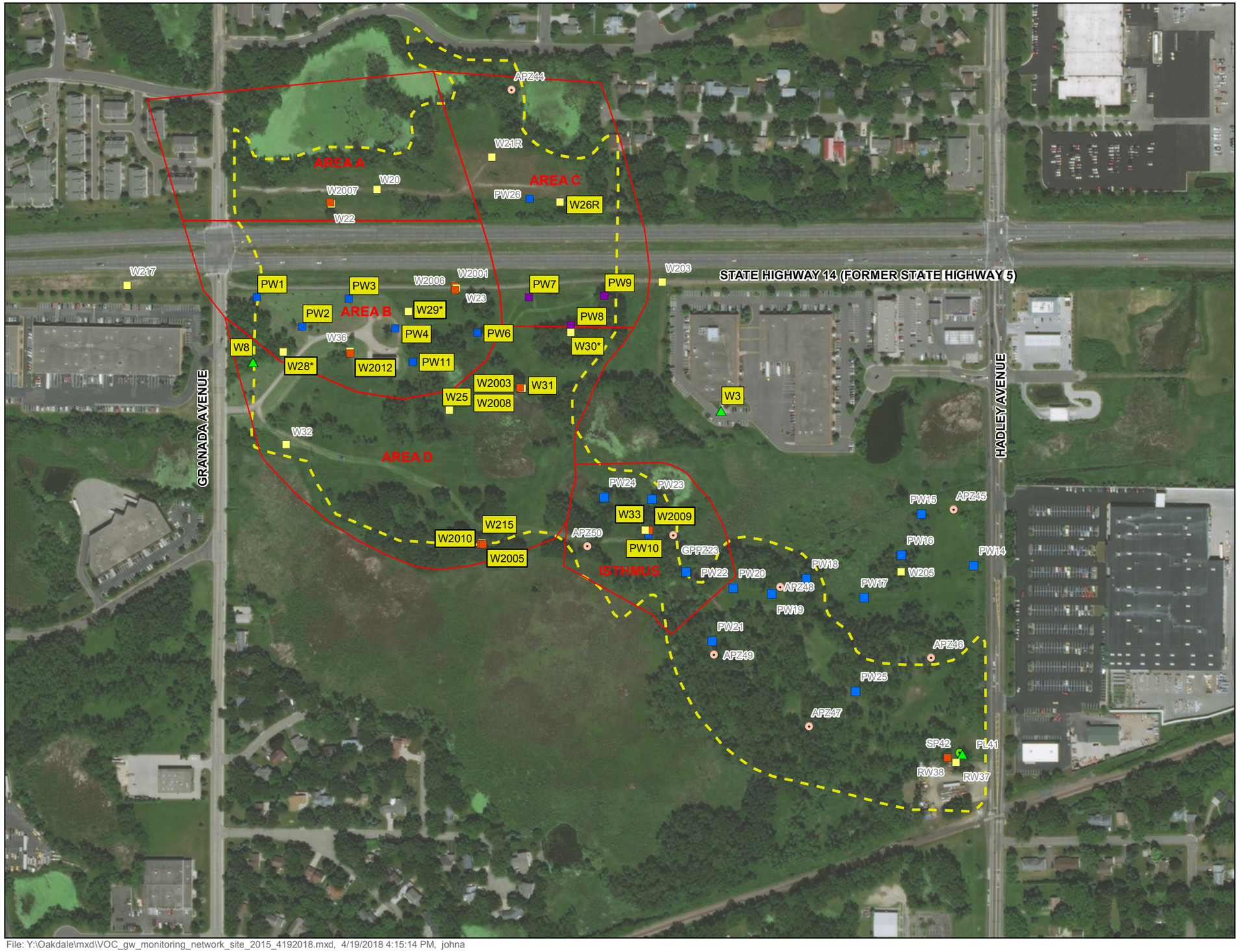
- **List 1 VOCs:**
  - Acetone
  - Benzene
  - 1,1-Dichloroethane
  - 1,2-Dichloroethane
  - 1,1-Dichloroethene
  - cis-1,2-Dichloroethene
  - trans-1,2-Dichloroethene
  - Ethylbenzene
  - Isopropyl ether
  - Methyl ethyl ketone (MEK)
  - Tetrahydrofuran

- **List 2 VOCs:**
  - Isopropyl alcohol (2-Propanol)
  - 2-Butyl alcohol
  - Methyl isobutyl alcohol (4-methyl-2-pentanol)
  - Methylene chloride
  - Methyl isobutyl ketone (MIBK)
  - Toluene
  - Xylenes, total

The groundwater samples collected in June and October/November 2017 were analyzed for both List 1 and List 2 VOCs, with the exception of the groundwater sample collected from agricultural/irrigation well W80, which was analyzed for List 1 VOCs only in accordance with the Sampling Plan.

2.3 SITE GROUNDWATER TREATMENT SYSTEM MONITORING

In accordance with the Metropolitan Council Environmental Services (MCES) permit for the groundwater treatment facility, monitoring of the water treated and discharged to the sewer was conducted at the Site in 2017. The individual monthly discharge reports for 2017 submitted to the City of Oakdale and the MPCA are included in Appendix A. Laboratory analytical and discharge volume data were submitted to the MCES in accordance with the requirements of the permit.



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WESTON SOLUTIONS

Legend

- Inferred Limits of the Site Area
- Groundwater Monitoring Areas
- Upper Alluvium Monitoring Well
- Lower Alluvium Monitoring Well
- Platteville Monitoring Well
- Alluvium Monitoring Well (Former Pumpout Well)
- Pumpout Well
- St. Peter Monitoring Well
- Piezometer
- W20 VOC Groundwater Sampling Location

Notes:
1) W21 and W26 were abandoned in November 2010. Replacement wells were installed and included in the monitoring network after soil excavation activities were completed in this area.
2) Wells denoted with an asterisk (*) are typically dry during periods of low precipitation and may not yield groundwater samples.

Imagery Source: ESRI Imagery Mapping Service, 2013

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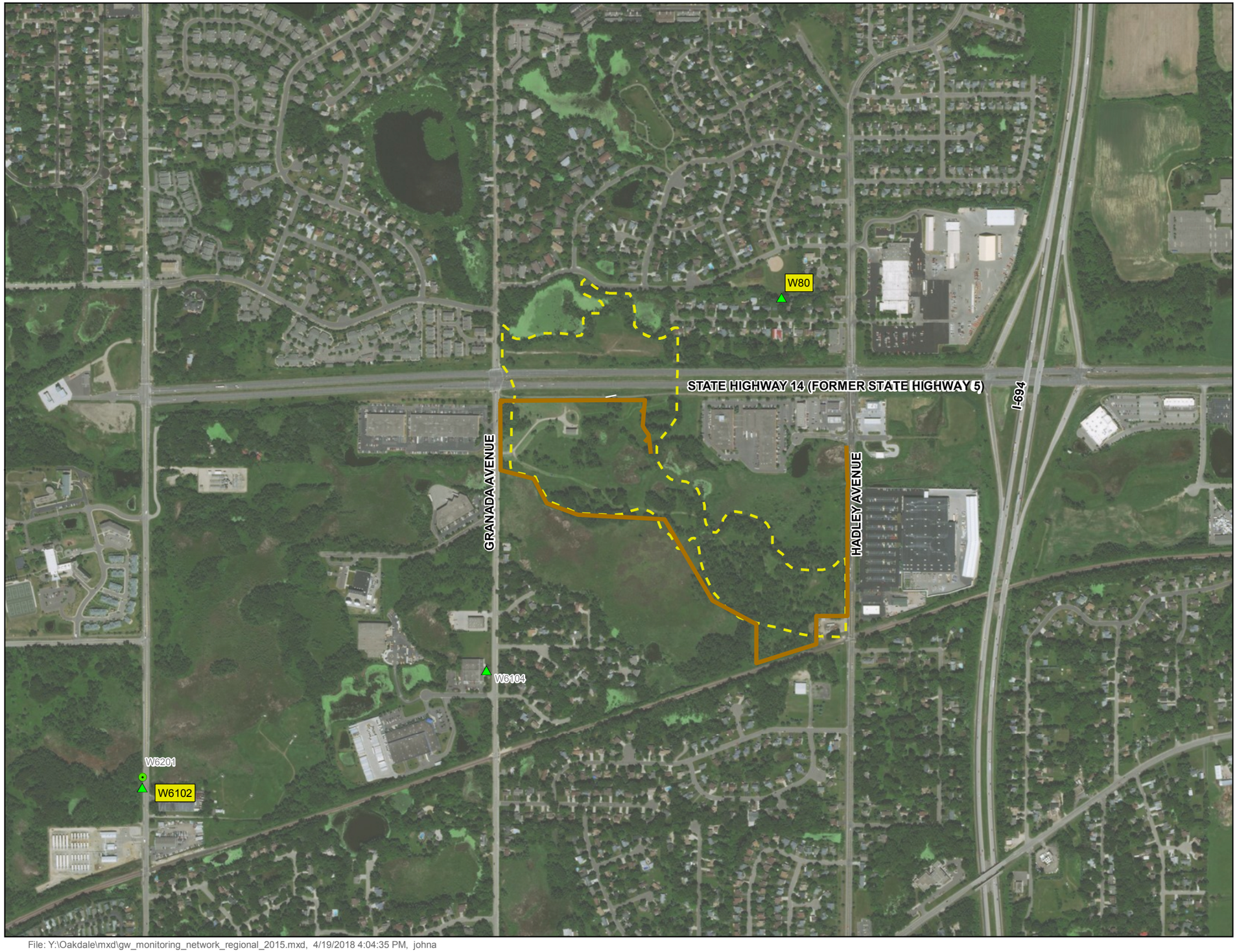
Figure 2-1

Site Groundwater VOC Monitoring Network - 2017

Oakdale Site
Oakdale, Minnesota



Legend

- Inferred Limits of the Site Area
- Fenceline
- Platteville Monitoring Well
- St. Peter Monitoring Well
- W80 VOC Groundwater Sampling Location

Imagery Source: ESRI Imagery Mapping Service, 2013

N W E S

0 330 660 1,320 Feet

Figure 2-2

Regional Groundwater VOC Monitoring Network - 2017

Oakdale Site
Oakdale, Minnesota

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Table 2-1

VOC Monitoring Plan Schedule - 2017
Oakdale Site, Oakdale, MN

Well	Aquifer	Well Type	Jan - March 2017	April - June 2017	July - Sept 2017	Oct - Dec 2017
Area A (upgradient of pumpout wells)						
W20	Upper Alluvium	Monitoring	WL	WL	WL	WL
W22	Upper Alluvium	Monitoring	WL	WL	WL	WL
W2007	Lower Alluvium	Monitoring	WL	WL	WL	WL
Area B (area of pumpout wells)						
PW1	Upper and Lower Alluvium	Pumpout	WL	WL	WL	List 1 &2, WL
PW2	Upper and Lower Alluvium	Pumpout	WL	WL	WL	List 1 &2, WL
PW3	Upper and Lower Alluvium	Pumpout	WL	WL	WL	List 1 &2, WL
PW4	Upper and Lower Alluvium	Pumpout	WL	WL	WL	List 1 &2, WL
PW6	Upper and Lower Alluvium	Pumpout	WL	WL	WL	List 1 &2, WL
PW11	Upper and Lower Alluvium	Pumpout	WL	WL	WL	List 1 &2, WL
W23	Upper Alluvium	Monitoring	WL	WL	WL	WL
W28	Upper Alluvium	Monitoring	WL	WL	WL	List 1 &2, WL
W29	Upper Alluvium	Monitoring	WL	WL	WL	List 1 &2, WL
W36	Upper Alluvium	Monitoring	WL	WL	WL	WL
W2001	Lower Alluvium	Monitoring	WL	WL	WL	WL
W2006	Lower Alluvium	Monitoring	WL	WL	WL	WL
W2012	Lower Alluvium	Monitoring	WL	WL	WL	List 1 & 2, WL
Area C (upgradient of pumpout wells that were shut off in 2003)						
W21R[a]	Upper Alluvium	Monitoring	WL	WL	WL	WL
W26R[a]	Upper Alluvium	Monitoring	WL,	List 1&2, WL	WL	List 1 &2, WL
PW7	Upper and Lower Alluvium	Pumpout	WL	List 1&2, WL	WL	List 1 &2, WL
PW8	Upper and Lower Alluvium	Pumpout	WL	List 1&2, WL	WL	List 1&2, WL
PW9	Upper and Lower Alluvium	Pumpout	WL	List 1&2, WL	WL	List 1&2, WL
APZ44	Upper Alluvium	Piezometer	WL	WL	WL	WL

List 1 : VOCs including: acetone, benzene, 1,1-dichloroethane, 1,2-dichloroethane, 1,1-dichloroethylene, cis & trans-1,2-dichloroethylene, ethylbenzene, isopropyl ether, methyl ethyl ketone, and tetrahydrofuran

List 2: VOCs including: isopropyl alcohol, 2-butyl alcohol, 4-Methyl-2-pentanol, methylene chloride, methyl isobutyl ketone, toluene, and total xylenes.

WL: Water Level Measurement

[a] : Monitoring wells W21 and W26 were abandoned in November 2010 due to soil excavation activities in this area. Replacement wells W21R and W26R were installed after soil excavation activities were completed.

Table 2-1 (cont'd)

VOC Monitoring Plan Schedule - 2017
Oakdale Site, Oakdale, MN

Well	Aquifer	Well Type	Jan - March 2017	April - June 2017	July - Sept 2017	Oct - Dec 2017
Area D (area where natural attenuation will be evaluated following shutdown)						
W25	Upper Alluvium	Monitoring	WL	WL	WL	List 1&2, WL
W30	Upper Alluvium	Monitoring	WL	WL	WL	List 1&2, WL
W31	Upper Alluvium	Monitoring	WL	WL	WL	List 1&2, WL
W32	Upper Alluvium	Monitoring	WL	WL	WL	WL
W215	Upper Alluvium	Monitoring	WL	WL	WL	List 1&2, WL
W2003	Lower Alluvium	Monitoring	WL	WL	WL	List 1&2, WL
W2005	Lower Alluvium	Monitoring	WL	WL	WL	List 1&2, WL
W2008	Lower Alluvium	Monitoring	WL	WL	WL	List 1&2, WL
W2010	Lower Alluvium	Monitoring	WL	WL	WL	List 1&2, WL
Platteville						
W3	Platteville	Monitoring	WL	WL	WL	List 1&2, WL
W8	Platteville	Monitoring	WL	WL	WL	List 1&2, WL
W80*	Platteville	Agricultural	--	--	--	List 1
W6102	Platteville	Monitoring	WL	WL	WL	List 1&2, WL
W6104	Platteville	Monitoring	WL	WL	WL	WL
PL41	Platteville	Monitoring	WL	WL	WL	WL
St Peter						
W6201	St Peter	Monitoring	WL	WL	WL	WL
SP42	St Peter	Monitoring	WL	WL	WL	WL

List 1 : VOCs including: acetone, benzene, 1,1-dichloroethane, 1,2-dichloroethane, 1,1-dichloroethylene, cis & trans-1,2-dichloroethylene, ethylbenzene, isopropyl ether, methyl ethyl ketone, and tetrahydrofuran

List 2: VOCs including: isopropyl alcohol, 2-butyl alcohol, 4-Methyl-2-pentanol, methylene chloride, methyl isobutyl ketone, toluene, and total xylenes.

WL: Water Level Measurement

*Private well, used for agricultural purposes only. Water level cannot be measured.

Table 2-1 (cont'd)

VOC Monitoring Plan Schedule - 2017
Oakdale Site, Oakdale, MN

Well	Aquifer	Well Type	Jan - March 2017	April - June 2017	July - Sept 2017	Oct - Dec 2017
Other Wells						
PW10	Surficial Alluvium Units	Pumpout	WL	WL	WL	List 1&2, WL
W33	Upper Alluvium	Monitoring	WL	WL	WL	List 1&2, WL
W35	Upper Alluvium	Monitoring	N/A	N/A	N/A	N/A
W203	Upper Alluvium	Monitoring	WL	WL	WL	WL
W205	Upper Alluvium	Monitoring	WL	WL	WL	WL
W217	Upper Alluvium	Monitoring	WL	WL	WL	WL
W2009	Lower Alluvium	Monitoring	WL	WL	WL	List 1 & 2, WL
APZ45	Upper Alluvium	Piezometer	WL	WL	WL	WL
APZ46	Upper Alluvium	Piezometer	WL	WL	WL	WL
APZ47	Upper Alluvium	Piezometer	WL	WL	WL	WL
APZ48	Upper Alluvium	Piezometer	WL	WL	WL	WL
APZ49	Upper Alluvium	Piezometer	WL	WL	WL	WL
APZ50	Upper Alluvium	Piezometer	WL	WL	WL	WL
GPPZ23	Lower Alluvium	Piezometer	WL	WL	WL	WL
PW14	Lower Alluvium	Pumpout	WL	WL	WL	WL
PW15	Lower Alluvium	Pumpout	WL	WL	WL	WL
PW16	Lower Alluvium	Pumpout	WL	WL	WL	WL
PW17	Lower Alluvium	Pumpout	WL	WL	WL	WL
PW18	Lower Alluvium	Pumpout	WL	WL	WL	WL
PW19	Lower Alluvium	Pumpout	WL	WL	WL	WL
PW20	Lower Alluvium	Pumpout	WL	WL	WL	WL
PW21	Lower Alluvium	Pumpout	WL	WL	WL	WL
PW22	Lower Alluvium	Pumpout	WL	WL	WL	WL
PW23	Lower Alluvium	Pumpout	WL	WL	WL	WL
PW24	Lower Alluvium	Pumpout	WL	WL	WL	WL
PW25	Lower Alluvium	Pumpout	WL	WL	WL	WL
PW26[b]	Lower Alluvium	Pumpout	WL	WL	WL	WL
RW37	Lower Alluvium	Monitoring	WL	WL	WL	WL
RW38	Lower Alluvium	Monitoring	WL	WL	WL	WL

List 1 : VOCs including: acetone, benzene, 1,1-dichloroethane, 1,2-dichloroethane, 1,1-dichloroethylene, cis & trans-1,2-dichloroethylene, ethylbenzene, isopropyl ether, methyl ethyl ketone, and tetrahydrofuran

List 2: VOCs including: isopropyl alcohol, 2-butyl alcohol, 4-Methyl-2-pentanol, methylene chloride, methyl isobutyl ketone, toluene, and total xylenes.

WL: Water Level Measurement

PW26[b] : Pumpout well PW26 was installed in 2011 after soil excavation activities were completed.

3. GROUNDWATER MONITORING AND RESULTS

The VOC pumpout wells PW1, PW2, PW3, PW4, PW6, PW10 and PW11 were installed in the upper and lower alluvium near areas where measurable levels of VOCs were detected in groundwater following previous source area removal actions performed in the mid-1980s. As shown on Figure 2-1, six of the pumpout wells are located just south of Highway 14 in the north-central area of the Site. Pumpout well PW10 is located in the central (isthmus) area of the Site. Operation of these pumpout wells has met the 1983 Consent Order goals for plume containment and contaminant removal at the Site. Plume containment involves both horizontal and vertical control by maintaining an inward hydraulic gradient in the alluvium groundwater unit. This inward hydraulic gradient (both horizontally and vertically) is maintained from areas where higher VOCs are present in groundwater, towards the pumpout wells. In addition, an upward hydraulic gradient is maintained from the Platteville groundwater to the alluvial groundwater units in the vicinity of the former suspected VOC source areas. The groundwater monitoring program has consistently shown an extensive area of drawdown in the upper and lower alluvium units around the VOC pumpout system just south of Highway 14.

Another component of vertical containment involves the presence of lower confining units (glacial till unit and the Decorah Shale), which restrict downward groundwater and contaminant migration from the alluvium to the Platteville formation. These lower confining units are present across most of the northern Site area as shown on Figure 3-1, and the cross-section presented in Figure 3-2.

The following sections contain a discussion of the 2017 groundwater monitoring results.

3.1 GROUNDWATER ELEVATIONS

In 2017, water levels were measured quarterly (where accessible) at 46 well/piezometer locations listed in Table 2-1. A table summarizing available well construction and other information for the Site wells/piezometers is included in Appendix B. Quarterly groundwater level measurements collected in 2017 from the groundwater monitoring wells, former pumpout wells, and piezometers are presented in Table 3-1. As observed in previous years,

the 2017 water levels exhibit some seasonal fluctuations, but overall remain consistent with historical measurements. Groundwater elevations were generally lowest in September 2017 due to lower recharge to the groundwater table from precipitation during this period.

The groundwater levels were reviewed for compliance with the hydraulic gradient control criteria described in the March 1985 "Final Groundwater Monitoring Plan" (Barr Engineering Company, 1985). This plan specifies that the groundwater VOC pumpout system will be operated to create a hydraulic gradient which would prevent groundwater where higher levels of VOCs are present, from moving into the Platteville formation and contain lateral migration in the surficial deposits.

In 2017, in the vicinity of the VOC groundwater pumpout system just south of Highway 14, groundwater elevations in the lower alluvium were maintained at a level lower than those in the underlying Platteville formation. Specifically, this differential is measured as the difference in water levels between Platteville monitoring well W8 and lower alluvium monitoring well W2012 (near Area B), and between Platteville monitoring well W3 and lower alluvium monitoring well W2008 (near Area D). Figure 3-3 shows the difference in water levels for 2017 compared to previous years. Figure 3-4 contains a hydrograph showing the groundwater elevations of the same wells for multiple measurements taken from January 2015 through December 2017. The typical lower groundwater elevation in the lower alluvium monitoring wells (W2008 and W2012) compared to the corresponding water levels in the nearby Platteville formation monitoring wells (W3 and W8) verifies that an upward vertical gradient exists near the pumpout system. The generalized direction of groundwater at the Site is presented in Figure 3-2.

The groundwater elevation data collected from the network of wells/piezometers shown in Table 3-1 are used to prepare groundwater elevation contour maps. These data are used to construct quarterly groundwater elevation contour maps to assess the area of groundwater capture induced by the groundwater pumpout system. Using these data, two groundwater elevation contour maps, one for the upper alluvium aquifer and one for the lower alluvium aquifer, were constructed for dates that site-wide depth-to-groundwater measurements were recorded. Upper alluvium aquifer monitor wells are screened primarily within the uppermost

water-bearing unit across the site. The lower alluvium monitor wells are screened within the more permeable strata just above the subcropping bedrock.

The groundwater elevation contour maps for the Site are constructed using KT3D (Tonkin and Larson, 2002; Karanovic, Tonkin and Wilson, 2009), a computer software program designed to contour groundwater elevation data while taking into account one or more pumping centers. KT3D uses a log-linear kriging algorithm to create two-dimensional groundwater contour maps with more tightly spaced groundwater elevation contours that are inferred around pumping centers. KT3D calculates groundwater elevations in the vicinity of pumping centers using a standard analytical method (Thiem analytical method) that incorporates the hydraulic gradients in each alluvium unit. This approach (i.e. using KT3D) results in a more representative groundwater elevation contour map and capture zones as compared to including measurement of groundwater elevations in pumping wells that could overestimate capture zones. For upper alluvium monitoring wells that were measured as dry, the groundwater elevation was conservatively assumed to be at the bottom of well. Several upper alluvium monitoring wells are typically dry in the area of the pumpout wells immediately south of Highway 14.

Figures 3-5 and 3-6 present groundwater elevation contours for the upper and lower alluvium aquifers, respectively, based on water level data collected on March 30, 2017 (1st Quarter 2017 (1Q2017)). Figures 3-7 through 3-12 contain the groundwater elevation contour maps for June 22, 2017 (2Q2017), September 5, 2017 (3Q2017), and October 25, 2017 (4Q2017).

An examination of the groundwater elevation contours in Figures 3-5 through 3-12 reveals that the groundwater pumpout system (PW1, PW2, PW3, PW4, PW6 and PW11) is consistently creating a large cone of depression in both the upper and lower alluvium immediately south of Highway 14 (north-central Site area). The long-term operation of the pumpout system has dewatered a portion of the upper and lower alluvium in this area of the Site, and induced groundwater to flow inward toward the pumpout wells from beyond the limits of the former disposal area. In addition, higher yielding pumpout wells PW4, PW6 and PW11 have created a significant cone of depression in the center of Site as shown in Figures 3-5 through 3-12.

Pumpout well PW10 is located in the central (isthmus) area of the Site where the upper and lower alluvium aquifers are comprised of low-permeability sediments. The drawdown induced by pumpout well PW10 is much less than the pumpout wells to the north; however, as shown in Figures 3-5 through 3-12, the combination of pumpout well PW10 and new pumpout wells PW19 through PW24 provide groundwater capture in this area of the Site.

The groundwater elevation contour maps for each quarter also indicate that groundwater elevations are primarily higher, and the cone of depression is not as pronounced, in the upper alluvium compared to the lower alluvium. This is due to the lower permeability of the sediments comprising the upper alluvium (as compared to the lower alluvium) that causes recharge from precipitation and/or snow melt to accumulate in the upper alluvium. Recharge to the upper alluvium was higher in 2017 due to the above average precipitation that occurred in the Site area (www.climate.umn.edu). The higher groundwater elevations in the upper alluvium compared to the lower alluvium creates a downward hydraulic gradient that causes groundwater within the upper alluvium aquifer to flow downward by gravity drainage into the lower alluvium aquifer where it is ultimately captured by the pumpout well network.

3.2 GROUNDWATER QUALITY

Groundwater quality data are summarized in Table 3-2 through Table 3-6, and the laboratory analytical data reports are included in Appendix C. The groundwater quality data are discussed below for each hydrogeologic unit. In general, this discussion uses “total VOCs” or “isopropyl ether” (IPE) as a basis for comparing groundwater quality over time and from well to well. For most wells, IPE concentrations dominate the total VOC concentration. While no Health Risk Limit (HRL) exists for IPE, the Minnesota Department of Health (MDH) previously developed a Health Based Value (HBV) of 80 µg/L for this VOC (MPCA memorandum May 14, 2001). However, MDH did not include IPE when they established updated groundwater HBVs in 2008 (MDH, 2008), or in updates to HBVs since 2008.

3.2.1 Upper and Lower Alluvium Units

VOC analytical results from the 2017 water quality monitoring of wells in the upper and lower alluvium units are provided in Tables 3-2 through 3-6. Historical VOC groundwater

analytical data for 2006 through 2017 are included in Appendix D. In general, the results from the VOC analysis of upper and lower alluvium monitoring well samples indicated generally stable water quality in 2017 when compared to the range of results from previous years (see Appendix D). The upper and lower alluvium monitoring wells are grouped by the groundwater monitoring areas established for the Site (see Figure 2-1) for discussion purposes:

- **Area A –** In accordance with the Sampling Plan, quarterly depth-to-groundwater measurements were collected from Area A monitoring wells W20, W22 and W2007 in 2017. Wells W20 and W2007 are sampled for VOCs on a triennial basis and will be sampled in 2019.

- **Area B –** Six pumpout wells are operational in Area B (PW1, PW2, PW3, PW4, PW6 and PW11). Area B is in the western portion of the Site, located near the suspected gap in the Decorah Shale and lower till confining units (see Figures 2-1 and 3-1). The primary indication of shallow groundwater quality in this area has been the VOC concentration trends in the extracted groundwater from the pumpout wells.

  The lowest total VOC concentrations in the pumpout wells in 2017 are in wells PW6 and PW11, which are in the eastern part of Area B. Pumpout well PW4 has the highest total VOC concentrations and is located in the center of Area B where groundwater levels are lowest (see contour maps in Figures 3-5 through 3-12). Historical total VOC concentrations for all of the active pumpout wells are shown in Table 3-7 and Table D-1 in Appendix D. An inspection of the total VOC and IPE concentrations for the pumping wells reported in Table D-1 of Appendix D indicates VOC concentrations fluctuate with 2017 VOC concentrations comparable to historical concentrations. The long-term trends are generally stable or declining..

  As shown in Table 2-1, groundwater samples were also collected in 2017 from upper alluvium wells W28 and W29, and lower alluvium monitoring well W2012 in Area B. The 2017 VOC analytical results for these wells are presented in Tables 3-4 and 3-5, the historical data for upper alluvium wells W28 and W29 is provided in Table D-3 in Appendix D, and the historical data for lower alluvium well W2012 is provided in

Table D-4 in Appendix D. As shown in Table 3-4, IPE and total VOCs are higher in upper alluvium well W29 compared to W28. As shown in the upper alluvium groundwater elevation contour maps provided in Section 3.1 (Figures 3-5, 3-7, 3-9 and 3-11), upper alluvium well W29 is within the depression in the groundwater surface created by nearby pumpout well PW4. Due to the proximity of well W29 to higher yielding pumpout well PW4, upper alluvium well W29 is typically dry resulting in limited historical VOC analytical data for this well (see data in Table D-3 of Appendix D). When saturated, the higher VOCs in the upper alluvium near well W29 are captured by the pumping of nearby pumpout well PW4. As shown in Table D-4 in Appendix D, the 2017 VOC analytical results for lower alluvium well W2012 are lower compared to historical results for this well.

- **Area C –** This area is located on the eastern portion of the Site and extends both north and south of Highway 14. As described in Section 1, pumping was discontinued at wells PW7, PW8 and PW9 in May 2003 and the wells were retained for monitoring. As shown on Figures 3-5 through 3-12, the groundwater elevation contour maps for 2017 indicate that the groundwater in Area C is being captured by either pumpout well PW26 north of Highway 14, or pumpout wells PW4, PW6 and PW11 located south of Highway 14.

  Two Area C monitoring wells, W21 and W26, had to be abandoned prior to the 2011 soil excavation activities completed in accordance with the MPCA-approved RD/RA Plan. These monitoring wells were reinstalled immediately adjacent to their previous locations following the RD/RA activities, and are now designated as monitoring wells W21R and W26R. Monitoring well W21R continues to be used for water level measurements in the VOC program. Water quality in Area C is monitored at former alluvium pumpout wells PW7, PW8, PW9 (Table 3-3) and monitoring well W26R (Table 3-4). Former pumpout wells PW7, PW8 and PW9 are completed across the upper and lower alluvium units, while monitoring well W26R is completed in the upper alluvium.

  As shown in Table 3-3, for those wells to the south of Highway 14, total VOCs are lowest in former pumpout well PW9, which is east of former pumpout wells PW7 and

PW8. A comparison of the 2017 VOC analytical data to the historical VOC data presented in Table D-2 in Appendix D for former pumpout wells PW7, PW8 and PW9 indicates that the 2017 VOC results are within historical values.

Monitoring well W26R is located within an area where soil remediation activities were completed in 2011. These remedial activities were part of the PFC program at the Site, and included the removal of 27,951 cubic yards of soil disposed at a permitted facility off-Site. In addition, nearby pumpout well PW26 was installed to remediate groundwater in this area. An inspection of the VOC analytical results for monitoring well W26R presented in Table D-3 of Appendix D indicates a significant decline in VOC concentrations (e.g. benzene and IPE) over time. The previous soil removal remedial actions near this well and operation of pumpout well PW26 have been effective in reducing VOC concentrations in this area of the Site.

- **Area D –** Based on groundwater monitoring of VOCs performed since 2003, Area D has not been affected by the cessation of pumping in Area C (former pumpout wells PW7, PW8 and PW9). In accordance with the Groundwater Sampling Plan, water quality samples were to be collected in 2017 at monitoring wells W25, W30, W31 and W215 (Table 2-1). Well W30 was dry during the October/November 2017 sampling event, so groundwater samples could not be collected from this location. Total VOC concentrations were non-detect (ND) in upper alluvium monitoring wells W25, W31 and W215 (Table 3-4). This indicates that an ongoing source for VOCs is not present in the upper alluvium in the areas monitored by these wells.

  Groundwater samples were collected for VOC analyses in 2017 from lower alluvium monitoring wells W2003, W2005, W2008 and W2010. As shown on Figure 2-1, monitoring wells W2003 and W2008 are installed adjacent to one another at 52 and 62 feet below ground surface (ft bgs), respectively. As shown in Table 3-5, the IPE concentration in monitoring wells W2003 (91.1 µg/L) and W2008 (44.5 µg/L) in 2017 are comparable to one another. Wells W2005 and W2010 are also installed adjacent to one another at 43 and 76 ft bgs, respectively. IPE concentrations are higher in well W2005 (320 µg/L) compared to W2010 (24.8 µg/L).

VOC concentrations in these lower alluvium wells fluctuate, but the long-term trend in VOC concentrations is generally stable to declining (see historical data in Table D-4 in Appendix D). Groundwater elevation data collected at the Site indicate that all wells within Area D are consistently within the capture zone of the pumpout well network.

- **Isthmus Area –** Monitoring wells W33, W2009 and pumpout well PW10 are located in an area defined as the "isthmus area". As shown in Table 3-2, a total average VOC concentration of 6,613 µg/L was calculated using the November 2017 primary and duplicate sample results for pumpout well PW10. The long-term total VOC trend in pumpout well PW10 is declining as shown in the historical data contained in Table D-1 in Appendix D.

  Upper alluvium well W33 and lower alluvium well W2009 are located adjacent to pumpout well PW10. The historical total VOCs in well W33 and well W2009 are presented in Tables D-3 and D-4, respectively, in Appendix D. An inspection of these analytical results indicates a long-term decline in total VOCs in these wells. Although pumpout well PW10 does not yield significant quantities of groundwater, the addition of nearby pumpout wells PW19 through PW24 to the recovery well network in, and adjacent to, the "isthmus area" is contributing to the decline in VOC concentrations in pumpout well PW10 and monitoring wells W33 and W2009.

3.2.2 Platteville Formation

Earlier investigations have shown that IPE is the most mobile VOC in the groundwater beneath the Site, and that IPE migrated downward to the Platteville formation prior to implementation of the VOC pumpout system in 1985. Groundwater analytical results revealed that IPE migrated southwest and northeast from the Site through preferential flow paths in the Platteville formation. Beginning in 1985, the pumpout system contained the source of the VOCs and the water quality in the Platteville has improved significantly (i.e., lower VOC concentrations and reduced lateral extent of plume).

The purpose of monitoring the Platteville formation is two-fold. One is to monitor the concentration and extent of the VOCs (mainly IPE) and the second is to determine the

effectiveness of the VOC pumpout system in preventing vertical migration of shallow groundwater containing VOCs to the Platteville formation. As specified in Section A9.1.5 of the May 2003 QAPP (Barr Engineering Company, 2003), Decision Rule 6 was established as part of the on-going evaluation of the 2003 pumpout system modifications. The decision rule specified that the VOC pumpout system will continue to be reviewed to verify (1) an upward vertical gradient between the Platteville and the alluvium aquifer near the pumpout system, and (2) stable or improving water quality trends in the Platteville monitoring wells. Water levels and vertical gradients are summarized in Section 3.1 and Figures 3-3 and 3-4, and the water quality results are discussed below.

The first part of the decision rule continues to be verified by Site groundwater elevation data that indicate an upward hydraulic gradient between the Platteville formation and lower alluvium monitoring wells (see Section 3.1 and Figure 3-3). The second part of the decision rule indicates that additional effort may be necessary if the observed VOC concentrations from two consecutive sampling events exceed the QAPP goal at either well W80 or W6102, which represent the critical monitoring locations for IPE concentrations in the Platteville formation. That decision rule was established around the MDH's HRLs and HBVs in 2003 because it was thought that the only detectable VOC present (i.e., IPE) had been less than its corresponding HBV for four of the previous five years of monitoring events (1998 to 2002), so it was a suitable goal to compare against. As discussed in the 2006 annual report (Barr Engineering Company, 2007), this was in fact not correct; the IPE concentrations in W6102 have generally been above the 2001 HBV of 80 µg/L since 1999. It should be noted that, as discussed in Section 3.2, the MDH did not include IPE when they established their updated groundwater values table in 2008 (MDH, 2008).

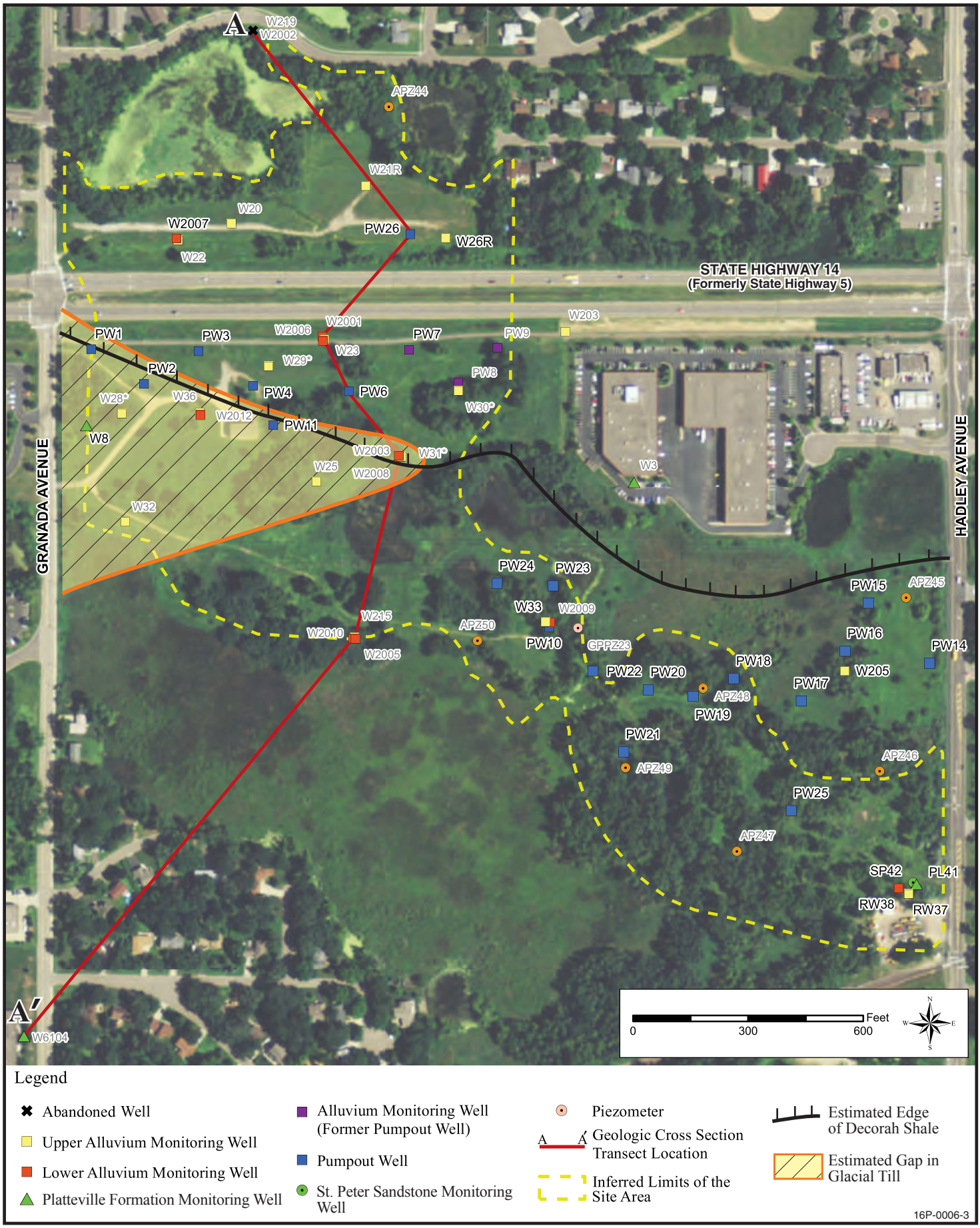
In 2017, water quality samples were collected from Platteville monitoring wells W3, W8, W6102 and agricultural/irrigation well W80. Table 3-6 contains a summary of the water quality results from these monitoring wells. As shown in Table D-5 in Appendix D, the IPE concentration in 2017 in well W3 is comparable to historical data. Historical IPE concentrations for well W3 fluctuate with no definitive trend. The November 2017 IPE concentration in monitoring well W8 was 28.8 µg/L, which is the lowest IPE concentration

detected between November 2006 and October 2017 at this well (see data in Table D-5 in Appendix D).

Figure 3-13 presents the historic IPE concentration trend in wells W80 and W6102. The analytical results show that IPE levels in well W80 have been non-detect since 2008. As shown in Figure 3-13, the IPE concentration in monitoring well W6102 has generally remained above 100 µg/L. This well has historically exhibited wide variations in IPE concentration, but as shown in Figure 3-13, the IPE concentration has been more stable since 1998. The favorable downward concentration trend in well W80 was part of the basis for the 2003 VOC pumpout system modifications and the current data does not change the conclusion that the pumpout system continues to be effective at restricting further IPE releases to the Platteville from shallow groundwater source areas.

3.2.3 St. Peter Sandstone

As specified in the Sampling Plan, quarterly depth-to-groundwater measurements were collected in St. Peter Sandstone monitoring wells W6201 and SP42. Well W6201 is sampled on a quadrennial basis with the next sampling event scheduled for 2019. Historical VOC groundwater analytical data for wells completed in the St. Peter Sandstone are provided in Table D-6 in Appendix D.

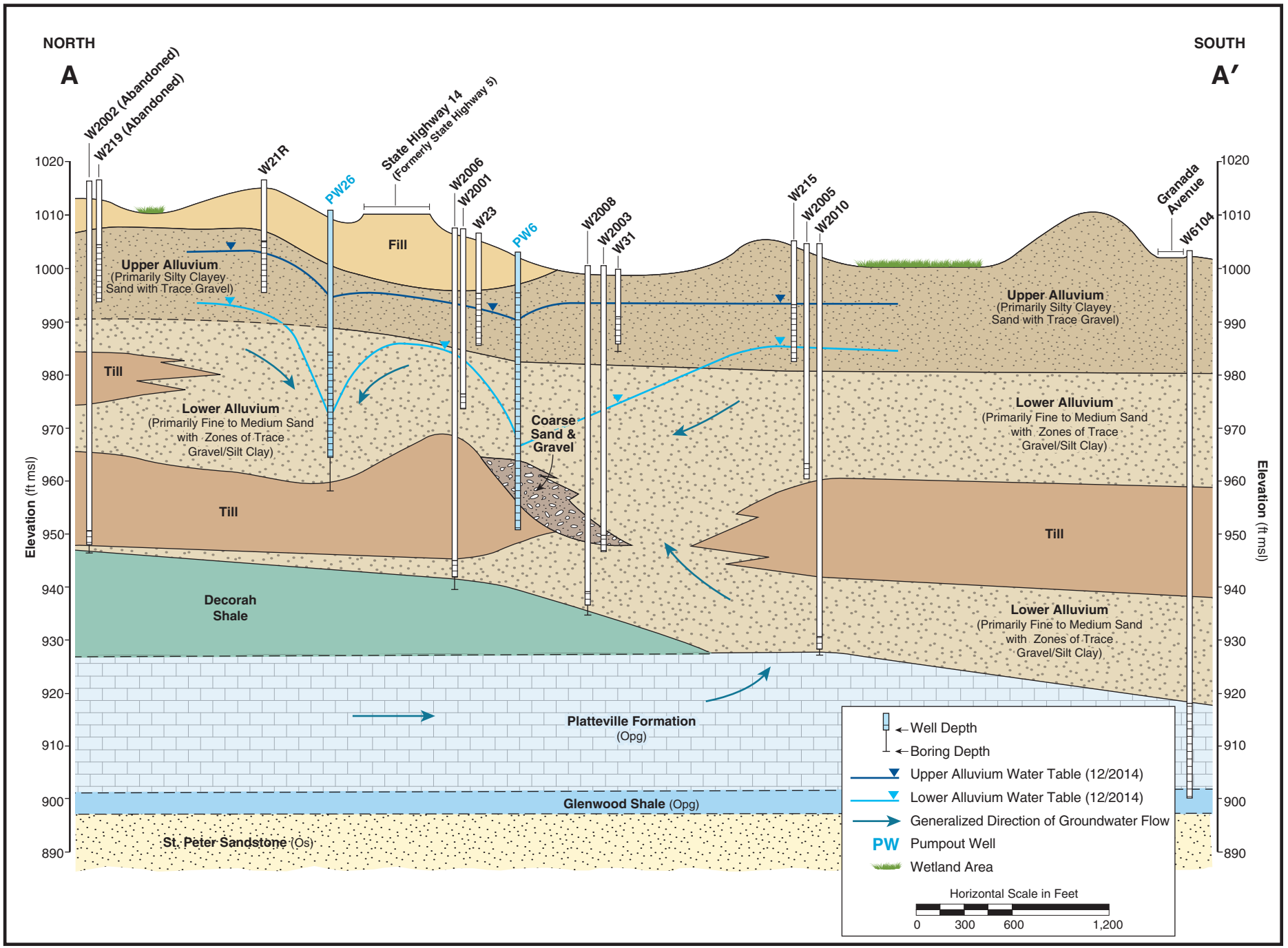


Legend

- Abandoned Well
- Upper Alluvium Monitoring Well
- Lower Alluvium Monitoring Well
- Platteville Formation Monitoring Well
- Alluvium Monitoring Well (Former Pumpout Well)
- Pumpout Well
- St. Peter Sandstone Monitoring Well
- Piezometer
- A A′ Geologic Cross Section Transect Location
- Inferred Limits of the Site Area
- Estimated Edge of Decorah Shale
- Estimated Gap in Glacial Till

16P-0006-3

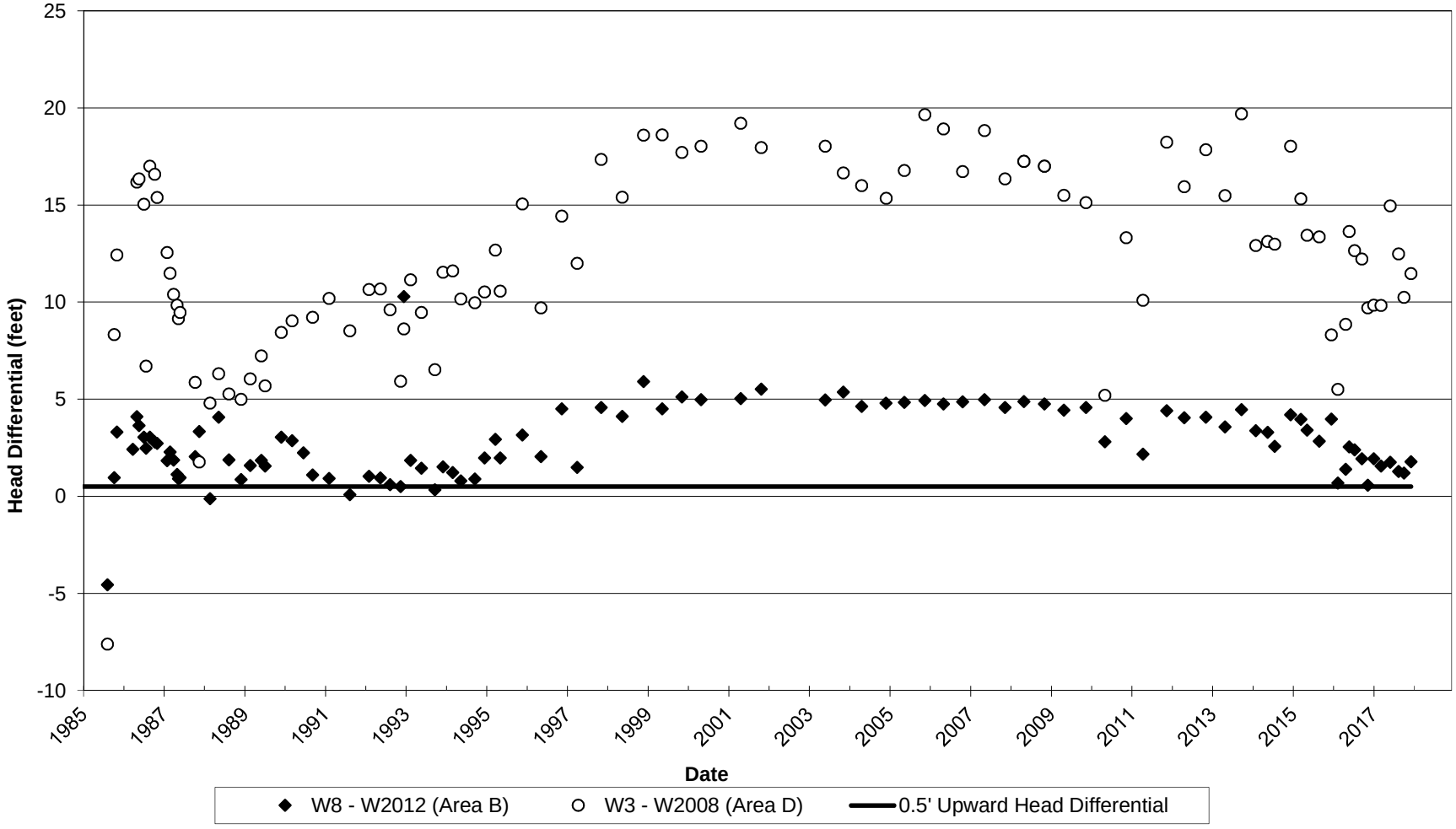
Figure 3-1 Geologic Cross Section A-A′ Location and Well Location Map
Oakdale Site
Oakdale, Minnesota



16P-0006-1

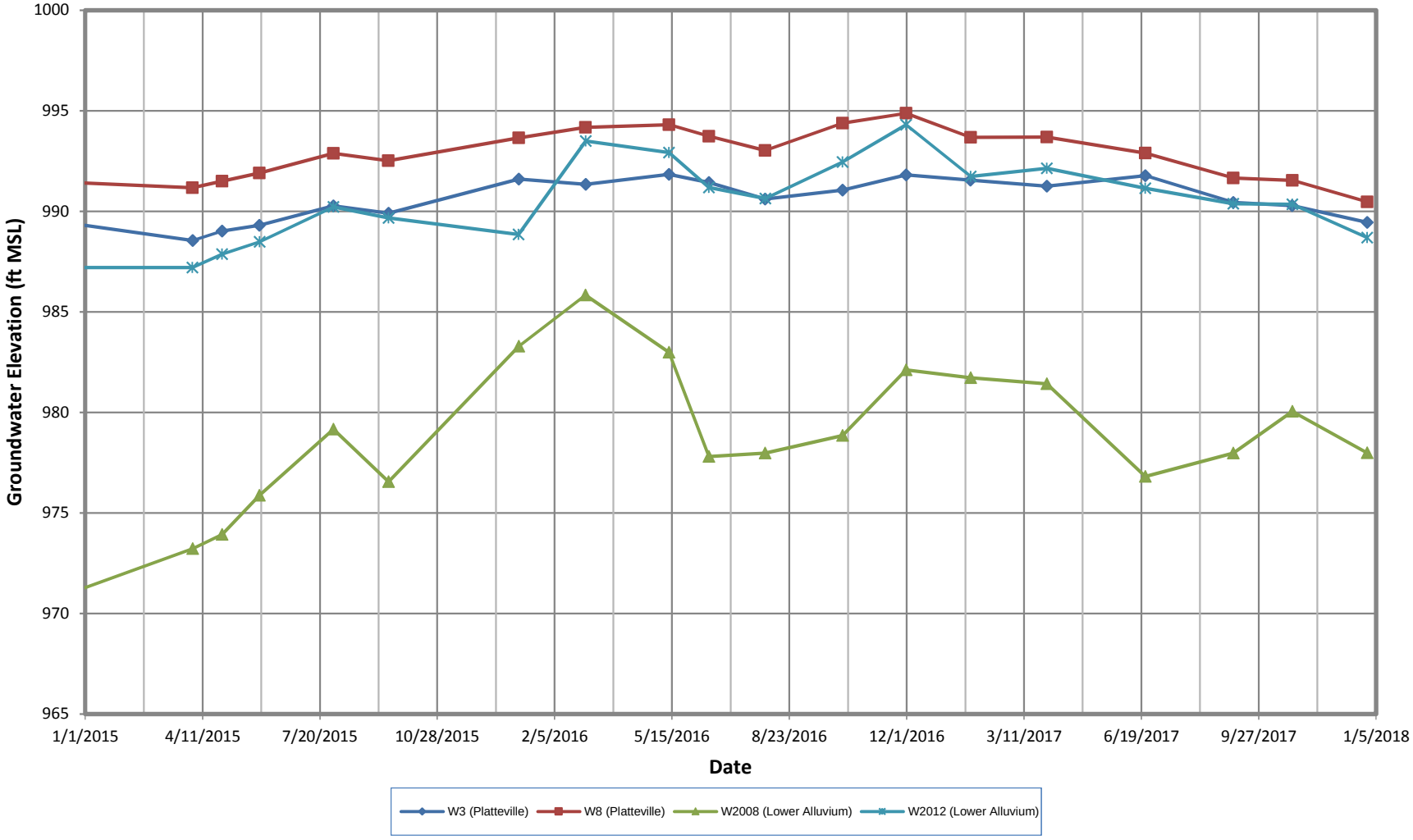
Figure 3-2 Geologic Cross Section A-A′
Oakdale Site

Figure 3-3
Static Water Level Head Differential between Platteville and Lower Alluvium Wells
(W8 minus W2012 Near Area B; W3 minus W2008 near Area D)
Oakdale Site



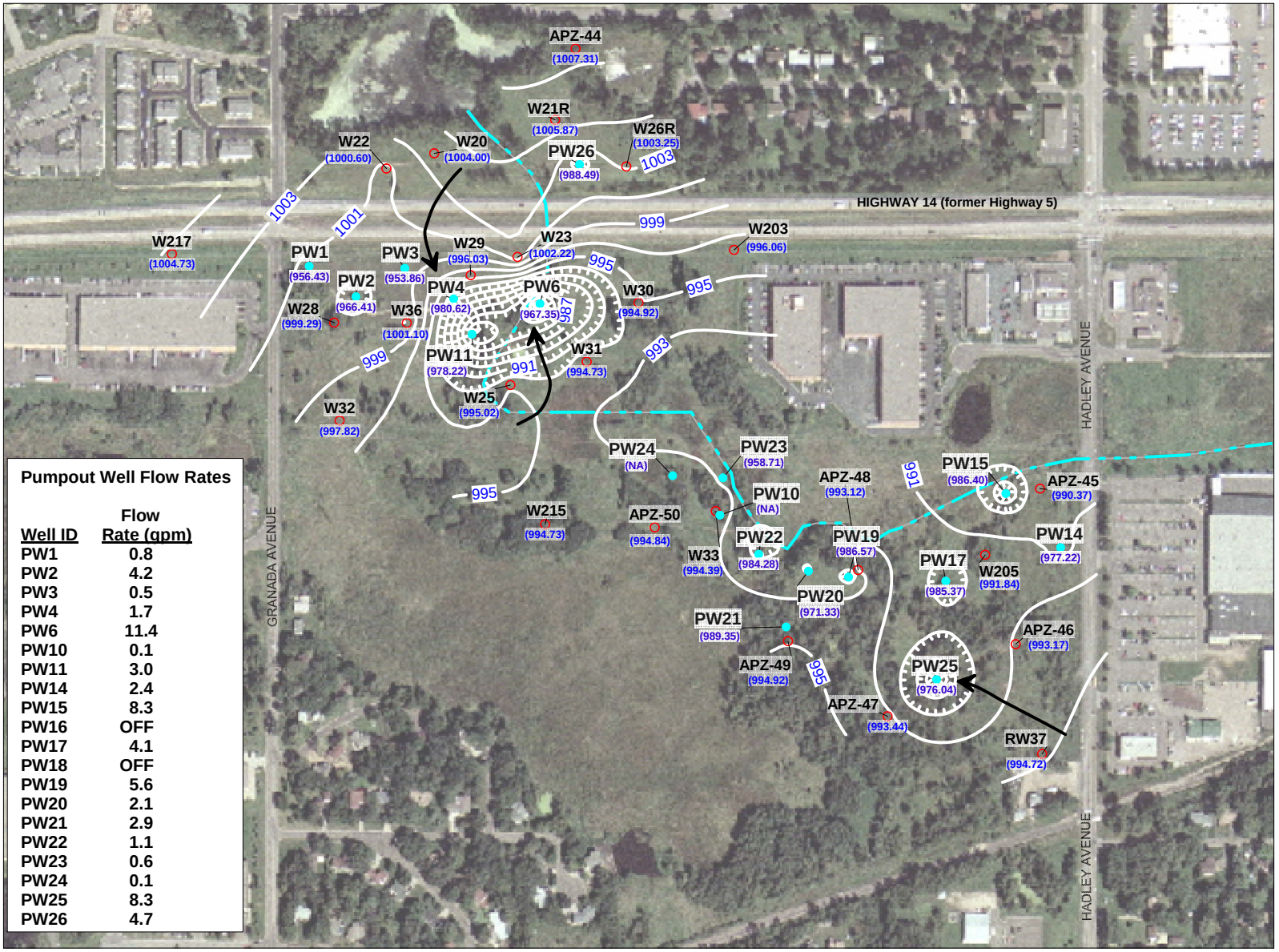
NOTE: W8 and W3 monitor the Platteville Formation. W2012 and W2008 monitor the lower alluvium unit.

Figure 3-4
Hydrograph of Platteville (W3 and W8) and Lower Alluvium Wells (W2008 and W2012)
January 2015 - December 2017
Oakdale Site, Oakdale, MN



NOTE:
Platteville well W3 and lower alluvium well W2008 located in Area D.
Platteville well W8 and lower alluvium well W2012 located in Area B.

HydroGRAPH-QRY_10-W3-W8-W2008-W2012-OKMN-2016.xls
Fig3-4-2017(VOC_RPT)



Pumpout Well Flow Rates

Well ID	Flow Rate (gpm)
PW1	0.8
PW2	4.2
PW3	0.5
PW4	1.7
PW6	11.4
PW10	0.1
PW11	3.0
PW14	2.4
PW15	8.3
PW16	OFF
PW17	4.1
PW18	OFF
PW19	5.6
PW20	2.1
PW21	2.9
PW22	1.1
PW23	0.6
PW24	0.1
PW25	8.3
PW26	4.7

Legend

- Pumpout Well Location (PW)
- Monitoring Well/Piezometer Location (W/APZ)
- Groundwater Elevation Contour
- (990.37) Monitoring Well/Piezometer Groundwater Elevation (ft MSL)
- (986.40) Pumpout Well Groundwater Elevation (ft MSL)
- (NA) Not Available
- Intermittent Stream (Approximate location)
- Groundwater Flow Path

N
W E
S

0 250 500
Feet

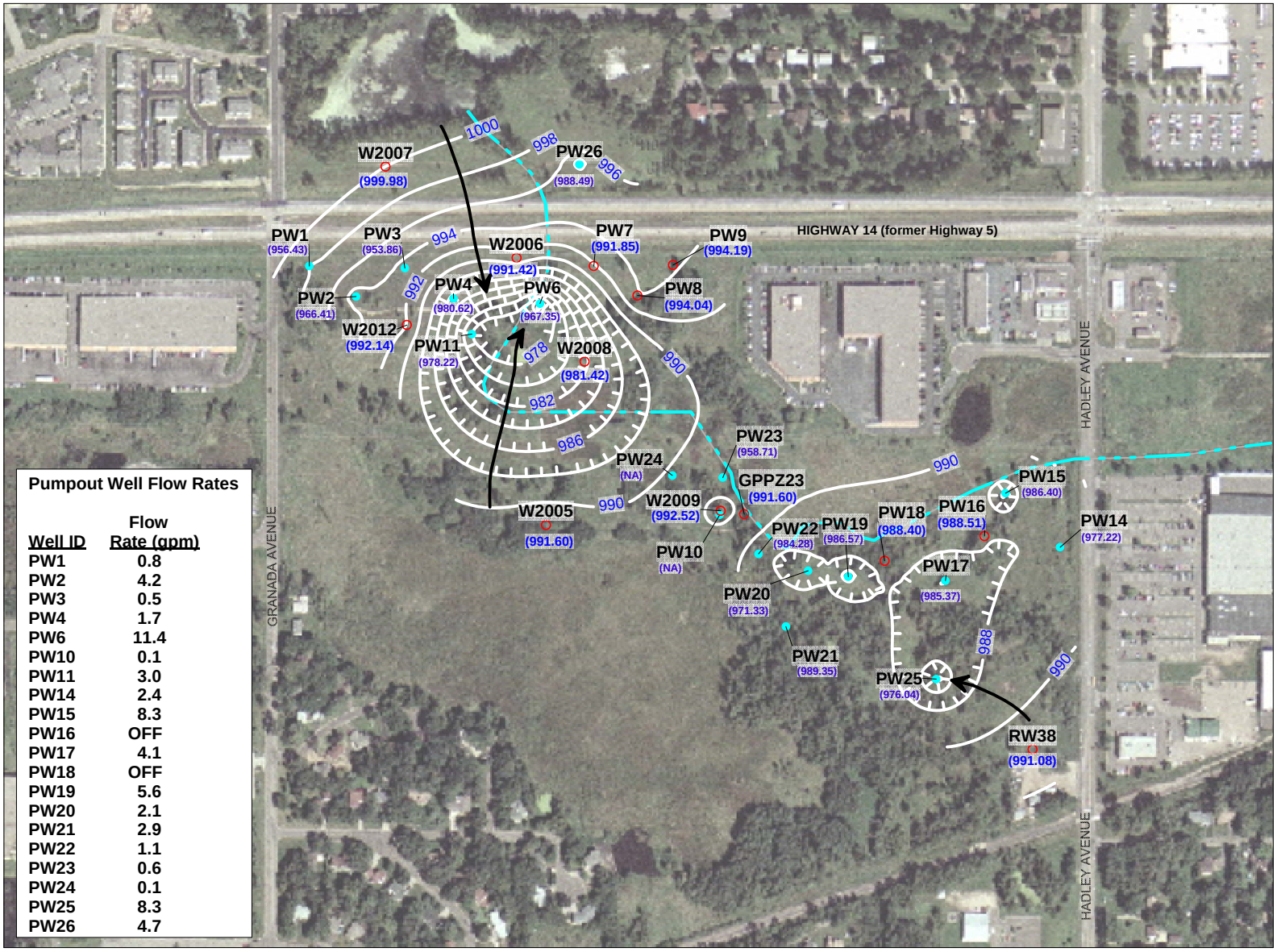
Figure 3-5

Groundwater Elevation Contour Map
Upper Alluvium Aquifer
1st Quarter 2017
30 March 2017

Oakdale Site
Oakdale, Minnesota

Note: 1. Groundwater elevations for pumpout wells are posted but not used in preparing contours. Groundwater elevation contours are inferred around pumping centers.
2. The location of pumpout wells PW16 and PW18 are shown on Figure 3-5.

2017-0330-OKMN-UA.srf



Pumpout Well Flow Rates

Well ID	Flow Rate (gpm)
PW1	0.8
PW2	4.2
PW3	0.5
PW4	1.7
PW6	11.4
PW10	0.1
PW11	3.0
PW14	2.4
PW15	8.3
PW16	OFF
PW17	4.1
PW18	OFF
PW19	5.6
PW20	2.1
PW21	2.9
PW22	1.1
PW23	0.6
PW24	0.1
PW25	8.3
PW26	4.7

Legend

- Pumpout Well Location (PW)
- Monitoring Well/Piezometer Location (W/APZ)
- Groundwater Elevation Contour
- (994.19) Monitoring Well/Piezometer Groundwater Elevation (ft MSL)
- (986.40) Pumpout Well Groundwater Elevation (ft MSL)
- (NA) Not Available
- Intermittent Stream (Approximate location)
- Groundwater Flow Path

N
W E
S

0 250 500
Feet

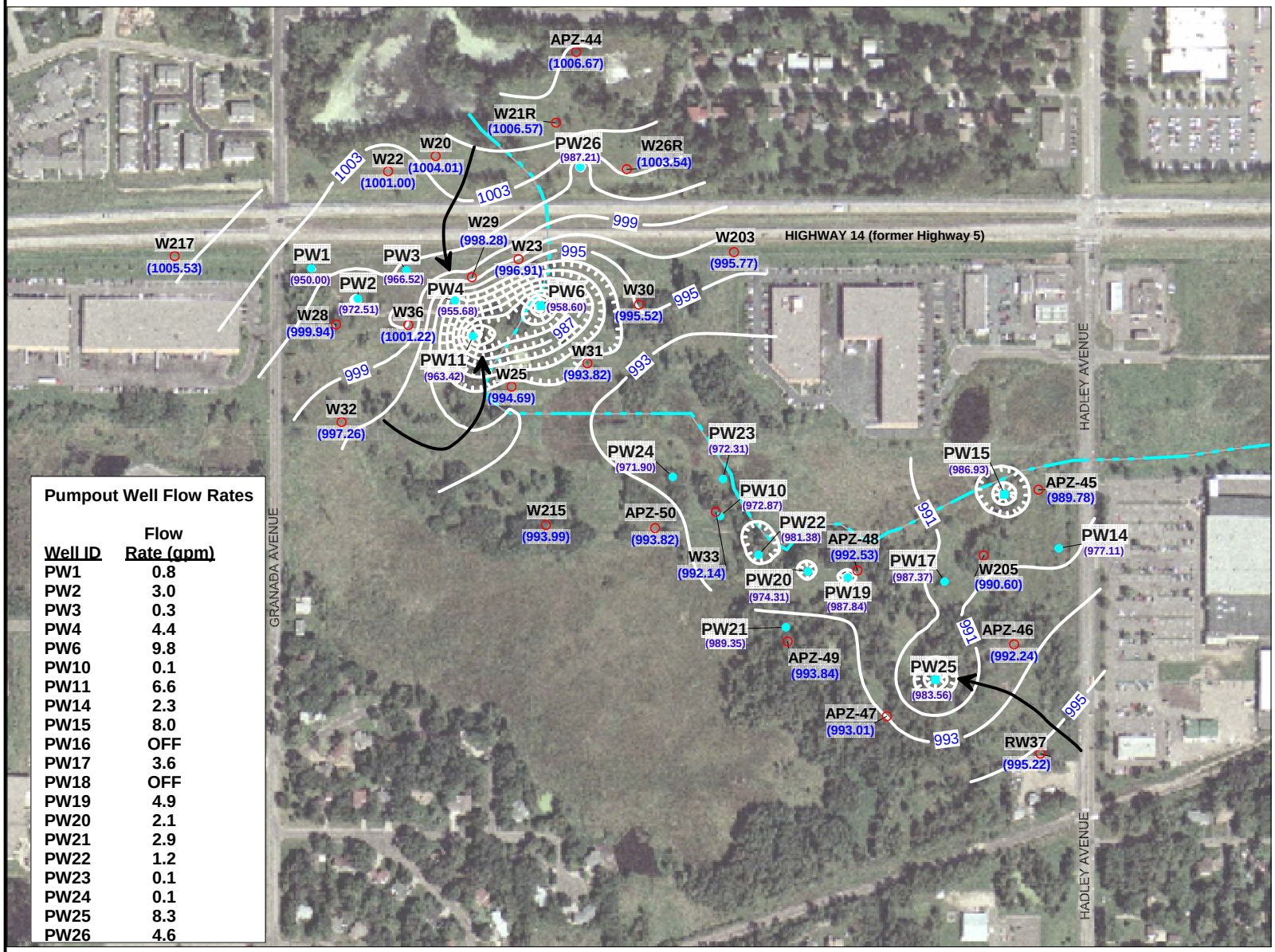
Note: 1. During this event, pumpout wells PW16 and PW18 were off temporarily and allowed to reach a steady-state condition to provide additional groundwater monitoring points for the lower alluvium contour map.
2. Groundwater elevations for pumpout wells are posted but not used in preparing contours. Groundwater elevation contours are inferred around pumping centers.

Figure 3-6

Groundwater Elevation Contour Map
Lower Alluvium Aquifer
1st Quarter 2017
30 March 2017

Oakdale Site
Oakdale, Minnesota

2017-0330-OKMN-LA.srf



Pumpout Well Flow Rates

Well ID	Flow Rate (gpm)
PW1	0.8
PW2	3.0
PW3	0.3
PW4	4.4
PW6	9.8
PW10	0.1
PW11	6.6
PW14	2.3
PW15	8.0
PW16	OFF
PW17	3.6
PW18	OFF
PW19	4.9
PW20	2.1
PW21	2.9
PW22	1.2
PW23	0.1
PW24	0.1
PW25	8.3
PW26	4.6

Legend

- Pumpout Well Location (PW)
- Monitoring Well/Piezometer Location (W/APZ)
- Groundwater Elevation Contour
- (990.60) Monitoring Well/Piezometer Groundwater Elevation (ft MSL)
- (983.56) Pumpout Well Groundwater Elevation (ft MSL)
- Intermittent Stream (Approximate location)
- Groundwater Flow Path

N
W
E
S

0 250 500
Feet

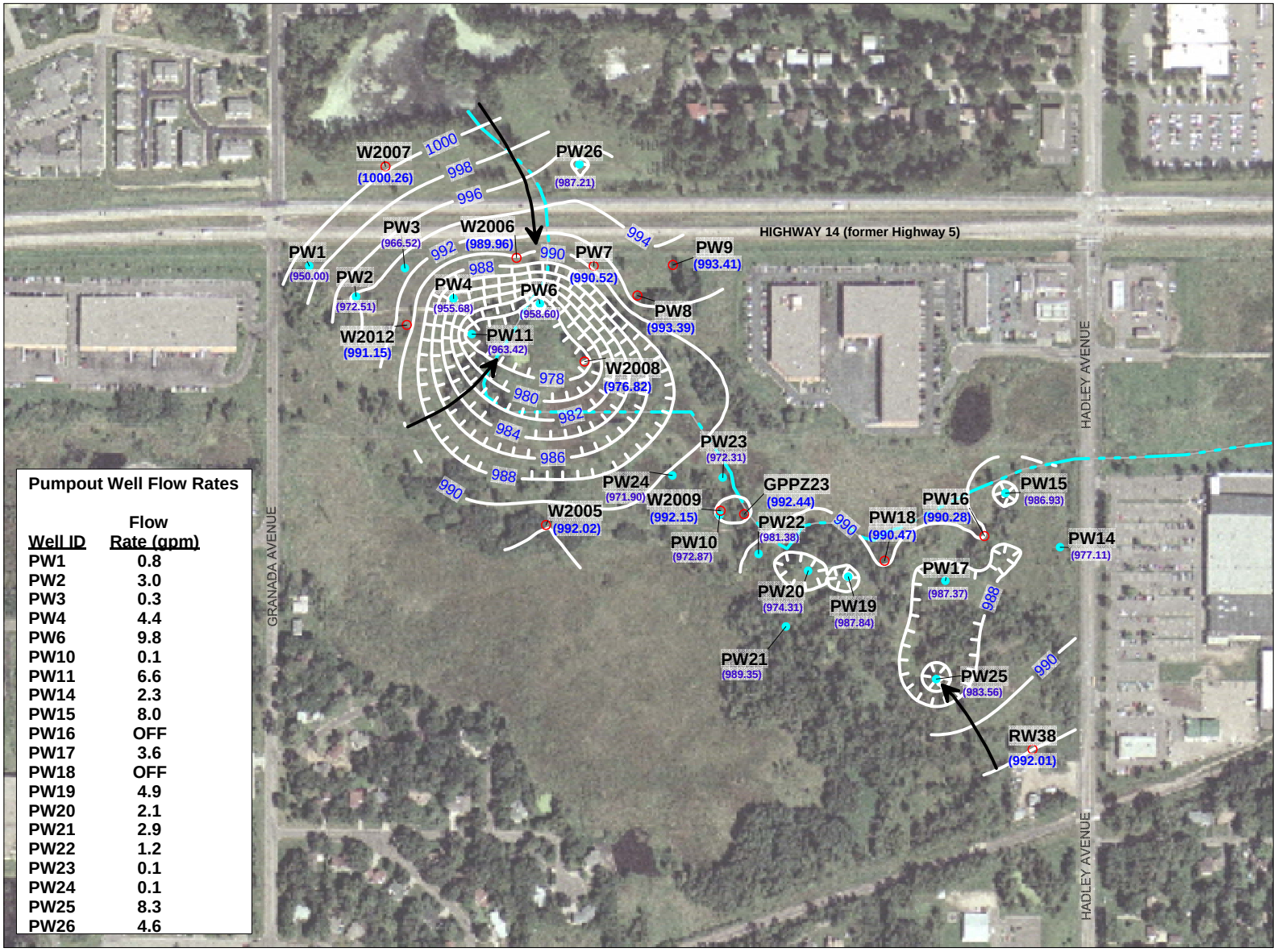
Note: 1. Groundwater elevations for pumpout wells are posted but not used in preparing contours. Groundwater elevation contours are inferred around pumping centers.
2. The locations of pumpout wells PW16 and PW18 are shown on Figure 3-5.

Figure 3-7

Groundwater Elevation Contour Map
Upper Alluvium Aquifer
2nd Quarter 2017
22 June 2017

Oakdale Site
Oakdale, Minnesota

2017-0622-OKMN-UA.srf



Pumpout Well Flow Rates

Well ID	Flow Rate (gpm)
PW1	0.8
PW2	3.0
PW3	0.3
PW4	4.4
PW6	9.8
PW10	0.1
PW11	6.6
PW14	2.3
PW15	8.0
PW16	OFF
PW17	3.6
PW18	OFF
PW19	4.9
PW20	2.1
PW21	2.9
PW22	1.2
PW23	0.1
PW24	0.1
PW25	8.3
PW26	4.6

Legend

- Pumpout Well Location (PW)
- Monitoring Well/Piezometer Location (W/APZ)
- Groundwater Elevation Contour
- (990.28) Monitoring Well/Piezometer Groundwater Elevation (ft MSL)
- (986.93) Pumpout Well Groundwater Elevation (ft MSL)
- Intermittent Stream (Approximate location)
- Groundwater Flow Path

N
W
E
S

0 250 500
Feet

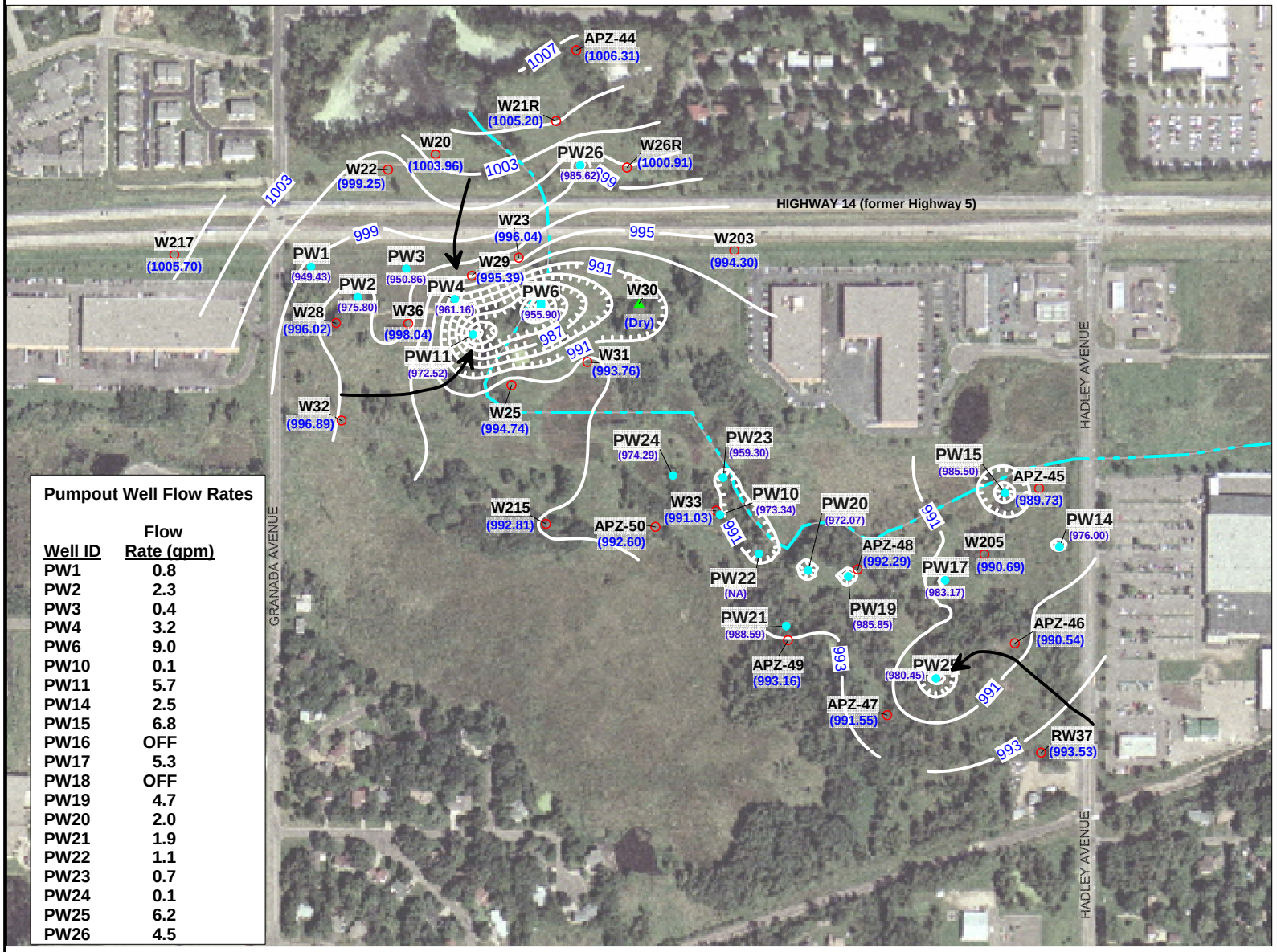
Figure 3-8

Groundwater Elevation Contour Map
Lower Alluvium Aquifer
2nd Quarter 2017
22 June 2017

Oakdale Site
Oakdale, Minnesota

Note: 1. During this event, pumpout wells PW16 and PW18 were off temporarily and allowed to reach a steady-state condition to provide additional groundwater monitoring points for the lower alluvium contour map.
2. Groundwater elevations for pumpout wells are posted but not used in preparing contours. Groundwater elevation contours are inferred around pumping centers.

