ASSESSMENT OF CORRECTIVE MEASURES

REVISION 0

Charles R. Lowman Power Plant

Leroy, Washington County, Alabama

Prepared under:
Black & Veatch Project No. 198676.00.51

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CERTIFICATION PAGE

"I certify under penalty of law that I am a registered professional engineer experienced in hydrogeologic investigations and remediation. The activities discussed in the following Assessment of Corrective Measures are, in my opinion, appropriate for the Charles R. Lowman Power Plant facility. The information submitted herein, to the best of my knowledge and belief is true, accurate, and complete. I am aware that there are significant penalties for submitting false information."

7/11/2019

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Acronyms and Abbreviations

ADEM	Alabama Department of Environmental Management
amsl	above mean sea level
Black & Veatch	Black & Veatch Special Project Corp.
CDG	CDG Engineers & Associates, Inc.
CFR	Code of Federal Regulations
cm/sec	centimeter per second
COC	constituent of concern
CCR	Coal Combustion Residuals
CSM	conceptual site model
EPA	U.S. Environmental Protection Agency
ft	feet/foot
ft/day	foot per day
ft toc	feet below the top of the well casings
GWPS	groundwater protection standard
K	hydraulic conductivity
kg	kilogram
kg/day	kilograms per day
kg/m^3	kilograms per cubic meter
MCL	Maximum Contaminant Level
pH	hydrogen ion concentration
RSL	Regional Screening Level
Site	Charles R. Lowman Power Facility
SSL	Statistically Significant Level
TDS	total dissolved solids
USGS	U.S. Geological Survey

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Executive Summary

The Charles R. Lowman Power Plant (Site) is a coal fired power generating facility located along the west bank of the Tombigbee River near Leroy, Washington County, Alabama (Figure 1-1). The main facility consists of three power generating units and coal off-loading and storage units. The regulated Coal Combustion Residual (CCR) unit at the site is one facility consisting of the Unit 1 Ash Pond, the Unit 2/3 Ash Pond and the Flue-Gas Desulfurization (FGD) Pond.

This Assessment of Corrective Measures (ACM) report was prepared by PowerSouth for the Charles R. Lowman Power Plant in response to the detection of Appendix IV constituents at statistically significant levels (SSLs) greater than a groundwater protection standard (GWPS) as defined in the Alabama Department of Environmental Management's (ADEM) Standards for the Disposal of Coal Combustion Residuals (CCR) in Landfills and Surface Impoundments, ADEM Admin. Code Chapter 335-13-15, the U.S. Environmental Protection Agency's CCR Rule, 40 Code of Federal Regulations (CFR) Part 257 Subpart D. Beryllium, cobalt, lithium, and molybdenum have been detected at SSLs above their respective GWPS. Arsenic has been detected at concentrations slightly above its MCL of 10 ug/L, but currently does not have a SSL based on statistical analysis.

Initial detections of arsenic and beryllium above promulgated maximum contaminant levels prompted the Alabama Department of Environmental Management to issue Administrative Order No. 18-099-GW, in part requiring PowerSouth to conduct a comprehensive investigation, assessment of corrective measures, and potential implementation of corrective measures at the Site. This ACM report summarizes soil and groundwater investigation work performed at the Lowman plant, and identifies and evaluates potential corrective measures that could be selected and implemented to address groundwater impacts.

Potential corrective measures identified for the Site included Source Control, Groundwater Recovery & Treatment (GR&T), *In Situ* Permeable Treatment Barriers (multiple variations/approaches), and Monitored Natural Attenuation (MNA). For Source Control, PowerSouth intends to conduct a clean closure of the Unit 1 Ash Pond via complete excavation and removal of all CCR historically placed into the pond. The plan is to consolidate the CCR from the Unit 1 Ash Pond into the Unit 2/3 Ash Pond. In addition, the Unit 2/3 Ash Pond and FGD Pond will undergo in-place closure and capping. As such, alternative source area control technologies screening and evaluations were not conducted for the ACM. Corrective measures screening and evaluation steps therefore focused on addressing adsorbed and dissolved groundwater impacts beyond the footprint of the CCR waste units.

The ACM reviewed potential groundwater corrective measures technologies and screened these against the criteria set forth within the CCR regulations. These criteria consist of: performance, reliability, ease of implementation, potential safety impacts, potential cross-media impacts, potential exposure to residuals, time required to begin remedy, time to complete remedy, and institutional requirements (permitting ability). The potential corrective measures were screened, and relative ratings were assigned based upon each criterion. Ratings range from low to very high, each subjectively assigned based on experience, site-specific lithology and constituent of concern (COC) characteristics, and industry knowledge. The technologies / corrective measures alternatives that were rated highest were retained for further evaluation as follows:

1. Monitored Natural Attenuation – using indigenous biotic and abiotic mechanisms to reduce contaminant levels in groundwater.

2. Permeable Treatment Barrier - Infused Oxygen Injection and Chemical Neutralization – to stabilize the COC's onto the soil matrix and minimize contaminant mobility.

3. Groundwater Recovery & Treatment (GR&T) – to remove contaminant mass from the groundwater by extracting groundwater and treating it ex-situ.

Each of the three retained corrective measures alternatives listed above would be expected to restore site groundwater to compliance with GWPS within a 10-20 year time period. GR&T is very effective for hydraulic control of the dissolved plume and will have appreciable mass removal in the Site's moderately permeable surficial aquifer. However, GR&T relies on natural desorption (leaching) of contaminants from the soil to groundwater which should be a long-term process. In many instances GR&T systems operate for greater than 10 years with the majority of contaminant mass removal occurring during the first 5 years of operation, and then the systems are shut down to allow MNA processes to complete the job. COC concentrations at Lowman are currently at levels where GR&T systems are typically shut down. Another limitation to GR&T for Lowman is that placing extraction wells in close proximity to the closed ponds could have an adverse effect of drawing stationary/absorbed COC's into groundwater and spreading the contamination, the opposite of what the remedy is intended to accomplish. These factors would need to be considered during the design.

Permeable treatment in situ barriers are a viable corrective measure for Lowman, particularly if situated in strategic areas to intercept and treat the most highly impacted groundwater (or source)., Geochemical conditions at Lowman are complex and design of such an approach would require treatability and field pilot studies to ensure adequate treatment of each targeted COC. These studies will also need to confirm non-excessive injectate/amendment consumption, and no significant unintended adverse effects (e.g. formation plugging, mobilization of other metals, etc.). These factors would need to be considered during the design. Another drawback of a treatment barrier scenario is that it is passive and only treats the advected plume at the barrier; upgradient desorption will continue unabated. Performance monitoring and evaluations will be required throughout the life cycle of the treatment barrier and media replacement or barrier modifications may be necessary over time.

Monitored Natural Attenuation has the potential for equivalent performance as the other two retained active corrective measures alternatives, with little to no potential for adverse effects. MNA relies on natural soil sorption, biotic assisted stabilization and dispersion/diffusion to abate contaminant levels. It can be a relatively slow process; semi-annual monitoring allows for geochemical conditions to be tracked and COC trends observed to determine if the conditions and processes are being effective. MNA can either be a stand-alone corrective measure, or it can be combined with any other active corrective measure that may be implemented, giving it the most versatility of the three retained corrective measures. Coupled with Source Control, it is expected that MNA will be sufficient to reduce contaminant levels to acceptable limits in a reasonable timeframe.

Based on the detailed evaluations, the recommended corrective measures for the Site are Source Control (closures of the Ash Ponds) combined with Monitored Natural Attenuation. Closure of the ash ponds will eliminate or significantly reduce the potential for COC contributions to groundwater, which should allow natural attenuation processes to reduce COC concentrations to below GWPS within a reasonable time period. Groundwater monitoring data from the site shows that COC concentrations have never been nor are they currently that highly elevated, and many wells have shown declining COC trends over the past 2-3 years. Continued monitoring will be a key component of the MNA corrective measure to ensure declining COC trends continue and are on track to achieve GWPS compliance. It is estimated that it will take between 10 to 15 years to meet GWPS utilizing MNA. Provided ADEM concurs with this

recommendation, PowerSouth will conduct a public meeting to explain and answer questions, take comments into consideration, then proceed with implementing the MNA corrective measure.

Semi-annual groundwater monitoring will be conducted and reported to ensure the remediation goals are achieved within the expected remedial timeframe for the Site. In the event monitoring data indicate that natural attenuation processes are not performing as intended, PowerSouth will evaluate supplementing the MNA remedy with corrective measures alternatives 2 and/or 3. Recommendations for supplementing the MNA remedy would be included in one of the semi-annual monitoring reports submitted to ADEM. Semi-Annual performance monitoring combined with MNA monitoring and reporting will continue until GWPS have been met and maintained as required. A flowchart that illustrates the proposed phasing for this adaptive management approach is Section 6.3 of this report.

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1.0 Introduction

This Assessment of Corrective Measures (ACM) report was prepared in accordance with the Alabama Department of Environmental Management's (ADEM) Standards for the Disposal of Coal Combustion Residuals (CCR) in Landfills and Surface Impoundments, ADEM Admin. Code Chapter 335-13-15, the U.S. Environmental Protection Agency's CCR Rule, 40 Code of Federal Regulations (CFR) Part 257 Subpart D, and Part C of an Administrative Order issued by ADEM to PowerSouth (AO 18-099-GW) on August 15, 2018.

Section 257.96 and r. 335-13-15-.06(7) of the CCR rules require an ACM if any constituents listed in Appendix IV of the rule have been detected at a statistically significant level (SSL) that is greater than a groundwater protection standard (GWPS) as defined in § 257.95(h) and r. 335-13-15-.06(6)(h), and the owner or operator has been unable to demonstrate that the cause of that constituent concentration level was a source other than the CCR unit. Beryllium, cobalt, lithium, and molybdenum have been detected at SSLs above respective GWPS at the Charles R. Lowman Power Facility (Site), located in Washington County, Alabama. This ACM was initiated in April 2019 within 90 days of identifying the SSLs.

In addition, initial detections of arsenic and beryllium above promulgated MCL's prompted ADEM to issue Administrative Order No. 18-099-GW, in part requiring PowerSouth to conduct a comprehensive investigation, assessment of corrective measures, and potential implementation of corrective measures at the Site. This report summarizes soil and groundwater investigation work performed at the Lowman plant, and identifies and evaluates potential corrective measures that could be selected and implemented to restore site groundwater to compliance with GWPS.

1.1 SCOPE AND OBJECTIVES

The CCR Rules (40 CFR §257.96(c) and ADEM Admin Code r. 335-13-15-.06(7)(c)) and ADEM Administrative Order No. 18-099-GW require that the ACM must include an analysis of the effectiveness of any potential corrective measures in meeting all requirements and objectives of the remedy as described under § 257.97 and r. 335-13-15-.06(8). These remedy evaluation criterion include:

- The performance, reliability, ease of implementation, and potential impacts of appropriate potential remedies, including safety impacts, cross-media impacts, and control of exposure to any residual contamination;
- The time required to begin and complete the remedy, and;
- The institutional requirements, such as state or local permit requirements or other environmental or public health requirements that may substantially affect implementation of the remedy(s).

These requirements form the basis for evaluating potential corrective measure technologies outlined in this report. Potential corrective measures options are listed in Section 4. Potential technologies are evaluated against these requirements in Section 5. PowerSouth's preliminary recommendation for corrective measures are included in Section 6.

1.2 SITE INFORMATION AND HISTORICAL SITE OPERATIONS

The Charles R. Lowman Power Plant is a coal fired power generating facility located along the west bank of the Tombigbee River near Leroy, Washington County, Alabama (Figure 1-1). The main facility consists of three power generating units and coal off-loading and storage units (Figure 1-2). Construction of Unit

#1 was completed in the late 1960s with Units #2 and #3 being competed in late 1970s. The regulated Coal Combustion Residual (CCR) unit at the site is one facility consisting of the Unit 1 Ash Pond, the Unit 2/3 Ash Pond and the Flue-Gas Desulfurization (FGD) Pond (Figure 1-2).

1.3 REPORT ORGANIZATION

This ACM is divided into seven sections. The remaining sections in this report include:

- Section 2 – presents summaries of the findings from recent investigations;
- Section 3 – identifies remedial objectives and goals;
- Section 4 – identification and screening of potential corrective measures;
- Section 5 –detailed evaluation of the potential corrective measures;
- Section 6 –recommended corrective measures; and
- Section 7 – references cited.

2.0 Summary of Previous Investigations

2.1 SITE DESCRIPTION

This section describes the Site and surrounding area. It presents general summaries of the physiographic setting, climate, geology, surface water hydrology, and hydrogeology.

2.1.1 Physiography

The Lowman Plant is located within the Alluvial-Deltaic Plain district of the East Gulf Coastal Plain physiographic section of Alabama. This district is made up of broad flat flood plain and terraces within the valleys of the Tombigbee and Alabama River systems. Topography surrounding the Plant is relatively flat with a maximum relief of less than 20 feet. The facility is located at an elevation of approximately 45 feet above mean sea level (amsl) and about 40 feet above the base-flow level of the Tombigbee River (CDG, 2019a).

2.1.2 Climate

The Site is located in an area of moderately high precipitation with an average annual precipitation of approximately 60 inches, with most falling as rain. Historically, March (6 inches on average) is the wettest month of year with October (3 inches) being the driest.

The mean average high and low annual temperatures in nearby Jackson, Alabama are 76.7 degrees Fahrenheit (°F) and 52.8°F, respectively. The highest average maximum monthly temperature occurs in July and August (around 91°F) and the lowest average monthly temperature of 35°F occurs in January.

2.1.3 Geology

The main Lowman facility is located within the alluvial valley along the west bank of the Tombigbee River. Geology at the site is dominated by fluvial channel and terrace deposits. These deposits consist of interbedded clays, clayey sand and sand to a depth of approximately 90 to 100 feet. Beneath the channel and terrace deposits lie a weathered limestone. This limestone unit is most likely attributable to the Marianna Limestone of the Tertiary age Oligocene Series (CDG, 2019a).

The surficial geology of Washington County consists of Tertiary aged sedimentary units which strike to the northwest and dip to the southwest. The Miocene and Pliocene series cover a large part of Washington County. Weathered outcrops of the Miocene and Pliocene are light gray and varicolored clay; yellow, pink, and tan sands; gravel; and sandstone. The series are more than 300 feet thick in Washington County. Along the major stream valleys of the Alabama and Tombigbee rivers the localized surficial geology is primarily Quaternary age alluvial sediments and stream terrace deposits (CDG, 2019a).

Between 1965 and 1978, during the construction of the plant, a large volume of fill material obtained from local sources was used to bring the Site up to its current grade. In some cases, this material was greater than 20 feet in thickness. This addition of fill material has likely resulted in a decrease in the porosity of the native sediments lying beneath the Site (CDG, 2019a).

Site geology consisted of fluvial channel and terrace deposits. These units were comprised of interbedded clays, clayey sands, and sand to a depth of 90 to 100 feet below the land surface. Beneath these fluvial deposits is a weathered limestone, believed to be part of the Marianna Limestone (CDG, 2019a).

2.1.4 Hydrogeology

As described in the previous section, the surficial geology of the Site is comprised of a complex sequence of fluvial sedimentary deposits to a depth of approximately 90 feet below ground surface (approximately 57 feet amsl). Data collected from previous studies found the bed of the Tombigbee River adjacent to the plant is at an average elevation of approximately -11 feet amsl (CDG, 2019b).

Several factors influence the direction of groundwater flow within the surficial unit beneath the facility. The main factor is the Tombigbee River which borders the site to the east. Changes in the river stage have been observed to effect the groundwater levels beneath the plant.

During the April 2019 Comprehensive Investigation conducted at the Site, groundwater in the existing monitoring wells (Figure 2-1) was encountered at depths ranging from 5.96 to 30.72 feet below the top of the well casings (ft toc) within the area of the main facility (Table 2-1). Groundwater elevations during the 2019 event ranged from 18.36 to 23.21 feet amsl. Groundwater elevations at the Site have fluctuated due to local precipitation, surface water infiltration, the water level in the ash ponds, and the fluctuating level of the Tombigbee River. In February 2016, when the Tombigbee River levels were higher, the groundwater evaluations ranged from 18.32 to 26.80 ft amsl. When the river stage was lower in November 2016 the groundwater elevations ranged from 1.84 to 27.87 ft amsl.

Based upon the April 2019 groundwater level data a potentiometric surface map of the shallow aquifer was prepared for the Site (Figure 2-2). The predominant groundwater flow direction during the April 2019 investigation was toward the east and southeast. CDG noted that during the Comprehensive Investigation activities, the Tombigbee River was fluctuating to levels well above flood stage and that groundwater conditions beneath the facility were at the upper end of the historical range of seasonal fluctuations observed over the previous monitoring period (CDG, 2019). CDG stated that under normal stage conditions the general groundwater flow direction within the shallow aquifer would be more distinctly to the east and southeast. This can be seen in potentiometric surface maps prepared during previous sampling events. These historic maps are presented in Appendix B.

The hydraulic gradient in the surficial aquifer during the April 2019 event varied slightly throughout the site. The gradient from Unit 2/3 Ash Pond moving east-southeast toward the river was approximately 0.0018 ft/ft. On the northern portion of the Site the hydraulic gradient from MW-9 toward the river (east) was approximately 0.0057 ft/ft.

Aquifer step drawdown testing was conducted on seven of the piezometers in order to determine the hydraulic conductivity (K) of the surficial aquifer beneath the main facility. The results of the drawdown test were evaluated using AQTESOLV© software. The calculated K values ranged from 6.045 x 10-5 centimeter per second (cm/sec) to 1.769 x 10-4 cm/sec (0.171 ft/day to 0.505 ft/day) at the main plant. This range of values is consistent with the heterogenous silt and clayey sand lithology in the surficial aquifer.

2.2 SUMMARY OF NATURE AND EXTENT

2.2.1 Soil

During the April 2019 Comprehensive Investigation (CDG, 2019b) sampling activities, direct-push technology (DPT) soil and groundwater samples were collected from varied depth intervals at multiple locations across the Site (Figure 2-3). The purpose of the DPT investigation was to optimize the locations for additional monitoring wells and to provide soil characterization data. Thirteen soil samples were

selected and submitted for laboratory analysis for each of the Appendix IV parameters. The results of the laboratory soil analyses are summarized in Table 2-2.

Laboratory results for the five Appendix IV COC's with GWPS exceedances as compared to the current EPA regional soil screening level (RSL) for protection of groundwater are as follows:

- Arsenic (As) had RSL soil exceedances ranging from 305 ug/kg to 3200 ug/kg versus a RSL of 290 ug/kg;
- Beryllium (Be) did not have any exceedances of the RSL (3200 ug/kg). Detectable concentrations of beryllium ranged from 286 ug/kg to 459 ug/kg;
- Cobalt (Co) had RSL soil exceedances ranging from 262 ug/kg to 3170 ug/kg versus a RSL of 27 ug/kg.
- Lithium (LI) had one detection at a value of 3220 ug/kg, which was in exceedance of the soil RSL of 1200 ug/kg.
- Molybdenum (Mo) had RSL soil exceedances ranging from 429 ug/kg to 1220 ug/kg versus a RSL of 200 ug/kg.

A copy of the EPA's most current RSL table is included in Appendix A. It is important to note that the RSLs are not site-specific values derived from leaching tests on site soils, but rather conservative values for potential consideration as an initial point of comparison. This is especially the case for each Appendix IV COC's of interest, where their naturally occurring values in this geographic area can exceed the specified RSL.

2.2.2 Groundwater

Groundwater Quality

CDG installed twelve (12) piezometers (PZ1 – PZ12) at the Site in 2014 (Sheet 3, Appendix B). CDG re-designated ten of the piezometers (PZ1, PZ2, PZ4 – PZ10, and PZ12) to monitoring wells in 2016. One new monitoring well (MW-11) was installed at the site and PZ3, PZ6, and PZ11R were retained as piezometers (Figure 1, Appendix B). The wells have been sampled for CCR Rule Appendix III and Appendix IV parameters semi-annually since then, with some wells being sampled more often. Ten additional monitoring wells were installed at the Site in 2019 and piezometer PZ3 was re-designated to monitoring well MW-3 (Figure 2-2). During groundwater sampling events, field parameters including hydrogen ion concentration (pH), temperature, conductivity, dissolved oxygen, turbidity, and oxidation/reduction potential were collected (Table 2-3). The two monitoring wells upgradient of the ash ponds (MW1 and MW2) have relatively low pH values ranging from 4.33 to 5.80. Generally speaking, the wells adjacent to and down-gradient of the ash ponds have slightly higher pH values ranging from 4.06 to 7.06. This range does not include the December 2018 readings which were unusually high and are suspect. Selected field parameters (pH and ORP) from the April 2019 sample event are shown on Figure 2-4.

Previous sampling events have detected arsenic above the MCL and shown that beryllium, cobalt, lithium, and molybdenum were detected at a statistically significant level (SSL) above their respective GWPS. The GWPS for these compounds were previously established for the Lowman facility using the statistical approach specified under 40 CFR 257.95 and 335-13-15-.06(6). This is detailed in the facility's 2018 Annual Groundwater Monitoring Report (CDG, 2019b). The GWPS established for the Site are included in Table

2-4. While there have been exceedances of these constituents above their respective GWPS, overall the concentrations remain relatively low (parts per billion). April 2019 groundwater analytical results are presented in Table 2-5. COC trends in groundwater are shown for select wells in Figure 2-5. April 2019 groundwater analytical results are shown on Figure 2-6.

A network of 12 piezometers were initially installed in and around the plant area to determine site groundwater levels/elevations and flow direction. Eight of the piezometers were subsequently converted to monitoring wells. In 2016 four additional monitoring wells were installed and in 2019 nine more wells were installed at the Site. Figure 2-2 shows the Lowman facility aerial view with well locations comprising the current monitoring system installed in compliance with CCR Rules.

Groundwater sampling events were conducted via the monitoring well network in 2016, 2017, 2018, and 2019. For most of the groundwater sampling events during this period, samples were analyzed for CCR Appendix III and IV constituents. Analytical results and identification of parameters with GWPS exceedances from the monitoring events are shown in Appendix C, Tables C-1 and C-2.

Based upon the historic groundwater flow directions determined at the site, monitoring wells MW-1 and MW-2 are upgradient of the ash ponds and can serve as background wells (Figure 2-1, Appendix B). During the sampling events arsenic, beryllium, lithium, and selenium have been detected sporadically in these two wells and at concentrations well below their respective GWPS. Cobalt, barium, and combined radium have been detected during each sampling event. Of these three, only cobalt has been detected in concentrations above its GWPS of 6 ug/L.

Arsenic has been detected in concentrations above its GWPS (10 ug/L) in wells MW-5, MW-6, MW-8, MW-14, MW-17, MW-20, and MW-23. Wells MW-1 through MW-14A have enough data to prepare trend graphs for arsenic, cobalt, molybdenum, and lithium (Figure 2-5). During the sampling events the concentration of As in MW-2, MW-7, MW-10 and MW-12A show no apparent trend. MW-4, MW-5A, MW-6, and MW-8 shows a slightly downward As trend while MW-5 shows a slightly upward trend.

The highest arsenic result from the most recent (April 2019) sampling event occurred in MW-20, with a reported concentration of 51 ug/L arsenic (Table 2-5). MW-20 is a newly installed well located in close proximity to the Tombigbee River and it was sampled shortly following its installation in April 2019. PowerSouth resampled MW-20 in June (results pending) to determine if the April result was possibly affected by its recent drilling and installation as opposed to being actually representative of GW conditions at this location. Additional future sampling events should also help to determine the validity of this elevated result.

Beryllium detected at SSLs exceeding its GWPS have occurred in only one well at the site, MW-4, during the monitoring period of 2016 through April 2019. The April 2019 result was 4.6 ug/L beryllium, compared to its GWPS of 4.0 ug/L. Further, although detected in MW-4 during each sampling event since 2016, the concentrations of beryllium appear quite stable, ranging only from 4.4 to 7 ug/L in this one well.

Cobalt, lithium, and molybdenum have also been detected at SSLs above their respective GWPS. None of these metals currently have established MCLs. The GWPS for each of these constituents was established by EPA (2018) for CCR sites.

Cobalt has been detected at SSLs above its GWPS (6 ug/L) in monitoring wells MW-3, MW-4, MW-5, MW-5A, MW-12A, MW-14 and, MW-14A. Cobalt has also been detected in MW-1 and MW-2 (background wells) in concentrations above its GWPS. The highest concentrations have been reported for MW-4, with

a maximum concentration of 1,000 ug/L during 2016 and 2017 sampling events. In 2019, the cobalt concentration in MW-4 was reported at 800 ug/L, and cobalt was detected in new wells MW-16 and MW-17 at concentrations of 30 ug/L and 42 ug/L, respectively. In 2019, Cobalt was reported at concentrations exceeding the GWPS in 6 wells, with the maximum reported for MW-4 (800 ug/L). The average concentration for the other 5 wells with the exceedance was 51 ug/L.

A review of the historical data (Table 2-5 and C-2) and Figure 2-5 for cobalt shows that the concentrations are generally stable with some declining concentrations over time. For instance, MW-5, MW-5A, and MW-14 have declined from above the GWPS to below the GWPS in recent events. In addition, cobalt has declined from 1,000 ug/L to 800 ug/L in MW-4.

Lithium has been detected at SSLs above its GWPS (40 ug/L) in seven (7) monitoring wells (MW-5A, MW-7, and MW-11, MW-12A, MW-14A, MW-16, and MW-23) during the 2016-2018 monitoring period. It has ranged from non-detect to 220 ug/L during that period. In 2019 the number of wells with lithium exceedances decreased to six, and the concentration in MW5A decreased to 90 ug/L as compared to a normal concentration in the well of about 200 ug/L The remaining wells with exceedances had an average lithium concentration of 120 ug/L during the April 2019 event. Lithium concentrations versus time charts for wells with exceedances and multiple sampling events are shown in Figure 2-5. MW-5A, MW-11, and MW-14A show downward trends while MW-7 and MW-12A are stable with no apparent trend. MW-12 and MW-23 have only been sampled the one time in April 2019.

Molybdenum has been detected in SSLs above its GWPS (100 ug/L) in monitoring wells MW-5A MW-11, MW-12, MW-17, and MW-23 at times during the 2016 – 2018 monitoring period. It has ranged from non-detect to 440 ug/L during that period. MW-12 had one exceedance (180 ug/L) in early 2016, but has not had an exceedance since then. The 4 wells with GWPS exceedances during the April 2019 sampling event had an average concentration of 192 ug/L. Molybdenum concentrations versus time charts for wells with exceedances and multiple sampling events are shown in Figure 2-5. The reported concentrations of molybdenum show no apparent trend in most wells at this time, with the exception of MW-12, which just had the one exceedance in 2016. MW-11 shows a slight downward trend.

2.3 SUMMARY OF CONTAMINANT FATE AND TRANSPORT

2.3.1 Conceptual Site Model

Conceptual Site Models (CSMs) illustrate the physical, chemical, and biological relationships between contaminant sources and affected resources. As such, they provide a basis for interpreting contaminant fate and transport and assessments of risk to human and ecological receptors.

The CCR unit is presumed to be the source of CCR constituents in the surrounding groundwater. Variable naturally occurring soil concentrations of As, Be, Co, Li, and Mo are a viable alternate hypothesis or co-contribution for the indicated groundwater concentrations of these constituents.

The metal COCs (arsenic, beryllium, cobalt, lithium, and molybdenum) are typically highly adsorbed to soil particles through a variety of sorption processes related to the soil type (e.g., clay, silt), soil organic content, parent rock mineralogy, redox state, soil pH, cationic exchange capacity, and other factors. Thus, these constituents are more likely to be present in the soil matrix than dissolved in groundwater. A low pH can be a significant factor in the increased mobility for these COCS.

Once in groundwater the COCs appear to migrate downgradient generally toward the east-southeast. This migration of groundwater is influenced by the complex sequence of fluvial sedimentary deposits beneath the Site. Migration is also influenced by the flow and level of the Tombigbee River. Following flood events, the groundwater gradient to the northwest of the Site briefly changed to a northerly direction in response the rise in river stage. In terms of potential receptors, no public or private drinking water wells are located within a mile and half of the Site. The main receptor for site groundwater is the Tombigbee River. However, since the volume and flow of river water is so much greater than groundwater flow from the site, it is highly unlikely that any site-related Appendix IV constituents would even be detected in the river water.

2.3.2 Contaminant Migration

Based upon groundwater monitoring data and the groundwater flow direction the Site's COCs appear to be migrating within the groundwater of the surficial aquifer from the area of the ash ponds toward the Tombigbee river. The mobilization of arsenic and beryllium in groundwater at the Site can be affected by several reactions such as dissolution/precipitation, adsorption/co-precipitation, and reduction/oxidation. In addition to these it has been noted that the Tombigbee river has a large impact upon groundwater movement at the Site. The stage of the river will affect both groundwater flow direction, gradient, and seepage velocities.

The most common forms of arsenic found in groundwater are arsenite (As+3) and arsenate (As+5). Under reducing conditions, arsenite is the predominant species while under oxidizing conditions arsenate is the predominant species. Both are capable of adsorbing to subsurface materials, such as ferric oxides and clay particles. Ferric oxides are particularly important to arsenate fate and transport as ferric oxides tend to be abundant in the subsurface and arsenate strongly adsorbs to these surfaces in acidic to neutral waters. The arsenic oxy-anions are also sensitive to changes in redox conditions. This has been observed at the Site where wells with low redox values have elevated concentrations of arsenic while wells with higher redox values have lower concentrations of arsenic (Figure 2-4).

Beryllium binds strongly to soil fulvic acid; binding increases with increasing pH. At pH ranges of 4 to 8, beryllium oxide is highly insoluble, thus preventing mobilization in soil. Beryllium is strongly adsorbed by finely dispersed sedimentary materials including clays, iron hydroxides, and organic substances (Izmerov, 1985). The mobility of beryllium in groundwater is limited because of the poor solubility of most beryllium compounds and its affinity to bind with clay minerals and organic compounds. Beryllium mobility is enhanced under low pH water conditions and may be found as a dissolved cation (beryllium2+) or may form soluble fluorine and organic complexes (Kabata-Pendias and Mukherjee, 2007). At near-neutral pH beryllium is controlled by the formation of beryllium hydroxide, which is a low solubility phase (USGS, 2017).

Cobalt is found in natural waters normally in concentrations of no more than a few micrograms per liter. Coprecipitation or adsorption of cobalt by oxides of manganese and iron are important controlling factors in the amount of cobalt that can occur in solution in water (Hem, 1985).

Most geogenic lithium in soil is insoluble and when added to soil, there is only limited sorption. Lithium sorption increases with increasing soil pH and decreases proportionately with increasing lithium concentrations. Compared to other cations in soil, lithium is mobile and may leach into groundwater and surface water. In soils and groundwater in which Na and K are present at high concentrations, lithium may remain in solution and behave conservatively. Lithium is commonly removed from solution by incorporation into clays (Robinson, et al., 2018).

Molybdenum is a rather rare element that occurs in oxidation states ranging from Mo3+ to Mo6+, but the most common solid and aqueous species contain Mo4+ or Mo6+. In oxidizing conditions, the predominant oxidation state is Mo6+, which forms molybdate anions in water. Below pH 2 the predominant molybdate species is the undissociated form, H2Mo04(aq). The HMoO4- ion is predominant between about pH 2 and pH 5. Above pH 5 the dominant species is the molybdate ion MoO42-. These generalizations about molybdenum geochemistry indicate that it has a relatively high geochemical mobility, a tendency to enter into solution in water under normal Earth-surface conditions (Hem, 1985).

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3.0 Cleanup Objectives and Remedial Goals

This section provides information regarding the corrective measure objectives for the Lowman Plant.

3.1 CORRECTIVE MEASURES OBJECTIVES

As indicated in § 257.96(a) and r. 335-13-15-.06(7)(a), the objectives of corrective measures for a CCR facility are "to prevent further releases, to remediate any releases and to restore affected area to original conditions." As required in § 257.97(b) and r. 335-13-15-.06(8)(b), the remedy selected, at minimum, must:

(1) Be protective of human health and the environment;
(2) Attain the groundwater protection standard;
(3) Control the source(s) of releases to reduce or eliminate, to the maximum extent feasible, further releases of constituents in appendix IV to this part into the environment;
(4) Remove from the environment as much of the contaminated material that was released from the CCR unit as is feasible, taking into account factors such as avoiding inappropriate disturbance of sensitive ecosystems;
(5) Comply with standards for management of wastes.

3.2 REMEDIAL GOALS

The remedial goal for the Lowman Plant, as directed in the Admin Order Paragraph C.3., is to "contain the source of the release and attain the established groundwater protection standard." Moreover, § 257.98(c) and ADEM Admin. Code r. 335-13-15-.06(9)(d) specify that implementation of the corrective program is completed at a Site once the owner or operator demonstrates compliance with the applicable GWPS. The GWPS for Appendix IV constituents in groundwater at the Lowman facility are presented in Table 2-4. The GWPS for the five COCs at the Lowman facility are: arsenic (0.01 mg/L); beryllium (0.004 mg/L); cobalt (0.006 mg/L); lithium (0.04 mg/L); and, molybdenum (0.1 mg/L).

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4.0 Identification and Screening of Potential Corrective Measures

Identification and evaluation of technologies that may be used as part of an overall remedial action is the initial step in preparing a list of corrective measures to meet the requirements of the CCR Rule. Source control methods are described in Section 4.1. Sections 4.2 and 4.3 briefly identify the various groundwater remedial technologies potentially applicable for implementation at the Site. Section 4.4 presents the results of the technology screening, to eliminate, or screen out, less effective technologies.

The remedial goals for the Site are to restore site groundwater to compliance with the GWPS for each Appendix IV constituent that is detected at an SSL. As noted above, arsenic has been detected at levels greater than the promulgated MCL but not at an SSL above is GWPS. Beryllium, cobalt, lithium, and molybdenum have been detected at SSLs above respective GWPS at the Site. For the purposes of this ACM, corrective measures screening will cover technologies which can potentially address all five of these metals. For this ACM, beryllium, cobalt, lithium, and molybdenum are not being separately screened for remedies. At most locations these COC's have only been detected in low concentrations, they currently do not have established MCLs (meaning their health risk due to ingestion has not been defined/studied), and treatment approaches are likely to be compatible. Any needed treatability studies would be performed during the design stage to address and optimize proposed treatment processes.

4.1 SOURCE CONTROL

Source control measures are aimed at removal, containment, or treatment of contaminated media that can serve as a source of groundwater contamination. For the Lowman Plant, it is presumed that the CCR wastes within the onsite unit is the source material. More specifically, it is presumed that the CCR within existing Unit 1 Ash Pond, the Unit 2/3 Ash Pond, and the FGD Pond contain this source material. As such, it is PowerSouth's intent, pursuant to § 257.103(b) and r. 335-13-15.07(4)(b), to discontinue use of these ponds and to complete closure of these ponds over the next several years. Details of proposed closure designs have been prepared by PowerSouth and submitted to ADEM under separate submittal for review and approval. A brief summary of the proposed closure design is provided below.

PowerSouth intends to conduct a clean closure of the Unit 1 Ash Pond via complete excavation and removal of all CCR historically placed into the pond. The plan is to consolidate the CCR from the Unit 1 Ash Pond into the Unit 2/3 Ash Pond. This approach will completely eliminate the Unit 1 Ash Pond as a source of future impacts to groundwater. In-Place closure and capping of the Unit 2/3 Ash Pond and the FGD Pond has been proposed, the details of which were included in a separate report and provided to ADEM. Discontinued sluicing of ash and FGD wastes into the ponds combined with dewatering, and capping once dewatering is completed, will significantly reduce or eliminate the ponds as a potentiometric high point by reducing pressure to cause any potential migration of constituents of concern (CCR Rule Appendix IV constituents) beyond the pond footprints into surrounding groundwater.