2017-0622-OKMN-LA.srf



Pumpout Well Flow Rates

Well ID	Flow Rate (gpm)
PW1	0.8
PW2	2.3
PW3	0.4
PW4	3.2
PW6	9.0
PW10	0.1
PW11	5.7
PW14	2.5
PW15	6.8
PW16	OFF
PW17	5.3
PW18	OFF
PW19	4.7
PW20	2.0
PW21	1.9
PW22	1.1
PW23	0.7
PW24	0.1
PW25	6.2
PW26	4.5

Legend

- Pumpout Well Location (PW)
- Monitoring Well/Piezometer Location (W/APZ)
- Monitoring Well Location - Measured as Dry
- (NA) Not Available
- Groundwater Elevation Contour
- (989.89) Monitoring Well/Piezometer Groundwater Elevation (ft MSL)
- (985.55) Pumpout Well Groundwater Elevation (ft MSL)
- Intermittent Stream (Approximate location)
- Groundwater Flow Path

N
W E
S

0 250 500
Feet

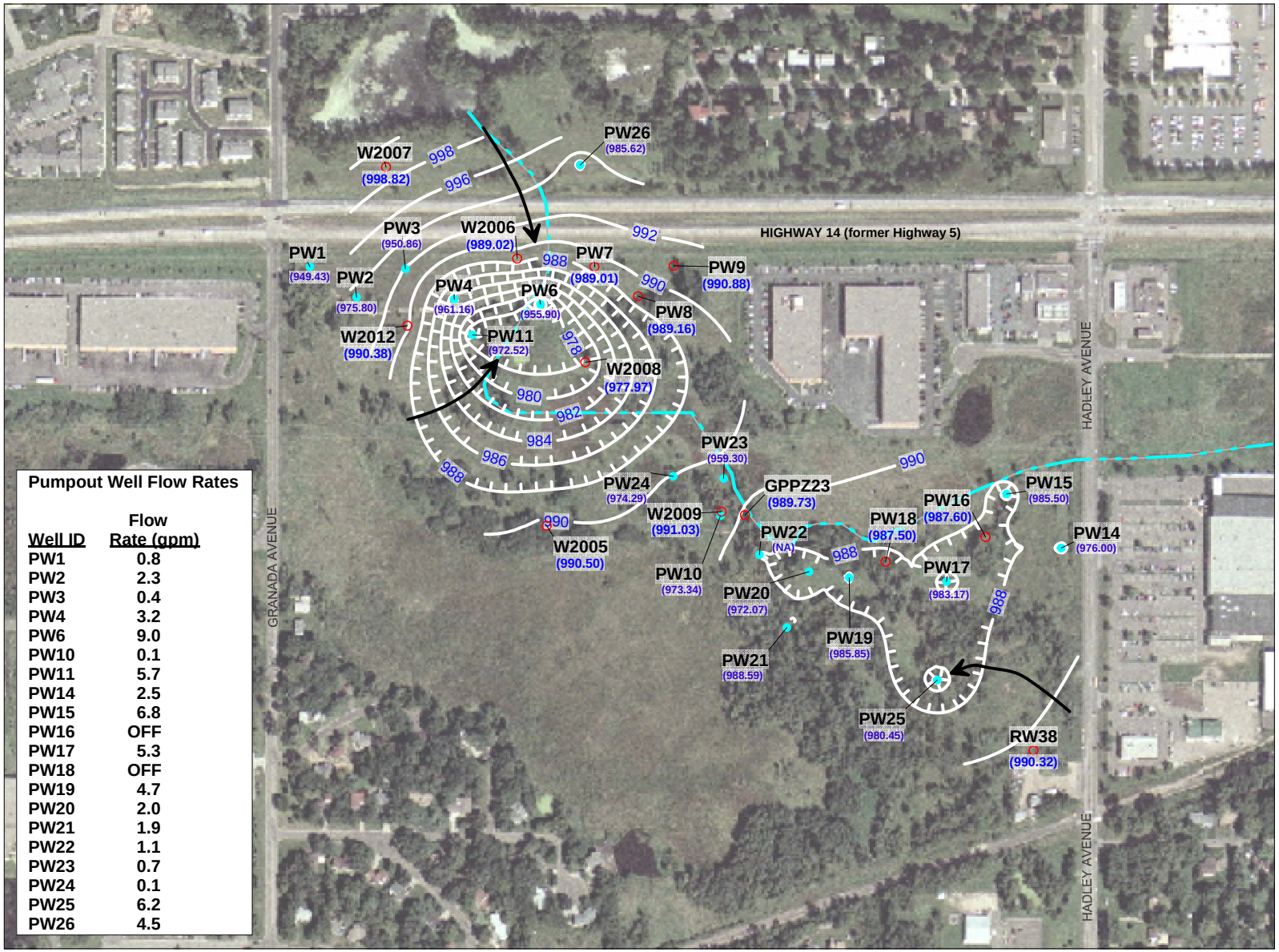
Note: 1. For each well measured as dry, the groundwater elevation was conservatively assumed to be at bottom of well.
2. Groundwater elevations for pumpout wells are posted but not used in preparing contours. Groundwater elevation contours are inferred around pumping centers.
3. The locations of pumpout wells PW16 and PW18 are shown on Figure 3-5.

Figure 3-9

Groundwater Elevation Contour Map
Upper Alluvium Aquifer
3rd Quarter 2017
5 September 2017

Oakdale Site
Oakdale, Minnesota

2015-0402-OKMN-UA.srf



Pumpout Well Flow Rates

Well ID	Flow Rate (gpm)
PW1	0.8
PW2	2.3
PW3	0.4
PW4	3.2
PW6	9.0
PW10	0.1
PW11	5.7
PW14	2.5
PW15	6.8
PW16	OFF
PW17	5.3
PW18	OFF
PW19	4.7
PW20	2.0
PW21	1.9
PW22	1.1
PW23	0.7
PW24	0.1
PW25	6.2
PW26	4.5

Legend

- Pumpout Well Location (PW)
- Monitoring Well/Piezometer Location (W/APZ)
- Groundwater Elevation Contour
- (987.60) Monitoring Well/Piezometer Groundwater Elevation (ft MSL)
- (985.50) Pumpout Well Groundwater Elevation (ft MSL)
- (NA) Not Available
- Intermittent Stream (Approximate location)
- Groundwater Flow Path

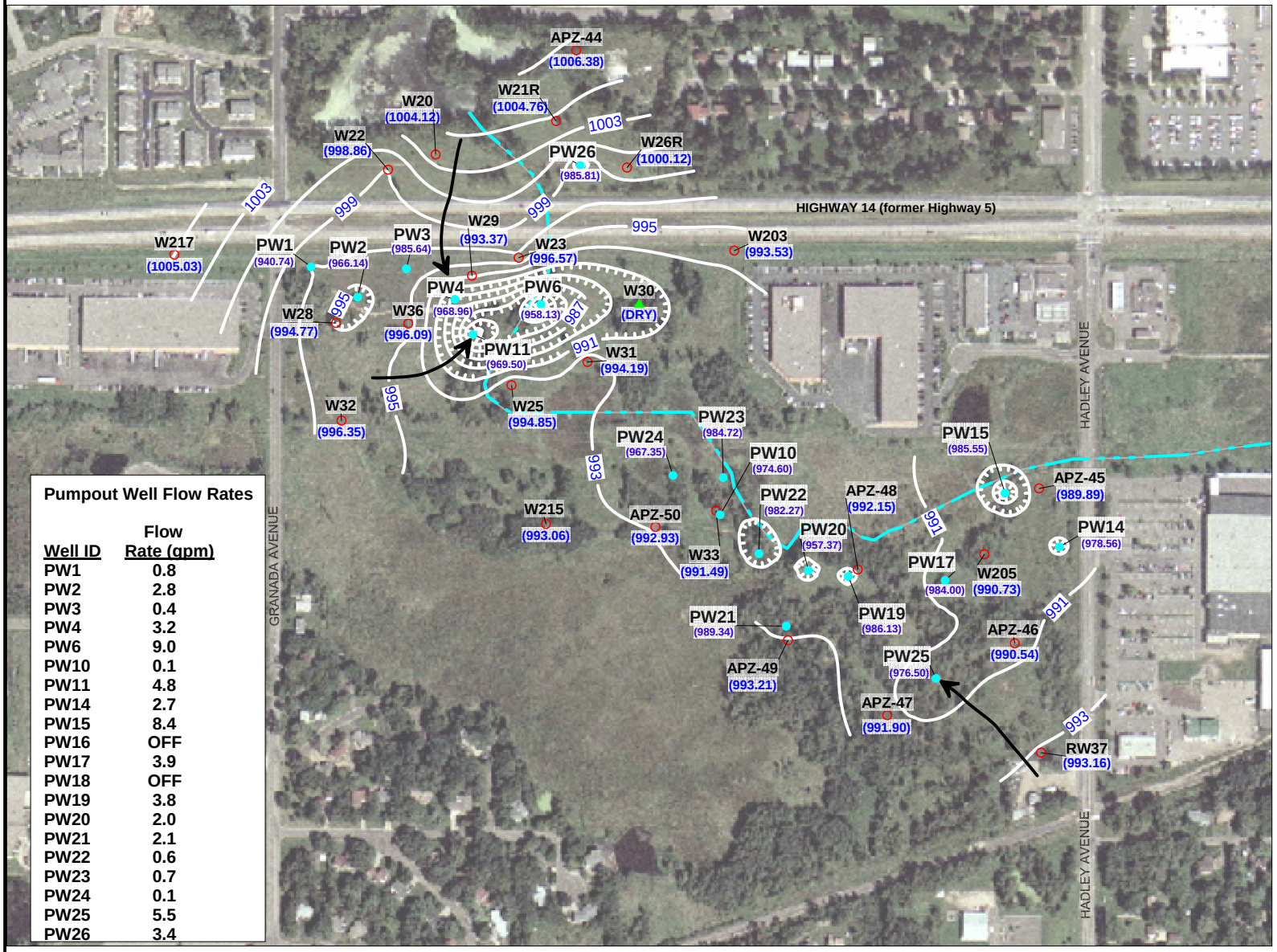
Note: 1. During this event, pumpout wells PW16 and PW18 were off temporarily and allowed to reach a steady-state condition to provide additional groundwater monitoring points for the lower alluvium contour map.
2. Groundwater elevations for pumpout wells are posted but not used in preparing contours. Groundwater elevation contours are inferred around pumping centers.

Figure 3-10

Groundwater Elevation Contour Map
Lower Alluvium Aquifer
3rd Quarter 2017
5 September 2017

Oakdale Site
Oakdale, Minnesota

2017-0905-OKMN-LA.srf



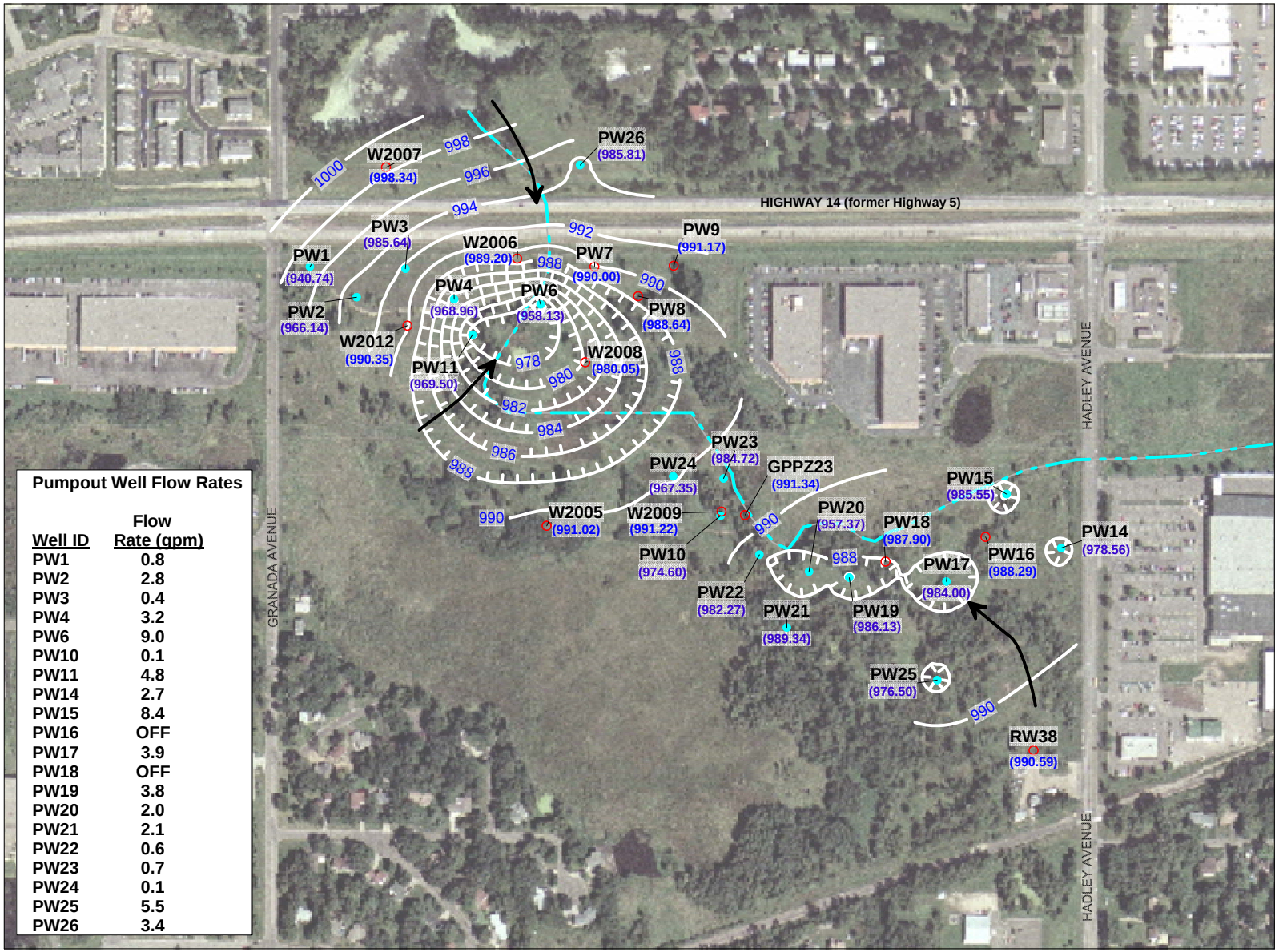
Note: 1. For each well measured as dry, the groundwater elevation was conservatively assumed to be at bottom of well.
2. Groundwater elevations for pumpout wells are posted but not used in preparing contours. Groundwater elevation contours are inferred around pumping centers.
3. The locations of pumpout wells PW16 and PW18 are shown on Figure 3-5.

Figure 3-11

Groundwater Elevation Contour Map
Upper Alluvium Aquifer
4th Quarter 2017
25 October 2017

Oakdale Site
Oakdale, Minnesota

2017-1025-OKMN-UA.srf



Note: 1. During this event, pumpout wells PW16 and PW18 were off temporarily and allowed to reach a steady-state condition to provide additional groundwater monitoring points for the lower alluvium contour map.
2. Groundwater elevations for pumpout wells are posted but not used in preparing contours. Groundwater elevation contours are inferred around pumping centers.

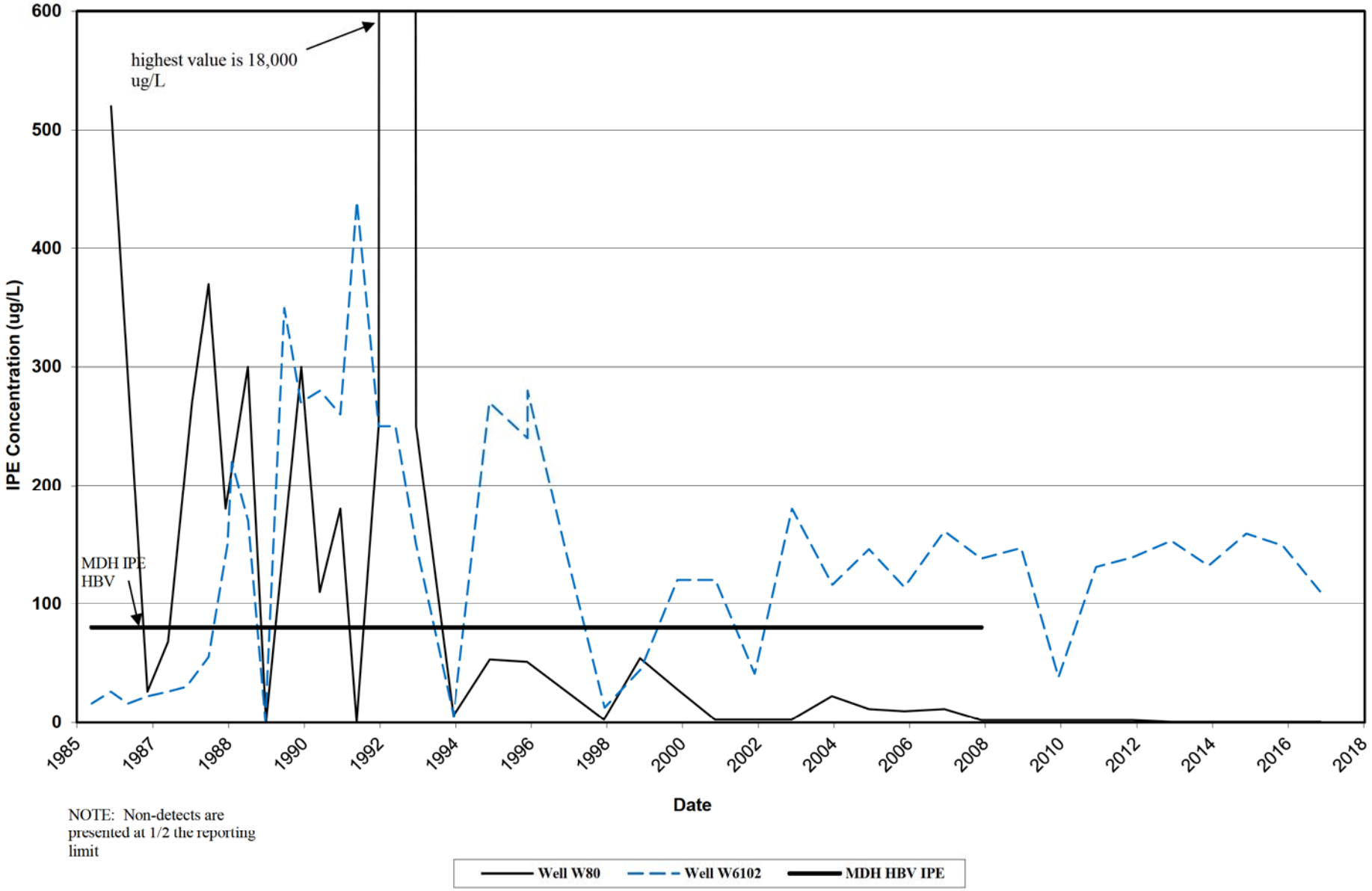
Figure 3-12

Groundwater Elevation Contour Map Lower Alluvium Aquifer 4th Quarter 2017 25 October 2017

Oakdale Site Oakdale, Minnesota

2017-1025-OKMN-LA.srf

Figure 3-13
Isopropyl Ether Concentration Trends in
Platteville Wells W80 and W6102
Oakdale Site



NOTE: Non-detects are presented at 1/2 the reporting limit

Table 3-1
2017 Depth-to-Groundwater and Groundwater Elevation Data
Oakdale Site

Well ID	TOC Elevation (ft MSL)	3/30/2017 Depth-to-Groundwater (ft btoc)	3/30/2017 Groundwater Elevation (ft MSL)	6/22/2017 Depth-to-Groundwater (ft btoc)	6/22/2017 Groundwater Elevation (ft MSL)	9/5/2017 Depth-to-Groundwater (ft btoc)	9/5/2017 Groundwater Elevation (ft MSL)	10/25/2017 Depth-to-Groundwater (ft btoc)	10/25/2017 Groundwater Elevation (ft MSL)	Groundwater Elevation Data Minimum	Maximum	Range	Standard Deviation
Area A[1] (Upgradient of pumpout wells)													
W20	1016.64	12.64	1004.00	12.63	1004.01	12.68	1003.96	12.52	1004.12	1003.96	1004.12	0.16	0.07
W2007	1021.94	21.96	999.98	21.68	1000.26	23.12	998.82	23.60	998.34	998.34	1000.26	1.92	0.92
W22	1019.44	18.84	1000.60	18.44	1001.00	20.19	999.25	20.58	998.86	998.86	1001.00	2.14	1.03
Area B[1] (Area of pumpout wells)													
W2001	1007.18	12.43	994.75	13.45	993.73	14.29	992.89	14.06	993.12	992.89	994.75	1.86	0.83
W2006	1007.32	15.90	991.42	17.36	989.96	18.30	989.02	18.12	989.20	989.02	991.42	2.40	1.09
W2012	1016.29	24.15	992.14	25.14	991.15	25.91	990.38	25.94	990.35	990.35	992.14	1.79	0.84
W23	1005.44	3.22	1002.22	8.53	996.91	9.40	996.04	8.87	996.57	996.04	1002.22	6.18	2.88
W28	1012.39	13.10	999.29	12.45	999.94	16.37	996.02	17.62	994.77	994.77	999.94	5.17	2.50
W29	1016.97	20.94	996.03	18.69	998.28	21.58	995.39	23.60	993.37	993.37	998.28	4.91	2.02
W36	1016.87	15.77	1001.10	15.65	1001.22	18.83	998.04	20.78	996.09	996.09	1001.22	5.13	2.50
Area C[1] (Upgradient of pumpout wells that were shut off in 2003)													
APZ44	1011.76	4.45	1007.31	5.09	1006.67	5.45	1006.31	5.38	1006.38	1006.31	1007.31	1.00	0.46
PW7	1007.75	15.90	991.85	17.23	990.52	18.74	989.01	17.75	990.00	989.01	991.85	2.84	1.18
PW8	1007.64	13.60	994.04	14.25	993.39	18.48	989.16	19.00	988.64	988.64	994.04	5.40	2.80
PW9	1005.59	11.40	994.19	12.18	993.41	14.71	990.88	14.42	991.17	990.88	994.19	3.31	1.64
W21R	1017.48	11.61	1005.87	10.91	1006.57	12.28	1005.20	12.72	1004.76	1004.76	1006.57	1.81	0.79
W26R	1010.89	7.64	1003.25	7.35	1003.54	9.98	1000.91	10.77	1000.12	1000.12	1003.54	3.42	1.70
Area D[1]													
W2003	1000.90	19.43	981.47	24.50	976.40	22.90	978.00	20.83	980.07	976.40	981.47	5.07	2.24
W2005	1007.47	15.87	991.60	15.45	992.02	16.97	990.50	16.45	991.02	990.50	992.02	1.52	0.66
W2008	1001.42	20.00	981.42	24.60	976.82	23.45	977.97	21.37	980.05	976.82	981.42	4.60	2.06
W2010	1006.99	15.81	991.18	15.39	991.60	16.85	990.14	16.61	990.38	990.14	991.60	1.46	0.68
W215	1007.30	12.57	994.73	13.31	993.99	14.49	992.81	14.24	993.06	992.81	994.73	1.92	0.88
W25	1000.37	5.35	995.02	5.68	994.69	5.63	994.74	5.52	994.85	994.69	995.02	0.33	0.15
W30	1006.93	12.01	994.92	11.41	995.52	DRY	DRY	DRY	DRY	---	995.52	---	---
W31	999.91	5.18	994.73	6.09	993.82	6.15	993.76	5.72	994.19	993.76	994.73	0.97	0.45
W32	1003.09	5.27	997.82	5.83	997.26	6.20	996.89	6.74	996.35	996.35	997.82	1.47	0.62
Platteville Monitoring Wells													
PL41	1003.74	23.80	979.94	23.67	980.07	24.86	978.88	25.20	978.54	978.54	980.07	1.53	0.76
W3	1003.05	11.80	991.25	11.27	991.78	12.60	990.45	12.76	990.29	990.29	991.78	1.49	0.70
W8	1015.50	21.80	993.70	22.60	992.90	23.84	991.66	23.96	991.54	991.54	993.70	2.16	1.04
W6102	992.70	17.40	975.30	17.79	974.91	19.10	973.60	19.32	973.38	973.38	975.30	1.92	0.95
W6104	1001.23	38.56	962.67	38.84	962.39	39.56	961.67	39.58	961.65	961.65	962.67	1.02	0.52
St. Peter Monitoring Wells													
SP42	1004.34	114.65	889.69	114.26	890.08	114.51	889.83	114.05	890.29	889.69	890.29	0.60	0.27
W6201	991.23	109.51	881.72	109.49	881.74	109.56	881.67	108.99	882.24	881.67	882.24	0.57	0.27
Other Wells													
APZ45	995.52	5.15	990.37	5.74	989.78	5.79	989.73	5.63	989.89	989.73	990.37	0.64	0.29
APZ46	998.57	5.40	993.17	6.33	992.24	8.03	990.54	8.03	990.54	990.54	993.17	2.63	1.31
APZ47	1004.63	11.19	993.44	11.62	993.01	13.08	991.55	12.73	991.90	991.55	993.44	1.89	0.90
APZ48	1000.02	6.90	993.12	7.49	992.53	7.73	992.29	7.87	992.15	992.15	993.12	0.97	0.43
APZ49	999.25	4.33	994.92	5.41	993.84	6.09	993.16	6.04	993.21	993.16	994.92	1.76	0.82
APZ50	1004.65	9.81	994.84	10.82	993.83	12.05	992.60	11.71	992.94	992.60	994.84	2.24	1.00
GPPZ23	998.32	6.72	991.60	5.88	992.44	8.59	989.73	6.98	991.34	989.73	992.44	2.71	1.13
PW14	995.40	18.18	977.22	18.29	977.11	19.4	976.00	16.84	978.56	976.00	978.56	2.56	1.05
PW15	995.60	9.2	986.40	8.67	986.93	10.1	985.50	10.05	985.55	985.50	986.93	1.43	0.69
PW16	996.18	7.67	988.51	5.9	990.28	8.58	987.60	7.89	988.29	987.60	990.28	2.68	1.14
PW17	996.75	11.38	985.37	9.38	987.37	13.58	983.17	12.75	984.00	983.17	987.37	4.20	1.83
PW18	996.86	8.46	988.40	6.39	990.47	9.36	987.50	8.96	987.90	987.50	990.47	2.97	1.32
PW19	1000.53	13.96	986.57	12.69	987.84	14.68	985.85	14.4	986.13	985.85	987.84	1.99	0.88
PW20	1000.24	28.77	971.33	25.79	974.31	28.03	972.07	42.73	957.37	957.37	974.31	16.94	7.70
PW21	998.41	9.06	989.35	7.89	990.52	9.82	988.59	9.07	989.34	988.59	990.52	1.93	0.80
PW22	998.48	13.53	984.28	16.43	981.38	NA	NA	15.54	982.27	981.38	984.28	2.90	1.49
PW23	1000.75	41.1	958.71	27.5	972.31	40.51	959.30	15.09	984.72	958.71	984.72	26.01	12.35
PW24	999.42	NA	NA	27.2	971.90	24.81	974.29	31.75	967.35	967.35	974.29	6.94	3.53
PW25	1003.21	27.17	976.04	19.65	983.56	22.76	980.45	26.71	976.50	976.04	983.56	7.52	3.55
PW26	1011.25	22.76	988.49	24.04	987.21	25.63	985.62	25.44	985.81	985.62	988.49	2.87	1.34
RW37	1005.03	10.31	994.72	9.81	995.22	11.50	993.53	11.87	993.16	993.16	995.22	2.06	0.97
RW38	1004.11	13.03	991.08	12.10	992.01	13.79	990.32	13.52	990.59	990.32	992.01	1.69	0.74
W2009	1001.33	8.81	992.52	9.18	992.15	10.30	991.03	10.11	991.22	991.03	992.52	1.49	0.72
W203	1004.79	8.73	996.06	9.02	995.77	10.49	994.30	11.26	993.53	993.53	996.06	2.53	1.20
W205	997.79	5.95	991.84	7.19	990.60	7.10	990.69	7.06	990.73	990.60	991.84	1.24	0.59
W217	1018.58	13.85	1004.73	13.05	1005.53	12.88	1005.70	13.55	1005.03	1004.73	1005.70	0.97	0.45
W33	1001.89	7.50	994.39	9.75	992.14	10.86	991.03	10.40	991.49	991.03	994.39	3.36	1.49

ft MSL - feet above mean sea level. NA - Not Available

ft btoc - feet below top of casing.

[1]Areas A, B, C and D shown on Figure 2-1.

Table 3-2
2017 Groundwater VOC Analytical Data
VOC Pumpout Wells
Oakdale Site

Sample Location:	PW1	PW2	PW3	PW4	PW6	PW10		PW11
Sample Date:	11/2/2017	11/2/2017	11/2/2017	11/2/2017	11/2/2017	11/2/2017		11/2/2017
Sample Code:	0	0	0	0	0	0	DB	0
List 1 VOCs (µg/L)								
Acetone	ND	**9260**	ND	**7000**	ND	ND	ND	ND
Benzene	ND	ND	**318**	**147**	**32.3**	**469**	**511**	**139**
1,1-Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethylene	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethylene, cis	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethylene, trans	ND	ND	ND	ND	ND	ND	ND	ND
Ethyl benzene	ND	ND	ND	**44.7**	ND	**78.7**	**83.3**	ND
Isopropyl ether	**10600**	**6780**	**20300**	**14200**	**3740**	**5460**	**5420**	**6690**
Methyl ethyl ketone	ND	**3380**	**2130**	**1740**	**152**	ND	ND	ND
Tetrahydrofuran	ND	ND	ND	ND	ND	ND	ND	ND
List 2 VOCs (µg/L)								
Isopropyl alcohol	ND	ND	ND	**6980**	ND	ND	ND	ND
2-Butyl alcohol	ND	ND	ND	**1340**	ND	ND	ND	ND
Methyl isobutyl alcohol	ND	ND	ND	ND	ND	ND	ND	ND
Methylene chloride	ND	ND	ND	ND	ND	ND	ND	ND
Methyl isobutyl ketone	ND	ND	ND	**1180**	**134**	ND	ND	ND
Toluene	**250**	**266**	**488**	**963**	**60.5**	**275**	**295**	**60.9**
Xylenes, total	ND	ND	ND	**223**	ND	**338**	**296**	ND
Total VOCs (µg/L)	**10850**	**19686**	**23236**	**33818**	**4119**	**6613**		**6890**

ND = Not detected

0 = Primary Sample

DB = Duplicate Sample

Total VOCs: Includes J values; ND treated as 0.0; Original and duplicate results averaged.

Table 3-3
2017 Groundwater VOC Analytical Data
VOC Pumpout Wells Converted to Monitoring Wells
Oakdale Site

Sample Location:	PW7	PW7		PW8	PW8	PW9	PW9
Sample Date:	6/14/2017	10/31/2017		6/14/2017	10/31/2017	6/14/2017	10/31/2017
Sample Code:	0	0	DB	0	0	0	0
List 1 VOCs (µg/L)							
Acetone	ND	ND	ND	ND	ND	ND	ND
Benzene	**77.0**	**102**	**98.5**	**446**	**811**	**1.4**	**2.9**
1,1-Dichloroethane	ND	ND	ND	ND	ND	**1.3**	ND
1,2-Dichloroethane	ND	ND	ND	ND	ND	**1.6**	**4.2**
1,1-Dichloroethylene	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethylene, cis	ND	ND	ND	ND	ND	**2.8**	**4.0**
1,2-Dichloroethylene, trans	ND	ND	ND	ND	ND	ND	ND
Ethyl benzene	ND	ND	ND	**40.5**	**40.2**	ND	ND
Isopropyl ether	**4360**	**4090**	**4090**	**5700**	**11000**	**38.5**	**29.9**
Methyl ethyl ketone	ND	ND	ND	ND	ND	ND	ND
Tetrahydrofuran	ND	ND	ND	ND	ND	ND	ND
List 2 VOCs (µg/L)							
Isopropyl alcohol	ND	ND	ND	ND	ND	ND	**170**
2-Butyl alcohol	ND	ND	ND	ND	ND	ND	ND
Methyl isobutyl alcohol	ND	ND	ND	ND	ND	ND	ND
Methylene chloride	ND	ND	ND	ND	ND	ND	ND
Methyl isobutyl ketone	ND	ND	ND	ND	**182**	ND	ND
Toluene	**38.2**	ND	ND	ND	ND	ND	ND
Xylenes, total	**1200**	**1870**	**1850**	**740**	**1240**	ND	ND
Total VOCs (µg/L)	**5675**	**6050**		**6927**	**13273**	**45.6**	**211**

ND = Not detected

0 = Primary Sample

DB = Duplicate Sample

Total VOCs: Includes J values; ND treated as 0.0; Original and duplicate results averaged.

Table 3-4
2017 Groundwater VOC Analytical Data
Upper Alluvium Monitoring Wells
Oakdale Site

Sample Location:	W25	W26R		W26R		W28	W29	W31	W33	W215
Sample Date:	11/1/2017	6/14/2017		11/1/2017		11/1/2017	11/2/2017	11/1/2017	11/1/2017	11/1/2017
Sample Code:	0	0	DB	0	DB	0	0	0	0	0
List 1 VOCs (µg/L)										
Acetone	ND	ND	ND	ND	ND	ND	**51900**	ND	ND	ND
Benzene	ND	**2.8**	**2.9**	**1.2**	**1.1**	ND	**1600**	ND	**219**	ND
1,1-Dichloroethane	ND	ND	ND	ND	ND	ND	**205**	ND	ND	ND
1,2-Dichloroethane	ND	**1.1**	**1.1**	**1.0**	**1.0**	ND	**312**	ND	ND	ND
1,1-Dichloroethylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethylene, cis	ND	ND	ND	ND	ND	ND	**649**	ND	ND	ND
1,2-Dichloroethylene, trans	ND	ND	ND	ND	ND	ND	**3.8**	ND	ND	ND
Ethyl benzene	ND	ND	ND	ND	ND	ND	**262**	ND	ND	ND
Isopropyl ether	ND	**20.5**	**20.5**	**7.0**	**6.4**	**23.5**	**14200**	ND	**2280**	ND
Methyl ethyl ketone	ND	ND	ND	ND	ND	ND	**45800**	ND	ND	ND
Tetrahydrofuran	ND	ND	ND	ND	ND	ND	**66.7**	ND	ND	ND
List 2 VOCs (µg/L)										
Isopropyl alcohol	ND	**126**	ND	ND	**108**	ND	**5810**	ND	ND	ND
2-Butyl alcohol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methyl isobutyl alcohol	ND	ND	ND	ND	ND	ND	**2370**	ND	ND	ND
Methylene chloride	ND	ND	ND	ND	ND	ND	**32.4**	ND	ND	ND
Methyl isobutyl ketone	ND	ND	ND	ND	ND	ND	**23000**	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND	**11000**	ND	ND	ND
Xylenes, total	ND	ND	ND	ND	ND	ND	**965**	ND	ND	ND
Total VOCs (µg/L)	ND	**87.5**		**62.9**		**23.5**	**158176**	ND	**2499**	ND

ND = Not detected

0 = Primary Sample

DB = Duplicate Sample

Total VOCs: Includes J values; ND treated as 0.0; Original and duplicate results averaged.

Table 3-5
2017 Groundwater VOCAnalytical Data
Lower Alluvium Monitoring Wells
Oakdale Site

Sample Location:	W2003	W2005	W2008	W2009	W2010	W2012
Sample Date:	10/31/2017	11/1/2017	11/1/2017	11/1/2017	11/1/2017	11/1/2017
Sample Code:	0	0	0	0	0	0
List 1 VOCs (µg/L)						
Acetone	ND	ND	ND	ND	ND	ND
Benzene	ND	ND	ND	**1.3**	ND	**7.5**
1,1-Dichloroethane	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND	ND	ND	ND
1,1-Dichloroethylene	ND	ND	ND	ND	ND	ND
1,2-Dichloroethylene, cis	ND	ND	ND	ND	ND	ND
1,2-Dichloroethylene, trans	ND	ND	ND	ND	ND	ND
Ethyl benzene	ND	ND	ND	ND	ND	**5.0**
Isopropyl ether	**91.1**	**320**	**44.5**	**96.7**	**24.8**	**298**
Methyl ethyl ketone	ND	ND	ND	ND	ND	ND
Tetrahydrofuran	ND	ND	ND	ND	ND	ND
List 2 VOCs (µg/L)						
Isopropyl alcohol	ND	ND	ND	ND	**137**	ND
2-Butyl alcohol	ND	ND	ND	ND	ND	ND
Methyl isobutyl alcohol	ND	ND	ND	ND	ND	ND
Methylene chloride	ND	ND	ND	ND	ND	ND
Methyl isobutyl ketone	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND
Xylenes, total	ND	ND	ND	ND	ND	ND
Total VOCs (µg/L)	**91.1**	**320**	**44.5**	**98.0**	**162**	**311**

ND = Not detected

0 = Primary Sample

DB = Duplicate Sample

Total VOCs: Includes J values; ND treated as 0.0; Original and duplicate results averaged.

Table 3-6
2017 Groundwater VOC Analytical Data
Platteville Limestone Monitoring Wells
Oakdale Site

Sample Location:	W3	W8	W80	W6102
Sample Date:	10/31/2017	10/31/2017	11/2/2017	11/2/2017
Sample Code:	0	0	0	0
List 1 VOCs (µg/L)				
Acetone	ND	ND	ND	ND
Benzene	ND	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND	ND
1,1-Dichloroethylene	ND	ND	ND	ND
1,2-Dichloroethylene, cis	ND	ND	ND	ND
1,2-Dichloroethylene, trans	ND	ND	ND	ND
Ethyl benzene	ND	ND	ND	ND
Isopropyl ether	**465**	**28.8**	ND	**110**
Methyl ethyl ketone	ND	ND	ND	ND
Tetrahydrofuran	ND	ND	ND	ND
List 2 VOCs (µg/L)				
Isopropyl alcohol	ND	**106**	---	ND
2-Butyl alcohol	ND	ND	---	ND
Methyl isobutyl alcohol	ND	ND	---	ND
Methylene chloride	ND	ND	---	ND
Methyl isobutyl ketone	ND	ND	---	ND
Toluene	ND	ND	---	ND
Xylenes, total	ND	ND	---	ND
Total VOCs (µg/L)	**465**	**135**	ND	**110**

ND = Not detected

0 = Primary Sample

Total VOCs: Includes J values; ND treated as 0.0; Original and duplicate results averaged.

Table 3-7
Historical Yearly Averages of Total VOC Concentrations
Active Pumping Wells
Oakdale Site

Year	PW1	PW2	PW3	PW4	PW6	PW10	PW11
1985	156	487	2000	136	32	1669	16
1986	319	212	1445	253	85	768	60
1987	344	377	2167	143	86	407	61
1988	345	330	2400	110	37	237	31
1989	270	433	3000	67	21	263	24
1990	155	187	2850	62	17	295	16
1991	122	153	2967	98	19	320	17
1992	248	283	2700	127	140	373	149
1993	186	247	1825	169	140	232	145
1994	53	82	1633	68	12	51	15
1995	86	83	1400	71	11	85	13
1996	88	84	1467	66	9.3	43	11
1997	83	87	1700	39	8.4	31	9.4
1998	59	78	1303	26	5.7	21	6.3
1999	44	67	396	30	6.3	17	8.7
2000	50	61	927	48	13	21	9.0
2001	36	51	1053	45	7.1	24	8.6
2002	51	78	1300	46	7.0	26	8.9
2003	25	40	730	27	4.2	23	8.2
2004	27	38	300	35	3.6	21	6.0
2005	19	41	434	34	1.9	16	6.9
2006	6.0	41	349	33	2.2	15	6.9
2007	5.6	49	358	29	2.1	17	7.1
2008	7.4	33	239	21	1.6	22	6.2
2009	12	31	251	30	2.6	14	7.3
2010	7.2	50	48	19	1.4	12	7.3
2011	8.5	38	83	21	1.3	8.9	5.9
2012	12	23	59	21	3.8	11	8.4
2013	8.2	43	19	15	3.6	7.5	6.5
2014	8.3	42	21	9	2.7	7.1	4.4
2015	10	11	42	16	3.3	3.2	16
2016	12	10	31	16	3.5	6.2	7.2
2017	11	20	23	34	4.1	6.6	6.9

NOTES: All total VOC concentrations are listed in milligrams per liter (mg/L).
Post 2005 values were recalculated in 2014, by increasing the reported significant figures.

4. GROUNDWATER PUMPOUT TREATMENT SYSTEM OPERATION AND MAINTENANCE

4.1 FLOW DATA

Groundwater pumpout well flow data for 2017 are summarized in Table 4-1. The average pumping rate for the VOC pumpout wells (PW1, PW2, PW3, PW4, PW6, PW10 and PW11) in 2017 was approximately 22 gallons per minute (gpm), assuming a continuous 24/7 operation (i.e. average flow rates were calculated using total gallons pumped divided by total minutes in 2017). The combined average of the flow rates of the VOC pumpout wells and additional pumpout wells (PW14 through PW26) was approximately 69 gpm. Figure 4-1 shows the cumulative quantity of groundwater removed since pumping began. This figure also shows the cumulative VOCs removed as discussed in Section 4.4.

Approximately 11.5 million gallons of water were removed by the VOC groundwater pumpout system in 2017. The total removed by the VOC pumpout system to date is approximately 594 million gallons. The third and fourth quarter 2017 flow totals were comparable to one another. Second quarter 2017 flow totals were higher due to increased recharge to the water table during this period from snowmelt and above normal precipitation. In the second quarter of 2017, approximately 14.2 in. of precipitation was received in the Site area compared to an average of 10.8 in. (www.climate.umn.edu). The first quarter 2017 flow totals were lower due to reduced recharge to the water table during the winter months. Figures 4-2 through 4-8 show the pumping history for the individual VOC pumpout wells. The individual monthly discharge reports for 2017 submitted to the City of Oakdale and the MPCA are included in Appendix A.

4.2 WELL MAINTENANCE

Regular maintenance/rehabilitation was performed in 2017 as needed, to reduce the amounts of biological growth and particulate matter that accumulate in the pumpout wells and discharge lines to maximize total operational running times for each pumpout well. A complete well maintenance/rehabilitation program was performed in September 2017 in VOC

pumpout wells PW1, PW2, PW3, PW4, PW6, PW10 and PW11 that consisted of the following:

- Removing, disassembling and cleaning the submersible pump in each well;
- Treatment of each well using an appropriate volume (as recommended by the manufacturer) of specialty chemicals to remove iron and biological growth;
- Using a surge block within the screened interval of each well for approximately 30 minutes to disperse the chemicals;
- Flushing the piping between each well and the treatment building using a combination of compressed air and potable water;
- Reinstallation of each submersible pump in the pumpout wells;
- Restarting the pumps in each well while containerizing the water affected by the chemical solution until the pH of the discharge water returned to normal;
- Adding the necessary amount of buffer to adjust the pH of the containerized water prior to disposal to the sanitary sewer;
- Sediment was removed from each well by means of the well rehabilitation activities that were performed. Pumpout wells PW1, PW2, PW3 and PW11 contained a significant amount of iron buildup or sediment that was removed.

4.3 TREATMENT SYSTEM OPERATIONS AND MAINTENANCE

The groundwater treatment vessels and equipment provide equalization, chemical conditioning, aeration, clarification and solids removal, granular activated carbon adsorption, and off-gas treatment. The system controls operate automatically; monitoring and maintenance are performed by the operators. The primary routine operation and maintenance activities that were performed during 2017 included:

- Regular inspections (4-5 days/week);
- Clarifier maintenance (leveling the sludge blanket, sludge wasting, monitoring sludge level and iron concentration);

- Building maintenance (as required);
- Replacement of activated carbon (performed four times during 2017);
- Adjustment and repair of chemical feed pumps;
- Cleaning of the aerator (three times during 2017);
- Inspection of off-gas treatment bio-mound.

In addition to normal operator maintenance on the clarifier sludge blanket, sludge that accumulated was removed using a sump pump.

4.4 VOC REMOVAL

Flow rates and water quality data are used to calculate the mass and volume of VOCs removed by the pumpout system. An overall specific gravity of 0.8 is assumed for total VOC volume/mass conversion in the calculations. This assumption is based on a concentration weighted average of specific gravities for the specific volatile organic compounds in the groundwater removed by the pumpout system, and is consistent with the assumption from previous years.

The VOC analytical results (Table 3-2) for the pumpout wells were used to determine average discharge concentrations for each well, and the total annual flow measured at each well was used to calculate the VOC mass removed. Figure 4-1 shows the cumulative amount of VOC removal and groundwater removed over time for the pumpout system. Figures 4-9 through 4-15 show the cumulative flow and VOC removal for all seven individual VOC pumpout wells.

It is estimated that 174 gallons (527 kg) of VOCs were removed by the pumpout system in 2017 (Table 4-2). This calculation does not account for the removal of VOCs by additional pumpout wells PW14 through PW26. The greatest VOC mass removal in 2017 (approximately 81 percent of the total mass) was from pumpout wells PW2, PW4 and PW6. Since 1985, it is estimated that the system has removed over 41,900 gallons of VOCs. As shown on Figure 4-1, the cumulative rate of VOC removal is decreasing due to a corresponding decrease in VOC concentrations over time. The decrease in historical VOC mass removed by each active pumpout well since 1985 is shown in Table 4-3.

Historical well VOC removal efficiencies (amount of VOC removed per million gallons of water pumped) over time are shown on Figure 4-16 for wells PW1, PW2 and PW4. Figures 4-17, 4-18, 4-19 and 4-20 show the VOC removal efficiency for wells PW3, PW6, PW10 and PW11, respectively. Pumpout wells PW3 and PW4 are the most efficient wells for removal of VOCs, removing approximately 89 kilograms of VOCs per million gallons of water pumped (kg/MG) and 129 kg/MG, respectively. As shown in Figures 4-16 through 4-20, the efficiency of VOC removal for the pumpout wells generally stable to declining over the last 6 years.