4.2 *IN SITU* TREATMENT

Multiple In situ soil and groundwater treatment strategies exist for the five targeted COC's present in GW at Lowman. Some approaches rely on the addition of reagents to the subsurface to effect stabilization or fixation of the COC's throughout the targeted aquifer zone. Other approaches entail the construction of passive systems that can treat or remove the COC's by intercepting the natural flow of groundwater (e.g., permeable reactive treatment zones). In situ processes could involve adjustment of the pH and oxidation

state or the addition of chemicals to remove contaminants through combinations of chemical oxidation, chemical reduction, precipitation, or sorption.

4.2.1 *In Situ* Chemical Oxidation/Precipitation

In situ chemical oxidation (ISCO) strategies for arsenic are intended to promote the oxidation of arsenite (As+3) to arsenate (As+5) ions. The arsenate complexes are significantly more stable and less toxic, resulting in a lower degree of leaching into groundwater. In this form, it forms an arsenate oxyanion ($HAsO_4^{2-}$ or $H_2AsO_4^-$) that is amenable to sorption onto iron hydroxides, iron arsenate, manganese compounds, arsenopyrite (FeAsS) or other substrate materials such as iron-rich clays. Similar strategies exist for the other four COC's. Oxidation can be accomplished by several techniques including air sparging, ozone sparging, liquid oxygen or peroxide injection, chemical oxidant injection (e.g., injection of permanganate or persulfate solutions), or the in situ placement of solid chemical oxidants. Several oxidants can also combine with in situ divalent metals to form more powerful oxidants such as hydroxyl radicals.

4.2.2 *In Situ* Chemical Reduction/Precipitation

In situ chemical reduction (ISCR) of arsenic can result in some precipitation complexes such as calcium arsenite, but these are less stable (more susceptible for long term leaching). In general, it is more efficient and easier to stabilize arsenic as arsenate (oxidized) rather than arsenite (reduced). However, some reduction strategies can be used to promote the precipitation of arsenic compounds. Similar strategies exist for the other four COC's. Chemical reduction may be affected through use of chemical amendments or biological (microbial) action. Reduction can be accomplished through direct injection of reducing amendments or through placement of reducing amendments such as a zero valent iron wall. Due to the dynamic exchange of groundwater beneath the site with oxygenated water from the Tombigbee River, chemical reduction strategies are best suited for use in permeable reactive barrier applications.

4.2.3 *In Situ* Chemical Neutralization

Neutralization strategies are aimed at raising pH to meet water quality standards or to facilitate the stabilization or removal of arsenic and beryllium. The aquifer alkalinity is an important parameter for determining the necessary alkaline dosage.

4.2.4 Groundwater Migration Barriers

Low permeability barriers can be installed below the ground surface to prevent groundwater flow from reaching locations that pose a threat to receptors. Barriers can be installed with continuous trenching techniques using bentonite or other slurries as the low permeable barrier material to prevent migration of groundwater. Barriers are most effective at preventing flow to relatively small areas or to protect specific receptors. Protecting larger areas is possible if the COCs are not highly soluble and cannot follow a diverted groundwater flow pattern. The barrier will change the groundwater flow conditions, and at some point the increased head (pressure) will cause a change in flow patterns around the ends or beneath the barrier. To reduce/prevent flow beneath the barrier, it must be sealed at an underlying impermeable layer such as a clay layer or competent bedrock with very limited fractures. Groundwater migration barriers are often used in conjunction with groundwater extraction systems. The barriers are used to restrict flow to allow extraction systems upgradient of the barrier to collect groundwater.

4.2.5 Permeable Reactive Treatment Barriers

Permeable reactive barriers (PRBs) can be an effective *in situ* groundwater treatment technology. In general, the design involves excavation of a narrow trench perpendicular to groundwater flow and then backfilling the trench with a reactive material that either removes or transforms COCs as the groundwater passes through the PRB. The PRB can be designed to include impermeable sections to funnel the flow through a narrower and more permeable reactive zone. This limits the potential problems of altered flow paths. The treatment barrier can be used for redox manipulation (ISCO or ISCR), pH adjustment, or adsorption technologies.

4.2.6 Electrokinetics

Electrokinetics is the application of low DC voltage gradients to the subsurface through simple electrodes, which results in the migration of ions towards their oppositely charged electrode. The applied voltage gradient also results in the bulk movement of groundwater from one electrode to another, through a process known as electro-osmosis. This process is highly efficient in clay-rich strata, and can result in migration of arsenate, arsenite, and metal cations and anions and dissolved compounds.

4.2.7 Soil Stabilization/Solidification

Soil solidification/stabilization (S/S) can be used to encapsulate the COC-laden soil and coexisting groundwater into a stabilized soil that will not appreciably leach COCs. S/S typically involves blending impacted soil either in situ or ex situ with Portland cement and other additives such as furnace slag or bentonite. The amended soil has a very low permeability, improved compressive strength, and COCs are bound permanently within the soil/cement matrix. S/S for a Site as large as the Lowman Power Plant would be difficult to implement, especially for such low contaminant levels.

4.2.8 Monitored Natural Attenuation

Following the actions to close the CCR Units a highly promising corrective measure approach for the groundwater is Monitored Natural Attenuation (MNA). MNA is well suited for low level COC's, especially metals which naturally have a strong affinity to sorb onto the soils. As applied to Superfund sites, EPA defines MNA as "the reliance on natural attenuation processes (within the context of a carefully controlled and monitored site cleanup approach) to achieve site-specific remediation objectives within a time frame that is reasonable compared to that offered by other more active methods" (OSWER Directive 9200.4-17P [EPA, 1999]). MNA processes may "include a variety of physical, chemical, and biological processes that, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume or concentration of contaminants in soil or groundwater" (EPA, 1999).

4.3 GROUNDWATER RECOVERY AND *EX SITU* TREATMENT

Groundwater recovery containment strategies rely on hydraulic control to prevent the migration of contamination or to prevent receptor contact. Groundwater recovery and treatment provides containment through hydraulic control in addition to continuous mass removal of contaminants. Groundwater can be removed from the aquifer using conventional vertical extraction wells, angled wells, horizontal wells, or collection trenches and their associated pumping systems.

Recovered groundwater is treated ex situ prior to disposal of the effluent. A variety of potential treatment techniques are available to remove the five COC's; many rely on the same treatment principals and process as for in situ treatment. Oxidation of arsenic is an advantage for essentially all ex situ groundwater treatment processes. Adjustment of pH is another common feature of ex situ treatment and is easily accomplished with several alkaline reagents. Treatment of the COC's in extracted groundwater would

consist of one or more of the following technologies: ion exchange, sorption (e.g., activated alumina), membrane separation, or a coagulation/precipitation process.

4.4 TECHNOLOGY SCREENING

As indicated in Section 4.1, PowerSouth intends to conduct a clean closure of the Unit 1 Ash Pond via complete excavation and removal of all CCR historically placed into the pond. The plan is to consolidate the CCR from the Unit 1 Ash Pond into the Unit 2/3 Ash Pond. In addition, the Unit 2/3 Ash Pond and FGD Pond will undergo in-place closure and capping, the details of which were developed in a separate report that has been provided to ADEM. As such, source area control technologies screening and evaluations will not be further presented in this ACM. The screening and evaluation steps to follow are therefore focused on addressing adsorbed and dissolved groundwater impacts beyond the footprint of the waste units.

Each of the technologies identified and discussed above (except source control) have been included in Table 4-1 to assist in the screening process. Table 4-1 groups each technology by its corresponding general remedial action, then presents screening criteria where relative ratings have been assigned against multiple criteria including technology performance, reliability, ease of implementation, exposure to residuals, remediation timeframe, and permitting ability. Ratings for each criterion range from low to very high, each subjectively assigned based on experience, site-specific lithology and COC characteristics, and industry knowledge.

- As indicated in Table 4-1, the following technologies were retained and will be evaluated further as stand-alone or combined remedies in Section 5:Groundwater Recovery & Treatment
- Infused Oxygen Injection
- Oxidation / Ferrous Sulfate Precipitation
- Chemical Neutralization
- Permeable Treatment Barriers
- Monitored Natural Attenuation
- Ex Situ Groundwater Treatment

5.0 Evaluation of Potential Corrective Measures

The evaluation of the most viable technologies to meet the requirements of § 257.96(c) and r. 335-13-15-.07(c) of the CCR Rules is provided in the following section and is summarized in Table 5-1.

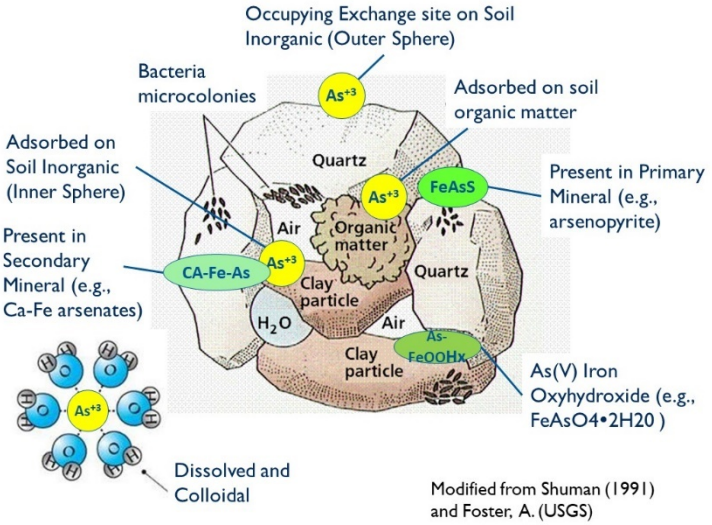
5.1 DESCRIPTION OF CORRECTIVE MEASURE ALTERNATIVES

Corrective measure alternatives were developed to provide PowerSouth with a manageable list of viable cleanup options, along with sufficient detail of the viability of the cleanup options to adequately compare and select the most plausible and optimal alternative(s) to implement. The technologies retained from the CMS identification and screening step were used to derive three specific CMS alternatives for further evaluation and analysis. This section explains the rationale for derivation of the corrective measures along with a detailed description of each alternative.

5.1.1 Corrective Measure #1: Monitored Natural Attenuation

MNA is the use of natural biotic degradation or natural abiotic degradation (e.g., due to reduced iron species, soil attenuation, advection, dispersion, dilution, etc.) for contaminant reduction. Natural attenuation is thought to be active for the Lowman Site as evidenced by the overall low COC concentrations and declining level of COCs despite the presence of the likely CCR source from the ash ponds. MNA was retained as a corrective measure due to the relatively low levels of COCs, generally declining dissolved plume, and physicochemical properties of arsenic and other COCs.

Arsenic (as a metalloid) and the COC metals are bound to soil through a number of complex abiotic and biotic reactions including surface precipitates (typically as iron oxyhydroxides), surface complexation, organic adsorption, and bacteria reduced species. The figure shown at right illustrates several of these mechanisms. Given favorable redox and pH, arsenic will be bound to the form in stable As(V) complexes instead of the more mobile and toxic As(III) complexes. The numerous sorption pathways are complex and MNA analysis often is best addressed by evaluating declining dissolved arsenic trends in groundwater.



The complexity of the COCs for the Site are not conducive to fully characterizing all natural attenuation processes. Sorption of arsenic and other COCs is expected to be a significant MNA mechanism, in addition to others. With active treatment or control of the source area ponds, natural processes should be a realistic phased alternative for attenuating the CCR constituents within a reasonable time frame.

5.1.2 Corrective Measure #2: Permeable Treatment Barrier – Infused Oxygen Injection and Chemical Neutralization

A permeable treatment barrier (PTB) is a functional subsurface unit that treats the contaminants in the advecting groundwater flow. It is a passive approach that only treats dissolved phase contamination.

Adsorbed phase contamination is treated through leaching of contaminants from the soil with subsequent treatment downgradient at the PTB. A PTB is installed transverse to groundwater flow at a depth corresponding to the contamination requiring treatment.

A PTB corrective measure for the Lowman Site could be used in two scenarios: 1) directly adjacent and downgradient of the Unit 2/3 Ash Pond to intercept any residual source area contamination and prevent its movement towards the River; 2) in a downgradient position(s) with an intent to intercept groundwater flow into the River. The PTB can be configured for several treatment mechanisms. Based on the technology screening, an oxidation (ISCO) wall or a combination ISCO/ISCR wall would be the most effective implementation. An oxidation wall could be either an injection of infused oxygen, ozone sparging, air sparging, or direct chemical injection or placement (e.g., hydrogen peroxide, permanganate, calcium oxide). An infused oxygen barrier is assumed for the CMS; this approach can deliver oxygen infused in a water solution at levels up to 40 milligrams per liter (mg/L) using off-the-shelf package equipment systems.

PTBs can be constructed as shallow or deep horizontal trenched walls or as a series of injection wells transverse to the groundwater flow. The groundwater pH or alkalinity can be adjusted at the treatment barrier to optimize any in situ precipitation reactions. A metered addition of sodium hydroxide or sodium carbonate would allow reliable adjustment while still meeting the constraints of any downgradient NPDES discharge requirements.

The PTB could also be designed as a ISCO/ISCR combination wall. A promising remedial strategy for coal ash sites is use an oxidation mechanism to convert As(III) to As(V) followed by an injection of ferrous sulfate ($FeSO_4$) to provide additional iron for iron co-precipitation. Residual sulfate can then be used as a source for bacterial driven sulfate reduction, which subsequently provides sulfide for further arsenic precipitation.

The PTB may require recharging over time. The ability to maintain adequate and reactive reagent concentrations at depth over an extended period of time is a significant operational and performance assurance challenge for this corrective measure.

5.1.3 Corrective Measure #3: Groundwater Recovery and Treatment (GR&T)

GR&T provides both a hydraulic capture of Site contaminants along with limited mass removal. Approximately four to five vertical groundwater recovery wells totaling approximately 50 gpm would suffice to provide hydraulic containment. Recovered groundwater would be conveyed to a groundwater treatment system contained within an equipment compound. The equipment required for this option can either be capitally purchased or leased monthly from an equipment Supplier for the duration of groundwater treatment. A conceptual treatment train would consist of an equalization tank followed by particle filtration and ion exchange media filters. Treated water could be discharged to a National Pollution Discharge Elimination System (NPDES) outfall on the Tombigbee River or reinjected into the water table aquifer upgradient of the recovery wells.

Ion exchange (IX) is a proven technology for removing metals from groundwater and can reach very low effluent concentrations. Ion exchange is a physical process in which ions held electrostatically on the surface of a solid are exchanged for target ions of similar charge in a solution. The medium used for ion exchange is typically a resin made from synthetic organic materials, inorganic materials, or natural polymeric materials that contain ionic functional groups to which exchangeable ions are attached. The filtration and ion exchange system will require minimal operational oversight and intervention as there

are no moving parts or chemical addition. When a media resin becomes exhausted, it would be removed and returned to the Supplier for reuse and disposal. The system would not require backwash or wastewater collection streams.

Recovered Groundwater treatment with precipitation would be unnecessary due to the low levels of arsenic and metals. Precipitation processes involves the conversion of soluble (dissolved) constituents to insoluble particles that will precipitate such as hydroxides, carbonates, or sulfides which are subsequently removed by physical methods such as clarification and/or filtration. An oxidation step would be needed to convert the constituent to a less soluble and more easily precipitated form.

Adsorption media could also be used in lieu of ion exchange to treat the groundwater. Groundwater containing dissolved constituents is passed through columns filled with adsorption media that attract and accumulate the target ions onto the adsorbent surface and reduce their concentration in the bulk fluid phase. When adsorption sites become filled, the column must be regenerated or disposed of and replaced with new media. Common adsorbent media include activated alumina, copper-zinc granules, granular ferric hydroxide, ferric oxide-coated sand, greensand, zeolite, and other proprietary materials. This technology could also generate a significant regeneration waste stream.

5.2 PERFORMANCE EVALUATION

This CCR criterion includes the ability of the technology to effectively achieve the specified goal of corrective measures to prevent further releases, to remediate any releases, and to restore the affected area to original conditions.

5.2.1 Monitored Natural Attenuation

MNA can be effectively used at the Site to verify constituent reductions over time through natural processes of physical and geochemical attenuation (Table 5-1). The Site COCs are strong candidates for sorption and precipitation on soil and are expected to attenuate naturally at the Site with source area control. The existing monitoring well network could be supplemented with additional monitoring wells to effectively monitor constituent trends over time in key areas. Wells can be used in transects to show a mass flux reduction in COCs and also in a downgradient trend. The overall performance for MNA can be better predicted following continued monitoring well trend analysis. MNA performance after source control will undoubtedly be more pronounced as the COCs would not be replenishing the aquifer from pond leachate. The low levels of COCs at the Site are ideal for this corrective measure.

5.2.2 Permeable Treatment Barrier – Infused Oxygen Injection and Chemical Neutralization

PTBs and the use of ISCO or ISCR technologies for *in situ* remediation of arsenic have proven performance but rely on complex chemistry and a thorough understanding of the Site hydrogeology. The ability of a PTB to maintain adequate and reactive reagent concentrations at depth over an extended period is also a major operational and performance assurance issue. This technology is expected to be effective in treating many coal ash related constituents, but its long-term effectiveness and longevity is not well tested (Table 5-1). The heterogenous formation may undermine efforts to inject in situ chemical oxidation or precipitation reagents with an adequate distribution in the aquifer. The potential need to treat other than arsenic is a complicating performance factor as different reagent chemistries and redox solutions may be needed for these COCs.

5.2.3 Groundwater Recovery & Treatment

GR&T is a technology with wide and effective application across various site conditions (Table 5-1). GR&T can be expected to effectively control groundwater migration and remove appreciable contaminant mass from the groundwater. The technology is proven and well understood. Fouling of wells and equipment can be an operational issue if groundwater has high iron content. High levels of maintenance or system element replacement may also be needed. Mass removal of COCs would be low for this site as the COC concentrations are in the µg/L range.

Ion exchange is a proven technology for treatment of groundwater contaminated with low levels of arsenic or metals. However, due to competing reactions, the usage rate of ion exchange resin cannot be determined without bench scale testing. Fouling of the resin may be an operational concern. The treatment technology is scalable for flow and contaminant concentration. IX is capable of meeting strict NPDES effluent limitations. A backwash or reject waste stream will be generated which may require further treatment or off-site disposal.

5.3 RELIABILITY EVALUATION

The degree of certainty that the technology will consistently work toward and achieve the specified goal of corrective measures over time is the second criteria that must be evaluated.

5.3.1 Monitored Natural Attenuation

MNA is a reliable technology for sites with low concentrations of COCs similar to the Lowman facility. MNA processes gain reliability with an improved understanding of the Site conceptual model, including the hydrogeology, geochemistry, biochemistry, and soil sorption characteristics. If specific natural attenuation abiotic or biotic processes are isolated and defined and understood, the efficacy and reliability will be improved. Some of this information is well defined, but bench scale testing and or continued monitoring well trend analysis would be needed to better predict the overall corrective measure reliability. Continuous monitoring of geochemical conditions and COC analysis over time is needed to evaluate ongoing effectiveness of natural attenuation at the Site and to discern if supplemental remedial action is warranted.

5.3.2 Permeable Treatment Barrier – Infused Oxygen Injection and Chemical Neutralization

PTBs, properly designed, can be expected to be a reliable treatment technology. The PTB(s) can be designed for flexible gradients and COC flux concentrations. Fouling of the PTB material and long-term longevity of the original injected amendments are realistic reliability concerns over increased operation timeframes. The PTB can be designed for reinjection of amendments to refresh the wall. Neutralization chemistry can be reliably predicted and easily adjusted.

5.3.3 Groundwater Recovery & Treatment

Groundwater recovery is a very reliable technology and is easily designed to produce a conservative hydraulic capture zone. Environmental submersible well pumps are both proven, operationally flexible, and reliable and the system can be automatically controlled and monitored to maintain high uptime.

The IX treatment approach is generally reliable and flexible (scalable) with a proper design basis established by bench scale testing. Operational issues with fouling or variable influent COC concentrations are potential reliability concerns. The system operation would also be controlled by a programmable logic controller and telemetry to allow real-time monitoring and control. Added flow from additional extraction wells or potentially higher COC concentrations can be planned into the system design.

5.4 EASE OF IMPLEMENTATION EVALUATION

This criterion includes the ease with which the technologies can be implemented at the Site.

5.4.1 Monitored Natural Attenuation

MNA would not have any significant implementation issues. A significant number of monitoring wells already exist at the Site that could be incorporated into a monitoring program to monitor natural attenuation processes over time. It is possible that additional monitoring wells might need to be installed as part of the monitoring program. Otherwise, MNA relies upon natural processes which are already active at the Site.

5.4.2 Permeable Treatment Barrier – Infused Oxygen Injection and Chemical Neutralization

Construction of PTBs can be implemented with only moderate difficulty. Vertical wells placed along a linear array for injection are not an issue. A horizontal trenching machine could also be used to place the PTB given the ample room, although this would result in more Site disruption. Injection of amendments through wells may present an implementation hurdle, as the distribution of injected chemicals from a well array is not expected to be sufficiently isotropic or uniform. Once constructed, the technology is passive and could operate with minimal restrictions. Injection may require that State of Alabama Underground Injection Control (UIC) permit requirements be met.

5.4.3 Groundwater Recovery & Treatment

GR&T is a relatively easy technology for implementation. Ample room exists for well drilling and for securing an equipment compound location. The drilling, equipment procurement, construction and system operation are all easily implemented. NPDES permitting already exists at the facility and it may be feasible to modify the permit. IX bench scale testing would be required but is straight-forward.

5.5 POTENTIAL SAFETY IMPACTS EVALUATION

This criterion includes potential safety impacts that may result from implementation and use of the technology at the Site. None of the proposed corrective measures have any appreciable safety impacts if prudently constructed. No short-term construction or environmental impacts will arise for plant workers or any surrounding communities. No air emissions will occur with GR&T. Localized dust emissions are possible if horizontal trenching is used for a PTB. Well drilling, piping installation, and trenching, are common construction practices with well-defined safety procedures. MNA offers no safety impacts with implementation. Minimal safety concerns associated with ongoing groundwater monitoring would be common among all potential corrective measure options evaluated, as groundwater monitoring for corrective measure effectiveness will be necessary.

5.6 POTENTIAL CROSS-MEDIA IMPACTS EVALUATION

This criterion includes potential cross-media impacts that may result from implementation and use of the technology at the Site.

5.6.1 Monitored Natural Attenuation

MNA will not have cross-media impacts. The potential for low-concentration impacts of COCs to the River may persist until the source reduction effort is observed downgradient. However, even the current levels of arsenic and other COC impacts to the River are negligible.

5.6.2 Permeable Treatment Barrier – Infused Oxygen Injection and Chemical Neutralization

PTBs pose minimal risk of cross-media impacts, as they rely on natural groundwater flow. Some injected amendments or pH adjustments can migrate downstream from the PTB(s); however, proper design and monitoring should mitigate any impacts on the River.

5.6.3 Groundwater Recovery & Treatment

GR&T poses a minimal risk of cross-media impacts. Treated groundwater will be completely treated to acceptable effluent standards prior to NPDES discharge. Groundwater treatment with IX will not produce air emissions and disposal of spent resin will follow established waste disposal practices.

5.7 CONTROL OF EXPOSURE TO RESIDUAL CONTAMINATION EVALUATION

This criterion includes the ability to control exposure of humans and the environment to residual contamination through implementation and use of the technology at the Site.

5.7.1 Monitored Natural Attenuation

MNA will not increase the existing potential for human or environmental exposure to impacted groundwater or impacted soil. Over time, these exposures will be asymptotically reduced. In a short-term MNA scenario, the potential for impacted groundwater to discharge into surface water could persist although currently there are no indications of COCs in surface water above background levels.

5.7.2 Permeable Treatment Barrier – Infused Oxygen Injection and Chemical Neutralization

Since *in situ* technologies involve placement or injection of a structure or reagent in order to treat impacted groundwater in-place, there is no increased risk of exposure of humans and the environment to residual contamination. Existing contamination upgradient of a PTB will still present the current risk of exposure, which is deemed to be negligible as groundwater pumping and construction is closely controlled on the facility.

5.7.3 Groundwater Recovery & Treatment

Groundwater extraction and conveyance could result in unintended releases due to spills or leaks. However, the groundwater would be conveyed through an engineered system designed to prevent introduction of water into the environment where risk to human health or the environment could occur. The system would be designed to have various safety features to ensure the possibility of human or environmental exposure to the impacted groundwater is limited. The extracted groundwater would be discharged to surface waters according to NPDES permit requirements, including meeting permit limits established for ecological receptors. The hydraulic capture will effectively eliminate downgradient exposure.

5.8 EVALUATION OF TIME REQUIRED TO BEGIN REMEDY

This criterion includes the time necessary for planning, pilot testing, design, permitting, procurement, installation, and startup of the technology at the Site. All corrective measures alternatives could begin with no limitations following corrective measures design. MNA could occur the soonest as it involves minimal planning and design, principally designing the monitoring well network and upgrading the site geochemistry data. GR&T and PTB remedies could be construction complete within a year.

5.9 EVALUATION OF TIME REQUIRED TO COMPLETE REMEDY

This criterion includes the estimated time necessary to achieve the stated goals of corrective measures to prevent further releases from the Site, to remediate any releases, and to restore the affected area to original conditions. The evaluation of all three corrective measures assumes that source control of the ponds is in place. All three corrective measures have weakly defined timeframes for completion of remediation.

5.9.1 Monitored Natural Attenuation

MNA is the only corrective measure considered that does not introduce an additional physical or chemical remedial aid to supplement the process of natural attenuation. However, based on the relatively low COC concentrations which are either stable or trending downward, a reasonable estimate for the required MNA duration is 10+ years

5.9.2 Permeable Treatment Barrier – Infused Oxygen Injection and Chemical Neutralization

The cleanup timeframe for a downgradient PTB configuration would still be dependent on the rate limiting step of desorption of COCs from upgradient soils. A PTB directly downgradient of the source area would accelerate the Site cleanup by reducing the net flux of upgradient COCs in a shorter timeframe. As a passive remedy with no induced gradient, a PTB will not impact the rate of upstream contaminant degradation. The total time estimated to reach the goals is anticipated to be 10+ years with a downgradient PTB and less than 10 years with a PTB located downgradient of the source area.

5.9.3 Groundwater Recovery & Treatment

Groundwater extraction could take a significant period of time due to COCs being present across a large area along with the rate limiting step being desorption of COCs from the soil matrix. The increased gradient and mass removal with GR&T will result in a marginally faster time for cleanup. The total time estimated to reach the goals is anticipated to be 10+ years.

5.10 STATE, LOCAL, OR OTHER ENVIRONMENTAL PERMIT REQUIREMENTS THAT MAY SUBSTANTIALLY AFFECT IMPLEMENTATION

This criterion includes anticipation of any state or local permit requirements or other environmental or public health requirements that may substantially affect implementation of the technology at the Site. None of the corrective measures have any apparent limitations for permit requirements that will appreciably impact the implementation or timeframe for the remedy. GR&T may require a NPDES permit modification as stated earlier. A PTB well configuration may require UIC permit conditions be met. MNA would not require any permits.

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6.0 Recommended Corrective Measures

Pursuant to Part C of the Administrative Order, this section includes the proposed recommended corrective measure to address CCR groundwater impacts at the Lowman Plant. The recommendation is a result of evaluating the nine criterion for CCR corrective measures against the three specific alternatives described and evaluated in Section 5.1.

The recommendations presented in this ACM are preliminary and will require both review and comment from ADEM and the public. PowerSouth is required to hold a public meeting to discuss the results of the ACM, the remedy selection process, and the selected preferred approaches. This meeting must be conducted in accordance with § 257.96(e) and r. 335-13-15-.06(7)(e) and held at least 30 days prior to the selection of the final remedy.

6.1 CLOSURE OF ASH PONDS

The likely sources of groundwater CCR impacts are limited to the CCR unit (Unit 1 Ash Pond, the Unit 2/3 Ash Pond, and the FGD Pond). PowerSouth plans to discontinue use of the Unit 1 Ash Pond followed by dewatering and clean closure of the Unit 1 Ash Pond via complete excavation of all historically placed ash into the pond. Removed ash will be consolidated into the Unit 2/3 Ash Pond. This corrective measure will eliminate or drastically reduce the Unit 1 Ash Pond as a source of future impacts to groundwater. PowerSouth is further recommending to discontinue use of the Unit 2/3 Ash Pond and the FGD Pond followed by dewatering of the ash and in-place closure and capping of the CCR unit. PowerSouth is submitting closure plans for the ponds under separate cover in accordance with the CCR rule. It is anticipated that these source removal and control measures will have a positive effect on groundwater quality in the areas surrounding the closed ponds.

6.2 MONITORED NATURAL ATTENUATION

It is recommended that MNA be the corrective measure selected to address impacted groundwater water at the Lowman facility. Although arsenic has been detected at the Site and there are exceedances at SSL's above the GWPS for four additional Appendix IV constituents including beryllium, cobalt, lithium, and molybdenum, each are at relatively low concentrations which appear to be stable or trending downward.

Closure of the CCR unit combined with MNA is expected to accelerate the declining trend in all COCs with an expectation that GWPS levels will be attained within 10 plus years at the Site. Semi-annual corrective action monitoring and reporting will be conducted during this time period to verify this in accordance with the CCR Rule.

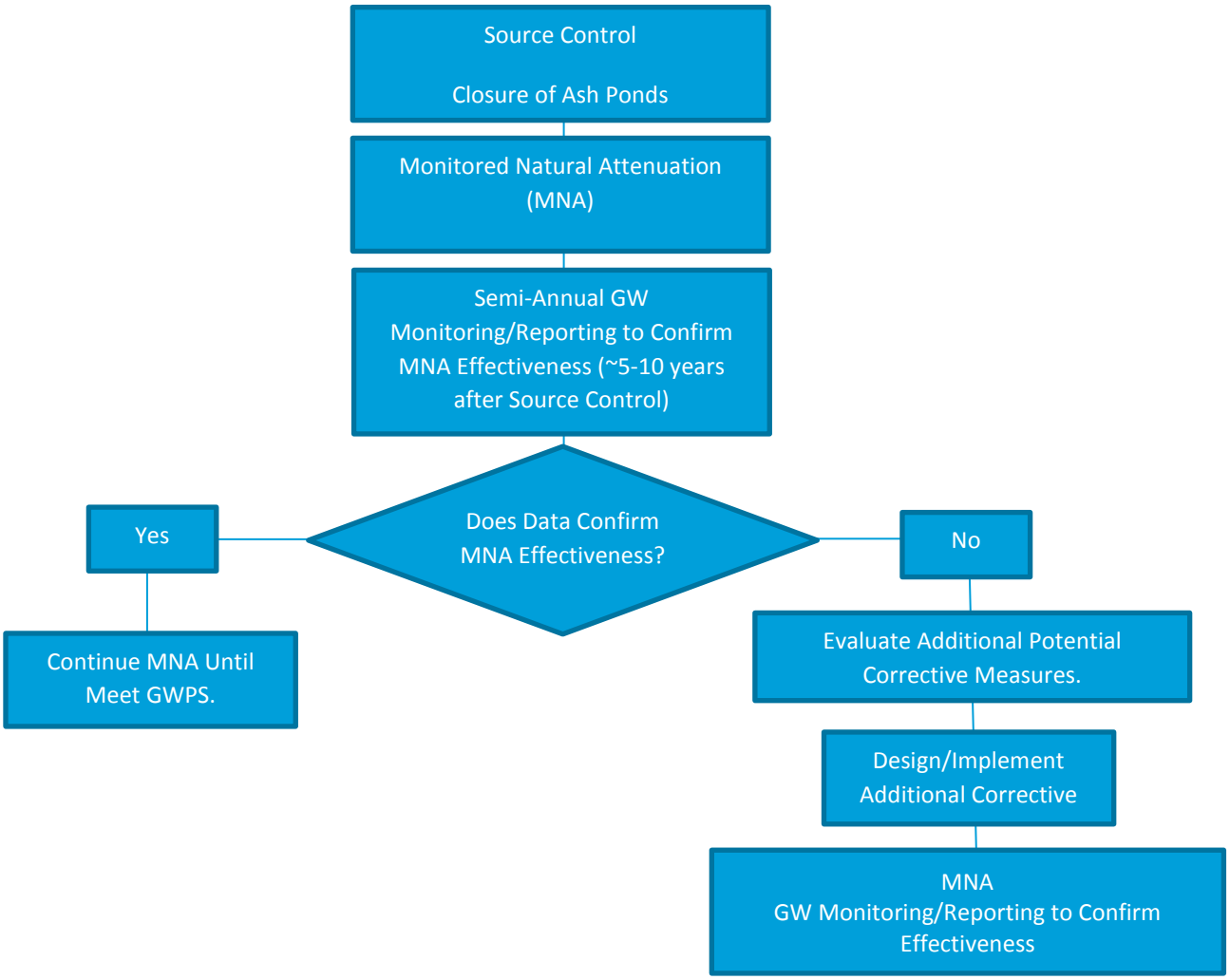
During implementation of the proposed MNA corrective measure, additional studies may be conducted to better define MNA processes, including the remedial timeframe for the Lowman facility. This will entail the further data collection and presentation of:

- Charts of groundwater COC data and other indicator parameters versus time to allow continued observations of trends in mass or concentration over time at appropriate locations. These charts will be examined on a transverse flux basis and as downgradient trends along different linear paths.
- Data that indirectly demonstrate that natural attenuation processes is occurring (e.g., improved geochemistry, soil organic content); and

- Potentially a desorption bench scale study to allow a more accurate prediction for the remedial timeframe.

6.3 CORRECTIVE MEASURES MONITORING AND REPORTING

To ensure the remediation goals are achieved within the expected remedial timeframe for the Site (~10 years), semi-annual groundwater monitoring will be conducted and reported. It is anticipated that the effectiveness of MNA alone will be apparent within approximately 5 years of completing the pond closures. In the event monitoring data indicate that natural attenuation processes are not occurring or are not performing as intended, PowerSouth will evaluate supplementing the MNA remedy with corrective measures alternatives 2 and/or 3, or other appropriate remedial technology. Recommendations for supplementing the MNA remedy would be included in one of the semi-annual monitoring reports submitted to ADEM for review and comments. Provided ADEM concurred with modifying the corrective measure, PowerSouth would then conduct additional design work followed by implementation of the modifications. Semi-Annual performance monitoring combined with MNA monitoring and reporting will continue until GWPS have been met and maintained as required. A flowchart that illustrates the proposed phasing for this adaptive management approach is shown below.



7.0 References

Brunsting, J. H. and McBean, E., 2014, *In Situ Treatment of Arsenic-Contaminated Groundwater by Air Sparging.* Journal of Contaminant Hydrogeology. Number 159. April 2014.

CDG, 2019a, CDG Engineers and Associates, Inc., 2018 Annual Groundwater Monitoring Report, Charles R. Lowman Generating Facility, Leroy, Washington County, Alabama. January 2019,

CDG, 2019b, CDG Engineers and Associates, Inc., Comprehensive Investigation Report, Charles R. Lowman Generating Facility, Leroy, Washington County, Alabama. May 2019.