Figure 4-1
Cumulative Discharge Data
VOC Pumpout Wells
Oakdale Site

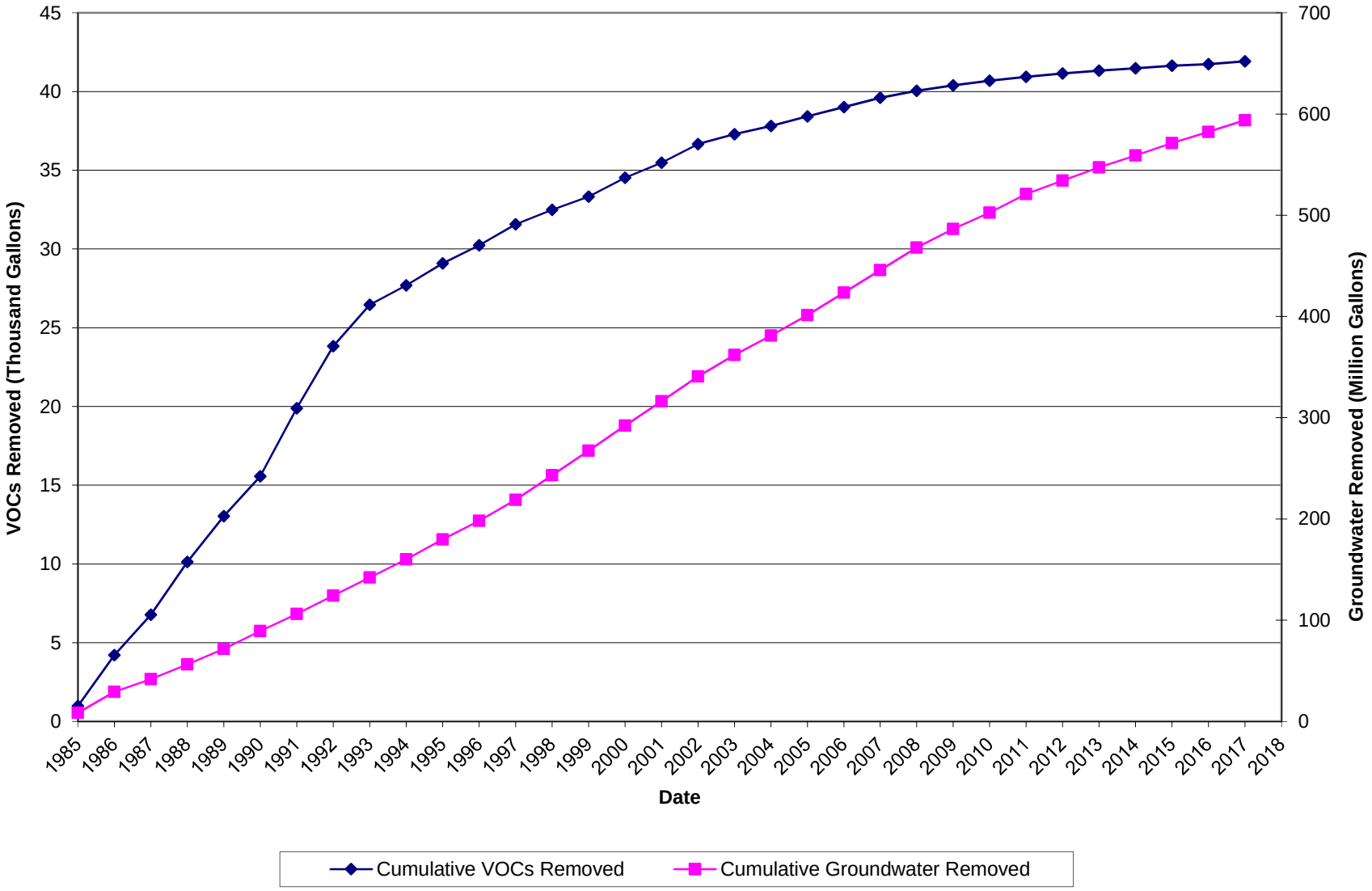


Figure 4-2
Pumpout Well PW1
Historical Average Pumping Rate
Oakdale Site

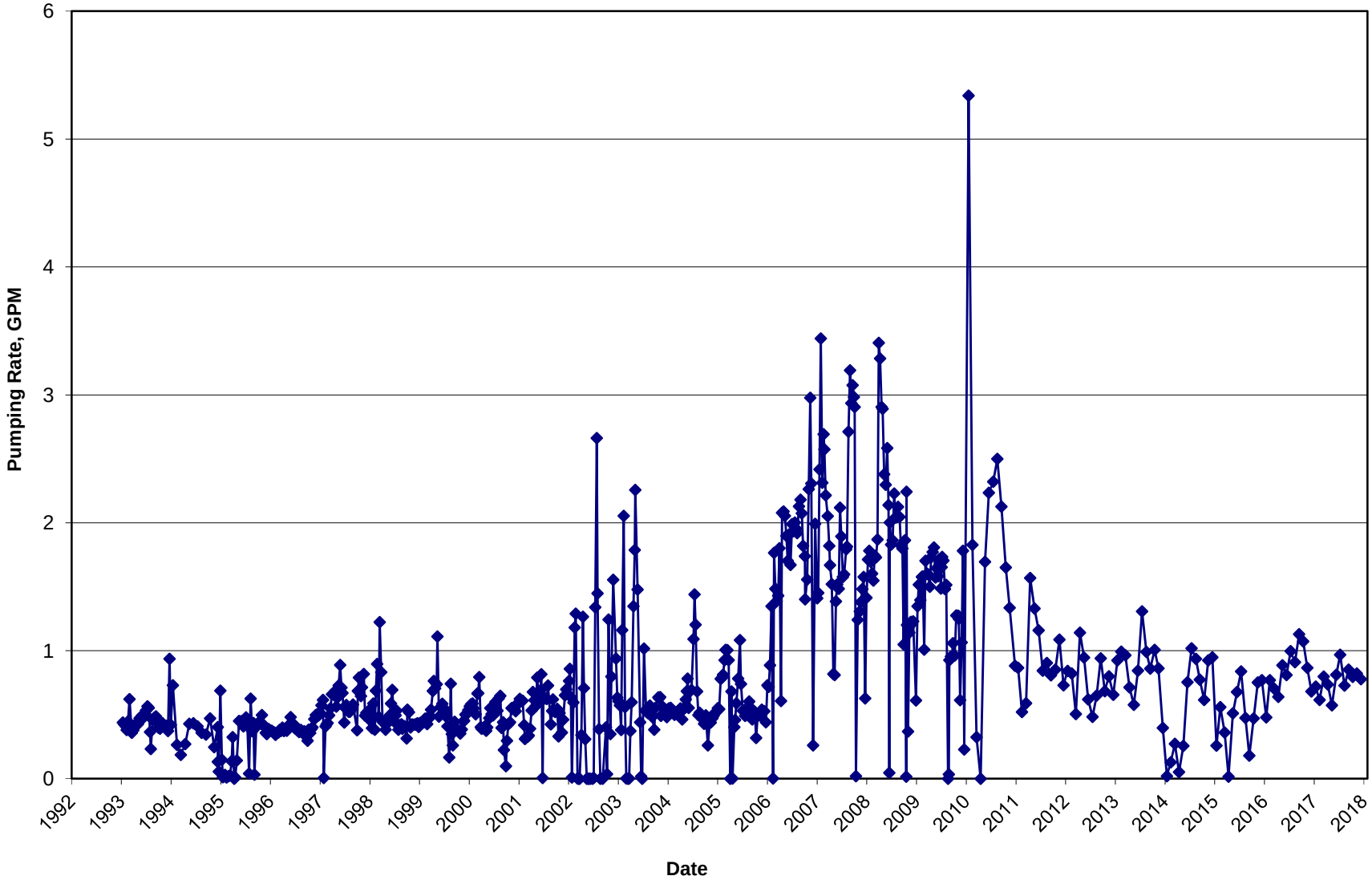


Figure 4-3
Pumpout Well PW2
Historical Average Pumping Rate
Oakdale Site

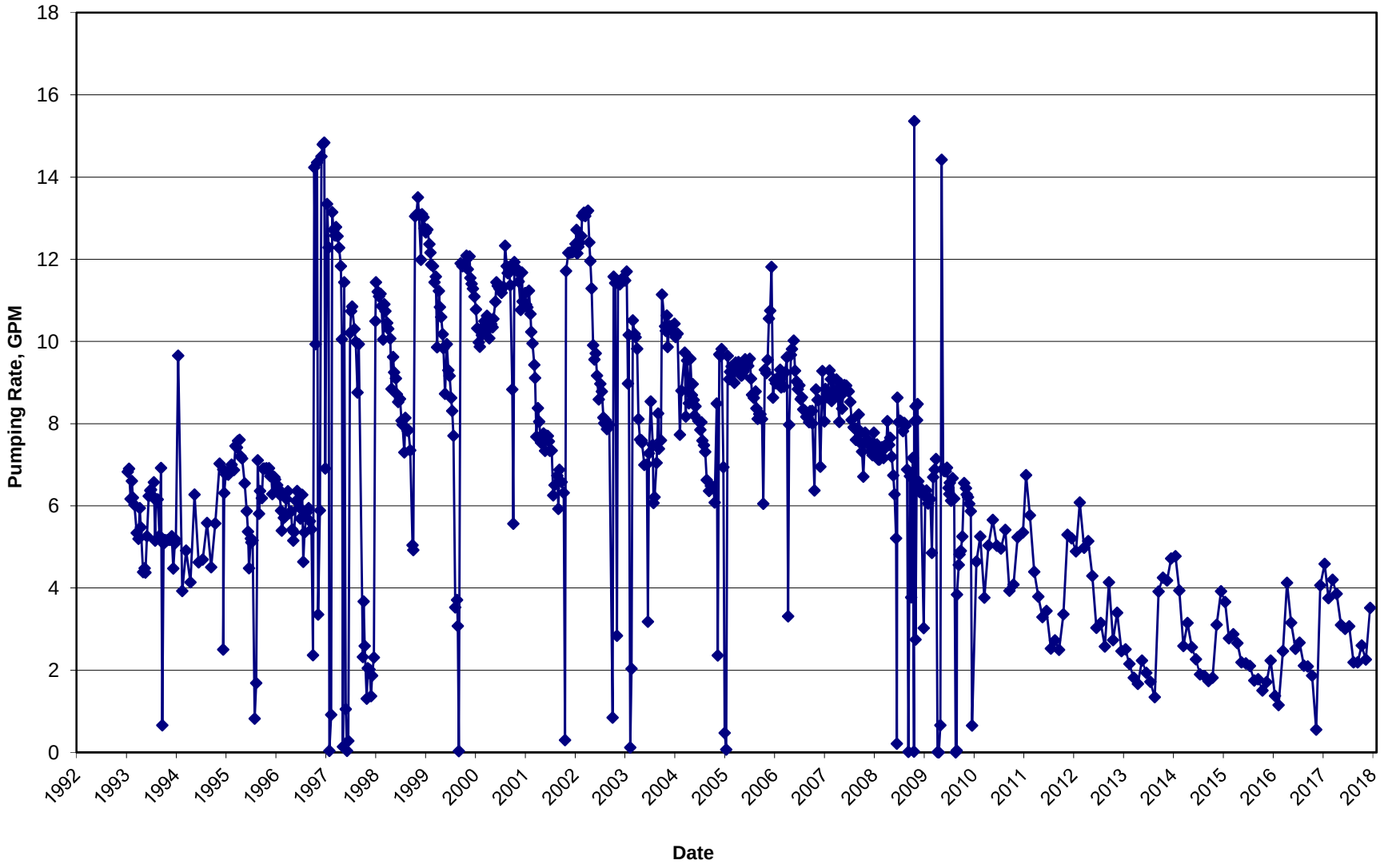


Figure 4-4
Pumpout Well PW3
Historical Average Pumping Rate
Oakdale Site

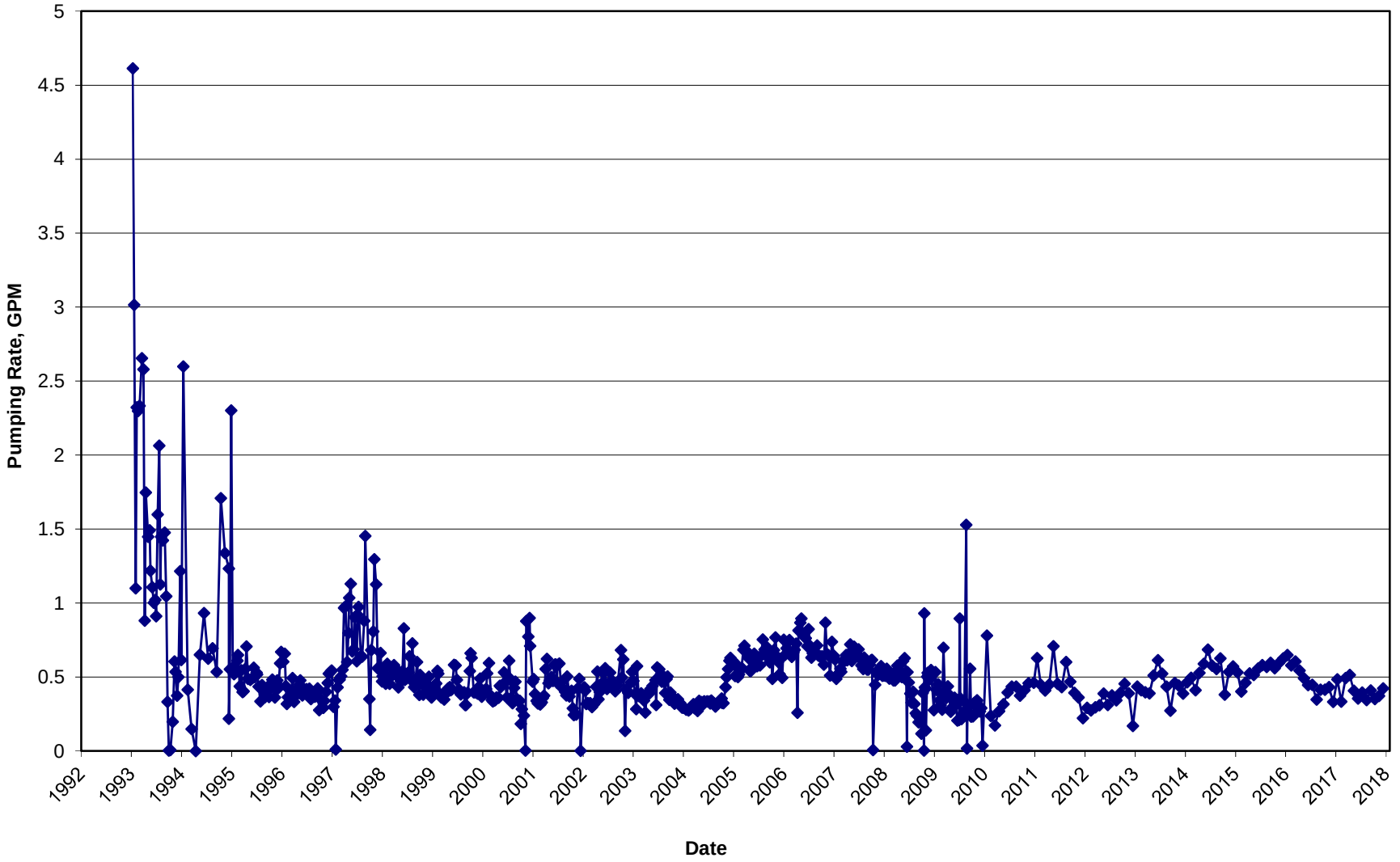


Figure 4-5
Pumpout Well PW4
Historical Average Pumping Rate
Oakdale Site

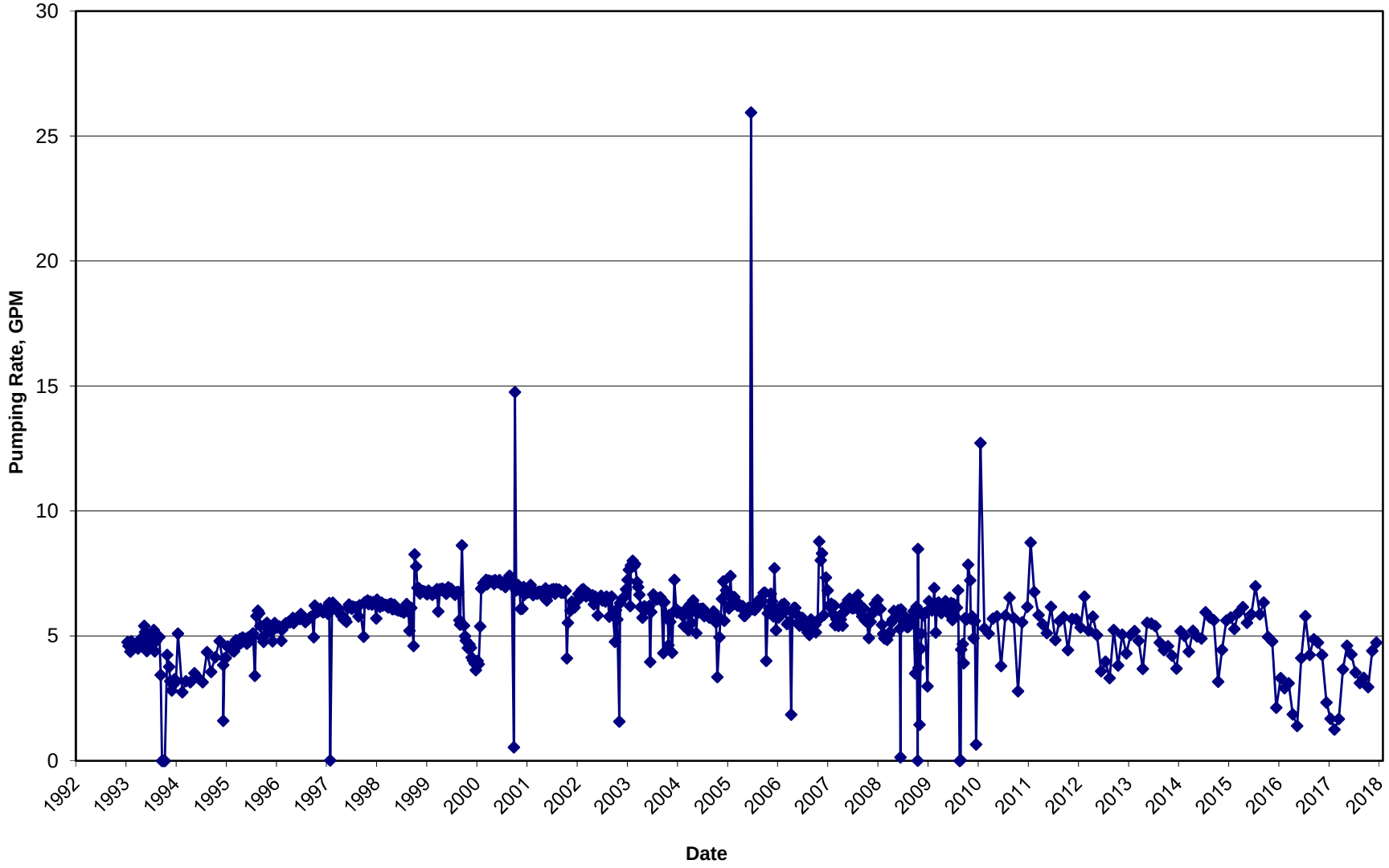


Figure 4-6
Pumpout Well PW6
Historical Average Pumping Rate
Oakdale Site

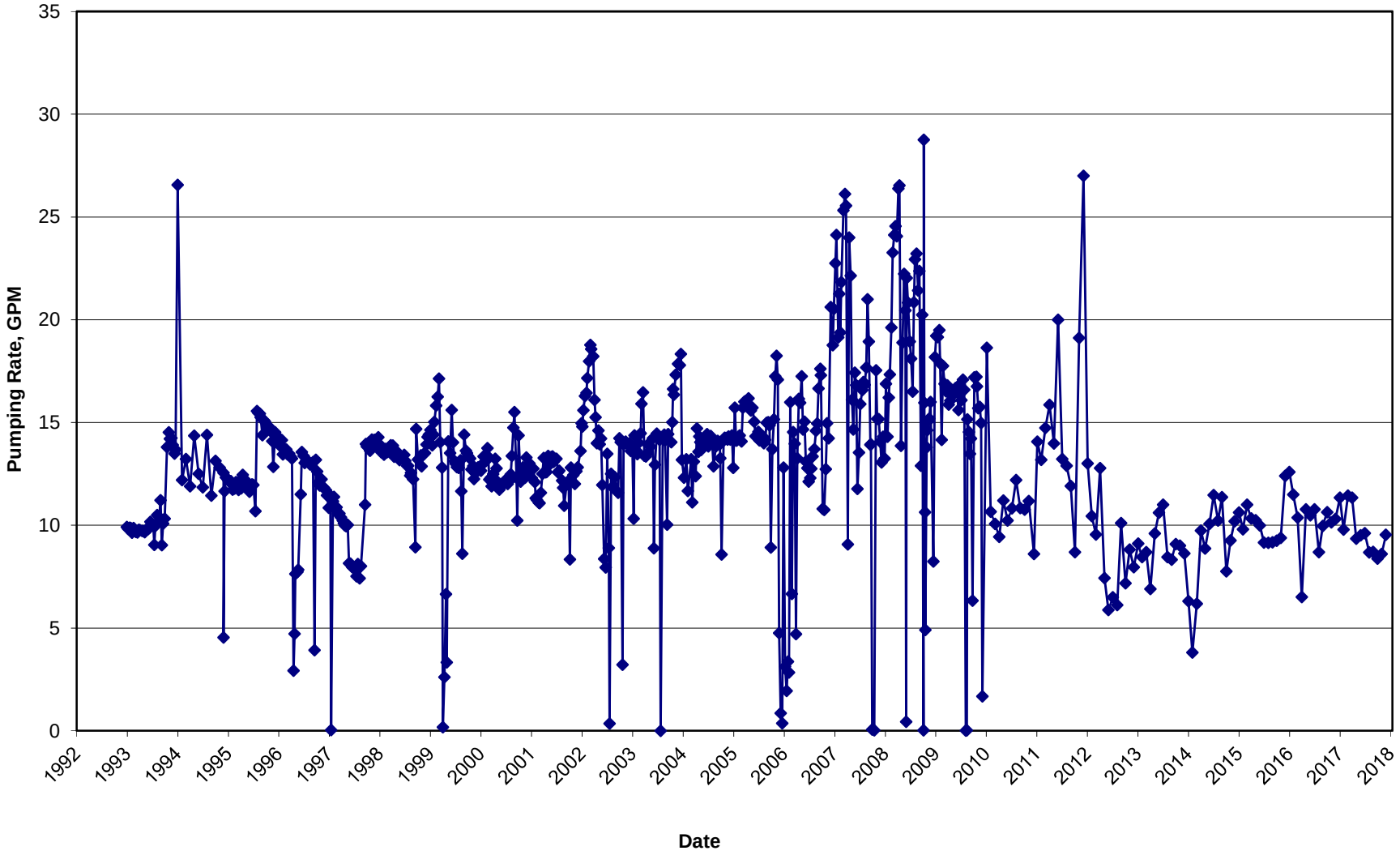


Figure 4-7
Pumpout Well PW10
Historical Average Pumping Rate
Oakdale Site

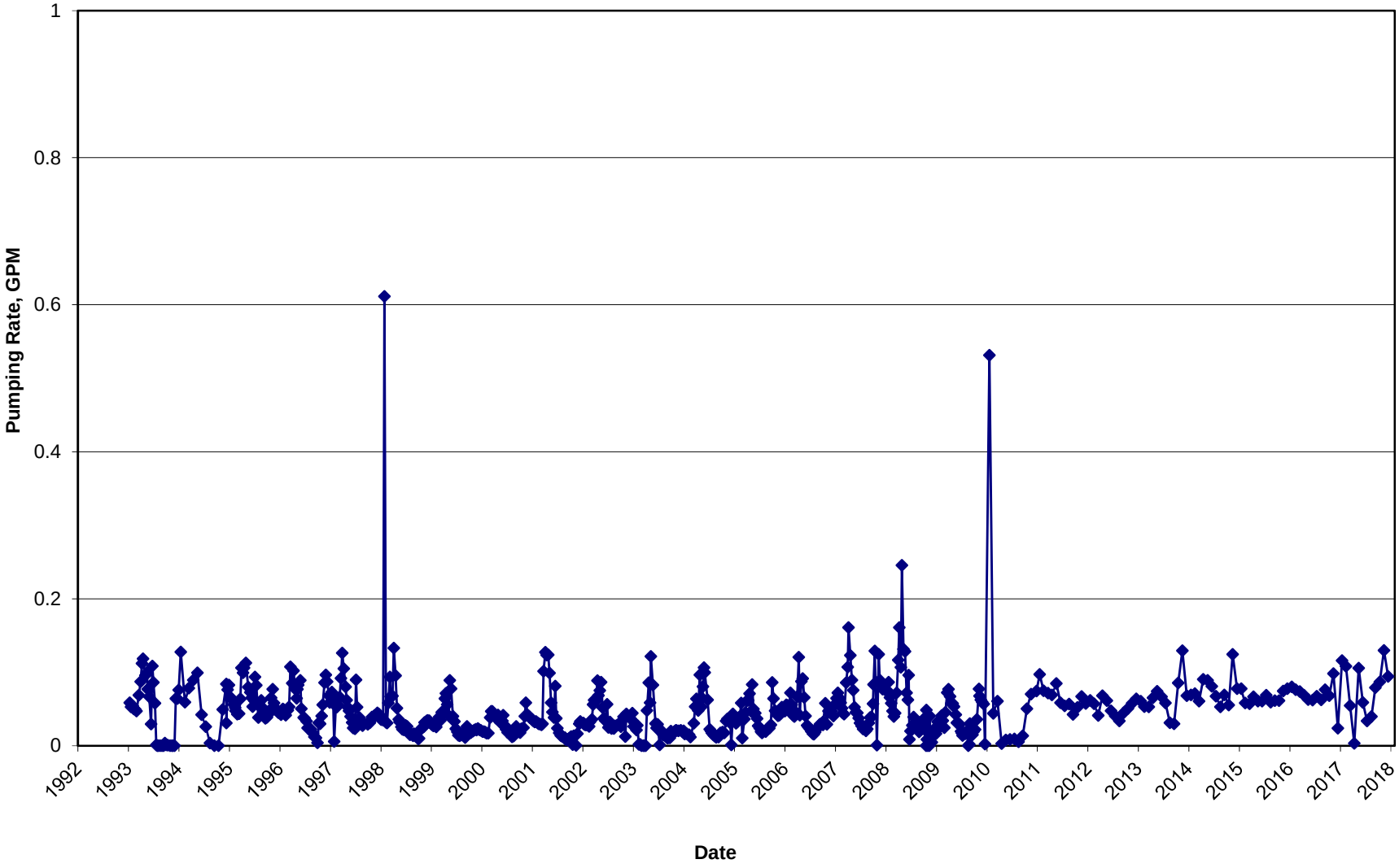


Figure 4-8
Pumpout Well PW11
Historical Average Pumping Rate
Oakdale Site

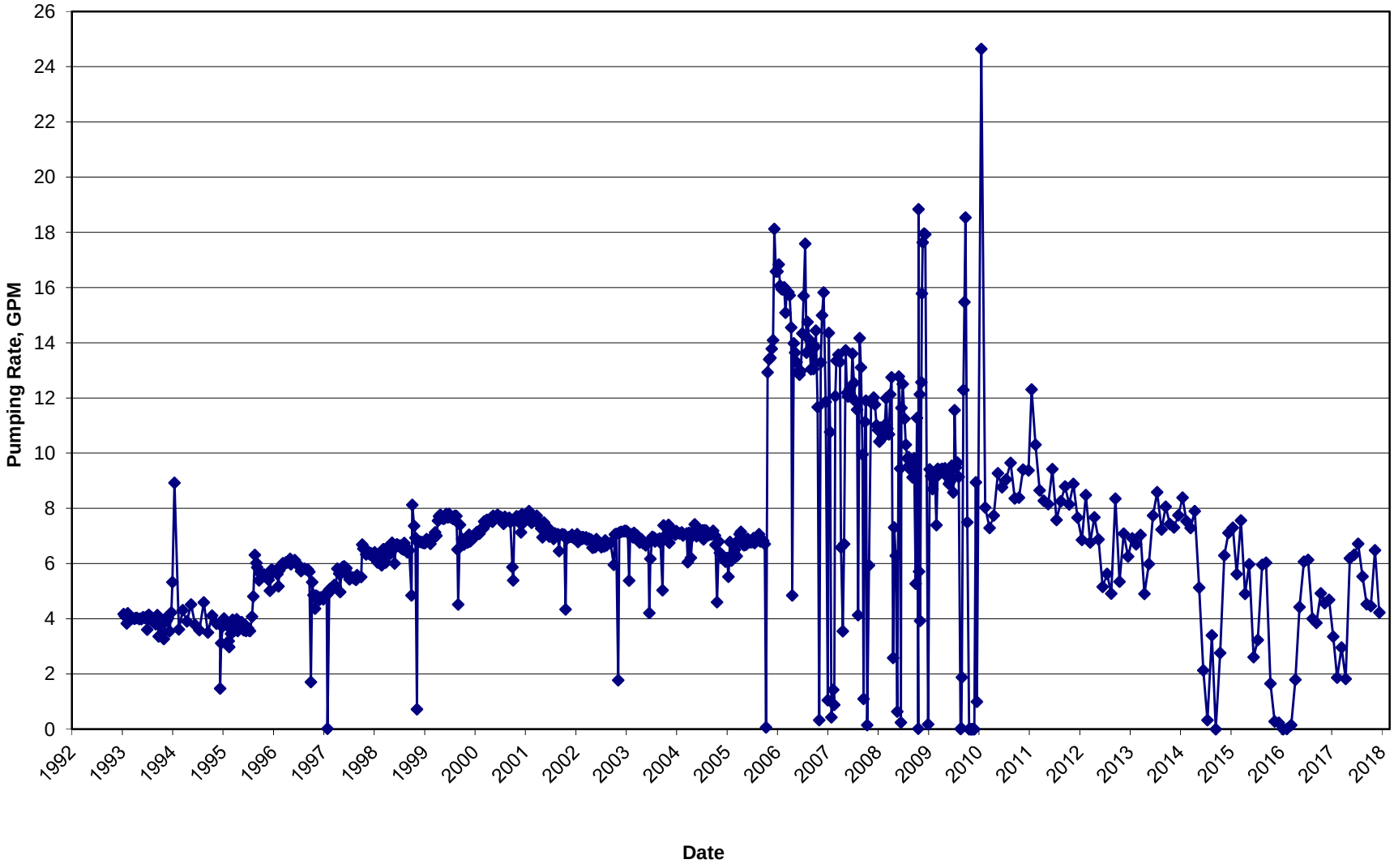


Figure 4-9
Pumpout Well PW1
Cumulative Discharge Data
Oakdale Site

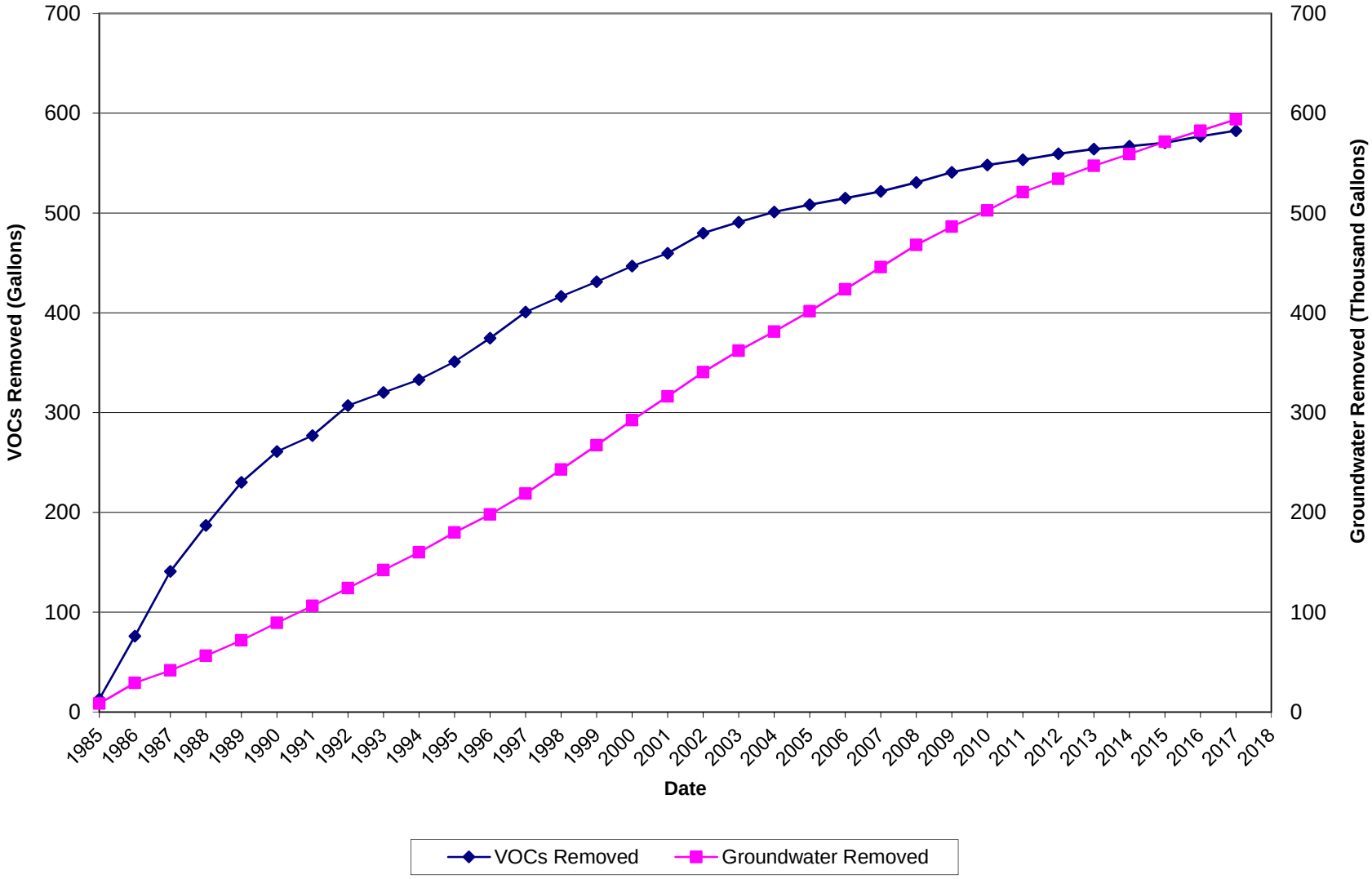
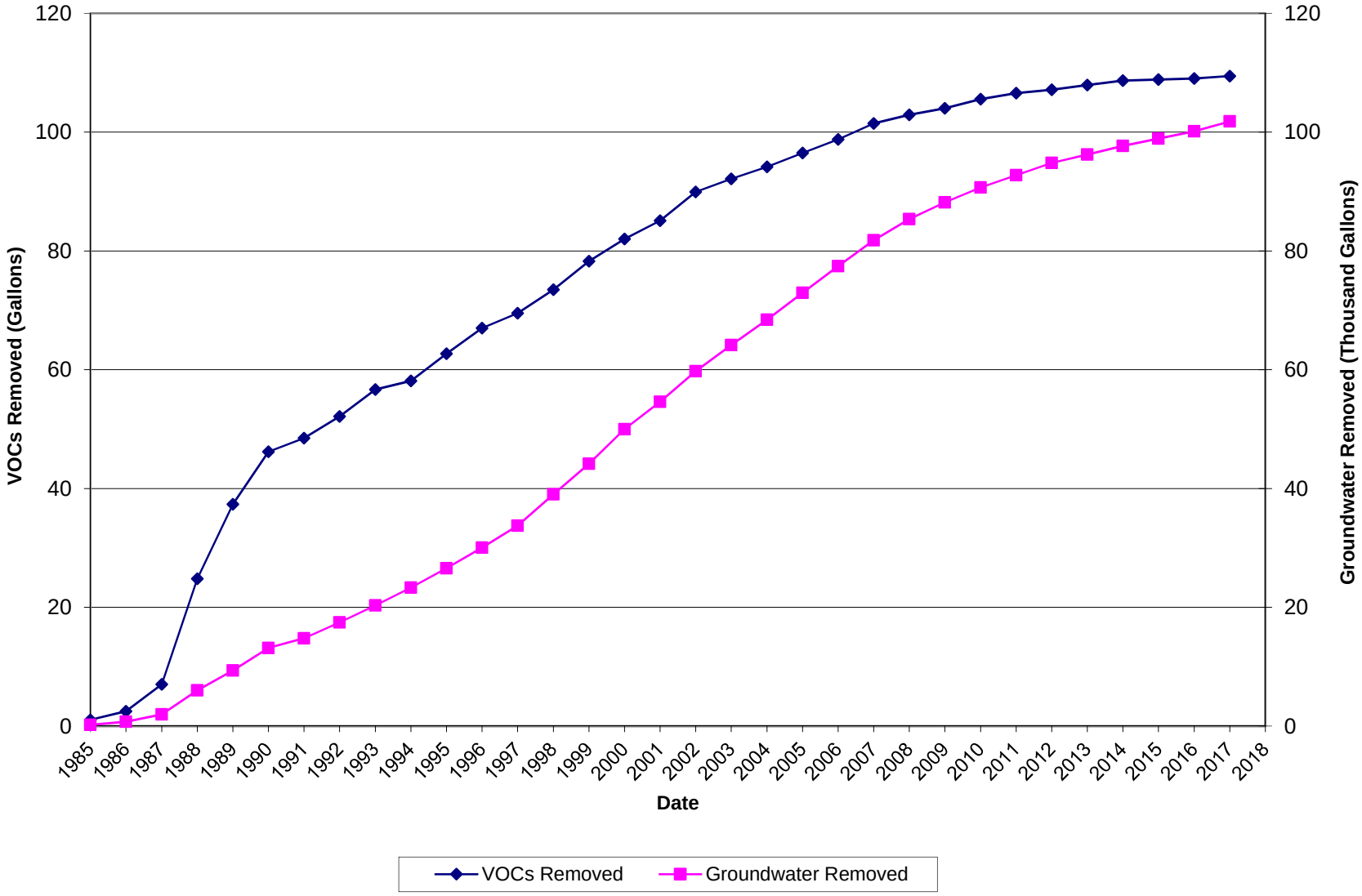
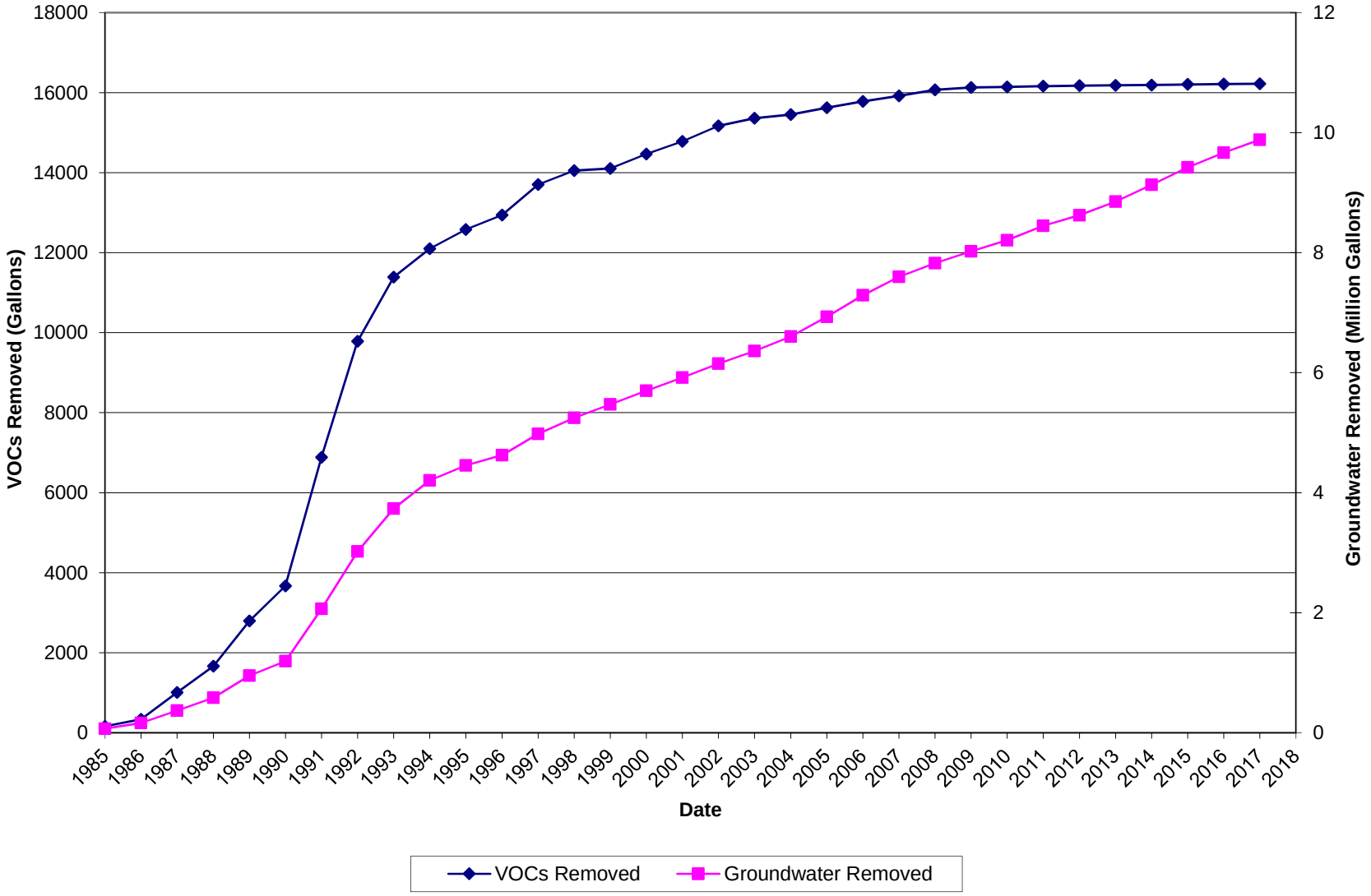


Figure 4-10
Pumpout Well PW2
Cumulative Discharge Data
Oakdale Site



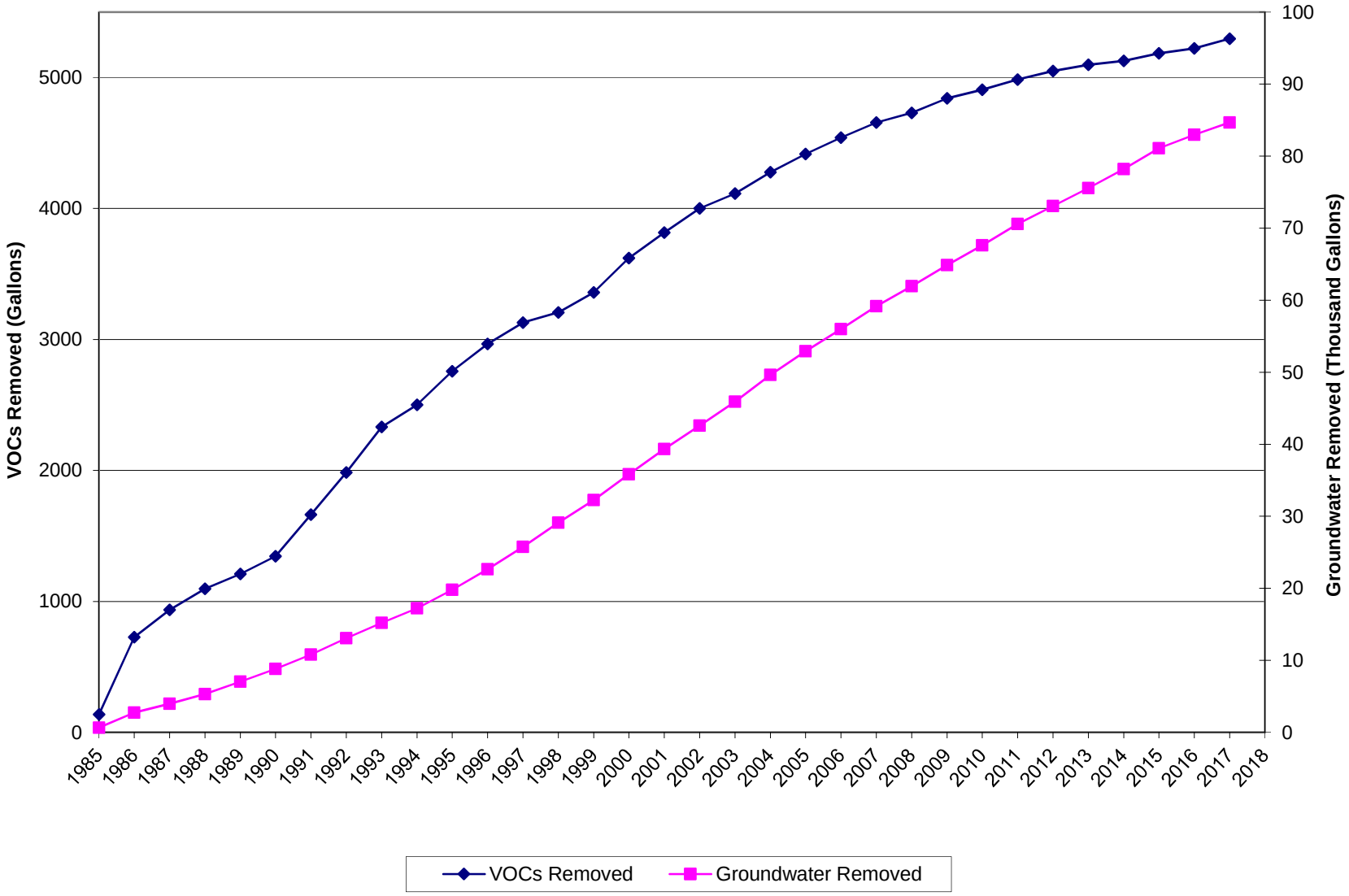
2017-OKMN-VOC_Figures-Calcs-Charts; Fig-04-10-PW2

Figure 4-11
Pumpout Well PW3
Cumulative Discharge Data
Oakdale Site



2017-OKMN-VOC_Figures-Calcs-Charts; Fig-04-11-PW3

Figure 4-12
Pumpout Well PW4
Cumulative Discharge Data
Oakdale Site



2017-OKMN-VOC_Figures-Calcs-Charts; Fig-04-12-PW4

Figure 4-13
Pumpout Well PW6
Cumulative Discharge Data
Oakdale Site

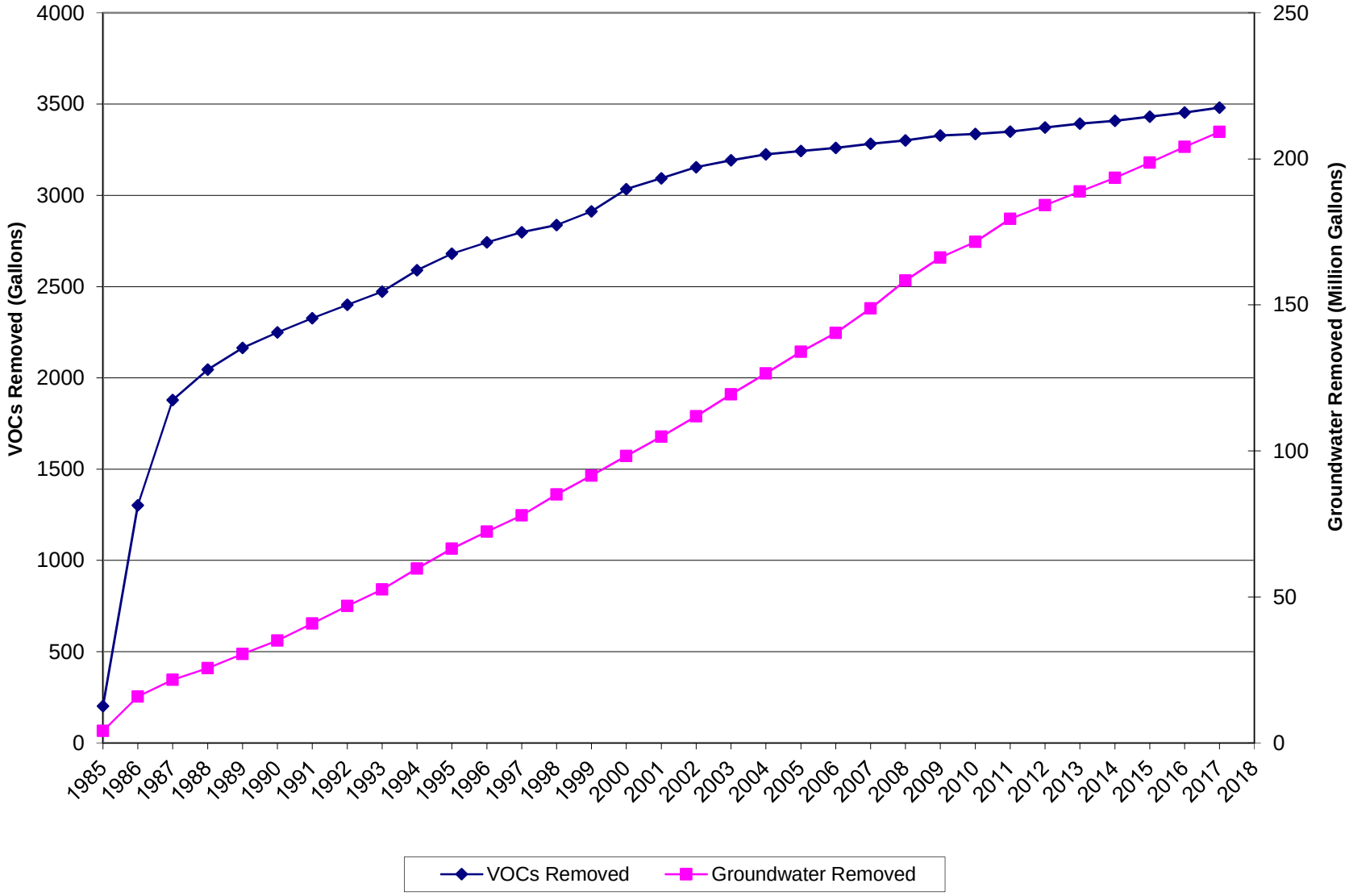
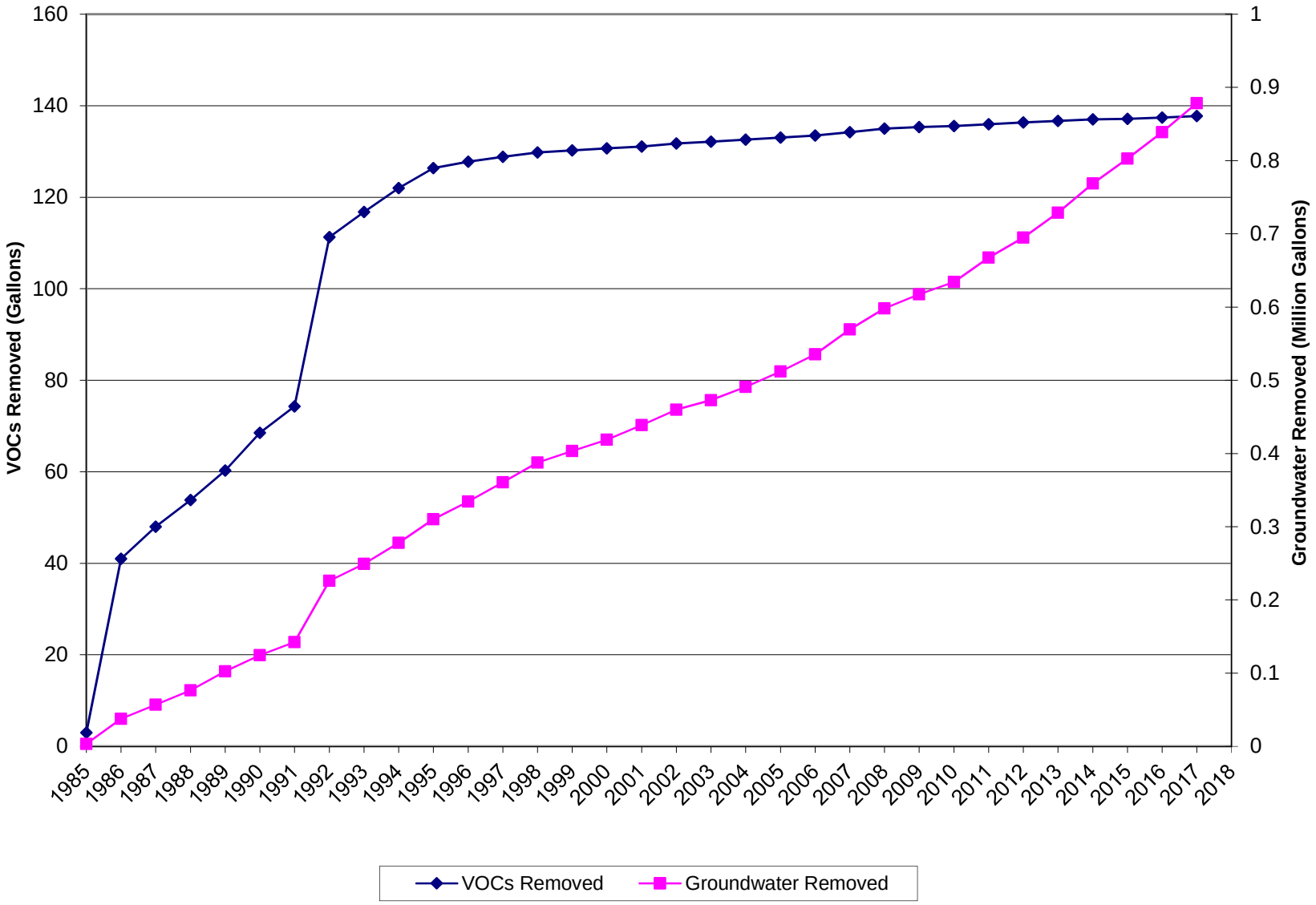


Figure 4-14
Pumpout Well PW10
Cumulative Discharge Data
Oakdale Site



2017-OKMN-VOC_Figures-Calcs-Charts; Fig-04-14-PW10

Figure 4-15
Pumpout Well PW11
Cumulative Discharge Data
Oakdale Site

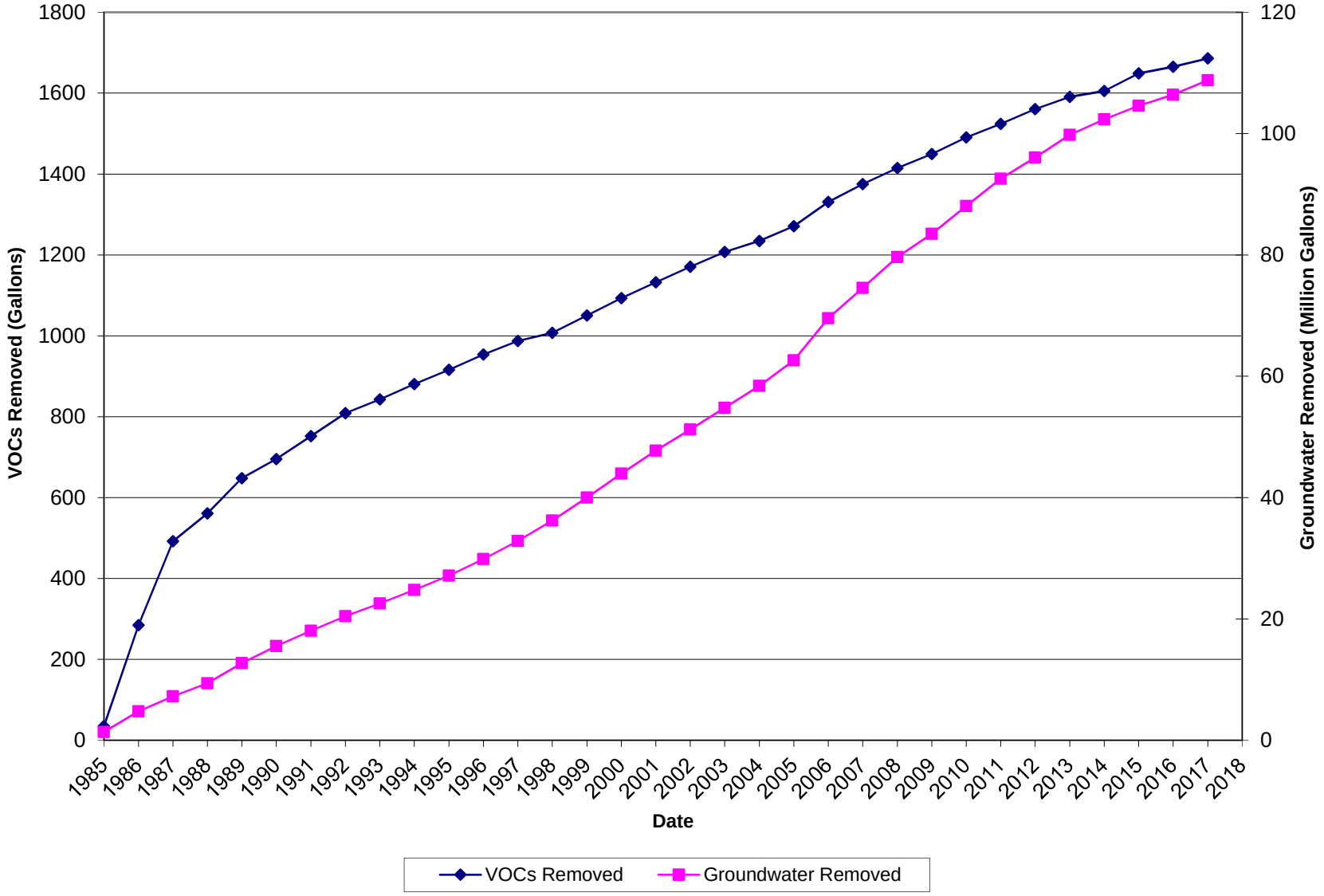
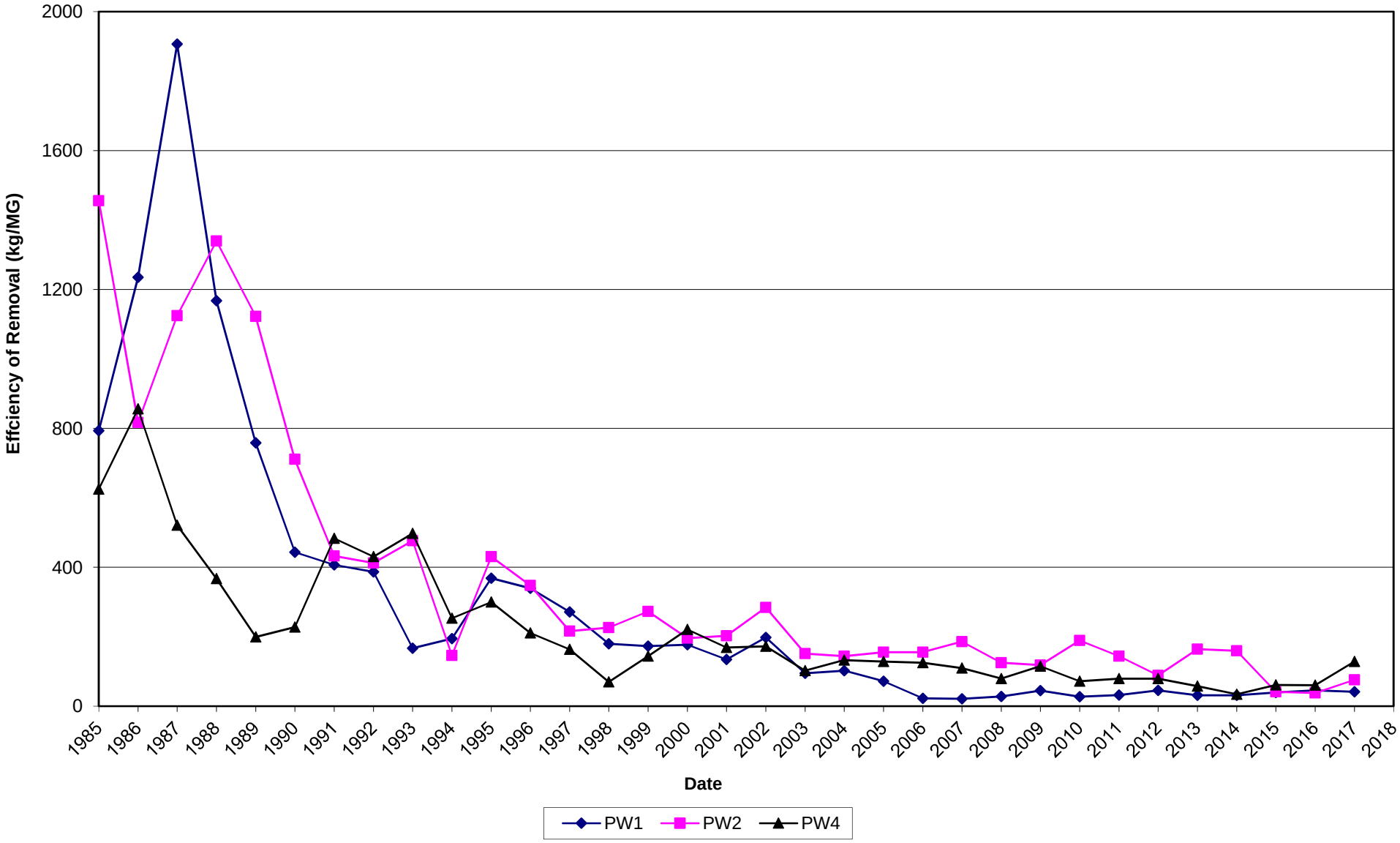
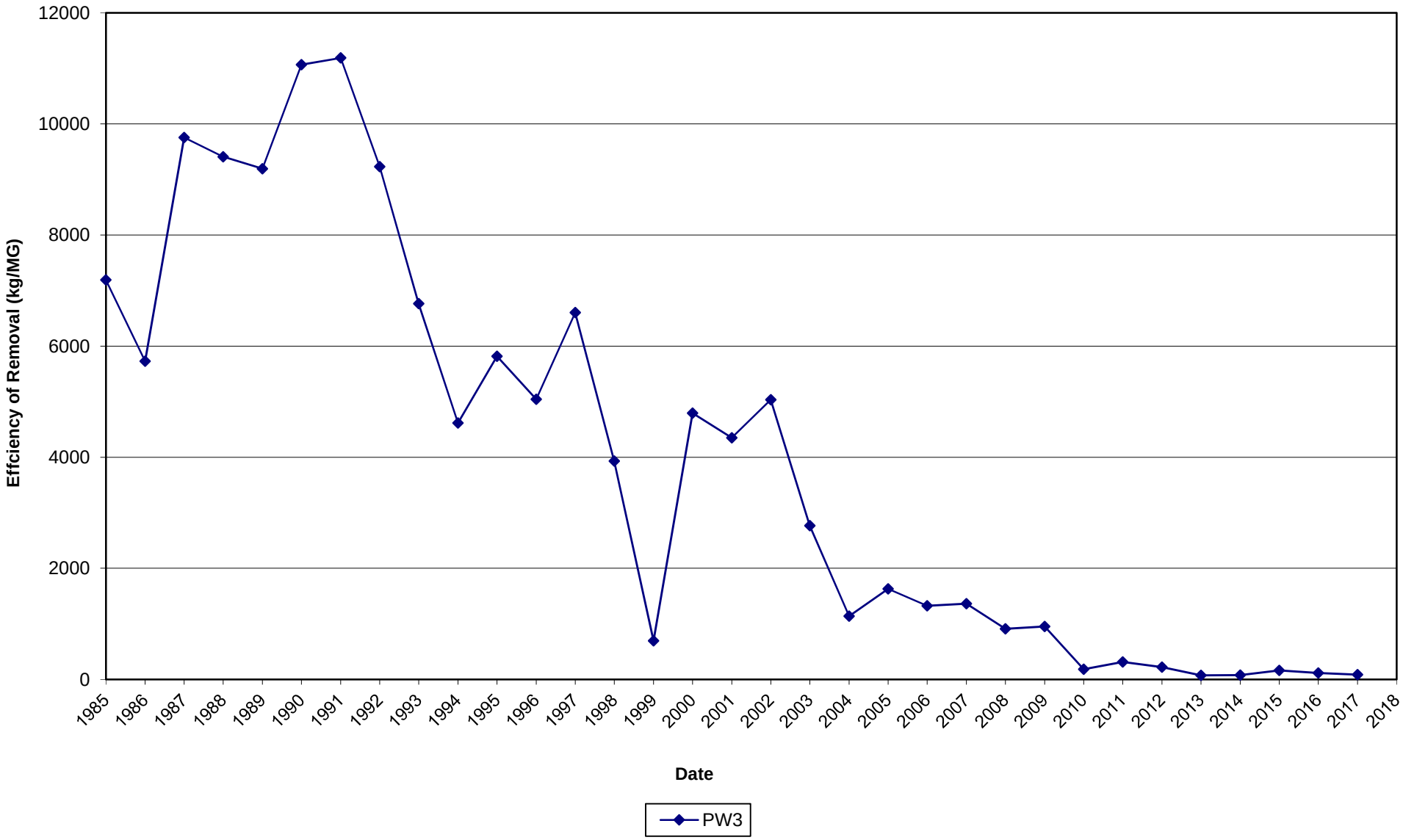


Figure 4-16
Historical Efficiency of VOC Removal
Pumpout Wells PW1, PW2 and PW4
Oakdale Site



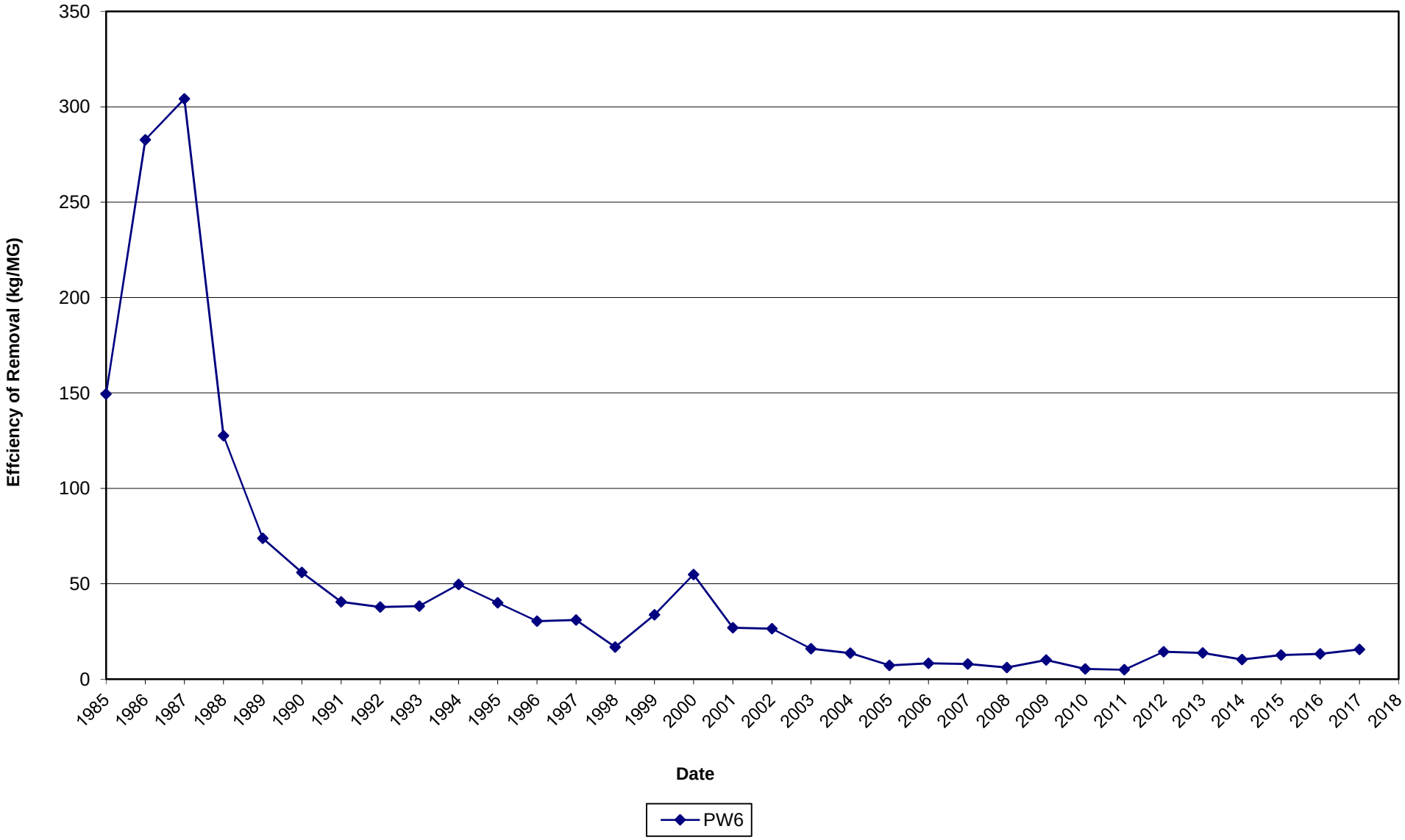
2017-OKMN-VOC_Figures-Calcs-Charts; Fig-04-16-PW-1-2-4

Figure 4-17
Historical Efficiency of VOC Removal
Pumpout Well PW3
Oakdale Site



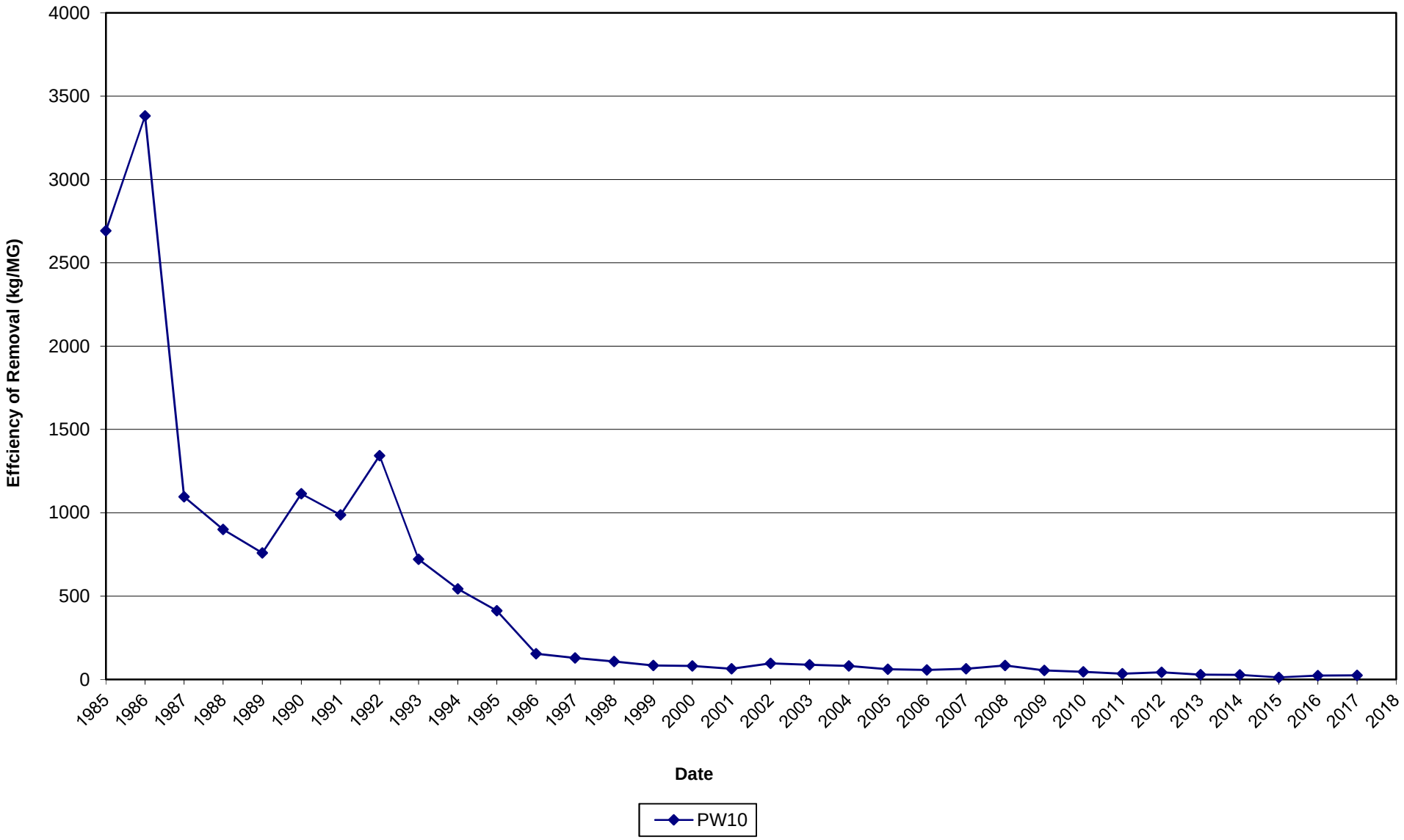
2017-OKMN-VOC_Figures-Calcs-Charts; Fig-04-17-PW3

Figure 4-18
Historical Efficiency of VOC Removal
Pumpout Well PW6
Oakdale Site



2017-OKMN-VOC_Figures-Calcs-Charts; Fig-04-18-PW6

Figure 4-19
Historical Efficiency of VOC Removal
Pumpout Well PW10
Oakdale Site



2017-OKMN-VOC_Figures-Calcs-Charts; Fig-04-19-PW10

Figure 4-20
Historical Efficiency of VOC Removal
Pumpout Well PW11
Oakdale Site

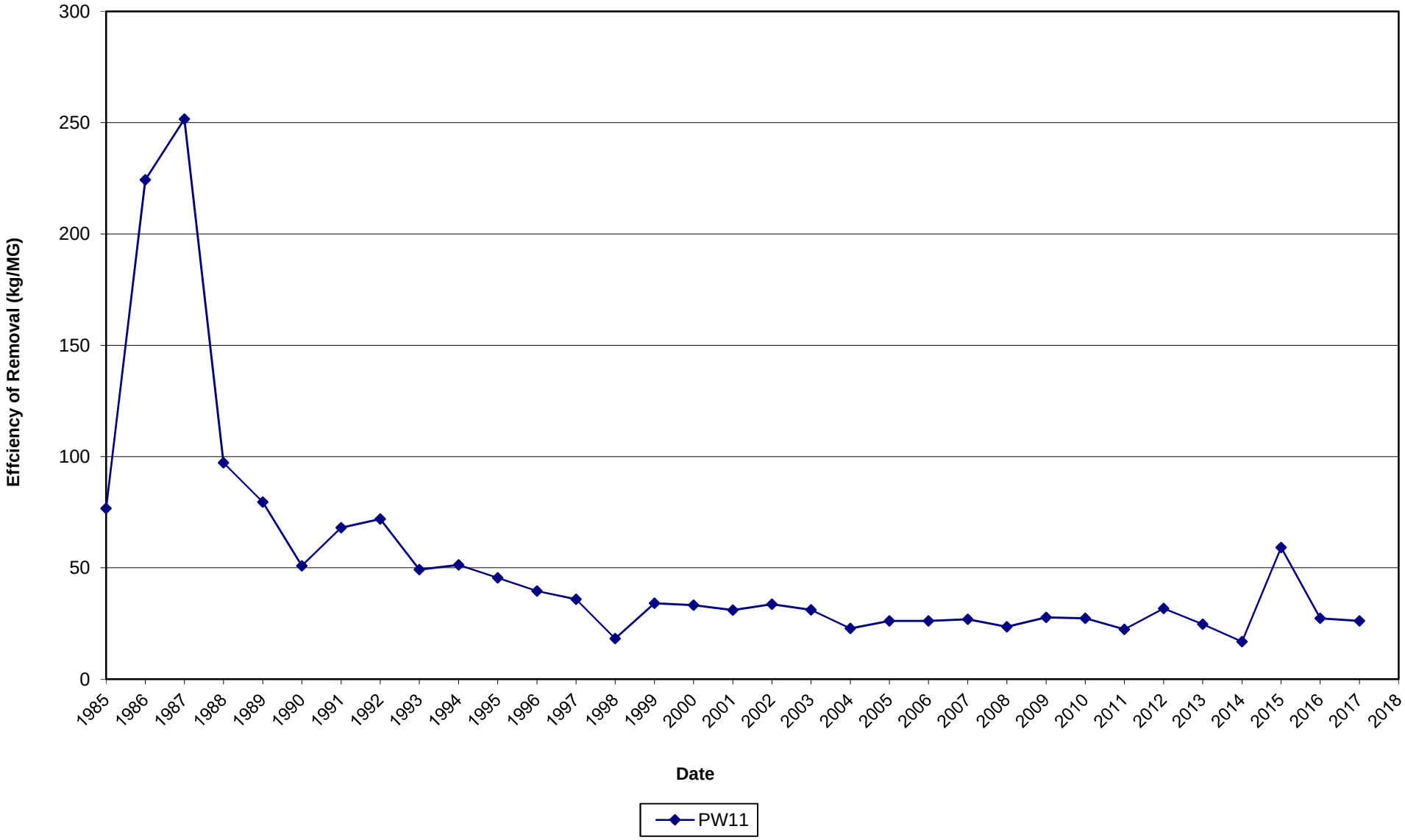


Table 4-1
2017 Quarterly Flow Totals - Pumpout Wells
Oakdale Site

Total Flow (gallons)					
Well	**1st Quarter**	**2nd Quarter**	**3rd Quarter**	**4th Quarter**	**2017 Total**
PW1	92,571	93,622	110,984	105,747	402,924
PW2	543,642	439,182	325,026	370,731	1,678,581
PW3	57,089	56,192	50,037	50,682	214,000
PW4	200,052	554,016	434,764	533,231	1,722,063
PW6	1,411,740	1,332,140	1,178,840	1,171,380	5,094,100
PW10	11,984	7,479	6,585	13,693	39,741
PW11	356,982	637,352	734,070	668,004	2,396,408
VOC Pumpout Wells Total	**2,674,060**	**3,119,983**	**2,840,306**	**2,913,468**	**11,547,817**
PW14	257,300	342,939	352,103	371,688	1,324,030
PW15	1,103,334	1,053,438	970,044	1,146,965	4,273,781
PW16	521,843	467,157	706,597	582,104	2,277,701
PW17	425,392	488,287	702,466	591,928	2,208,073
PW18	874,771	799,498	859,013	692,212	3,225,494
PW19	580,205	598,703	658,317	681,787	2,519,012
PW20	254,092	273,781	278,478	241,493	1,047,844
PW21	392,819	294,021	268,053	267,393	1,222,286
PW22	130,416	161,552	122,286	113,114	527,368
PW23	86,925	64,521	75,837	69,529	296,812
PW24	9,260	13,803	12,670	14,597	50,330
PW25	834,525	1,334,506	651,191	637,411	3,457,633
PW26	565,473	597,785	451,918	519,492	2,134,668
All Pumpout Wells Total [1]	**8,710,415**	**9,609,974**	**8,949,279**	**8,843,181**	**36,112,849**

[1] - Water pumped, treated and discharged to sewer

Table 4-2
Pumpout Well Operating Data - 2015 to 2017
Oakdale Site

Pumpout Well No.	Total Gallons of Water Pumped			Average Total VOC Concentrations (ug/L)			Estimated Total Gallons of Volatile Organics Pumped [1]			Total Mass Removed (kg)		
	2015	2016	2017	2015	2016	2017	2015	2016	2017	2015	2016	2017
PW1	257,365	435,012	402,924	10,415	12,400	11,000	3.4	6.5	5.5	10	20	17
PW2	1,199,489	1,238,685	1,678,581	10,884	10,200	20,000	16.3	15.5	42.0	49	47	127
PW3	285,854	249,029	214,000	42,271	31,000	23,000	15.1	9.6	6.2	46	29	19
PW4	2,868,143	1,877,615	1,722,063	16,184	15,900	34,000	58.0	37.6	73.2	176	114	222
PW6	5,281,343	5,373,620	5,094,100	3,340	3,500	4,100	22.0	23.5	26.1	67	71	79
PW10	34,309	35,837	39,741	3,173	6,200	6,600	0.1	0.3	0.3	0.4	0.8	1.0
PW11	2,246,856	1,788,988	2,396,408	15,610	7,200	6,900	43.8	16.1	20.7	133	49	63
Totals	**12,173,359**	**10,998,786**	**11,547,817**				**159**	**109**	**174**	**482**	**331**	**527**

Notes:

[1] - Total gallons of volatile organic compounds are calculated using annual discharges for each well and an average specific gravity of 0.8.

Table 4-3

Historical VOC Mass Removed
Active Pumping Wells
Oakdale Site

Date	PW1 (kg/yr)	PW2 (kg/yr)	PW3 (kg/yr)	PW4 (kg/yr)	PW6 (kg/yr)	PW10 (kg/yr)	PW11 (kg/yr)
1985	39	321	482	415	612	9.1	106
1986	191	434	546	1789	3335	115	758
1987	197	1377	2025	631	1749	21	628
1988	139	5397	2001	488	503	18	209
1989	130	3796	3411	346	361	20	264
1990	94	2683	2665	409	258	25	143
1991	49	697	9748	961	236	18	173
1992	91	1104	8796	979	224	112	173
1993	40	1370	4860	1055	216	17	102
1994	38	439	2148	509	356	16	115
1995	55	1398	1460	776	274	13	107
1996	71	1301	1103	633	190	4.2	115
1997	79	758	2297	497	168	3.3	102
1998	47	1202	1060	235	119	2.9	61
1999	45	1449	159	465	225	1.4	128
2000	47	1136	1096	791	372	1.3	132
2001	39	933	962	592	177	1.3	118
2002	61	1469	1169	561	184	2.0	117
2003	33	665	582	340	119	1.1	111
2004	31	614	273	493	98	1.5	82
2005	22	708	534	423	54	1.3	111
2006	20	695	480	383	54	1.3	181
2007	21	811	416	348	67	2.2	135
2008	27	444	207	221	58	2.4	120
2009	31	336	188	338	79	1.1	106
2010	23	474	34	198	28	0.8	124
2011	16	297	75	236	39	1.1	101
2012	18	182	39	199	67	1.2	110
2013	14	233	17	144	65	1.0	92
2014	9.3	234	22	90	47	1.1	43
2015	10	49	46	176	67	0.4	133
2016	20	47	29	114	71	0.8	49
2017	17	127	19	222	79	1.0	63

kg/yr = kilograms of VOCs removed per year.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 GROUNDWATER CAPTURE

Since the installation of the VOC pumpout system in 1985, water levels collected in the Site monitoring wells have demonstrated that the pumpout system has hydraulically controlled the migration of VOCs in groundwater at the Site. The observed inward/upward groundwater hydraulic gradients serve as the primary demonstration of VOC pumpout system effectiveness. In addition, groundwater monitoring data have demonstrated significant water quality improvement over the years (i.e. downward trend in VOC concentrations and reduced area of groundwater impacts), further establishing that the Site's source areas have been contained and that VOCs are being removed by the pumpout system.

5.2 HISTORICAL GROUNDWATER QUALITY TRENDS

Figure 4-1 shows cumulative groundwater and VOC removal in gallons for the VOC pumpout system. A change in slope (i.e., decrease in rate of VOC removal over time) of the cumulative VOC removal curve is present at approximately 1993, and again at approximately 2003, compared to the slope (i.e., rate of groundwater removal over time) of the groundwater removal graph, which has remained relatively constant. The decrease in slope of the cumulative VOC removal curve indicates that the higher VOC concentrations in the groundwater were removed during the early operation of the pumpout system and over time, lower VOC concentrations in groundwater have resulted in a lower rate of removal.

Figures 4-9 through 4-15 show cumulative groundwater discharge versus cumulative VOC removal graphs for pumpout wells PW1, PW2, PW3, PW4, PW6, PW10 and PW11. Pumpout wells PW1, PW3, PW6 and PW10 indicate overall declining rates of VOC removal since approximately 1992, and at PW2 and PW3 since approximately 2003. VOC removal for pumpout well PW11 has been generally stable over the past 28 years.

5.3 2017 TREATMENT SYSTEM OPERATION

Since the pumpout system monitoring data continues to show removal of VOCs while maintaining gradient control, the system is operating in accordance with the July 1983

Consent Order (U.S. EPA, 1983). In 2017, the highest total mass of VOCs was removed by pumpout wells PW2, PW4 and PW6 (approximately 81 percent of total mass). Pumpout wells PW3 and PW4 continue to have the greatest efficiency in terms of mass of VOCs removed per millions of gallons of water pumped (Figures 4-16 and 4-17). The total flow rate of the pumpout system was higher in the 2nd quarter compared to the 1st, 3rd and 4th quarters of 2017. This was likely due to the increased recharge to the water table during the 2nd quarter from snowmelt and above normal precipitation.

Treatment system equipment improvements and other maintenance activities contributed to improving the operation of the system in 2017. Surge protectors, which were installed in 2013, have addressed previous electrical issues and prevented the treatment system from shutting down due to power supply surges. Annual well maintenance/rehabilitation activities performed in November 2017 were successful in cleaning the pumpout wells and discharge piping. Additional well maintenance/rehabilitation activities were performed throughout 2017 on an as needed basis. Site groundwater elevation data indicates that the VOC pumpout system remains effective at maintaining hydraulic gradient control vertically and laterally.

5.4 RECOMMENDATIONS

3M implemented significant changes to the VOC pumpout system operation and the monitoring program in 2003 as documented in the May 2003 QAPP (Barr Engineering Company, 2003). In November 2010, 3M submitted a site-wide Groundwater and Surface Water Sampling Plan to the MPCA that summarized the VOC monitoring program. The VOC monitoring program in the 2010 Sampling Plan remained the same.

The groundwater elevation monitoring and analytical sample collection for 2018 will continue in accordance with the November 2010 Groundwater and Surface Water Sampling Plan. Additionally, regular maintenance will be performed on the pumpout wells as needed to maintain optimal performance. Based on our operating experience, iron removal and cleaning will be conducted for the pumps and piping on a yearly basis. Routine treatment plant operation and maintenance activities and reporting will continue as defined in Section 4.

6. REFERENCES

Barr Engineering Company. 1985. Final Groundwater Monitoring Plan. Prepared for 3M Company, March 1985.

Barr Engineering Company. 2003. Quality Assurance Project Plan (Revision 1): Oakdale Disposal site, Oakdale, Minnesota. Prepared for 3M Company, May 2003.

Barr Engineering Company. 2007. 2006 Annual Monitoring Report, Oakdale Disposal Sites. Prepared for 3M Company, April 2007.

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Karanovic, Marinko, Tonkin, Matthew, and Wilson, David. 2009. *KT3D_H2O: A Program for Kriging Water Level Data Using Hydrologic Drift terms.* Ground Water. July/August 2009.

MDH. 2008. Health Risk Values for groundwater and groundwater values table. Minnesota Department of Health website:
http://www.health.state.mn.us/divs/eh/risk/guidance/gw/table.html

Tonkin, Matthew J. and Larson, Steven P. 2002. *Kriging Water Levels with a Regional-linear and Point-logarithmic Drift.* Ground Water. March/April 2002.

U.S. Environmental Protection Agency (U.S EPA). 1983. Administrative Order by Consent and Response Order by Consent: Exhibit A. U.S. EPA Region V, Chicago, Illinois, Minnesota Pollution Control Agency, St. Paul, Minnesota, and Minnesota Mining and Manufacturing Company, St. Paul, Minnesota.

WESTON (Weston Solutions, Inc.). 2009. *Remedial Design/Response Action Plan.* Prepared by Weston Solutions, Inc. for the 3M Company. February 2009.

WESTON (Weston Solutions, Inc.). 2010. *Groundwater and Surface Water Sampling Plan for the Former Oakdale Disposal Area.* Prepared by Weston Solutions, Inc. for the 3M Company. November 2010. Revised January 25, 2011.

APPENDIX A
2017 MONTHLY DISCHARGE REPORTS

Weston Solutions, Inc.
1400 Weston Way
P.O. Box 2653
West Chester, Pennsylvania 19380
610-701-3000 Fax 610-701-3186
www.westonsolutions.com

February 2, 2017

Ms. Jill Crisp
Utility Clerk, City of Oakdale
1584 Hadley Avenue North
Oakdale, Minnesota 55128

RE: January 2017 Discharge Report
3M Oakdale Site

Dear Ms. Crisp:

On behalf of 3M, we are providing the January 2017 discharge volumes to the sanitary sewer from the 3M Oakdale Disposal Site pumpout system in Table 1. Please note that several totalizer readings reported in Table 1 for December 30, 2016, have been revised compared to the totalizer readings reported in the December 2016 Discharge Report. The totalizer meters for each pumpout well are 9-digit meters and reset after every 10 million gallons is discharged. Previously, totalizer readings reported in Table 1 accounted for any reset made to a totalizer; however, starting in January 2017, the totalizer readings provided in Table 1 will represent the numeric value on the meter. The pumpout wells with a revised totalizer reading for December 30, 2016, are noted in Table 1.

Please feel free to contact me (at 610-701-3676) or Denver Martin (at 715-222-7116) with any questions or comments.

Very truly yours,
WESTON SOLUTIONS, INC.

Dave Cairns
Project Scientist

c: Fred Campbell, MPCA
Justin Pettinelli, 3M

February 2, 2017

Table 1 – January 2017 Discharge Volume Summary
3M Oakdale Site, Oakdale, MN

Well Number	December 30, 2016 Meter Readings (gallons)	January 31, 2017 Meter Readings (gallons)	January 2017 Discharge Volume (gallons)
PW-1	2,974,516	3,006,664	32,148
PW-2	1,142,808[a]	1,347,536	204,728
PW-3	1,602,199	1,623,821	21,622
PW-4	7,140,093	7,215,226	75,133
PW-6	5,613,920 [a]	6,120,470	506,550
PW-10	214,863	220,042	5,179
PW-11	1,434,539 [a]	1,584,321	149,782
PW-14	4,380,276	4,458,523	78,247
PW-15	307,808 [a]	724,913	417,105
PW-16	424,297 [a]	619,572	195,275
PW-17	1,339,302 [a]	1,494,653	155,351
PW-18	737,957 [a]	1,070,341	332,384
PW-19	3,077,316 [a]	3,288,770	211,454
PW-20	8,787,004	8,879,158	92,154
PW-21	8,927,608	9,086,583	158,975
PW-22	2,365,581	2,409,908	44,327
PW-23	1,356,298	1,377,190	20,892
PW-24	299,139	303,675	4,536
PW-25	92,289 [a]	268,207	175,918
PW-26	3,617,758	3,818,862	201,104
City Meter	7,678,955	8,122,622	443,667
		Total:	3,526,531

[a] – Pumpout wells with revised totalizer readings for December 30, 2016.

January operational days: 31

Weston Solutions, Inc.
1400 Weston Way
P.O. Box 2653
West Chester, Pennsylvania 19380
610-701-3000 Fax 610-701-3186
www.westonsolutions.com

March 1, 2017

Ms. Jill Crisp
Utility Clerk, City of Oakdale
1584 Hadley Avenue North
Oakdale, Minnesota 55128

RE: February 2017 Discharge Report
3M Oakdale Site

Dear Ms. Crisp:

On behalf of 3M, we are providing the February discharge volumes to the sanitary sewer from the 3M Oakdale Disposal Site pump-out system in Table 1.

Please feel free to contact me (at 610-701-3676) or Denver Martin (at 715-222-7116) with any questions or comments.

Very truly yours,
WESTON SOLUTIONS, INC.

Dave Cairns
Project Scientist

c: Fred Campbell, MPCA
Justin Pettinelli, 3M
Denver Martin, WESTON

March 1, 2017

Table 1 – February 2017 Discharge Volume Summary
3M Oakdale Site, Oakdale, MN

Well Number	January 31, 2017 Meter Readings (gallons)	February 28, 2017 Meter Readings (gallons)	February 2017 Discharge Volume (gallons)
PW-1	3,006,664	3,031,501	24,837
PW-2	1,347,536	1,498,841	151,305
PW-3	1,623,821	1,637,279	13,458
PW-4	7,215,226	7,265,579	50,353
PW-6	6,120,470	6,515,000	394,530
PW-10	220,042	224,406	4,364
PW-11	1,584,321	1,659,678	75,357
PW-14	4,458,523	4,530,398	71,875
PW-15	724,913	1,041,181	316,268
PW-16	619,572	775,468	155,896
PW-17	1,494,653	1,580,961	86,308
PW-18	1,070,341	1,315,214	244,873
PW-19	3,288,770	3,406,463	117,693
PW-20	8,879,158	8,948,612	69,454
PW-21	9,086,583	9,189,278	102,695
PW-22	2,409,908	2,445,229	35,321
PW-23	1,377,190	1,415,865	38,675
PW-24	303,675	305,761	2,086
PW-25	268,207	557,251	289,044
PW-26	3,818,862	3,972,579	153,717
City Meter	8,122,622	8,335,943	213,321
		Total:	2,611,430

February operational days: 23

Weston Solutions, Inc.
1400 Weston Way
P.O. Box 2653
West Chester, Pennsylvania 19380
610-701-3000 Fax 610-701-3186
www.westonsolutions.com

March 31, 2017

Ms. Jill Crisp
Utility Clerk, City of Oakdale
1584 Hadley Avenue North
Oakdale, Minnesota 55128

RE: March 2017 Discharge Report
3M Oakdale Site

Dear Ms. Crisp:

On behalf of 3M, we are providing the March discharge volumes to the sanitary sewer from the 3M Oakdale Disposal Site pump-out system in Table 1.

Please feel free to contact me (at 610-701-3676) or Denver Martin (at 715-222-7116) with any questions or comments.

Very truly yours,
WESTON SOLUTIONS, INC.

Dave Cairns
Project Scientist

c: Fred Campbell, MPCA
Karie Blomquist, 3M
Kevin Madson, 3M
Denver Martin, WESTON

March 31, 2017

Table 1 – March 2017 Discharge Volume Summary
3M Oakdale Site, Oakdale, MN

Well Number	February 28, 2017 Meter Readings (gallons)	March 31, 2017 Meter Readings (gallons)	March 2017 Discharge Volume (gallons)
PW-1	3,031,501	3,067,087	35,586
PW-2	1,498,841	1,686,450	187,609
PW-3	1,637,279	1,659,288	22,009
PW-4	7,265,579	7,340,145	74,566
PW-6	6,515,000	7,025,660	510,660
PW-10	224,406	226,847	2,441
PW-11	1,659,678	1,791,521	131,843
PW-14	4,530,398	4,637,576	107,178
PW-15	1,041,181	1,411,142	369,961
PW-16	775,468	946,140	170,672
PW-17	1,580,961	1,764,694	183,733
PW-18	1,315,214	1,612,728	297,514
PW-19	3,406,463	3,657,521	251,058
PW-20	8,948,612	9,041,096	92,484
PW-21	9,189,278	9,320,427	131,149
PW-22	2,445,229	2,495,997	50,768
PW-23	1,415,865	1,443,223	27,358
PW-24	305,761	308,399	2,638
PW-25	557,251	926,814	369,563
PW-26	3,972,579	4,183,231	210,652
City Meter	8,335,943	8,378,480	42,537
		Total:	3,271,979

March operational days: 31

Weston Solutions, Inc.
1400 Weston Way
P.O. Box 2653
West Chester, Pennsylvania 19380
610-701-3000 Fax 610-701-3186
www.westonsolutions.com

May 2, 2017

Ms. Jill Crisp
Utility Clerk, City of Oakdale
1584 Hadley Avenue North
Oakdale, Minnesota 55128

RE: April 2017 Discharge Report
3M Oakdale Site

Dear Ms. Crisp:

On behalf of 3M, we are providing the April discharge volumes to the sanitary sewer from the 3M Oakdale Disposal Site pump-out system in Table 1.

Please feel free to contact me (at 610-701-3676) or Denver Martin (at 715-222-7116) with any questions or comments.

Very truly yours,
WESTON SOLUTIONS, INC.

Dave Cairns
Project Scientist

c: Fred Campbell, MPCA
Kevin Madson, 3M
Karie Blomquist, 3M
Denver Martin, WESTON

May 2, 2017

Table 1 – April 2017 Discharge Volume Summary
3M Oakdale Site, Oakdale, MN

Well Number	March 31, 2017 Meter Readings (gallons)	May 01, 2017 Meter Readings (gallons)	April 2017 Discharge Volume (gallons)
PW-1	3,067,087	3,098,907	31,820
PW-2	1,686,450	1,853,242	166,792
PW-3	1,659,288	1,681,462	22,174
PW-4	7,340,145	7,498,363	158,218
PW-6	7,025,660	7,515,850	490,190
PW-10	226,847	226,984	137
PW-11	1,791,521	1,870,290	78,769
PW-14	4,637,576	4,768,153	130,577
PW-15	1,411,142	1,782,646	371,504
PW-16	946,140	1,095,439	149,299
PW-17	1,764,694	1,933,625	168,931
PW-18	1,612,728	1,865,551	252,823
PW-19	3,657,521	3,850,808	193,287
PW-20	9,041,096	9,134,022	92,926
PW-21	9,320,427	9,449,006	128,579
PW-22	2,495,997	2,550,971	54,974
PW-23	1,443,223	1,473,125	29,902
PW-24	308,399	311,227	2,828
PW-25	926,814	1,555,867	629,053
PW-26	4,183,231	4,390,936	207,705
City Meter	8,378,480	8,448,631	70,151
		Total:	3,430,639

April operational days: 30

Weston Solutions, Inc.
1400 Weston Way
P.O. Box 2653
West Chester, Pennsylvania 19380
610-701-3000 Fax 610-701-3186
www.westonsolutions.com

June 5, 2017

Ms. Jill Crisp
Utility Clerk, City of Oakdale
1584 Hadley Avenue North
Oakdale, Minnesota 55128

RE: May 2017 Discharge Report
3M Oakdale Site

Dear Ms. Crisp:

On behalf of 3M, we are providing the May 2017 discharge volumes to the sanitary sewer from the 3M Oakdale Disposal Site pump-out system in Table 1.

Please feel free to contact me (at 610-701-3676) or Denver Martin (at 715-222-7116) with any questions or comments.

Very truly yours,
WESTON SOLUTIONS, INC.

Dave Cairns
Project Scientist

c: Fred Campbell, MPCA
Kevin Madson, 3M
Denver Martin, WESTON

June 5, 2017

Table 1 – May 2017 Discharge Volume Summary
3M Oakdale Site, Oakdale, MN

Well Number	May 01, 2017 Meter Readings (gallons)	May 31, 2017 Meter Readings (gallons)	May 2017 Discharge Volume (gallons)
PW-1	3,098,907	3,124,483	25,576
PW-2	1,853,242	1,991,559	138,317
PW-3	1,681,462	1,699,656	18,194
PW-4	7,498,363	7,703,876	205,513
PW-6	7,515,850	7,933,340	417,490
PW-10	226,984	231,699	4,715
PW-11	1,870,290	2,146,655	276,365
PW-14	4,768,153	4,875,848	107,695
PW-15	1,782,646	2,114,925	332,279
PW-16	1,095,439	1,255,119	159,680
PW-17	1,933,625	2,091,817	158,192
PW-18	1,865,551	2,139,692	274,141
PW-19	3,850,808	4,041,492	190,684
PW-20	9,134,022	9,221,615	87,593
PW-21	9,449,006	9,538,576	89,570
PW-22	2,550,971	2,602,496	51,525
PW-23	1,473,125	1,499,759	26,634
PW-24	311,227	316,604	5,377
PW-25	1,555,867	1,891,956	336,089
PW-26	4,390,936	4,582,313	191,377
City Meter	8,448,631	8,544,686	96,055
		Total:	3,193,061

May operational days: 30

Weston Solutions, Inc.
1400 Weston Way
P.O. Box 2653
West Chester, Pennsylvania 19380
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www.westonsolutions.com

June 30, 2017

Ms. Jill Crisp
Utility Clerk, City of Oakdale
1584 Hadley Avenue North
Oakdale, Minnesota 55128

RE: June 2017 Discharge Report
3M Oakdale Site

Dear Ms. Crisp:

On behalf of 3M, we are providing the June 2017 discharge volumes to the sanitary sewer from the 3M Oakdale Disposal Site pump-out system in Table 1.

Please feel free to contact me (at 610-701-3676) or Denver Martin (at 715-222-7116) with any questions or comments.

Very truly yours,
WESTON SOLUTIONS, INC.

Dave Cairns
Project Scientist

c: Fred Campbell, MPCA
Kevin Madson, 3M
Denver Martin, WESTON

June 30, 2017

Table 1 – June 2017 Discharge Volume Summary
3M Oakdale Site, Oakdale, MN

Well Number	May 31, 2017 Meter Readings (gallons)	June 30, 2017 Meter Readings (gallons)	June 2017 Discharge Volume (gallons)
PW-1	3,124,483	3,160,709	36,226
PW-2	1,991,559	2,125,632	134,073
PW-3	1,699,656	1,715,480	15,824
PW-4	7,703,876	7,894,161	190,285
PW-6	7,933,340	8,357,800	424,460
PW-10	231,699	234,326	2,627
PW-11	2,146,655	2,428,873	282,218
PW-14	4,875,848	4,980,515	104,667
PW-15	2,114,925	2,464,580	349,655
PW-16	1,255,119	1,413,297	158,178
PW-17	2,091,817	2,252,981	161,164
PW-18	2,139,692	2,412,226	272,534
PW-19	4,041,492	4,256,224	214,732
PW-20	9,221,615	9,314,877	93,262
PW-21	9,538,576	9,614,448	75,872
PW-22	2,602,496	2,657,549	55,053
PW-23	1,499,759	1,507,744	7,985
PW-24	316,604	322,202	5,598
PW-25	1,891,956	2,261,320	369,364
PW-26	4,582,313	4,781,016	198,703
City Meter	8,544,686	8,583,134	38,448
		Total:	3,190,928

June operational days: 30

Weston Solutions, Inc.
1400 Weston Way
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West Chester, Pennsylvania 19380
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www.westonsolutions.com

August 1, 2017

Ms. Jill Crisp
Utility Clerk, City of Oakdale
1584 Hadley Avenue North
Oakdale, Minnesota 55128

RE: July 2017 Discharge Report
3M Oakdale Site

Dear Ms. Crisp:

On behalf of 3M, we are providing the July 2017 discharge volumes to the sanitary sewer from the 3M Oakdale Disposal Site pump-out system in Table 1.

Please feel free to contact me (at 610-701-3676) or Denver Martin (at 715-222-7116) with any questions or comments.

Very truly yours,
WESTON SOLUTIONS, INC.