EPA, 2019, US Environmental Protection Agency, *Arsenic Chemistry and Behavior,* http://clu-in.org/contaminantfocus/default.focus/sec/arsenic/cat/chemistry_and_behavior/, February 5, 2019. Accessed June 5, 2019.

EPRI, 2015, Electric Power Research Institute, Corrective Action for Closed and Closing Ash Ponds, Technical Report 3002006292, December 2015.

Hem, 1985. Hem, J.D. Study and Interpretation of the Chemical Characteristics of Natural Water, Third Edition, USGS Water-Supply Paper 2254, 1985.

Izmerov, N.F. (ed.) (1985), Beryllium. Series "Scientific Reviews of Soviet Literature on Toxicity and Hazards of Chemicals", International Register of Potentially Toxic Chemicals and Centre of International Projects, Moscow, GKNT, 49 pp.

Kabata-Pendias, Alina, and Mukherjee, A.B., 2007, Trace Elements from Soil to Human: Berlin, Germany, Springer-Verlag, 550 p.

Robinson, et al, 2018. Robinson, B.H. et al., 2018. Robinson, B.H., Yalamanchali, R., Reiser, R., and Dickinson, N.M. *Lithium as an emerging environmental contaminant: Mobility in the soil-plant system.* Chemosphere 197, April 2018 p. 1-6.

USGS, 2017, United States Geological Survey, Beryllium, Professional Paper 1802-E, 2017.

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Tables

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Table 2-1
Groundwater Level Data
Charles R. Lowman Power Facility

Well/ Piezometer ID	Top of Casing Elevation (ft-amsl)	Total Depth (ft-btc)	Bottom Elevation (ft-amsl)	Water Level Measurements																															
				2/23/2016		3/26/2016		3/28/2016		5/18/2016		7/19/2016		8/4/2016		9/19/2016		11/28/2016		1/30/2017		3/27/2017		5/22/2017		10/9/2017		12/11/2017		4/16/2018		8/13/2018		4/10/2019	
				ft - btc	ft-amsl	ft - btc	ft-amsl	ft - btc	ft-amsl	ft - btc	ft-amsl	ft - btc	ft-amsl	ft - btc	ft-amsl	ft - btc	ft-amsl	ft - btc	ft-amsl	ft - btc	ft-amsl	ft - btc	ft-amsl	ft - btc	ft-amsl	ft - btc	ft-amsl	ft - btc	ft-amsl	ft - btc	ft-amsl	ft - btc	ft-amsl	ft - btc	ft-amsl
MW-1	29.17	24.30	4.87	5.24	23.93	5.48	23.69	5.79	23.38	7.31	21.86	9.79	19.38	10.33	18.84	11.03	18.14	12.85	16.32	6.39	22.78	6.56	22.61	6.80	22.37	7.04	22.13	5.83	23.34	5.91	23.26	8.57	20.60	5.96	23.21
MW-2	38.18	36.47	1.71	16.74	21.44	16.26	21.92	17.58	20.60	18.99	19.19	22.13	16.05	24.84	13.34	24.52	13.66	27.11	11.07	18.14	20.04	18.69	19.49	19.13	19.05	18.85	19.33	19.02	19.16	17.02	21.16	21.41	16.77	18.03	20.15
MW-3 (PZ-3)	28.55	24.58	3.97	7.06	21.49	7.22	21.33	-	-	9.66	18.89	13.54	15.01	15.15	13.40	15.59	12.96	17.95	10.60	9.57	18.98	9.58	18.97	8.67	19.88	8.10	20.45	8.76	19.79	6.84	21.71	11.22	17.33	7.55	21.00
MW-4	36.40	28.32	8.08	13.68	22.72	11.84	24.56	13.59	22.81	15.30	21.10	18.24	18.16	19.07	17.33	19.63	16.77	22.15	14.25	14.68	21.72	15.28	21.12	15.75	20.65	16.46	19.94	15.55	20.85	13.96	22.44	17.00	19.40	14.54	21.86
MW-5	37.41	29.35	8.06	16.50	20.91	13.53	23.88	16.32	21.09	22.70	14.71	28.11	9.30	29.19	8.22	28.78	8.63	31.78	5.63	25.26	12.15	25.25	12.16	25.75	11.66	BTP		BTP		17.72	19.69	BTP		19.08	18.33
MW-5A	37.23	39.02	-1.79											29.01	8.22	28.60	8.63	31.60	5.63	24.27	12.96	25.12	12.11	25.72	11.51	27.82	9.41	28.68	8.55	17.42	19.81	27.60	9.63	18.87	18.36
PZ-6	49.30	44.30	5.00	28.30	21.00	-	-	-	-	34.82	14.48	40.95	8.35	41.49	7.81	42.00	7.30	43.87	5.43	38.64	10.66	37.41	11.89	37.59	11.71	39.91	9.39	40.82	8.48	30.76	18.54	39.65	9.65	30.72	18.58
MW-6	30.14	29.26	0.88	3.34	26.80	7.62	22.52	10.45	19.69	14.20	15.94	18.38	11.76	19.38	10.76	19.15	10.99	22.04	8.10	13.58	16.56	15.92	14.22	16.70	13.44	17.78	12.36	19.60	10.54	7.91	22.23	17.62	12.52	12.25	17.89
MW-7	34.20	32.65	1.55	13.28	20.92	9.86	24.34	16.00	18.20	18.50	15.70	24.93	9.27	25.48	8.72	24.84	9.36	28.63	5.57	22.94	11.26	21.17	13.03	21.50	12.70	23.15	11.05	24.62	9.58	14.73	19.47	22.79	11.41	16.49	17.71
MW-8	32.91	37.68	-4.77	13.57	19.34	9.04	23.87	14.36	18.55	25.83	7.08	28.98	3.93	29.32	3.59	29.50	3.41	29.94	2.97	18.18	14.73	24.02	8.89	26.09	6.82	26.58	6.33	24.74	8.17	11.91	21.00	28.59	4.32	18.03	14.88
MW-9	32.63	29.01	3.62	8.08	24.55	7.70	24.93	9.78	22.85	15.33	17.30	21.02	11.61	22.31	10.32	22.01	10.62	22.73	9.90	11.92	20.71	13.57	19.06	13.60	19.03	13.25	19.38	12.46	20.17	5.20	27.43	10.65	21.98	6.72	25.91
MW-10	34.14	41.46	-7.32	15.82	18.32	12.40	21.74	18.99	15.15	29.49	4.65	31.28	2.86	31.49	2.65	31.73	2.41	32.30	1.84	18.43	15.71	27.37	6.77	29.17	4.97	29.03	5.11	29.74	4.40	13.96	20.18	31.06	3.08	18.94	15.20
PZ-11R	44.75	47.31	-2.56	23.63	21.12	-	-	-	-	33.85	10.90	38.79	5.96	39.22	5.53	39.40	5.35	40.65	4.10	31.12	13.63	34.31	10.44	35.66	9.09	38.20	6.55	38.42	6.33	26.12	18.63	37.74	7.01	28.80	15.95
MW-11	45.29	43.10	2.19	21.94	23.35	21.14	24.15	23.65	21.64	29.72	15.57	34.16	11.13	34.33	10.96	34.67	10.62	31.25	14.04	31.54	13.75	32.47	12.82	33.19	12.10	31.33	13.96	31.42	13.87	24.82	20.47	33.42	11.87	26.67	18.62
MW-12	43.31	38.42	4.89	22.24	21.07	18.09	25.22	21.67	21.64	29.13	14.18	36.22	7.09	36.92	6.39	36.97	6.34	38.66	4.65	33.31	10.00	31.89	11.42	32.63	10.68	BTP		BTP		25.08	18.23	34.62	8.69	26.84	16.47
MW-12A	43.39	46.31	-2.92											37.00	6.39	37.05	6.34	38.74	4.65	31.31	12.08	32.52	10.87	33.53	9.86	35.90	7.49	34.15	9.24	24.84	18.55	35.48	7.91	27.00	16.39
MW-13	42.26	29.25	13.01							11.44	30.82	13.58	28.68	14.38	27.88	14.39	27.87	14.84	27.42	10.65	31.61	11.21	31.05	11.09	31.17	10.88	31.38	11.17	31.09	9.89	32.37	12.55	29.71	11.48	30.78
MW-13A	41.61	62.90	-21.29																															22.27	19.34
MW-14	38.56	29.48	9.08							23.81	14.75	28.87	9.69	30.14	8.42	29.85	8.71	32.64	5.92	25.65	12.91	25.98	12.58	26.16	12.40	BTP		BTP		18.82	19.74	BTP		20.30	18.26
MW-14A	38.50	38.98	-0.48											30.08	8.42	29.79	8.71	32.58	5.92	25.14	13.36	26.13	12.37	26.71	11.79	28.79	9.71	29.68	8.82	18.31	20.19	28.64	9.86	19.88	18.62
MW-15	31.51	33.18	-1.67																															12.63	18.88
MW-16	34.70	42.23	-7.53																															15.87	18.83
MW-17	36.23	41.70	-5.47																															17.68	18.55
MW-18	32.64	53.03	-20.39																															16.42	16.22
MW-19	50.76	53.13	-2.37																															31.48	19.28
MW-20	30.01	33.41	-3.40																															11.94	18.07
MW-21	30.00	36.45	-6.45																															15.48	14.52
MW-22	30.24	33.55	-3.31																															13.53	16.71
MW-23	38.86	43.85	-4.99																															21.26	17.60
River Stage					18.55		14.48		13.07		3.18		2.36		2.40		2.00		1.76		14.48		6.25		5.56		6.44		3.89		24.50		1.80		17.52

Notes:
ft-amsl = feet above mean sea level
btc = below top of casing

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Table 2-2
April 2019 Soil Sampling Results
Charles R. Lowman Power Facility

	COC	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Lead	Mercury	Molybdenum	Selenium	Thallium	Total Lithium
	Units	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg	mg/Kg	µg/Kg	µg/Kg	µg/Kg	mg/Kg
	RSL	270	290	82000	3200	1300	380	-	$1.8x10^8$	27	14000	0.1	200	260	140	1.2
Sample ID	Sample Date															
SB-1 @ 20	3/15/2019	<250	864	26300	305	2410	<250	563000	5420	2240	2890	<0.0142	<250	<250	<250	<0.500
SB-1 @ 30	3/15/2019	<250	2960	21800	286	2250	<250	679000	6430	2300	2910	<0.0150	<250	<250	<250	<2.50
SB-10 @ 50	3/15/2019	<250	<250	2150	<250	1320	<250	73600	1570	262	623	<0.0142	<250	<250	<250	<2.50
SB-11 @ 40	3/15/2019	<250	<250	4010	<250	2430	<250	167000	2090	354	781	<0.0154	<250	<250	<250	<2.50
SB-12 @ 30	3/15/2019	<250	469	9440	<250	2230	<250	160000	2260	1800	1100	<0.0137	<250	<250	<250	<2.50
SB-12 @ 40	3/15/2019	<250	305	1810	<250	<1250	<250	63700	1640	338	488	<0.0155	<250	<250	<250	<2.50
SB-12 @ 50	3/15/2019	<250	450	6830	<250	<1250	<250	112000	4540	921	764	<0.0155	762	<250	<250	<2.50
SB-13 @ 40	3/15/2019	<250	827	7410	<250	1730	<250	122000	2000	757	937	<0.0152	429	<250	<250	<0.500
SB-14 @ 40	3/15/2019	<250	1020	1230	<250	<1250	<250	80600	1050	332	542	<0.0153	<250	<250	<250	<2.50
SB-14 @ 50	3/15/2019	<250	3200	4450	<250	<1250	<250	154000	1650	507	700	<0.0144	1220	<250	<250	<2.50
SB-15 @ 50	3/15/2019	<250	317	2330	<250	3310	<250	152000	2370	787	926	<0.0140	<250	<250	<250	<2.50
SB-19 @ 20	3/15/2019	<250	711	38700	459	2000	<250	997000	11300	3170	5930	<0.0143	<250	319	<250	3.22
SB-19 @ 40	3/15/2019	<250	<250	3570	<250	<1250	<250	93500	1540	735	1060	<0.0143	<250	<250	<250	<0.500

Notes:
RSL = EPA Regional Screening Levels for Protection of Groundwater, HQ=0.1

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Table 2-3
Summary of Groundwater Field Parameters
Charles R. Lowman Power Plant

Monitoring Well	Date	pH Standard Units	Temperature C°	Conductivity µS/Cm	Dissolved Oxygen mg/L	Turbidity NTUs	ORP Mv
MW-1	3/29/2016	5.46	17.7	201	0.17	1.0	-
	5/18/2016	5.52	19.8	201	0.19	0.9	1.4
	7/19/2016	5.31	21.5	168	0.11	0.5	-23.2
	9/19/2016	5.21	22.8	162	0.15	3.5	-16.5
	11/29/2016	5.30	22.0	139	0.16	1.6	176.2
	1/31/2017	5.34	18.8	194	0.17	1.9	-33.6
	3/28/2017	5.35	19.4	214	0.17	1.9	-5.5
	5/23/2017	5.28	20.5	206	0.21	1.8	-95.0
	10/9/2017	4.70	22.6	210	0.19	2.5	9.7
	4/17/2018	5.80	18.2	368	0.22	3.3	16.0
	8/14/2018	5.36	21.6	201	0.27	2.5	-42.0
	4/10/2019	5.46	17.9	298	0.27	3.1	55.0
MW-2	3/29/2016	4.70	21.0	71	0.09	1.7	214.4
	5/18/2016	4.74	21.2	72	0.08	1.5	227.8
	7/19/2016	4.71	22.0	71	0.10	3.3	199.0
	9/19/2016	4.59	21.9	71	0.16	1.1	188.0
	11/29/2016	4.82	21.7	69	0.16	2.0	246.2
	1/31/2017	4.51	21.5	68	0.17	3.0	223.3
	3/28/2017	4.54	21.9	71	0.17	2.8	237.0
	5/23/2017	4.45	21.4	71	0.17	2.6	239.2
	10/10/2017	4.33	22.1	70	0.19	3.1	234.4
	4/17/2018	4.76	21.2	89	0.26	3.7	235.0
	8/14/2018	4.48	22.6	62	0.24	3.9	230.5
	4/10/2019	4.54	21.4	80	0.34	4.5	256.0
MW-3	4/6/2019	4.53	17.8	78	0.58	3.4	156.0
MW-4	3/29/2016	4.52	20.8	2373	0.07	3.8	-
	5/18/2016	4.45	20.8	2423	0.11	1.1	183.7
	7/19/2016	4.55	21.1	2413	0.09	0.2	143.0
	9/19/2016	4.57	21.4	2484	0.16	1.5	130.0
	11/29/2016	4.06	22.4	2756	0.15	0.4	250.3
	1/31/2017	4.55	21.5	2477	0.14	1.4	135.1
	3/28/2017	4.53	21.6	2513	0.16	1.4	150.5
	5/23/2017	4.40	21.1	2557	0.16	1.7	156.0
	10/10/2017	4.63	22.1	2401	0.17	2.9	107.8
	12/11/2018	8.28	21.4	3378	0.23	3.0	102.9
	4/17/2018	4.71	20.6	2903	0.21	1.1	135.7
	8/14/2018	4.82	22	2207	0.20	2.9	74.6
	4/10/2019	4.87	20.7	2811	0.26	2.2	147.0
MW-5	3/29/2016	5.96	22.4	1061	0.07	3.4	-
	5/18/2016	6.03	22.6	1022	0.06	2.9	-74.9
	7/19/2016	Dry	Dry	Dry	Dry	Dry	Dry
	9/19/2016	Dry	Dry	Dry	Dry	Dry	Dry
	11/29/2016	Dry	Dry	Dry	Dry	Dry	Dry
	1/31/2017	5.08	22.81	1550	0.23	4.4	239.7
	3/28/2017	5.23	23.7	1474	0.18	3.4	86.8
	5/24/2017	5.50	22.5	1112	0.41	3.3	41.9
	10/10/2017	Dry	Dry	Dry	Dry	Dry	Dry
	4/17/2018	5.97	21.7	1180	0.21	3.1	-50.6
	8/14/2018	Dry	Dry	Dry	Dry	Dry	Dry
	4/9/2019	6.04	21.50	1076	0.22	1.8	-51.20

Table 2-3
Summary of Groundwater Field Parameters
Charles R. Lowman Power Plant

Monitoring Well	Date	pH Standard Units	Temperature C°	Conductivity µS/Cm	Dissolved Oxygen mg/L	Turbidity NTUs	ORP Mv
MW-5A	8/4/2016	5.97	23.3	2658	0.21	3.2	32.5
	9/20/2016	6.01	23.9	2582	0.16	2.6	55.0
	11/29/2016	5.81	23.1	2083	0.19	2.7	23.9
	1/31/2017	5.98	22.9	2527	0.13	1.9	18.0
	3/28/2017	5.64	23.6	2291	0.15	4.1	54.0
	5/24/2017	5.63	23.0	2021	0.18	2.9	64.0
	10/10/2017	5.84	23.6	1738	0.18	3.2	18.1
	12/11/2018	8.50	22.0	2979	0.21	2.9	-70.0
	4/17/2018	6.39	22.4	2143	0.20	1.3	-31.7
	8/15/2018	6.15	22.8	1257	0.29	2.4	96.3
	4/9/2019	6.10	22.0	1435	0.24	2.0	-1.6
MW-6	3/29/2016	6.15	20.4	907	0.07	4.8	-88.5
	5/18/2016	6.04	20.4	788	0.20	4.6	-79.3
	7/19/2016	6.20	21.4	673	0.11	3.4	-126.0
	9/19/2016	6.31	22.3	735	0.13	1.8	-117.0
	11/29/2016	6.35	22.4	689	0.31	1.9	-84.3
	1/31/2017	5.43	21.1	709	0.15	2.7	103.4
	3/29/2017	5.82	21.2	732	0.20	2.4	4.8
	5/24/2017	5.66	20.7	719	0.24	3.0	17.0
	10/11/2017	6.07	22.3	736	0.20	2.7	-79.4
	12/11/2018	8.17	21.2	1068	0.22	3.5	-128.7
	4/17/2018	5.82	19.2	954	0.20	3.5	60.7
	8/15/2018	6.20	21.2	595	0.21	3.3	-91.4
	4/7/2019	5.65	19.7	656	0.27	2.9	113.7
MW-7	3/29/2016	5.94	21.8	1649	0.11	1.3	128.9
	5/18/2016	5.91	21.9	1878	0.12	1.6	104.0
	7/19/2016	6.13	22.7	1077	0.21	2.6	57.6
	9/19/2016	6.03	23.2	2186	0.18	2.0	73.0
	11/29/2016	5.99	23.2	2971	0.67	1.6	23.2
	1/31/2017	5.93	22.6	1142	0.14	1.9	68.6
	3/29/2017	6.05	22.4	2070	0.18	1.9	22.4
	5/24/2017	5.96	21.8	1543	0.17	2.0	27.2
	10/11/2017	6.16	22.9	1134	0.25	3.2	-1.6
	12/11/2018	8.57	22	1985	0.27	1.3	-39.2
	4/17/2018	6.24	21	800	0.25	1.4	133.9
	8/15/2018	6.03	22.3	1344	0.31	1.4	58.3
	4/7/2019	6.04	21.2	1198	0.26	1.7	77.7
MW-8	3/29/2016	6.11	19.7	403	0.12	2.0	186.0
	5/18/2016	6.29	21.4	501	0.20	1.9	19.2
	7/19/2016	6.43	22.2	637	0.13	2.3	-150.0
	9/19/2016	6.48	22.7	633	0.11	3.2	-133.0
	11/29/2016	6.43	21.4	612	0.13	2.0	-141.4
	1/31/2017	6.42	21.4	522	0.14	1.4	-111.0
	3/29/2017	6.19	22.2	530	0.15	2.9	5.2
	5/24/2017	6.17	22.0	524	0.21	2.7	-19.9
	10/11/2017	6.40	22.1	576	0.16	1.2	-126.7
	12/11/2018	8.07	20.5	821	0.16	1.4	-150.8
	4/17/2018	6.65	21.2	477	0.18	2.7	-134.8
	8/15/2018	6.47	22.3	505	0.20	2.5	-134.0
	4/7/2019	6.26	20.1	390	0.25	1.1	26.3

Table 2-3
Summary of Groundwater Field Parameters
Charles R. Lowman Power Plant

Monitoring Well	Date	pH Standard Units	Temperature C°	Conductivity µS/Cm	Dissolved Oxygen mg/L	Turbidity NTUs	ORP Mv
MW-9	3/29/2016	6.26	18.6	844	0.80	4.7	-77.5
	5/18/2016	6.26	19.2	1001	1.92	3.7	-33.6
	7/19/2016	6.20	21.3	1186	1.70	2.4	-24.7
	9/19/2016	6.13	22.1	1465	2.18	2.2	-5.0
	11/29/2016	6.26	21.5	2259	1.80	0.1	3.0
	1/31/2017	6.00	20.0	1769	0.35	1.2	-24.6
	3/28/2017	5.90	19.5	1798	2.05	1.5	-0.1
	5/22/2017	5.95	19.7	1873	1.58	2.8	-10.2
	10/9/2017	5.47	22.4	1639	0.34	2.9	-33.9
	12/11/2018	7.34	20.7	2517	0.36	1.1	-64.9
	4/17/2018	6.39	17.8	1877	0.26	3.0	-105.1
	8/14/20018	5.96	21.2	2336	0.26	0.4	-109.1
	4/10/2019	5.91	18.2	3189	0.28	1.0	-32.5
MW-10	3/29/2016	3.78	21.1	897	5.11	3.1	373.0
	5/18/2016	3.95	21.3	989	4.03	0.5	391.0
	7/19/2016	3.81	22.8	917	1.33	3.8	354.0
	9/19/2016	3.79	23.1	954	0.49	3.7	402.0
	11/29/2016	3.83	21.7	895	0.23	1.6	297.2
	1/31/2017	4.06	22.0	1145	1.47	1.8	332.0
	3/29/2017	3.90	22.5	930	0.23	1.2	378.0
	5/24/2017	3.84	22.0	884	0.26	1.6	344.0
	10/11/2017	4.05	22.4	832	0.94	2.4	330.2
	12/11/2018	8.02	20.7	1361	1.41	1.2	329.1
	4/17/2018	4.01	21.2	1108	0.57	2.0	353.8
	8/14/2018	4.32	23.4	659	1.39	2.5	309.1
	4/9/2019	3.87	21.5	808	1.22	0.8	327.0
MW-11	3/29/2016	6.76	23.7	3130	0.12	0.5	-116.9
	5/18/2016	6.76	23.9	2944	0.12	4.6	-125.7
	7/19/2016	6.75	25.7	3019	0.13	0.8	-125.0
	9/19/2016	6.93	27.3	3324	0.16	1.3	-112.0
	11/29/2016	6.65	26.5	2729	2.94	0.6	-75.9
	1/31/2017	6.80	24.1	2138	0.18	2.6	-99.6
	3/29/2017	6.88	23.2	2524	0.15	1.0	-124.8
	5/24/2017	6.73	22.9	2270	0.16	1.4	-107.8
	10/10/2017	6.58	26.3	3120	0.20	1.9	-116.1
	12/11/2018	10.58	23.8	5259	0.20	0.0	-126.4
	4/17/2018	7.06	21.1	2762	0.21	0.8	-123.7
	8/15/2018	7.00	24.7	1418	0.21	1.1	-115.0
	4/9/2019	6.90	20.7	2503	0.25	0.7	-92.5
MW-12	3/29/2016	6.13	22.4	948	6.25	3.2	212.0
	5/18/2016	5.67	22.5	961	5.00	3.8	201.8
	7/19/2016	Dry	Dry	Dry	Dry	Dry	Dry
	9/19/2016	Dry	Dry	Dry	Dry	Dry	Dry
	11/29/2016	Dry	Dry	Dry	Dry	Dry	Dry
	1/31/2017	5.71	22.8	846	1.53	2.7	201.5
	3/30/2017	5.59	22.4	815	2.43	1.2	337.0
	5/25/2017	5.58	21.7	1028	3.94	0.8	394.2
	10/10/2017	Dry	Dry	Dry	Dry	Dry	Dry
	4/17/2018	5.71	22.5	1220	0.27	1.1	262.3
	8/15/2018	Dry	Dry	Dry	Dry	Dry	Dry
	4/9/2019	5.65	22.2	1062	1.06	0.3	254.00

Table 2-3
Summary of Groundwater Field Parameters
Charles R. Lowman Power Plant

Monitoring Well	Date	pH Standard Units	Temperature C°	Conductivity µS/Cm	Dissolved Oxygen mg/L	Turbidity NTUs	ORP Mv
MW-12A	7/19/2016	5.67	23.6	1152	2.34	4.1	230.2
	9/20/2016	5.59	23.9	1063	1.76	2.9	269.0
	11/29/2016	5.39	22.5	1077	2.33	2.5	282.9
	1/31/2017	5.69	22.9	1027	0.17	1.2	141.2
	3/30/2017	5.57	22.3	834	0.29	0.8	309.8
	5/25/2017	5.44	22.3	995	1.48	1.0	384.5
	10/10/2017	5.38	23.6	883	1.62	1.1	213.8
	12/11/2018	8.68	21.4	1459	1.48	1.9	221.2
	4/17/2018	5.67	22.6	1580	0.23	0.8	238.6
	8/14/2018	5.45	25.2	780	1.13	1.7	291.5
	4/9/2019	5.50	22.0	1057	0.43	0.2	256.0
MW-13	5/18/2016	6.05	20.7	777	0.27	3.1	26.2
	7/19/2016	5.97	23.5	602	0.24	0.7	18.8
	9/19/2016	6.18	26.0	495	2.75	2.2	115.0
	11/29/2016	6.19	24.5	890	0.35	1.7	77.9
	1/31/2017	6.01	21.7	891	1.49	1.9	120.1
	3/27/2017	6.23	20.8	737	1.38	2.2	99.8
	5/25/2017	6.18	21.4	579	0.74	3.3	56.2
	10/10/2017	5.92	26.3	473	0.69	1.5	28.5
	12/11/2018	8.34	22.9	709	0.32	1.1	7.5
	4/17/2018	6.46	20.6	401	1.02	2.4	-19.5
	8/13/2018	6.26	23.9	396	1.40	2.2	88.7
	4/9/2019	6.25	19.4	381	0.50	1.3	17.6
MW-13A	4/8/2019	5.78	21.3	451	1.27	11.8	9.2
MW-14	5/18/2016	6.09	22.8	1014	0.09	1.3	137.6
	7/19/2016	Dry	Dry	Dry	Dry	Dry	Dry
	9/19/2016	Dry	Dry	Dry	Dry	Dry	Dry
	11/29/2016	Dry	Dry	Dry	Dry	Dry	Dry
	1/31/2017	4.62	24.9	1303	0.16	0.8	246.9
	3/29/2017	4.99	23.7	1574	1.16	1.6	173.0
	5/23/2017	5.46	24.8	921	0.32	2.5	107.5
	10/10/2017	Dry	Dry	Dry	Dry	Dry	Dry
	4/17/2018	6.11	24.4	1943	0.21	3.1	-75.9
	8/15/2018	Dry	Dry	Dry	Dry	Dry	Dry
	4/10/2019	6.05	23.0	1539	0.20	3.8	-59.9
MW-14A	8/4/2016	5.63	23.8	1642	0.17	1.2	75.5
	9/19/2016	5.75	24.1	1596	0.15	1.9	85.0
	11/29/2016	5.48	23.3	1494	0.19	0.7	54.6
	1/31/2017	5.11	24.0	1671	0.13	1.1	120.1
	3/29/2017	5.38	24.0	1825	0.16	1.2	54.7
	5/23/2017	5.16	23.9	1729	0.17	2.1	69.5
	10/10/2017	5.09	24.1	1642	0.18	2.3	82.0
	12/11/2018	7.24	23.3	2412	0.23	2.1	-10.2
	4/17/2018	5.53	22.9	2459	0.19	1.3	60.9
	8/15/2018	5.34	24.0	1352	0.20	1.2	63.2
	4/10/2019	5.41	23.1	1847	0.24	1.8	84.6

Table 2-3
Summary of Groundwater Field Parameters
Charles R. Lowman Power Plant

Monitoring Well	Date	pH Standard Units	Temperature C°	Conductivity µS/Cm	Dissolved Oxygen mg/L	Turbidity NTUs	ORP Mv
MW-15	4/7/2019	5.49	20.7	226	0.30	4.2	102.0
MW-16	4/8/2019	5.90	21.6	1229	0.25	3.9	-19.0
MW-17	4/8/2019	6.12	21.7	1724	0.24	4.6	-30.5
MW-18	4/7/2019	6.24	19.8	553	0.25	2.1	-101.0
MW-19	4/7/2019	4.95	21.2	372	0.29	3.3	245.0
MW-20	4/6/2019	6.10	19.0	529	0.29	1.2	-118.3
MW-21	4/6/2019	5.98	19.8	465	0.29	3.3	-28.0
MW-22	4/7/2019	6.24	22.3	774	0.27	3.1	-51.5
MW-23	4/8/2019	6.91	23.8	2507	0.25	3.9	-130.0

Notes:

MW-16 through MW-23 installed in March-April 2019.

MW-3 was originally installed as a piezometer. In April 2019 it was redesignated as a monitoring well and sampled/monitored for the first time.

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Table 2-4
Groundwater Protection Standards
Charles R. Lowman Power Plant

Appendix IV COC	Units	GWPS
Antimony	mg/L	0.006
Arsenic	mg/L	0.01
Barium	mg/L	2.0
Beryllium	mg/L	0.004
Cadmium	mg/L	0.005
Chromium	mg/L	0.1
Cobalt	mg/L	0.006[1]
Fluoride	mg/L	4.0
Lead	mg/L	0.015
Lithium	mg/L	0.04[1]
Mercury	mg/L	0.002
Molybdenum	mg/L	0.1[1]
Selenium	mg/L	0.05
Thallium	mg/L	0.002
Radium 226 and 228 combined	pCi/L	5

Notes

GWPS based on MCL unless otherwise noted.

[1] Established based upon ADEM Varience Letter (ADEM, April 15, 2019)

m/L - milligrams per liter

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Table 2-5
April 2019 Groundwater Results - Appendix IV
Charles R. Lowman Power Facility

	Analyte	Turbidity	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium	Combined Radium
	Units	NTUs	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	pCi/L
	GWPS	-	0.006	0.01	2.0	0.004	0.005	0.1	0.006	0.015	0.04	0.002	0.1	0.05	0.002	5
Well ID	Date															
MW-1	4/10/2019	3.1	<0.0010	0.00140	0.12	<0.00034	<0.00034	<0.0011	0.0086	<0.00035	0.0018 J	<0.000070	<0.0020	<0.00071	<0.000085	NA
MW-2	4/10/2019	4.5	<0.0010	<0.00046	0.064	<0.00034	<0.00034	<0.0011	0.010	<0.00035	0.0020 J	<0.000070	<0.00085	<0.00024	<0.000085	NA
MW-3	4/6/2019	3.4	<0.0010	<0.00046	0.13	0.00057 J	<0.00034	<0.0011	0.031	<0.00035	0.0027 J	<0.000070	<0.0020	<0.00071	<0.000085	NA
MW-4	4/10/2019	2.2	<0.0010	0.0036	0.044	0.0046	0.00057 J	<0.0011	0.82	0.0014	0.0056	<0.000070	0.002	0.0013	0.00023 J	NA
MW-5	5/9/2019	1.8	<0.0010	0.022	0.36	<0.00034	<0.00034	<0.0011	0.016	<0.00035	<0.0011	<0.000070	<0.0020	0.0033	<0.000085	NA
MW-5A	4/9/2019	2.0	<0.0010	0.00430	0.078	<0.00034	<0.00034	<0.0011	0.012	<0.00035	0.09	<0.000070	0.20	<0.00071	<0.000085	NA
MW-6	4/7/2019	2.9	<0.0010	0.012 J	0.043	<0.00034	<0.00034	<0.0011	0.0042	<0.00035	0.0020 J	<0.000070	<0.0020	<0.00071	<0.000085	NA
MW-7	4/7/2019	1.7	<0.0010	<0.00046	0.089	<0.00034	<0.00034	<0.00034	0.0033	<0.00035	0.15	<0.000070	0.02	<0.00071	<0.000085	NA
MW-8	4/7/2019	1.1	<0.0010	0.0016	0.055	<0.00034	<0.00034	<0.0011	0.0025	<0.00035	<0.0011	<0.000070	<0.0020	<0.00071	<0.000085	NA
MW-9	4/10/2019	1.0	<0.0010	0.00066 J	0.07	<0.00034	<0.00034	<0.0011	<0.00040	<0.00035	<0.0011	<0.000070	<0.0020	<0.00071	<0.000085	NA
MW-10	4/10/2019	0.8	<0.0010	<0.00046	0.034	0.00082 J	0.00082 J	<0.0011	0.0047	<0.00035	0.012	<0.000070	<0.0020	0.0030	<0.000085	NA
MW-11	4/9/2019	0.7	<0.0010	0.0033	0.30	<0.00034	<0.00034	<0.0011	<0.00040	<0.00035	0.058	<0.000070	0.14	<0.00071	<0.000085	NA
MW-12	4/9/2019	0.3	<0.0010	<0.00046	0.027	<0.00034	0.00037 J	<0.0011	<0.00040	<0.00035	0.0074	<0.000070	<0.0020	<0.00071	<0.000085	NA
MW-12A	4/9/2019	0.2	<0.0010	<0.00046	0.028	<0.00034	0.00056 J	<0.0011	0.0074	<0.00035	0.014	<0.000070	<0.0020	<0.00071	<0.000085	NA
MW-13	4/9/2019	1.3	<0.0010	0.00082 J	0.07	<0.00034	<0.00034	<0.0011	<0.00040	<0.00035	<0.0011	<0.000070	<0.0020	0.00076 J	<0.000085	NA
MW-13A	4/9/2019	11.8	<0.0010	0.0069	0.12	<0.00034	<0.00034	<0.0011	0.011	<0.00035	0.005	<0.000070	<0.0020	<0.00071	<0.000085	NA
MW-14	4/10/2019	3.8	<0.0010	0.017	0.19	<0.00034	<0.00034	<0.0011	0.043	<0.00035	0.0015 J	<0.000070	<0.00020	<0.00071	<0.000085	NA
MW-14A	4/10/2019	1.8	<0.0010	0.0075	0.072	<0.00034	<0.00034	<0.0011	0.11	<0.00035	0.026	<0.000070	<0.0020	<0.00071	<0.000085	NA
MW-15	4/7/2019	4.2	<0.0010	0.0012 J	0.093	<0.00034	<0.00034	<0.0011	0.014	<0.00035	0.0038 J	<0.000070	<0.0020	<0.00071	<0.000085	NA
MW-16	4/8/2019	3.9	<0.0010	0.0046	0.29	<0.00034	<0.00034	<0.0011	0.03	<0.00035	0.046	<0.000070	<0.0020	<0.00071	<0.000085	NA
MW-17	4/8/2019	4.6	<0.0010	0.016	0.26	<0.00034	<0.00034	<0.0011	0.042	<0.00035	0.15	<0.000070	0.22	<0.00071	<0.000085	NA
MW-18	4/7/2019	2.1	<0.0010	0.0063	0.29	<0.00034	<0.00034	<0.0011	0.0046	<0.00035	0.0030 J	<0.000070	<0.0020	<0.00071	<0.000085	NA
MW-19	4/7/2019	3.3	<0.0010	<0.00046	0.095	<0.00034	0.00049 J	<0.0011	0.014	<0.00035	0.011	<0.000070	<0.0020	<0.00071	<0.000085	NA
MW-20	4/6/2019	1.2	<0.0010	0.051	0.15	<0.00034	<0.00034	<0.0011	0.0027	<0.00035	0.0015 J	<0.000070	<0.0020	<0.00071	<0.000085	NA
MW-21	4/6/2019	3.3	<0.0010	0.0059	0.096	<0.00034	<0.00034	<0.0011	0.0034	<0.00035	0.0018 J	<0.000070	<0.0020	<0.00071	<0.000085	NA
MW-22	4/7/2019	3.1	<0.0010	0.0027	0.2	<0.00034	<0.00034	<0.0011	0.0091	<0.00035	0.0012 J	<0.000070	<0.0020	<0.00071	<0.000085	NA
MW-23	4/8/2019	3.9	<0.0010	0.042	0.12	<0.00034	<0.00034	<0.0011	0.00059 J	<0.00035	0.2	<0.000070	0.21	<0.00071	<0.000085	NA