Dave Cairns
Project Scientist

c: Fred Campbell, MPCA
Kevin Madson, 3M
Denver Martin, WESTON

August 1, 2017

Table 1 – July 2017 Discharge Volume Summary
3M Oakdale Site, Oakdale, MN

Well Number	June 30, 2017 Meter Readings (gallons)	July 31, 2017 Meter Readings (gallons)	July 2017 Discharge Volume (gallons)
PW-1	3,160,709	3,202,574	41,865
PW-2	2,125,632	2,258,313	132,681
PW-3	1,715,480	1,732,552	17,072
PW-4	7,894,161	8,046,780	152,619
PW-6	8,357,800	8,772,950	415,150
PW-10	234,326	235,782	1,456
PW-11	2,428,873	2,719,123	290,250
PW-14	4,980,515	5,111,457	130,942
PW-15	2,464,580	2,771,040	306,460
PW-16	1,413,297	1,636,422	223,125
PW-17	2,252,981	2,475,221	222,240
PW-18	2,412,226	2,674,982	262,756
PW-19	4,256,224	4,460,494	204,270
PW-20	9,314,877	9,408,768	93,891
PW-21	9,614,448	9,702,331	87,883
PW-22	2,657,549	2,710,984	53,435
PW-23	1,507,744	1,531,138	23,394
PW-24	322,202	326,619	4,417
PW-25	2,261,320	2,440,503	179,183
PW-26	4,781,016	4,878,200	97,184
City Meter	8,583,134	8,633,114	49,980
		Total:	2,990,253

July operational days: 31

Weston Solutions, Inc.
1400 Weston Way
P.O. Box 2653
West Chester, Pennsylvania 19380
610-701-3000 Fax 610-701-3186
www.westonsolutions.com

September 1, 2017

Ms. Jill Crisp
Utility Clerk, City of Oakdale
1584 Hadley Avenue North
Oakdale, Minnesota 55128

RE: August 2017 Discharge Report
3M Oakdale Site

Dear Ms. Crisp:

On behalf of 3M, we are providing the August 2017 discharge volumes to the sanitary sewer from the 3M Oakdale Disposal Site pump-out system in Table 1.

Please feel free to contact me (at 610-701-3676) or Denver Martin (at 715-222-7116) with any questions or comments.

Very truly yours,
WESTON SOLUTIONS, INC.

Dave Cairns
Project Scientist

c: Fred Campbell, MPCA
Kevin Madson, 3M
Denver Martin, WESTON

September 1, 2017

Table 1 – August 2017 Discharge Volume Summary
3M Oakdale Site, Oakdale, MN

Well Number	July 31, 2017 Meter Readings (gallons)	August 31, 2017 Meter Readings (gallons)	August 2017 Discharge Volume (gallons)
PW-1	3,202,574	3,236,068	33,494
PW-2	2,258,313	2,359,275	100,962
PW-3	1,732,552	1,748,418	15,866
PW-4	8,046,780	8,190,288	143,508
PW-6	8,772,950	9,172,960	400,010
PW-10	235,782	237,616	1,834
PW-11	2,719,123	2,973,862	254,739
PW-14	5,111,457	5,224,484	113,027
PW-15	2,771,040	3,074,631	303,591
PW-16	1,636,422	1,816,498	180,076
PW-17	2,475,221	2,710,111	234,890
PW-18	2,674,982	2,948,647	273,665
PW-19	4,460,494	4,673,056	212,562
PW-20	9,408,768	9,517,188	108,420
PW-21	9,702,331	9,792,985	90,654
PW-22	2,710,984	2,761,261	50,277
PW-23	1,531,138	1,562,884	31,746
PW-24	326,619	330,995	4,376
PW-25	2,440,503	2,715,292	274,789
PW-26	4,878,200	5,078,569	200,369
City Meter	8,633,114	8,705,501	72,387
		Total:	3,101,242

August operational days: 30

Weston Solutions, Inc.
1400 Weston Way
P.O. Box 2653
West Chester, Pennsylvania 19380
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www.westonsolutions.com

October 3, 2017

Ms. Jill Crisp
Utility Clerk, City of Oakdale
1584 Hadley Avenue North
Oakdale, Minnesota 55128

RE: September 2017 Discharge Report
3M Oakdale Site

Dear Ms. Crisp:

On behalf of 3M, we are providing the September 2017 discharge volumes to the sanitary sewer from the 3M Oakdale Disposal Site pump-out system in Table 1.

Please feel free to contact me (at 610-701-3676) or Denver Martin (at 715-222-7116) with any questions or comments.

Very truly yours,
WESTON SOLUTIONS, INC.

Dave Cairns
Project Scientist

c: Fred Campbell, MPCA
Kevin Madson, 3M
Denver Martin, WESTON

October 3, 2017

Table 1 – September 2017 Discharge Volume Summary
3M Oakdale Site, Oakdale, MN

Well Number	August 31, 2017 Meter Readings (gallons)	October 2, 2017 Meter Readings (gallons)	September 2017 Discharge Volume (gallons)
PW-1	3,236,068	3,271,693	35,625
PW-2	2,359,275	2,450,658	91,383
PW-3	1,748,418	1,765,517	17,099
PW-4	8,190,288	8,328,925	138,637
PW-6	9,172,960	9,536,640	363,680
PW-10	237,616	240,911	3,295
PW-11	2,973,862	3,162,943	189,081
PW-14	5,224,484	5,332,618	108,134
PW-15	3,074,631	3,434,624	359,993
PW-16	1,816,498	2,119,894	303,396
PW-17	2,710,111	2,955,447	245,336
PW-18	2,948,647	3,271,239	322,592
PW-19	4,673,056	4,914,541	241,485
PW-20	9,517,188	9,593,355	76,167
PW-21	9,792,985	9,882,501	89,516
PW-22	2,761,261	2,779,835	18,574
PW-23	1,562,884	1,583,581	20,697
PW-24[a]	330,995	1,891	3,877
PW-25	2,715,292	2,912,511	197,219
PW-26	5,078,569	5,232,934	154,365
City Meter	8,705,501	8,772,533	67,032
		Total:	3,047,183

[a]The totalizer for PW-24 was reset on 9/19/2017. Total gallons pumped by PW-24 during September 2017 was calculated using totalizer readings collected prior to, and after, the reset of the meter.

September operational days: 30

Weston Solutions, Inc.
1400 Weston Way
P.O. Box 2653
West Chester, Pennsylvania 19380
610-701-3000 Fax 610-701-3186
www.westonsolutions.com

November 3, 2017

Ms. Jill Crisp
Utility Clerk, City of Oakdale
1584 Hadley Avenue North
Oakdale, Minnesota 55128

RE: October 2017 Discharge Report
3M Oakdale Site

Dear Ms. Crisp:

On behalf of 3M, we are providing the October 2017 discharge volumes to the sanitary sewer from the 3M Oakdale Disposal Site pump-out system in Table 1.

Please feel free to contact me (at 610-701-3676) or Denver Martin (at 715-222-7116) with any questions or comments.

Very truly yours,
WESTON SOLUTIONS, INC.

Dave Cairns
Project Scientist

c: Fred Campbell, MPCA
Kevin Madson, 3M
Denver Martin, WESTON

November 3, 2017

Table 1 – October 2017 Discharge Volume Summary
3M Oakdale Site, Oakdale, MN

Well Number	October 2, 2017 Meter Readings (gallons)	October 31, 2017 Meter Readings (gallons)	October 2017 Discharge Volume (gallons)
PW-1	3,271,693	3,307,191	35,498
PW-2	2,450,658	2,566,762	116,104
PW-3	1,765,517	1,781,226	15,709
PW-4	8,328,925	8,460,848	131,923
PW-6	9,536,640	9,910,370	373,730
PW-10	240,911	244,795	3,884
PW-11	3,162,943	3,362,216	199,273
PW-14	5,332,618	5,447,207	114,589
PW-15	3,434,624	3,786,332	351,708
PW-16	2,119,894	2,302,928	183,034
PW-17	2,955,447	3,118,310	162,863
PW-18	3,271,239	3,497,721	226,482
PW-19	4,914,541	5,074,411	159,870
PW-20	9,593,355	9,659,868	66,513
PW-21	9,882,501	9,969,671	87,170
PW-22	2,779,835	2,805,366	25,531
PW-23	1,583,581	1,612,930	29,349
PW-24	1,891	6,970	5,079
PW-25	2,912,511	3,141,730	229,219
PW-26	5,232,934	5,374,510	141,576
City Meter	8,772,533	8,846,503	73,970
		Total:	2,733,074

October operational days: 31

Weston Solutions, Inc.
1400 Weston Way
P.O. Box 2653
West Chester, Pennsylvania 19380
610-701-3000 Fax 610-701-3186
www.westonsolutions.com

December 4, 2017

Ms. Jill Crisp
Utility Clerk, City of Oakdale
1584 Hadley Avenue North
Oakdale, Minnesota 55128

RE: November 2017 Discharge Report
3M Oakdale Site

Dear Ms. Crisp:

On behalf of 3M, we are providing the November 2017 discharge volumes to the sanitary sewer from the 3M Oakdale Disposal Site pump-out system in Table 1.

Please feel free to contact me (at 610-701-3676) or Denver Martin (at 715-222-7116) with any questions or comments.

Very truly yours,
WESTON SOLUTIONS, INC.

Dave Cairns
Project Scientist

c: Fred Campbell, MPCA
Kevin Madson, 3M
Denver Martin, WESTON

December 4, 2017

Table 1 – November 2017 Discharge Volume Summary
3M Oakdale Site, Oakdale, MN

Well Number	October 31, 2017 Meter Readings (gallons)	November 30, 2017 Meter Readings (gallons)	November 2017 Discharge Volume (gallons)
PW-1	3,307,191	3,342,746	35,555
PW-2	2,566,762	2,664,286	97,524
PW-3	1,781,226	1,797,317	16,091
PW-4	8,460,848	8,650,995	190,147
PW-6[a]	9,910,370	282,270	371,900
PW-10	244,795	250,393	5,598
PW-11	3,362,216	3,642,226	280,010
PW-14	5,447,207	5,572,843	125,636
PW-15	3,786,332	4,157,932	371,600
PW-16	2,302,928	2,446,702	143,774
PW-17	3,118,310	3,311,028	192,718
PW-18	3,497,721	3,668,940	171,219
PW-19	5,074,411	5,314,932	240,521
PW-20	9,659,868	9,725,590	65,722
PW-21[a]	9,969,671	48,975	79,304
PW-22	2,805,366	2,858,387	53,021
PW-23	1,612,930	1,628,778	15,848
PW-24	6,970	11,305	4,335
PW-25	3,141,730	3,375,660	233,930
PW-26	5,374,510	5,551,946	177,436
City Meter	8,846,503	8,949,546	103,043
		Total:	2,974,932

[a]PW-6 and PW-21 meters rolled over 10,000,000 gallons during month.
November operational days: 29

Weston Solutions, Inc.
1400 Weston Way
P.O. Box 2653
West Chester, Pennsylvania 19380
610-701-3000 Fax 610-701-3186
www.westonsolutions.com

January 2, 2018

Ms. Jill Crisp
Utility Clerk, City of Oakdale
1584 Hadley Avenue North
Oakdale, Minnesota 55128

RE: December 2017 Discharge Report
3M Oakdale Site

Dear Ms. Crisp:

On behalf of 3M, we are providing the December 2017 discharge volumes to the sanitary sewer from the 3M Oakdale Disposal Site pump-out system in Table 1.

Please feel free to contact me (at 610-701-3676) or Denver Martin (at 715-222-7116) with any questions or comments.

Very truly yours,
WESTON SOLUTIONS, INC.

Dave Cairns
Project Scientist

c: Fred Campbell, MPCA
Kevin Madson, 3M
Denver Martin, WESTON

January 2, 2018

Table 1 – December 2017 Discharge Volume Summary
3M Oakdale Site, Oakdale, MN

Well Number	November 30, 2017 Meter Readings (gallons)	January 2, 2018 Meter Readings (gallons)	December 2017 Discharge Volume (gallons)
PW-1	3,342,746	3,377,440	34,694
PW-2	2,664,286	2,821,389	157,103
PW-3	1,797,317	1,816,199	18,882
PW-4	8,650,995	8,862,156	211,161
PW-6	282,270	708,020	425,750
PW-10	250,393	254,604	4,211
PW-11	3,642,226	3,830,947	188,721
PW-14	5,572,843	5,704,306	131,463
PW-15	4,157,932	4,581,589	423,657
PW-16	2,446,702	2,701,998	255,296
PW-17	3,311,028	3,547,375	236,347
PW-18	3,668,940	3,963,451	294,511
PW-19	5,314,932	5,596,328	281,396
PW-20	9,725,590	9,834,848	109,258
PW-21	48,975	149,894	100,919
PW-22	2,858,387	2,892,949	34,562
PW-23	1,628,778	1,653,110	24,332
PW-24	11,305	16,488	5,183
PW-25	3,375,660	3,549,922	174,262
PW-26	5,551,946	5,752,426	200,480
City Meter	8,949,546	8,999,168	49,622
		Total:	3,361,810

December operational days: 31

APPENDIX B
SUMMARY OF WELL CONSTRUCTION INFORMATION

Summary of Well Information
Former Oakdale Disposal Site
Oakdale, MN

Well ID	MDH Unique Well Number	TOC Elevation (ft MSL)	Depth to Top of Screen* (ft BGS)	Depth to Bottom of Screen* (ft BGS)	Total Depth* (ft BGS)	Well Diameter/ Casing Material*	Aquifer	Northing (UTM meters)	Easting (UTM meters)
APZ44	---	1011.76	5	15	15	2" PVC	Upper Alluvium	4982851	502295
APZ45	---	995.52	5	15	15	2" PVC	Upper Alluvium	4982418	502752
APZ46	---	998.57	5	15	15	2" PVC	Upper Alluvium	4982265	502728
APZ47	---	1004.63	10	20	20	2" PVC	Upper Alluvium	4982194	502602
APZ48	---	1000.02	5	15	15	2" PVC	Upper Alluvium	4982338	502573
APZ49	---	999.25	5	15	15	2" PVC	Upper Alluvium	4982268	502504
APZ50	---	1004.65	5	15	15	2" PVC	Upper Alluvium	4982380	502373
GPPZ23	---	998.32	33	38	38	1" PVC	Lower Alluvium	4982393	502461
PC45 (ABD)	737655	1011.08	284.4	294.4	294.4	2" SS	Prairie du Chien	4981485	501958
PL41	737656	1003.74	71.4	81.4	81.4	2" SS	Platteville	4982165	502761
PW1	403786	1017.09	6	83	83	6" SS	Upper Alluvium, Lower Alluvium	4982637	502033
PW2	403787	1021.51	5.5	91	91	6" SS	Upper Alluvium, Lower Alluvium	4982607	502079
PW3	403788	1018.66	6	67	67	6" SS	Upper Alluvium, Lower Alluvium	4982635	502127
PW4	403789	1017.23	6	79	79	6" SS	Upper Alluvium, Lower Alluvium	4982605	502175
PW6	403791	1003.75	6	51	51	6" SS	Upper Alluvium, Lower Alluvium	4982600	502260
PW7	403792	1007.75	6	46	46	6" SS	Upper Alluvium, Lower Alluvium	4982637	502313
PW8	403793	1007.64	6	52.5	52.5	6" SS	Upper Alluvium, Lower Alluvium	4982608	502356
PW9	403794	1005.59	6	29	29	6" SS	Upper Alluvium, Lower Alluvium	4982638	502391
PW10	403795	1000.37	6	32	32	6" SS	Upper Alluvium, Lower Alluvium	4982392	502437
PW11	403796	1006.12	6	68	68	6" SS	Upper Alluvium, Lower Alluvium	4982570	502193
PW14	761336	995.40	15.4	30.4	30.4	6" SS	Lower Alluvium	4982360	502772
PW15	761337	995.60	20.9	50.9	50.9	6" SS	Lower Alluvium	4982413	502718
PW16	761338	996.18	19.1	39.1	39.1	6" SS	Lower Alluvium	4982371	502698
PW17	761339	996.75	18.6	38.6	38.6	6" SS	Lower Alluvium	4982327	502659
PW18	761340	996.86	17	57	57	6" SS	Lower Alluvium	4982347	502599
PW19	761341	1000.53	28.9	53.9	53.9	6" SS	Lower Alluvium	4982331	502564
PW20	761342	1000.24	31.5	51.5	51.5	6" SS	Lower Alluvium	4982337	502524
PW21	761343	998.41	37.5	57.5	57.5	6" SS	Lower Alluvium	4982282	502502
PW22	761344	998.47	15	25	25	6" SS	Lower Alluvium	4982354	502475
PW23	761345	1000.75	32.2	57.2	57.2	6" SS	Lower Alluvium	4982429	502440
PW24	761346	999.42	12.7	32.7	32.7	6" SS	Lower Alluvium	4982431	502390
PW25	761347	1003.21	20.2	60.2	60.2	6" SS	Lower Alluvium	4982230	502650
PW26	785569	1011.25	24.5	44.5	44.5	6" SS	Lower Alluvium	4982739	502314
RW37	727752	1005.03	5.28	15.28	15.28	4" SS	Upper Alluvium	4982157	502754
RW38	727753	1004.11	48.49	58.49	58.49	4" SS	Lower Alluvium	4982161	502745

Summary of Well Information (cont'd)
Former Oakdale Disposal Site
Oakdale, MN

Well ID	MDH Unique Well Number	TOC Elevation (ft MSL)	Depth to Top of Screen* (ft BGS)	Depth to Bottom of Screen* (ft BGS)	Total Depth* (ft BGS)	Well Diameter/ Casing Material*	Aquifer	Northing (UTM meters)	Easting (UTM meters)
SP42	737657	1004.34	115.17	125.17	125.17	2" SS	St. Peter Sandstone	4982167	502758
SP44 (ABD)	737654	1010.81	125.0	135.0	135.0	2" SS	St. Peter Sandstone	4981485	501962
W3		1003.05	NA	NA	94.7	4" CS (OH?)	Platteville	4982520	502512
W8		1015.50	NA	NA	97.4	4" CS (OH?)	Platteville	4982570	502028
W1103		NA	NA	NA	87.23 (TOC)[1]		Platteville	4983689	503213
W20		1016.64	15	25	25	2" SS	Upper Alluvium	4982748	502156
W2001		1007.18	31	33	33	2" SS	Lower Alluvium	4982648	502237
W2003		1000.90	50	52	52	2" SS	Lower Alluvium	4982542	502305
W2005		1007.47	41	43	43	2" SS	Lower Alluvium	4982382	502266
W2006		1007.32	62	64	64	2" SS	Lower Alluvium	4982645	502237
W2007		1021.94	44	46	46	2" SS	Lower Alluvium	4982735	502108
W2008		1001.42	60	62	62	2" SS	Lower Alluvium	4982543	502304
W2009		1001.33	35	37	37	2" SS	Lower Alluvium	4982396	502438
W2010		1006.99	74	76	76	2" SS	Lower Alluvium	4982382	502264
W2012		1016.29			53.87	2" SS	Lower Alluvium	4982579	502129
W203		1004.79	4	15	13.85	2" SS	Upper Alluvium	4982653	502451
W205		997.79	2	13	10.84	2" SS	Upper Alluvium	4982353	502698
W215		1007.30	7	15.5	15.5	2" SS	Upper Alluvium	4982383	502265
W217		1018.58	8.5	20	19.72	2" SS	Upper Alluvium	4982649	501898
W21R	785567	1017.48	9.90	19.9	19.9	2" PVC	Upper Alluvium	4982781	502275
W22		1019.44	19	29	27.57	2" SS	Upper Alluvium	4982733	502109
W23		1005.44	NA	NA	17.22	2" SS	Upper Alluvium	4982646	502238
W25		1000.37	0.5	12	11.09	2" SS	Upper Alluvium	4982520	502231
W26R	785568	1010.89	14.6	24.6	24.6	2" PVC	Upper Alluvium	4982735	502345
W28		1012.39	11	20.5	20.5	2" SS	Upper Alluvium	4982581	502059
W29		1016.97	17	25.5	25.5	2" SS	Upper Alluvium	4982622	502189
W30		1006.93	10	15	15	2" SS	Upper Alluvium	4982601	502357
W31		999.91	7	12	12	2" SS	Upper Alluvium	4982543	502306
W32		1003.09	5	15	15	2" SS	Upper Alluvium	4982485	502063
W33		1001.89	12	15.5	15.5	2" SS	Upper Alluvium	4982396	502433
W36		1016.87	NA	NA	22.84	2" SS	Upper Alluvium	4982581	502129
W6102	190335	992.70	94	105	105	4" OH	Platteville	4981766	501196
W6104		1001.23	NA	NA	102.89 (TOC)[1]	4" CS (OH?)	Platteville	4982031	501973
W6201		991.23	109	124	124	4" SS	St. Peter Sandstone	4981790	501197

Notes:

* - Information obtained from well completion reports.
ft BGS - Feet below ground surface.
ft MSL - Feet above mean sea level.
NA - Not Available
--- - Piezometers (do not require MDH #)
[1] - Total depth measured from Top of Casing.

CS - Carbon Steel
SS - Stainless Steel
OH - Open Hole
ABD - Abandoned

APPENDIX C
LABORATORY ANALYTICAL REPORTS

APPENDIX C.1
JUNE 2017 GROUNDWATER SAMPLING EVENT

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

June 27, 2017

Mr. David Cairns
Weston Solutions, Inc.
1400 Weston Way
West Chester, PA 19380

RE: Project: 02181.202.038.0001 Confidentia
Pace Project No.: 10392323

Dear Mr. Cairns:
Enclosed are the analytical results for sample(s) received by the laboratory on June 15, 2017. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Tina Soltani
tina.soltani@pacelabs.com
(612)607-6384
Project Manager

Enclosures

cc: Ms. Marta Cairns, Weston Solutions, Inc.
NATACCData WestonSolutions, Weston Solutions, Inc.

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

CERTIFICATIONS

Project: 02181.202.038.0001 Confidentia
Pace Project No.: 10392323

Minnesota Certification IDs

1700 Elm Street SE, Suite 200, Minneapolis, MN 55414
A2LA Certification #: 2926.01
Alabama Certification #: 40770
Alaska Contaminated Sites Certification #: UST-078
Alaska DW Certification #: MN00064
Arizona Certification #: AZ0014
Arkansas Certification #: 88-0680
California Certification #: MN00064
CNMI Saipan Certification #:MP0003
Colorado Certification #: MN00064
Connecticut Certification #: PH-0256
EPA Region 8 Certification #: 8TMS-L
Florida Certification #: E87605
Georgia Certification #: 959
Guam EPA Certification #: MN00064
Hawaii Certification #: MN00064
Idaho Certification #: MN00064
Illinois Certification #: 200011
Indiana Certification #: C-MN-01
Iowa Certification #: 368
Kansas Certification #: E-10167
Kentucky DW Certification #: 90062
Kentucky WW Certification #: 90062
Louisiana DEQ Certification #: 03086
Louisiana DW Certification #: MN00064
Maine Certification #: MN00064
Maryland Certification #: 322
Michigan Certification #: 9909
Minnesota Certification #: 027-053-137
Mississippi Certification #: MN00064
Montana Certification #: CERT0092
Nebraska Certification #: NE-OS-18-06
Nevada Certification #: MN00064
New Hampshire Certification #: 2081
New Jersey Certification #: MN002
New York Certification #: 11647
North Carolina DW Certification #: 27700
North Carolina WW Certification #: 530
North Dakota Certification #: R-036
Ohio DW Certification #: 41244
Ohio VAP Certification #: CL101
Oklahoma Certification #: 9507
Oregon NwTPH Certification #: MN300001
Oregon Secondary Certification #: MN200001
Pennsylvania Certification #: 68-00563
Puerto Rico Certification #: MN00064
South Carolina Certification #:74003001
Tennessee Certification #: TN02818
Texas Certification #: T104704192
Utah Certification #: MN00064
Virginia Certification #: 460163
Washington Certification #: C486
West Virginia DW Certification #: 9952 C
West Virginia WW Certification #: 382
Wisconsin Certification #: 999407970
Wyoming via EPA Region 8 Certification #: 8TMS-L

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

SAMPLE SUMMARY

Project: 02181.202.038.0001 Confidentia
Pace Project No.: 10392323

Lab ID	Sample ID	Matrix	Date Collected	Date Received
10392323001	**OKMN-GW-PW09-0-170614**	Water	06/14/17 09:20	06/15/17 09:15
10392323002	**OKMN-GW-PW08-0-170614**	Water	06/14/17 13:00	06/15/17 09:15
10392323003	**OKMN-GW-PW07-0-170614**	Water	06/14/17 11:00	06/15/17 09:15
10392323004	**OKMN-GW-W26R-0-170614**	Water	06/14/17 12:10	06/15/17 09:15
10392323005	**OKMN-GW-W26R-DB-170614**	Water	06/14/17 12:10	06/15/17 09:15
10392323006	**OKMN-GW-TRIP01-170614**	Water	06/14/17 07:00	06/15/17 09:15
10392323007	**OKMN-GW-W26R-RB-170614**	Water	06/14/17 11:20	06/15/17 09:15

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

SAMPLE ANALYTE COUNT

Project: 02181.202.038.0001 Confidentia
Pace Project No.: 10392323

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
10392323001	**OKMN-GW-PW09-0-170614**	EPA 8260B	DJB	21	PASI-M
10392323002	**OKMN-GW-PW08-0-170614**	EPA 8260B	DJB	21	PASI-M
10392323003	**OKMN-GW-PW07-0-170614**	EPA 8260B	DJB	21	PASI-M
10392323004	**OKMN-GW-W26R-0-170614**	EPA 8260B	DJB	21	PASI-M
10392323005	**OKMN-GW-W26R-DB-170614**	EPA 8260B	DJB	21	PASI-M
10392323006	**OKMN-GW-TRIP01-170614**	EPA 8260B	DJB	21	PASI-M
10392323007	**OKMN-GW-W26R-RB-170614**	EPA 8260B	DJB	21	PASI-M

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

PROJECT NARRATIVE

Project: 02181.202.038.0001 Confidentia
Pace Project No.: 10392323

Method: **EPA 8260B**
Description: 8260B MSV
Client: Weston Solutions, Inc.
Date: June 27, 2017

General Information:
7 samples were analyzed for EPA 8260B. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

QC Batch: 481246

CH: The continuing calibration for this compound is outside of Pace Analytical acceptance limits. The results may be biased high.

- LCS (Lab ID: 2620993)
  - Acetone
- MS (Lab ID: 2620994)
  - Acetone
- MSD (Lab ID: 2620995)
  - Acetone

Internal Standards:
All internal standards were within QC limits with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

QC Batch: 481246

L1: Analyte recovery in the laboratory control sample (LCS) was above QC limits. Results for this analyte in associated samples may be biased high.

- LCS (Lab ID: 2620993)
  - Acetone

L3: Analyte recovery in the laboratory control sample (LCS) exceeded QC limits. Analyte presence below reporting limits in associated samples.

- LCS (Lab ID: 2620993)
  - Tetrahydrofuran

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

PROJECT NARRATIVE

Project: 02181.202.038.0001 Confidentia
Pace Project No.: 10392323

Method: **EPA 8260B**
Description: 8260B MSV
Client: Weston Solutions, Inc.
Date: June 27, 2017

QC Batch: 481350

L1: Analyte recovery in the laboratory control sample (LCS) was above QC limits. Results for this analyte in associated samples may be biased high.

- LCS (Lab ID: 2621802)
  - Acetone

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: 481246

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 10392548007

M0: Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.

- MS (Lab ID: 2620994)
  - Acetone
- MSD (Lab ID: 2620995)
  - Acetone
  - Tetrahydrofuran

QC Batch: 481634

A matrix spike/matrix spike duplicate was not performed due to insufficient sample volume.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: 02181.202.038.0001 Confidentia
Pace Project No.: 10392323

Sample: OKMN-GW-PW09-0-170614 **Lab ID: 10392323001** Collected: 06/14/17 09:20 Received: 06/15/17 09:15 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV	Analytical Method: EPA 8260B								
Acetone	ND	ug/L	20.0	2.0	1		06/23/17 07:40	67-64-1	L3
Benzene	**1.4**	ug/L	1.0	0.16	1		06/23/17 07:40	71-43-2	
2-Butanone (MEK)	ND	ug/L	5.0	1.1	1		06/23/17 07:40	78-93-3	
sec-Butyl alcohol	ND	ug/L	40.0	2.2	1		06/23/17 07:40	15892-23-6	
1,1-Dichloroethane	**1.3**	ug/L	1.0	0.17	1		06/23/17 07:40	75-34-3	
1,2-Dichloroethane	**1.6**	ug/L	1.0	0.17	1		06/23/17 07:40	107-06-2	
1,1-Dichloroethene	ND	ug/L	1.0	0.28	1		06/23/17 07:40	75-35-4	
cis-1,2-Dichloroethene	**2.8**	ug/L	1.0	0.12	1		06/23/17 07:40	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	1.0	0.16	1		06/23/17 07:40	156-60-5	
Diisopropyl ether	**38.5**	ug/L	1.0	0.17	1		06/23/17 07:40	108-20-3	
Ethylbenzene	ND	ug/L	1.0	0.15	1		06/23/17 07:40	100-41-4	
4-Methyl-2-pentanol	ND	ug/L	40.0	1.6	1		06/23/17 07:40	108-11-2	
Methylene Chloride	ND	ug/L	4.0	0.29	1		06/23/17 07:40	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/L	5.0	0.43	1		06/23/17 07:40	108-10-1	
2-Propanol	ND	ug/L	100	1.9	1		06/23/17 07:40	67-63-0	
Tetrahydrofuran	ND	ug/L	10.0	1.5	1		06/23/17 07:40	109-99-9	
Toluene	ND	ug/L	1.0	0.14	1		06/23/17 07:40	108-88-3	
Xylene (Total)	ND	ug/L	3.0	0.32	1		06/23/17 07:40	1330-20-7	
Surrogates									
1,2-Dichloroethane-d4 (S)	107	%.	75-137		1		06/23/17 07:40	17060-07-0	
Toluene-d8 (S)	100	%.	75-125		1		06/23/17 07:40	2037-26-5	
4-Bromofluorobenzene (S)	104	%.	75-125		1		06/23/17 07:40	460-00-4	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: 02181.202.038.0001 Confidentia
Pace Project No.: 10392323

Sample: OKMN-GW-PW08-0-170614 **Lab ID: 10392323002** Collected: 06/14/17 13:00 Received: 06/15/17 09:15 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV	Analytical Method: EPA 8260B								
Acetone	ND	ug/L	500	50.2	25		06/27/17 01:29	67-64-1	
Benzene	**446**	ug/L	25.0	3.9	25		06/27/17 01:29	71-43-2	
2-Butanone (MEK)	ND	ug/L	125	27.5	25		06/27/17 01:29	78-93-3	
sec-Butyl alcohol	ND	ug/L	1000	55.0	25		06/27/17 01:29	15892-23-6	
1,1-Dichloroethane	ND	ug/L	25.0	4.3	25		06/27/17 01:29	75-34-3	
1,2-Dichloroethane	ND	ug/L	25.0	4.2	25		06/27/17 01:29	107-06-2	
1,1-Dichloroethene	ND	ug/L	25.0	6.9	25		06/27/17 01:29	75-35-4	
cis-1,2-Dichloroethene	ND	ug/L	25.0	3.0	25		06/27/17 01:29	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	25.0	4.0	25		06/27/17 01:29	156-60-5	
Diisopropyl ether	**5700**	ug/L	25.0	4.4	25		06/27/17 01:29	108-20-3	
Ethylbenzene	**40.5**	ug/L	25.0	3.8	25		06/27/17 01:29	100-41-4	
4-Methyl-2-pentanol	ND	ug/L	1000	40.0	25		06/27/17 01:29	108-11-2	
Methylene Chloride	ND	ug/L	100	7.3	25		06/27/17 01:29	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/L	125	10.8	25		06/27/17 01:29	108-10-1	
2-Propanol	ND	ug/L	2500	47.5	25		06/27/17 01:29	67-63-0	
Tetrahydrofuran	ND	ug/L	250	37.5	25		06/27/17 01:29	109-99-9	
Toluene	ND	ug/L	25.0	3.6	25		06/27/17 01:29	108-88-3	
Xylene (Total)	**740**	ug/L	75.0	7.9	25		06/27/17 01:29	1330-20-7	
Surrogates									
1,2-Dichloroethane-d4 (S)	105	%.	75-137		25		06/27/17 01:29	17060-07-0	
Toluene-d8 (S)	103	%.	75-125		25		06/27/17 01:29	2037-26-5	
4-Bromofluorobenzene (S)	101	%.	75-125		25		06/27/17 01:29	460-00-4	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
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(612)607-1700

ANALYTICAL RESULTS

Project: 02181.202.038.0001 Confidentia
Pace Project No.: 10392323

Sample: OKMN-GW-PW07-0-170614 **Lab ID: 10392323003** Collected: 06/14/17 11:00 Received: 06/15/17 09:15 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV	Analytical Method: EPA 8260B								
Acetone	ND	ug/L	500	50.2	25		06/24/17 06:54	67-64-1	L3
Benzene	**77.0**	ug/L	25.0	3.9	25		06/24/17 06:54	71-43-2	
2-Butanone (MEK)	ND	ug/L	125	27.5	25		06/24/17 06:54	78-93-3	
sec-Butyl alcohol	ND	ug/L	1000	55.0	25		06/24/17 06:54	15892-23-6	
1,1-Dichloroethane	ND	ug/L	25.0	4.3	25		06/24/17 06:54	75-34-3	
1,2-Dichloroethane	ND	ug/L	25.0	4.2	25		06/24/17 06:54	107-06-2	
1,1-Dichloroethene	ND	ug/L	25.0	6.9	25		06/24/17 06:54	75-35-4	
cis-1,2-Dichloroethene	ND	ug/L	25.0	3.0	25		06/24/17 06:54	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	25.0	4.0	25		06/24/17 06:54	156-60-5	
Diisopropyl ether	**4360**	ug/L	25.0	4.4	25		06/24/17 06:54	108-20-3	
Ethylbenzene	ND	ug/L	25.0	3.8	25		06/24/17 06:54	100-41-4	
4-Methyl-2-pentanol	ND	ug/L	1000	40.0	25		06/24/17 06:54	108-11-2	
Methylene Chloride	ND	ug/L	100	7.3	25		06/24/17 06:54	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/L	125	10.8	25		06/24/17 06:54	108-10-1	
2-Propanol	ND	ug/L	2500	47.5	25		06/24/17 06:54	67-63-0	
Tetrahydrofuran	ND	ug/L	250	37.5	25		06/24/17 06:54	109-99-9	
Toluene	**38.2**	ug/L	25.0	3.6	25		06/24/17 06:54	108-88-3	
Xylene (Total)	**1200**	ug/L	75.0	7.9	25		06/24/17 06:54	1330-20-7	
Surrogates									
1,2-Dichloroethane-d4 (S)	107	%.	75-137		25		06/24/17 06:54	17060-07-0	
Toluene-d8 (S)	101	%.	75-125		25		06/24/17 06:54	2037-26-5	
4-Bromofluorobenzene (S)	100	%.	75-125		25		06/24/17 06:54	460-00-4	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
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ANALYTICAL RESULTS

Project: 02181.202.038.0001 Confidentia
Pace Project No.: 10392323

Sample: OKMN-GW-W26R-0-170614 **Lab ID: 10392323004** Collected: 06/14/17 12:10 Received: 06/15/17 09:15 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV	Analytical Method: EPA 8260B								
Acetone	ND	ug/L	20.0	2.0	1		06/24/17 05:48	67-64-1	L3
Benzene	**2.8**	ug/L	1.0	0.16	1		06/24/17 05:48	71-43-2	
2-Butanone (MEK)	ND	ug/L	5.0	1.1	1		06/24/17 05:48	78-93-3	
sec-Butyl alcohol	ND	ug/L	40.0	2.2	1		06/24/17 05:48	15892-23-6	
1,1-Dichloroethane	ND	ug/L	1.0	0.17	1		06/24/17 05:48	75-34-3	
1,2-Dichloroethane	**1.1**	ug/L	1.0	0.17	1		06/24/17 05:48	107-06-2	
1,1-Dichloroethene	ND	ug/L	1.0	0.28	1		06/24/17 05:48	75-35-4	
cis-1,2-Dichloroethene	ND	ug/L	1.0	0.12	1		06/24/17 05:48	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	1.0	0.16	1		06/24/17 05:48	156-60-5	
Diisopropyl ether	**20.5**	ug/L	1.0	0.17	1		06/24/17 05:48	108-20-3	
Ethylbenzene	ND	ug/L	1.0	0.15	1		06/24/17 05:48	100-41-4	
4-Methyl-2-pentanol	ND	ug/L	40.0	1.6	1		06/24/17 05:48	108-11-2	
Methylene Chloride	ND	ug/L	4.0	0.29	1		06/24/17 05:48	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/L	5.0	0.43	1		06/24/17 05:48	108-10-1	
2-Propanol	**126**	ug/L	100	1.9	1		06/24/17 05:48	67-63-0	
Tetrahydrofuran	ND	ug/L	10.0	1.5	1		06/24/17 05:48	109-99-9	
Toluene	ND	ug/L	1.0	0.14	1		06/24/17 05:48	108-88-3	
Xylene (Total)	ND	ug/L	3.0	0.32	1		06/24/17 05:48	1330-20-7	
Surrogates									
1,2-Dichloroethane-d4 (S)	108	%.	75-137		1		06/24/17 05:48	17060-07-0	
Toluene-d8 (S)	100	%.	75-125		1		06/24/17 05:48	2037-26-5	
4-Bromofluorobenzene (S)	101	%.	75-125		1		06/24/17 05:48	460-00-4	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
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ANALYTICAL RESULTS

Project: 02181.202.038.0001 Confidentia
Pace Project No.: 10392323

Sample: OKMN-GW-W26R-DB-170614 **Lab ID: 10392323005** Collected: 06/14/17 12:10 Received: 06/15/17 09:15 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV	Analytical Method: EPA 8260B								
Acetone	ND	ug/L	20.0	2.0	1		06/24/17 06:10	67-64-1	L3
Benzene	**2.9**	ug/L	1.0	0.16	1		06/24/17 06:10	71-43-2	
2-Butanone (MEK)	ND	ug/L	5.0	1.1	1		06/24/17 06:10	78-93-3	
sec-Butyl alcohol	ND	ug/L	40.0	2.2	1		06/24/17 06:10	15892-23-6	
1,1-Dichloroethane	ND	ug/L	1.0	0.17	1		06/24/17 06:10	75-34-3	
1,2-Dichloroethane	**1.1**	ug/L	1.0	0.17	1		06/24/17 06:10	107-06-2	
1,1-Dichloroethene	ND	ug/L	1.0	0.28	1		06/24/17 06:10	75-35-4	
cis-1,2-Dichloroethene	ND	ug/L	1.0	0.12	1		06/24/17 06:10	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	1.0	0.16	1		06/24/17 06:10	156-60-5	
Diisopropyl ether	**20.5**	ug/L	1.0	0.17	1		06/24/17 06:10	108-20-3	
Ethylbenzene	ND	ug/L	1.0	0.15	1		06/24/17 06:10	100-41-4	
4-Methyl-2-pentanol	ND	ug/L	40.0	1.6	1		06/24/17 06:10	108-11-2	
Methylene Chloride	ND	ug/L	4.0	0.29	1		06/24/17 06:10	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/L	5.0	0.43	1		06/24/17 06:10	108-10-1	
2-Propanol	ND	ug/L	100	1.9	1		06/24/17 06:10	67-63-0	
Tetrahydrofuran	ND	ug/L	10.0	1.5	1		06/24/17 06:10	109-99-9	
Toluene	ND	ug/L	1.0	0.14	1		06/24/17 06:10	108-88-3	
Xylene (Total)	ND	ug/L	3.0	0.32	1		06/24/17 06:10	1330-20-7	
Surrogates									
1,2-Dichloroethane-d4 (S)	107	%.	75-137		1		06/24/17 06:10	17060-07-0	
Toluene-d8 (S)	100	%.	75-125		1		06/24/17 06:10	2037-26-5	
4-Bromofluorobenzene (S)	103	%.	75-125		1		06/24/17 06:10	460-00-4	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 02181.202.038.0001 Confidentia
Pace Project No.: 10392323

Sample: OKMN-GW-TRIP01-170614 **Lab ID: 10392323006** Collected: 06/14/17 07:00 Received: 06/15/17 09:15 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV	Analytical Method: EPA 8260B								
Acetone	**30.2**	ug/L	20.0	2.0	1		06/24/17 00:00	67-64-1	L1
Benzene	ND	ug/L	1.0	0.16	1		06/24/17 00:00	71-43-2	
2-Butanone (MEK)	ND	ug/L	5.0	1.1	1		06/24/17 00:00	78-93-3	
sec-Butyl alcohol	ND	ug/L	40.0	2.2	1		06/24/17 00:00	15892-23-6	
1,1-Dichloroethane	ND	ug/L	1.0	0.17	1		06/24/17 00:00	75-34-3	
1,2-Dichloroethane	ND	ug/L	1.0	0.17	1		06/24/17 00:00	107-06-2	
1,1-Dichloroethene	ND	ug/L	1.0	0.28	1		06/24/17 00:00	75-35-4	
cis-1,2-Dichloroethene	ND	ug/L	1.0	0.12	1		06/24/17 00:00	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	1.0	0.16	1		06/24/17 00:00	156-60-5	
Diisopropyl ether	ND	ug/L	1.0	0.17	1		06/24/17 00:00	108-20-3	
Ethylbenzene	ND	ug/L	1.0	0.15	1		06/24/17 00:00	100-41-4	
4-Methyl-2-pentanol	ND	ug/L	40.0	1.6	1		06/24/17 00:00	108-11-2	
Methylene Chloride	ND	ug/L	4.0	0.29	1		06/24/17 00:00	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/L	5.0	0.43	1		06/24/17 00:00	108-10-1	
2-Propanol	**326**	ug/L	100	1.9	1		06/24/17 00:00	67-63-0	
Tetrahydrofuran	ND	ug/L	10.0	1.5	1		06/24/17 00:00	109-99-9	
Toluene	ND	ug/L	1.0	0.14	1		06/24/17 00:00	108-88-3	
Xylene (Total)	ND	ug/L	3.0	0.32	1		06/24/17 00:00	1330-20-7	
Surrogates									
1,2-Dichloroethane-d4 (S)	104	%.	75-137		1		06/24/17 00:00	17060-07-0	
Toluene-d8 (S)	100	%.	75-125		1		06/24/17 00:00	2037-26-5	
4-Bromofluorobenzene (S)	101	%.	75-125		1		06/24/17 00:00	460-00-4	

REPORT OF LABORATORY ANALYSIS

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1700 Elm Street - Suite 200
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ANALYTICAL RESULTS

Project: 02181.202.038.0001 Confidentia
Pace Project No.: 10392323

Sample: OKMN-GW-W26R-RB-170614 **Lab ID: 10392323007** Collected: 06/14/17 11:20 Received: 06/15/17 09:15 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV	Analytical Method: EPA 8260B								
Acetone	ND	ug/L	20.0	2.0	1		06/24/17 06:32	67-64-1	L3
Benzene	ND	ug/L	1.0	0.16	1		06/24/17 06:32	71-43-2	
2-Butanone (MEK)	ND	ug/L	5.0	1.1	1		06/24/17 06:32	78-93-3	
sec-Butyl alcohol	ND	ug/L	40.0	2.2	1		06/24/17 06:32	15892-23-6	
1,1-Dichloroethane	ND	ug/L	1.0	0.17	1		06/24/17 06:32	75-34-3	
1,2-Dichloroethane	ND	ug/L	1.0	0.17	1		06/24/17 06:32	107-06-2	
1,1-Dichloroethene	ND	ug/L	1.0	0.28	1		06/24/17 06:32	75-35-4	
cis-1,2-Dichloroethene	ND	ug/L	1.0	0.12	1		06/24/17 06:32	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	1.0	0.16	1		06/24/17 06:32	156-60-5	
Diisopropyl ether	ND	ug/L	1.0	0.17	1		06/24/17 06:32	108-20-3	
Ethylbenzene	ND	ug/L	1.0	0.15	1		06/24/17 06:32	100-41-4	
4-Methyl-2-pentanol	ND	ug/L	40.0	1.6	1		06/24/17 06:32	108-11-2	
Methylene Chloride	ND	ug/L	4.0	0.29	1		06/24/17 06:32	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/L	5.0	0.43	1		06/24/17 06:32	108-10-1	
2-Propanol	ND	ug/L	100	1.9	1		06/24/17 06:32	67-63-0	
Tetrahydrofuran	ND	ug/L	10.0	1.5	1		06/24/17 06:32	109-99-9	
Toluene	ND	ug/L	1.0	0.14	1		06/24/17 06:32	108-88-3	
Xylene (Total)	ND	ug/L	3.0	0.32	1		06/24/17 06:32	1330-20-7	
Surrogates									
1,2-Dichloroethane-d4 (S)	107	%.	75-137		1		06/24/17 06:32	17060-07-0	
Toluene-d8 (S)	99	%.	75-125		1		06/24/17 06:32	2037-26-5	
4-Bromofluorobenzene (S)	102	%.	75-125		1		06/24/17 06:32	460-00-4	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
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QUALITY CONTROL DATA

Project: 02181.202.038.0001 Confidentia
Pace Project No.: 10392323

QC Batch: 481246 Analysis Method: EPA 8260B
QC Batch Method: EPA 8260B Analysis Description: 8260B MSV
Associated Lab Samples: 10392323001

METHOD BLANK: 2620992 Matrix: Water
Associated Lab Samples: 10392323001

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
1,1-Dichloroethane	ug/L	ND	1.0	0.17	06/23/17 00:03	
1,1-Dichloroethene	ug/L	ND	1.0	0.28	06/23/17 00:03	
1,2-Dichloroethane	ug/L	ND	1.0	0.17	06/23/17 00:03	
2-Butanone (MEK)	ug/L	ND	5.0	1.1	06/23/17 00:03	
2-Propanol	ug/L	ND	100	1.9	06/23/17 00:03	
4-Methyl-2-pentanol	ug/L	ND	40.0	1.6	06/23/17 00:03	
4-Methyl-2-pentanone (MIBK)	ug/L	ND	5.0	0.43	06/23/17 00:03	
Acetone	ug/L	ND	20.0	2.0	06/23/17 00:03	
Benzene	ug/L	ND	1.0	0.16	06/23/17 00:03	
cis-1,2-Dichloroethene	ug/L	ND	1.0	0.12	06/23/17 00:03	
Diisopropyl ether	ug/L	ND	1.0	0.17	06/23/17 00:03	
Ethylbenzene	ug/L	ND	1.0	0.15	06/23/17 00:03	
Methylene Chloride	ug/L	ND	4.0	0.29	06/23/17 00:03	
sec-Butyl alcohol	ug/L	ND	40.0	2.2	06/23/17 00:03	
Tetrahydrofuran	ug/L	ND	10.0	1.5	06/23/17 00:03	
Toluene	ug/L	ND	1.0	0.14	06/23/17 00:03	
trans-1,2-Dichloroethene	ug/L	ND	1.0	0.16	06/23/17 00:03	
Xylene (Total)	ug/L	ND	3.0	0.32	06/23/17 00:03	
1,2-Dichloroethane-d4 (S)	%.	107	75-137		06/23/17 00:03	
4-Bromofluorobenzene (S)	%.	99	75-125		06/23/17 00:03	
Toluene-d8 (S)	%.	101	75-125		06/23/17 00:03	

LABORATORY CONTROL SAMPLE: 2620993

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,1-Dichloroethane	ug/L	20	21.2	106	62-130	
1,1-Dichloroethene	ug/L	20	20.5	103	64-134	
1,2-Dichloroethane	ug/L	20	21.9	109	64-126	
2-Butanone (MEK)	ug/L	100	100	100	57-142	
2-Propanol	ug/L	200	201	100	57-148	
4-Methyl-2-pentanol	ug/L	200	196	98	52-140	
4-Methyl-2-pentanone (MIBK)	ug/L	100	113	113	56-142	
Acetone	ug/L	100	150	150	75-133	CH,L1
Benzene	ug/L	20	20.0	100	74-125	
cis-1,2-Dichloroethene	ug/L	20	20.8	104	75-125	
Diisopropyl ether	ug/L	20	20.7	104	72-126	
Ethylbenzene	ug/L	20	20.3	101	73-125	
Methylene Chloride	ug/L	20	20.9	105	74-125	
sec-Butyl alcohol	ug/L	200	196	98	50-149	
Tetrahydrofuran	ug/L	200	284	142	75-132	L3

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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 02181.202.038.0001 Confidentia
Pace Project No.: 10392323

LABORATORY CONTROL SAMPLE: 2620993

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Toluene	ug/L	20	21.0	105	75-125	
trans-1,2-Dichloroethene	ug/L	20	19.9	99	69-127	
Xylene (Total)	ug/L	60	63.5	106	75-125	
1,2-Dichloroethane-d4 (S)	%.			102	75-137	
4-Bromofluorobenzene (S)	%.			99	75-125	
Toluene-d8 (S)	%.			101	75-125	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2620994 2620995

Parameter	Units	10392548007 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
1,1-Dichloroethane	ug/L	<0.17	20	20	21.2	20.5	106	103	75-140	3	30	
1,1-Dichloroethene	ug/L	<0.28	20	20	23.5	22.8	117	114	73-150	3	30	
1,2-Dichloroethane	ug/L	<0.17	20	20	20.3	20.3	102	101	75-125	0	30	
2-Butanone (MEK)	ug/L	<1.1	100	100	91.7	88.2	92	88	68-133	4	30	
2-Propanol	ug/L	104	200	200	340	275	118	86	54-150	21	30	
4-Methyl-2-pentanol	ug/L	<1.6	200	200	222	223	111	112	39-146	0	30	
4-Methyl-2-pentanone (MIBK)	ug/L	<0.43	100	100	104	102	104	102	67-150	2	30	
Acetone	ug/L	24.4	100	100	189	197	165	172	56-150	4	30	CH,M0
Benzene	ug/L	<0.16	20	20	20.8	20.6	104	103	74-134	1	30	
cis-1,2-Dichloroethene	ug/L	<0.12	20	20	20.7	20.4	104	102	73-140	2	30	
Diisopropyl ether	ug/L	<0.17	20	20	21.0	20.8	105	104	63-138	1	30	
Ethylbenzene	ug/L	<0.15	20	20	19.4	18.8	97	94	75-136	3	30	
Methylene Chloride	ug/L	<0.29	20	20	19.8	19.1	99	96	69-150	3	30	
sec-Butyl alcohol	ug/L	<2.2	200	200	202	189	101	95	55-136	6	30	
Tetrahydrofuran	ug/L	<1.5	200	200	288	304	144	152	53-150	5	30	M0
Toluene	ug/L	<0.14	20	20	21.0	20.8	105	104	71-138	1	30	
trans-1,2-Dichloroethene	ug/L	<0.16	20	20	21.8	21.2	109	106	74-149	3	30	
Xylene (Total)	ug/L	<0.32	60	60	59.1	58.6	98	98	75-131	1	30	
1,2-Dichloroethane-d4 (S)	%.						102	102	75-137			
4-Bromofluorobenzene (S)	%.						97	101	75-125			
Toluene-d8 (S)	%.						101	100	75-125			

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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 02181.202.038.0001 Confidentia
Pace Project No.: 10392323

QC Batch: 481350 Analysis Method: EPA 8260B
QC Batch Method: EPA 8260B Analysis Description: 8260B MSV
Associated Lab Samples: 10392323003, 10392323004, 10392323005, 10392323006, 10392323007

METHOD BLANK: 2621801 Matrix: Water
Associated Lab Samples: 10392323003, 10392323004, 10392323005, 10392323006, 10392323007

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
1,1-Dichloroethane	ug/L	ND	1.0	0.17	06/23/17 23:38	
1,1-Dichloroethene	ug/L	ND	1.0	0.28	06/23/17 23:38	
1,2-Dichloroethane	ug/L	ND	1.0	0.17	06/23/17 23:38	
2-Butanone (MEK)	ug/L	ND	5.0	1.1	06/23/17 23:38	
2-Propanol	ug/L	ND	100	1.9	06/23/17 23:38	
4-Methyl-2-pentanol	ug/L	ND	40.0	1.6	06/23/17 23:38	
4-Methyl-2-pentanone (MIBK)	ug/L	ND	5.0	0.43	06/23/17 23:38	
Acetone	ug/L	ND	20.0	2.0	06/23/17 23:38	
Benzene	ug/L	ND	1.0	0.16	06/23/17 23:38	
cis-1,2-Dichloroethene	ug/L	ND	1.0	0.12	06/23/17 23:38	
Diisopropyl ether	ug/L	ND	1.0	0.17	06/23/17 23:38	
Ethylbenzene	ug/L	ND	1.0	0.15	06/23/17 23:38	
Methylene Chloride	ug/L	ND	4.0	0.29	06/23/17 23:38	
sec-Butyl alcohol	ug/L	ND	40.0	2.2	06/23/17 23:38	
Tetrahydrofuran	ug/L	ND	10.0	1.5	06/23/17 23:38	
Toluene	ug/L	ND	1.0	0.14	06/23/17 23:38	
trans-1,2-Dichloroethene	ug/L	ND	1.0	0.16	06/23/17 23:38	
Xylene (Total)	ug/L	ND	3.0	0.32	06/23/17 23:38	
1,2-Dichloroethane-d4 (S)	%.	106	75-137		06/23/17 23:38	
4-Bromofluorobenzene (S)	%.	101	75-125		06/23/17 23:38	
Toluene-d8 (S)	%.	100	75-125		06/23/17 23:38	

LABORATORY CONTROL SAMPLE: 2621802

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,1-Dichloroethane	ug/L	20	19.7	99	62-130	
1,1-Dichloroethene	ug/L	20	19.2	96	64-134	
1,2-Dichloroethane	ug/L	20	20.6	103	64-126	
2-Butanone (MEK)	ug/L	100	95.0	95	57-142	
2-Propanol	ug/L	200	191	95	57-148	
4-Methyl-2-pentanol	ug/L	200	174	87	52-140	
4-Methyl-2-pentanone (MIBK)	ug/L	100	108	108	56-142	
Acetone	ug/L	100	136	136	75-133	L1
Benzene	ug/L	20	18.3	91	74-125	
cis-1,2-Dichloroethene	ug/L	20	19.3	97	75-125	
Diisopropyl ether	ug/L	20	19.8	99	72-126	
Ethylbenzene	ug/L	20	18.5	92	73-125	
Methylene Chloride	ug/L	20	19.0	95	74-125	
sec-Butyl alcohol	ug/L	200	175	88	50-149	
Tetrahydrofuran	ug/L	200	250	125	75-132	

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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 02181.202.038.0001 Confidentia
Pace Project No.: 10392323

LABORATORY CONTROL SAMPLE: 2621802

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Toluene	ug/L	20	19.1	96	75-125	
trans-1,2-Dichloroethene	ug/L	20	18.0	90	69-127	
Xylene (Total)	ug/L	60	57.6	96	75-125	
1,2-Dichloroethane-d4 (S)	%.			102	75-137	
4-Bromofluorobenzene (S)	%.			101	75-125	
Toluene-d8 (S)	%.			101	75-125	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2621803 2621804

Parameter	Units	10392359001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
1,1-Dichloroethane	ug/L	ND	20	20	18.5	18.8	92	94	75-140	2	30	
1,1-Dichloroethene	ug/L	ND	20	20	19.8	21.3	99	106	73-150	7	30	
1,2-Dichloroethane	ug/L	ND	20	20	17.7	18.6	88	93	75-125	5	30	
2-Butanone (MEK)	ug/L	ND	100	100	81.7	85.5	82	85	68-133	4	30	
2-Propanol	ug/L	ND	200	200	242	198	107	85	54-150	20	30	
4-Methyl-2-pentanol	ug/L	ND	200	200	182	200	91	100	39-146	10	30	
4-Methyl-2-pentanone (MIBK)	ug/L	ND	100	100	89.7	94.0	90	94	67-150	5	30	
Acetone	ug/L	ND	100	100	162	162	148	149	56-150	1	30	
Benzene	ug/L	ND	20	20	18.0	19.1	90	95	74-134	6	30	
cis-1,2-Dichloroethene	ug/L	ND	20	20	17.7	18.6	89	93	73-140	5	30	
Diisopropyl ether	ug/L	ND	20	20	18.5	19.3	93	97	63-138	4	30	
Ethylbenzene	ug/L	ND	20	20	16.6	17.4	83	87	75-136	5	30	
Methylene Chloride	ug/L	ND	20	20	17.3	18.2	87	91	69-150	5	30	
sec-Butyl alcohol	ug/L	ND	200	200	164	181	82	90	55-136	10	30	
Tetrahydrofuran	ug/L	ND	200	200	264	277	132	138	53-150	5	30	
Toluene	ug/L	ND	20	20	18.2	18.9	90	94	71-138	4	30	
trans-1,2-Dichloroethene	ug/L	ND	20	20	19.3	20.2	96	101	74-149	4	30	
Xylene (Total)	ug/L	ND	60	60	50.7	54.2	85	90	75-131	7	30	
1,2-Dichloroethane-d4 (S)	%.						101	101	75-137			
4-Bromofluorobenzene (S)	%.						101	102	75-125			
Toluene-d8 (S)	%.						101	101	75-125			

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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 02181.202.038.0001 Confidentia
Pace Project No.: 10392323

QC Batch: 481634 Analysis Method: EPA 8260B
QC Batch Method: EPA 8260B Analysis Description: 8260B MSV
Associated Lab Samples: 10392323002

METHOD BLANK: 2623534 Matrix: Water
Associated Lab Samples: 10392323002

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
1,1-Dichloroethane	ug/L	ND	1.0	0.17	06/26/17 21:51	
1,1-Dichloroethene	ug/L	ND	1.0	0.28	06/26/17 21:51	
1,2-Dichloroethane	ug/L	ND	1.0	0.17	06/26/17 21:51	
2-Butanone (MEK)	ug/L	ND	5.0	1.1	06/26/17 21:51	
2-Propanol	ug/L	ND	100	1.9	06/26/17 21:51	
4-Methyl-2-pentanol	ug/L	ND	40.0	1.6	06/26/17 21:51	
4-Methyl-2-pentanone (MIBK)	ug/L	ND	5.0	0.43	06/26/17 21:51	
Acetone	ug/L	ND	20.0	2.0	06/26/17 21:51	
Benzene	ug/L	ND	1.0	0.16	06/26/17 21:51	
cis-1,2-Dichloroethene	ug/L	ND	1.0	0.12	06/26/17 21:51	
Diisopropyl ether	ug/L	ND	1.0	0.17	06/26/17 21:51	
Ethylbenzene	ug/L	ND	1.0	0.15	06/26/17 21:51	
Methylene Chloride	ug/L	ND	4.0	0.29	06/26/17 21:51	
sec-Butyl alcohol	ug/L	ND	40.0	2.2	06/26/17 21:51	
Tetrahydrofuran	ug/L	ND	10.0	1.5	06/26/17 21:51	
Toluene	ug/L	ND	1.0	0.14	06/26/17 21:51	
trans-1,2-Dichloroethene	ug/L	ND	1.0	0.16	06/26/17 21:51	
Xylene (Total)	ug/L	ND	3.0	0.32	06/26/17 21:51	
1,2-Dichloroethane-d4 (S)	%.	111	75-137		06/26/17 21:51	
4-Bromofluorobenzene (S)	%.	102	75-125		06/26/17 21:51	
Toluene-d8 (S)	%.	100	75-125		06/26/17 21:51	

LABORATORY CONTROL SAMPLE & LCSD: 2623535 2623536

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
1,1-Dichloroethane	ug/L	20	20.8	19.4	104	97	62-130	7	20	
1,1-Dichloroethene	ug/L	20	18.7	17.4	94	87	64-134	7	20	
1,2-Dichloroethane	ug/L	20	21.5	19.5	107	97	64-126	10	20	
2-Butanone (MEK)	ug/L	100	100	91.1	100	91	57-142	10	20	
2-Propanol	ug/L	200	194	185	97	92	57-148	5	20	
4-Methyl-2-pentanol	ug/L	200	182	186	91	93	52-140	2	20	
4-Methyl-2-pentanone (MIBK)	ug/L	100	108	100	108	100	56-142	8	20	
Acetone	ug/L	100	129	117	129	117	75-133	10	20	
Benzene	ug/L	20	18.8	17.5	94	88	74-125	7	20	
cis-1,2-Dichloroethene	ug/L	20	19.6	17.9	98	90	75-125	9	20	
Diisopropyl ether	ug/L	20	20.5	19.0	102	95	72-126	7	20	
Ethylbenzene	ug/L	20	18.6	17.8	93	89	73-125	4	20	
Methylene Chloride	ug/L	20	18.6	17.5	93	88	74-125	6	20	
sec-Butyl alcohol	ug/L	200	176	183	88	91	50-149	4	20	
Tetrahydrofuran	ug/L	200	233	218	116	109	75-132	7	20	

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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 02181.202.038.0001 Confidentia
Pace Project No.: 10392323

LABORATORY CONTROL SAMPLE & LCSD: 2623535 2623536

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
Toluene	ug/L	20	19.1	17.7	95	89	75-125	7	20	
trans-1,2-Dichloroethene	ug/L	20	18.3	16.6	92	83	69-127	10	20	
Xylene (Total)	ug/L	60	56.9	54.1	95	90	75-125	5	20	
1,2-Dichloroethane-d4 (S)	%.				105	104	75-137			
4-Bromofluorobenzene (S)	%.				100	99	75-125			
Toluene-d8 (S)	%.				100	103	75-125			

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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
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(612)607-1700

QUALIFIERS

Project: 02181.202.038.0001 Confidentia
Pace Project No.: 10392323

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-M	Pace Analytical Services - Minneapolis

BATCH QUALIFIERS

Batch: 481634

[M5]	A matrix spike/matrix spike duplicate was not performed for this batch due to insufficient sample volume.

ANALYTE QUALIFIERS

CH	The continuing calibration for this compound is outside of Pace Analytical acceptance limits. The results may be biased high.
L1	Analyte recovery in the laboratory control sample (LCS) was above QC limits. Results for this analyte in associated samples may be biased high.
L3	Analyte recovery in the laboratory control sample (LCS) exceeded QC limits. Analyte presence below reporting limits in associated samples.
M0	Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 02181.202.038.0001 Confidentia
Pace Project No.: 10392323

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10392323001	**OKMN-GW-PW09-0-170614**	EPA 8260B	481246		
10392323002	**OKMN-GW-PW08-0-170614**	EPA 8260B	481634		
10392323003	**OKMN-GW-PW07-0-170614**	EPA 8260B	481350		
10392323004	**OKMN-GW-W26R-0-170614**	EPA 8260B	481350		
10392323005	**OKMN-GW-W26R-DB-170614**	EPA 8260B	481350		
10392323006	**OKMN-GW-TRIP01-170614**	EPA 8260B	481350		
10392323007	**OKMN-GW-W26R-RB-170614**	EPA 8260B	481350		

Pace Analytical
www.pacelabs.com

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

10392323

Section A Required Client Information:

Company:	WESTON
Address:	1400 WESTON WAY
	WEST CHESTER, PA 19380
Email To:	NATACC.Data@WestonSolutions.com
Phone: 610-701-3676	Fax: 610-701-3401
Requested Due Date/TAT:	Standard TAT

Section B Required Project Information:

Report To:	DAVE CAIRNS
Copy To:	MARTA CAIRNS
Purchase Order No.:	
Project Name:	CONFIDENTIAL-OAKDALE
Project Number:	02181.202.038.0001

Section C Invoice Information:

Attention:	DAVE CAIRNS
Company Name:	WESTON SOLUTIONS
Address:	WEST CHESTER PA
Pace Quote Reference:	
Pace Project Manager:	Tina Soltani
Pace Profile #:	

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER MPCA

Site Location STATE: MN

Section D Required Client Information

SAMPLE ID
(A-Z, 0-9 / ,-)
Sample IDs MUST BE UNIQUE

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	OT
TISSUE	TS

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COLLECTED COMPOSITE START TIME	COLLECTED COMPOSITE END/GRAB DATE	COLLECTED COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test Y/N	VOC - OKMN-List1 (see notes)	VOC - OKMN-List2 (see notes)	TCLP VOCS	TCLP METALS	IGNITIBILITY	REACTIVITY	TSS/TDS							Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	OKMN-GW-PW09-0-1706 14	WT	G			6-14-17	0920		3				3						X	X												001
2	OKMN-GW-PW08-0-1706	WT	G			6-14-17	1300		3				3						X	X												002
3	OKMN-GW-PW07-0-1706	WT	G			6-14-17	1100		3				3						X	X												003
4	OKMN-GW-W26R-0-1706	WT	G			6-14-17	1210		3				3						X	X												004
5	OKMN-GW-W26R-DB-1706	WT	G			6-14-17	1210		3				3						X	X												005
6	OKMN-GW-TRIP01-1706 14	WT	G			6-14-17	0700		2				2						X	X												006
~~7~~	~~OKMN-GW-PW08-RB-1706~~	~~WT~~	~~G~~						~~3~~				~~3~~						~~X~~	~~X~~												~~007~~
8	OKMN-GW-W26R-RB-170614	WT	G			6-14-17	1120		3				3						X	X												007
9																																
10																																
11																																
12																																

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
OKMN-List 1 : VOCs including: Acetone, Benzene, 1,1-DCA, 1,2-DCA, 1,1-DCE, cis & trans-1,2-DCE, ethylbenzene, isopropy ether, MEK, and tetrahydrofuran	WESTON	6-15-17	09:00		6-15-17	9:15	0.7	Y	Y	Y
OKMN-List 2: VOCs including: isopropyl alcohol, 2-butyl alcohol, methyl isobutyl alcohol, methylene chloride, MIBK, toluene, and total xylenes.										
Please send results to: NATACC.Data@westonsolutions.com										

SAMPLER NAME AND SIGNATURE		Temp In °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
PRINT Name of SAMPLER:	Dave Cairns, Denver Martin, Seth Welty				
SIGNATURE of SAMPLER:	DATE Signed (MM/DD/YY): 6-15-17				

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

APPENDIX C.2
OCTOBER/NOVEMBER 2017 GROUNDWATER SAMPLING EVENT

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

December 19, 2017

Mr. David Cairns
Weston Solutions, Inc.
1400 Weston Way
West Chester, PA 19380

RE: Project: 02181-202-038 Confidential-Oak-Revised Report
Pace Project No.: 10409358

Dear Mr. Cairns:
Enclosed are the analytical results for sample(s) received by the laboratory on November 01, 2017. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

This report was revised on December 19, 2017 to correct the sample IDs for Pace samples 10409358-019 and 10409358-021 to OKMN-GW-W26R-RB02-171101 and OKMN-GW-W26R-0-171101, respectively.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Tina Soltani
tina.soltani@pacelabs.com
(612)607-6384
Project Manager

Enclosures

cc: Ms. Marta Cairns, Weston Solutions, Inc.
NATACCData WestonSolutions, Weston Solutions, Inc.

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

CERTIFICATIONS

Project: 02181-202-038 Confidential-Oak-Revised Report
Pace Project No.: 10409358

Minnesota Certification IDs

1700 Elm Street SE, Suite 200, Minneapolis, MN 55414-2485
A2LA Certification #: 2926.01
Alabama Certification #: 40770
Alaska Contaminated Sites Certification #: 17-009
Alaska DW Certification #: MN00064
Arizona Certification #: AZ0014
Arkansas Certification #: 88-0680
California Certification #: 2929
CNMI Saipan Certification #:MP0003
Colorado Certification #: MN00064
Connecticut Certification #: PH-0256
EPA Region 8+Wyoming DW Certification #: via MN 027-053-137
Florida Certification #: E87605
Georgia Certification #: 959
Guam EPA Certification #: MN00064
Hawaii Certification #: MN00064
Idaho Certification #: MN00064
Illinois Certification #: 200011
Indiana Certification #: C-MN-01
Iowa Certification #: 368
Kansas Certification #: E-10167
Kentucky DW Certification #: 90062
Kentucky WW Certification #: 90062
Louisiana DEQ Certification #: 03086
Louisiana DW Certification #: MN00064
Maine Certification #: MN00064
Maryland Certification #: 322
Massachusetts Certification #: M-MN064
Michigan Certification #: 9909
Minnesota Certification #: 027-053-137
Mississippi Certification #: MN00064
Montana Certification #: CERT0092
Nebraska Certification #: NE-OS-18-06
Nevada Certification #: MN00064
New Hampshire Certification #: 2081
New Jersey Certification #: MN002
New York Certification #: 11647
North Carolina DW Certification #: 27700
North Carolina WW Certification #: 530
North Dakota Certification #: R-036
Ohio DW Certification #: 41244
Ohio VAP Certification #: CL101
Oklahoma Certification #: 9507
Oregon NwTPH Certification #: MN300001
Oregon Secondary Certification #: MN200001
Pennsylvania Certification #: 68-00563
Puerto Rico Certification #: MN00064
South Carolina Certification #:74003001
Tennessee Certification #: TN02818
Texas Certification #: T104704192
Utah Certification #: MN00064
Virginia Certification #: 460163
Washington Certification #: C486
West Virginia DW Certification #: 9952 C
West Virginia DEP Certification #: 382
Wisconsin Certification #: 999407970

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SAMPLE SUMMARY

Project: 02181-202-038 Confidential-Oak-Revised Report
Pace Project No.: 10409358

Lab ID	Sample ID	Matrix	Date Collected	Date Received
10409358001	**OKMN-GW-TRIP01-171031**	Water	10/31/17 07:00	11/01/17 17:18
10409358002	**OKMN-GW-W33-RB01-171101**	Water	11/01/17 08:30	11/01/17 17:18
10409358003	**OKMN-GW-PW07-0-171031**	Water	10/31/17 13:10	11/01/17 17:18
10409358004	**OKMN-GW-PW07-DB-171031**	Water	10/31/17 13:10	11/01/17 17:18
10409358005	**OKMN-GW-PW08-0-171031**	Water	10/31/17 11:50	11/01/17 17:18
10409358006	**OKMN-GW-PW09-0-171031**	Water	10/31/17 11:40	11/01/17 17:18
10409358007	**OKMN-GW-W03-0-171031**	Water	10/31/17 10:15	11/01/17 17:18
10409358008	**OKMN-GW-W08-0-171031**	Water	10/31/17 09:10	11/01/17 17:18
10409358009	**OKMN-GW-W2003-0-171031**	Water	10/31/17 14:05	11/01/17 17:18
10409358010	**OKMN-GW-W2008-0-171101**	Water	11/01/17 07:40	11/01/17 17:18
10409358011	**OKMN-GW-W31-0-171101**	Water	11/01/17 07:30	11/01/17 17:18
10409358012	**OKMN-GW-W33-0-171101**	Water	11/01/17 12:20	11/01/17 17:18
10409358013	**OKMN-GW-W25-0-171101**	Water	11/01/17 12:05	11/01/17 17:18
10409358014	**OKMN-GW-W215-0-171101**	Water	11/01/17 10:05	11/01/17 17:18
10409358015	**OKMN-GW-W2005-0-171101**	Water	11/01/17 10:20	11/01/17 17:18
10409358016	**OKMN-GW-W2009-0-171101**	Water	11/01/17 12:05	11/01/17 17:18
10409358017	**OKMN-GW-W2010-0-171101**	Water	11/01/17 10:15	11/01/17 17:18
10409358018	**OKMN-GW-W2012-0-171101**	Water	11/01/17 11:10	11/01/17 17:18
10409358019	**OKMN-GW-W26R-RB02-171101**	Water	11/01/17 14:55	11/01/17 17:18
10409358020	**OKMN-GW-W28-0-171101**	Water	11/01/17 15:30	11/01/17 17:18
10409358021	**OKMN-GW-W26R-0-171101**	Water	11/01/17 15:35	11/01/17 17:18
10409358022	**OKMN-GW-W26R-DB-171101**	Water	11/01/17 15:35	11/01/17 17:18

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

SAMPLE ANALYTE COUNT

Project: 02181-202-038 Confidential-Oak-Revised Report
Pace Project No.: 10409358

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
10409358001	OKMN-GW-TRIP01-171031	EPA 8260B	DJB	21	PASI-M
10409358002	OKMN-GW-W33-RB01-171101	EPA 8260B	DJB	21	PASI-M
10409358003	OKMN-GW-PW07-0-171031	EPA 8260B	DJB	21	PASI-M
10409358004	OKMN-GW-PW07-DB-171031	EPA 8260B	DJB	21	PASI-M
10409358005	OKMN-GW-PW08-0-171031	EPA 8260B	DJB	21	PASI-M
10409358006	OKMN-GW-PW09-0-171031	EPA 8260B	DJB	21	PASI-M
10409358007	OKMN-GW-W03-0-171031	EPA 8260B	DJB	21	PASI-M
10409358008	OKMN-GW-W08-0-171031	EPA 8260B	DJB	21	PASI-M
10409358009	OKMN-GW-W2003-0-171031	EPA 8260B	DJB	21	PASI-M
10409358010	OKMN-GW-W2008-0-171101	EPA 8260B	DJB	21	PASI-M
10409358011	OKMN-GW-W31-0-171101	EPA 8260B	DJB	21	PASI-M
10409358012	OKMN-GW-W33-0-171101	EPA 8260B	DJB	21	PASI-M
10409358013	OKMN-GW-W25-0-171101	EPA 8260B	DJB	21	PASI-M
10409358014	OKMN-GW-W215-0-171101	EPA 8260B	DJB	21	PASI-M
10409358015	OKMN-GW-W2005-0-171101	EPA 8260B	DJB	21	PASI-M
10409358016	OKMN-GW-W2009-0-171101	EPA 8260B	DJB	21	PASI-M
10409358017	OKMN-GW-W2010-0-171101	EPA 8260B	DJB	21	PASI-M
10409358018	OKMN-GW-W2012-0-171101	EPA 8260B	DJB	21	PASI-M
10409358019	OKMN-GW-W26R-RB02-171101	EPA 8260B	DJB	21	PASI-M
10409358020	OKMN-GW-W28-0-171101	EPA 8260B	DJB	21	PASI-M
10409358021	OKMN-GW-W26R-0-171101	EPA 8260B	DJB	21	PASI-M
10409358022	OKMN-GW-W26R-DB-171101	EPA 8260B	DJB	21	PASI-M

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PROJECT NARRATIVE

Project: 02181-202-038 Confidential-Oak-Revised Report
Pace Project No.: 10409358

Method: **EPA 8260B**
Description: 8260B MSV
Client: Weston Solutions, Inc.
Date: December 19, 2017

General Information:
22 samples were analyzed for EPA 8260B. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Internal Standards:
All internal standards were within QC limits with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: 508395

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 10409510001

M1: Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

- MS (Lab ID: 2763218)
  - Acetone

QC Batch: 508464

A matrix spike/matrix spike duplicate was not performed due to insufficient sample volume.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

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ANALYTICAL RESULTS

Project: 02181-202-038 Confidential-Oak-Revised Report
Pace Project No.: 10409358

Sample: OKMN-GW-TRIP01-171031 **Lab ID: 10409358001** Collected: 10/31/17 07:00 Received: 11/01/17 17:18 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV	Analytical Method: EPA 8260B								
Acetone	ND	ug/L	20.0	8.8	1		11/14/17 14:09	67-64-1	
Benzene	ND	ug/L	1.0	0.34	1		11/14/17 14:09	71-43-2	
2-Butanone (MEK)	ND	ug/L	5.0	2.4	1		11/14/17 14:09	78-93-3	
sec-Butyl alcohol	ND	ug/L	40.0	11.2	1		11/14/17 14:09	15892-23-6	
1,1-Dichloroethane	ND	ug/L	1.0	0.14	1		11/14/17 14:09	75-34-3	
1,2-Dichloroethane	ND	ug/L	1.0	0.32	1		11/14/17 14:09	107-06-2	
1,1-Dichloroethene	ND	ug/L	1.0	0.18	1		11/14/17 14:09	75-35-4	
cis-1,2-Dichloroethene	ND	ug/L	1.0	0.20	1		11/14/17 14:09	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	1.0	0.21	1		11/14/17 14:09	156-60-5	
Diisopropyl ether	ND	ug/L	1.0	0.12	1		11/14/17 14:09	108-20-3	
Ethylbenzene	ND	ug/L	1.0	0.14	1		11/14/17 14:09	100-41-4	
4-Methyl-2-pentanol	ND	ug/L	40.0	14.4	1		11/14/17 14:09	108-11-2	
Methylene Chloride	ND	ug/L	4.0	1.2	1		11/14/17 14:09	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/L	5.0	0.55	1		11/14/17 14:09	108-10-1	
2-Propanol	ND	ug/L	100	20.6	1		11/14/17 14:09	67-63-0	
Tetrahydrofuran	ND	ug/L	10.0	4.3	1		11/14/17 14:09	109-99-9	
Toluene	ND	ug/L	1.0	0.17	1		11/14/17 14:09	108-88-3	
Xylene (Total)	ND	ug/L	3.0	0.24	1		11/14/17 14:09	1330-20-7	
Surrogates									
1,2-Dichloroethane-d4 (S)	99	%.	75-137		1		11/14/17 14:09	17060-07-0	
Toluene-d8 (S)	93	%.	75-125		1		11/14/17 14:09	2037-26-5	
4-Bromofluorobenzene (S)	96	%.	75-125		1		11/14/17 14:09	460-00-4	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
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(612)607-1700

ANALYTICAL RESULTS

Project: 02181-202-038 Confidential-Oak-Revised Report
Pace Project No.: 10409358

Sample: OKMN-GW-W33-RB01-171101 **Lab ID: 10409358002** Collected: 11/01/17 08:30 Received: 11/01/17 17:18 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV	Analytical Method: EPA 8260B								
Acetone	ND	ug/L	20.0	8.8	1		11/14/17 16:30	67-64-1	
Benzene	ND	ug/L	1.0	0.34	1		11/14/17 16:30	71-43-2	
2-Butanone (MEK)	ND	ug/L	5.0	2.4	1		11/14/17 16:30	78-93-3	
sec-Butyl alcohol	ND	ug/L	40.0	11.2	1		11/14/17 16:30	15892-23-6	
1,1-Dichloroethane	ND	ug/L	1.0	0.14	1		11/14/17 16:30	75-34-3	
1,2-Dichloroethane	ND	ug/L	1.0	0.32	1		11/14/17 16:30	107-06-2	
1,1-Dichloroethene	ND	ug/L	1.0	0.18	1		11/14/17 16:30	75-35-4	
cis-1,2-Dichloroethene	ND	ug/L	1.0	0.20	1		11/14/17 16:30	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	1.0	0.21	1		11/14/17 16:30	156-60-5	
Diisopropyl ether	ND	ug/L	1.0	0.12	1		11/14/17 16:30	108-20-3	
Ethylbenzene	ND	ug/L	1.0	0.14	1		11/14/17 16:30	100-41-4	
4-Methyl-2-pentanol	ND	ug/L	40.0	14.4	1		11/14/17 16:30	108-11-2	
Methylene Chloride	ND	ug/L	4.0	1.2	1		11/14/17 16:30	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/L	5.0	0.55	1		11/14/17 16:30	108-10-1	
2-Propanol	ND	ug/L	100	20.6	1		11/14/17 16:30	67-63-0	
Tetrahydrofuran	ND	ug/L	10.0	4.3	1		11/14/17 16:30	109-99-9	
Toluene	ND	ug/L	1.0	0.17	1		11/14/17 16:30	108-88-3	
Xylene (Total)	ND	ug/L	3.0	0.24	1		11/14/17 16:30	1330-20-7	
Surrogates									
1,2-Dichloroethane-d4 (S)	99	%.	75-137		1		11/14/17 16:30	17060-07-0	
Toluene-d8 (S)	93	%.	75-125		1		11/14/17 16:30	2037-26-5	
4-Bromofluorobenzene (S)	95	%.	75-125		1		11/14/17 16:30	460-00-4	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
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ANALYTICAL RESULTS

Project: 02181-202-038 Confidential-Oak-Revised Report
Pace Project No.: 10409358

Sample: OKMN-GW-PW07-0-171031 **Lab ID: 10409358003** Collected: 10/31/17 13:10 Received: 11/01/17 17:18 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV	Analytical Method: EPA 8260B								
Acetone	ND	ug/L	500	221	25		11/14/17 19:16	67-64-1	
Benzene	**102**	ug/L	25.0	8.5	25		11/14/17 19:16	71-43-2	
2-Butanone (MEK)	ND	ug/L	125	60.5	25		11/14/17 19:16	78-93-3	
sec-Butyl alcohol	ND	ug/L	1000	280	25		11/14/17 19:16	15892-23-6	
1,1-Dichloroethane	ND	ug/L	25.0	3.6	25		11/14/17 19:16	75-34-3	
1,2-Dichloroethane	ND	ug/L	25.0	8.0	25		11/14/17 19:16	107-06-2	
1,1-Dichloroethene	ND	ug/L	25.0	4.5	25		11/14/17 19:16	75-35-4	
cis-1,2-Dichloroethene	ND	ug/L	25.0	5.0	25		11/14/17 19:16	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	25.0	5.2	25		11/14/17 19:16	156-60-5	
Diisopropyl ether	**4090**	ug/L	25.0	3.1	25		11/14/17 19:16	108-20-3	
Ethylbenzene	ND	ug/L	25.0	3.4	25		11/14/17 19:16	100-41-4	
4-Methyl-2-pentanol	ND	ug/L	1000	360	25		11/14/17 19:16	108-11-2	
Methylene Chloride	ND	ug/L	100	29.0	25		11/14/17 19:16	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/L	125	13.7	25		11/14/17 19:16	108-10-1	
2-Propanol	ND	ug/L	2500	515	25		11/14/17 19:16	67-63-0	
Tetrahydrofuran	ND	ug/L	250	108	25		11/14/17 19:16	109-99-9	
Toluene	ND	ug/L	25.0	4.3	25		11/14/17 19:16	108-88-3	
Xylene (Total)	**1870**	ug/L	75.0	6.1	25		11/14/17 19:16	1330-20-7	
Surrogates									
1,2-Dichloroethane-d4 (S)	95	%.	75-137		25		11/14/17 19:16	17060-07-0	
Toluene-d8 (S)	93	%.	75-125		25		11/14/17 19:16	2037-26-5	
4-Bromofluorobenzene (S)	98	%.	75-125		25		11/14/17 19:16	460-00-4	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
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ANALYTICAL RESULTS

Project: 02181-202-038 Confidential-Oak-Revised Report
Pace Project No.: 10409358

Sample: OKMN-GW-PW07-DB-171031 **Lab ID: 10409358004** Collected: 10/31/17 13:10 Received: 11/01/17 17:18 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV	Analytical Method: EPA 8260B								
Acetone	ND	ug/L	500	221	25		11/14/17 19:40	67-64-1	
Benzene	**98.5**	ug/L	25.0	8.5	25		11/14/17 19:40	71-43-2	
2-Butanone (MEK)	ND	ug/L	125	60.5	25		11/14/17 19:40	78-93-3	
sec-Butyl alcohol	ND	ug/L	1000	280	25		11/14/17 19:40	15892-23-6	
1,1-Dichloroethane	ND	ug/L	25.0	3.6	25		11/14/17 19:40	75-34-3	
1,2-Dichloroethane	ND	ug/L	25.0	8.0	25		11/14/17 19:40	107-06-2	
1,1-Dichloroethene	ND	ug/L	25.0	4.5	25		11/14/17 19:40	75-35-4	
cis-1,2-Dichloroethene	ND	ug/L	25.0	5.0	25		11/14/17 19:40	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	25.0	5.2	25		11/14/17 19:40	156-60-5	
Diisopropyl ether	**4090**	ug/L	25.0	3.1	25		11/14/17 19:40	108-20-3	
Ethylbenzene	ND	ug/L	25.0	3.4	25		11/14/17 19:40	100-41-4	
4-Methyl-2-pentanol	ND	ug/L	1000	360	25		11/14/17 19:40	108-11-2	
Methylene Chloride	ND	ug/L	100	29.0	25		11/14/17 19:40	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/L	125	13.7	25		11/14/17 19:40	108-10-1	
2-Propanol	ND	ug/L	2500	515	25		11/14/17 19:40	67-63-0	
Tetrahydrofuran	ND	ug/L	250	108	25		11/14/17 19:40	109-99-9	
Toluene	ND	ug/L	25.0	4.3	25		11/14/17 19:40	108-88-3	
Xylene (Total)	**1850**	ug/L	75.0	6.1	25		11/14/17 19:40	1330-20-7	
Surrogates									
1,2-Dichloroethane-d4 (S)	96	%.	75-137		25		11/14/17 19:40	17060-07-0	
Toluene-d8 (S)	92	%.	75-125		25		11/14/17 19:40	2037-26-5	
4-Bromofluorobenzene (S)	96	%.	75-125		25		11/14/17 19:40	460-00-4	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
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Minneapolis, MN 55414
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ANALYTICAL RESULTS

Project: 02181-202-038 Confidential-Oak-Revised Report
Pace Project No.: 10409358

Sample: OKMN-GW-PW08-0-171031 **Lab ID: 10409358005** Collected: 10/31/17 11:50 Received: 11/01/17 17:18 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV	Analytical Method: EPA 8260B								
Acetone	ND	ug/L	500	221	25		11/14/17 20:04	67-64-1	
Benzene	**811**	ug/L	25.0	8.5	25		11/14/17 20:04	71-43-2	
2-Butanone (MEK)	ND	ug/L	125	60.5	25		11/14/17 20:04	78-93-3	
sec-Butyl alcohol	ND	ug/L	1000	280	25		11/14/17 20:04	15892-23-6	
1,1-Dichloroethane	ND	ug/L	25.0	3.6	25		11/14/17 20:04	75-34-3	
1,2-Dichloroethane	ND	ug/L	25.0	8.0	25		11/14/17 20:04	107-06-2	
1,1-Dichloroethene	ND	ug/L	25.0	4.5	25		11/14/17 20:04	75-35-4	
cis-1,2-Dichloroethene	ND	ug/L	25.0	5.0	25		11/14/17 20:04	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	25.0	5.2	25		11/14/17 20:04	156-60-5	
Diisopropyl ether	**11000**	ug/L	100	12.5	100		11/15/17 20:06	108-20-3	HS
Ethylbenzene	**40.2**	ug/L	25.0	3.4	25		11/14/17 20:04	100-41-4	
4-Methyl-2-pentanol	ND	ug/L	1000	360	25		11/14/17 20:04	108-11-2	
Methylene Chloride	ND	ug/L	100	29.0	25		11/14/17 20:04	75-09-2	
4-Methyl-2-pentanone (MIBK)	**182**	ug/L	125	13.7	25		11/14/17 20:04	108-10-1	
2-Propanol	ND	ug/L	2500	515	25		11/14/17 20:04	67-63-0	
Tetrahydrofuran	ND	ug/L	250	108	25		11/14/17 20:04	109-99-9	
Toluene	ND	ug/L	25.0	4.3	25		11/14/17 20:04	108-88-3	
Xylene (Total)	**1240**	ug/L	75.0	6.1	25		11/14/17 20:04	1330-20-7	
Surrogates									
1,2-Dichloroethane-d4 (S)	96	%.	75-137		25		11/14/17 20:04	17060-07-0	
Toluene-d8 (S)	93	%.	75-125		25		11/14/17 20:04	2037-26-5	
4-Bromofluorobenzene (S)	95	%.	75-125		25		11/14/17 20:04	460-00-4	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 02181-202-038 Confidential-Oak-Revised Report
Pace Project No.: 10409358

Sample: OKMN-GW-PW09-0-171031 **Lab ID: 10409358006** Collected: 10/31/17 11:40 Received: 11/01/17 17:18 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV	Analytical Method: EPA 8260B								
Acetone	ND	ug/L	20.0	8.8	1		11/14/17 16:54	67-64-1	
Benzene	**2.9**	ug/L	1.0	0.34	1		11/14/17 16:54	71-43-2	
2-Butanone (MEK)	ND	ug/L	5.0	2.4	1		11/14/17 16:54	78-93-3	
sec-Butyl alcohol	ND	ug/L	40.0	11.2	1		11/14/17 16:54	15892-23-6	
1,1-Dichloroethane	ND	ug/L	1.0	0.14	1		11/14/17 16:54	75-34-3	
1,2-Dichloroethane	**4.2**	ug/L	1.0	0.32	1		11/14/17 16:54	107-06-2	
1,1-Dichloroethene	ND	ug/L	1.0	0.18	1		11/14/17 16:54	75-35-4	
cis-1,2-Dichloroethene	**4.0**	ug/L	1.0	0.20	1		11/14/17 16:54	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	1.0	0.21	1		11/14/17 16:54	156-60-5	
Diisopropyl ether	**29.9**	ug/L	1.0	0.12	1		11/14/17 16:54	108-20-3	
Ethylbenzene	ND	ug/L	1.0	0.14	1		11/14/17 16:54	100-41-4	
4-Methyl-2-pentanol	ND	ug/L	40.0	14.4	1		11/14/17 16:54	108-11-2	
Methylene Chloride	ND	ug/L	4.0	1.2	1		11/14/17 16:54	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/L	5.0	0.55	1		11/14/17 16:54	108-10-1	
2-Propanol	**170**	ug/L	100	20.6	1		11/14/17 16:54	67-63-0	
Tetrahydrofuran	ND	ug/L	10.0	4.3	1		11/14/17 16:54	109-99-9	
Toluene	ND	ug/L	1.0	0.17	1		11/14/17 16:54	108-88-3	
Xylene (Total)	ND	ug/L	3.0	0.24	1		11/14/17 16:54	1330-20-7	
Surrogates									
1,2-Dichloroethane-d4 (S)	100	%.	75-137		1		11/14/17 16:54	17060-07-0	
Toluene-d8 (S)	95	%.	75-125		1		11/14/17 16:54	2037-26-5	
4-Bromofluorobenzene (S)	95	%.	75-125		1		11/14/17 16:54	460-00-4	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 02181-202-038 Confidential-Oak-Revised Report
Pace Project No.: 10409358

Sample: OKMN-GW-W03-0-171031 **Lab ID: 10409358007** Collected: 10/31/17 10:15 Received: 11/01/17 17:18 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV	Analytical Method: EPA 8260B								
Acetone	ND	ug/L	200	88.4	10		11/14/17 18:53	67-64-1	
Benzene	ND	ug/L	10.0	3.4	10		11/14/17 18:53	71-43-2	
2-Butanone (MEK)	ND	ug/L	50.0	24.2	10		11/14/17 18:53	78-93-3	
sec-Butyl alcohol	ND	ug/L	400	112	10		11/14/17 18:53	15892-23-6	
1,1-Dichloroethane	ND	ug/L	10.0	1.4	10		11/14/17 18:53	75-34-3	
1,2-Dichloroethane	ND	ug/L	10.0	3.2	10		11/14/17 18:53	107-06-2	
1,1-Dichloroethene	ND	ug/L	10.0	1.8	10		11/14/17 18:53	75-35-4	
cis-1,2-Dichloroethene	ND	ug/L	10.0	2.0	10		11/14/17 18:53	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	10.0	2.1	10		11/14/17 18:53	156-60-5	
Diisopropyl ether	**465**	ug/L	10.0	1.2	10		11/14/17 18:53	108-20-3	
Ethylbenzene	ND	ug/L	10.0	1.4	10		11/14/17 18:53	100-41-4	
4-Methyl-2-pentanol	ND	ug/L	400	144	10		11/14/17 18:53	108-11-2	
Methylene Chloride	ND	ug/L	40.0	11.6	10		11/14/17 18:53	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/L	50.0	5.5	10		11/14/17 18:53	108-10-1	
2-Propanol	ND	ug/L	1000	206	10		11/14/17 18:53	67-63-0	
Tetrahydrofuran	ND	ug/L	100	43.1	10		11/14/17 18:53	109-99-9	
Toluene	ND	ug/L	10.0	1.7	10		11/14/17 18:53	108-88-3	
Xylene (Total)	ND	ug/L	30.0	2.4	10		11/14/17 18:53	1330-20-7	
Surrogates									
1,2-Dichloroethane-d4 (S)	97	%.	75-137		10		11/14/17 18:53	17060-07-0	
Toluene-d8 (S)	95	%.	75-125		10		11/14/17 18:53	2037-26-5	
4-Bromofluorobenzene (S)	97	%.	75-125		10		11/14/17 18:53	460-00-4	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 02181-202-038 Confidential-Oak-Revised Report
Pace Project No.: 10409358

Sample: OKMN-GW-W08-0-171031 **Lab ID: 10409358008** Collected: 10/31/17 09:10 Received: 11/01/17 17:18 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV	Analytical Method: EPA 8260B								
Acetone	ND	ug/L	20.0	8.8	1		11/14/17 17:18	67-64-1	
Benzene	ND	ug/L	1.0	0.34	1		11/14/17 17:18	71-43-2	
2-Butanone (MEK)	ND	ug/L	5.0	2.4	1		11/14/17 17:18	78-93-3	
sec-Butyl alcohol	ND	ug/L	40.0	11.2	1		11/14/17 17:18	15892-23-6	
1,1-Dichloroethane	ND	ug/L	1.0	0.14	1		11/14/17 17:18	75-34-3	
1,2-Dichloroethane	ND	ug/L	1.0	0.32	1		11/14/17 17:18	107-06-2	
1,1-Dichloroethene	ND	ug/L	1.0	0.18	1		11/14/17 17:18	75-35-4	
cis-1,2-Dichloroethene	ND	ug/L	1.0	0.20	1		11/14/17 17:18	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	1.0	0.21	1		11/14/17 17:18	156-60-5	
Diisopropyl ether	**28.8**	ug/L	1.0	0.12	1		11/14/17 17:18	108-20-3	
Ethylbenzene	ND	ug/L	1.0	0.14	1		11/14/17 17:18	100-41-4	
4-Methyl-2-pentanol	ND	ug/L	40.0	14.4	1		11/14/17 17:18	108-11-2	
Methylene Chloride	ND	ug/L	4.0	1.2	1		11/14/17 17:18	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/L	5.0	0.55	1		11/14/17 17:18	108-10-1	
2-Propanol	**106**	ug/L	100	20.6	1		11/14/17 17:18	67-63-0	
Tetrahydrofuran	ND	ug/L	10.0	4.3	1		11/14/17 17:18	109-99-9	
Toluene	ND	ug/L	1.0	0.17	1		11/14/17 17:18	108-88-3	
Xylene (Total)	ND	ug/L	3.0	0.24	1		11/14/17 17:18	1330-20-7	
Surrogates									
1,2-Dichloroethane-d4 (S)	99	%.	75-137		1		11/14/17 17:18	17060-07-0	
Toluene-d8 (S)	94	%.	75-125		1		11/14/17 17:18	2037-26-5	
4-Bromofluorobenzene (S)	97	%.	75-125		1		11/14/17 17:18	460-00-4	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 02181-202-038 Confidential-Oak-Revised Report
Pace Project No.: 10409358

Sample: OKMN-GW-W2003-0-171031 **Lab ID: 10409358009** Collected: 10/31/17 14:05 Received: 11/01/17 17:18 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV	Analytical Method: EPA 8260B								
Acetone	ND	ug/L	20.0	8.8	1		11/14/17 17:42	67-64-1	
Benzene	ND	ug/L	1.0	0.34	1		11/14/17 17:42	71-43-2	
2-Butanone (MEK)	ND	ug/L	5.0	2.4	1		11/14/17 17:42	78-93-3	
sec-Butyl alcohol	ND	ug/L	40.0	11.2	1		11/14/17 17:42	15892-23-6	
1,1-Dichloroethane	ND	ug/L	1.0	0.14	1		11/14/17 17:42	75-34-3	
1,2-Dichloroethane	ND	ug/L	1.0	0.32	1		11/14/17 17:42	107-06-2	
1,1-Dichloroethene	ND	ug/L	1.0	0.18	1		11/14/17 17:42	75-35-4	
cis-1,2-Dichloroethene	ND	ug/L	1.0	0.20	1		11/14/17 17:42	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	1.0	0.21	1		11/14/17 17:42	156-60-5	
Diisopropyl ether	**91.1**	ug/L	1.0	0.12	1		11/14/17 17:42	108-20-3	
Ethylbenzene	ND	ug/L	1.0	0.14	1		11/14/17 17:42	100-41-4	
4-Methyl-2-pentanol	ND	ug/L	40.0	14.4	1		11/14/17 17:42	108-11-2	
Methylene Chloride	ND	ug/L	4.0	1.2	1		11/14/17 17:42	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/L	5.0	0.55	1		11/14/17 17:42	108-10-1	
2-Propanol	ND	ug/L	100	20.6	1		11/14/17 17:42	67-63-0	
Tetrahydrofuran	ND	ug/L	10.0	4.3	1		11/14/17 17:42	109-99-9	
Toluene	ND	ug/L	1.0	0.17	1		11/14/17 17:42	108-88-3	
Xylene (Total)	ND	ug/L	3.0	0.24	1		11/14/17 17:42	1330-20-7	
Surrogates									
1,2-Dichloroethane-d4 (S)	99	%.	75-137		1		11/14/17 17:42	17060-07-0	
Toluene-d8 (S)	95	%.	75-125		1		11/14/17 17:42	2037-26-5	
4-Bromofluorobenzene (S)	97	%.	75-125		1		11/14/17 17:42	460-00-4	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 02181-202-038 Confidential-Oak-Revised Report
Pace Project No.: 10409358

Sample: OKMN-GW-W2008-0-171101 **Lab ID: 10409358010** Collected: 11/01/17 07:40 Received: 11/01/17 17:18 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV	Analytical Method: EPA 8260B								
Acetone	ND	ug/L	20.0	8.8	1		11/14/17 18:05	67-64-1	
Benzene	ND	ug/L	1.0	0.34	1		11/14/17 18:05	71-43-2	
2-Butanone (MEK)	ND	ug/L	5.0	2.4	1		11/14/17 18:05	78-93-3	
sec-Butyl alcohol	ND	ug/L	40.0	11.2	1		11/14/17 18:05	15892-23-6	
1,1-Dichloroethane	ND	ug/L	1.0	0.14	1		11/14/17 18:05	75-34-3	
1,2-Dichloroethane	ND	ug/L	1.0	0.32	1		11/14/17 18:05	107-06-2	
1,1-Dichloroethene	ND	ug/L	1.0	0.18	1		11/14/17 18:05	75-35-4	
cis-1,2-Dichloroethene	ND	ug/L	1.0	0.20	1		11/14/17 18:05	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	1.0	0.21	1		11/14/17 18:05	156-60-5	
Diisopropyl ether	**44.5**	ug/L	1.0	0.12	1		11/14/17 18:05	108-20-3	
Ethylbenzene	ND	ug/L	1.0	0.14	1		11/14/17 18:05	100-41-4	
4-Methyl-2-pentanol	ND	ug/L	40.0	14.4	1		11/14/17 18:05	108-11-2	
Methylene Chloride	ND	ug/L	4.0	1.2	1		11/14/17 18:05	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/L	5.0	0.55	1		11/14/17 18:05	108-10-1	
2-Propanol	ND	ug/L	100	20.6	1		11/14/17 18:05	67-63-0	
Tetrahydrofuran	ND	ug/L	10.0	4.3	1		11/14/17 18:05	109-99-9	
Toluene	ND	ug/L	1.0	0.17	1		11/14/17 18:05	108-88-3	
Xylene (Total)	ND	ug/L	3.0	0.24	1		11/14/17 18:05	1330-20-7	
Surrogates									
1,2-Dichloroethane-d4 (S)	97	%.	75-137		1		11/14/17 18:05	17060-07-0	
Toluene-d8 (S)	94	%.	75-125		1		11/14/17 18:05	2037-26-5	
4-Bromofluorobenzene (S)	97	%.	75-125		1		11/14/17 18:05	460-00-4	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 02181-202-038 Confidential-Oak-Revised Report
Pace Project No.: 10409358

Sample: OKMN-GW-W31-0-171101 **Lab ID: 10409358011** Collected: 11/01/17 07:30 Received: 11/01/17 17:18 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV	Analytical Method: EPA 8260B								
Acetone	ND	ug/L	20.0	8.8	1		11/14/17 18:29	67-64-1	
Benzene	ND	ug/L	1.0	0.34	1		11/14/17 18:29	71-43-2	
2-Butanone (MEK)	ND	ug/L	5.0	2.4	1		11/14/17 18:29	78-93-3	
sec-Butyl alcohol	ND	ug/L	40.0	11.2	1		11/14/17 18:29	15892-23-6	
1,1-Dichloroethane	ND	ug/L	1.0	0.14	1		11/14/17 18:29	75-34-3	
1,2-Dichloroethane	ND	ug/L	1.0	0.32	1		11/14/17 18:29	107-06-2	
1,1-Dichloroethene	ND	ug/L	1.0	0.18	1		11/14/17 18:29	75-35-4	
cis-1,2-Dichloroethene	ND	ug/L	1.0	0.20	1		11/14/17 18:29	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	1.0	0.21	1		11/14/17 18:29	156-60-5	
Diisopropyl ether	ND	ug/L	1.0	0.12	1		11/14/17 18:29	108-20-3	
Ethylbenzene	ND	ug/L	1.0	0.14	1		11/14/17 18:29	100-41-4	
4-Methyl-2-pentanol	ND	ug/L	40.0	14.4	1		11/14/17 18:29	108-11-2	
Methylene Chloride	ND	ug/L	4.0	1.2	1		11/14/17 18:29	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/L	5.0	0.55	1		11/14/17 18:29	108-10-1	
2-Propanol	ND	ug/L	100	20.6	1		11/14/17 18:29	67-63-0	
Tetrahydrofuran	ND	ug/L	10.0	4.3	1		11/14/17 18:29	109-99-9	
Toluene	ND	ug/L	1.0	0.17	1		11/14/17 18:29	108-88-3	
Xylene (Total)	ND	ug/L	3.0	0.24	1		11/14/17 18:29	1330-20-7	
Surrogates									
1,2-Dichloroethane-d4 (S)	98	%.	75-137		1		11/14/17 18:29	17060-07-0	
Toluene-d8 (S)	93	%.	75-125		1		11/14/17 18:29	2037-26-5	
4-Bromofluorobenzene (S)	97	%.	75-125		1		11/14/17 18:29	460-00-4	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 02181-202-038 Confidential-Oak-Revised Report
Pace Project No.: 10409358

Sample: OKMN-GW-W33-0-171101 **Lab ID: 10409358012** Collected: 11/01/17 12:20 Received: 11/01/17 17:18 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV	Analytical Method: EPA 8260B								
Acetone	ND	ug/L	500	221	25		11/15/17 10:19	67-64-1	
Benzene	**219**	ug/L	25.0	8.5	25		11/15/17 10:19	71-43-2	
2-Butanone (MEK)	ND	ug/L	125	60.5	25		11/15/17 10:19	78-93-3	
sec-Butyl alcohol	ND	ug/L	1000	280	25		11/15/17 10:19	15892-23-6	
1,1-Dichloroethane	ND	ug/L	25.0	3.6	25		11/15/17 10:19	75-34-3	
1,2-Dichloroethane	ND	ug/L	25.0	8.0	25		11/15/17 10:19	107-06-2	
1,1-Dichloroethene	ND	ug/L	25.0	4.5	25		11/15/17 10:19	75-35-4	
cis-1,2-Dichloroethene	ND	ug/L	25.0	5.0	25		11/15/17 10:19	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	25.0	5.2	25		11/15/17 10:19	156-60-5	
Diisopropyl ether	**2280**	ug/L	25.0	3.1	25		11/15/17 10:19	108-20-3	
Ethylbenzene	ND	ug/L	25.0	3.4	25		11/15/17 10:19	100-41-4	
4-Methyl-2-pentanol	ND	ug/L	1000	360	25		11/15/17 10:19	108-11-2	
Methylene Chloride	ND	ug/L	100	29.0	25		11/15/17 10:19	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/L	125	13.7	25		11/15/17 10:19	108-10-1	
2-Propanol	ND	ug/L	2500	515	25		11/15/17 10:19	67-63-0	
Tetrahydrofuran	ND	ug/L	250	108	25		11/15/17 10:19	109-99-9	
Toluene	ND	ug/L	25.0	4.3	25		11/15/17 10:19	108-88-3	
Xylene (Total)	ND	ug/L	75.0	6.1	25		11/15/17 10:19	1330-20-7	
Surrogates									
1,2-Dichloroethane-d4 (S)	95	%.	75-137		25		11/15/17 10:19	17060-07-0	
Toluene-d8 (S)	92	%.	75-125		25		11/15/17 10:19	2037-26-5	
4-Bromofluorobenzene (S)	93	%.	75-125		25		11/15/17 10:19	460-00-4	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 02181-202-038 Confidential-Oak-Revised Report
Pace Project No.: 10409358

Sample: OKMN-GW-W25-0-171101 **Lab ID: 10409358013** Collected: 11/01/17 12:05 Received: 11/01/17 17:18 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV	Analytical Method: EPA 8260B								
Acetone	ND	ug/L	20.0	8.8	1		11/15/17 06:22	67-64-1	
Benzene	ND	ug/L	1.0	0.34	1		11/15/17 06:22	71-43-2	
2-Butanone (MEK)	ND	ug/L	5.0	2.4	1		11/15/17 06:22	78-93-3	
sec-Butyl alcohol	ND	ug/L	40.0	11.2	1		11/15/17 06:22	15892-23-6	
1,1-Dichloroethane	ND	ug/L	1.0	0.14	1		11/15/17 06:22	75-34-3	
1,2-Dichloroethane	ND	ug/L	1.0	0.32	1		11/15/17 06:22	107-06-2	
1,1-Dichloroethene	ND	ug/L	1.0	0.18	1		11/15/17 06:22	75-35-4	
cis-1,2-Dichloroethene	ND	ug/L	1.0	0.20	1		11/15/17 06:22	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	1.0	0.21	1		11/15/17 06:22	156-60-5	
Diisopropyl ether	ND	ug/L	1.0	0.12	1		11/15/17 06:22	108-20-3	
Ethylbenzene	ND	ug/L	1.0	0.14	1		11/15/17 06:22	100-41-4	
4-Methyl-2-pentanol	ND	ug/L	40.0	14.4	1		11/15/17 06:22	108-11-2	
Methylene Chloride	ND	ug/L	4.0	1.2	1		11/15/17 06:22	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/L	5.0	0.55	1		11/15/17 06:22	108-10-1	
2-Propanol	ND	ug/L	100	20.6	1		11/15/17 06:22	67-63-0	
Tetrahydrofuran	ND	ug/L	10.0	4.3	1		11/15/17 06:22	109-99-9	
Toluene	ND	ug/L	1.0	0.17	1		11/15/17 06:22	108-88-3	
Xylene (Total)	ND	ug/L	3.0	0.24	1		11/15/17 06:22	1330-20-7	
Surrogates									
1,2-Dichloroethane-d4 (S)	98	%.	75-137		1		11/15/17 06:22	17060-07-0	
Toluene-d8 (S)	92	%.	75-125		1		11/15/17 06:22	2037-26-5	
4-Bromofluorobenzene (S)	97	%.	75-125		1		11/15/17 06:22	460-00-4	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 02181-202-038 Confidential-Oak-Revised Report
Pace Project No.: 10409358

Sample: OKMN-GW-W215-0-171101 **Lab ID: 10409358014** Collected: 11/01/17 10:05 Received: 11/01/17 17:18 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV	Analytical Method: EPA 8260B								
Acetone	ND	ug/L	20.0	8.8	1		11/15/17 06:45	67-64-1	
Benzene	ND	ug/L	1.0	0.34	1		11/15/17 06:45	71-43-2	
2-Butanone (MEK)	ND	ug/L	5.0	2.4	1		11/15/17 06:45	78-93-3	
sec-Butyl alcohol	ND	ug/L	40.0	11.2	1		11/15/17 06:45	15892-23-6	
1,1-Dichloroethane	ND	ug/L	1.0	0.14	1		11/15/17 06:45	75-34-3	
1,2-Dichloroethane	ND	ug/L	1.0	0.32	1		11/15/17 06:45	107-06-2	
1,1-Dichloroethene	ND	ug/L	1.0	0.18	1		11/15/17 06:45	75-35-4	
cis-1,2-Dichloroethene	ND	ug/L	1.0	0.20	1		11/15/17 06:45	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	1.0	0.21	1		11/15/17 06:45	156-60-5	
Diisopropyl ether	ND	ug/L	1.0	0.12	1		11/15/17 06:45	108-20-3	
Ethylbenzene	ND	ug/L	1.0	0.14	1		11/15/17 06:45	100-41-4	
4-Methyl-2-pentanol	ND	ug/L	40.0	14.4	1		11/15/17 06:45	108-11-2	
Methylene Chloride	ND	ug/L	4.0	1.2	1		11/15/17 06:45	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/L	5.0	0.55	1		11/15/17 06:45	108-10-1	
2-Propanol	ND	ug/L	100	20.6	1		11/15/17 06:45	67-63-0	
Tetrahydrofuran	ND	ug/L	10.0	4.3	1		11/15/17 06:45	109-99-9	
Toluene	ND	ug/L	1.0	0.17	1		11/15/17 06:45	108-88-3	
Xylene (Total)	ND	ug/L	3.0	0.24	1		11/15/17 06:45	1330-20-7	
Surrogates									
1,2-Dichloroethane-d4 (S)	99	%.	75-137		1		11/15/17 06:45	17060-07-0	
Toluene-d8 (S)	91	%.	75-125		1		11/15/17 06:45	2037-26-5	
4-Bromofluorobenzene (S)	96	%.	75-125		1		11/15/17 06:45	460-00-4	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 02181-202-038 Confidential-Oak-Revised Report
Pace Project No.: 10409358

Sample: OKMN-GW-W2005-0-171101 **Lab ID: 10409358015** Collected: 11/01/17 10:20 Received: 11/01/17 17:18 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV	Analytical Method: EPA 8260B								
Acetone	ND	ug/L	100	44.2	5		11/15/17 09:32	67-64-1	
Benzene	ND	ug/L	5.0	1.7	5		11/15/17 09:32	71-43-2	
2-Butanone (MEK)	ND	ug/L	25.0	12.1	5		11/15/17 09:32	78-93-3	
sec-Butyl alcohol	ND	ug/L	200	56.0	5		11/15/17 09:32	15892-23-6	
1,1-Dichloroethane	ND	ug/L	5.0	0.72	5		11/15/17 09:32	75-34-3	
1,2-Dichloroethane	ND	ug/L	5.0	1.6	5		11/15/17 09:32	107-06-2	
1,1-Dichloroethene	ND	ug/L	5.0	0.90	5		11/15/17 09:32	75-35-4	
cis-1,2-Dichloroethene	ND	ug/L	5.0	1.0	5		11/15/17 09:32	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	5.0	1.0	5		11/15/17 09:32	156-60-5	
Diisopropyl ether	**320**	ug/L	5.0	0.62	5		11/15/17 09:32	108-20-3	
Ethylbenzene	ND	ug/L	5.0	0.68	5		11/15/17 09:32	100-41-4	
4-Methyl-2-pentanol	ND	ug/L	200	72.0	5		11/15/17 09:32	108-11-2	
Methylene Chloride	ND	ug/L	20.0	5.8	5		11/15/17 09:32	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/L	25.0	2.7	5		11/15/17 09:32	108-10-1	
2-Propanol	ND	ug/L	500	103	5		11/15/17 09:32	67-63-0	
Tetrahydrofuran	ND	ug/L	50.0	21.6	5		11/15/17 09:32	109-99-9	
Toluene	ND	ug/L	5.0	0.86	5		11/15/17 09:32	108-88-3	
Xylene (Total)	ND	ug/L	15.0	1.2	5		11/15/17 09:32	1330-20-7	
Surrogates									
1,2-Dichloroethane-d4 (S)	98	%.	75-137		5		11/15/17 09:32	17060-07-0	
Toluene-d8 (S)	92	%.	75-125		5		11/15/17 09:32	2037-26-5	
4-Bromofluorobenzene (S)	96	%.	75-125		5		11/15/17 09:32	460-00-4	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 02181-202-038 Confidential-Oak-Revised Report
Pace Project No.: 10409358

Sample: OKMN-GW-W2009-0-171101 **Lab ID: 10409358016** Collected: 11/01/17 12:05 Received: 11/01/17 17:18 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV	Analytical Method: EPA 8260B								
Acetone	ND	ug/L	20.0	8.8	1		11/15/17 07:09	67-64-1	
Benzene	**1.3**	ug/L	1.0	0.34	1		11/15/17 07:09	71-43-2	
2-Butanone (MEK)	ND	ug/L	5.0	2.4	1		11/15/17 07:09	78-93-3	
sec-Butyl alcohol	ND	ug/L	40.0	11.2	1		11/15/17 07:09	15892-23-6	
1,1-Dichloroethane	ND	ug/L	1.0	0.14	1		11/15/17 07:09	75-34-3	
1,2-Dichloroethane	ND	ug/L	1.0	0.32	1		11/15/17 07:09	107-06-2	
1,1-Dichloroethene	ND	ug/L	1.0	0.18	1		11/15/17 07:09	75-35-4	
cis-1,2-Dichloroethene	ND	ug/L	1.0	0.20	1		11/15/17 07:09	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	1.0	0.21	1		11/15/17 07:09	156-60-5	
Diisopropyl ether	**96.7**	ug/L	1.0	0.12	1		11/15/17 07:09	108-20-3	
Ethylbenzene	ND	ug/L	1.0	0.14	1		11/15/17 07:09	100-41-4	
4-Methyl-2-pentanol	ND	ug/L	40.0	14.4	1		11/15/17 07:09	108-11-2	
Methylene Chloride	ND	ug/L	4.0	1.2	1		11/15/17 07:09	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/L	5.0	0.55	1		11/15/17 07:09	108-10-1	
2-Propanol	ND	ug/L	100	20.6	1		11/15/17 07:09	67-63-0	
Tetrahydrofuran	ND	ug/L	10.0	4.3	1		11/15/17 07:09	109-99-9	
Toluene	ND	ug/L	1.0	0.17	1		11/15/17 07:09	108-88-3	
Xylene (Total)	ND	ug/L	3.0	0.24	1		11/15/17 07:09	1330-20-7	
Surrogates									
1,2-Dichloroethane-d4 (S)	98	%.	75-137		1		11/15/17 07:09	17060-07-0	
Toluene-d8 (S)	95	%.	75-125		1		11/15/17 07:09	2037-26-5	
4-Bromofluorobenzene (S)	97	%.	75-125		1		11/15/17 07:09	460-00-4	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 02181-202-038 Confidential-Oak-Revised Report
Pace Project No.: 10409358

Sample: OKMN-GW-W2010-0-171101 **Lab ID: 10409358017** Collected: 11/01/17 10:15 Received: 11/01/17 17:18 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV	Analytical Method: EPA 8260B								
Acetone	ND	ug/L	20.0	8.8	1		11/15/17 07:33	67-64-1	
Benzene	ND	ug/L	1.0	0.34	1		11/15/17 07:33	71-43-2	
2-Butanone (MEK)	ND	ug/L	5.0	2.4	1		11/15/17 07:33	78-93-3	
sec-Butyl alcohol	ND	ug/L	40.0	11.2	1		11/15/17 07:33	15892-23-6	
1,1-Dichloroethane	ND	ug/L	1.0	0.14	1		11/15/17 07:33	75-34-3	
1,2-Dichloroethane	ND	ug/L	1.0	0.32	1		11/15/17 07:33	107-06-2	
1,1-Dichloroethene	ND	ug/L	1.0	0.18	1		11/15/17 07:33	75-35-4	
cis-1,2-Dichloroethene	ND	ug/L	1.0	0.20	1		11/15/17 07:33	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	1.0	0.21	1		11/15/17 07:33	156-60-5	
Diisopropyl ether	**24.8**	ug/L	1.0	0.12	1		11/15/17 07:33	108-20-3	
Ethylbenzene	ND	ug/L	1.0	0.14	1		11/15/17 07:33	100-41-4	
4-Methyl-2-pentanol	ND	ug/L	40.0	14.4	1		11/15/17 07:33	108-11-2	
Methylene Chloride	ND	ug/L	4.0	1.2	1		11/15/17 07:33	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/L	5.0	0.55	1		11/15/17 07:33	108-10-1	
2-Propanol	**137**	ug/L	100	20.6	1		11/15/17 07:33	67-63-0	
Tetrahydrofuran	ND	ug/L	10.0	4.3	1		11/15/17 07:33	109-99-9	
Toluene	ND	ug/L	1.0	0.17	1		11/15/17 07:33	108-88-3	
Xylene (Total)	ND	ug/L	3.0	0.24	1		11/15/17 07:33	1330-20-7	
Surrogates									
1,2-Dichloroethane-d4 (S)	97	%.	75-137		1		11/15/17 07:33	17060-07-0	
Toluene-d8 (S)	94	%.	75-125		1		11/15/17 07:33	2037-26-5	
4-Bromofluorobenzene (S)	96	%.	75-125		1		11/15/17 07:33	460-00-4	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 02181-202-038 Confidential-Oak-Revised Report
Pace Project No.: 10409358

Sample: OKMN-GW-W2012-0-171101 **Lab ID: 10409358018** Collected: 11/01/17 11:10 Received: 11/01/17 17:18 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV	Analytical Method: EPA 8260B								
Acetone	ND	ug/L	100	44.2	5		11/15/17 09:56	67-64-1	
Benzene	**7.5**	ug/L	5.0	1.7	5		11/15/17 09:56	71-43-2	
2-Butanone (MEK)	ND	ug/L	25.0	12.1	5		11/15/17 09:56	78-93-3	
sec-Butyl alcohol	ND	ug/L	200	56.0	5		11/15/17 09:56	15892-23-6	
1,1-Dichloroethane	ND	ug/L	5.0	0.72	5		11/15/17 09:56	75-34-3	
1,2-Dichloroethane	ND	ug/L	5.0	1.6	5		11/15/17 09:56	107-06-2	
1,1-Dichloroethene	ND	ug/L	5.0	0.90	5		11/15/17 09:56	75-35-4	
cis-1,2-Dichloroethene	ND	ug/L	5.0	1.0	5		11/15/17 09:56	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	5.0	1.0	5		11/15/17 09:56	156-60-5	
Diisopropyl ether	**298**	ug/L	5.0	0.62	5		11/15/17 09:56	108-20-3	
Ethylbenzene	**5.0**	ug/L	5.0	0.68	5		11/15/17 09:56	100-41-4	
4-Methyl-2-pentanol	ND	ug/L	200	72.0	5		11/15/17 09:56	108-11-2	
Methylene Chloride	ND	ug/L	20.0	5.8	5		11/15/17 09:56	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/L	25.0	2.7	5		11/15/17 09:56	108-10-1	
2-Propanol	ND	ug/L	500	103	5		11/15/17 09:56	67-63-0	
Tetrahydrofuran	ND	ug/L	50.0	21.6	5		11/15/17 09:56	109-99-9	
Toluene	ND	ug/L	5.0	0.86	5		11/15/17 09:56	108-88-3	
Xylene (Total)	ND	ug/L	15.0	1.2	5		11/15/17 09:56	1330-20-7	
Surrogates									
1,2-Dichloroethane-d4 (S)	97	%.	75-137		5		11/15/17 09:56	17060-07-0	
Toluene-d8 (S)	90	%.	75-125		5		11/15/17 09:56	2037-26-5	
4-Bromofluorobenzene (S)	93	%.	75-125		5		11/15/17 09:56	460-00-4	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 02181-202-038 Confidential-Oak-Revised Report
Pace Project No.: 10409358

Sample: OKMN-GW-W26R-RB02-171101 **Lab ID: 10409358019** Collected: 11/01/17 14:55 Received: 11/01/17 17:18 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV	Analytical Method: EPA 8260B								
Acetone	ND	ug/L	20.0	8.8	1		11/15/17 07:57	67-64-1	
Benzene	ND	ug/L	1.0	0.34	1		11/15/17 07:57	71-43-2	
2-Butanone (MEK)	ND	ug/L	5.0	2.4	1		11/15/17 07:57	78-93-3	
sec-Butyl alcohol	ND	ug/L	40.0	11.2	1		11/15/17 07:57	15892-23-6	
1,1-Dichloroethane	ND	ug/L	1.0	0.14	1		11/15/17 07:57	75-34-3	
1,2-Dichloroethane	ND	ug/L	1.0	0.32	1		11/15/17 07:57	107-06-2	
1,1-Dichloroethene	ND	ug/L	1.0	0.18	1		11/15/17 07:57	75-35-4	
cis-1,2-Dichloroethene	ND	ug/L	1.0	0.20	1		11/15/17 07:57	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	1.0	0.21	1		11/15/17 07:57	156-60-5	
Diisopropyl ether	ND	ug/L	1.0	0.12	1		11/15/17 07:57	108-20-3	
Ethylbenzene	ND	ug/L	1.0	0.14	1		11/15/17 07:57	100-41-4	
4-Methyl-2-pentanol	ND	ug/L	40.0	14.4	1		11/15/17 07:57	108-11-2	
Methylene Chloride	ND	ug/L	4.0	1.2	1		11/15/17 07:57	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/L	5.0	0.55	1		11/15/17 07:57	108-10-1	
2-Propanol	ND	ug/L	100	20.6	1		11/15/17 07:57	67-63-0	
Tetrahydrofuran	ND	ug/L	10.0	4.3	1		11/15/17 07:57	109-99-9	
Toluene	ND	ug/L	1.0	0.17	1		11/15/17 07:57	108-88-3	
Xylene (Total)	ND	ug/L	3.0	0.24	1		11/15/17 07:57	1330-20-7	
Surrogates									
1,2-Dichloroethane-d4 (S)	98	%.	75-137		1		11/15/17 07:57	17060-07-0	
Toluene-d8 (S)	94	%.	75-125		1		11/15/17 07:57	2037-26-5	
4-Bromofluorobenzene (S)	97	%.	75-125		1		11/15/17 07:57	460-00-4	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 02181-202-038 Confidential-Oak-Revised Report
Pace Project No.: 10409358

Sample: OKMN-GW-W28-0-171101 **Lab ID: 10409358020** Collected: 11/01/17 15:30 Received: 11/01/17 17:18 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV	Analytical Method: EPA 8260B								
Acetone	ND	ug/L	20.0	8.8	1		11/15/17 08:20	67-64-1	
Benzene	ND	ug/L	1.0	0.34	1		11/15/17 08:20	71-43-2	
2-Butanone (MEK)	ND	ug/L	5.0	2.4	1		11/15/17 08:20	78-93-3	
sec-Butyl alcohol	ND	ug/L	40.0	11.2	1		11/15/17 08:20	15892-23-6	
1,1-Dichloroethane	ND	ug/L	1.0	0.14	1		11/15/17 08:20	75-34-3	
1,2-Dichloroethane	ND	ug/L	1.0	0.32	1		11/15/17 08:20	107-06-2	
1,1-Dichloroethene	ND	ug/L	1.0	0.18	1		11/15/17 08:20	75-35-4	
cis-1,2-Dichloroethene	ND	ug/L	1.0	0.20	1		11/15/17 08:20	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	1.0	0.21	1		11/15/17 08:20	156-60-5	
Diisopropyl ether	**23.5**	ug/L	1.0	0.12	1		11/15/17 08:20	108-20-3	
Ethylbenzene	ND	ug/L	1.0	0.14	1		11/15/17 08:20	100-41-4	
4-Methyl-2-pentanol	ND	ug/L	40.0	14.4	1		11/15/17 08:20	108-11-2	
Methylene Chloride	ND	ug/L	4.0	1.2	1		11/15/17 08:20	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/L	5.0	0.55	1		11/15/17 08:20	108-10-1	
2-Propanol	ND	ug/L	100	20.6	1		11/15/17 08:20	67-63-0	
Tetrahydrofuran	ND	ug/L	10.0	4.3	1		11/15/17 08:20	109-99-9	
Toluene	ND	ug/L	1.0	0.17	1		11/15/17 08:20	108-88-3	
Xylene (Total)	ND	ug/L	3.0	0.24	1		11/15/17 08:20	1330-20-7	
Surrogates									
1,2-Dichloroethane-d4 (S)	99	%.	75-137		1		11/15/17 08:20	17060-07-0	
Toluene-d8 (S)	93	%.	75-125		1		11/15/17 08:20	2037-26-5	
4-Bromofluorobenzene (S)	95	%.	75-125		1		11/15/17 08:20	460-00-4	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
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ANALYTICAL RESULTS

Project: 02181-202-038 Confidential-Oak-Revised Report
Pace Project No.: 10409358

Sample: OKMN-GW-W26R-0-171101 **Lab ID: 10409358021** Collected: 11/01/17 15:35 Received: 11/01/17 17:18 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV	Analytical Method: EPA 8260B								
Acetone	ND	ug/L	20.0	8.8	1		11/15/17 08:44	67-64-1	
Benzene	**1.2**	ug/L	1.0	0.34	1		11/15/17 08:44	71-43-2	
2-Butanone (MEK)	ND	ug/L	5.0	2.4	1		11/15/17 08:44	78-93-3	
sec-Butyl alcohol	ND	ug/L	40.0	11.2	1		11/15/17 08:44	15892-23-6	
1,1-Dichloroethane	ND	ug/L	1.0	0.14	1		11/15/17 08:44	75-34-3	
1,2-Dichloroethane	**1.0**	ug/L	1.0	0.32	1		11/15/17 08:44	107-06-2	
1,1-Dichloroethene	ND	ug/L	1.0	0.18	1		11/15/17 08:44	75-35-4	
cis-1,2-Dichloroethene	ND	ug/L	1.0	0.20	1		11/15/17 08:44	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	1.0	0.21	1		11/15/17 08:44	156-60-5	
Diisopropyl ether	**7.0**	ug/L	1.0	0.12	1		11/15/17 08:44	108-20-3	
Ethylbenzene	ND	ug/L	1.0	0.14	1		11/15/17 08:44	100-41-4	
4-Methyl-2-pentanol	ND	ug/L	40.0	14.4	1		11/15/17 08:44	108-11-2	
Methylene Chloride	ND	ug/L	4.0	1.2	1		11/15/17 08:44	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/L	5.0	0.55	1		11/15/17 08:44	108-10-1	
2-Propanol	ND	ug/L	100	20.6	1		11/15/17 08:44	67-63-0	
Tetrahydrofuran	ND	ug/L	10.0	4.3	1		11/15/17 08:44	109-99-9	
Toluene	ND	ug/L	1.0	0.17	1		11/15/17 08:44	108-88-3	
Xylene (Total)	ND	ug/L	3.0	0.24	1		11/15/17 08:44	1330-20-7	
Surrogates									
1,2-Dichloroethane-d4 (S)	101	%.	75-137		1		11/15/17 08:44	17060-07-0	
Toluene-d8 (S)	92	%.	75-125		1		11/15/17 08:44	2037-26-5	
4-Bromofluorobenzene (S)	96	%.	75-125		1		11/15/17 08:44	460-00-4	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 02181-202-038 Confidential-Oak-Revised Report
Pace Project No.: 10409358

Sample: OKMN-GW-W26R-DB-171101 **Lab ID: 10409358022** Collected: 11/01/17 15:35 Received: 11/01/17 17:18 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV	Analytical Method: EPA 8260B								
Acetone	ND	ug/L	20.0	8.8	1		11/15/17 09:08	67-64-1	
Benzene	**1.1**	ug/L	1.0	0.34	1		11/15/17 09:08	71-43-2	
2-Butanone (MEK)	ND	ug/L	5.0	2.4	1		11/15/17 09:08	78-93-3	
sec-Butyl alcohol	ND	ug/L	40.0	11.2	1		11/15/17 09:08	15892-23-6	
1,1-Dichloroethane	ND	ug/L	1.0	0.14	1		11/15/17 09:08	75-34-3	
1,2-Dichloroethane	**1.0**	ug/L	1.0	0.32	1		11/15/17 09:08	107-06-2	
1,1-Dichloroethene	ND	ug/L	1.0	0.18	1		11/15/17 09:08	75-35-4	
cis-1,2-Dichloroethene	ND	ug/L	1.0	0.20	1		11/15/17 09:08	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	1.0	0.21	1		11/15/17 09:08	156-60-5	
Diisopropyl ether	**6.4**	ug/L	1.0	0.12	1		11/15/17 09:08	108-20-3	
Ethylbenzene	ND	ug/L	1.0	0.14	1		11/15/17 09:08	100-41-4	
4-Methyl-2-pentanol	ND	ug/L	40.0	14.4	1		11/15/17 09:08	108-11-2	
Methylene Chloride	ND	ug/L	4.0	1.2	1		11/15/17 09:08	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/L	5.0	0.55	1		11/15/17 09:08	108-10-1	
2-Propanol	**108**	ug/L	100	20.6	1		11/15/17 09:08	67-63-0	
Tetrahydrofuran	ND	ug/L	10.0	4.3	1		11/15/17 09:08	109-99-9	
Toluene	ND	ug/L	1.0	0.17	1		11/15/17 09:08	108-88-3	
Xylene (Total)	ND	ug/L	3.0	0.24	1		11/15/17 09:08	1330-20-7	
Surrogates									
1,2-Dichloroethane-d4 (S)	97	%.	75-137		1		11/15/17 09:08	17060-07-0	
Toluene-d8 (S)	91	%.	75-125		1		11/15/17 09:08	2037-26-5	
4-Bromofluorobenzene (S)	96	%.	75-125		1		11/15/17 09:08	460-00-4	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 02181-202-038 Confidential-Oak-Revised Report
Pace Project No.: 10409358

QC Batch: 508395 Analysis Method: EPA 8260B
QC Batch Method: EPA 8260B Analysis Description: 8260B MSV
Associated Lab Samples: 10409358001, 10409358002, 10409358003, 10409358004, 10409358005, 10409358006, 10409358007, 10409358008, 10409358009, 10409358010, 10409358011

METHOD BLANK: 2763216 Matrix: Water
Associated Lab Samples: 10409358001, 10409358002, 10409358003, 10409358004, 10409358005, 10409358006, 10409358007, 10409358008, 10409358009, 10409358010, 10409358011

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
1,1-Dichloroethane	ug/L	ND	1.0	0.14	11/14/17 12:57	
1,1-Dichloroethene	ug/L	ND	1.0	0.18	11/14/17 12:57	
1,2-Dichloroethane	ug/L	ND	1.0	0.32	11/14/17 12:57	
2-Butanone (MEK)	ug/L	ND	5.0	2.4	11/14/17 12:57	
2-Propanol	ug/L	ND	100	20.6	11/14/17 12:57	
4-Methyl-2-pentanol	ug/L	ND	40.0	14.4	11/14/17 12:57	
4-Methyl-2-pentanone (MIBK)	ug/L	ND	5.0	0.55	11/14/17 12:57	
Acetone	ug/L	ND	20.0	8.8	11/14/17 12:57	
Benzene	ug/L	ND	1.0	0.34	11/14/17 12:57	
cis-1,2-Dichloroethene	ug/L	ND	1.0	0.20	11/14/17 12:57	
Diisopropyl ether	ug/L	ND	1.0	0.12	11/14/17 12:57	
Ethylbenzene	ug/L	ND	1.0	0.14	11/14/17 12:57	
Methylene Chloride	ug/L	ND	4.0	1.2	11/14/17 12:57	
sec-Butyl alcohol	ug/L	ND	40.0	11.2	11/14/17 12:57	
Tetrahydrofuran	ug/L	ND	10.0	4.3	11/14/17 12:57	
Toluene	ug/L	ND	1.0	0.17	11/14/17 12:57	
trans-1,2-Dichloroethene	ug/L	ND	1.0	0.21	11/14/17 12:57	
Xylene (Total)	ug/L	ND	3.0	0.24	11/14/17 12:57	
1,2-Dichloroethane-d4 (S)	%.	98	75-137		11/14/17 12:57	
4-Bromofluorobenzene (S)	%.	97	75-125		11/14/17 12:57	
Toluene-d8 (S)	%.	95	75-125		11/14/17 12:57	

LABORATORY CONTROL SAMPLE: 2763217

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,1-Dichloroethane	ug/L	20	17.7	89	62-130	
1,1-Dichloroethene	ug/L	20	16.3	82	64-134	
1,2-Dichloroethane	ug/L	20	18.3	91	64-126	
2-Butanone (MEK)	ug/L	100	89.9	90	57-142	
2-Propanol	ug/L	200	195	98	57-148	
4-Methyl-2-pentanol	ug/L	200	181	90	52-140	
4-Methyl-2-pentanone (MIBK)	ug/L	100	105	105	56-142	
Acetone	ug/L	100	113	113	75-133	
Benzene	ug/L	20	18.6	93	74-125	
cis-1,2-Dichloroethene	ug/L	20	16.6	83	75-125	
Diisopropyl ether	ug/L	20	16.5	82	72-126	
Ethylbenzene	ug/L	20	19.8	99	73-125	
Methylene Chloride	ug/L	20	16.5	83	74-125	

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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
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QUALITY CONTROL DATA

Project: 02181-202-038 Confidential-Oak-Revised Report
Pace Project No.: 10409358

LABORATORY CONTROL SAMPLE: 2763217

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
sec-Butyl alcohol	ug/L	200	196	98	50-149	
Tetrahydrofuran	ug/L	200	219	110	75-132	
Toluene	ug/L	20	18.4	92	75-125	
trans-1,2-Dichloroethene	ug/L	20	16.6	83	69-127	
Xylene (Total)	ug/L	60	59.5	99	75-125	
1,2-Dichloroethane-d4 (S)	%.			96	75-137	
4-Bromofluorobenzene (S)	%.			96	75-125	
Toluene-d8 (S)	%.			98	75-125	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2763218 2763219

Parameter	Units	10409510001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
1,1-Dichloroethane	ug/L	ND	20	20	22.6	20.0	113	100	75-140	12	30	
1,1-Dichloroethene	ug/L	ND	20	20	22.3	19.5	111	98	73-150	13	30	
1,2-Dichloroethane	ug/L	ND	20	20	22.6	19.9	113	99	75-125	13	30	
2-Butanone (MEK)	ug/L	ND	100	100	104	98.7	104	99	68-133	5	30	
2-Propanol	ug/L	ND	200	200	248	221	124	111	54-150	11	30	
4-Methyl-2-pentanol	ug/L	ND	200	200	221	192	111	96	39-146	14	30	
4-Methyl-2-pentanone (MIBK)	ug/L	ND	100	100	126	115	126	115	67-150	10	30	
Acetone	ug/L	ND	100	100	152	137	152	137	56-150	10	30	M1
Benzene	ug/L	ND	20	20	24.2	21.3	121	107	74-134	13	30	
cis-1,2-Dichloroethene	ug/L	ND	20	20	20.7	18.5	103	93	73-140	11	30	
Diisopropyl ether	ug/L	ND	20	20	20.7	18.4	104	92	63-138	12	30	
Ethylbenzene	ug/L	ND	20	20	24.2	21.7	121	108	75-136	11	30	
Methylene Chloride	ug/L	ND	20	20	20.4	18.4	102	92	69-150	10	30	
sec-Butyl alcohol	ug/L	ND	200	200	225	199	112	99	55-136	12	30	
Tetrahydrofuran	ug/L	ND	200	200	294	268	147	134	53-150	9	30	
Toluene	ug/L	ND	20	20	23.2	20.8	116	104	71-138	11	30	
trans-1,2-Dichloroethene	ug/L	ND	20	20	22.1	19.4	111	97	74-149	13	30	
Xylene (Total)	ug/L	ND	60	60	74.4	66.6	124	111	75-131	11	30	
1,2-Dichloroethane-d4 (S)	%.						96	95	75-137			
4-Bromofluorobenzene (S)	%.						97	98	75-125			
Toluene-d8 (S)	%.						98	96	75-125			

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 02181-202-038 Confidential-Oak-Revised Report
Pace Project No.: 10409358

QC Batch: 508464 Analysis Method: EPA 8260B
QC Batch Method: EPA 8260B Analysis Description: 8260B MSV
Associated Lab Samples: 10409358012, 10409358013, 10409358014, 10409358015, 10409358016, 10409358017, 10409358018, 10409358019, 10409358020, 10409358021, 10409358022

METHOD BLANK: 2763535 Matrix: Water
Associated Lab Samples: 10409358012, 10409358013, 10409358014, 10409358015, 10409358016, 10409358017, 10409358018, 10409358019, 10409358020, 10409358021, 10409358022

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
1,1-Dichloroethane	ug/L	ND	1.0	0.14	11/15/17 01:13	
1,1-Dichloroethene	ug/L	ND	1.0	0.18	11/15/17 01:13	
1,2-Dichloroethane	ug/L	ND	1.0	0.32	11/15/17 01:13	
2-Butanone (MEK)	ug/L	ND	5.0	2.4	11/15/17 01:13	
2-Propanol	ug/L	ND	100	20.6	11/15/17 01:13	
4-Methyl-2-pentanol	ug/L	ND	40.0	14.4	11/15/17 01:13	
4-Methyl-2-pentanone (MIBK)	ug/L	ND	5.0	0.55	11/15/17 01:13	
Acetone	ug/L	ND	20.0	8.8	11/15/17 01:13	
Benzene	ug/L	ND	1.0	0.34	11/15/17 01:13	
cis-1,2-Dichloroethene	ug/L	ND	1.0	0.20	11/15/17 01:13	
Diisopropyl ether	ug/L	ND	1.0	0.12	11/15/17 01:13	
Ethylbenzene	ug/L	ND	1.0	0.14	11/15/17 01:13	
Methylene Chloride	ug/L	ND	4.0	1.2	11/15/17 01:13	
sec-Butyl alcohol	ug/L	ND	40.0	11.2	11/15/17 01:13	
Tetrahydrofuran	ug/L	ND	10.0	4.3	11/15/17 01:13	
Toluene	ug/L	ND	1.0	0.17	11/15/17 01:13	
trans-1,2-Dichloroethene	ug/L	ND	1.0	0.21	11/15/17 01:13	
Xylene (Total)	ug/L	ND	3.0	0.24	11/15/17 01:13	
1,2-Dichloroethane-d4 (S)	%.	97	75-137		11/15/17 01:13	
4-Bromofluorobenzene (S)	%.	96	75-125		11/15/17 01:13	
Toluene-d8 (S)	%.	93	75-125		11/15/17 01:13	

LABORATORY CONTROL SAMPLE & LCSD: 2763536 2763537

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
1,1-Dichloroethane	ug/L	20	18.1	16.3	90	82	62-130	10	20	
1,1-Dichloroethene	ug/L	20	17.0	15.3	85	77	64-134	10	20	
1,2-Dichloroethane	ug/L	20	19.1	17.2	96	86	64-126	11	20	
2-Butanone (MEK)	ug/L	100	100	96.8	100	97	57-142	3	20	
2-Propanol	ug/L	200	197	190	99	95	57-148	4	20	
4-Methyl-2-pentanol	ug/L	200	190	178	95	89	52-140	7	20	
4-Methyl-2-pentanone (MIBK)	ug/L	100	118	110	118	110	56-142	6	20	
Acetone	ug/L	100	110	99.3	110	99	75-133	10	20	
Benzene	ug/L	20	19.7	17.8	98	89	74-125	10	20	
cis-1,2-Dichloroethene	ug/L	20	17.5	15.8	87	79	75-125	10	20	
Diisopropyl ether	ug/L	20	17.4	16.0	87	80	72-126	9	20	
Ethylbenzene	ug/L	20	21.1	19.0	106	95	73-125	10	20	
Methylene Chloride	ug/L	20	17.1	15.7	85	78	74-125	9	20	

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REPORT OF LABORATORY ANALYSIS

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(612)607-1700

QUALITY CONTROL DATA

Project: 02181-202-038 Confidential-Oak-Revised Report
Pace Project No.: 10409358

LABORATORY CONTROL SAMPLE & LCSD: 2763536 2763537

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
sec-Butyl alcohol	ug/L	200	199	188	100	94	50-149	6	20	
Tetrahydrofuran	ug/L	200	219	199	109	99	75-132	10	20	
Toluene	ug/L	20	19.9	18.2	100	91	75-125	9	20	
trans-1,2-Dichloroethene	ug/L	20	17.5	15.9	87	80	69-127	9	20	
Xylene (Total)	ug/L	60	63.2	57.0	105	95	75-125	10	20	
1,2-Dichloroethane-d4 (S)	%.				94	93	75-137			
4-Bromofluorobenzene (S)	%.				96	96	75-125			
Toluene-d8 (S)	%.				96	94	75-125			

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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(612)607-1700

QUALIFIERS

Project: 02181-202-038 Confidential-Oak-Revised Report
Pace Project No.: 10409358

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-M	Pace Analytical Services - Minneapolis

BATCH QUALIFIERS

Batch: 508464

[M5]	A matrix spike/matrix spike duplicate was not performed for this batch due to insufficient sample volume.

ANALYTE QUALIFIERS

HS	Results are from sample aliquot taken from VOA vial with headspace (air bubble greater than 6 mm diameter).
M1	Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 02181-202-038 Confidential-Oak-Revised Report
Pace Project No.: 10409358

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10409358001	**OKMN-GW-TRIP01-171031**	EPA 8260B	508395		
10409358002	**OKMN-GW-W33-RB01-171101**	EPA 8260B	508395		
10409358003	**OKMN-GW-PW07-0-171031**	EPA 8260B	508395		
10409358004	**OKMN-GW-PW07-DB-171031**	EPA 8260B	508395		
10409358005	**OKMN-GW-PW08-0-171031**	EPA 8260B	508395		
10409358006	**OKMN-GW-PW09-0-171031**	EPA 8260B	508395		
10409358007	**OKMN-GW-W03-0-171031**	EPA 8260B	508395		
10409358008	**OKMN-GW-W08-0-171031**	EPA 8260B	508395		
10409358009	**OKMN-GW-W2003-0-171031**	EPA 8260B	508395		
10409358010	**OKMN-GW-W2008-0-171101**	EPA 8260B	508395		
10409358011	**OKMN-GW-W31-0-171101**	EPA 8260B	508395		
10409358012	**OKMN-GW-W33-0-171101**	EPA 8260B	508464		
10409358013	**OKMN-GW-W25-0-171101**	EPA 8260B	508464		
10409358014	**OKMN-GW-W215-0-171101**	EPA 8260B	508464		
10409358015	**OKMN-GW-W2005-0-171101**	EPA 8260B	508464		
10409358016	**OKMN-GW-W2009-0-171101**	EPA 8260B	508464		
10409358017	**OKMN-GW-W2010-0-171101**	EPA 8260B	508464		
10409358018	**OKMN-GW-W2012-0-171101**	EPA 8260B	508464		
10409358019	**OKMN-GW-W26R-RB02-171101**	EPA 8260B	508464		
10409358020	**OKMN-GW-W28-0-171101**	EPA 8260B	508464		
10409358021	**OKMN-GW-W26R-0-171101**	EPA 8260B	508464		
10409358022	**OKMN-GW-W26R-DB-171101**	EPA 8260B	508464		

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CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

10409358

Page: 1 of 2

Section A Required Client Information:

Company:	WESTON
Address:	1400 WESTON WAY
	WEST CHESTER, PA 19380
Email To:	NATACC.Data@WestonSolutions.com
Phone: 610-701-3676	Fax: 610-701-3401
Requested Due Date/TAT:	Standard TAT

Section B Required Project Information:

Report To:	DAVE CAIRNS
Copy To:	NATACC.Data@westonsolutions.com
Purchase Order No.:	
Project Name:	CONFIDENTIAL-OAKDALE
Project Number:	02181-202-038

Section C Invoice Information:

Attention:	DAVE CAIRNS
Company Name:	WESTON SOLUTIONS
Address:	WEST CHESTER PA
Pace Quote Reference:	
Pace Project Manager:	TINA SOLTANI
Pace Profile #:	

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER MPCA

Site Location STATE: MN

Section D Required Client Information

SAMPLE ID
(A-Z, 0-9 / ,-)
Sample IDs MUST BE UNIQUE

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	OT
TISSUE	TS

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COLLECTED COMPOSITE START TIME	COLLECTED COMPOSITE END/GRAB DATE	COLLECTED COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	VOC - OKMN-List1 (see notes)	VOC - OKMN-List2 (see notes)	TCLP VOCS	TCLP METALS	IGNITIBILITY	REACTIVITY	TSS/TDS	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	OKMN-GW-TRIP01-171031	WT	G			10/31/17	7:00		2				2					x	x								001
2	OKMN-GW-W33-RB01-171101	WT	G			11/1/17	8:30		3				3					x	x								002
3	OKMN-GW-PW07-0-171031	WT	G			10/31/17	13:10		3				3					x	x								003
4	OKMN-GW-PW07-DB-171031	WT	G			10/31/17	13:10		3				3					x	x								004
5	OKMN-GW-PW08-0-171031	WT	G			10/31/17	11:50		3				3					x	x								005
6	OKMN-GW-PW09-0-171031	WT	G			10/31/17	11:40		3				3					x	x								006
7	OKMN-GW-W03-0-171031	WT	G			10/31/17	10:15		3				3					x	x								007
8	OKMN-GW-W08-0-171031	WT	G			10/31/17	9:10		3				3					x	x								008
9	OKMN-GW-W2003-0-171031	WT	G			10/31/17	14:05		3				3					x	x								009
10	OKMN-GW-W2008-0-171101	WT	G			11/1/17	7:40		3				3					x	x								010
11	OKMN-GW-W31-0-171101	WT	G			11/1/17	7:30		3				3					x	x								011
12	OKMN-GW-W33-0-171101	WT	G			11/1/17	12:20		3				3					x	x								012

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
OKMN-List 1 : VOCs including: Acetone, Benzene, 1,1-DCA, 1,2-DCA, 1,1-DCE, cis & trans-1,2-DCE, ethylbenzene, isopropy ether, MEK, and tetrahydrofuran	Weston	11/1/17	17:15	PACE	11/1/17	1718	3.2	Y	N	Y
OKMN-List 2: VOCs including: isopropyl alcohol, 2-butyl alcohol, 4-Methyl-2-pentanol, methylene chloride, MIBK, toluene, and total xylenes.										
Please send results to: NATACC Data@westonsolutions.com										

SAMPLER NAME AND SIGNATURE				
PRINT Name of SAMPLER:	Denver Martin, Seth Welty			
SIGNATURE of SAMPLER:		DATE Signed (MM/DD/YY):	11/1/2017	

Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N)

F-ALL-Q-020rev.07, 15-Feb-2007

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

Copy of Copy of 2817-18-OKMN-GW-SW-VOCs-LABELS+PACE_COCs-TEMPLATE-4QTR PaceCOC-GW-FIELDCOC(BLANK)

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CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Section A Required Client Information:		Section B Required Project Information:		Section C Invoice Information:	
Company:	WESTON	Report To:	DAVE CAIRNS	Attention:	DAVE CAIRNS
Address:	1400 WESTON WAY	Copy To:	NATACC.Data@westonsolutions.com	Company Name:	WESTON SOLUTIONS
	WEST CHESTER, PA 19380			Address:	WEST CHESTER PA
Email To:	NATACC.Data@WestonSolutions.com	Purchase Order No.:		Pace Quote Reference:	
Phone:	610-701-3676 Fax: 610-701-3401	Project Name:	CONFIDENTIAL-OAKDALE	Pace Project Manager:	TINA SOLTANI
Requested Due Date/TAT:	Standard TAT	Project Number:	02181-202-038	Pace Profile #:	

REGULATORY AGENCY: ☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER ☐ UST ☐ RCRA ☐ OTHER MPCA

Site Location STATE: MN

Section D Required Client Information

SAMPLE ID
(A-Z, 0-9 / ,-)
Sample IDs MUST BE UNIQUE

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	OT
TISSUE	TS

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COLLECTED COMPOSITE START TIME	COLLECTED COMPOSITE END/GRAB DATE	COLLECTED COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Y/N	Analysis Test: VOC - OKMN-List1 (see notes)	VOC - OKMN-List2 (see notes)	TCLP VOCS	TCLP METALS	IGNITIBILITY	REACTIVITY	TSS/TDS	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	OKMN-GW-W25-0-171101	WT	G			11/1/17	12:05		3				3						x	x							93
2	OKMN-GW-W215-0-171101	WT	G			11/1/17	10:05		3				3						x	x							014
3	OKMN-GW-W2005-0-171101	WT	G			11/1/17	10:20		3				3						x	x							015
4	OKMN-GW-W2009-0-171101	WT	G			11/1/17	12:05		3				3						x	x							016
5	OKMN-GW-W2010-0-171101	WT	G			11/1/17	10:15		3				3						x	x							017
6	OKMN-GW-W2012-0-171101	WT	G			11/1/17	11:10		3				3						x	x							018
7	OKMN-GW-W26R-0-171101	WT	G			11/1/17	15:35		3				3						x	x							019
8	OKMN-GW-W28-0-171101	WT	G			11/1/17	15:30		3				3						x	x							020
9	OKMN-GW-W26R-RB02-171101	WT	G			11/1/17	14:55		3				3						x	x							021
10	OKMN-GW-W26R-DB-171101	WT	G			11/1/17	15:35		3				3						x	x							022
11		WT																									
12		WT																									

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS: Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
OKMN-List 1: VOCs including: Acetone, Benzene, 1,1-DCA, 1,2-DCA, 1,1-DCE, cis & trans-1,2-DCE, ethylbenzene, isopropy ether, MEK, and tetrahydrofuran	MW / WESTON	11/1/17	17:15	PACE	11/1/17	1710	3.2	Y	N	Y
OKMN-List 2: VOCs including: isopropyl alcohol, 2-butyl alcohol, 4-Methyl-2-pentanol, methylene chloride, MIBK, toluene, and total xylenes										
Please send results to: NATACC.Data@westonsolutions.com										

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Denver Martin, Seth Welty

SIGNATURE of SAMPLER: [signature] DATE Signed (MM/DD/YY): 11/1/2017

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

November 17, 2017

Mr. David Cairns
Weston Solutions, Inc.
1400 Weston Way
West Chester, PA 19380

RE: Project: 02181-202-038 Confidential-Oak
Pace Project No.: 10409650

Dear Mr. Cairns:
Enclosed are the analytical results for sample(s) received by the laboratory on November 03, 2017. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Tina Soltani
tina.soltani@pacelabs.com
(612)607-6384
Project Manager

Enclosures

cc: Ms. Marta Cairns, Weston Solutions, Inc.
NATACCData WestonSolutions, Weston Solutions, Inc.