Notes:

GWPS - groundwater protection standard (MCL except for cobalt, lithium, and molybdenum. These based on ADEM varience letter dated April 15, 2019)

mg/l - milligrams per liter

pCi/L - picocuries per liter

NA - not analyzed

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Table 4-1
Corrective Measures Technology Screening
Charles R. Lowman Power Plant
Leroy, Washington County, Alabama

General Remedial Action	Specific Corrective Measure Technolgy	Performance	Reliability	Ease of Implementation	Exposure to Residuals	Remediation Timeframe	Permitability	Cost	Relative Score	Retained	Screening Rationale
Containment or Isolation	Vertical Engineered Barrier (VEB)	Moderate-Low	Moderate-Low	Moderate-High	Moderate-High	Moderate-Low	Moderate-High	Moderate-Low	17		Impermeable basal unit not present, COCs have retarded lateral transport in aquifer
	In Situ Solidification/Stabilization	Very High	High	Moderate-Low	High	Moderate-High	Moderate-High	Low	22		Very large and deep area to stabilize, building constraints
	Surface Cap	Moderate-High	High	Moderate-High	High	Moderate-Low	Moderate-High	Moderate-High	22		Prevents additional flux of surface water infiltration, does not limit saturated transport
	Hydraulic Containment	Very High	Very High	High	Moderate-High	Moderate-High	High	High	**28**	✓	Effective for protection of Tombigbee River; hydrogeology is suitable
Removal / Transport	Soil Excavation and Disposal	Very High	Very High	Low	Very High	High	Moderate-Low	Low	23		Very large and deep area to excavate, cost prohibitive, building constraints
	Deep Excavation w/ LDA	High	High	Low	Very High	High	Moderate-Low	Low	**21**		Very large and deep area to excavate, cost prohibitive, building constraints
	Groundwater Recovery & Treatment	High	High	Very High	Moderate-High	Moderate-High	Very High	High	**28**	✓	Low mass removal rate, low concnetrations easy to treat
Recovery/ Reclamation (*In Situ* Treatment)	In Situ Chemical Oxidation (ISCO)										
	Air Sparging	Moderate-High	Moderate-High	Moderate-High	Moderate-High	High	Very High	High	25		Distribution of sparge air uncertain, large number of points needed
	Ozone Sparging	High	Moderate-High	Moderate-High	High	High	Moderate-High	Moderate-High	24		Distribution of ozone uncertain, large number of points needed, higher cost to oxygenate
	Infused Oxygen Injection	Very High	High	High	High	High	Very High	High	**30**	✓	Proven method for oxygen delivery, can work as recirculation concept
	Peroxide Injection	High	Moderate-High	Moderate-High	High	High	Very High	High	27		Distribution of liquid amednment uncertain without testing
	Direct Chemical Oxidant Injection	High	High	Moderate-High	High	High	High	Moderate-Low	25		Distribution of liquid oxidant uncertain without testing, higher cost
	Solid Oxidant Emplacment	Moderate-High	High	Moderate-High	Moderate-High	Moderate-High	Very High	Moderate-Low	23		Passive approach, effective contact, more expensive to install at depth
	In Situ Chemical Reduction (ISCR)										Conservative placement needed; Presence of NAPL will limit effectiveness
	Direct Chemical Reductant Injection	Moderate-High	Moderate-High	Moderate-High	Moderate-High	Moderate-High	High	Moderate-High	22		Distribution of liquid reductant uncertain without testing, higher cost, ISCR less favorable
	Biological Reduction	Moderate-High	Moderate-High	Moderate-High	Moderate-High	Moderate-High	High	Moderate-High	22		Distribution fluids uncertain without testing, bacteria enumeration uncertain/low/complex
	Oxidation/ Ferrrous Sulfate Precipitation	High	Moderate-High	Moderate-High	High	High	High	Moderate-High	**25**	✓	Proven method for chemical precipitation, distribution of amendment uncertain
	Zero Valent Iron (ZVI) Injction	Moderate-High	Moderate-High	Moderate-High	High	Moderate-High	High	Moderate-High	23		Passive, applied as a barrier or not cost effective, ISCR less favorable
	Chemical Neutralization	High	High	High	High	High	Very High	High	**29**	✓	Higher pH is favorable for precipitation of COCs, could be supplemental remedy
	Groundwater Migration Barriers	Moderate-High	High	Moderate-High	Moderate-High	Moderate-High	Moderate-High	Moderate-High	22		Passive and expensive approach, requires treatment zone and ancillary technology
	Permeable Treatment Barrier	High	High	Moderate-High	Moderate-High	Moderate-High	High	Moderate-High	24	✓	Passive but effective approach, protective of river, suitable source cutoff approach
	Electrokinetics	High	Moderate-High	Moderate-High	Moderate-High	High	Moderate-High	Moderate-High	23		Viable technology but complex and expensive over a wide area
	Monitored Natural Attenuation	Moderate-High	High	Very High	Moderate-Low	Moderate-High	High	High	**25**	✓	Low COC levels and sorption/precipitation reactions are favorable, more data required
Recovery/ Reclamation (*Ex Situ* Treatment)	*Ex Situ* Solidification/Stabilization (S/S)	-	-	-	-	-	-	-			Cost prohibitive, not applicable
	Ex Situ Chemical Oxidation	-	-	-	-	-	-	-			Cost prohibitive, not applicable
	Ex Situ Chemical Reduction	-	-	-	-	-	-	-			Cost prohibitive, not applicable
	Ex Situ Groundwater Treatment	Very High	High	High	Very High	Very High	Very High	Moderate-High	**31**	✓	Proven but O&M intensive prcoess; low concentrations are favorable

Key: Retained / Rejected

	Performance	Reliability	Ease of Implementation	Exposre to Residuals	Remediation Timeframe	Permitability	Cost
Very High	Very High	Best	Best	Low	Short	Best	Low
High	High	Better	Better	Moderate - Low	Moderate - Low	Better	Moderate - Low
Moderate-High	Moderate-High	Good	Good	Moderate-High	Moderate-High	Good	Moderate-High
Moderate-Low	Moderate - Low	Fair	Fair	High	High	Fair	High
Low	Low	Poor	Poor	Very High	Indefinite	Poor	Very High

Abbreviations/Notes:

COC = contaminat of concern
LDA = large diameter auger
ISCO = *in situ* chemical oxidation
ISCR = *in situ* chemical reduction
S/S = Solidfication/Stabilization
VEB = vertical engineered barrier
⦿ = partial or targeted application
✓ = SItwide application

Performance
Very High = very effective for this site
High = effective under the right conditions
Moderate-High = partially effective by itself or in combo with other RTPOs
Moderate-Low = seldom effective under these conditions
Low = ineffective

Ease of Implementation
Best = easily and readily implemented at this site
Better = good implementability with minor issues
Good = implementable under the right conditions
Fair = implemented with difficulty
Poor = rarely/not able to be implemented at this site

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Table 5-1
Evaluation of Corrective Measure Technologies
Charles R. Lowman Power Plant
Leroy, Washington County, Alabama

Criteria Technology	Criteria Based on 257.96(c)(1)		
	Performance	**Reliability**	**Ease of Implementation**
Groundwater Recovery & Treatment (GR&T)	• GR&T will provide effective hydraulic containment and ongoing mass removal • Does not directly address mass of COCs on soil; limiting factor for rate of Site restoration • Treated water can be discharged to River with NPDES permit	• Proven groundwater recovery technology • Well fouling a concern over long term • Treatment technology, ion exchange (IX) is proven	• Reasonable and cost-effective number of wells • Suitable lithology • Ample room for implementation • Package ion exchange treatment systems available
Infused Oxygen Injection	• Injection of high concentration of oxygen infused water will alter site geochemistry to oxidized state allowing arsenate precipitation • Good longevity for oxygen persistence	• Proven technology; high (>40 mg/L) of oxygen infused allows for dispersion and diffusion of enriched oxygenated water	• Several injection points can be installed to sweep a wide area with higher DO • Suitable lithology • Bench scale testing and/or field scale testing needed
Oxidation/ Ferrous Sulfate Precipitation	• Ancillary technology to oxidation approach, provides two mechanisms for fixation on soils • Precipitation complexes would be expected to have a low reversibility or good stability	• Proven technique provides for both oxygenated precipitation (e.g., iron oxyhydroxides) complexes and reduced sulfide driven reduction • Engineered approach, flexible	• Several injection points can be installed to sweep a wide area with higher DO • Suitable lithology for injection • Bench scale testing and/or field scale testing needed
Chemical Neutralization	• Shift to a more alkaline geochemistry will drive arsenic to arsenate precipitation complexes	• Proven and reliable	• Chemical dosing may be significant • Multiple injection locations or an infiltration trench may be required • Bench scale testing and/or field scale testing needed
Permeable Treatment Barrier	• Properly designed, very effective for treating dissolved flux of COCs • Passive, does not address upgradient contamination. • Would be effective at further reducing any source area COC flux from pond closures	• Reliable • Barrier could be subject to fouling that could affect the permeability	• Multiple injection points or a trenched barrier needed • Barrier can be recharged as needed • Location can be designed to not interfere with facility and to be especially protective of the source area or river • Bench scale testing and/or field scale testing needed
Monitored Natural Attenuation	• Accurate prediction of performance will require additional monitoring period (1-2 years) and more trend analysis • Low levels of COCs are ideal for corrective measure • Improved viability expected with source area control at coal ash ponds	• MNA is a reliable technology for sites with low concentrations of COCs, especially for metals that have an affinity to sorb to soil • MNA processes gain reliability with an improved understanding of the Site conceptual model, including the hydrogeology, geochemistry, biochemistry, and soil sorption characteristics • Currently no receptor impacts from Site	• Easiest CM to implement • Long term monitoring required • Additional monitoring wells, if needed are easily installed

Table 5-1
Evaluation of Corrective Measure Technologies
Charles R. Lowman Power Plant
Leroy, Washington County, Alabama

Criteria	Criteria Based on 257.96(c)(1)		
	Potential Impacts of Appropriate Potential Remedies: Safety Impacts	**Potential Impacts of Appropriate Potential Remedies: Cross Media Impacts**	**Potential Impacts of Appropriate Potential Remedies: Control of Exposure to Residual Contamination**
Groundwater Recovery & Treatment	• No significant safety impacts or issues	• Treatment system can be reliable designed to not have any effluent discharges to NPDES permit discharge • No air emissions	• Residual contamination in aquifer persists for an extended time • Hydraulic control will minimize exposure of COCs into the River • Recovered COCs have no significant exposure pathways
Infused Oxygen Injection	• No significant safety impacts or issues	• No significant cross media impacts • Oxygenated water beneficial for River	• If oxygenation coverage is complete, transference to low mobility arsenate should be effective. • Oxidation of arsenic will minimize exposure into the River • COCs not removed from formation, just fixed on soils
Oxidation/ Ferrous Sulfate Precipitation	• No significant safety impacts or issues • Chemical amendments are generally safe when handled properly	• No significant cross media impacts	• If redox coverage is complete, transference to low mobility arsenate or sulfide complexes should be effective. • Precipitation of COCs will minimize exposure into the River • COCs not removed from formation, just fixed on soils
Chemical Neutralization	• Proper care required with storage, handling and distribution of alkaline solution	• No significant cross media impacts • pH at river can be controlled to neutral levels	• Increase in pH should reduce COC mobility into River and support soil fixation and sorption
Permeable Treatment Barrier	• No significant safety impacts or issues	• No significant cross media impacts	• Barrier along the River will not alter current exposure scenario upgradient but does protect River • Source control barrier would reduce flux of COCs downgradient, likely pushing residual below GWPS levels.
Monitored Natural Attenuation	• No significant safety impacts or issues	• No cross-media impacts	• Residual low-level contamination will persist, but no sensitive receptors identified

Table 5-1
Evaluation of Corrective Measure Technologies
Charles R. Lowman Power Plant
Leroy, Washington County, Alabama

Criteria	Criteria Based on 257.96(c)2), (3)		
	Time Required to Begin Remedy	Time Required to Complete Remedy	State, Local or Other Environmental Permit Requirements That May Substantially Affect Implementation
Groundwater Recovery & Treatment	• Remedy can be initiated at any time following approval of NPDES permit/revision	• Long term desorption from soils infers a long-term remediation • Greater than 5 to 10 years as a function of source control	• No significant regulatory/permit issue • NPDES revision
Infused Oxygen Injection	• Remedy can be initiated at any time	• Providing distribution of oxygen is isotropic, CM could be in place within a year of construction/injection followed by monitoring for several years	• No significant regulatory/permit issue
Oxidation/ Ferrous Sulfate Precipitation	• Remedy can be initiated at any time	• Providing distribution of amendments is isotropic, CM could be in place within a year of construction/injection followed by monitoring for several years	• No significant regulatory/permit issue
Chemical Neutralization	• Remedy can be initiated at any time	• Contact driven, expected to be within a year	• No significant regulatory/permit issue
Permeable Treatment Barrier	• Remedy can be initiated at any time	• Less than a year to construct • Likely (>10 to 15 years) for plume desorption/transport and treatment	• No significant regulatory/permit issue
Monitored Natural Attenuation	• Remedy can be initiated at any time	• Difficult to predict without trend analysis • Likely (>10 to 15 years)	• No significant regulatory/permit issue

Notes:
COC - Constituent of Concern (Appendix IV constituent)
GWPS - Groundwater Protection Standards

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Figures

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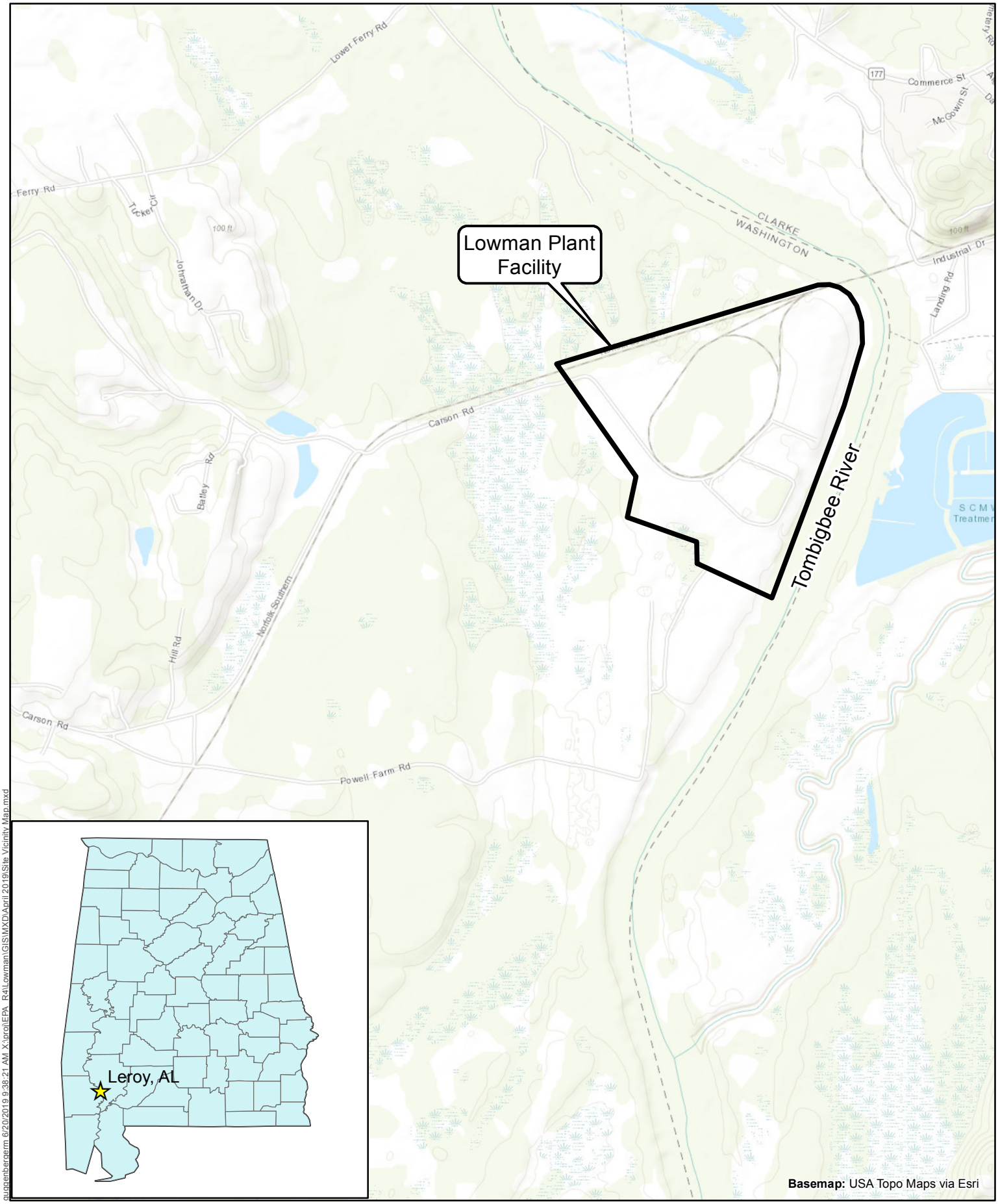