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

CERTIFICATIONS

Project: 02181-202-038 Confidential-Oak
Pace Project No.: 10409650

Minnesota Certification IDs

1700 Elm Street SE, Suite 200, Minneapolis, MN 55414-2485
A2LA Certification #: 2926.01
Alabama Certification #: 40770
Alaska Contaminated Sites Certification #: 17-009
Alaska DW Certification #: MN00064
Arizona Certification #: AZ0014
Arkansas Certification #: 88-0680
California Certification #: 2929
CNMI Saipan Certification #:MP0003
Colorado Certification #: MN00064
Connecticut Certification #: PH-0256
EPA Region 8+Wyoming DW Certification #: via MN 027-053-137
Florida Certification #: E87605
Georgia Certification #: 959
Guam EPA Certification #: MN00064
Hawaii Certification #: MN00064
Idaho Certification #: MN00064
Illinois Certification #: 200011
Indiana Certification #: C-MN-01
Iowa Certification #: 368
Kansas Certification #: E-10167
Kentucky DW Certification #: 90062
Kentucky WW Certification #: 90062
Louisiana DEQ Certification #: 03086
Louisiana DW Certification #: MN00064
Maine Certification #: MN00064
Maryland Certification #: 322
Massachusetts Certification #: M-MN064
Michigan Certification #: 9909
Minnesota Certification #: 027-053-137
Mississippi Certification #: MN00064
Montana Certification #: CERT0092
Nebraska Certification #: NE-OS-18-06
Nevada Certification #: MN00064
New Hampshire Certification #: 2081
New Jersey Certification #: MN002
New York Certification #: 11647
North Carolina DW Certification #: 27700
North Carolina WW Certification #: 530
North Dakota Certification #: R-036
Ohio DW Certification #: 41244
Ohio VAP Certification #: CL101
Oklahoma Certification #: 9507
Oregon NwTPH Certification #: MN300001
Oregon Secondary Certification #: MN200001
Pennsylvania Certification #: 68-00563
Puerto Rico Certification #: MN00064
South Carolina Certification #:74003001
Tennessee Certification #: TN02818
Texas Certification #: T104704192
Utah Certification #: MN00064
Virginia Certification #: 460163
Washington Certification #: C486
West Virginia DW Certification #: 9952 C
West Virginia DEP Certification #: 382
Wisconsin Certification #: 999407970

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

SAMPLE SUMMARY

Project: 02181-202-038 Confidential-Oak
Pace Project No.: 10409650

Lab ID	Sample ID	Matrix	Date Collected	Date Received
10409650001	**OKMN-GW-TRIP02-171102**	Water	11/02/17 07:00	11/03/17 09:33
10409650002	**OKMN-GW-PW10-RB03-171102**	Water	11/02/17 08:15	11/03/17 09:33
10409650003	**OKMN-GW-PW01-0-171102**	Water	11/02/17 07:35	11/03/17 09:33
10409650004	**OKMN-GW-PW02-0-171102**	Water	11/02/17 07:30	11/03/17 09:33
10409650005	**OKMN-GW-PW03-0-171102**	Water	11/02/17 08:10	11/03/17 09:33
10409650006	**OKMN-GW-PW04-0-171102**	Water	11/02/17 07:45	11/03/17 09:33
10409650007	**OKMN-GW-PW06-0-171102**	Water	11/02/17 07:55	11/03/17 09:33
10409650008	**OKMN-GW-PW10-0-171102**	Water	11/02/17 08:30	11/03/17 09:33
10409650009	**OKMN-GW-PW10-DB-171102**	Water	11/02/17 08:30	11/03/17 09:33
10409650010	**OKMN-GW-PW11-0-171102**	Water	11/02/17 08:00	11/03/17 09:33
10409650011	**OKMN-GW-W29-0-171102**	Water	11/02/17 09:50	11/03/17 09:33
10409650012	**OKMN-GW-W6102-0-171102**	Water	11/02/17 12:10	11/03/17 09:33
10409650013	**OKMN-GW-W80-0-171102**	Water	11/02/17 11:05	11/03/17 09:33
10409650014	**OKMN-SW-SW01-0-171102**	Water	11/02/17 12:30	11/03/17 09:33
10409650015	**OKMN-SW-SW12-0-171102**	Water	11/02/17 12:00	11/03/17 09:33
10409650016	**OKMN-SW-SW13-0-171102**	Water	11/02/17 11:48	11/03/17 09:33
10409650017	**OKMN-SW-SW14-0-171102**	Water	11/02/17 11:40	11/03/17 09:33
10409650018	**OKMN-SW-SW16-0-171102**	Water	11/02/17 11:25	11/03/17 09:33

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

SAMPLE ANALYTE COUNT

Project: 02181-202-038 Confidential-Oak
Pace Project No.: 10409650

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
10409650001	**OKMN-GW-TRIP02-171102**	EPA 8260B	DJB	21	PASI-M
10409650002	**OKMN-GW-PW10-RB03-171102**	EPA 8260B	DJB	21	PASI-M
10409650003	**OKMN-GW-PW01-0-171102**	EPA 8260B	DJB	21	PASI-M
10409650004	**OKMN-GW-PW02-0-171102**	EPA 8260B	DJB	21	PASI-M
10409650005	**OKMN-GW-PW03-0-171102**	EPA 8260B	DJB	21	PASI-M
10409650006	**OKMN-GW-PW04-0-171102**	EPA 8260B	DJB	21	PASI-M
10409650007	**OKMN-GW-PW06-0-171102**	EPA 8260B	DJB	21	PASI-M
10409650008	**OKMN-GW-PW10-0-171102**	EPA 8260B	DJB	21	PASI-M
10409650009	**OKMN-GW-PW10-DB-171102**	EPA 8260B	DJB	21	PASI-M
10409650010	**OKMN-GW-PW11-0-171102**	EPA 8260B	DJB	21	PASI-M
10409650011	**OKMN-GW-W29-0-171102**	EPA 8260B	DJB	21	PASI-M
10409650012	**OKMN-GW-W6102-0-171102**	EPA 8260B	DJB	21	PASI-M
10409650013	**OKMN-GW-W80-0-171102**	EPA 8260B	DJB	14	PASI-M
10409650014	**OKMN-SW-SW01-0-171102**	SM 2540C	NAS	1	PASI-M
		SM 2540D	NAS	1	PASI-M
10409650015	**OKMN-SW-SW12-0-171102**	SM 2540C	NAS	1	PASI-M
		SM 2540D	NAS	1	PASI-M
10409650016	**OKMN-SW-SW13-0-171102**	SM 2540C	NAS	1	PASI-M
		SM 2540D	NAS	1	PASI-M
10409650017	**OKMN-SW-SW14-0-171102**	SM 2540C	NAS	1	PASI-M
		SM 2540D	NAS	1	PASI-M
10409650018	**OKMN-SW-SW16-0-171102**	SM 2540C	NAS	1	PASI-M
		SM 2540D	NAS	1	PASI-M

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

PROJECT NARRATIVE

Project: 02181-202-038 Confidential-Oak
Pace Project No.: 10409650

Method: **EPA 8260B**
Description: 8260B MSV
Client: Weston Solutions, Inc.
Date: November 17, 2017

General Information:
13 samples were analyzed for EPA 8260B. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Internal Standards:
All internal standards were within QC limits with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: 508690

A matrix spike/matrix spike duplicate was not performed due to insufficient sample volume.

QC Batch: 508808

A matrix spike/matrix spike duplicate was not performed due to insufficient sample volume.

QC Batch: 509016

A matrix spike/matrix spike duplicate was not performed due to insufficient sample volume.

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

QC Batch: 509016

D6: The precision between the sample and sample duplicate exceeded laboratory control limits.

- DUP (Lab ID: 2766766)
  - 2-Propanol

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

PROJECT NARRATIVE

Project: 02181-202-038 Confidential-Oak
Pace Project No.: 10409650

Method: **EPA 8260B**
Description: 8260B MSV
Client: Weston Solutions, Inc.
Date: November 17, 2017

Additional Comments:

Analyte Comments:

QC Batch: 508690

E: Analyte concentration exceeded the calibration range. The reported result is estimated.

- OKMN-GW-W29-0-171102 (Lab ID: 10409650011)
  - 2-Propanol

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

PROJECT NARRATIVE

Project: 02181-202-038 Confidential-Oak
Pace Project No.: 10409650

Method: **SM 2540C**
Description: 2540C Total Dissolved Solids
Client: Weston Solutions, Inc.
Date: November 17, 2017

General Information:
5 samples were analyzed for SM 2540C. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

PROJECT NARRATIVE

Project: 02181-202-038 Confidential-Oak
Pace Project No.: 10409650

Method: **SM 2540D**
Description: 2540D Total Suspended Solids
Client: Weston Solutions, Inc.
Date: November 17, 2017

General Information:
5 samples were analyzed for SM 2540D. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: 02181-202-038 Confidential-Oak
Pace Project No.: 10409650

Sample: OKMN-GW-TRIP02-171102 **Lab ID: 10409650001** Collected: 11/02/17 07:00 Received: 11/03/17 09:33 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV	Analytical Method: EPA 8260B								
Acetone	ND	ug/L	20.0	8.8	1		11/15/17 15:45	67-64-1	
Benzene	ND	ug/L	1.0	0.34	1		11/15/17 15:45	71-43-2	
2-Butanone (MEK)	ND	ug/L	5.0	2.4	1		11/15/17 15:45	78-93-3	
sec-Butyl alcohol	ND	ug/L	40.0	11.2	1		11/15/17 15:45	15892-23-6	
1,1-Dichloroethane	ND	ug/L	1.0	0.14	1		11/15/17 15:45	75-34-3	
1,2-Dichloroethane	ND	ug/L	1.0	0.32	1		11/15/17 15:45	107-06-2	
1,1-Dichloroethene	ND	ug/L	1.0	0.18	1		11/15/17 15:45	75-35-4	
cis-1,2-Dichloroethene	ND	ug/L	1.0	0.20	1		11/15/17 15:45	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	1.0	0.21	1		11/15/17 15:45	156-60-5	
Diisopropyl ether	ND	ug/L	1.0	0.12	1		11/15/17 15:45	108-20-3	
Ethylbenzene	ND	ug/L	1.0	0.14	1		11/15/17 15:45	100-41-4	
4-Methyl-2-pentanol	ND	ug/L	40.0	14.4	1		11/15/17 15:45	108-11-2	
Methylene Chloride	ND	ug/L	4.0	1.2	1		11/15/17 15:45	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/L	5.0	0.55	1		11/15/17 15:45	108-10-1	
2-Propanol	ND	ug/L	100	20.6	1		11/15/17 15:45	67-63-0	
Tetrahydrofuran	ND	ug/L	10.0	4.3	1		11/15/17 15:45	109-99-9	
Toluene	ND	ug/L	1.0	0.17	1		11/15/17 15:45	108-88-3	
Xylene (Total)	ND	ug/L	3.0	0.24	1		11/15/17 15:45	1330-20-7	
Surrogates									
1,2-Dichloroethane-d4 (S)	97	%.	75-137		1		11/15/17 15:45	17060-07-0	
Toluene-d8 (S)	90	%.	75-125		1		11/15/17 15:45	2037-26-5	
4-Bromofluorobenzene (S)	95	%.	75-125		1		11/15/17 15:45	460-00-4	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
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Minneapolis, MN 55414
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ANALYTICAL RESULTS

Project: 02181-202-038 Confidential-Oak
Pace Project No.: 10409650

Sample: OKMN-GW-PW10-RB03-171102 **Lab ID: 10409650002** Collected: 11/02/17 08:15 Received: 11/03/17 09:33 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV	Analytical Method: EPA 8260B								
Acetone	ND	ug/L	20.0	8.8	1		11/15/17 20:29	67-64-1	
Benzene	ND	ug/L	1.0	0.34	1		11/15/17 20:29	71-43-2	
2-Butanone (MEK)	ND	ug/L	5.0	2.4	1		11/15/17 20:29	78-93-3	
sec-Butyl alcohol	ND	ug/L	40.0	11.2	1		11/15/17 20:29	15892-23-6	
1,1-Dichloroethane	ND	ug/L	1.0	0.14	1		11/15/17 20:29	75-34-3	
1,2-Dichloroethane	ND	ug/L	1.0	0.32	1		11/15/17 20:29	107-06-2	
1,1-Dichloroethene	ND	ug/L	1.0	0.18	1		11/15/17 20:29	75-35-4	
cis-1,2-Dichloroethene	ND	ug/L	1.0	0.20	1		11/15/17 20:29	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	1.0	0.21	1		11/15/17 20:29	156-60-5	
Diisopropyl ether	**1.9**	ug/L	1.0	0.12	1		11/15/17 20:29	108-20-3	
Ethylbenzene	ND	ug/L	1.0	0.14	1		11/15/17 20:29	100-41-4	
4-Methyl-2-pentanol	ND	ug/L	40.0	14.4	1		11/15/17 20:29	108-11-2	
Methylene Chloride	ND	ug/L	4.0	1.2	1		11/15/17 20:29	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/L	5.0	0.55	1		11/15/17 20:29	108-10-1	
2-Propanol	ND	ug/L	100	20.6	1		11/15/17 20:29	67-63-0	
Tetrahydrofuran	ND	ug/L	10.0	4.3	1		11/15/17 20:29	109-99-9	
Toluene	ND	ug/L	1.0	0.17	1		11/15/17 20:29	108-88-3	
Xylene (Total)	ND	ug/L	3.0	0.24	1		11/15/17 20:29	1330-20-7	
Surrogates									
1,2-Dichloroethane-d4 (S)	99	%.	75-137		1		11/15/17 20:29	17060-07-0	
Toluene-d8 (S)	96	%.	75-125		1		11/15/17 20:29	2037-26-5	
4-Bromofluorobenzene (S)	95	%.	75-125		1		11/15/17 20:29	460-00-4	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 02181-202-038 Confidential-Oak
Pace Project No.: 10409650

Sample: OKMN-GW-PW01-0-171102 **Lab ID: 10409650003** Collected: 11/02/17 07:35 Received: 11/03/17 09:33 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV	Analytical Method: EPA 8260B								
Acetone	ND	ug/L	2000	884	100		11/15/17 23:38	67-64-1	
Benzene	ND	ug/L	100	33.9	100		11/15/17 23:38	71-43-2	
2-Butanone (MEK)	ND	ug/L	500	242	100		11/15/17 23:38	78-93-3	
sec-Butyl alcohol	ND	ug/L	4000	1120	100		11/15/17 23:38	15892-23-6	
1,1-Dichloroethane	ND	ug/L	100	14.4	100		11/15/17 23:38	75-34-3	
1,2-Dichloroethane	ND	ug/L	100	32.2	100		11/15/17 23:38	107-06-2	
1,1-Dichloroethene	ND	ug/L	100	18.0	100		11/15/17 23:38	75-35-4	
cis-1,2-Dichloroethene	ND	ug/L	100	20.2	100		11/15/17 23:38	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	100	21.0	100		11/15/17 23:38	156-60-5	
Diisopropyl ether	**10600**	ug/L	100	12.5	100		11/15/17 23:38	108-20-3	
Ethylbenzene	ND	ug/L	100	13.5	100		11/15/17 23:38	100-41-4	
4-Methyl-2-pentanol	ND	ug/L	4000	1440	100		11/15/17 23:38	108-11-2	
Methylene Chloride	ND	ug/L	400	116	100		11/15/17 23:38	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/L	500	54.9	100		11/15/17 23:38	108-10-1	
2-Propanol	ND	ug/L	10000	2060	100		11/15/17 23:38	67-63-0	
Tetrahydrofuran	ND	ug/L	1000	431	100		11/15/17 23:38	109-99-9	
Toluene	**250**	ug/L	100	17.1	100		11/15/17 23:38	108-88-3	
Xylene (Total)	ND	ug/L	300	24.3	100		11/15/17 23:38	1330-20-7	
Surrogates									
1,2-Dichloroethane-d4 (S)	101	%.	75-137		100		11/15/17 23:38	17060-07-0	
Toluene-d8 (S)	96	%.	75-125		100		11/15/17 23:38	2037-26-5	
4-Bromofluorobenzene (S)	96	%.	75-125		100		11/15/17 23:38	460-00-4	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 02181-202-038 Confidential-Oak
Pace Project No.: 10409650

Sample: OKMN-GW-PW02-0-171102 **Lab ID: 10409650004** Collected: 11/02/17 07:30 Received: 11/03/17 09:33 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV	Analytical Method: EPA 8260B								
Acetone	**9260**	ug/L	2000	884	100		11/16/17 00:02	67-64-1	
Benzene	ND	ug/L	100	33.9	100		11/16/17 00:02	71-43-2	
2-Butanone (MEK)	**3380**	ug/L	500	242	100		11/16/17 00:02	78-93-3	
sec-Butyl alcohol	ND	ug/L	4000	1120	100		11/16/17 00:02	15892-23-6	
1,1-Dichloroethane	ND	ug/L	100	14.4	100		11/16/17 00:02	75-34-3	
1,2-Dichloroethane	ND	ug/L	100	32.2	100		11/16/17 00:02	107-06-2	
1,1-Dichloroethene	ND	ug/L	100	18.0	100		11/16/17 00:02	75-35-4	
cis-1,2-Dichloroethene	ND	ug/L	100	20.2	100		11/16/17 00:02	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	100	21.0	100		11/16/17 00:02	156-60-5	
Diisopropyl ether	**6780**	ug/L	100	12.5	100		11/16/17 00:02	108-20-3	
Ethylbenzene	ND	ug/L	100	13.5	100		11/16/17 00:02	100-41-4	
4-Methyl-2-pentanol	ND	ug/L	4000	1440	100		11/16/17 00:02	108-11-2	
Methylene Chloride	ND	ug/L	400	116	100		11/16/17 00:02	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/L	500	54.9	100		11/16/17 00:02	108-10-1	
2-Propanol	ND	ug/L	10000	2060	100		11/16/17 00:02	67-63-0	
Tetrahydrofuran	ND	ug/L	1000	431	100		11/16/17 00:02	109-99-9	
Toluene	**266**	ug/L	100	17.1	100		11/16/17 00:02	108-88-3	
Xylene (Total)	ND	ug/L	300	24.3	100		11/16/17 00:02	1330-20-7	
Surrogates									
1,2-Dichloroethane-d4 (S)	105	%.	75-137		100		11/16/17 00:02	17060-07-0	
Toluene-d8 (S)	95	%.	75-125		100		11/16/17 00:02	2037-26-5	
4-Bromofluorobenzene (S)	98	%.	75-125		100		11/16/17 00:02	460-00-4	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 02181-202-038 Confidential-Oak
Pace Project No.: 10409650

Sample: OKMN-GW-PW03-0-171102 **Lab ID: 10409650005** Collected: 11/02/17 08:10 Received: 11/03/17 09:33 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV	Analytical Method: EPA 8260B								
Acetone	ND	ug/L	4000	1770	200		11/16/17 00:26	67-64-1	
Benzene	**318**	ug/L	200	67.8	200		11/16/17 00:26	71-43-2	
2-Butanone (MEK)	**2130**	ug/L	1000	484	200		11/16/17 00:26	78-93-3	
sec-Butyl alcohol	ND	ug/L	8000	2240	200		11/16/17 00:26	15892-23-6	
1,1-Dichloroethane	ND	ug/L	200	28.8	200		11/16/17 00:26	75-34-3	
1,2-Dichloroethane	ND	ug/L	200	64.4	200		11/16/17 00:26	107-06-2	
1,1-Dichloroethene	ND	ug/L	200	36.0	200		11/16/17 00:26	75-35-4	
cis-1,2-Dichloroethene	ND	ug/L	200	40.4	200		11/16/17 00:26	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	200	42.0	200		11/16/17 00:26	156-60-5	
Diisopropyl ether	**20300**	ug/L	200	25.0	200		11/16/17 00:26	108-20-3	
Ethylbenzene	ND	ug/L	200	27.0	200		11/16/17 00:26	100-41-4	
4-Methyl-2-pentanol	ND	ug/L	8000	2880	200		11/16/17 00:26	108-11-2	
Methylene Chloride	ND	ug/L	800	232	200		11/16/17 00:26	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/L	1000	110	200		11/16/17 00:26	108-10-1	
2-Propanol	ND	ug/L	20000	4120	200		11/16/17 00:26	67-63-0	
Tetrahydrofuran	ND	ug/L	2000	862	200		11/16/17 00:26	109-99-9	
Toluene	**488**	ug/L	200	34.2	200		11/16/17 00:26	108-88-3	
Xylene (Total)	ND	ug/L	600	48.6	200		11/16/17 00:26	1330-20-7	
Surrogates									
1,2-Dichloroethane-d4 (S)	98	%.	75-137		200		11/16/17 00:26	17060-07-0	
Toluene-d8 (S)	95	%.	75-125		200		11/16/17 00:26	2037-26-5	
4-Bromofluorobenzene (S)	97	%.	75-125		200		11/16/17 00:26	460-00-4	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 02181-202-038 Confidential-Oak
Pace Project No.: 10409650

Sample: OKMN-GW-PW04-0-171102 **Lab ID: 10409650006** Collected: 11/02/17 07:45 Received: 11/03/17 09:33 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV	Analytical Method: EPA 8260B								
Acetone	**7000**	ug/L	500	221	25		11/15/17 21:40	67-64-1	
Benzene	**147**	ug/L	25.0	8.5	25		11/15/17 21:40	71-43-2	
2-Butanone (MEK)	**1740**	ug/L	125	60.5	25		11/15/17 21:40	78-93-3	
sec-Butyl alcohol	**1340**	ug/L	1000	280	25		11/15/17 21:40	15892-23-6	
1,1-Dichloroethane	ND	ug/L	25.0	3.6	25		11/15/17 21:40	75-34-3	
1,2-Dichloroethane	ND	ug/L	25.0	8.0	25		11/15/17 21:40	107-06-2	
1,1-Dichloroethene	ND	ug/L	25.0	4.5	25		11/15/17 21:40	75-35-4	
cis-1,2-Dichloroethene	ND	ug/L	25.0	5.0	25		11/15/17 21:40	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	25.0	5.2	25		11/15/17 21:40	156-60-5	
Diisopropyl ether	**14200**	ug/L	200	25.0	200		11/16/17 23:46	108-20-3	
Ethylbenzene	**44.7**	ug/L	25.0	3.4	25		11/15/17 21:40	100-41-4	
4-Methyl-2-pentanol	ND	ug/L	1000	360	25		11/15/17 21:40	108-11-2	
Methylene Chloride	ND	ug/L	100	29.0	25		11/15/17 21:40	75-09-2	
4-Methyl-2-pentanone (MIBK)	**1180**	ug/L	125	13.7	25		11/15/17 21:40	108-10-1	
2-Propanol	**6980**	ug/L	2500	515	25		11/15/17 21:40	67-63-0	
Tetrahydrofuran	ND	ug/L	250	108	25		11/15/17 21:40	109-99-9	
Toluene	**963**	ug/L	25.0	4.3	25		11/15/17 21:40	108-88-3	
Xylene (Total)	**223**	ug/L	75.0	6.1	25		11/15/17 21:40	1330-20-7	
Surrogates									
1,2-Dichloroethane-d4 (S)	98	%.	75-137		25		11/15/17 21:40	17060-07-0	
Toluene-d8 (S)	98	%.	75-125		25		11/15/17 21:40	2037-26-5	
4-Bromofluorobenzene (S)	99	%.	75-125		25		11/15/17 21:40	460-00-4	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 02181-202-038 Confidential-Oak
Pace Project No.: 10409650

Sample: OKMN-GW-PW06-0-171102 **Lab ID: 10409650007** Collected: 11/02/17 07:55 Received: 11/03/17 09:33 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV	Analytical Method: EPA 8260B								
Acetone	ND	ug/L	500	221	25		11/15/17 22:04	67-64-1	
Benzene	**32.3**	ug/L	25.0	8.5	25		11/15/17 22:04	71-43-2	
2-Butanone (MEK)	**152**	ug/L	125	60.5	25		11/15/17 22:04	78-93-3	
sec-Butyl alcohol	ND	ug/L	1000	280	25		11/15/17 22:04	15892-23-6	
1,1-Dichloroethane	ND	ug/L	25.0	3.6	25		11/15/17 22:04	75-34-3	
1,2-Dichloroethane	ND	ug/L	25.0	8.0	25		11/15/17 22:04	107-06-2	
1,1-Dichloroethene	ND	ug/L	25.0	4.5	25		11/15/17 22:04	75-35-4	
cis-1,2-Dichloroethene	ND	ug/L	25.0	5.0	25		11/15/17 22:04	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	25.0	5.2	25		11/15/17 22:04	156-60-5	
Diisopropyl ether	**3740**	ug/L	25.0	3.1	25		11/15/17 22:04	108-20-3	
Ethylbenzene	ND	ug/L	25.0	3.4	25		11/15/17 22:04	100-41-4	
4-Methyl-2-pentanol	ND	ug/L	1000	360	25		11/15/17 22:04	108-11-2	
Methylene Chloride	ND	ug/L	100	29.0	25		11/15/17 22:04	75-09-2	
4-Methyl-2-pentanone (MIBK)	**134**	ug/L	125	13.7	25		11/15/17 22:04	108-10-1	
2-Propanol	ND	ug/L	2500	515	25		11/15/17 22:04	67-63-0	
Tetrahydrofuran	ND	ug/L	250	108	25		11/15/17 22:04	109-99-9	
Toluene	**60.5**	ug/L	25.0	4.3	25		11/15/17 22:04	108-88-3	
Xylene (Total)	ND	ug/L	75.0	6.1	25		11/15/17 22:04	1330-20-7	
Surrogates									
1,2-Dichloroethane-d4 (S)	98	%.	75-137		25		11/15/17 22:04	17060-07-0	
Toluene-d8 (S)	96	%.	75-125		25		11/15/17 22:04	2037-26-5	
4-Bromofluorobenzene (S)	100	%.	75-125		25		11/15/17 22:04	460-00-4	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 02181-202-038 Confidential-Oak
Pace Project No.: 10409650

Sample: OKMN-GW-PW10-0-171102 **Lab ID: 10409650008** Collected: 11/02/17 08:30 Received: 11/03/17 09:33 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV	Analytical Method: EPA 8260B								
Acetone	ND	ug/L	500	221	25		11/15/17 22:28	67-64-1	
Benzene	**469**	ug/L	25.0	8.5	25		11/15/17 22:28	71-43-2	
2-Butanone (MEK)	ND	ug/L	125	60.5	25		11/15/17 22:28	78-93-3	
sec-Butyl alcohol	ND	ug/L	1000	280	25		11/15/17 22:28	15892-23-6	
1,1-Dichloroethane	ND	ug/L	25.0	3.6	25		11/15/17 22:28	75-34-3	
1,2-Dichloroethane	ND	ug/L	25.0	8.0	25		11/15/17 22:28	107-06-2	
1,1-Dichloroethene	ND	ug/L	25.0	4.5	25		11/15/17 22:28	75-35-4	
cis-1,2-Dichloroethene	ND	ug/L	25.0	5.0	25		11/15/17 22:28	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	25.0	5.2	25		11/15/17 22:28	156-60-5	
Diisopropyl ether	**5460**	ug/L	25.0	3.1	25		11/15/17 22:28	108-20-3	
Ethylbenzene	**78.7**	ug/L	25.0	3.4	25		11/15/17 22:28	100-41-4	
4-Methyl-2-pentanol	ND	ug/L	1000	360	25		11/15/17 22:28	108-11-2	
Methylene Chloride	ND	ug/L	100	29.0	25		11/15/17 22:28	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/L	125	13.7	25		11/15/17 22:28	108-10-1	
2-Propanol	ND	ug/L	2500	515	25		11/15/17 22:28	67-63-0	
Tetrahydrofuran	ND	ug/L	250	108	25		11/15/17 22:28	109-99-9	
Toluene	**275**	ug/L	25.0	4.3	25		11/15/17 22:28	108-88-3	
Xylene (Total)	**338**	ug/L	75.0	6.1	25		11/15/17 22:28	1330-20-7	
Surrogates									
1,2-Dichloroethane-d4 (S)	97	%.	75-137		25		11/15/17 22:28	17060-07-0	
Toluene-d8 (S)	94	%.	75-125		25		11/15/17 22:28	2037-26-5	
4-Bromofluorobenzene (S)	98	%.	75-125		25		11/15/17 22:28	460-00-4	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: 02181-202-038 Confidential-Oak
Pace Project No.: 10409650

Sample: OKMN-GW-PW10-DB-171102 **Lab ID: 10409650009** Collected: 11/02/17 08:30 Received: 11/03/17 09:33 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV	Analytical Method: EPA 8260B								
Acetone	ND	ug/L	1000	442	50		11/15/17 22:51	67-64-1	
Benzene	**511**	ug/L	50.0	17.0	50		11/15/17 22:51	71-43-2	
2-Butanone (MEK)	ND	ug/L	250	121	50		11/15/17 22:51	78-93-3	
sec-Butyl alcohol	ND	ug/L	2000	560	50		11/15/17 22:51	15892-23-6	
1,1-Dichloroethane	ND	ug/L	50.0	7.2	50		11/15/17 22:51	75-34-3	
1,2-Dichloroethane	ND	ug/L	50.0	16.1	50		11/15/17 22:51	107-06-2	
1,1-Dichloroethene	ND	ug/L	50.0	9.0	50		11/15/17 22:51	75-35-4	
cis-1,2-Dichloroethene	ND	ug/L	50.0	10.1	50		11/15/17 22:51	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	50.0	10.5	50		11/15/17 22:51	156-60-5	
Diisopropyl ether	**5420**	ug/L	50.0	6.2	50		11/15/17 22:51	108-20-3	
Ethylbenzene	**83.3**	ug/L	50.0	6.8	50		11/15/17 22:51	100-41-4	
4-Methyl-2-pentanol	ND	ug/L	2000	720	50		11/15/17 22:51	108-11-2	
Methylene Chloride	ND	ug/L	200	58.0	50		11/15/17 22:51	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/L	250	27.4	50		11/15/17 22:51	108-10-1	
2-Propanol	ND	ug/L	5000	1030	50		11/15/17 22:51	67-63-0	
Tetrahydrofuran	ND	ug/L	500	216	50		11/15/17 22:51	109-99-9	
Toluene	**295**	ug/L	50.0	8.6	50		11/15/17 22:51	108-88-3	
Xylene (Total)	**296**	ug/L	150	12.2	50		11/15/17 22:51	1330-20-7	
Surrogates									
1,2-Dichloroethane-d4 (S)	98	%.	75-137		50		11/15/17 22:51	17060-07-0	
Toluene-d8 (S)	98	%.	75-125		50		11/15/17 22:51	2037-26-5	
4-Bromofluorobenzene (S)	99	%.	75-125		50		11/15/17 22:51	460-00-4	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
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Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: 02181-202-038 Confidential-Oak
Pace Project No.: 10409650

Sample: OKMN-GW-PW11-0-171102 **Lab ID: 10409650010** Collected: 11/02/17 08:00 Received: 11/03/17 09:33 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV	Analytical Method: EPA 8260B								
Acetone	ND	ug/L	1000	442	50		11/15/17 23:15	67-64-1	
Benzene	**139**	ug/L	50.0	17.0	50		11/15/17 23:15	71-43-2	
2-Butanone (MEK)	ND	ug/L	250	121	50		11/15/17 23:15	78-93-3	
sec-Butyl alcohol	ND	ug/L	2000	560	50		11/15/17 23:15	15892-23-6	
1,1-Dichloroethane	ND	ug/L	50.0	7.2	50		11/15/17 23:15	75-34-3	
1,2-Dichloroethane	ND	ug/L	50.0	16.1	50		11/15/17 23:15	107-06-2	
1,1-Dichloroethene	ND	ug/L	50.0	9.0	50		11/15/17 23:15	75-35-4	
cis-1,2-Dichloroethene	ND	ug/L	50.0	10.1	50		11/15/17 23:15	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	50.0	10.5	50		11/15/17 23:15	156-60-5	
Diisopropyl ether	**6690**	ug/L	50.0	6.2	50		11/15/17 23:15	108-20-3	
Ethylbenzene	ND	ug/L	50.0	6.8	50		11/15/17 23:15	100-41-4	
4-Methyl-2-pentanol	ND	ug/L	2000	720	50		11/15/17 23:15	108-11-2	
Methylene Chloride	ND	ug/L	200	58.0	50		11/15/17 23:15	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/L	250	27.4	50		11/15/17 23:15	108-10-1	
2-Propanol	ND	ug/L	5000	1030	50		11/15/17 23:15	67-63-0	
Tetrahydrofuran	ND	ug/L	500	216	50		11/15/17 23:15	109-99-9	
Toluene	**60.9**	ug/L	50.0	8.6	50		11/15/17 23:15	108-88-3	
Xylene (Total)	ND	ug/L	150	12.2	50		11/15/17 23:15	1330-20-7	
Surrogates									
1,2-Dichloroethane-d4 (S)	98	%.	75-137		50		11/15/17 23:15	17060-07-0	
Toluene-d8 (S)	95	%.	75-125		50		11/15/17 23:15	2037-26-5	
4-Bromofluorobenzene (S)	99	%.	75-125		50		11/15/17 23:15	460-00-4	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 02181-202-038 Confidential-Oak
Pace Project No.: 10409650

Sample: OKMN-GW-W29-0-171102 **Lab ID: 10409650011** Collected: 11/02/17 09:50 Received: 11/03/17 09:33 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV	Analytical Method: EPA 8260B								
Acetone	**51900**	ug/L	2000	884	100		11/16/17 23:22	67-64-1	
Benzene	**1600**	ug/L	100	33.9	100		11/16/17 23:22	71-43-2	
2-Butanone (MEK)	**45800**	ug/L	500	242	100		11/16/17 23:22	78-93-3	
sec-Butyl alcohol	ND	ug/L	40.0	11.2	1		11/15/17 20:53	15892-23-6	
1,1-Dichloroethane	**205**	ug/L	1.0	0.14	1		11/15/17 20:53	75-34-3	
1,2-Dichloroethane	**312**	ug/L	100	32.2	100		11/16/17 23:22	107-06-2	
1,1-Dichloroethene	ND	ug/L	1.0	0.18	1		11/15/17 20:53	75-35-4	
cis-1,2-Dichloroethene	**649**	ug/L	100	20.2	100		11/16/17 23:22	156-59-2	
trans-1,2-Dichloroethene	**3.8**	ug/L	1.0	0.21	1		11/15/17 20:53	156-60-5	
Diisopropyl ether	**14200**	ug/L	100	12.5	100		11/16/17 23:22	108-20-3	
Ethylbenzene	**262**	ug/L	100	13.5	100		11/16/17 23:22	100-41-4	
4-Methyl-2-pentanol	**2370**	ug/L	40.0	14.4	1		11/15/17 20:53	108-11-2	
Methylene Chloride	**32.4**	ug/L	4.0	1.2	1		11/15/17 20:53	75-09-2	
4-Methyl-2-pentanone (MIBK)	**23000**	ug/L	500	54.9	100		11/16/17 23:22	108-10-1	
2-Propanol	**5810**	ug/L	100	20.6	1		11/15/17 20:53	67-63-0	E
Tetrahydrofuran	**66.7**	ug/L	10.0	4.3	1		11/15/17 20:53	109-99-9	
Toluene	**11000**	ug/L	100	17.1	100		11/16/17 23:22	108-88-3	
Xylene (Total)	**965**	ug/L	300	24.3	100		11/16/17 23:22	1330-20-7	
Surrogates									
1,2-Dichloroethane-d4 (S)	96	%.	75-137		1		11/15/17 20:53	17060-07-0	
Toluene-d8 (S)	95	%.	75-125		1		11/15/17 20:53	2037-26-5	
4-Bromofluorobenzene (S)	100	%.	75-125		1		11/15/17 20:53	460-00-4	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 02181-202-038 Confidential-Oak
Pace Project No.: 10409650

Sample: OKMN-GW-W6102-0-171102 **Lab ID: 10409650012** Collected: 11/02/17 12:10 Received: 11/03/17 09:33 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV	Analytical Method: EPA 8260B								
Acetone	ND	ug/L	20.0	8.8	1		11/16/17 19:49	67-64-1	
Benzene	ND	ug/L	1.0	0.34	1		11/16/17 19:49	71-43-2	
2-Butanone (MEK)	ND	ug/L	5.0	2.4	1		11/16/17 19:49	78-93-3	
sec-Butyl alcohol	ND	ug/L	40.0	11.2	1		11/16/17 19:49	15892-23-6	
1,1-Dichloroethane	ND	ug/L	1.0	0.14	1		11/16/17 19:49	75-34-3	
1,2-Dichloroethane	ND	ug/L	1.0	0.32	1		11/16/17 19:49	107-06-2	
1,1-Dichloroethene	ND	ug/L	1.0	0.18	1		11/16/17 19:49	75-35-4	
cis-1,2-Dichloroethene	ND	ug/L	1.0	0.20	1		11/16/17 19:49	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	1.0	0.21	1		11/16/17 19:49	156-60-5	
Diisopropyl ether	**110**	ug/L	1.0	0.12	1		11/16/17 19:49	108-20-3	
Ethylbenzene	ND	ug/L	1.0	0.14	1		11/16/17 19:49	100-41-4	
4-Methyl-2-pentanol	ND	ug/L	40.0	14.4	1		11/16/17 19:49	108-11-2	
Methylene Chloride	ND	ug/L	4.0	1.2	1		11/16/17 19:49	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/L	5.0	0.55	1		11/16/17 19:49	108-10-1	
2-Propanol	ND	ug/L	100	20.6	1		11/16/17 19:49	67-63-0	
Tetrahydrofuran	ND	ug/L	10.0	4.3	1		11/16/17 19:49	109-99-9	
Toluene	ND	ug/L	1.0	0.17	1		11/16/17 19:49	108-88-3	
Xylene (Total)	ND	ug/L	3.0	0.24	1		11/16/17 19:49	1330-20-7	
Surrogates									
1,2-Dichloroethane-d4 (S)	96	%.	75-137		1		11/16/17 19:49	17060-07-0	
Toluene-d8 (S)	95	%.	75-125		1		11/16/17 19:49	2037-26-5	
4-Bromofluorobenzene (S)	98	%.	75-125		1		11/16/17 19:49	460-00-4	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 02181-202-038 Confidential-Oak
Pace Project No.: 10409650

Sample: OKMN-GW-W80-0-171102 **Lab ID: 10409650013** Collected: 11/02/17 11:05 Received: 11/03/17 09:33 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260B MSV	Analytical Method: EPA 8260B								
Acetone	ND	ug/L	20.0	8.8	1		11/16/17 05:56	67-64-1	
Benzene	ND	ug/L	1.0	0.34	1		11/16/17 05:56	71-43-2	
2-Butanone (MEK)	ND	ug/L	5.0	2.4	1		11/16/17 05:56	78-93-3	
1,1-Dichloroethane	ND	ug/L	1.0	0.14	1		11/16/17 05:56	75-34-3	
1,2-Dichloroethane	ND	ug/L	1.0	0.32	1		11/16/17 05:56	107-06-2	
1,1-Dichloroethene	ND	ug/L	1.0	0.18	1		11/16/17 05:56	75-35-4	
cis-1,2-Dichloroethene	ND	ug/L	1.0	0.20	1		11/16/17 05:56	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	1.0	0.21	1		11/16/17 05:56	156-60-5	
Diisopropyl ether	ND	ug/L	1.0	0.12	1		11/16/17 05:56	108-20-3	
Ethylbenzene	ND	ug/L	1.0	0.14	1		11/16/17 05:56	100-41-4	
Tetrahydrofuran	ND	ug/L	10.0	4.3	1		11/16/17 05:56	109-99-9	
Surrogates									
1,2-Dichloroethane-d4 (S)	99	%.	75-137		1		11/16/17 05:56	17060-07-0	
Toluene-d8 (S)	94	%.	75-125		1		11/16/17 05:56	2037-26-5	
4-Bromofluorobenzene (S)	98	%.	75-125		1		11/16/17 05:56	460-00-4	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 02181-202-038 Confidential-Oak
Pace Project No.: 10409650

Sample: OKMN-SW-SW01-0-171102 **Lab ID: 10409650014** Collected: 11/02/17 12:30 Received: 11/03/17 09:33 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**259**	mg/L	10.0	5.0	1		11/08/17 13:56		
2540D Total Suspended Solids	Analytical Method: SM 2540D								
Total Suspended Solids	ND	mg/L	10.0	5.0	1		11/09/17 09:30		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 02181-202-038 Confidential-Oak
Pace Project No.: 10409650

Sample: OKMN-SW-SW12-0-171102 **Lab ID: 10409650015** Collected: 11/02/17 12:00 Received: 11/03/17 09:33 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**620**	mg/L	33.3	16.7	1		11/08/17 13:56		
2540D Total Suspended Solids	Analytical Method: SM 2540D								
Total Suspended Solids	ND	mg/L	10.0	5.0	1		11/09/17 09:30		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 02181-202-038 Confidential-Oak
Pace Project No.: 10409650

Sample: OKMN-SW-SW13-0-171102 **Lab ID: 10409650016** Collected: 11/02/17 11:48 Received: 11/03/17 09:33 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**593**	mg/L	33.3	16.7	1		11/08/17 13:56		
2540D Total Suspended Solids	Analytical Method: SM 2540D								
Total Suspended Solids	ND	mg/L	10.0	5.0	1		11/09/17 09:30		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 02181-202-038 Confidential-Oak
Pace Project No.: 10409650

Sample: OKMN-SW-SW14-0-171102 **Lab ID: 10409650017** Collected: 11/02/17 11:40 Received: 11/03/17 09:33 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**299**	mg/L	10.0	5.0	1		11/08/17 13:56		
2540D Total Suspended Solids	Analytical Method: SM 2540D								
Total Suspended Solids	ND	mg/L	10.0	5.0	1		11/09/17 09:30		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 02181-202-038 Confidential-Oak
Pace Project No.: 10409650

Sample: OKMN-SW-SW16-0-171102 **Lab ID: 10409650018** Collected: 11/02/17 11:25 Received: 11/03/17 09:33 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**298**	mg/L	10.0	5.0	1		11/08/17 13:56		
2540D Total Suspended Solids	Analytical Method: SM 2540D								
Total Suspended Solids	ND	mg/L	10.0	5.0	1		11/09/17 10:28		

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 02181-202-038 Confidential-Oak
Pace Project No.: 10409650

QC Batch: 508690 Analysis Method: EPA 8260B
QC Batch Method: EPA 8260B Analysis Description: 8260B MSV
Associated Lab Samples: 10409650001, 10409650002, 10409650003, 10409650004, 10409650005, 10409650006, 10409650007, 10409650008, 10409650009, 10409650010, 10409650011

METHOD BLANK: 2764672 Matrix: Water
Associated Lab Samples: 10409650001, 10409650002, 10409650003, 10409650004, 10409650005, 10409650006, 10409650007, 10409650008, 10409650009, 10409650010, 10409650011

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
1,1-Dichloroethane	ug/L	ND	1.0	0.14	11/15/17 15:22	
1,1-Dichloroethene	ug/L	ND	1.0	0.18	11/15/17 15:22	
1,2-Dichloroethane	ug/L	ND	1.0	0.32	11/15/17 15:22	
2-Butanone (MEK)	ug/L	ND	5.0	2.4	11/15/17 15:22	
2-Propanol	ug/L	ND	100	20.6	11/15/17 15:22	
4-Methyl-2-pentanol	ug/L	ND	40.0	14.4	11/15/17 15:22	
4-Methyl-2-pentanone (MIBK)	ug/L	ND	5.0	0.55	11/15/17 15:22	
Acetone	ug/L	ND	20.0	8.8	11/15/17 15:22	
Benzene	ug/L	ND	1.0	0.34	11/15/17 15:22	
cis-1,2-Dichloroethene	ug/L	ND	1.0	0.20	11/15/17 15:22	
Diisopropyl ether	ug/L	ND	1.0	0.12	11/15/17 15:22	
Ethylbenzene	ug/L	ND	1.0	0.14	11/15/17 15:22	
Methylene Chloride	ug/L	ND	4.0	1.2	11/15/17 15:22	
sec-Butyl alcohol	ug/L	ND	40.0	11.2	11/15/17 15:22	
Tetrahydrofuran	ug/L	ND	10.0	4.3	11/15/17 15:22	
Toluene	ug/L	ND	1.0	0.17	11/15/17 15:22	
trans-1,2-Dichloroethene	ug/L	ND	1.0	0.21	11/15/17 15:22	
Xylene (Total)	ug/L	ND	3.0	0.24	11/15/17 15:22	
1,2-Dichloroethane-d4 (S)	%.	97	75-137		11/15/17 15:22	
4-Bromofluorobenzene (S)	%.	98	75-125		11/15/17 15:22	
Toluene-d8 (S)	%.	95	75-125		11/15/17 15:22	

LABORATORY CONTROL SAMPLE & LCSD: 2764673 2764674

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
1,1-Dichloroethane	ug/L	20	18.4	17.1	92	86	62-130	7	20	
1,1-Dichloroethene	ug/L	20	17.3	16.1	86	81	64-134	7	20	
1,2-Dichloroethane	ug/L	20	19.1	18.9	96	94	64-126	1	20	
2-Butanone (MEK)	ug/L	100	94.2	96.8	94	97	57-142	3	20	
2-Propanol	ug/L	200	197	200	98	100	57-148	1	20	
4-Methyl-2-pentanol	ug/L	200	174	187	87	93	52-140	7	20	
4-Methyl-2-pentanone (MIBK)	ug/L	100	113	116	113	116	56-142	3	20	
Acetone	ug/L	100	112	109	112	109	75-133	2	20	
Benzene	ug/L	20	19.8	18.9	99	95	74-125	5	20	
cis-1,2-Dichloroethene	ug/L	20	17.4	17.0	87	85	75-125	2	20	
Diisopropyl ether	ug/L	20	17.2	16.9	86	84	72-126	2	20	
Ethylbenzene	ug/L	20	19.9	19.2	100	96	73-125	3	20	
Methylene Chloride	ug/L	20	17.3	17.0	86	85	74-125	2	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 02181-202-038 Confidential-Oak
Pace Project No.: 10409650

LABORATORY CONTROL SAMPLE & LCSD: 2764673 2764674

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
sec-Butyl alcohol	ug/L	200	204	209	102	104	50-149	3	20	
Tetrahydrofuran	ug/L	200	221	212	111	106	75-132	4	20	
Toluene	ug/L	20	19.2	18.1	96	91	75-125	6	20	
trans-1,2-Dichloroethene	ug/L	20	17.7	16.6	89	83	69-127	7	20	
Xylene (Total)	ug/L	60	60.5	59.7	101	100	75-125	1	20	
1,2-Dichloroethane-d4 (S)	%.				94	94	75-137			
4-Bromofluorobenzene (S)	%.				98	97	75-125			
Toluene-d8 (S)	%.				95	95	75-125			

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 02181-202-038 Confidential-Oak
Pace Project No.: 10409650

QC Batch: 508808 Analysis Method: EPA 8260B
QC Batch Method: EPA 8260B Analysis Description: 8260B MSV
Associated Lab Samples: 10409650013

METHOD BLANK: 2765196 Matrix: Water
Associated Lab Samples: 10409650013

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
1,1-Dichloroethane	ug/L	ND	1.0	0.14	11/16/17 03:58	
1,1-Dichloroethene	ug/L	ND	1.0	0.18	11/16/17 03:58	
1,2-Dichloroethane	ug/L	ND	1.0	0.32	11/16/17 03:58	
2-Butanone (MEK)	ug/L	ND	5.0	2.4	11/16/17 03:58	
Acetone	ug/L	ND	20.0	8.8	11/16/17 03:58	
Benzene	ug/L	ND	1.0	0.34	11/16/17 03:58	
cis-1,2-Dichloroethene	ug/L	ND	1.0	0.20	11/16/17 03:58	
Diisopropyl ether	ug/L	ND	1.0	0.12	11/16/17 03:58	
Ethylbenzene	ug/L	ND	1.0	0.14	11/16/17 03:58	
Tetrahydrofuran	ug/L	ND	10.0	4.3	11/16/17 03:58	
trans-1,2-Dichloroethene	ug/L	ND	1.0	0.21	11/16/17 03:58	
1,2-Dichloroethane-d4 (S)	%.	100	75-137		11/16/17 03:58	
4-Bromofluorobenzene (S)	%.	97	75-125		11/16/17 03:58	
Toluene-d8 (S)	%.	95	75-125		11/16/17 03:58	

LABORATORY CONTROL SAMPLE & LCSD: 2765197 2765198

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
1,1-Dichloroethane	ug/L	20	19.3	19.3	96	97	62-130	0	20	
1,1-Dichloroethene	ug/L	20	18.2	18.4	91	92	64-134	1	20	
1,2-Dichloroethane	ug/L	20	20.1	20.1	100	100	64-126	0	20	
2-Butanone (MEK)	ug/L	100	91.6	95.1	92	95	57-142	4	20	
Acetone	ug/L	100	112	110	112	110	75-133	2	20	
Benzene	ug/L	20	18.6	19.2	93	96	74-125	3	20	
cis-1,2-Dichloroethene	ug/L	20	18.3	18.7	91	93	75-125	2	20	
Diisopropyl ether	ug/L	20	18.2	18.6	91	93	72-126	2	20	
Ethylbenzene	ug/L	20	20.8	20.9	104	104	73-125	1	20	
Tetrahydrofuran	ug/L	200	220	218	110	109	75-132	1	20	
trans-1,2-Dichloroethene	ug/L	20	18.3	18.5	92	92	69-127	1	20	
1,2-Dichloroethane-d4 (S)	%.				97	98	75-137			
4-Bromofluorobenzene (S)	%.				98	96	75-125			
Toluene-d8 (S)	%.				96	98	75-125			

MATRIX SPIKE SAMPLE: 2766508

Parameter	Units	10410073001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
1,1-Dichloroethane	ug/L	ND	20	19.3	96	75-140	
1,1-Dichloroethene	ug/L	ND	20	18.5	92	73-150	

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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 02181-202-038 Confidential-Oak
Pace Project No.: 10409650

MATRIX SPIKE SAMPLE: 2766508

Parameter	Units	10410073001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
1,2-Dichloroethane	ug/L	ND	20	18.9	94	75-125	
2-Butanone (MEK)	ug/L	46.3	100	130	84	68-133	
Acetone	ug/L	148	100	262	114	56-150	
Benzene	ug/L	28.5	20	49.5	105	74-134	
cis-1,2-Dichloroethene	ug/L	ND	20	18.0	90	73-140	
Diisopropyl ether	ug/L	ND	20	17.2	86	63-138	
Ethylbenzene	ug/L	2.4	20	23.6	106	75-136	
Tetrahydrofuran	ug/L	ND	200	207	104	53-150	
trans-1,2-Dichloroethene	ug/L	ND	20	18.3	91	74-149	
1,2-Dichloroethane-d4 (S)	%.				95	75-137	
4-Bromofluorobenzene (S)	%.				97	75-125	
Toluene-d8 (S)	%.				97	75-125	

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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
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(612)607-1700

QUALITY CONTROL DATA

Project: 02181-202-038 Confidential-Oak
Pace Project No.: 10409650

QC Batch: 509016 Analysis Method: EPA 8260B
QC Batch Method: EPA 8260B Analysis Description: 8260B MSV
Associated Lab Samples: 10409650012

METHOD BLANK: 2766762 Matrix: Water
Associated Lab Samples: 10409650012

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
1,1-Dichloroethane	ug/L	ND	1.0	0.14	11/16/17 15:05	
1,1-Dichloroethene	ug/L	ND	1.0	0.18	11/16/17 15:05	
1,2-Dichloroethane	ug/L	ND	1.0	0.32	11/16/17 15:05	
2-Butanone (MEK)	ug/L	ND	5.0	2.4	11/16/17 15:05	
2-Propanol	ug/L	ND	100	20.6	11/16/17 15:05	
4-Methyl-2-pentanol	ug/L	ND	40.0	14.4	11/16/17 15:05	
4-Methyl-2-pentanone (MIBK)	ug/L	ND	5.0	0.55	11/16/17 15:05	
Acetone	ug/L	ND	20.0	8.8	11/16/17 15:05	
Benzene	ug/L	ND	1.0	0.34	11/16/17 15:05	
cis-1,2-Dichloroethene	ug/L	ND	1.0	0.20	11/16/17 15:05	
Diisopropyl ether	ug/L	ND	1.0	0.12	11/16/17 15:05	
Ethylbenzene	ug/L	ND	1.0	0.14	11/16/17 15:05	
Methylene Chloride	ug/L	ND	4.0	1.2	11/16/17 15:05	
sec-Butyl alcohol	ug/L	ND	40.0	11.2	11/16/17 15:05	
Tetrahydrofuran	ug/L	ND	10.0	4.3	11/16/17 15:05	
Toluene	ug/L	ND	1.0	0.17	11/16/17 15:05	
trans-1,2-Dichloroethene	ug/L	ND	1.0	0.21	11/16/17 15:05	
Xylene (Total)	ug/L	ND	3.0	0.24	11/16/17 15:05	
1,2-Dichloroethane-d4 (S)	%.	93	75-137		11/16/17 15:05	
4-Bromofluorobenzene (S)	%.	99	75-125		11/16/17 15:05	
Toluene-d8 (S)	%.	94	75-125		11/16/17 15:05	

LABORATORY CONTROL SAMPLE & LCSD: 2766763 2766764

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
1,1-Dichloroethane	ug/L	20	19.1	18.7	96	94	62-130	2	20	
1,1-Dichloroethene	ug/L	20	18.2	17.8	91	89	64-134	3	20	
1,2-Dichloroethane	ug/L	20	19.4	19.2	97	96	64-126	1	20	
2-Butanone (MEK)	ug/L	100	98.6	94.9	99	95	57-142	4	20	
2-Propanol	ug/L	200	212	202	106	101	57-148	5	20	
4-Methyl-2-pentanol	ug/L	200	215	204	107	102	52-140	5	20	
4-Methyl-2-pentanone (MIBK)	ug/L	100	114	115	114	115	56-142	1	20	
Acetone	ug/L	100	123	116	123	116	75-133	5	20	
Benzene	ug/L	20	21.1	20.3	106	101	74-125	4	20	
cis-1,2-Dichloroethene	ug/L	20	18.1	17.7	90	88	75-125	2	20	
Diisopropyl ether	ug/L	20	18.7	18.5	94	92	72-126	2	20	
Ethylbenzene	ug/L	20	21.1	20.7	106	103	73-125	2	20	
Methylene Chloride	ug/L	20	17.6	17.5	88	87	74-125	1	20	
sec-Butyl alcohol	ug/L	200	219	208	110	104	50-149	5	20	
Tetrahydrofuran	ug/L	200	233	232	117	116	75-132	1	20	

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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 02181-202-038 Confidential-Oak
Pace Project No.: 10409650

LABORATORY CONTROL SAMPLE & LCSD: 2766763 2766764

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
Toluene	ug/L	20	20.1	19.9	101	99	75-125	1	20	
trans-1,2-Dichloroethene	ug/L	20	17.9	17.6	90	88	69-127	2	20	
Xylene (Total)	ug/L	60	64.3	63.3	107	106	75-125	2	20	
1,2-Dichloroethane-d4 (S)	%.				94	93	75-137			
4-Bromofluorobenzene (S)	%.				99	100	75-125			
Toluene-d8 (S)	%.				98	98	75-125			

MATRIX SPIKE SAMPLE: 2766765

Parameter	Units	10410117001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
1,1-Dichloroethane	ug/L	ND	20	19.6	98	75-140	
1,1-Dichloroethene	ug/L	ND	20	19.4	97	73-150	
1,2-Dichloroethane	ug/L	ND	20	19.7	98	75-125	
2-Butanone (MEK)	ug/L	ND	100	96.9	97	68-133	
2-Propanol	ug/L	ND	200	431	170	54-150	M1
4-Methyl-2-pentanol	ug/L	ND	200	229	114	39-146	
4-Methyl-2-pentanone (MIBK)	ug/L	ND	100	119	119	67-150	
Acetone	ug/L	ND	100	140	140	56-150	
Benzene	ug/L	ND	20	21.5	108	74-134	
cis-1,2-Dichloroethene	ug/L	ND	20	19.0	95	73-140	
Diisopropyl ether	ug/L	ND	20	18.6	93	63-138	
Ethylbenzene	ug/L	ND	20	21.5	108	75-136	
Methylene Chloride	ug/L	ND	20	17.9	89	69-150	
sec-Butyl alcohol	ug/L	ND	200	220	110	55-136	
Tetrahydrofuran	ug/L	ND	200	272	136	53-150	
Toluene	ug/L	ND	20	21.1	105	71-138	
trans-1,2-Dichloroethene	ug/L	ND	20	19.4	97	74-149	
Xylene (Total)	ug/L	ND	60	66.3	111	75-131	
1,2-Dichloroethane-d4 (S)	%.				94	75-137	
4-Bromofluorobenzene (S)	%.				102	75-125	
Toluene-d8 (S)	%.				100	75-125	

SAMPLE DUPLICATE: 2766766

Parameter	Units	10410117002 Result	Dup Result	RPD	Max RPD	Qualifiers
1,1-Dichloroethane	ug/L	ND	ND		30	
1,1-Dichloroethene	ug/L	ND	ND		30	
1,2-Dichloroethane	ug/L	ND	ND		30	
2-Butanone (MEK)	ug/L	ND	ND		30	
2-Propanol	ug/L	193	114	51	30	D6
4-Methyl-2-pentanol	ug/L	ND	ND		30	
4-Methyl-2-pentanone (MIBK)	ug/L	ND	ND		30	
Acetone	ug/L	ND	ND		30	
Benzene	ug/L	ND	ND		30	

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QUALITY CONTROL DATA

Project: 02181-202-038 Confidential-Oak
Pace Project No.: 10409650

SAMPLE DUPLICATE: 2766766

Parameter	Units	10410117002 Result	Dup Result	RPD	Max RPD	Qualifiers
cis-1,2-Dichloroethene	ug/L	ND	ND		30	
Diisopropyl ether	ug/L	ND	ND		30	
Ethylbenzene	ug/L	ND	ND		30	
Methylene Chloride	ug/L	ND	ND		30	
sec-Butyl alcohol	ug/L	ND	ND		30	
Tetrahydrofuran	ug/L	ND	ND		30	
Toluene	ug/L	ND	ND		30	
trans-1,2-Dichloroethene	ug/L	ND	ND		30	
Xylene (Total)	ug/L	ND	ND		30	
1,2-Dichloroethane-d4 (S)	%.	96	96	0		
4-Bromofluorobenzene (S)	%.	98	100	2		
Toluene-d8 (S)	%.	95	96	1		

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 02181-202-038 Confidential-Oak
Pace Project No.: 10409650

QC Batch: 507225 Analysis Method: SM 2540C
QC Batch Method: SM 2540C Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 10409650014, 10409650015, 10409650016, 10409650017, 10409650018

METHOD BLANK: 2757154 Matrix: Water
Associated Lab Samples: 10409650014, 10409650015, 10409650016, 10409650017, 10409650018

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	ND	10.0	5.0	11/08/17 13:56	

LABORATORY CONTROL SAMPLE: 2757155

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	1000	986	99	80-120	

SAMPLE DUPLICATE: 2757156

Parameter	Units	10409856002 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	6720	6500	3	10	

SAMPLE DUPLICATE: 2757157

Parameter	Units	10410003001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	2000	2020	1	10	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 02181-202-038 Confidential-Oak
Pace Project No.: 10409650

QC Batch: 507515 Analysis Method: SM 2540D
QC Batch Method: SM 2540D Analysis Description: 2540D Total Suspended Solids
Associated Lab Samples: 10409650014, 10409650015, 10409650016, 10409650017

METHOD BLANK: 2758483 Matrix: Water
Associated Lab Samples: 10409650014, 10409650015, 10409650016, 10409650017

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Total Suspended Solids	mg/L	ND	10.0	5.0	11/09/17 09:30	

LABORATORY CONTROL SAMPLE: 2758484

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Suspended Solids	mg/L	100	94.0	94	80-120	

SAMPLE DUPLICATE: 2758485

Parameter	Units	10409456002 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Suspended Solids	mg/L	706	732	4	10	

SAMPLE DUPLICATE: 2758486

Parameter	Units	10409556001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Suspended Solids	mg/L	ND	ND		10	

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QUALITY CONTROL DATA

Project: 02181-202-038 Confidential-Oak
Pace Project No.: 10409650

QC Batch: 507516 Analysis Method: SM 2540D
QC Batch Method: SM 2540D Analysis Description: 2540D Total Suspended Solids
Associated Lab Samples: 10409650018

METHOD BLANK: 2758487 Matrix: Water
Associated Lab Samples: 10409650018

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Total Suspended Solids	mg/L	ND	10.0	5.0	11/09/17 10:28	

LABORATORY CONTROL SAMPLE: 2758488

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Suspended Solids	mg/L	100	100	100	80-120	

SAMPLE DUPLICATE: 2758489

Parameter	Units	10409650018 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Suspended Solids	mg/L	ND	ND		10	

SAMPLE DUPLICATE: 2758490

Parameter	Units	10409757003 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Suspended Solids	mg/L	ND	ND		10	

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REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: 02181-202-038 Confidential-Oak
Pace Project No.: 10409650

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-M	Pace Analytical Services - Minneapolis

BATCH QUALIFIERS

Batch: 508690

[M5]	A matrix spike/matrix spike duplicate was not performed for this batch due to insufficient sample volume.

Batch: 508808

[M5]	A matrix spike/matrix spike duplicate was not performed for this batch due to insufficient sample volume.

Batch: 509016

[M5]	A matrix spike/matrix spike duplicate was not performed for this batch due to insufficient sample volume.

ANALYTE QUALIFIERS

D6	The precision between the sample and sample duplicate exceeded laboratory control limits.
E	Analyte concentration exceeded the calibration range. The reported result is estimated.
M1	Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 02181-202-038 Confidential-Oak
Pace Project No.: 10409650

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10409650001	**OKMN-GW-TRIP02-171102**	EPA 8260B	508690		
10409650002	**OKMN-GW-PW10-RB03-171102**	EPA 8260B	508690		
10409650003	**OKMN-GW-PW01-0-171102**	EPA 8260B	508690		
10409650004	**OKMN-GW-PW02-0-171102**	EPA 8260B	508690		
10409650005	**OKMN-GW-PW03-0-171102**	EPA 8260B	508690		
10409650006	**OKMN-GW-PW04-0-171102**	EPA 8260B	508690		
10409650007	**OKMN-GW-PW06-0-171102**	EPA 8260B	508690		
10409650008	**OKMN-GW-PW10-0-171102**	EPA 8260B	508690		
10409650009	**OKMN-GW-PW10-DB-171102**	EPA 8260B	508690		
10409650010	**OKMN-GW-PW11-0-171102**	EPA 8260B	508690		
10409650011	**OKMN-GW-W29-0-171102**	EPA 8260B	508690		
10409650012	**OKMN-GW-W6102-0-171102**	EPA 8260B	509016		
10409650013	**OKMN-GW-W80-0-171102**	EPA 8260B	508808		
10409650014	**OKMN-SW-SW01-0-171102**	SM 2540C	507225		
10409650015	**OKMN-SW-SW12-0-171102**	SM 2540C	507225		
10409650016	**OKMN-SW-SW13-0-171102**	SM 2540C	507225		
10409650017	**OKMN-SW-SW14-0-171102**	SM 2540C	507225		
10409650018	**OKMN-SW-SW16-0-171102**	SM 2540C	507225		
10409650014	**OKMN-SW-SW01-0-171102**	SM 2540D	507515		
10409650015	**OKMN-SW-SW12-0-171102**	SM 2540D	507515		
10409650016	**OKMN-SW-SW13-0-171102**	SM 2540D	507515		
10409650017	**OKMN-SW-SW14-0-171102**	SM 2540D	507515		
10409650018	**OKMN-SW-SW16-0-171102**	SM 2540D	507516		

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CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

1409650

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Section A Required Client Information:

Company: WESTON
Address: 1400 WESTON WAY
WEST CHESTER, PA 19380
Email To: NATACC.Data@WestonSolutions.com
Phone: 610-701-3676 Fax: 610-701-3401
Requested Due Date/TAT: Standard TAT

Section B Required Project Information:

Report To: DAVE CAIRNS
Copy To: NATACC.Data@westonsolutions.com
Purchase Order No.:
Project Name: CONFIDENTIAL-OAKDALE
Project Number: 02181-202-038

Section C Invoice Information:

Attention: DAVE CAIRNS
Company Name: WESTON SOLUTIONS
Address: WEST CHESTER PA
Pace Quote Reference:
Pace Project Manager: TINA SOLTANI
Pace Profile #:

REGULATORY AGENCY
☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER MPCA
Site Location STATE: MN

Section D Required Client Information

SAMPLE ID
(A-Z, 0-9 / ,-)
Sample IDs MUST BE UNIQUE

Valid Matrix Codes

MATRIX	CODE
DRINKING WATER	DW
WATER	WT
WASTE WATER	WW
PRODUCT	P
SOIL/SOLID	SL
OIL	OL
WIPE	WP
AIR	AR
OTHER	OT
TISSUE	TS

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COLLECTED COMPOSITE START TIME	COLLECTED COMPOSITE END/GRAB DATE	COLLECTED COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test Y/N	VOC + OKMN-List1 (see notes)	VOC + OKMN-List2 (see notes)	TCLP VOCS	TCLP METALS	IGNITIBILITY	REACTIVITY	TSS/TDS	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	OKMN-GW-TRIP02-171102	WT	G			11/2/17	7:00		2				2					X	X								001
2	OKMN-GW-PW10-RB03-171102	WT	G			11/2/17	8:15		3				3					X	X								002
3	OKMN-GW-PW01-0-171102	WT	G			11/2/17	7:35		3				3					X	X								003
4	OKMN-GW-PW02-0-171102	WT	G			11/2/17	7:30		3				3					X	X								004
5	OKMN-GW-PW03-0-171102	WT	G			11/2/17	8:10		3				3					X	X								005
6	OKMN-GW-PW04-0-171102	WT	G			11/2/17	7:45		3				3					X	X								006
7	OKMN-GW-PW06-0-171102	WT	G			11/2/17	7:55		3				3					X	X								007
8	OKMN-GW-PW10-0-171102	WT	G			11/2/17	8:30		3				3					X	X								008
9	OKMN-GW-PW10-DB-171102	WT	G			11/2/17	8:30		3				3					X	X								009
10	OKMN-GW-PW11-0-171102	WT	G			11/2/17	8:00		3				3					X	X								010
11	OKMN-GW-W29-0-171102	WT	G			11/2/17	9:50		3				3					X	X								011
12	OKMN-GW-W6102-0-171102	WT	G			11/2/17	12:10		3				3					X	X								012

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
OKMN-List 1 : VOCs including: Acetone, Benzene, 1,1-DCA, 1,2-DCA, 1,1-DCE, cis & trans-1,2-DCE, ethylbenzene, isopropy ether, MEK, and tetrahydrofuran		11/3/17	0935		11/3/17	933	2.2	Y	N	Y
OKMN-List 2: VOCs including: isopropyl alcohol, 2-butyl alcohol, 4-Methyl-2-pentanol, methylene chloride, MIBK, toluene, and total xylenes.										
Please send results to: NATACC Data@westonsolutions.com										
							Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Denver Martin, Seth Welty

SIGNATURE of SAMPLER: DATE Signed (MM/DD/YY): 11/3/17

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Pace Analytical
www.pacelabs.com

Page: of

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Company:	WESTON
Address:	1400 WESTON WAY
	WEST CHESTER, PA 19380
Email To:	NATACC.Data@WestonSolutions.com
Phone: 610-701-3676	Fax: 610-701-3401
Requested Due Date/TAT:	Standard TAT

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Purchase Order No.:	
Project Name:	CONFIDENTIAL-OAKDALE
Project Number:	02181-202-038

Section C Invoice Information:

Attention:	DAVE CAIRNS
Company Name:	WESTON SOLUTIONS
Address:	WEST CHESTER PA
Pace Quote Reference:	
Pace Project Manager:	TINA SOLTANI
Pace Profile #:	

REGULATORY AGENCY: ☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER ☐ UST ☐ RCRA ☐ OTHER MPCA

Site Location STATE: MN

Section D Required Client Information

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Valid Matrix Codes: DRINKING WATER DW; WATER WT; WASTE WATER WW; PRODUCT P; SOIL/SOLID SL; OIL OL; WIPE WP; AIR AR; OTHER OT; TISSUE TS

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED Composite Start DATE	Composite Start TIME	Composite End/Grab DATE	Composite End/Grab TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	VOC - OKMN-List1 (see notes)	VOC - OKMN-List2 (see notes)	TCLP VOCS	TCLP METALS	IGNITIBILITY	REACTIVITY	TSS/TDS	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	OKMN-GW-W80-0-171102	WT	G			11/2/17	11:05		3				3						X								013
2	OKMN-SW-SW01-0-171102	WT	G			11/2/17	12:30		1	X															X		014
3	OKMN-SW-SW12-0-171102	WT	G			11/2/17	12:00		1	X															X		015
4	OKMN-SW-SW13-0-171102	WT	G			11/2/17	11:48		1	X															X		016
5	OKMN-SW-SW14-0-171102	WT	G			11/2/17	11:40		1	X															X		017
6	OKMN-SW-SW16-0-171102	WT	G			11/2/17	11:25		1	X															X		018
7		WT																									
8		WT																									
9		WT																									
10		WT																									
11		WT																									
12		WT																									

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
OKMN-List 1: VOCs including: Acetone, Benzene, 1,1-DCA, 1,2-DCA, 1,1-DCE cis & trans-1,2-DCE, ethylbenzene, isopropy ether, MEK, and tetrahydrofuran		11/3/17	0935		11/3/17	935
OKMN-List 2: VOCs including: isopropyl alcohol, 2-butyl alcohol, 4-Methyl-2-pentanol, methylene chloride, MIBK, toluene, and total xylenes						
Please send results to: NATACC.Data@westonsolutions.com						

SAMPLE CONDITIONS			
Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
2.2	Y	N	Y

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Denver Martin, Seth Welty

SIGNATURE of SAMPLER: DATE Signed (MM/DD/YY): 11/3/17

APPENDIX D
HISTORICAL VOC GROUNDWATER QUALITY DATA 2006-2017

Table D-1
Groundwater Quality Data - 2006-2017
VOC Pumpout Wells
Oakdale Site

Sample Location:	PW1	PW1	PW1	PW1	PW1	PW1	PW1	PW1	PW1	PW1	PW1	PW1
Sample Date:	11/10/2006	11/29/2007	11/21/2008	12/7/2009	12/7/2010	12/2/2011	11/15/2012	11/24/2013	11/20/2014	11/18/2015	11/3/2016	11/2/2017
Sample Code:	0	0	0	0	0	0	0	0	0	0	0	0
List 1 VOCs (µg/L)												
Acetone	**316 J**	**57.4**	**118**	**76.4**	< 500	< 125	<25.0	<2000	<2000	<1000	<2000	<2000
Benzene	**26.1**	**21.0**	**32.4**	**47.8**	< 50.0	**35.5**	**82.8**	<100	<100	<50.0	<100	<100
1,1-Dichloroethane	< 10.0	< 5.0	< 5.0	< 5.0	< 50.0	< 5.0	<1.0	<100	<100	<50.0	<100	<100
1,2-Dichloroethane	< 10.0	< 5.0	< 5.0	< 5.0	< 50.0	< 5.0	**3.9**	<100	<100	<50.0	<100	<100
1,1-Dichloroethylene	< 10.0	< 5.0	< 5.0	< 5.0	< 50.0	< 5.0	<1.0	<100	<100	<50.0	<100	<100
1,2-Dichloroethylene, cis	< 10.0	< 5.0	< 5.0	< 5.0	< 50.0	< 5.0	**6.0**	<100	<100	<50.0	<100	<100
1,2-Dichloroethylene, trans	< 10.0	< 5.0	< 5.0	< 5.0	< 50.0	< 20.0	<1.0	<100	<100	<50.0	<100	<100
Ethyl benzene	**11.3**	**13.9**	**8.6**	**18.0**	< 50.0	**15.0**	**39.6**	<100	<100	<50.0	<100	<100
Isopropyl ether	**5320**	**5280**	**7030**	**11300**	**7120**	**8220**	**11300**	**8240**	**7910**	**10300**	**12400**	**10600**
Methyl ethyl ketone	**91.4 J**	**42.9**	**36.0**	**47.1**	< 200	**21.9**	<4.0	<500	<500	<250	<500	<500
Tetrahydrofuran	< 100	< 50.0	< 50.0	< 50.0	< 500	< 50.0	**30.5**	<1000	<1000	<500	<1000	<1000
List 2 VOCs (µg/L)												
Isopropyl alcohol	< 300 J	< 150	< 200	< 200	< 5000	< 500	<100	<10000	<10000	<5000	<10000	<10000
2-Butyl alcohol	< 300	< 150	< 200	< 200	< 2000	< 200	<40.0	<4000	<4000	<2000	<4000	<4000
Methyl isobutyl alcohol	< 300 J	< 150	< 200	< 200	< 2000	< 200	<40.0	<4000	<4000	<2000	<4000	<4000
Methylene chloride	< 10.0	< 20.0	< 20.0	< 20.0	< 200	< 20.0	<4.0	<400	<400	<200	<400	<400
Methyl isobutyl ketone	**79.5**	**51.5**	**30.5 J**	**42.4**	< 200	**51.2**	**12.3**	<500	<500	<250	<500	<500
Toluene	**60.0**	**60.6**	**40.5**	**79.4**	**71.3**	**38.7**	**124**	<100	**388**	**115**	<100	**250**
Xylenes, total	**125**	**93.9**	**108**	**201**	< 150	**114**	**433**	<300	<300	<150	<300	<300
Total VOCs (µg/L)	**6029**	**5621**	**7404**	**11812**	**7191**	**8496**	**12032**	**8240**	**8298**	**10415**	**12400**	**10850**

< Detection Limit = Not Detected (ND) at or above listed detection limit.

0 = Primary Sample

DB = Duplicate Sample

J = Reported value is less than laboratory quantitation limit and is considered an estimated value.

Total VOCs: Includes J values; ND treated as 0.0; Original and duplicate results averaged.
Values were recalculated in 2014, by increasing the reported significant figures.

Table D-1 (cont'd)
Groundwater Quality Data - 2006-2017
VOC Pumpout Wells
Oakdale Site

Sample Location:	PW2	PW2	PW2	PW2	PW2	PW2	PW2	PW2	PW2	PW2	PW2	PW2
Sample Date:	11/10/2006	11/29/2007	11/21/2008	12/7/2009	12/7/2010	12/2/2011	11/15/2012	11/23/2013	11/20/2014	11/18/2015	11/3/2016	11/2/2017
Sample Code:	0	0	0	0	0	0	0	0	0	0	0	0
List 1 VOCs (µg/L)												
Acetone	**12900 J**	**10800**	**9320**	**7520**	**13800**	**12000**	**5170**	**19500**	**12200**	**2030**	<1000	**9260**
Benzene	**16.7**	**27.1**	**24.1**	**21.9**	< 50.0	**23.0**	**32.7**	<50.0	<50.0	<50.0	<50.0	<100
1,1-Dichloroethane	< 10.0	< 1.0	< 5.0	< 5.0	< 50.0	< 5.0	<1.0	<50.0	<50.0	<50.0	<50.0	<100
1,2-Dichloroethane	< 10.0	< 1.0	< 5.0	< 5.0	< 50.0	< 5.0	<1.0	<50.0	<50.0	<50.0	<50.0	<100
1,1-Dichloroethylene	< 10.0	< 1.0	< 5.0	< 5.0	< 50.0	< 5.0	<1.0	<50.0	<50.0	<50.0	<50.0	<100
1,2-Dichloroethylene, cis	< 10.0	< 1.0	< 5.0	< 5.0	< 50.0	< 5.0	<1.0	<50.0	<50.0	<50.0	<50.0	<100
1,2-Dichloroethylene, trans	< 10.0	< 1.0	< 5.0	< 5.0	< 50.0	< 20.0	<1.0	<50.0	<50.0	<50.0	<50.0	<100
Ethyl benzene	< 10.0	**10.6**	**8.7**	**7.8**	< 50.0	**6.7**	**12.2**	<50.0	<50.0	<50.0	<50.0	<100
Isopropyl ether	**5890**	**7790**	**6850**	**5970**	**9850**	**7670**	**8300**	**6640**	**8490**	**7980**	**10100**	**6780**
Methyl ethyl ketone	**6420 J**	**6900**	**4650**	**4330**	**7670**	**5970**	**2500**	**7420**	**6430**	**767**	<250	**3380**
Tetrahydrofuran	< 100	< 10.0	< 50.0	< 50.0	< 500	< 50.0	**35.9**	<500	<500	<500	<500	<1000
List 2 VOCs (µg/L)												
Isopropyl alcohol	**9680 J**	**15000**	**8000**	**8060**	**12000**	**8460**	**3470 J**	**6190**	**9770**	<5000	<5000	<10000
2-Butyl alcohol	**3720**	**5780 J**	**3620**	**3970**	**5710**	**3070**	**2460**	**2600**	**3610**	<2000	<2000	<4000
Methyl isobutyl alcohol	**646 J**	**558 J**	< 200	**249**	< 2000	**240**	**412**	<2000	<2000	<2000	<2000	<4000
Methylene chloride	< 10.0	< 4.0	< 20.0	< 20.0	< 200	< 20.0	<4.0	<200	<200	<200	<200	<400
Methyl isobutyl ketone	**1310**	**1870**	**749**	**925**	**1170**	**868**	**781**	**967**	**1120**	<250	<250	<500
Toluene	**112**	**142**	**123**	**117**	**142**	**87.7**	**158**	**92.3**	**431**	**107**	**93.1**	**266**
Xylenes, total	< 30.0	**30.3**	**24.4**	**21.9**	< 150	**20.1**	**39.4**	<150	<150	<150	<150	<300
Total VOCs (µg/L)	**40695**	**48908**	**33369**	**31193**	**50342**	**38416**	**23371**	**43409**	**42051**	**10884**	**10193**	**19686**

< Detection Limit = Not Detected (ND) at or above listed detection limit.

0 = Primary Sample

DB = Duplicate Sample

J = Reported value is less than laboratory quantitation limit and is considered an estimated value.

Total VOCs: Includes J values; ND treated as 0.0; Original and duplicate results averaged.
Values were recalculated in 2014, by increasing the reported significant figures.

Table D-1 (cont'd)
Groundwater Quality Data - 2006-2017
VOC Pumpout Wells
Oakdale Site

Sample Location:	PW3	PW3	PW3	PW3	PW3	PW3	PW3	PW3	PW3	PW3	PW3	PW3
Sample Date:	11/10/2006	11/29/2007	11/21/2008	12/7/2009	12/7/2010	12/2/2011	11/15/2012	11/24/2013	11/20/2014	11/18/2015	11/3/2016	11/2/2017
Sample Code:	0	0	0	0	0	0	0	0	0	0	0	0
List 1 VOCs (µg/L)												
Acetone	92900 J	66200	70300	76000	13500	27400	7730	3680	<2000	10300	<4000	<4000
Benzene	437	552	483	542	< 100	< 500	367	248	294	309	427	318
1,1-Dichloroethane	< 10.0	< 10.0	< 25.0	< 20.0	< 100	< 500	<1.0	<100	<100	<50.0	<200	<200
1,2-Dichloroethane	< 10.0	< 10.0	< 25.0	< 20.0	< 100	< 500	3.6	<100	<100	<50.0	<200	<200
1,1-Dichloroethylene	< 10.0	< 10.0	< 25.0	< 20.0	< 100	< 500	<1.0	<100	<100	<50.0	<200	<200
1,2-Dichloroethylene, cis	< 10.0	< 10.0	< 25.0	< 20.0	< 100	< 500	2.1	<100	<100	<50.0	<200	<200
1,2-Dichloroethylene, trans	< 10.0	< 10.0	< 25.0	< 20.0	< 100	< 2000	<1.0	<100	<100	<50.0	<200	<200
Ethyl benzene	276	320	270	304	< 100	< 500	187	<100	189	130	202	<200
Isopropyl ether	38300	43600	34100	44300	9350	29500	30500	12800	17500	20100	25400	20300
Methyl ethyl ketone	69400 J	65000	50200	61200	8330	17800	4820	1260	<500	6810	2890	2130
Tetrahydrofuran	< 100	259	< 250	219	< 1000	< 5000	179	<1000	<1000	<500	<2000	<2000
List 2 VOCs (µg/L)												
Isopropyl alcohol	82200	84100	43400	< 800	11000	< 50000	4260 J	<10000	<10000	<5000	<20000	<20000
2-Butyl alcohol	45400	70200 J	28400	47100	4330	< 20000	3250	<4000	<4000	2360	<8000	<8000
Methyl isobutyl alcohol	4190 J	4400	1690	3820	< 4000	< 20000	1940	<4000	<4000	<2000	<8000	<8000
Methylene chloride	< 10.0	< 40.0	< 100	< 80.0	< 400	< 2000	<4.0	<400	<400	<200	<800	<800
Methyl isobutyl ketone	12000	19300 J	6890	12900	1560	6370	3390	651	806	1220	1080	<1000
Toluene	3190	3510	2830	3620	233	2420	1550	566	1620	639	1000	488
Xylenes, total	723	843	749	947	< 300	< 1500	551	<300	543	403	<600	<600
Total VOCs (µg/L)	349016	358284	239312	250952	48303	83490	58730	19205	20952	42271	30999	23236

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Total VOCs: Includes J values; ND treated as 0.0; Original and duplicate results averaged.
Values were recalculated in 2014, by increasing the reported significant figures.

Table D-1 (cont'd)
Groundwater Quality Data - 2006-2017
VOC Pumpout Wells
Oakdale Site

Sample Location:	PW4	PW4	PW4	PW4	PW4	PW4	PW4	PW4	PW4	PW4	PW4	PW4
Sample Date:	11/10/2006	11/29/2007	11/21/2008	12/7/2009	12/7/2010	12/2/2011	11/15/2012	11/23/2013	11/20/2014	11/18/2015	11/8/2016	11/2/2017
Sample Code:	0	0	0	0	0	0	0	0	0	0	0	0
List 1 VOCs (µg/L)												
Acetone	5620 J	2400	2570	3960	3620	3100	3200	3080	<2000	2710	<2000	7000
Benzene	119	134	116	116	< 100	102	115	89.9	<100	171	117	147
1,1-Dichloroethane	< 10.0	< 10.0	< 10.0	< 10.0	< 100	< 10.0	<1.0	<1.0	<100	<50.0	<100	<25.0
1,2-Dichloroethane	< 10.0	< 10.0	< 10.0	< 10.0	< 100	< 10.0	2.1	<1.0	<100	<50.0	<100	<25.0
1,1-Dichloroethylene	< 10.0	< 10.0	< 10.0	< 10.0	< 100	< 10.0	<1.0	<1.0	<100	<50.0	<100	<25.0
1,2-Dichloroethylene, cis	< 10.0	< 10.0	< 10.0	< 10.0	< 100	< 10.0	3.9	<1.0	<100	<50.0	<100	<25.0
1,2-Dichloroethylene, trans	< 10.0	< 10.0	< 10.0	< 10.0	< 100	< 40.0	<1.0	<1.0	<100	<50.0	<100	<25.0
Ethyl benzene	27.2	25.0	19.8	20.0	< 100	14.1	18.7	6.3	<100	<50.0	<100	44.7
Isopropyl ether	17000	17400	14300	20900	13300	12400	13300	9180	8840	12500	15000	14200
Methyl ethyl ketone	2570 J	1780	996	1160	1050	1040	706	576	<500	696	563	1740
Tetrahydrofuran	< 100	< 100	< 100	< 100	< 1000	< 100	60.2	63.7	<1000	<500	<1000	<250
List 2 VOCs (µg/L)												
Isopropyl alcohol	5000 J	4260	1880	2620	< 10000	3220	1940	1560	<10000	<5000	<10000	6980
2-Butyl alcohol	1620	1670 J	497	1080	< 4000	856	978	389	<4000	<2000	<4000	1340
Methyl isobutyl alcohol	522 J	571	< 400	< 400	< 4000	< 400	140	64.6	<4000	<2000	<4000	<1000
Methylene chloride	< 10.0	< 40.0	< 40.0	< 40.0	< 400	< 40.0	<4.0	<4.0	<400	<200	<400	<100
Methyl isobutyl ketone	552	568 J	243 J	305	599	246	241	138	<500	<250	<500	1180
Toluene	196	200	148	159	136	102	174	67.6	219	107	255	963
Xylenes, total	101	89.2	74.9	92.0	< 300	80.7	108	78.6	<300	<150	<300	223
Total VOCs (µg/L)	33327	29097	20845	30412	18705	21161	20987	15294	9059	16184	15935	33818

< Detection Limit = Not Detected (ND) at or above listed detection limit.

0 = Primary Sample

DB = Duplicate Sample

J = Reported value is less than laboratory quantitation limit and is considered an estimated value.

Total VOCs: Includes J values; ND treated as 0.0; Original and duplicate results averaged.
Values were recalculated in 2014, by increasing the reported significant figures.

Table D-1 (cont'd)
Groundwater Quality Data - 2006-2017
VOC Pumpout Wells
Oakdale Site

Sample Location:	PW6	PW6	PW6	PW6	PW6	PW6	PW6	PW6	PW6	PW6	PW6	PW6
Sample Date:	11/10/2006	11/29/2007	11/21/2008	12/7/2009	12/7/2010	12/2/2011	11/15/2012	11/23/2013	11/20/2014	11/18/2015	11/3/2016	11/2/2017
Sample Code:	0	0	0	0	0	0	0	0	0	0	0	0
List 1 VOCs (µg/L)												
Acetone	**6.2 J**	< 5.0	< 10.0	< 50.0	< 100	< 125	**43.3**	<500	<500	<1000	<500	<500
Benzene	**12.3**	**13.4**	**10.9**	**19.0**	< 10.0	**8.7**	**27.3**	<25.0	**25.4**	<50.0	**28**	**32.3**
1,1-Dichloroethane	< 1.0	< 1.0	< 1.0	< 5.0	< 10.0	< 5.0	**1.0**	<25.0	<25.0	<50.0	<25.0	<25.0
1,2-Dichloroethane	< 1.0	< 1.0	< 1.0	< 5.0	< 10.0	< 5.0	**8.1**	<25.0	<25.0	<50.0	<25.0	<25.0
1,1-Dichloroethylene	< 1.0	< 1.0	< 1.0	< 5.0	< 10.0	< 5.0	<1.0	<25.0	<25.0	<50.0	<25.0	<25.0
1,2-Dichloroethylene, cis	< 1.0	< 1.0	< 1.0	< 5.0	< 10.0	< 5.0	**5.8**	<25.0	<25.0	<50.0	<25.0	<25.0
1,2-Dichloroethylene, trans	< 1.0	< 1.0	< 1.0	< 5.0	< 10.0	< 20.0	<1.0	<25.0	<25.0	<50.0	<25.0	<25.0
Ethyl benzene	**2.3**	**2.3**	**1.2**	< 5.0	< 10.0	< 5.0	**30.7**	<25.0	<25.0	<50.0	<25.0	<25.0
Isopropyl ether	**2130**	**2040**	**1540**	**2610**	**1410**	**1300**	**2930**	**3630**	**2660**	**3340**	**3480**	**3740**
Methyl ethyl ketone	< 5.0 J	< 5.0	< 4.0	< 20.0	< 40.0	< 20.0	<4.0	<125	<125	<250	<125	**152**
Tetrahydrofuran	< 10.0	< 10.0	< 10.0	< 50.0	< 100	< 50.0	<10.0	<250	<250	<500	<250	<250
List 2 VOCs (µg/L)												
Isopropyl alcohol	**44.9 J**	< 30.0	< 40.0	< 200	< 1000	< 500	**449**	<2500	<2500	<5000	<2500	<2500
2-Butyl alcohol	< 30.0	< 30.0	< 40.0	< 200	< 400	< 200	**66.5**	<1000	<1000	<2000	<1000	<1000
Methyl isobutyl alcohol	< 30.0 J	< 30.0	< 40.0	< 200	< 400	< 200	<40.0	<1000	<1000	<2000	<1000	<1000
Methylene chloride	< 1.0	< 4.0	< 4.0	< 20.0	< 40.0	< 20.0	<4.0	<100	<100	<200	<100	<100
Methyl isobutyl ketone	< 5.0	< 5.0	< 4.0 J	< 20.0	< 40.0	< 20.0	**5.6**	<125	<125	<250	<125	**134**
Toluene	**3.2**	**11.3**	**7.4**	**6.3**	< 10.0	< 5.0	**166**	<25.0	**26.2**	<50.0	<25.0	**60.5**
Xylenes, total	**3.6**	**6.9**	**4.3**	< 15.0	< 30.0	< 15.0	**54.9**	<75.0	<75.0	<150	<75.0	<75.0
Total VOCs (µg/L)	**2203**	**2074**	**1564**	**2635**	**1410**	**1309**	**3788**	**3630**	**2712**	**3340**	**3508**	**4119**

< Detection Limit = Not Detected (ND) at or above listed detection limit.

0 = Primary Sample

DB = Duplicate Sample

J = Reported value is less than laboratory quantitation limit and is considered an estimated value.

Total VOCs: Includes J values; ND treated as 0.0; Original and duplicate results averaged.
Values were recalculated in 2014, by increasing the reported significant figures.

Table D-1 (cont'd)
Groundwater Quality Data - 2006-2017
VOC Pumpout Wells
Oakdale Site

Sample Location:	PW10	PW10	PW10	PW10	PW10	PW10	PW10		PW10	
Sample Date:	11/10/2006	11/29/2007	12/12/2008	12/7/2009	12/1/2010	12/2/2011	11/15/2012		11/24/2013	
Sample Code:	0	0	0	0	0	0	0	DB	0	DB
List 1 VOCs (µg/L)										
Acetone	< 50.0 J	< 50.0	< 100	< 100	**1640**	< 125	<25.0	<25.0	<1000	<20.0
Benzene	**546**	**1240**	**1010**	**1060**	**423**	**1110**	**1420**	**1420**	**1130**	**1130**
1,1-Dichloroethane	< 10.0	< 10.0	< 10.0	< 10.0	< 100	< 5.0	**1.2**	**1.3**	<50.0	<1.0
1,2-Dichloroethane	< 10.0	< 10.0	< 10.0	< 10.0	< 100	**10.3**	**9.6**	**12.9**	<50.0	**1.4**
1,1-Dichloroethylene	< 10.0	< 10.0	< 10.0	< 10.0	< 100	< 5.0	<1.0	<1.0	<50.0	<1.0
1,2-Dichloroethylene, cis	**15.7**	**10.3**	**114**	< 10.0	< 100	**12.6**	**25.4**	**26.9**	<50.0	**6.2**
1,2-Dichloroethylene, trans	< 10.0	< 10.0	< 10.0	< 10.0	< 100	< 20.0	<1.0	<1.0	<50.0	<1.0
Ethyl benzene	**257**	**240**	**639**	**248**	**126**	**192**	**264**	**363**	**223**	**191**
Isopropyl ether	**12100**	**13300**	**13000**	**11200**	**7850**	**6420**	**6870**	**6590**	**4940**	**4590**
Methyl ethyl ketone	< 50.0 J	< 50.0	< 40.0	< 40.0	**1400**	< 20.0	<4.0	<4.0	<250	<5.0
Tetrahydrofuran	**369**	**465**	**321**	**233**	< 1000	**203**	**251**	**233**	<500	**214**
List 2 VOCs (µg/L)										
Isopropyl alcohol	< 300 J	< 300	< 400	< 400	< 10000	< 500	<100	<100	<5000	<100
2-Butyl alcohol	< 300	< 300	< 400	< 400	< 4000	< 200	<40.0	<40.0	<2000	<40.0
Methyl isobutyl alcohol	< 300 J	**501**	< 400	< 400	< 4000	< 200	<40.0	<40.0	<2000	<40.0
Methylene chloride	< 10.0	< 40.0	< 40.0 J	< 40.0	< 400	< 20.0	<4.0	<4.0	<200	<4.0
Methyl isobutyl ketone	< 50.0	**538 J**	< 40.0	< 40.0	< 400	**25.1**	<4.0	**4.6**	<250	**6.8**
Toluene	**1190**	**384**	**4540**	**710**	**535**	**456**	**991**	**1990**	**1320**	**198**
Xylenes, total	**919**	**737**	**1900**	**731**	**447**	**450**	**762**	**1000**	**688**	**449**
Total VOCs (µg/L)	**15397**	**17415**	**21524**	**14182**	**12421**	**8879**	**11118**		**7544**	

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Total VOCs: Includes J values; ND treated as 0.0; Original and duplicate results averaged.
Values were recalculated in 2014, by increasing the reported significant figures.

Table D-1 (cont'd)
Groundwater Quality Data - 2006-2017
VOC Pumpout Wells
Oakdale Site

Sample Location:	PW10		PW10		PW10		PW10	
Sample Date:	11/20/2014		11/18/2015		11/3/2016		11/2/2017	
Sample Code:	0	DB	0	DB	0	DUP	0	DB
List 1 VOCs (µg/L)								
Acetone	<1000	<1000	<1000	<20.0	<500	<200	<500	<1000
Benzene	**950**	**940**	**693**	**415**	**911**	**931**	**469**	**511**
1,1-Dichloroethane	<50.0	<50.0	<50.0	<1.0	<25.0	<10.0	<25.0	<50.0
1,2-Dichloroethane	<50.0	<50.0	<50.0	<1.0	<25.0	<10.0	<25.0	<50.0
1,1-Dichloroethylene	<50.0	<50.0	<50.0	<1.0	<25.0	<10.0	<25.0	<50.0
1,2-Dichloroethylene, cis	<50.0	<50.0	<50.0	**1.2**	<25.0	<10.0	<25.0	<50.0
1,2-Dichloroethylene, trans	<50.0	<50.0	<50.0	<1.0	<25.0	<10.0	<25.0	<50.0
Ethyl benzene	**245**	**214**	**91.1**	**109**	**175**	**227**	**78.7**	**83.3**
Isopropyl ether	**4170**	**3720**	**3110**	**828**	**4750**	**4750**	**5460**	**5420**
Methyl ethyl ketone	<250	<250	<250	<5.0	<125	<50.0	<125	<250
Tetrahydrofuran	<500	<500	<500	**131**	<250	**123**	<250	<500
List 2 VOCs (µg/L)								
Isopropyl alcohol	<5000	<5000	<5000	<100	<2500	<1000	<2500	<5000
2-Butyl alcohol	<2000	<2000	<2000	<40.0	<1000	<400	<1000	<2000
Methyl isobutyl alcohol	<2000	<2000	<2000	<40.0	<1000	<400	<1000	<2000
Methylene chloride	<200	<200	<200	<4.0	<100	<40.0	<100	<200
Methyl isobutyl ketone	<250	<250	<250	<5.0	<125	<50.0	<125	<250
Toluene	**1390**	**883**	**161**	**153**	**75.1**	**210**	**275**	**295**
Xylenes, total	**883**	**779**	**273**	**380**	**329**	**454**	**338**	**296**
Total VOCs (µg/L)	**7087**		**3173**		**6468**		**6613**	

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Total VOCs: Includes J values; ND treated as 0.0; Original and duplicate results averaged.
Values were recalculated in 2014, by increasing the reported significant figures.

Table D-1 (cont'd)
Groundwater Quality Data - 2006-2017
VOC Pumpout Wells
Oakdale Site

Sample Location:	PW11	PW11	PW11	PW11	PW11	PW11	PW11	PW11	PW11	PW11	PW11	PW11
Sample Date:	11/10/2006	11/29/2007	11/21/2008	12/7/2009	12/7/2010	12/2/2011	11/15/2012	11/23/2013	11/20/2014	11/18/2015	11/3/2016	11/2/2017
Sample Code:	0	0	0	0	0	0	0	0	0	0	0	0
List 1 VOCs (µg/L)												
Acetone	**17.9 J**	< 5.0	**10.6**	< 50.0	< 500	< 125	<25.0	<20.0	<2000	<4000	<1000	<1000
Benzene	**70.0**	**74.7**	**71.7**	**65.6**	**69.6**	**74.4**	**114**	**122**	**112**	<200	**154**	**139**
1,1-Dichloroethane	< 1.0	< 1.0	< 1.0	< 5.0	< 50.0	< 5.0	<1.0	<1.0	<100	<200	<50.0	<50.0
1,2-Dichloroethane	< 1.0	< 1.0	< 1.0	< 5.0	< 50.0	< 5.0	**10.3**	<1.0	<100	<200	<50.0	<50.0
1,1-Dichloroethylene	< 1.0	< 1.0	< 1.0	< 5.0	< 50.0	< 5.0	<1.0	<1.0	<100	<200	<50.0	<50.0
1,2-Dichloroethylene, cis	< 1.0	< 1.0	< 1.0	< 5.0	< 50.0	< 5.0	**6.1**	<1.0	<100	<200	<50.0	<50.0
1,2-Dichloroethylene, trans	< 1.0	< 1.0	< 1.0	< 5.0	< 50.0	< 20.0	<1.0	<1.0	<100	<200	<50.0	<50.0
Ethyl benzene	**2.5**	**2.8**	< 1.0	< 5.0	< 50.0	< 5.0	**37.0**	**5.2**	<100	<200	<50.0	<50.0
Isopropyl ether	**6260**	**6930**	**6030**	**7230**	**7220**	**5820**	**7800**	**6210**	**4330**	**14500**	**7080**	**6690**
Methyl ethyl ketone	< 5.0 J	**7.9**	< 4.0	< 20.0	< 200	< 20.0	<4.0	**7.8**	<500	**1110**	<250	<250
Tetrahydrofuran	**11.4**	**13.2**	**10.6**	< 50.0	< 500	< 50.0	**26.7**	**23.5**	<1000	<2000	<500	<500
List 2 VOCs (µg/L)												
Isopropyl alcohol	**512 J**	< 30.0	< 40.0	< 200	< 5000	< 500	<100	<100	<10000	<20000	<5000	<5000
2-Butyl alcohol	< 30.0	< 30.0	< 40.0	< 200	< 2000	< 200	<40.0	<40.0	<4000	<8000	<2000	<2000
Methyl isobutyl alcohol	< 30.0 J	< 30.0	< 40.0	< 200	< 2000	< 200	<40.0	<40.0	<4000	<8000	<2000	<2000
Methylene chloride	< 1.0	< 4.0	< 4.0	< 20.0	< 200	< 20.0	<4.0	<4.0	<400	<800	<200	<200
Methyl isobutyl ketone	< 5.0	< 5.0	< 4.0 J	< 20.0	< 200	< 20.0	**9.3**	**10.6**	<500	<1000	<250	<250
Toluene	**4.7**	**7.2**	**4.1**	**8.4**	< 50.0	**6.4**	**243**	**16.0**	<100	<200	<50.0	**60.9**
Xylenes, total	**22.3**	**30.3**	**27.0**	**17.3**	< 150	< 150	**127**	**59.5**	<300	<600	<150	<150
Total VOCs (µg/L)	**6901**	**7066**	**6154**	**7321**	**7290**	**5901**	**8373**	**6455**	**4442**	**15610**	**7234**	**6890**

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Total VOCs: Includes J values; ND treated as 0.0; Original and duplicate results averaged.
Values were recalculated in 2014, by increasing the reported significant figures.

Table D-2
Groundwater Quality Data - 2006-2017
VOC Pumpout Wells Converted to Monitoring Wells
Oakdale Site

Sample Location:	PW7	PW7		PW7	PW7		PW7		PW7	PW7	PW7
Sample Date:	5/18/2006	11/9/2006		5/24/2007	11/29/2007		5/15/2008		11/20/2008	5/14/2009	12/7/2009
Sample Code:	0	0	DB	0	0	DB	0	DB	0	0	0
List 1 VOCs (µg/L)											
Acetone	< 50.0	**12.8 J**	**17.9 J**	**25.8**	< 5.0	< 5.0	< 10.0 J	< 10.0 J	< 50.0	< 50.0	< 50.0
Benzene	**59.3**	**105**	**99.0**	**58.8**	**75.8**	**80.1**	**40.8**	**40.1**	**76.0**	**62.9**	**80.6**
1,1-Dichloroethane	< 10.0	< 1.0	< 1.0	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0
1,2-Dichloroethane	< 10.0	< 1.0	< 1.0	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0
1,1-Dichloroethylene	< 10.0	< 1.0	< 1.0	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0
1,2-Dichloroethylene, cis	< 10.0	< 1.0	< 1.0	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0
1,2-Dichloroethylene, trans	< 10.0	< 1.0	< 1.0	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0
Ethyl benzene	**163**	**236**	**197**	**49.0**	**59.2**	**63.5**	**3.6**	**3.1**	**67.5**	**9.2**	**34.1**
Isopropyl ether	**4610**	**4610**	**5390**	**2980**	**3360**	**3700**	**1960**	**1960**	**3160**	**3760**	**4560**
Methyl ethyl ketone	< 50.0	< 5.0 J	< 5.0 J	< 10.0	< 5.0	< 5.0	< 4.0	< 4.0	**23.4**	< 20.0	< 20.0
Tetrahydrofuran	< 100	< 10.0	< 10.0	< 20.0	< 10.0	< 10.0	< 10.0	< 10.0	< 50.0	< 50.0	< 50.0
List 2 VOCs (µg/L)											
Isopropyl alcohol	< 300	**343 J**	**473 J**	< 60.0	< 30.0	< 30.0	< 40.0	< 40.0	< 200	< 200	< 200
2-Butyl alcohol	< 300 J	< 30.0	< 30.0	< 60.0	< 30.0	< 30.0	< 40.0	< 40.0	< 200	< 200	< 200
Methyl isobutyl alcohol	< 300	< 30.0 J	< 30.0 J	< 60.0	< 30.0	< 30.0	< 40.0	< 40.0	< 200	< 200	< 200
Methylene chloride	< 10.0	< 1.0	< 1.0	< 2.0	< 4.0	< 4.0	< 4.0	< 4.0	< 20.0	< 20.0	< 20.0
Methyl isobutyl ketone	< 50.0	< 5.0	< 5.0	< 10.0	< 5.0	< 5.0	< 4.0	< 4.0	< 20.0 J	< 20.0	< 20.0
Toluene	**14.3**	**12.4**	**10.6**	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0
Xylenes, total	**432**	**1020**	**966**	**409 J**	**575**	**592**	**201**	**189**	**802**	**330**	**831**
Total VOCs (µg/L)	**5279**	**6746**		**3523**	**4253**		**2199**		**4129**	**4162**	**5506**

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Total VOCs: Includes J values; ND treated as 0.0; Original and duplicate results averaged.
Values were recalculated in 2014, by increasing the reported significant figures.

Table D-2 (cont'd)
Groundwater Quality Data - 2006-2017
VOC Pumpout Wells Converted to Monitoring Wells
Oakdale Site

Sample Location:	PW7		PW7	PW7	PW7		PW7		PW7	PW7	PW7
Sample Date:	5/20/2010		12/7/2010	5/12/2011	12/1/2011		6/14/2012		11/13/2012	6/12/2013	11/21/2013
Sample Code:	0	DB	0	0	0	DB	0	DB	0	0	0
List 1 VOCs (µg/L)											
Acetone	< 50.0	< 50.0	< 250	< 125	< 500	< 2500	< 25.0	< 25.0	<250	<1000	<20.0
Benzene	**54.0**	**57.6**	**80.0**	**37.4**	**294**	**339**	**169**	**174**	**133**	**112**	**98.0**
1,1-Dichloroethane	< 5.0	< 5.0	< 25.0	< 5.0	< 20.0	< 100	< 1.0	< 1.0	<10.0	<50.0	<1.0
1,2-Dichloroethane	< 5.0	< 5.0	< 25.0	< 5.0	< 20.0	< 100	< 1.0	< 1.0	<10.0	<50.0	<1.0
1,1-Dichloroethylene	< 5.0	< 5.0	< 25.0	< 5.0	< 20.0	< 100	< 1.0	< 1.0	<10.0	<50.0	<1.0
1,2-Dichloroethylene, cis	< 5.0	< 5.0	< 25.0	< 5.0	< 20.0	< 100	< 1.0	< 1.0	<10.0	<50.0	<1.0
1,2-Dichloroethylene, trans	< 5.0	< 5.0	< 25.0	< 20.0	< 80.0	< 400	< 1.0	< 1.0	<10.0	<50.0	<1.0
Ethyl benzene	**6.9**	**6.0**	**35.2**	< 5.0	**775**	**884**	**101**	**105**	<10.0	<50.0	**15.2**
Isopropyl ether	**3590**	**3740**	**3970**	**2380**	**8780**	**9940**	**5910**	**5840**	**4610**	**4090**	**4140**
Methyl ethyl ketone	< 20.0	< 20.0	< 100	< 20.0	< 80.0	< 400	< 4.0	< 4.0	<40.0	<250	<5.0
Tetrahydrofuran	< 50.0	< 50.0	< 250	< 50.0	< 200	< 1000	< 10.0	< 10.0	<100	<500	<10.0
List 2 VOCs (µg/L)											
Isopropyl alcohol	< 200	< 200	< 2500	< 500	< 2000	< 10000	< 100	< 100	<1000	<5000	<100
2-Butyl alcohol	< 200	< 200	< 1000	< 200	< 800	< 4000	< 40.0	< 40.0	<400	<2000	<40.0
Methyl isobutyl alcohol	< 200	< 200	< 1000	< 200	< 800	< 4000	< 40.0	< 40.0	<400	<2000	<40.0
Methylene chloride	< 20.0	< 20.0	< 100	< 20.0	< 80.0	< 400	< 4.0	< 4.0	<40.0	<200	<4.0
Methyl isobutyl ketone	< 20.0	< 20.0	< 100	< 20.0	< 80.0	< 400	< 4.0	< 4.0	<40.0	<250	<5.0
Toluene	< 5.0	< 5.0	**45.0**	< 5.0	**1210**	**1360**	**250**	**252**	**30.3**	<50.0	**229**
Xylenes, total	**567**	**585**	**1080**	**366**	**3150**	**3800**	**2060**	**2020**	**1890**	**1150**	**1290**
Total VOCs (µg/L)	**4303**		**5210**	**2783**	**15266**		**8441**		**6663**	**5352**	**5772**

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Total VOCs: Includes J values; ND treated as 0.0; Original and duplicate results averaged.
Values were recalculated in 2014, by increasing the reported significant figures.

Table D-2 (cont'd)
Groundwater Quality Data - 2006-2017
VOC Pumpout Wells Converted to Monitoring Wells
Oakdale Site

Sample Location:	PW7	PW7	PW7	PW7		PW7	PW7		PW7	PW7	
Sample Date:	6/13/2014	11/18/2014	6/15/2015	11/18/2015		6/15/2016	11/1/2016		6/14/2017	10/31/2017	
Sample Code:	0	0	0	0	DB	0	0	DUP	0	0	DB
List 1 VOCs (µg/L)											
Acetone	<1000	<400	<400	<1000	<1000	<200	<200	<500	<500	<500	<500
Benzene	**55.5**	**114**	**51.5**	<50.0	<50.0	**37.9**	**46.7**	**36.6**	**77.0**	**102**	**98.5**
1,1-Dichloroethane	<50.0	<20.0	<20.0	<50.0	<50.0	<10.0	<10.0	<25.0	<25.0	<25.0	<25.0
1,2-Dichloroethane	<50.0	<20.0	<20.0	<50.0	<50.0	<10.0	<10.0	<25.0	<25.0	<25.0	<25.0
1,1-Dichloroethylene	<50.0	<20.0	<20.0	<50.0	<50.0	<10.0	<10.0	<25.0	<25.0	<25.0	<25.0
1,2-Dichloroethylene, cis	<50.0	<20.0	<20.0	**62.3**	<50.0	<10.0	<10.0	<25.0	<25.0	<25.0	<25.0
1,2-Dichloroethylene, trans	<50.0	<20.0	<20.0	<50.0	<50.0	<10.0	<10.0	<25.0	<25.0	<25.0	<25.0
Ethyl benzene	<50.0	<20.0	<20.0	<50.0	<50.0	**17.7**	**12**	<25.0	<25.0	<25.0	<25.0
Isopropyl ether	**3810**	**4090**	**4280**	**2490**	**2280**	**1730**	**2760**	**2390**	**4360**	**4090**	**4090**
Methyl ethyl ketone	<250	<100	<100	<250	<250	<50.0	<50.0	<125	<125	<125	<125
Tetrahydrofuran	<500	<200	<200	<500	<500	<100	<100	<250	<250	<250	<250
List 2 VOCs (µg/L)											
Isopropyl alcohol	<5000	<2000	<2000	<5000	<5000	<1000	<1000	<2500	<2500	<2500	<2500
2-Butyl alcohol	<2000	<800	<800	<2000	<2000	<400	<400	<1000	<1000	<1000	<1000
Methyl isobutyl alcohol	<2000	<800	<800	<2000	<2000	<400	<400	<1000	<1000	<1000	<1000
Methylene chloride	<200	<80.0	<80.0	<200	<200	<40.0	<40.0	<100	<100	<100	<100
Methyl isobutyl ketone	<250	<100	<400	<250	<250	<50.0	<50.0	<125	<125	<125	<125
Toluene	**250**	<20.0	<20.0	**159**	**127**	<10.0	**66.5**	**46.5**	**38.2**	<25.0	<25.0
Xylenes, total	**490**	**1640**	**627**	**415**	**386**	**701**	**843**	**617**	**1200**	**1870**	**1850**
Total VOCs (µg/L)	**4606**	**5844**	**4959**	**2960**		**2487**	**3409**		**5675**	**6050**	

< Detection Limit = Not Detected (ND) at or above listed detection limit.

0 = Primary Sample

DB = Duplicate Sample

J = Reported value is less than laboratory quantitation limit and is considered an estimated value.

Total VOCs: Includes J values; ND treated as 0.0; Original and duplicate results averaged.
Values were recalculated in 2014, by increasing the reported significant figures.

Table D-2 (cont'd)
Groundwater Quality Data - 2006-2017
VOC Pumpout Wells Converted to Monitoring Wells
Oakdale Site

Sample Location:	PW8		PW8	PW8		PW8	PW8	PW8		PW8	
Sample Date:	5/18/2006		11/9/2006	5/24/2007		11/29/2007	5/15/2008	11/20/2008		5/14/2009	
Sample Code:	0	DB	0	0	DB	0	0	0	DB	0	DB
List 1 VOCs (µg/L)											
Acetone	< 50.0	**11.1**	**20.8 J**	**28.4**	**16.1**	< 5.0 J	< 10.0 J	**20.7 J**	**21.7 J**	< 50.0	< 10.0
Benzene	**133**	**142**	**294**	**197**	**184**	**308 J**	**96.4**	**434**	**411**	**300**	**292**
1,1-Dichloroethane	< 10.0	**1.4**	**1.2**	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0	< 1.0
1,2-Dichloroethane	< 10.0	< 1.0	< 1.0	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0	< 1.0
1,1-Dichloroethylene	< 10.0	< 1.0	< 1.0	< 2.0	< 1.0	< 1.0 J	< 1.0	< 1.0	< 1.0	< 5.0	< 1.0
1,2-Dichloroethylene, cis	< 10.0	< 1.0	< 1.0	< 2.0	< 1.0	< 1.0 J	< 1.0	< 1.0	< 1.0	< 5.0	< 1.0
1,2-Dichloroethylene, trans	< 10.0	< 1.0	< 1.0	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0	< 1.0
Ethyl benzene	**60.9**	**68.8**	**44.7**	**12.4**	**14.6**	**15.0**	< 1.0	**32.1**	**28.0**	< 5.0	**2.6**
Isopropyl ether	**3120**	**2660**	**5880**	**4080**	**4130**	**6990 J**	**2200**	**7630**	**7890**	**7570**	**7300**
Methyl ethyl ketone	< 50.0	< 5.0	< 5.0 J	< 10.0	< 5.0	**6.9**	< 4.0	**5.0**	< 4.0	< 20.0	< 4.0
Tetrahydrofuran	< 100	**17.3**	**36.9**	**32.3**	**29.1**	**56.5**	**10.6**	**39.2**	**45.9**	< 50.0	**43.7**
List 2 VOCs (µg/L)											
Isopropyl alcohol	< 300	< 30.0	**304 J**	< 60.0	< 30.0	< 30.0	< 40.0	< 40.0	< 40.0	< 200	< 40.0
2-Butyl alcohol	< 300 J	< 30.0	< 30.0	< 60.0	< 30.0	< 30.0	< 40.0	< 40.0	< 40.0	< 200	< 40.0
Methyl isobutyl alcohol	< 300	< 30.0	< 30.0 J	< 60.0	< 30.0	< 30.0	< 40.0	< 40.0	< 40.0	< 200	< 40.0
Methylene chloride	< 10.0	< 1.0	< 1.0	< 2.0	**1.0**	< 4.0 J	< 4.0	< 4.0	< 4.0	< 20.0	< 4.0
Methyl isobutyl ketone	< 50.0	< 5.0	< 5.0	< 10.0	< 5.0	< 5.0	< 4.0	< 4.0 J	< 4.0	< 20.0	< 4.0
Toluene	< 10.0	< 1.0	< 1.0	< 2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0	< 1.0
Xylenes, total	**141**	**138**	**226**	**127**	**150**	**261 J**	**25.7**	**312**	**276**	**88.5**	**98.6**
Total VOCs (µg/L)	**3247**		**6808**	**4501**		**7637**	**2333**	**8573**		**7848**	

< Detection Limit = Not Detected (ND) at or above listed detection limit.

0 = Primary Sample

DB = Duplicate Sample

J = Reported value is less than laboratory quantitation limit and is considered an estimated value.

Total VOCs: Includes J values; ND treated as 0.0; Original and duplicate results averaged.
Values were recalculated in 2014, by increasing the reported significant figures.

Table D-2 (cont'd)
Groundwater Quality Data - 2006-2017
VOC Pumpout Wells Converted to Monitoring Wells
Oakdale Site

Sample Location:	PW8		PW8	PW8		PW8		PW8	PW8	PW8	PW8	
Sample Date:	12/7/2009		5/20/2010	12/7/2010		5/12/2011		12/2/2011	6/14/2012	11/13/2012	6/12/2013	
Sample Code:	0	DB	0	0	DB	0	DB	0	0	0	0	DB
List 1 VOCs (µg/L)												
Acetone	< 100	< 50.0	< 50.0	< 250	< 50.0	< 25.0	< 25.0	**402**	< 25.0	<250	<1000	<1000
Benzene	**413**	**388**	**178**	**476**	**436**	**220**	**219**	**428**	**257**	**851**	**177**	**195**
1,1-Dichloroethane	< 10.0	< 5.0	< 5.0	< 25.0	< 5.0	< 1.0	< 1.0	< 10.0	< 1.0	<10.0	<50.0	<50.0
1,2-Dichloroethane	**10.5**	< 5.0	< 5.0	< 25.0	< 5.0	< 1.0	< 1.0	< 10.0	< 1.0	<10.0	<50.0	<50.0
1,1-Dichloroethylene	< 10.0	< 5.0	< 5.0	< 25.0	< 5.0	< 1.0	< 1.0	< 10.0	< 1.0	<10.0	<50.0	<50.0
1,2-Dichloroethylene, cis	< 10.0	< 5.0	< 5.0	< 25.0	< 5.0	< 1.0	< 1.0	< 10.0	< 1.0	<10.0	<50.0	<50.0
1,2-Dichloroethylene, trans	< 10.0	< 5.0	< 5.0	< 25.0	< 5.0	< 4.0	< 4.0	< 40.0	< 1.0	<10.0	<50.0	<50.0
Ethyl benzene	< 10.0	**8.7**	< 5.0	< 25.0	**13.4**	**62.3**	**61.8**	**158**	**59.8**	**377**	<50.0	<50.0
Isopropyl ether	**9680**	**8930**	**3600**	**9690**	**10300**	**4640**	**4890**	**8760**	**3690**	**15900**	**2940**	**3190**
Methyl ethyl ketone	< 40.0	< 20.0	< 20.0	< 100	< 20.0	< 4.0	< 4.0	**221**	< 4.0	<40.0	<250	<250
Tetrahydrofuran	< 100	**60.0**	< 50.0	< 250	**146**	< 10.0	< 10.0	< 100	< 10.0	<100	<500	<500
List 2 VOCs (µg/L)												
Isopropyl alcohol	< 400	< 200	< 200	< 2500	< 500	< 100	< 100	< 1000	< 100	<1000	<5000	<5000
2-Butyl alcohol	< 400	< 200	< 200	< 1000	< 200	< 40.0	< 40.0	< 400	< 40.0	<400	<2000	<2000
Methyl isobutyl alcohol	< 400	< 200	< 200	< 1000	< 200	< 40.0	< 40.0	< 400	< 40.0	<400	<2000	<2000
Methylene chloride	< 40.0	< 20.0	< 20.0	< 100	< 20.0	< 4.0	< 4.0	< 40.0	< 4.0	<40.0	<200	<200
Methyl isobutyl ketone	< 40.0	< 20.0	< 20.0	< 100	< 20.0	< 4.0	< 4.0	**1290**	**79.6**	**130**	<250	<250
Toluene	< 10.0	< 5.0	< 5.0	< 25.0	< 5.0	**19.1**	**17.9**	**64.5**	**44.5**	**610**	<50.0	<50.0
Xylenes, total	**159**	**158**	**37.9**	**194**	**248**	**198**	**198**	**370**	**115**	**1180**	<150	<150
Total VOCs (µg/L)	**9904**		**3816**	**10752**		**5263**		**11694**	**4246**	**19048**	**3251**	

< Detection Limit = Not Detected (ND) at or above listed detection limit.

0 = Primary Sample

DB = Duplicate Sample

J = Reported value is less than laboratory quantitation limit and is considered an estimated value.

Total VOCs: Includes J values; ND treated as 0.0; Original and duplicate results averaged.
Values were recalculated in 2014, by increasing the reported significant figures.

Table D-2 (cont'd)
Groundwater Quality Data - 2006-2017
VOC Pumpout Wells Converted to Monitoring Wells
Oakdale Site

Sample Location:	PW8	PW8		PW8	PW8	PW8	PW8	PW8	PW8	PW8
Sample Date:	11/22/2013	6/13/2014		11/19/2014	6/16/2015	11/18/2015	6/15/2016	11/1/2016	6/14/2017	10/31/2017
Sample Code:	0	0	DB	0	0	0	0	0	0	0
List 1 VOCs (µg/L)										
Acetone	<20.0	<100	<20.0	<2000	<400	<20.0	<400	<500	<500	<500
Benzene	**503**	**53.0**	**59.2**	**270**	**70.3**	**17.7**	**304**	**550**	**446**	**811**
1,1-Dichloroethane	<1.0	<5.0	<1.0	<100	<20.0	<1.0	<20.0	<25.0	<25.0	<25.0
1,2-Dichloroethane	<1.0	<5.0	<1.0	<100	<20.0	<1.0	<20.0	<25.0	<25.0	<25.0
1,1-Dichloroethylene	<1.0	<5.0	<1.0	<100	<20.0	<1.0	<20.0	<25.0	<25.0	<25.0
1,2-Dichloroethylene, cis	<1.0	<5.0	<1.0	<100	<20.0	<1.0	<20.0	<25.0	<25.0	<25.0
1,2-Dichloroethylene, trans	<1.0	<5.0	<1.0	<100	<80.0	<1.0	<20.0	<25.0	<25.0	<25.0
Ethyl benzene	**27.7**	<5.0	<1.0	<100	<20.0	<1.0	<20.0	<25.0	**40.5**	**40.2**
Isopropyl ether	**9960**	**728**	**985**	**3810**	**1720**	**198**	**4250**	**10600**	**5700**	**11000**
Methyl ethyl ketone	<5.0	<25.0	<5.0	<500	<100	<5.0	<100	<125	<125	<125
Tetrahydrofuran	<10.0	<50.0	<10.0	<1000	<200	<10.0	<200	<250	<250	<250
List 2 VOCs (µg/L)										
Isopropyl alcohol	<100	<500	<100	**42100**	<2000	<100	<2000	<2500	<2500	<2500
2-Butyl alcohol	<40.0	<200	<40.0	<4000	<800	<40.0	<800	<1000	<1000	<1000
Methyl isobutyl alcohol	<40.0	<200	<40.0	<4000	<800	<40.0	<800	<1000	<1000	<1000
Methylene chloride	<4.0	<20.0	<4.0	<400	<80.0	<4.0	<80.0	<100	<100	<100
Methyl isobutyl ketone	<5.0	<25.0	<5.0	<500	<100	<5.0	<100	<125	<125	**182**
Toluene	<1.0	<5.0	<1.0	<100	<20.0	<1.0	<20.0	<25.0	<25.0	<25.0
Xylenes, total	**454**	<15.0	**3.5**	<300	<60.0	**5.4**	**391**	**623**	**740**	**1240**
Total VOCs (µg/L)	**10945**	**915**		**46180**	**1790**	**221.1**	**4945**	**11773**	**6927**	**13273**

< Detection Limit = Not Detected (ND) at or above listed detection limit.

0 = Primary Sample

DB = Duplicate Sample

J = Reported value is less than laboratory quantitation limit and is considered an estimated value.

Total VOCs: Includes J values; ND treated as 0.0; Original and duplicate results averaged.
Values were recalculated in 2014, by increasing the reported significant figures.

Table D-2 (cont'd)
Groundwater Quality Data - 2006-2017
VOC Pumpout Wells Converted to Monitoring Wells
Oakdale Site

Sample Location:	PW9	PW9	PW9	PW9	PW9	PW9	PW9	PW9	PW9	PW9	PW9	PW9
Sample Date:	6/14/2012	11/13/2012	6/12/2013	11/20/2013	6/13/2014	11/18/2014	6/15/2015	11/18/2015	6/15/2016	11/1/2016	6/14/2017	10/31/2017
Sample Code:	0	0	0	0	0	0	0	0	0	0	0	0
List 1 VOCs (µg/L)												
Acetone	< 25.0	<25.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0
Benzene	**12.7**	**1.2**	**5.2**	<1.0	<1.0	<1.0	<1.0	**1.5**	**3.7**	**1.6**	**1.4**	**2.9**
1,1-Dichloroethane	**5.9**	<1.0	**2.4**	<1.0	**1.2**	<1.0	<1.0	<1.0	**2.1**	**2.3**	**1.3**	<1.0
1,2-Dichloroethane	**60.8**	**5.0**	**13.9**	**1.5**	**2.4**	**1.9**	**2.4**	**2**	**5.0**	**2.6**	**1.6**	**4.2**
1,1-Dichloroethylene	< 1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene, cis	**32.4**	**1.8**	**13.3**	<1.0	<1.0	<1.0	**1.5**	**4.1**	**10.8**	**3.9**	**2.8**	**4.0**
1,2-Dichloroethylene, trans	< 1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethyl benzene	**11.4**	<1.0	**6.3**	<1.0	<1.0	<1.0	<1.0	<1.0	**1.8**	<1.0	<1.0	<1.0
Isopropyl ether	**707**	**40.4**	**103**	**7.6**	**34.9**	**12.8**	**24**	**70**	**34.4**	**30**	**38.5**	**29.9**
Methyl ethyl ketone	< 4.0	<4.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Tetrahydrofuran	< 10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
List 2 VOCs (µg/L)												
Isopropyl alcohol	< 100	<100	**45.6 J**	<100	<100	<100	<100	<100	<100	<100	<100	**170**
2-Butyl alcohol	< 40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0
Methyl isobutyl alcohol	< 40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0
Methylene chloride	**4.5**	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Methyl isobutyl ketone	**36.7**	<4.0	<5.0	<5.0	<5.0	<5.0	<20.0	**59.9**	<5.0	<5.0	<5.0	<5.0
Toluene	**44.7**	<1.0	**2.1**	<1.0	<1.0	<1.0	<1.0	**11**	<1.0	<1.0	<1.0	<1.0
Xylenes, total	**21.9**	<3.0	**8.5**	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Total VOCs (µg/L)	**938**	**48**	**200**	**9.1**	**38.5**	**14.7**	**27.9**	**148.5**	**57.8**	**40.4**	**46**	**211**

< Detection Limit = Not Detected (ND) at or above listed detection limit.

0 = Primary Sample

DB = Duplicate Sample

J = Reported value is less than laboratory quantitation limit and is considered an estimated value.

Total VOCs: Includes J values; ND treated as 0.0; Original and duplicate results averaged.
Values were recalculated in 2014, by increasing the reported significant figures.

PW9 added to VOC sampling network in 2012.

Table D-3
Groundwater Quality Data - 2006-2017
Water Table Monitoring Wells (Upper Alluvial Unit)
Oakdale Site

Sample Location:	W20	W20	W20	W20	W25	W25	W25	W25	W25	W25	W25
Sample Date:	11/20/2008	12/2/2011	11/16/2012	11/19/2015	11/7/2006	11/27/2007	11/18/2008	12/2/2009	11/30/2010	11/29/2011	11/15/2012
Sample Code:	0	0	0	0	0	0	0	0	0	0	0
List 1 VOCs (µg/L)											
Acetone	**2770**	**3010**	**3030**	**208**	< 5.0 J	< 5.0	< 10.0	< 10.0	< 10.0	< 25.0	<25.0
Benzene	**65.3**	**56.2**	**45.9**	**65**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0
1,1-Dichloroethane	< 5.0	< 5.0	<25.0	**6.7**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0
1,2-Dichloroethane	**24.9**	**14.9**	<25.0	**6**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0
1,1-Dichloroethylene	< 5.0	< 5.0	<25.0	<1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0
1,2-Dichloroethylene, cis	**113**	**44.4**	**36**	**11**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0
1,2-Dichloroethylene, trans	< 5.0	< 20.0	<25.0	<1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 4.0	<1.0
Ethyl benzene	**113**	**133**	**94.2**	**199**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0
Isopropyl ether	**13900**	**8370**	**11400**	**2810**	**1.1 J**	< 5.0	< 4.0	< 4.0	< 4.0	< 4.0	<4.0
Methyl ethyl ketone	**4900**	**2390**	**3240**	**196**	< 5.0 J	< 5.0	< 4.0	< 4.0	< 4.0	< 4.0	<4.0
Tetrahydrofuran	**54.5**	< 50.0	<250	**18.2**	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	<10.0
List 2 VOCs (µg/L)											
Isopropyl alcohol	**1750**	**1640**	<2500	<100	< 30.0 J	< 30.0	< 40.0	< 40.0	< 100	< 100	<100
2-Butyl alcohol	**1750**	**925**	**1040**	**64.3**	< 30.0	< 30.0	< 40.0	< 40.0	< 40.0	< 40.0	<40.0
Methyl isobutyl alcohol	**753**	**631**	<1000	**48.6**	< 30.0 J	< 30.0	< 40.0	< 40.0	< 40.0	< 40.0	<40.0
Methylene chloride	**44.8**	**26.2**	<100	<4.0	< 1.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	<4.0
Methyl isobutyl ketone	**4520**	**2130**	**2770**	**220**	< 5.0	< 5.0	< 4.0	< 4.0	< 4.0	< 4.0	<4.0
Toluene	**4390**	**3520**	**1520**	**2520**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0
Xylenes, total	**405**	**450**	**329**	**844**	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	<3.0
Total VOCs (µg/L)	**35554**	**23340**	**23505**	**7217**	**1.1**	ND	ND	ND	ND	ND	ND

< Detection Limit = Not Detected (ND) at or above listed detection limit.

0 = Primary Sample

DB = Duplicate Sample

J = Reported value is less than laboratory quantitation limit and is considered an estimated value.

Total VOCs: Includes J values; ND treated as 0.0; Original and duplicate results averaged.
Values were recalculated in 2014, by increasing the reported significant figures.

Table D-3 (cont'd)
Groundwater Quality Data - 2006-2017
Water Table Monitoring Wells (Upper Alluvial Unit)
Oakdale Site

Sample Location:	W25		W25		W25	W25	W25
Sample Date:	11/23/2013		11/19/2014		11/19/2015	11/2/2016	11/1/2017
Sample Code:	0	DB	0	DB	0	0	0
List 1 VOCs (µg/L)							
Acetone	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0
Benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethylene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene, cis	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene, trans	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethyl benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Isopropyl ether	**2.2**	**2.3**	**1.0**	<1.0	<1.0	<1.0	<1.0
Methyl ethyl ketone	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Tetrahydrofuran	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
List 2 VOCs (µg/L)							
Isopropyl alcohol	<100	<100	<100	<100	<100	<100	<100
2-Butyl alcohol	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0
Methyl isobutyl alcohol	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0
Methylene chloride	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Methyl isobutyl ketone	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Toluene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Xylenes, total	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Total VOCs (µg/L)	**2.3**		**0.5**		ND	ND	ND

< Detection Limit = Not Detected (ND) at or above listed detection limit.

0 = Primary Sample

DB = Duplicate Sample

J = Reported value is less than laboratory quantitation limit and is considered an estimated value.

Total VOCs: Includes J values; ND treated as 0.0; Original and duplicate results averaged.
Values were recalculated in 2014, by increasing the reported significant figures.

Table D-3 (cont'd)
Groundwater Quality Data - 2006-2017
Water Table Monitoring Wells (Upper Alluvial Unit)
Oakdale Site

Sample Location:	W26	W26	W26	W26	W26	W26	W26	W26	W26	W26R	W26R	
Sample Date:	5/18/2006	11/9/2006	5/24/2007	11/29/2007	5/15/2008	11/20/2008	5/14/2009	12/3/2009	5/20/2010	6/13/2012	11/15/2012	
Sample Code:	0	0	0	0	0	0	0	0	0	0	0	DB
List 1 VOCs (µg/L)												
Acetone	**254**	**146 J**	**27.6**	< 5.0	< 10.0 J	**15.5 J**	< 50.0	< 50.0	< 50.0	< 25.0	<125	<125
Benzene	**304**	**443**	**116**	**96.3**	**63.8**	**443**	**42.4**	**192**	**12.0**	**77.2**	**42.8**	**37.6**
1,1-Dichloroethane	**81.3 J**	**26.8**	**22.0**	**17.1**	**17.0**	**10.7**	< 5.0	< 5.0	< 5.0	**3.3**	<5.0	<5.0
1,2-Dichloroethane	**329**	**110**	**25.2**	< 1.0	**13.4**	< 1.0	< 5.0	< 5.0	< 5.0	**23.6**	**20.0**	**18.3**
1,1-Dichloroethylene	< 10.0	< 1.0	< 2.0	< 1.0	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 1.0	<5.0	<5.0
1,2-Dichloroethylene, cis	**12.2**	**5.6**	< 2.0	< 1.0	< 1.0	**3.7**	< 5.0	< 5.0	< 5.0	**1.0**	<5.0	<5.0
1,2-Dichloroethylene, trans	< 10.0	**3.1**	< 2.0	**1.8**	< 1.0	**3.5**	< 5.0	< 5.0	< 5.0	< 1.0	<5.0	<5.0
Ethyl benzene	**144**	**194**	**56.1**	**27.1**	**52.4**	**45.4**	**16.0**	**35.8**	< 5.0	**98.7**	**42.5**	**37.8**
Isopropyl ether	**417**	**1850**	**599**	**343**	**309**	**2260**	**533**	**1240**	**830**	**719**	**400**	**352**
Methyl ethyl ketone	**155**	**160 J**	**17.6**	< 5.0	< 4.0	**11.1**	< 20.0	< 20.0	< 20.0	< 4.0	<20.0	<20.0
Tetrahydrofuran	< 100	**16.3**	< 20.0	< 10.0	< 10.0	**29.1**	< 50.0	< 50.0	< 50.0	**25.3**	<50.0	<50.0
List 2 VOCs (µg/L)												
Isopropyl alcohol	< 300	**108 J**	< 60.0	< 30.0	< 40.0	< 40.0	< 200	< 200	< 200	< 100	<500	<500
2-Butyl alcohol	< 300 J	**70.5**	< 60.0	< 30.0	< 40.0	< 40.0	< 200	< 200	< 200	< 40.0	<200	<200
Methyl isobutyl alcohol	**1210**	**677 J**	**78.9**	**46.9**	< 40.0	< 40.0	< 200	< 200	< 200	< 40.0	<200	<200
Methylene chloride	**13.5 J**	**15.5**	**6.2**	< 4.0	< 4.0	**11.9 b**	< 20.0	< 20.0	< 20.0	< 4.0	<20.0	<20.0
Methyl isobutyl ketone	**609**	**2020**	**137**	**21.4 J**	**40.7**	**77.3**	**23.4**	< 20.0	< 20.0	**4.7**	<20.0	<20.0
Toluene	**780**	**185**	**153**	**19.4**	**112**	**36.2**	**11.8**	< 5.0	< 5.0	< 1.0	<5.0	<5.0
Xylenes, total	**1060**	**470**	**219**	**131**	**172**	**422**	**71.3**	**237**	< 15.0	**84.7**	**25.2**	**21.1**
Total VOCs (µg/L)	**5369**	**6501**	**1458**	**704**	**780**	**3369**	**698**	**1705**	**842**	**1038**	**499**	

< Detection Limit = Not Detected (ND) at or above listed detection limit.

0 = Primary Sample

DB = Duplicate Sample

J = Reported value is less than laboratory quantitation limit and is considered an estimated value.

Total VOCs: Includes J values; ND treated as 0.0; Original and duplicate results averaged.
Values were recalculated in 2014, by increasing the reported significant figures.

Table D-3 (cont'd)
Groundwater Quality Data - 2006-2017
Water Table Monitoring Wells (Upper Alluvial Unit)
Oakdale Site

Sample Location:	W26R	W26R		W26R	W26R		W26R		W26R		W26R	
Sample Date:	6/12/2013	11/21/2013		6/12/2014	11/19/2014		6/16/2015		11/17/2015		6/15/2016	
Sample Code:	0	0	DB	0	0	DB	0	DB	0	DB	0	DUP
List 1 VOCs (µg/L)												
Acetone	<100	<20.0	<20.0	<20.0	<20.0	<40.0	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0
Benzene	**56.4**	**26.5**	**24.0**	**35.1**	**10.4**	**8.1**	**13.5**	**13.9**	**5.8**	**5.7**	**7.1**	**6.3**
1,1-Dichloroethane	<5.0	**1.2**	**1.0**	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane	**16.5**	**2.9**	**2.7**	**2.8**	**1.9**	<2.0	**3.9**	**4.0**	**4.1**	**4.2**	**1.9**	**1.9**
1,1-Dichloroethylene	<5.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene, cis	<5.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene, trans	<5.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethyl benzene	**36.3**	**3.6**	**3.2**	**1.1**	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Isopropyl ether	**436**	**115**	**109**	**208**	**43.4**	**35.3**	**82.8**	**80.7**	**36.4**	**35.8**	**31.2**	**27.2**
Methyl ethyl ketone	<25.0	<5.0	<5.0	<5.0	<5.0	<10.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Tetrahydrofuran	<50.0	<10.0	<10.0	<10.0	<10.0	<20.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
List 2 VOCs (µg/L)												
Isopropyl alcohol	<500	<100	<100	<100	**459**	**492**	<100	<100	<100	<100	<100	<100
2-Butyl alcohol	<200	<40.0	<40.0	<40.0	<40.0	<80.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0
Methyl isobutyl alcohol	<200	<40.0	<40.0	<40.0	<40.0	<80.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0
Methylene chloride	<20.0	<4.0	<4.0	<4.0	<4.0	<8.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Methyl isobutyl ketone	<25.0	<5.0	<5.0	<5.0	<5.0	<10.0	<20.0	<20.0	<5.0	<5.0	<5.0	<5.0
Toluene	<5.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Xylenes, total	**7.7 J**	<3.0	<3.0	<3.0	<3.0	<6.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Total VOCs (µg/L)	**553***	**145**		**247**	**525**		**99**		**46**		**38**	

< Detection Limit = Not Detected (ND) at or above listed detection limit.

0 = Primary Sample

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Total VOCs: Includes J values; ND treated as 0.0; Original and duplicate results averaged.
Values were recalculated in 2014, by increasing the reported significant figures.

* - The June 2013 data presented in the 2013 Annual report was reported in parts per billion (ppb) instead of parts per million (ppm). The numbers have been corrected in this table.

Table D-3 (cont'd)
Groundwater Quality Data - 2006-2017
Water Table Monitoring Wells (Upper Alluvial Unit)
Oakdale Site

Sample Location:	W26R		W26R		W26R		W28	W28	W28	W29	W29	W30
Sample Date:	11/2/2016		6/14/2017		11/1/2017		11/30/2010	11/19/2014	11/1/2017	12/7/2010	11/2/2017	11/1/2016
Sample Code:	0	DUP	0	DB	0	DB	0	0	0	0	0	0
List 1 VOCs (µg/L)												
Acetone	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	< 10.0	<20.0	<20.0	< 1000	**51900**	<20.0
Benzene	**5.0**	**4.1**	**2.8**	**2.9**	**1.2**	**1.1**	< 1.0	<1.0	<1.0	**1420**	**1600**	<1.0
1,1-Dichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	< 1.0	<1.0	<1.0	**172**	**205**	**1.3**
1,2-Dichloroethane	**1.7**	**1.5**	**1.1**	**1.1**	**1.0**	**1.0**	< 1.0	<1.0	<1.0	**993**	**312**	<1.0
1,1-Dichloroethylene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	< 1.0	<1.0	<1.0	< 100	<1.0	<1.0
1,2-Dichloroethylene, cis	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	< 1.0	<1.0	<1.0	**497**	**649**	<1.0
1,2-Dichloroethylene, trans	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	< 1.0	<1.0	<1.0	< 100	**3.8**	<1.0
Ethyl benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	< 1.0	<1.0	<1.0	**162**	**262**	<1.0
Isopropyl ether	**29.5**	**25.5**	**20.5**	**20.5**	**7.0**	**6.4**	< 4.0	**2.5**	**23.5**	**13100**	**14200**	**8.0**
Methyl ethyl ketone	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	< 4.0	<5.0	<5.0	**528**	**45800**	<5.0
Tetrahydrofuran	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	< 10.0	<10.0	<10.0	< 1000	**66.7**	<10.0
List 2 VOCs (µg/L)												
Isopropyl alcohol	<100	<100	**126**	<100	<100	**108**	< 100	<100	<100	< 10000	**5810**	<100
2-Butyl alcohol	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	< 40.0	<40.0	<40.0	< 4000	<40.0	<40.0
Methyl isobutyl alcohol	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	< 40.0	<40.0	<40.0	< 4000	**2370**	<40.0
Methylene chloride	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	< 4.0	<4.0	<4.0	< 400	**32.4**	<4.0
Methyl isobutyl ketone	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	< 4.0	<5.0	<5.0	**1200**	**23000**	<5.0
Toluene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	< 1.0	<1.0	<1.0	**750**	**11000**	<1.0
Xylenes, total	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	< 3.0	<3.0	<3.0	**313**	**965**	<3.0
Total VOCs (µg/L)	**34**		**87**		**63**		ND	**2.5**	**24**	**19135**	**158176**	**9.3**

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J = Reported value is less than laboratory quantitation limit and is considered an estimated value.

Total VOCs: Includes J values; ND treated as 0.0; Original and duplicate results averaged.
Values were recalculated in 2014, by increasing the reported significant figures.

Table D-3 (cont'd)
Groundwater Quality Data - 2006-2017
Water Table Monitoring Wells (Upper Alluvial Unit)
Oakdale Site

Sample Location:	W31	W31	W31	W31	W31	W31	W31	W31	W31
Sample Date:	11/7/2006	11/27/2007	12/2/2009	11/30/2010	11/29/2011	11/19/2014	11/19/2015	11/1/2016	11/1/2017
Sample Code:	0	0	0	0	0	0	0	0	0
List 1 VOCs (µg/L)									
Acetone	< 5.0 J	< 5.0	< 10.0	< 10.0	< 25.0	<20.0	<20.0	<20.0	<20.0
Benzene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethylene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene, cis	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene, trans	< 1.0	< 1.0	< 1.0	< 1.0	< 4.0	<1.0	<1.0	<1.0	<1.0
Ethyl benzene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0	<1.0	<1.0	<1.0
Isopropyl ether	< 1.0	< 5.0	< 4.0	< 4.0	< 4.0	<1.0	<1.0	<1.0	<1.0
Methyl ethyl ketone	< 5.0 J	< 5.0	< 4.0	< 4.0	< 4.0	<5.0	<5.0	<5.0	<5.0
Tetrahydrofuran	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	<10.0	<10.0	<10.0	<10.0
List 2 VOCs (µg/L)									
Isopropyl alcohol	< 30.0 J	< 30.0	< 40.0	< 100	< 100	<100	<100	<100	<100
2-Butyl alcohol	< 30.0	< 30.0	< 40.0	< 40.0	< 40.0	<40.0	<40.0	<40.0	<40.0
Methyl isobutyl alcohol	< 30.0 J	< 30.0	< 40.0	< 40.0	< 40.0	<40.0	<40.0	<40.0	<40.0
Methylene chloride	< 1.0	< 4.0	< 4.0	< 4.0	< 4.0	<4.0	<4.0	<4.0	<4.0
Methyl isobutyl ketone	< 5.0	< 5.0	< 4.0	< 4.0	< 4.0	<5.0	<5.0	<5.0	<5.0
Toluene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0	<1.0	<1.0	<1.0
Xylenes, total	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	<3.0	<3.0	<3.0	<3.0
Total VOCs (µg/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND

< Detection Limit = Not Detected (ND) at or above listed detection limit.

0 = Primary Sample

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J = Reported value is less than laboratory quantitation limit and is considered an estimated value.

Total VOCs: Includes J values; ND treated as 0.0; Original and duplicate results averaged.
Values were recalculated in 2014, by increasing the reported significant figures.

Table D-3 (cont'd)
Groundwater Quality Data - 2006-2017
Water Table Monitoring Wells (Upper Alluvial Unit)
Oakdale Site

Sample Location:	W32	W32	W32	W32	W33	W33	W33	W33	W33	W33
Sample Date:	11/20/2008	12/1/2011	11/15/2012	11/19/2015	11/10/2006	11/20/2008	12/7/2010	11/23/2013	11/19/2015	11/1/2017
Sample Code:	0	0	0	0	0	0	0	0	0	0
List 1 VOCs (µg/L)										
Acetone	**15.8 J**	< 1250	<25.0	<20.0	< 50.0 J	**80.6 J**	< 2000	<20.0	<20.0	<500
Benzene	**141**	**307**	**294**	**212**	**1100**	**1360**	**2360**	**25.7**	**295**	**219**
1,1-Dichloroethane	< 1.0	< 50.0	<1.0	<1.0	< 10.0	< 1.0	< 200	<1.0	<1.0	<25.0
1,2-Dichloroethane	< 1.0	< 50.0	<1.0	<1.0	< 10.0	< 1.0	< 200	<1.0	<1.0	<25.0
1,1-Dichloroethylene	< 1.0	< 50.0	<1.0	<1.0	< 10.0	< 1.0	< 200	<1.0	<1.0	<25.0
1,2-Dichloroethylene, cis	< 1.0	< 50.0	<1.0	<1.0	< 10.0	< 1.0	< 200	<1.0	<1.0	<25.0
1,2-Dichloroethylene, trans	< 1.0	< 200	<1.0	<1.0	< 10.0	< 1.0	< 200	<1.0	<1.0	<25.0
Ethyl benzene	**114**	**159**	**104**	**144**	**302**	**163**	< 200	**2.7**	**1.8**	<25.0
Isopropyl ether	**2450**	**6510**	**6280**	**2130**	**17000**	**23200**	**19100**	**3550**	**2860**	**2280**
Methyl ethyl ketone	< 4.0	< 200	<4.0	<5.0	< 50.0 J	**18.3**	< 800	<5.0	<5.0	<125
Tetrahydrofuran	< 10.0	< 500	<10.0	<10.0	**816**	**799**	< 2000	**199**	**101**	<250
List 2 VOCs (µg/L)										
Isopropyl alcohol	**125**	< 5000	<100	<100	< 300 J	**75.9**	< 20000	<100	<100	<2500
2-Butyl alcohol	< 40.0	< 2000	<40.0	<40.0	< 300	< 40.0	< 8000	<40.0	<40.0	<1000
Methyl isobutyl alcohol	< 40.0	< 2000	<40.0	<40.0	< 300 J	< 40.0	< 8000	<40.0	<40.0	<1000
Methylene chloride	< 4.0	< 200	<4.0	<4.0	< 10.0	**4.1**	< 800	<4.0	<4.0	<100
Methyl isobutyl ketone	< 4.0	< 200	<4.0	<5.0	< 50.0	< 4.0	< 800	<5.0	<5.0	<125
Toluene	**6.0**	< 50.0	**19.0**	**21.3**	< 10.0	< 1.0	< 200	<1.0	<1.0	<25.0
Xylenes, total	**341**	**453**	**331**	**536**	**1870**	**1630**	**2570**	**7.4**	<3.0	<75.0
Total VOCs (µg/L)	**3193**	**7429**	**7028**	**3043**	**21088**	**27331**	**24030**	**3785**	**3257.8**	**2499**

< Detection Limit = Not Detected (ND) at or above listed detection limit.

0 = Primary Sample

DB = Duplicate Sample

J = Reported value is less than laboratory quantitation limit and is considered an estimated value.

Total VOCs: Includes J values; ND treated as 0.0; Original and duplicate results averaged.
Values were recalculated in 2014, by increasing the reported significant figures.

Table D-3 (cont'd)
Groundwater Quality Data - 2006-2017
Water Table Monitoring Wells (Upper Alluvial Unit)
Oakdale Site

Sample Location:	W205	W205	W205		W205	W215		W215		W215	W215	W215
Sample Date:	11/20/2008	11/30/2011	11/13/2012		11/19/2015	11/7/2006		11/27/2007		11/18/2008	12/2/2009	11/30/2010
Sample Code:	0	0	0	DB	0	0	DB	0	DB	0	0	0
List 1 VOCs (µg/L)												
Acetone	< 10.0	< 25.0	<25.0	<25.0	<20.0	< 5.0 J	< 5.0 J	< 5.0	< 5.0	< 10.0	< 10.0	< 10.0
Benzene	**3.0**	< 1.0	**3.7**	**3.8**	<1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	< 1.0	< 1.0	<1.0	<1.0	<1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	< 1.0	< 1.0	<1.0	<1.0	<1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethylene	< 1.0	< 1.0	<1.0	<1.0	<1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethylene, cis	< 1.0	< 1.0	<1.0	<1.0	<1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethylene, trans	< 1.0	< 4.0	<1.0	<1.0	<1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethyl benzene	< 1.0	< 1.0	<1.0	<1.0	<1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Isopropyl ether	**177**	**31.5**	**74.6**	**74.6**	**11.8**	< 1.0	< 1.0	< 5.0	< 5.0	< 4.0	< 4.0	< 4.0
Methyl ethyl ketone	< 4.0	< 4.0	<4.0	<4.0	<5.0	< 5.0 J	< 5.0 J	< 5.0	< 5.0	< 4.0	< 4.0	< 4.0
Tetrahydrofuran	< 10.0	< 10.0	<10.0	<10.0	<10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
List 2 VOCs (µg/L)												
Isopropyl alcohol	< 40.0	< 100	<100	<100	<100	< 30.0 J	< 30.0 J	< 30.0	< 30.0	< 40.0	< 40.0	< 100
2-Butyl alcohol	< 40.0	< 40.0	<40.0	<40.0	<40.0	< 30.0	< 30.0	< 30.0	< 30.0	< 40.0	< 40.0	< 40.0
Methyl isobutyl alcohol	< 40.0	< 40.0	<40.0	<40.0	<40.0	< 30.0 J	< 30.0 J	< 30.0	< 30.0	< 40.0	< 40.0	< 40.0
Methylene chloride	< 4.0	< 4.0	<4.0	<4.0	<4.0	< 1.0	< 1.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Methyl isobutyl ketone	< 4.0	< 4.0	<4.0	<4.0	<5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 4.0	< 4.0	< 4.0
Toluene	< 1.0	< 1.0	<1.0	<1.0	<1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Xylenes, total	< 3.0	< 3.0	<3.0	<3.0	<3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Total VOCs (µg/L)	**180**	**32**	**78**		**11.8**	ND		ND		ND	ND	ND

< Detection Limit = Not Detected (ND) at or above listed detection limit.

0 = Primary Sample

DB = Duplicate Sample

J = Reported value is less than laboratory quantitation limit and is considered an estimated value.

Total VOCs: Includes J values; ND treated as 0.0; Original and duplicate results averaged.
Values were recalculated in 2014, by increasing the reported significant figures.

Table D-3 (cont'd)
Groundwater Quality Data - 2006-2017
Water Table Monitoring Wells (Upper Alluvial Unit)
Oakdale Site

Sample Location:	W215	W215	W215	W215	W215	W215	W215
Sample Date:	11/29/2011	11/13/2012	11/23/2013	11/19/2014	11/18/2015	11/2/2016	11/1/2017
Sample Code:	0	0	0	0	0	0	0
List 1 VOCs (µg/L)							
Acetone	< 25.0	<25.0	<20.0	<20.0	<20.0	<20.0	<20.0
Benzene	< 1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	< 1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane	< 1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethylene	< 1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene, cis	< 1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene, trans	< 4.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethyl benzene	< 1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Isopropyl ether	< 4.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Methyl ethyl ketone	< 4.0	<4.0	<5.0	<5.0	<5.0	<5.0	<5.0
Tetrahydrofuran	< 10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
List 2 VOCs (µg/L)							
Isopropyl alcohol	< 100	<100	<100	<100	<100	<100	<100
2-Butyl alcohol	< 40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0
Methyl isobutyl alcohol	< 40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0
Methylene chloride	< 4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Methyl isobutyl ketone	< 4.0	<4.0	<5.0	<5.0	<5.0	<5.0	<5.0
Toluene	< 1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Xylenes, total	< 3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Total VOCs (µg/L)	ND	ND	ND	ND	ND	ND	ND

< Detection Limit = Not Detected (ND) at or above listed detection limit.

0 = Primary Sample

DB = Duplicate Sample

J = Reported value is less than laboratory quantitation limit and is considered an estimated value.

Total VOCs: Includes J values; ND treated as 0.0; Original and duplicate results averaged.
Values were recalculated in 2014, by increasing the reported significant figures.

Table D-4
Groundwater Quality Data - 2006-2017
Monitoring Wells (Lower Alluvium)
Oakdale Site

Sample Location:	W2003		W2003		W2003		W2003		W2003	W2003	W2003
Sample Date:	11/8/2006		11/28/2007		11/18/2008		12/3/2009		12/1/2010	11/30/2011	11/13/2012
Sample Code:	0	DB	0	DB	0	DB	0	DB	0	0	0
List 1 VOCs (µg/L)											
Acetone	< 5.0 J	< 5.0 J	< 5.0	< 5.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 25.0	<25.0
Benzene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0
1,1-Dichloroethane	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0
1,2-Dichloroethane	< 1.0	**1.8**	**1.2**	**1.3**	**1.1**	**1.2**	< 1.0	**1.0**	< 1.0	**1.1**	<1.0
1,1-Dichloroethylene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0
1,2-Dichloroethylene, cis	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0
1,2-Dichloroethylene, trans	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 4.0	<1.0
Ethyl benzene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0
Isopropyl ether	**2.7 J**	**58.2 J**	**44.3**	**45.8**	**57.5**	**53.2**	**57.7**	**63.3**	**76.9**	**137**	**58.9**
Methyl ethyl ketone	< 5.0 J	< 5.0 J	< 5.0	< 5.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	<4.0
Tetrahydrofuran	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	<10.0
List 2 VOCs (µg/L)											
Isopropyl alcohol	< 30.0 J	< 30.0 J	< 30.0	< 30.0	< 40.0	< 40.0	< 40.0	< 40.0	< 100	< 100	<100
2-Butyl alcohol	< 30.0	< 30.0	< 30.0	< 30.0	< 40.0	< 40.0	< 40.0	< 40.0	< 40.0	< 40.0	<40.0
Methyl isobutyl alcohol	< 30.0 J	< 30.0 J	< 30.0	< 30.0	< 40.0	< 40.0	< 40.0	< 40.0	< 40.0	< 40.0	<40.0
Methylene chloride	< 1.0	< 1.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	<4.0
Methyl isobutyl ketone	< 5.0	< 5.0	< 5.0	< 5.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	<4.0
Toluene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0
Xylenes, total	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	<3.0
Total VOCs (µg/L)	**31**		**46**		**57**		**61**		**77**	**138**	**59**

< Detection Limit = Not Detected (ND) at or above listed detection limit.

0 = Primary Sample

DB = Duplicate Sample

J = Reported value is less than laboratory quantitation limit and is considered an estimated value.

Total VOCs: Includes J values; ND treated as 0.0; Original and duplicate results averaged.
Values were recalculated in 2014, by increasing the reported significant figures.

Table D-4 (cont'd)
Groundwater Quality Data - 2006-2017
Monitoring Wells (Lower Alluvium)
Oakdale Site

Sample Location:	W2003	W2003	W2003	W2003	W2003	W2005	W2005		W2005	W2005	W2005	W2005
Sample Date:	11/22/2013	11/18/2014	11/18/2015	11/1/2016	10/31/2017	11/9/2006	11/19/2008		12/3/2010	11/23/2013	11/19/2015	11/1/2017
Sample Code:	0	0	0	0	0	0	0	DB	0	0	0	0
List 1 VOCs (µg/L)												
Acetone	<20.0	<20.0	<20.0	<20.0	<20.0	< 5.0 J	< 10.0	< 10.0	< 10.0	<20.0	<20.0	<100
Benzene	<1.0	<1.0	<1.0	<1.0	<1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0	<1.0	<5.0
1,1-Dichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0	<1.0	<5.0
1,2-Dichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0	<1.0	<5.0
1,1-Dichloroethylene	<1.0	<1.0	<1.0	<1.0	<1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0	<1.0	<5.0
1,2-Dichloroethylene, cis	<1.0	<1.0	<1.0	<1.0	<1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0	<1.0	<5.0
1,2-Dichloroethylene, trans	<1.0	<1.0	<1.0	<1.0	<1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0	<1.0	<5.0
Ethyl benzene	<1.0	<1.0	<1.0	<1.0	<1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0	<1.0	<5.0
Isopropyl ether	**53.0**	**59.0**	**47.6**	**88.4**	**91.1**	**823**	**835**	**830**	**530**	**376**	**353**	**320**
Methyl ethyl ketone	<5.0	<5.0	<5.0	<5.0	<5.0	< 5.0 J	< 4.0	< 4.0	< 4.0	<5.0	<5.0	<25.0
Tetrahydrofuran	<10.0	<10.0	<10.0	<10.0	<10.0	< 10.0	< 10.0	< 10.0	< 10.0	<10.0	<10.0	<50.0
List 2 VOCs (µg/L)												
Isopropyl alcohol	<100	<100	<100	<100	<100	< 30.0 J	< 40.0	< 40.0	< 100	<100	<100	<500
2-Butyl alcohol	<40.0	<40.0	<40.0	<40.0	<40.0	< 30.0	< 40.0	< 40.0	< 40.0	<40.0	<40.0	<200
Methyl isobutyl alcohol	<40.0	<40.0	<40.0	<40.0	<40.0	< 30.0 J	< 40.0	< 40.0	< 40.0	<40.0	<40.0	<200
Methylene chloride	<4.0	<4.0	<4.0	<4.0	<4.0	< 1.0	< 4.0	< 4.0	< 4.0	<4.0	<4.0	<20.0
Methyl isobutyl ketone	<5.0	<5.0	<5.0	<5.0	<5.0	< 5.0	< 4.0	< 4.0	< 4.0	<5.0	<5.0	<25.0
Toluene	<1.0	<1.0	<1.0	<1.0	<1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0	<1.0	<5.0
Xylenes, total	<3.0	<3.0	<3.0	<3.0	<3.0	< 3.0	< 3.0	< 3.0	< 3.0	<3.0	<3.0	<15.0
Total VOCs (µg/L)	**53**	**59**	**47.6**	**88.4**	**91**	**823**	**833**		**530**	**376**	**353**	**320**

< Detection Limit = Not Detected (ND) at or above listed detection limit.

0 = Primary Sample

DB = Duplicate Sample

J = Reported value is less than laboratory quantitation limit and is considered an estimated value.

Total VOCs: Includes J values; ND treated as 0.0; Original and duplicate results averaged.
Values were recalculated in 2014, by increasing the reported significant figures.

Table D-4 (cont'd)
Groundwater Quality Data - 2006-2017
Monitoring Wells (Lower Alluvium)
Oakdale Site

Sample Location:	W2007	W2007		W2007	W2007	W2008	W2008	W2008	W2008	W2008		W2008
Sample Date:	11/19/2008	11/30/2011		11/15/2012	11/19/2015	11/8/2006	11/27/2007	11/18/2008	12/3/2009	12/1/2010		11/30/2011
Sample Code:	0	0	DB	0	0	0	0	0	0	0	DB	0
List 1 VOCs (µg/L)												
Acetone	< 50.0	< 25.0	< 25.0	<25.0	<20.0	< 5.0 J	< 5.0	< 10.0	< 10.0	< 10.0	< 10.0	< 25.0
Benzene	**5.5**	**1.9**	**2.3**	**11.4**	**10**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	< 5.0	< 1.0	< 1.0	**1.4**	**1.2**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	< 5.0	**1.1**	< 1.0	**1.9**	**1.5**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethylene	< 5.0	< 1.0	< 1.0	<1.0	<1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethylene, cis	< 5.0	**1.2**	**1.5**	**4.7**	**3.7**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethylene, trans	< 5.0	< 4.0	< 4.0	<1.0	<1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 4.0
Ethyl benzene	**15.0**	**6.7**	**6.6**	**56.0**	**51.2**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Isopropyl ether	**429**	**580**	**604**	**964**	**938**	< 1.0	**102**	**103**	**115**	**93.8**	**91.0**	**106**
Methyl ethyl ketone	< 20.0	< 4.0	< 4.0	<4.0	<5.0	< 5.0 J	< 5.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Tetrahydrofuran	< 50.0	**39.1**	**41.5**	**35.3**	**52.2**	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
List 2 VOCs (µg/L)												
Isopropyl alcohol	< 200	< 100	< 100	<100	<100	< 30.0 J	< 30.0	< 40.0	< 40.0	< 100	< 100	< 100
2-Butyl alcohol	< 200	< 40.0	< 40.0	<40.0	<40.0	< 30.0	< 30.0	< 40.0	< 40.0	< 40.0	< 40.0	< 40.0
Methyl isobutyl alcohol	< 200	< 40.0	< 40.0	<40.0	<40.0	< 30.0 J	< 30.0	< 40.0	< 40.0	< 40.0	< 40.0	< 40.0
Methylene chloride	< 20.0	< 4.0	< 4.0	<4.0	<4.0	< 1.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Methyl isobutyl ketone	< 20.0	< 4.0	< 4.0	<4.0	<5.0	< 5.0	< 5.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Toluene	< 5.0	< 1.0	< 1.0	**10.7**	**5.2**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Xylenes, total	**26.0**	**16.8**	**16.0**	**104**	**94.7**	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Total VOCs (µg/L)	**476**	**659**		**1189**	**1158**	ND	**102**	**103**	**115**	**92**		**106**

< Detection Limit = Not Detected (ND) at or above listed detection limit.

0 = Primary Sample

DB = Duplicate Sample

J = Reported value is less than laboratory quantitation limit and is considered an estimated value.

Total VOCs: Includes J values; ND treated as 0.0; Original and duplicate results averaged.
Values were recalculated in 2014, by increasing the reported significant figures.

Table D-4 (cont'd)
Groundwater Quality Data - 2006-2017
Monitoring Wells (Lower Alluvium)
Oakdale Site

Sample Location:	W2008	W2008	W2008	W2008	W2008	W2008	W2009	W2009	W2009	W2009	W2009	W2009
Sample Date:	11/13/2012	11/23/2013	11/18/2014	11/19/2015	11/1/2016	11/1/2017	11/8/2006	11/19/2008	12/1/2010	11/23/2013	11/19/2015	11/1/2017
Sample Code:	0	0	0	0	0	0	0	0	0	0	0	0
List 1 VOCs (µg/L)												
Acetone	<25.0	<20.0	<20.0	<20.0	<20.0	<20.0	< 5.0 J	< 10.0	< 10.0	<20.0	<20.0	<20.0
Benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.7**	**1.6**	**1.2**	**1.6**	**1.5**	**1.3**
1,1-Dichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	< 1.0	< 1.0	< 1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	< 1.0	< 1.0	< 1.0	<1.0	<1.0	<1.0
1,1-Dichloroethylene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	< 1.0	< 1.0	< 1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene, cis	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	< 1.0	< 1.0	< 1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene, trans	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	< 1.0	< 1.0	< 1.0	<1.0	<1.0	<1.0
Ethyl benzene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	< 1.0	< 1.0	< 1.0	<1.0	<1.0	<1.0
Isopropyl ether	**98.0**	**10.7**	**68.6**	**36.7**	**47.9**	**44.5**	**109**	**87.7**	**249**	**107**	**118**	**96.7**
Methyl ethyl ketone	<4.0	<5.0	<5.0	<5.0	<5.0	<5.0	< 5.0 J	< 4.0	**23.6**	**7.5**	**9.4**	<5.0
Tetrahydrofuran	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	< 10.0	< 10.0	**11.4**	<10.0	<10.0	<10.0
List 2 VOCs (µg/L)												
Isopropyl alcohol	<100	<100	<100	<100	<100	<100	**478 J**	< 40.0	< 100	<100	<100	<100
2-Butyl alcohol	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	< 30.0	< 40.0	< 40.0	<40.0	<40.0	<40.0
Methyl isobutyl alcohol	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0	< 30.0 J	< 40.0	< 40.0	<40.0	<40.0	<40.0
Methylene chloride	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	< 1.0	< 4.0	< 4.0	<4.0	<4.0	<4.0
Methyl isobutyl ketone	<4.0	<5.0	<5.0	<5.0	<5.0	<5.0	< 5.0	< 4.0	**21.9**	<5.0	**6.4**	<5.0
Toluene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	< 1.0	< 1.0	< 1.0	<1.0	<1.0	<1.0
Xylenes, total	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	< 3.0	< 3.0	< 3.0	<3.0	<3.0	<3.0
Total VOCs (µg/L)	**98**	**10.7**	**68.6**	**36.7**	**47.9**	**44.5**	**589**	**89**	**307**	**116**	**135**	**98.0**

< Detection Limit = Not Detected (ND) at or above listed detection limit.

0 = Primary Sample

DB = Duplicate Sample

J = Reported value is less than laboratory quantitation limit and is considered an estimated value.

Total VOCs: Includes J values; ND treated as 0.0; Original and duplicate results averaged.
Values were recalculated in 2014, by increasing the reported significant figures.

Table D-4 (cont'd)
Groundwater Quality Data - 2006-2017
Monitoring Wells (Lower Alluvium)
Oakdale Site

Sample Location:	W2010	W2010		W2010		W2010	W2010	W2010
Sample Date:	11/7/2006	11/19/2008		11/30/2010		11/22/2013	11/18/2015	11/1/2017
Sample Code:	0	0	DB	0	DB	0	0	0
List 1 VOCs (µg/L)								
Acetone	< 5.0 J	< 10.0	< 10.0	< 10.0	< 10.0	<20.0	<20.0	<20.0
Benzene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0	<1.0	<1.0
1,1-Dichloroethylene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene, cis	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene, trans	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0	<1.0	<1.0
Ethyl benzene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0	<1.0	<1.0
Isopropyl ether	**167**	**4.6**	**4.4**	**6.2**	**6.7**	**9.1**	**14.7**	**24.8**
Methyl ethyl ketone	< 5.0 J	< 4.0	< 4.0	< 4.0	< 4.0	<5.0	<5.0	<5.0
Tetrahydrofuran	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	<10.0	<10.0	<10.0
List 2 VOCs (µg/L)								
Isopropyl alcohol	< 30.0 J	< 40.0	< 40.0	< 100	< 100	<100	<100	**137**
2-Butyl alcohol	< 30.0	< 40.0	< 40.0	< 40.0	< 40.0	<40.0	<40.0	<40.0
Methyl isobutyl alcohol	< 30.0 J	< 40.0	< 40.0	< 40.0	< 40.0	<40.0	<40.0	<40.0
Methylene chloride	< 1.0	< 4.0	< 4.0	< 4.0	< 4.0	<4.0	<4.0	<4.0
Methyl isobutyl ketone	< 5.0	< 4.0	< 4.0	< 4.0	< 4.0	<5.0	<5.0	<5.0
Toluene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0	<1.0	<1.0
Xylenes, total	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	<3.0	<3.0	<3.0
Total VOCs (µg/L)	**167**	**4.5**		**6.5**		**9.1**	**14.7**	**162**

< Detection Limit = Not Detected (ND) at or above listed detection limit.

0 = Primary Sample

DB = Duplicate Sample

J = Reported value is less than laboratory quantitation limit and is considered an estimated value.

Total VOCs: Includes J values; ND treated as 0.0; Original and duplicate results averaged.
Values were recalculated in 2014, by increasing the reported significant figures.

Table D-4 (cont'd)
Groundwater Quality Data - 2006-2017
Monitoring Wells (Lower Alluvium)
Oakdale Site

Sample Location:	W2012	W2012	W2012	W2012	W2012		W2012
Sample Date:	11/9/2006	11/19/2008	12/3/2010	11/22/2013	11/19/2015		11/1/2017
Sample Code:	0	0	0	0	0	DB	0
List 1 VOCs (µg/L)							
Acetone	< 5.0 J	< 10.0	< 50.0	<20.0	<20.0	<20.0	<100
Benzene	**4.0**	**5.2**	**8.9**	**7.7**	**17.9**	**17.8**	**7.5**
1,1-Dichloroethane	< 1.0	< 1.0	< 5.0	<1.0	<1.0	<1.0	<5.0
1,2-Dichloroethane	< 1.0	< 1.0	< 5.0	<1.0	<1.0	<1.0	<5.0
1,1-Dichloroethylene	< 1.0	< 1.0	< 5.0	<1.0	<1.0	<1.0	<5.0
1,2-Dichloroethylene, cis	< 1.0	< 1.0	< 5.0	<1.0	<1.0	<1.0	<5.0
1,2-Dichloroethylene, trans	< 1.0	< 1.0	< 5.0	<1.0	<1.0	<1.0	<5.0
Ethyl benzene	< 1.0	**33.9**	**34.9**	**3.4**	**9.8**	**10.8**	**5.0**
Isopropyl ether	**582**	**381**	**443**	**460**	**645**	**624**	**298**
Methyl ethyl ketone	< 5.0 J	< 4.0	< 20.0	<5.0	<5.0	<5.0	<25.0
Tetrahydrofuran	< 10.0	< 10.0	< 50.0	<10.0	<10.0	<10.0	<50.0
List 2 VOCs (µg/L)							
Isopropyl alcohol	< 30.0 J	< 40.0	< 500	<100	<100	<100	<500
2-Butyl alcohol	< 30.0	< 40.0	< 200	<40.0	<40.0	<40.0	<200
Methyl isobutyl alcohol	< 30.0 J	< 40.0	< 200	<40.0	<40.0	<40.0	<200
Methylene chloride	< 1.0	< 4.0	< 20.0	<4.0	<4.0	<4.0	<20.0
Methyl isobutyl ketone	< 5.0	< 4.0	< 20.0	<5.0	<5.0	<5.0	<25.0
Toluene	< 1.0	**1.1**	< 5.0	<1.0	<1.0	<1.0	<5.0
Xylenes, total	< 3.0	**119**	**248**	**15.3**	**49.2**	**51.2**	<15.0
Total VOCs (µg/L)	**586**	**540**	**735**	**486**	**713**		**311**

< Detection Limit = Not Detected (ND) at or above listed detection limit.

0 = Primary Sample

DB = Duplicate Sample

J = Reported value is less than laboratory quantitation limit and is considered an estimated value.

Total VOCs: Includes J values; ND treated as 0.0; Original and duplicate results averaged.
Values were recalculated in 2014, by increasing the reported significant figures.

Table D-5
Groundwater Quality Data - 2006-2017
Platteville Bedrock Unit Monitoring Wells
Oakdale Site

Sample Location:	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3	W3
Sample Date:	11/9/2006	11/28/2007	11/20/2008	12/7/2009	12/3/2010	11/30/2011	11/13/2012	11/21/2013	11/17/2014	11/17/2015	10/31/2016	10/31/2017
Sample Code:	0	0	0	0	0	0	0	0	0	0	0	0
List 1 VOCs (µg/L)												
Acetone	< 5.0 J	< 5.0	< 10.0	< 50.0	< 50.0	< 125	<125	<20.0	<100	<100	<40.0	<200
Benzene	**10.0**	**8.7**	**8.1**	< 5.0	**5.5**	< 5.0	<5.0	<1.0	<5.0	<5.0	<2.0	<10.0
1,1-Dichloroethane	< 1.0	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	<5.0	<1.0	<5.0	<5.0	<2.0	<10.0
1,2-Dichloroethane	< 1.0	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	<5.0	<1.0	<5.0	<5.0	<2.0	<10.0
1,1-Dichloroethylene	< 1.0	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	<5.0	<1.0	<5.0	<5.0	<2.0	<10.0
1,2-Dichloroethylene, cis	< 1.0	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	<5.0	<1.0	<5.0	<5.0	<2.0	<10.0
1,2-Dichloroethylene, trans	< 1.0	< 1.0	< 1.0	< 5.0	< 5.0	< 20.0	<5.0	<1.0	<5.0	<5.0	<2.0	<10.0
Ethyl benzene	< 1.0	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	<5.0	<1.0	<5.0	<5.0	<2.0	<10.0
Isopropyl ether	**875**	**800**	**895**	**686**	**692**	**540**	**522**	**736**	**736**	**302**	**746**	**465**
Methyl ethyl ketone	< 5.0 J	< 5.0	< 4.0	< 20.0	< 20.0	< 20.0	<20.0	<5.0	<25.0	<25.0	<10.0	<50.0
Tetrahydrofuran	**39.1**	**31.7**	**20.3**	< 50.0	< 50.0	< 50.0	<50.0	<10.0	<50.0	<50.0	<20.0	<100
List 2 VOCs (µg/L)												
Isopropyl alcohol	< 30.0 J	< 30.0	< 40.0	< 200	< 500	< 500	<500	<100	**7980**	<500	<200	<1000
2-Butyl alcohol	< 30.0	< 30.0	< 40.0	< 200	< 200	< 200	<200	<40.0	<200	<200	<80.0	<400
Methyl isobutyl alcohol	< 30.0 J	< 30.0	< 40.0	< 200	< 200	< 200	<200	<40.0	<200	<200	<80.0	<400
Methylene chloride	< 1.0	< 4.0	< 4.0	< 20.0	< 20.0	< 20.0	<20.0	<4.0	<20.0	<20.0	<8.0	<40.0
Methyl isobutyl ketone	< 5.0	< 5.0	< 4.0	< 20.0	< 20.0	< 20.0	<20.0	<5.0	<25.0	<25.0	<10.0	<50.0
Toluene	< 1.0	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	<5.0	<1.0	<5.0	<5.0	<2.0	<10.0
Xylenes, total	< 3.0	< 3.0	< 3.0	< 15.0	< 15.0	< 15.0	<15.0	<3.0	<15.0	<15.0	<6.0	<30.0
Total VOCs (µg/L)	**924**	**840**	**923**	**686**	**698**	**540**	**522**	**736**	**8716**	**302**	**746**	**465**

< Detection Limit = Not Detected (ND) at or above listed detection limit.

0 = Primary Sample

DB = Duplicate Sample

J = Reported value is less than laboratory quantitation limit and is considered an estimated value.

Total VOCs: Includes J values; ND treated as 0.0; Original and duplicate results averaged.
Values were recalculated in 2014, by increasing the reported significant figures.

Table D-5 (cont'd)
Groundwater Quality Data - 2006-2017
Platteville Bedrock Unit Monitoring Wells
Oakdale Site

Sample Location:	W8	W8	W8	W8	W8	W8	W8	W8	W8	W8	W8	W8
Sample Date:	11/8/2006	11/28/2007	11/18/2008	12/2/2009	12/1/2010	11/30/2011	11/13/2012	11/20/2013	11/17/2014	11/17/2015	10/31/2016	10/31/2017
Sample Code:	0	0	0	0	0	0	0	0	0	0	0	0
List 1 VOCs (µg/L)												
Acetone	< 5.0 J	< 5.0	< 10.0	< 10.0	< 10.0	< 25.0	<25.0	<20.0	<20.0	<20.0	<20.0	<20.0
Benzene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethylene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene, cis	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene, trans	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 4.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethyl benzene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Isopropyl ether	**68.7**	**58.6**	**56.2**	**55.7**	**45.4**	**60.3**	**89.8**	**48.8**	**127**	**171**	**145**	**28.8**
Methyl ethyl ketone	< 5.0 J	< 5.0	< 4.0	< 4.0	< 4.0	< 4.0	<4.0	<5.0	<5.0	<5.0	<5.0	<5.0
Tetrahydrofuran	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
List 2 VOCs (µg/L)												
Isopropyl alcohol	< 30.0 J	< 30.0	< 40.0	< 40.0	< 100	< 100	<100	<100	<100	<100	<100	**106**
2-Butyl alcohol	< 30.0	< 30.0	< 40.0	< 40.0	< 40.0	< 40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0
Methyl isobutyl alcohol	< 30.0 J	< 30.0	< 40.0	< 40.0	< 40.0	< 40.0	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0
Methylene chloride	< 1.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Methyl isobutyl ketone	< 5.0	< 5.0	< 4.0	< 4.0	< 4.0	< 4.0	<4.0	<5.0	<5.0	<5.0	<5.0	<5.0
Toluene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Xylenes, total	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Total VOCs (µg/L)	**69**	**59**	**56**	**56**	**45**	**60**	**90**	**49**	**127**	**171**	**145**	**135**

< Detection Limit = Not Detected (ND) at or above listed detection limit.

0 = Primary Sample

DB = Duplicate Sample

J = Reported value is less than laboratory quantitation limit and is considered an estimated value.

Total VOCs: Includes J values; ND treated as 0.0; Original and duplicate results averaged.
Values were recalculated in 2014, by increasing the reported significant figures.

Table D-5 (cont'd)
Groundwater Quality Data - 2006-2017
Platteville Bedrock Unit Monitoring Wells
Oakdale Site

Sample Location:	W80	W80	W80	W80	W80	W80	W80	W80	W80	W80	W80	W80
Sample Date:	11/7/2006	11/28/2007	11/18/2008	12/2/2009	11/30/2010	11/29/2011	11/15/2012	11/22/2013	11/20/2014	11/19/2015	11/2/2016	11/2/2017
Sample Code:	0	0	0	0	0	0	0	0	0	0	0	0
List 1 VOCs (µg/L)												
Acetone	< 5.0 J	< 5.0	< 10.0	< 10.0	< 10.0	< 25.0	<25.0	<20.0	<20.0	<20.0	<20.0	<20.0
Benzene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethylene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene, cis	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene, trans	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 4.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethyl benzene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Isopropyl ether	**9.4**	**11.4**	< 4.0	< 4.0	< 4.0	< 4.0	<4.0	<1.0	<1.0	<1.0	<1.0	<1.0
Methyl ethyl ketone	< 5.0 J	< 5.0	< 4.0	< 4.0	< 4.0	< 4.0	<4.0	<5.0	<5.0	<5.0	<5.0	<5.0
Tetrahydrofuran	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
List 2 VOCs (µg/L)												
Isopropyl alcohol	--	--	--	--	--	--	--	--	--	--	---	---
2-Butyl alcohol	--	--	--	--	--	--	--	--	--	--	---	---
Methyl isobutyl alcohol	--	--	--	--	--	--	--	--	--	--	---	---
Methylene chloride	--	--	--	--	--	--	--	--	--	--	---	---
Methyl isobutyl ketone	--	--	--	--	--	--	--	--	--	--	---	---
Toluene	--	--	--	--	--	--	--	--	--	--	---	---
Xylenes, total	--	--	--	--	--	--	--	--	--	--	---	---
Total VOCs (µg/L)	**9**	**11**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

< Detection Limit = Not Detected (ND) at or above listed detection limit.

0 = Primary Sample

DB = Duplicate Sample

J = Reported value is less than laboratory quantitation limit and is considered an estimated value.

Total VOCs: Includes J values; ND treated as 0.0; Original and duplicate results averaged.
Values were recalculated in 2014, by increasing the reported significant figures.

Table D-5 (cont'd)
Groundwater Quality Data - 2006-2017
Platteville Bedrock Unit Monitoring Wells
Oakdale Site

Sample Location:	W6102	W6102	W6102	W6102	W6102	W6102		W6102	W6102	W6102	W6102	W6102	W6102
Sample Date:	11/8/2006	11/28/2007	11/18/2008	12/7/2009	12/3/2010	11/29/2011		11/13/2012	11/22/2013	11/18/2014	11/18/2015	11/2/2016	11/2/2017
Sample Code:	0	0	0	0	0	0	DB	0	0	0	0	0	0
List 1 VOCs (µg/L)													
Acetone	< 5.0 J	< 5.0	< 10.0	< 10.0	< 10.0	< 25.0	< 25.0	<25.0	<20.0	<40.0	<20.0	<20.0	<20.0
Benzene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0
1,2-Dichloroethane	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0
1,1-Dichloroethylene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene, cis	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0
1,2-Dichloroethylene, trans	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 4.0	< 4.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0
Ethyl benzene	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0
Isopropyl ether	**114**	**161**	**138**	**147**	**38.2**	**131**	**134**	**139**	**153**	**132**	**159**	**149**	**110**
Methyl ethyl ketone	< 5.0 J	< 5.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	<4.0	<5.0	<10.0	<5.0	<5.0	<5.0
Tetrahydrofuran	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	<10.0	<10.0	<20.0	<10.0	<10.0	<10.0
List 2 VOCs (µg/L)													
Isopropyl alcohol	--	--	--	--	--	--	--	--	--	--	<100	<100	<100
2-Butyl alcohol	--	--	--	--	--	--	--	--	--	--	<40.0	<40.0	<40.0
Methyl isobutyl alcohol	--	--	--	--	--	--	--	--	--	--	<40.0	<40.0	<40.0
Methylene chloride	--	--	--	--	--	--	--	--	--	--	<4.0	<4.0	<4.0
Methyl isobutyl ketone	--	--	--	--	--	--	--	--	--	--	<5.0	<5.0	<5.0
Toluene	--	--	--	--	--	--	--	--	--	--	<1.0	<1.0	<1.0
Xylenes, total	--	--	--	--	--	--	--	--	--	--	<3.0	<3.0	<3.0
Total VOCs (µg/L)	**114**	**161**	**138**	**147**	**38**	**133**		**139**	**153**	**132**	**159**	**149**	**110**

< Detection Limit = Not Detected (ND) at or above listed detection limit.

0 = Primary Sample

DB = Duplicate Sample

J = Reported value is less than laboratory quantitation limit and is considered an estimated value.

Total VOCs: Includes J values; ND treated as 0.0; Original and duplicate results averaged.
Values were recalculated in 2014, by increasing the reported significant figures.

Table D-5 (cont'd)
Groundwater Quality Data - 2006-2017
Platteville Bedrock Unit Monitoring Wells
Oakdale Site

Sample Location:	W6104	W6104	W6104
Sample Date:	11/19/2008	11/12/2012	11/17/2015
Sample Code:	0	0	0
List 1 VOCs (µg/L)			
Acetone	< 20.0	<25.0	<20.0
Benzene	< 2.0	<1.0	<1.0
1,1-Dichloroethane	< 2.0	<1.0	<1.0
1,2-Dichloroethane	< 2.0	<1.0	<1.0
1,1-Dichloroethylene	< 2.0	<1.0	<1.0
1,2-Dichloroethylene, cis	< 2.0	<1.0	<1.0
1,2-Dichloroethylene, trans	< 2.0	<1.0	<1.0
Ethyl benzene	< 2.0	<1.0	<1.0
Isopropyl ether	**170**	**171**	**205**
Methyl ethyl ketone	< 8.0	<4.0	<5.0
Tetrahydrofuran	< 20.0	<10.0	<10.0
List 2 VOCs (µg/L)			
Isopropyl alcohol	--	--	<100
2-Butyl alcohol	--	--	<40.0
Methyl isobutyl alcohol	--	--	<40.0
Methylene chloride	--	--	<4.0
Methyl isobutyl ketone	--	--	<5.0
Toluene	--	--	<1.0
Xylenes, total	--	--	<3.0
Total VOCs (µg/L)	**170**	**171**	**205**

< Detection Limit = Not Detected (ND) at or above listed detection limit.

0 = Primary Sample

DB = Duplicate Sample

J = Reported value is less than laboratory quantitation limit and is considered an estimated value.

Total VOCs: Includes J values; ND treated as 0.0; Original and duplicate results averaged.
Values were recalculated in 2014, by increasing the reported significant figures.

Table D-6
Groundwater Quality Data - 1999-2017
St. Peter Bedrock Monitoring Well
Oakdale Site

Sample Location:	W6201	W6201		W6201		W6201	W6201	W6201	W6201
Sample Date:	11/29/1999	11/10/2000		11/12/2001		11/25/2002	11/7/2006	12/1/2010	11/17/2015
Sample Code:	0	0	DB	0	DB	0	0	0	0
List 1 VOCs (µg/L)									
Acetone	**30**	< 25	< 25	< 25	< 25	< 25	< 5.0 J	< 10.0	<20.0
Benzene	< 5	< 5	< 5	< 5.0	< 5.0	< 5.0	< 1.0	< 1.0	<1.0
1,1-Dichloroethane	< 5	< 5	< 5	< 5.0	< 5.0	< 5.0	< 1.0	< 1.0	<1.0
1,2-Dichloroethane	**9.9**	< 5	**2.7 J**	< 4.0	< 4.0	< 4.0	< 1.0	< 1.0	<1.0
1,1-Dichloroethylene	< 5	< 5	< 5	< 5.0	< 5.0	< 5.0	< 1.0	< 1.0	<1.0
1,2-Dichloroethylene, cis	< 5	< 5	< 5	< 5.0	< 5.0	< 5.0	< 1.0	< 1.0	<1.0
1,2-Dichloroethylene, trans	< 5	< 5	< 5	< 5.0	< 5.0	< 5.0	< 1.0	< 1.0	<1.0
Ethyl benzene	< 5	< 5	< 5	< 5.0	< 5.0	< 5.0	< 1.0	< 1.0	<1.0
Isopropyl ether	**360**	**290**	**320**	**280**	**260**	< 5.0	**5.5**	**159**	**118**
Methyl ethyl ketone	< 25	< 25	< 25	< 25	< 25	< 25	< 5.0 J	< 4.0	<5.0
Tetrahydrofuran	< 50	< 50	< 50	< 50	< 50	< 50	< 10.0	< 10.0	<10.0
Total VOCs (µg/L)	**400**	**306**		**270**		ND	**5.5**	**159**	**118**

Historic data range was expanded for well W6201 since this well is only sampled once every four years since 2006.

< Detection Limit = Not Detected (ND) at or above listed detection limit.

0 = Primary Sample

DB = Duplicate Sample

J = Reported value is less than laboratory quantitation limit and is considered an estimated value.

Total VOCs: Includes J values; ND treated as 0.0; Original and duplicate results averaged.
Values were recalculated in 2014, by increasing the reported significant figures.

APPENDIX D

March 2007 Minnesota Department of Health Notice of Designation of Special Well Construction Area, Lake Elmo/Oakdale, Washington County, Minnesota

Protecting, maintaining and improving the health of all Minnesotans

DATE: March 8, 2007

TO: Licensed and Registered Well Contractors
Cindy Weckwerth, Washington County
Susan Hoyt, City of Lake Elmo
Brian Bachmeier, City of Oakdale
Advisory Council on Wells and Borings

FROM: John Linc Stine, Director
Environmental Health Division
P.O. Box 64975
St. Paul, Minnesota 55164-0975

PHONE: 651/201-4675

SUBJECT: **Notice of Designation of Special Well Construction Area, Lake Elmo-Oakdale, Washington County, Minnesota**

The Minnesota Department of Health (MDH) is designating a SPECIAL WELL CONSTRUCTION AREA (SWCA), which includes portions of Lake Elmo and Oakdale in Washington County, Minnesota (see Figure 1). The SWCA designation is effective March 15, 2007, and applies to the construction repair, modification, and sealing of wells and borings. The SWCA designation remains effective until further notice. This designation is an expansion and renaming of the existing Washington County Landfill SWCA, originally established in 1982. This expansion includes the Oakdale disposal site. The SWCA addresses the finding of more extensive groundwater contamination by perfluorochemicals in Lake Elmo and Oakdale.

AUTHORITY

Minnesota Statutes, section 103I, subdivision 5, clause 7 grants the commissioner of health the authority to establish standards for the construction, maintenance, sealing, and water-quality monitoring of wells in areas of known or suspected contamination. Minnesota Rules, part 4725.3650, details the requirements for construction, repair, and sealing of wells within a designated SWCA, including plan review and approval, water-quality monitoring, and other measures to protect public health and prevent degradation of groundwater.

SITE HISTORIES

The Washington County Landfill is located approximately one-quarter mile south of Lake Jane in Lake Elmo, Minnesota. It was initially permitted as a solid waste landfill by the Minnesota Pollution Control Agency (MPCA) in 1969 and operated until 1975. The

landfill received approximately 2.5 million cubic yards of municipal and industrial wastes (MPCA 2004). In 1981, sampling of on-site monitoring wells and off-site private wells to the south and southwest indicated the presence of volatile organic chemicals (VOCs), including trichloroethylene and tetrachloroethylene, and metals in groundwater. A "Well Advisory," of approximately 1 square mile, was established on July 19, 1982. The advisory covered an area from the landfill south to Highway 5. The advisory boundaries were revised in 1983 and, in 1993, the advisory became a SWCA. Due to the presence of VOC contamination, the SWCA required persons proposing to construct or seal wells within the SWCA to obtain written plan approval from the MDH prior to beginning work. This SWCA has been in effect to the present.

In 1983, Ramsey and Washington Counties installed a groundwater remediation system, including a gradient control well system with spray irrigation to remove VOCs. In 1996, the site entered the MPCA-administered Closed Landfill Program and the MPCA has taken additional steps to improve the landfill cover and the groundwater remediation system. Municipal water service, provided by the Oakdale municipal system, was extended into the SWCA in 1986, and private wells were sealed.

The Oakdale disposal site (actually three sites - Abresch, Brockman, and Eberle) was used in the 1940's through 1960's for disposal of commercial, industrial, and residential wastes. Disposal was via burying containers and solid materials in trenches, dumping liquids on the ground or in pits, and burning materials in pits. The site investigation began in 1980. Contaminants detected at the site include methyl ethyl ketone, acetone, toluene, isopropyl ether, and other VOCs. A number of remedial actions were taken, including excavation and disposal/incineration of wastes and contaminated soils, sealing 39 multiaquifer (Platteville limestone – St. Peter sandstone) wells and connecting potentially affected well owners to the Oakdale municipal water supply, installation and operation of a groundwater remediation system (12 extraction wells) in the unconsolidated aquifers, and installation of a groundwater monitoring system (Minnesota Department of Health, 1993).

PERFLUOROCHEMICALS

In 2003, the MPCA began investigating a family of chemicals called "perfluorochemicals" (PFCs) that were used in products resistant to heat, oil, grease, and water, and which appear to be persistent in the environment. These compounds were used in a wide array of products and materials, including nonstick cookware, stain- and water-resistant fabrics, fire-suppression foams, film coatings and other consumer and commercial products.

PFCs were produced by the 3M Company (3M) at its Cottage Grove facility. Wastes from this production were disposed at the Washington County Landfill and at the Oakdale disposal site. The initial investigations focused on two specific PFCs in groundwater – perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS). Testing of monitoring wells in 2003 at the Washington County Landfill and the Oakdale disposal site identified the presence of PFOA and PFOS. In 2004, 32 private wells near the Washington County Landfill were tested for PFCs. PFOA was detected at low levels in seven wells.

In December 2004, initial sampling of the Oakdale municipal wells identified five wells showing the presence of PFOA and PFOS. Testing expanded in early 2005 to investigate private wells in Lake Elmo, south and southwest of the Washington County Landfill. Findings indicated that PFOA and PFOS had migrated far beyond the distribution of the VOC contaminant plume and the boundaries of the original SWCA.

In the Spring 2006, testing was expanded to include five additional perfluorochemicals:

- perfluorobutane sulfonate (PFBS),
- perfluorobutanoic acid (PFBA),
- perfluoropentanoic acid (PFPeA),
- perfluorohexane sulfonate (PFHxS), and
- perfluorohexanoic acid (PFHxA).

Three of the chemicals (PFPeA, PFHxS, and PFHxA) were found in private wells that had previous detections of PFOA and PFOS. However, PFBA was detected in 204 wells that show the presence of no other PFCs. To date, 425 private wells and noncommunity public water-supply wells have been sampled and tested for PFCs. The testing results showed 92 wells with no detection of PFCs, 129 wells with multiple PFCs present, and 204 with only PFBA present. MDH advised that 151 wells should not be used for consumptive uses because of PFOS/PFOA/PFBA exceedances of the Health-Based Values (HBVs) or well advisory guidelines or a combination of PFCs exceeding a health index of greater than or equal to one. Some of the areas impacted include the Lake Elmo Heights, Tablyn Park, Torre Pines, and Parkview neighborhoods of Lake Elmo, extending south-southwest of the Washington County Landfill. PFBAs were also detected in a sixth Oakdale municipal well and in a recently-constructed municipal well in Lake Elmo that has not been put into service, and at very low levels in 16 Woodbury municipal wells, south of Interstate 94.

Additional testing in January-February 2007 indicated that PFBA contamination is found throughout much of southwest Washington County and part of northern Dakota County, affecting wells and public water-supply systems in Cottage Grove, Hastings, Newport, South St. Paul, and St. Paul Park. Investigations and well testing are continuing to better determine the extent and magnitude of contamination, assess source areas, and address remedial options. These findings south of Interstate 94 are not the subject of this SWCA, but may be addressed in a future SWCA designation.

RESPONSE ACTIONS

3M provided the city of Lake Elmo with a $3.3 million grant to extend the municipal water supply to service the Lake Elmo Heights and Tablyn Park neighborhoods. The grant is expected to cover the extension of watermains, connection of 214 homes to municipal service, and permanent sealing of the wells serving those homes. The extension of municipal water service is scheduled for completion in early 2007, at which time sealing of the private wells will occur.

In 2005, the MPCA began providing granular activated carbon (GAC) treatment for wells that exceeded the HBVs, well advisory guidelines, or had a hazard index of greater than or equal to one. Existing wells outside the area of the proposed municipal water-supply expansion are eligible for GAC treatment. The MPCA is providing bottled water until GAC treatment or an alternate water supply can be provided to these wells. New or replacement wells must meet the requirements of this SWCA.

In October 2006, the city of Oakdale began operation of a GAC filtration plant, designed to remove PFCs from water supplied by the two public water-supply wells having PFOA/PFOS concentrations exceeding HBVs. The design, construction, and operation costs were covered by 3M. During periods of high water demand, the city attempts to minimize PFC levels by careful management of use of the municipal wells.

SWCA HYDROGEOLOGY

The surficial geology of the Lake Elmo/Oakdale area consists of 50-150 feet of unconsolidated materials, comprised of glacial till deposits associated with the St. Croix Moraine. Lacustrine and wetland deposits are predominant in Oakdale, and glacial outwash is more widespread in Lake Elmo (Minnesota Geological Survey, Plate 3, 1990).

These materials are underlain by Paleozoic-era sedimentary rocks of interbedded dolostone/limestone, sandstone, and shale units (see Figure 2). These bedrock units have a slight southwesterly dip, reflecting the fact that this area is on the eastern flank of the Twin Cities Basin (Barr Engineering Company, 2005). In the northwestern corner of the SWCA, a remnant of the Decorah shale is present, and, in fact, directly underlies the Abresch disposal site in Oakdale. The first bedrock unit underlying most of Oakdale is the Platteville limestone/Glenwood shale. Further east, these units are eroded and, progressively eastward, the St. Peter sandstone, or the Prairie du Chien group, is the first bedrock encountered beneath the surficial materials. The first bedrock underlying the Washington County Landfill is the Prairie du Chien group.

A major groundwater divide bisects Washington County from north to south, with groundwater east of the divide moving eastward and discharging to the St. Croix River and groundwater west of the divide moving west-southwest towards the Mississippi River (Minnesota Geological Survey, Plate 5, 1990). The eastern boundary of the SWCA is located just east of this divide. Within the SWCA, groundwater flow within the drift and outwash deposits can be variable. Flow is controlled by local discharge/recharge points, the presence of confining layers, groundwater withdrawals, and land use. For instance, the groundwater remediation system at the Washington County Landfill and the presence of bedrock with low permeability at the Oakdale disposal site create mounding conditions that produce radial flow in the local groundwater. Groundwater levels and flow directions are also influenced by recharge from losing streams (i.e., Raleigh Creek) and by natural discharge to local lakes and streams.

Regional groundwater flow in the bedrock, particularly the St. Peter sandstone and the Prairie du Chien group, is generally to the southwest. The distribution and migration of PFCs to the south – southwest reflect this groundwater flow direction. The contaminant plume is also gradually "sinking" into deeper formations and dispersing along the transport path. PFC contamination tends to be limited to the drift and St. Peter sandstone in the northern third of the SWCA and is found in the Prairie du Chien dolomite and Jordan sandstone in the southern two-thirds of the SWCA.

ENVIRONMENTAL AND PUBLIC HEALTH CONCERNS

PFCs are synthetic chemicals that are not natural to the environment. They are found both as an ingredient in manufacturing processes and as part of some finished products. Unlike most organic compounds that tend to degrade in the environment or are adsorbed onto

natural materials, PFCs are very stable compounds and appear to be resistant to environmental degradation. In addition, these compounds can be transported widely in the environment, in general, and in groundwater, in particular. Some PFCs (primarily PFOA and PFOS) have been found to bioaccumulate (Minnesota Department of Health, 2005). Because of these characteristics, uses of groundwater for purposes other than drinking, such as irrigation and other nonconsumptive uses, may also be of concern.

PFCs are a relatively new family of environmental contaminants and there are limited numbers of studies of health effects in people. In animal studies, high concentrations of PFCs harm the liver and thyroid. Developmental problems have been seen in the offspring of rats and mice exposed to PFCs while pregnant. Studies of 3M workers exposed to PFOS and PFOA during manufacturing show no apparent impacts to their health. There is no similar health study information for the general population. However, the U.S. Environmental Protection Agency and other researchers are investigating the potential health effects on the general population and on other populations who are exposed to PFCs in their drinking water.

On March 1, 2007, the MDH issued revised HBVs, which are 0.5 micrograms/liter (μg/l) for PFOA and 0.3 μg/l for PFOS. A HBV is the concentration of a groundwater contaminant, or mixture of contaminants, that poses little or no risk to health, even if consumed over a lifetime. The MDH also recommends that consumers limit or reduce their intake of water that has a concentration of PFBA exceeding 1 μg/l. The MDH continues to evaluate toxicity data in order to calculate a HBV for PFBA in the future.

BOUNDARIES OF THE SPECIAL WELL CONSTRUCTION AREA

The boundaries of the existing SWCA, last revised in 1983, were as follows:

- Northern boundary of Lake Jane Hills Park, and west following an irregular boundary of Ivy Court North to Isle Avenue North.
- The alignment of Isle Avenue North to approximately 37th Avenue north, then west to the alignment of Irvin Circle North, then south to Highway 5.
- Highway 5 on the south, between Iris Avenue North and the midpoint of Section 15 (immediately east of intersection with 31st Street North.
- The north-south centerline of Section 15 and that part of Section 10 to the north boundary of Lake Jane Hills Park.

The location of the revised SWCA is shown on the attached map (Figure 1). Encompassing the area described above, the revised SWCA includes the following:

- Ramsey-Washington County line on the west (County Road 120, also known as Century Avenue or Geneva Avenue).
- Interstate 94 on the south, from county line to Lake Elmo Avenue.
- Lake Elmo Avenue on the east, extending from Interstate 94 to Highway 5 (Stillwater Boulevard North in Lake Elmo, 34th Street North in Oakdale) and, then, to 47th Street North.
- 47th Street North-Lake Jane Trail to Ideal Avenue North on the north, then southward to Highway 5, then westward to Ramsey-Washington County line.
- The area between Granada Avenue North and Hadley Avenue North, north of Highway 5 and south of 35th Street North.

The SWCA includes all of sections 14-16, 19-23 and 26-35 and portions of sections 9-11, 13, 17-18, and 24 of Township 29 North and Range 21 West.

REQUIREMENTS OF THE SPECIAL WELL CONSTRUCTION AREA

1. All wells and borings regulated by the MDH are subject to the requirements of this SWCA. Wells include water-supply wells (domestic, public, irrigation, commercial/industrial, cooling/heating, remedial, monitoring wells, and dewatering wells). Borings include environmental bore holes, elevator borings, and vertical heat exchangers. Notifications and permit applications, and their respective fees, must be submitted to the MDH.

2. Construction of a new well or boring, or modification of an existing well or boring, may not occur until plans have been reviewed and approved in writing by MDH. In addition to the normally required notification or permit application and fee, the plan must include the following information: street address; well or boring depth; casing type(s), diameter(s), and depth(s) for each casing; construction method(s), including grout materials and grouting methods; anticipated pumping rate; and use.

3. As a condition of the well construction plan approval, the well owner must agree to pay for a PFC analysis of the water, to be performed by the MDH Public Health Laboratory. Copies of analytical results will be forwarded to the well owner, the MPCA, Washington County Department of Public Health and Environment, and the city of Lake Elmo (or Oakdale). The MDH will review the analytical results and determine if the well can be completed, if the well must be drilled deeper, or if the well must be permanently sealed.

4. Special well construction and/or monitoring requirements may be imposed on a well/boring completion, location and use in order to protect the public health and groundwater quality and to prevent contaminant migration. These requirements will be based on available knowledge of groundwater contaminant movement near the well location and the proposed use and pumping rate of the well.

5. No potable water-supply wells may be completed in areas served by a community public water-supply system. The city of Lake Elmo has indicated that future new developments must be served by a community public water-supply system. For areas not served by a community system, potable water-supply wells may be allowed serving individual lots within already existing developments or replacing existing wells that go out of service. Potable water-supply wells may not be completed within the Platteville limestone, St. Peter sandstone, Prairie du Chien group, or Jordan sandstone without approval on a site-specific basis. For purposes of this SWCA, "potable use" includes any consumptive or other uses involving human contact, including drinking, cooking, bathing, recreation, manufacturing or processing of food, drink, or pharmaceuticals, or to supply water to fixtures accessible to humans.

6. Potable wells completed in the Franconia sandstone or Ironton-Galesville sandstones will be permitted throughout the SWCA. However, these wells must be cased and grouted through the full thickness of the St. Lawrence formation. Casing and grout must extend from at least 20 feet below the St. Lawrence formation to the surface.

7. Approval of plans and specifications for construction of a community public water-supply well and of the well site is required by Minnesota Rules, part 4725.5850. The MDH may approve completion of a public water-supply well within the designated SWCA if the system owner/operator can demonstrate that the water delivered to the distribution system meets Maximum Contaminant Levels (MCLs) established by the U.S. Environmental Protection Agency or other health guidelines referenced by the MDH, either through treatment, blending with other sources, monitoring, or other mechanisms.

8. A well completed in one of the geologic formations named in item 5 and used for a nonpotable purpose, such as groundwater quality monitoring or construction

dewatering, may be allowed, provided that the MDH and the MPCA determine that the well will not interfere with remediation efforts, cause further spread of contamination, or result in environmental or human exposures in excess of public health and environmental standards.

9. No well or boring in bedrock may be permanently sealed until the MDH has reviewed and approved the plans for the proposed sealing. In addition to the required notification and fee, the plan must include the following information: street address; original well/boring depth; current well/boring depth (if different); casing type(s), diameter(s), and depth(s); methods of identifying and sealing any open annular space(s); methods for identifying and removing any obstruction(s); grout materials and placement methods.

10. All other provisions of Minnesota Rules, Chapter 4725, are in effect.

WELL DISCLOSURE IN WASHINGTON COUNTY

Before signing an agreement to sell or transfer real property in Washington County that is not served by a municipal water system or is served by a municipal water system but has an unsealed well, Minnesota Statutes, section 103I.236, requires the seller to state in writing to the buyer whether, to the seller's knowledge, the property is located within a SWCA. Figure 1, details the Lake Elmo – Oakdale SWCA. This disclosure is in addition to the disclosure of the number, location, and status (in use, not in use, or sealed) of all wells on a property as required for all property transfers in Minnesota, as required under Minnesota Statutes, section 103I.235.

PERSONS TO CONTACT

For additional information regarding this SWCA, please contact Mr. Michael Convery of the MDH at 651/201-4586 or Michael.Convery@state.mn.us.

Plans for construction, repair, or sealing of wells and borings within the SWCA must be submitted to:

Mr. Patrick Sarafolean
Minnesota Department of Health
Well Management Section – Metro District
P.O. Box 64975
St. Paul, Minnesota 55164-0975
651/643-2110
Patrick.Sarafolean@state.mn.us

Notifications/permit applications for either construction or sealing of wells and borings must still be mailed or faxed to the MDH Central Office at:

Minnesota Department of Health
Well Management Section
P.O. Box 64975
St. Paul, Minnesota 55164-0975
651/201-4599

For information regarding public health concerns, please contact:

James Kelly/Virginia Yingling
Minnesota Department of Health
Site Assessment and Consultation Unit
P.O. Box 64975
St. Paul, Minnesota 55164-0975
(651)201-4910/(651)201-4930
James.Kelly@state.mn.us/Virginia.Yingling@state.mn.us

For information regarding the investigation, monitoring, and remediation of the ground water contamination, please contact:

Ms. Ingrid Verhagen/Mr. Shawn Ruotsinoja
Minnesota Pollution Control Agency
(651)296-7266/(651)282-2382
Ingrid.Verhagen@state.mn.us/Shawn.Ruotsinoja@state.mn.us

REFERENCES

Barr Engineering Company 2005, Washington County Landfill and Oakdale Disposal Site Groundwater Flow and Contaminant Transport Modeling, 23p.

Minnesota Department of Health, 1993, Site Review and Update – Oakdale Dump Site, CERCLIS Number MND980609515, 12p.

Minnesota Department of Health, 2005, Environmental Health Information – Perfluorochemicals and Health, 2p.

Minnesota Department of Health, 2006, Update: Perfluorochemicals and Private Drinking Water Wells in Lake Elmo, 2p.

Minnesota Geological Survey, 1990, *Hydrogeology* in Geologic Atlas – Washington County, Minnesota. County Atlas Series C-5, University of Minnesota – Plate 5.

Minnesota Pollution Control Agency, 2005, Minnesota Pollution Control Agency's Closed Landfill Program, Annual Report 2004, Washington County Sanitary Landfill SW-001.

JLS:MPC:jmw

Figure 1

Special Well Construction Area
Lake Elmo - Oakdale
Washington County

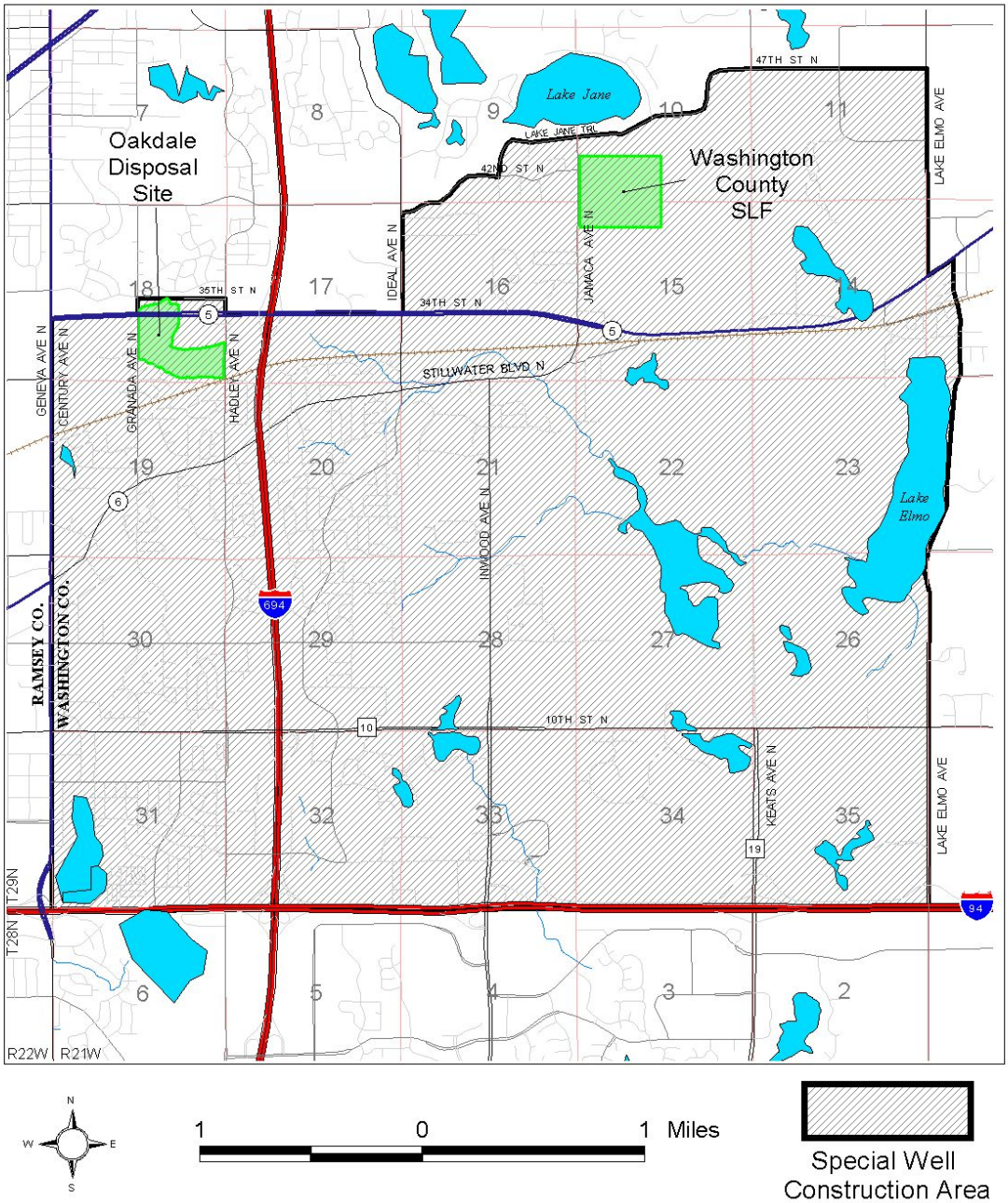
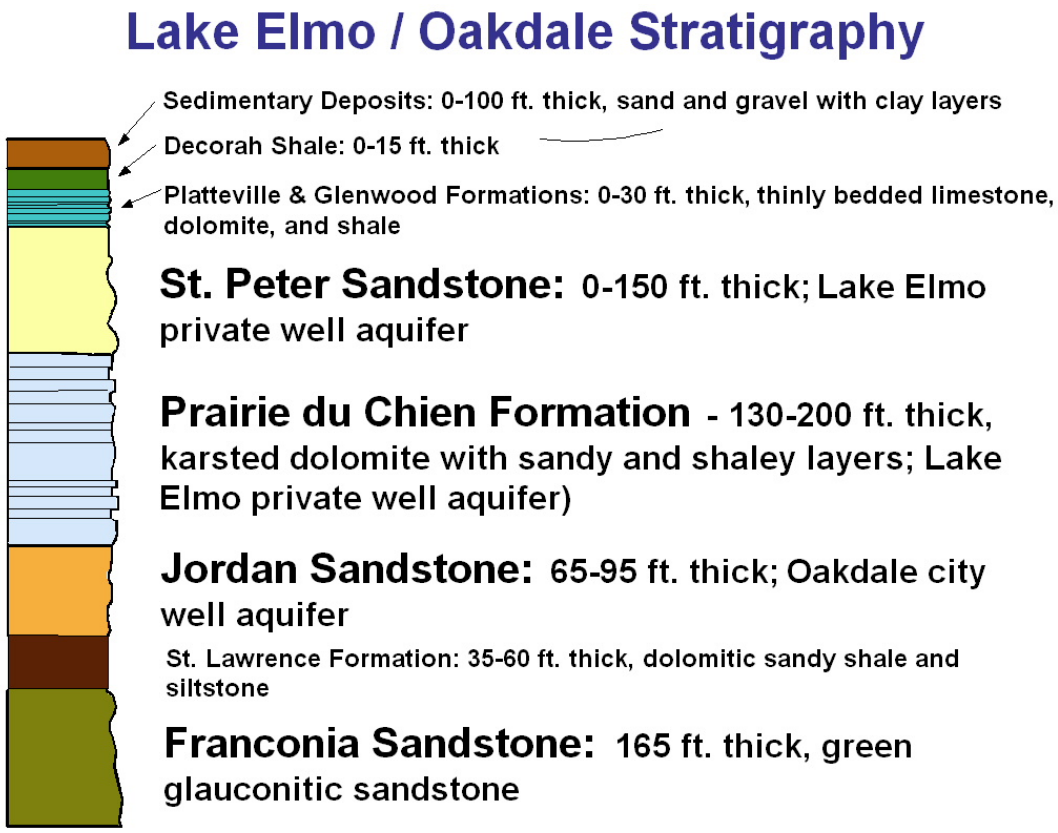


Figure 2


Lake Elmo / Oakdale Stratigraphy
Sedimentary Deposits: 0-100 ft. thick, sand and gravel with clay layers
Decorah Shale: 0-15 ft. thick
Platteville & Glenwood Formations: 0-30 ft. thick, thinly bedded limestone, dolomite, and shale
St. Peter Sandstone: 0-150 ft. thick; Lake Elmo private well aquifer
Prairie du Chien Formation - 130-200 ft. thick, karsted dolomite with sandy and shaley layers; Lake Elmo private well aquifer)
Jordan Sandstone: 65-95 ft. thick; Oakdale city well aquifer
St. Lawrence Formation: 35-60 ft. thick, dolomitic sandy shale and siltstone
Franconia Sandstone: 165 ft. thick, green glauconitic sandstone

APPENDIX E

Inspection Checklist for October 11, 2018 FYR Inspection by EPA at Oakdale Dump Site

Site Inspection Checklist

I. SITE INFORMATION	
Site name: **Oakdale Dump**	**Date of inspection:** **10/11/2018**
Location and Region: **Region 5. Oakdale, Washington County, Minnesota**	**EPA ID:** **MN980609515**
Agency, office, or company leading the FYR: EPA, Region 5	**Weather/temperature:** Windy, temps in the upper 30s, overcast

Remedy Includes: (Check all that apply)

☐ Landfill cover/containment	☐ Monitored natural attenuation
☐ Access controls	☒ Groundwater containment
☐ Institutional controls	☐ Vertical barrier walls
☒ Groundwater pump and treatment	☐ Other: Click or tap here to enter text.
☐ Surface water collection and treatment	

Attachments:

☒ Inspection team roster attached	☐ Site map attached

Site Inspection Checklist

II. INTERVIEWS (Check all that apply)

1. **O&M Site Manager** Name , Title , Click or tap to enter a date.

   Interviewed: ☐ at site ☐ at office ☐ by phone Phone Number: Click here to enter text.

   Problems, suggestions: ☐ Report attached

   Click or tap here to enter text.

2. **O&M Staff** Name , Title , Click or tap to enter a date.

   Interviewed: ☐ at site ☐ at office ☐ by phone Phone Number: Click here to enter text.

   Problems, suggestions: ☐ Report attached

   Click or tap here to enter text.

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

   Agency: Minnesota Pollution Control Agency

   Contact: Tim Lockrem, Project Manager, 10/11/2018, P: Phone Number

   Problems, suggestions: ☐ Report attached

   Inspection participant.

   Agency: Click or tap here to enter text.

   Contact: Name , Title , Click or tap to enter a date., P: Phone Number

   Problems, suggestions: ☐ Report attached

   Click or tap here to enter text.

   Agency: Click or tap here to enter text.

   Contact: Name , Title , Click or tap to enter a date., P: Phone Number

   Problems, suggestions: ☐ Report attached

   Click or tap here to enter text.

   Agency: Click or tap here to enter text.

   Contact: Name , Title , Click or tap to enter a date., P: Phone Number

   Problems, suggestions:

   Click or tap here to enter text.

4. **Other Interviews (optional):** ☐ Report attached

   Kevin Madson, Advanced Environmental Engineer, 3M. Participated in and interviewed during the inspection.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)			
1. O&M Documents			
☒ O&M manual	☒ Readily available	☐ Up to date	☐ N/A
☒ As-built drawings	☒ Readily available	☐ Up to date	☐ N/A
☒ Maintenance logs	☒ Readily available	☐ Up to date	☐ N/A
Remarks: Click or tap here to enter text.			
2. Site-Specific Health and Safety Plan		☐ Readily available	
☒ Contingency Plan/Emergency Response Plan		☒ Readily available	
Remarks: Last updated in 2016			
3. O&M and OSHA Training Records			
	☒ Readily available	☐ Up to date	☐ N/A
Remarks: At 3M office. Consultant provided HAZWOPER training.			
4. Permits and Service Agreements			
☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
☒ Waste disposal, POTW	☒ Readily available	☐ Up to date	☐ N/A
☐ Other permits: Click or tap here to enter text.			
Remarks: Click or tap here to enter text.			
5. Gas Generation Records			
	☐ Readily available	☐ Up to date	☒ N/A
Remarks: Click or tap here to enter text.			
6. Settlement Monument Records			
	☐ Readily available	☐ Up to date	☒ N/A
Remarks: Click or tap here to enter text.			
7. Groundwater Monitoring Records			
	☒ Readily available	☒ Up to date	☐ N/A
Remarks: At 3M office (and online)			
8. Leachate Extraction Records			
	☐ Readily available	☐ Up to date	☒ N/A

Remarks: Click or tap here to enter text.

9. Discharge Compliance Records

☐ Air	☐ Readily available	☐ Up to date	☒ N/A
☒Water (effluent)	☒ Readily available	☒ Up to date	☐ N/A

Remarks: Monthly reports provided to municipality

10. Daily Access/Security Logs

☒ Readily available	☐ Up to date	☐ N/A

Remarks: Security entrance. Badge scans recorded and kept with 3M security.

IV. O&M COSTS

1. O&M Organization

☐ State in-house	☐ Contractor for State
☐ PRP in-house	☒ Contractor for PRP
☐ Federal Facility in-house	☐ Contractor for Federal Facility

Remarks: Weston Solutions

2. O&M Cost Records

☐Readily available ☐ Up to date ☐ Funding mechanism/agreement in place

Original O&M cost estimate Click or tap here to enter text. ☐ Breakdown attached

Total annual cost by year for review period if available

From	To	Total cost	
Click or tap to enter a date.	Click or tap to enter a date.	Click or tap here to enter text.	☐ Breakdown attached
Click or tap to enter a date.	Click or tap to enter a date.	Click or tap here to enter text.	☐ Breakdown attached
Click or tap to enter a date.	Click or tap to enter a date.	Click or tap here to enter text.	☐ Breakdown attached
Click or tap to enter a date.	Click or tap to enter a date.	Click or tap here to enter text.	☐ Breakdown attached
Click or tap to enter a date.	Click or tap to enter a date.	Click or tap here to enter text.	☐ Breakdown attached

3. Unanticipated or Unusually High O&M Costs During Review Period

Describe costs and reasons:

Click or tap here to enter text.

V. ACCESS AND INSTITUTIONAL CONTROLS

☒ Applicable ☐ N/A

1. Fencing Damaged ☐ Location shown on site map ☒ Gates secured ☐ N/A

Remarks: Abresch Property only.

2. Other Access Restrictions ☐ Location shown on site map ☒ Gates secured

Remarks: No trespassing signs throughout property.

3. Institutional Controls (ICs)

A. Implementation and Enforcement

Site conditions imply ICs not properly implemented	☐ Yes	☐ No	☒ N/A
Site conditions imply ICs not being fully enforced	☐ Yes	☐ No	☒ N/A
Type of monitoring (*e.g.*, self-reporting, drive by)	Click or tap here to enter text.		
Frequency	Click or tap here to enter text.		
Responsible party/agency	Click or tap here to enter text.		

Contact: Name , Title , Click or tap to enter a date., P: Phone Number

Reporting is up-to-date	☐ Yes	☐ No	☒ N/A
Reports are verified by the lead agency	☐ Yes	☐ No	☒ N/A
Specific requirements in deed or decision documents have been met	☐ Yes	☐ No	☒ N/A
Violations have been reported	☐ Yes	☐ No	☒ N/A

Other problems or suggestions:

No ICs in place yet.

B. Adequacy ☐ ICs are adequate ☐ ICs are inadequate ☒ N/A

Remarks: Click or tap here to enter text.

4. General

A. Vandalism/Trespassing ☐ Location shown on site map ☒ No vandalism evident

Remarks: Trespassing issues identified during last FYR appear to have been resolved.

B. Land use changes on site ☐ N/A

Remarks: The city has expressed interest in developing the Brockman property.

C. Land use changes off site ☐ N/A

Remarks: Continued development surrounding Site

VI. GENERAL SITE CONDITIONS

1. Roads ☐ Applicable ☒ N/A

A. Roads damaged ☐ Location shown on site map ☐ Roads adequate ☐ N/A

Remarks: Click or tap here to enter text.

B. Other Site Conditions

Remarks: Click or tap here to enter text.

VII. LANDFILL COVERS

1. Landfill Surface ☐ Applicable ☒ N/A

A. Settlement (Low Spots) ☐ Location Shown on Site Map ☐ Settlement Not Evident

Areal Extent: Click or tap here to enter text. Depth: Click or tap here to enter text.

Remarks: Click or tap here to enter text.

B. Cracks ☐ Location Shown on Site Map ☐ Cracking Not Evident

Lengths: Click or tap here to enter text. Widths: Click or tap here to enter text. Depths: Click or tap here to enter text.

Remarks: Click or tap here to enter text.

C. Erosion ☐ Location Shown on Site Map ☐ Erosion Not Evident

Areal Extent: Click or tap here to enter text. Depth: Click or tap here to enter text.

Remarks: Click or tap here to enter text.

D. Holes ☐ Location Shown on Site Map ☐ Holes Not Evident

Areal Extent: Click or tap here to enter text. Depth: Click or tap here to enter text.

Remarks: Click or tap here to enter text.

E. Vegetative Cover ☐ Grass ☐ Cover Properly Established

☐ Tress/Shrubs (indicate size and locations on a diagram ☐ No Signs of Stress

Remarks: Click or tap here to enter text.

F. Alternative Cover (armored rock, concrete, etc.) ☐ N/A

Remarks: Click or tap here to enter text.

G. Bulges ☐ Location Shown on Site Map ☐ Bulges Not Evident

Areal Extent: Click or tap here to enter text. Height: Click or tap here to enter text.

Remarks: Click or tap here to enter text.

H. Wet Areas/Water Damage ☐ Wet Areas/Water Damage Not Evident

☐ Wet Areas	☐ Location Shown on Site Map	Areal Extent: Click or tap here to enter text.
☐ Ponding	☐ Location Shown on Site Map	Areal Extent: Click or tap here to enter text.
☐ Seeps	☐ Location Shown on Site Map	Areal Extent: Click or tap here to enter text.
☐ Soft Subgrade	☐ Location Shown on Site Map	Areal Extent: Click or tap here to enter text.

Remarks: Click or tap here to enter text.

I. Slope Instability ☐ Location Shown on Site Map ☐ Slope Instability Not Evident

☐ Slides Areal Extent: Click or tap here to enter text.

Remarks: Click or tap here to enter text.

2. Benches ☐ Applicable ☒ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

A. Flows Bypass Bench ☐ Location Shown on Site Map ☐ N/A or Okay

Remarks: Click or tap here to enter text.

B. Bench Breached ☐ Location Shown on Site Map ☐ N/A or Okay

Remarks: Click or tap here to enter text.

C. Bench Overtopped ☐ Location Shown on Site Map ☐ N/A or Okay

Remarks: Click or tap here to enter text.

3. Letdown Channels ☐ Applicable ☒ N/A

(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

A. Settlement ☐ Location Shown on Site Map ☐ Settlement Not Evident

Areal Extent: Click or tap here to enter text. Depth: Click or tap here to enter text.

Remarks: Click or tap here to enter text.

B. Material Degradation ☐ Location Shown on Site Map ☐ Degradation Not Evident

Material Type: Click or tap here to enter text. Areal Extent: Click or tap here to enter text.

Remarks: Click or tap here to enter text.

Site Inspection Checklist

C. Erosion ☐ Location Shown on Site Map ☐ Erosion Not Evident

Areal Extent: Click or tap here to enter text. Depth: Click or tap here to enter text.

Remarks: Click or tap here to enter text.

D. Undercutting ☐ Location Shown on Site Map ☐ Undercutting Not Evident

Areal Extent: Click or tap here to enter text. Depth: Click or tap here to enter text.

Remarks: Click or tap here to enter text.

E. Obstructions ☐ Location Shown on Site Map ☐ Undercutting Not Evident

Type: Click or tap here to enter text.

Areal Extent: Click or tap here to enter text. Size: Click or tap here to enter text.

Remarks: Click or tap here to enter text.

F. Excessive Vegetative Growth ☐ Location Shown on Site Map ☐ Excessive Growth Not Evident

Areal Extent: Click or tap here to enter text. ☐ Vegetation in channels does not obstruct flow

Remarks: Click or tap here to enter text.

4. Cover Penetrations ☐ Applicable ☒ N/A

A. Gas Vents ☐ Active ☐ Passive

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled

☐ Good condition ☐ Evidence of leakage at penetration

☐ Needs Maintenance ☐ N/A

Remarks: Click or tap here to enter text.

B. Gas Monitoring Probes

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled

☐ Good condition ☐ Evidence of leakage at penetration

☐ Needs Maintenance ☐ N/A

Remarks: Click or tap here to enter text.

C. Monitoring Wells

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled

☐ Good condition ☐ Evidence of leakage at penetration

☐ Needs Maintenance ☐ N/A

Remarks: Click or tap here to enter text.

D. Leachate Extraction Wells

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled

☐ Good condition ☐ Evidence of leakage at penetration

☐ Needs Maintenance ☐ N/A

Remarks: Click or tap here to enter text.

E. Settlement Monuments ☐ Located ☐ Routinely Surveyed ☐ N/A

Remarks: Click or tap here to enter text.

5. Gas Collection and Treatment ☐ Applicable ☒ N/A

A. Gas Treatment Facilities

☐ Flaring ☐ Thermal Destruction ☐ Collection for Reuse

☐ Good condition ☐ Needs Maintenance

Remarks: Click or tap here to enter text.

B. Gas Collection Wells, Manifolds, and Piping

☐ Good condition ☐ Needs Maintenance ☐ N/A

Remarks: Click or tap here to enter text.

C. Gas Monitoring Facilities (e.g. gas monitoring of adjacent homes or buildings)

☐ Good condition ☐ Needs Maintenance ☐ N/A

Remarks: Click or tap here to enter text.

6. Cover Drainage Layer ☐ Applicable ☒ N/A

A. Outlet Pipes Inspected ☐ Functioning ☐ N/A

Remarks: Click or tap here to enter text.

B. Outlet Rock Inspected ☐ Functioning ☐ N/A

Remarks: Click or tap here to enter text.

7. Detention/Sediment Ponds ☐ Applicable ☒ N/A

A. Siltation ☐ Siltation Not Evident ☐ N/A

Areal Extent: Click or tap here to enter text. Depth: Click or tap here to enter text.

Remarks: Click or tap here to enter text.

B. Erosion ☐ Erosion Not Evident

Areal Extent: Click or tap here to enter text. Depth: Click or tap here to enter text.

Remarks: Click or tap here to enter text.

C. Outlet Works ☐ Functioning ☐ N/A

Remarks: Click or tap here to enter text.

D. Dam ☐ Functioning ☐ N/A

Remarks: Click or tap here to enter text.

8. Retaining Walls ☐ Applicable ☒ N/A

A. Deformations ☐ Location Shown on Site Map ☐ Deformation Not Evident

Horizontal Displacement: Click or tap here to enter text.

Vertical Displacement: Click or tap here to enter text.

Rotational Displacement: Click or tap here to enter text.

Remarks: Click or tap here to enter text.

B. Degradation ☐ Location Shown on Site Map ☐ Deformation Not Evident

Remarks: Click or tap here to enter text.

9. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☒ N/A

A. Siltation ☐ Location Shown on Site Map ☐ Siltation Not Evident

Areal Extent: Click or tap here to enter text. Depth: Click or tap here to enter text.

Remarks: Click or tap here to enter text.

B. Vegetative Growth ☐ Location Shown on Site Map ☐ N/A

☐ Vegetation Does Not Impede Flow

Areal Extent: Click or tap here to enter text. Type: Click or tap here to enter text.

Remarks: Click or tap here to enter text.

C. Erosion ☐ Location Shown on Site Map ☐ Erosion Not Evident

Areal Extent: Click or tap here to enter text. Depth: Click or tap here to enter text.

Remarks: Click or tap here to enter text.

D. Discharge Structure ☐ Functioning ☐ N/A

Remarks: Click or tap here to enter text.

VIII. VERTICAL BARRIER WALLS

☐ Applicable ☒ N/A

1. Settlement ☐ Location Shown on Site Map ☐ Settlement Not Evident

Areal Extent: Click or tap here to enter text. Depth: Click or tap here to enter text.

Remarks: Click or tap here to enter text.

2. Performance Monitoring Type of Monitoring: Click or tap here to enter text.

☐ Performance Not Monitored ☐ Evidence of Breaching

Frequency: Click or tap here to enter text. Head Differential: Click or tap here to enter text.

Remarks: Click or tap here to enter text.

IX. GROUNDWATER/SURFACE WATER REMEDIES

☒ Applicable ☐ N/A

1. Groundwater Extraction Wells, Pumps, and Pipelines ☒ Applicable ☐ N/A

A. Pumps, Wellhead Plumbing, and Electrical ☐ N/A

☒ Good Condition ☒ All Required Wells Properly Operating ☐ Needs Maintenance

Remarks: On the surface and in treatment buildings, all GW treatment infrastructure is well maintained and in good condition.

B. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances

☒ Good Condition ☐ Needs Maintenance

Remarks: Click or tap here to enter text.

C. Spare Parts and Equipment ☐ Needs to be Provided

☒ Readily Available ☐ Good Condition ☐ Requires Upgrade

Remarks: Click or tap here to enter text.

2. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A

A. Collection Structures, Pumps, and Electrical

☐ Good Condition ☐ Needs Maintenance

Remarks: Click or tap here to enter text.

B. Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances

☐ Good Condition ☐ Needs Maintenance

Remarks: Click or tap here to enter text.

C. Spare Parts and Equipment ☐ Needs to be Provided

☐ Readily Available ☐ Good Condition ☐ Requires Upgrade

Remarks: Click or tap here to enter text.

3. Treatment System ☒ Applicable ☐ N/A

A. Treatment Train (Check components that apply)

☐ Metals removal ☐ Oil/Water Separation ☐ Bioremediation

☐ Air Stripping ☒ Carbon Absorbers

☒ Filters Polymers added, particles removed.

☒ Additive (e.g. chelation agent, flocculent) Polymer and permanganate

☐ Others Click or tap here to enter text.

☒ Good Condition ☐ Needs Maintenance

☐ Sampling ports properly marked and functional

☒ Sampling/maintenance log displayed and up to date

☒ Equipment properly identified

☒ Quantity of groundwater treated annually 70 GPM average: 36.7 Mgal/year

☐ Quantity of surface water treated annually Click or tap here to enter text.

Remarks: Click or tap here to enter text.

B. Electrical Enclosures and Panels (properly rated and functional)

☐ N/A ☒ Good Condition ☐ Needs Maintenance

Remarks: Click or tap here to enter text.

C. Tanks, Vaults, Storage Vessels ☐ N/A

☐ Proper Secondary Containment ☒ Good Condition ☐ Needs Maintenance

Remarks: Click or tap here to enter text.

D. Discharge Structure and Appurtenances

☐ N/A ☐ Good Condition ☐ Needs Maintenance

Remarks: Click or tap here to enter text.

E. Treatment Building(s)

☐ N/A ☒ Good condition (esp. roof and doorways)

☐ Needs repair ☐ Chemicals and equipment properly stored

Remarks Click or tap here to enter text.

F. Monitoring Wells (Pump and Treatment Remedy) ☐ N/A

☒ Properly secured/locked ☒ Functioning

☒ Routinely sampled ☐ All required wells located

☒ Good condition ☐ Needs Maintenance

Remarks Click or tap here to enter text.

4. Monitoring Data

A. Monitoring Data:

☒ Is Routinely Submitted on Time ☒ Is of Acceptable Quality

B. Monitoring Data Suggests:

☒ Groundwater plume is effectively contained ☒ Contaminant concentrations are declining

5. Monitored Natural Attenuation

A. Monitoring Wells (natural attenuation remedy) ☒ N/A

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled

☐ All required wells located ☐ Needs Maintenance ☐ Good condition

Remarks: Click or tap here to enter text.

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

1. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

Click or tap here to enter text.

2. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.
Previously used bag filters for removing suspended particles. The clogged frequently. Carbon is changed out more frequently without the bag filters, but the sytem operates better without the bag filters.

3. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.

Click or tap here to enter text.

4. Early Indicators of Potential Remedy Problems

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

Click or tap here to enter text.