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NAD83 State Plane Alabama West, Feet

Site Vicinity Map
Lowman Power Plant
Leroy, Washington County, Alabama

Figure
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Main Facility Overview
Lowman Power Plant
Leroy, Washington County, Alabama

Figure
1-2

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Monitoring Well Network
Lowman Power Plant
Leroy, Washington County, Alabama

Figure 2-1

Map Sources: ESRI, USGS

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Groundwater Potentiometric Surface Map - April 10, 2019
Lowman Power Plant
Leroy, Washington County, Alabama

Figure 2-2

Map Sources: ESRI, USGS

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Investigation Sample Locations
Lowman Power Plant
Leroy, Washington County, Alabama

Figure 2-3

Map Sources: ESRI, USGS

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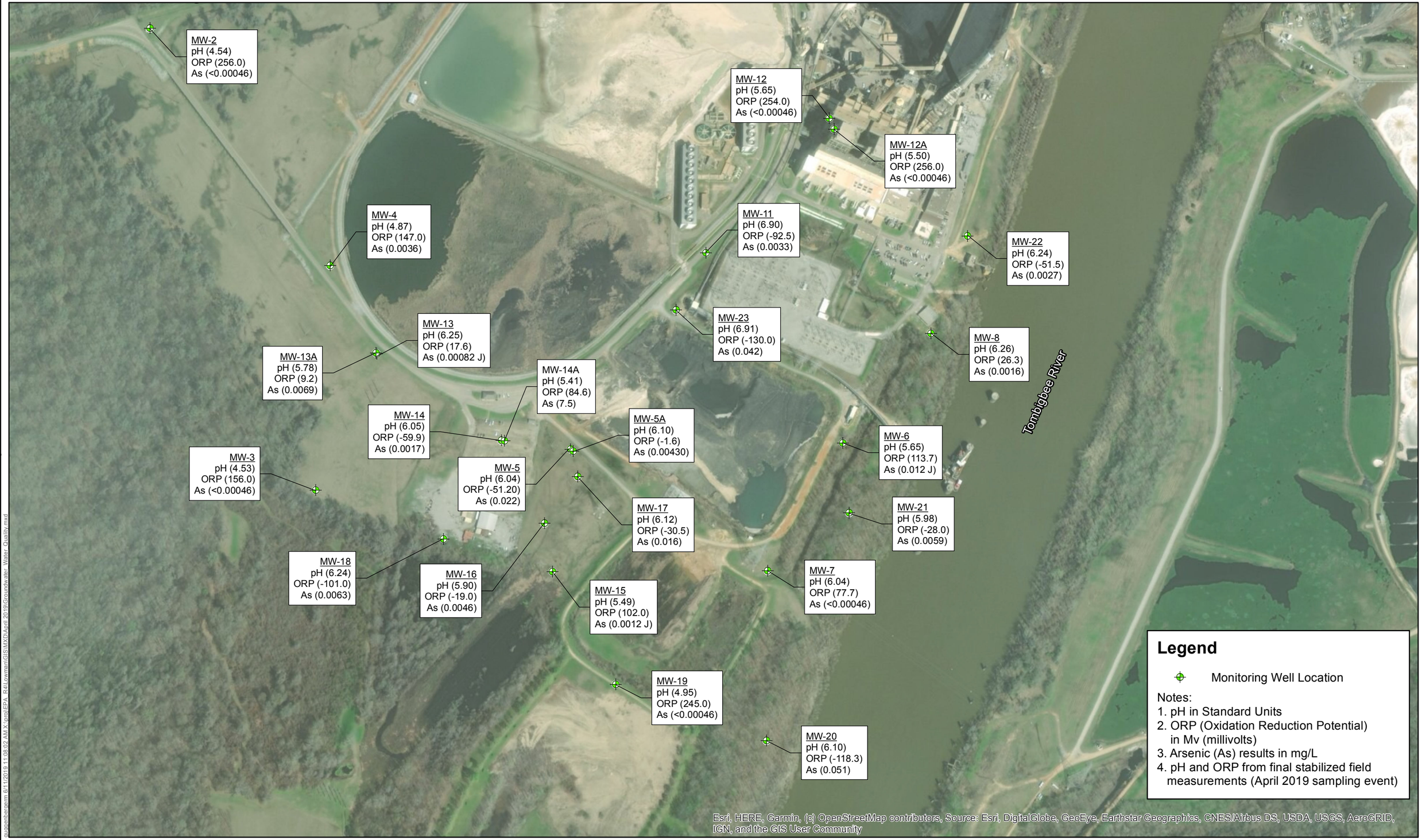

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Groundwater - Select Field Parameters and As Results (April 2019)
Lowman Power Plant
Leroy, Washington County, Alabama

Figure 2-4

Map Sources: ESRI, USGS

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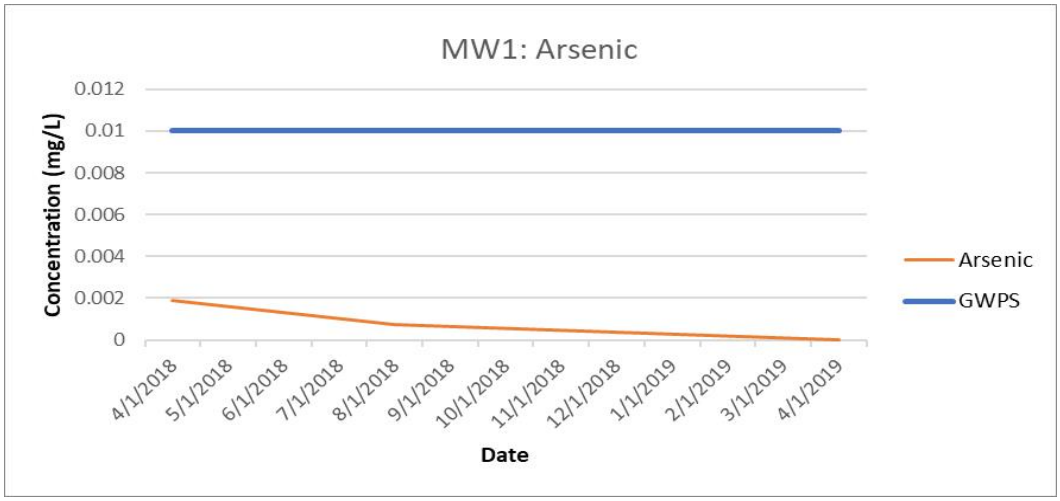
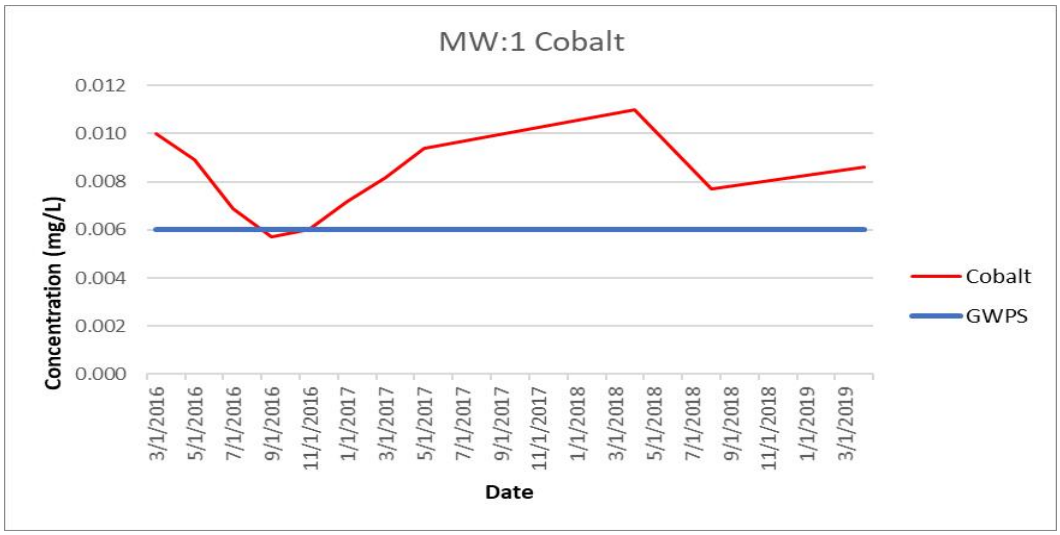
Figure 2-5
COC in Groundwater Trend Graphs
Charles R. Lowman Power Facility





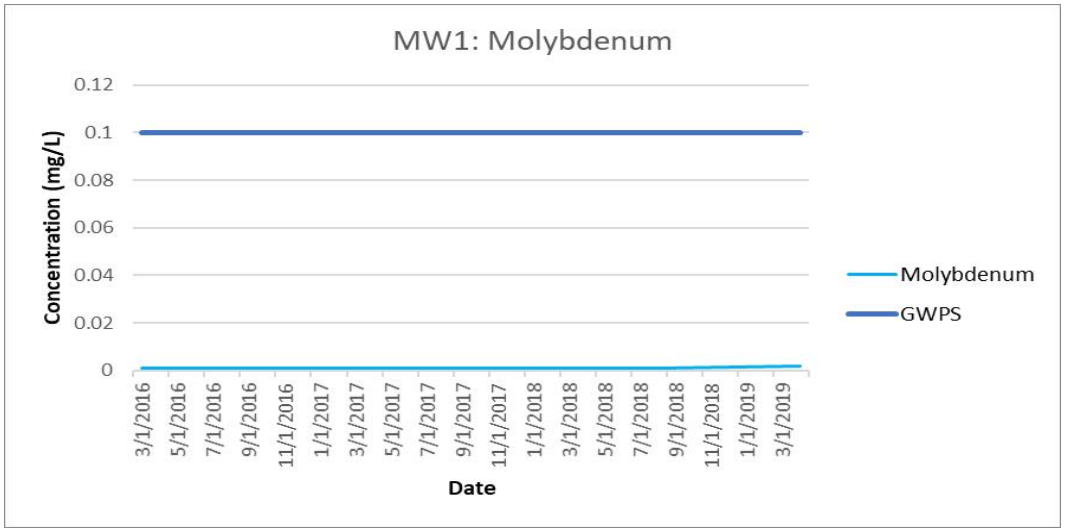
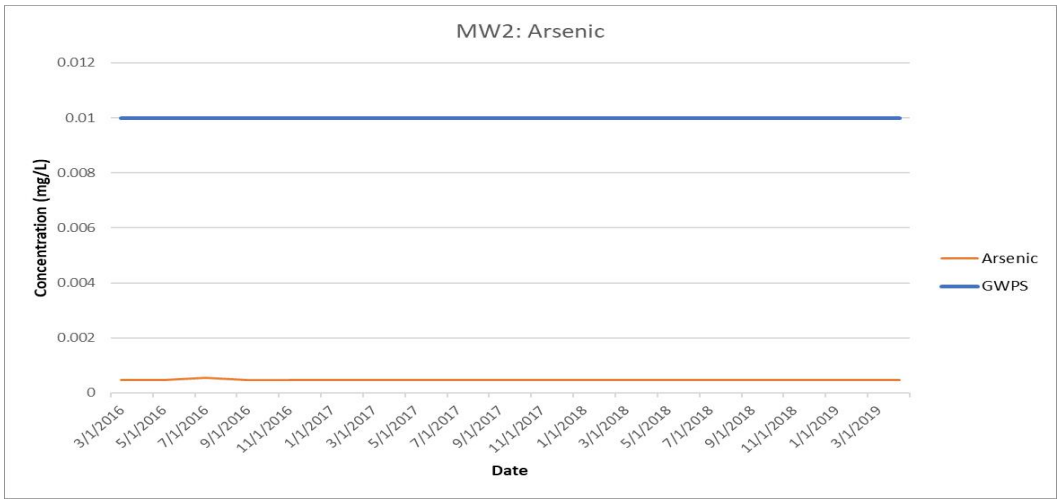
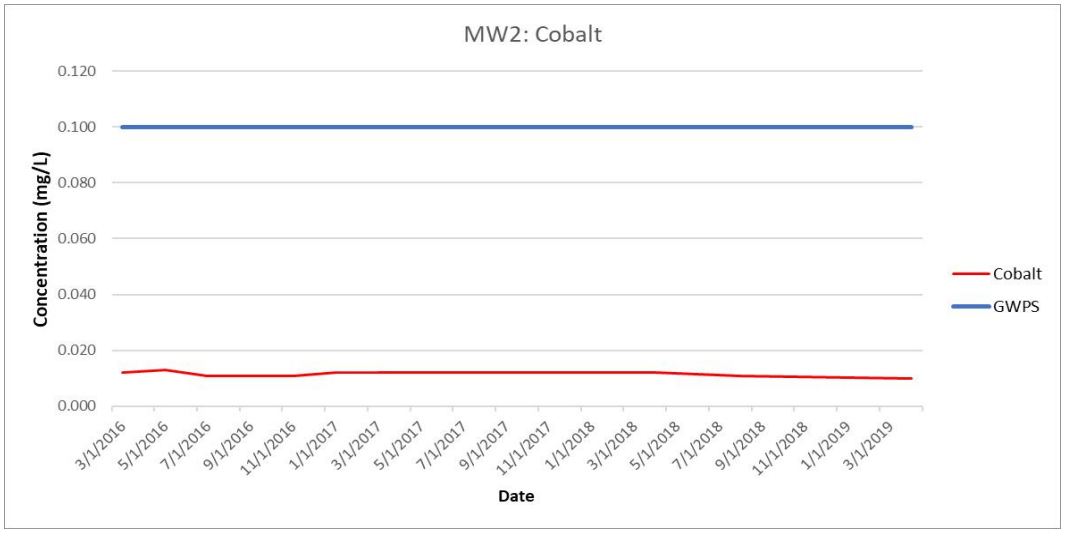


Figure 2-5 (cont)
COC in Groundwater Trend Graphs
Charles R. Lowman Power Facility





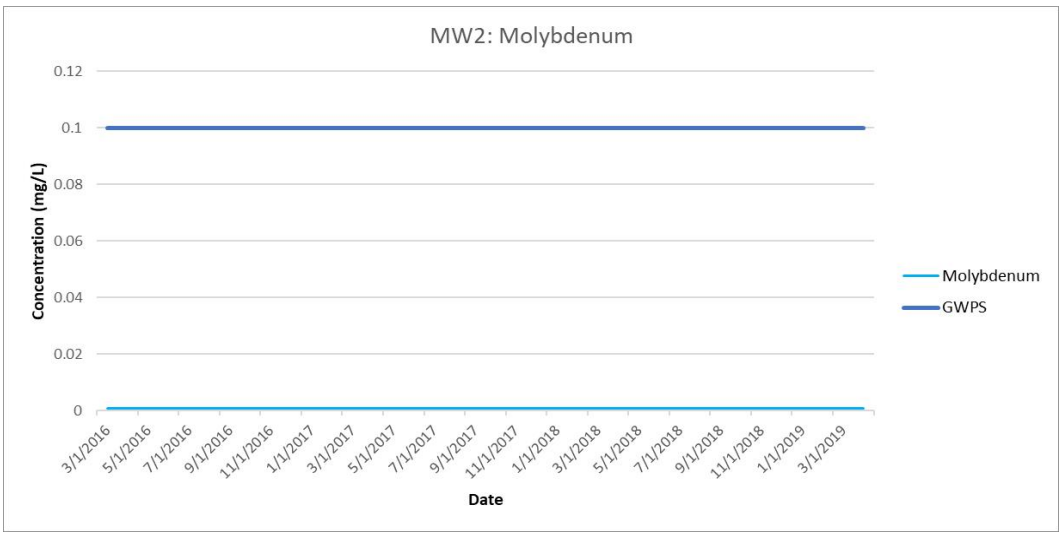
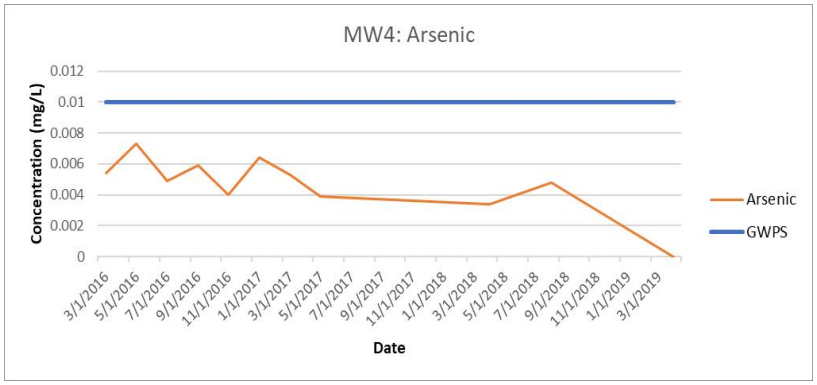
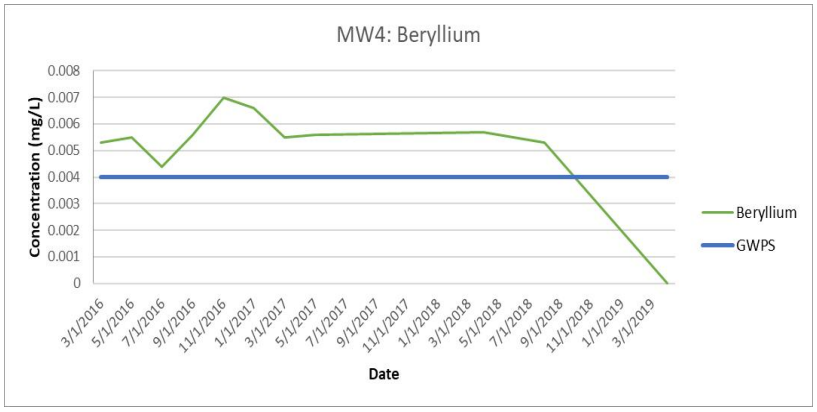
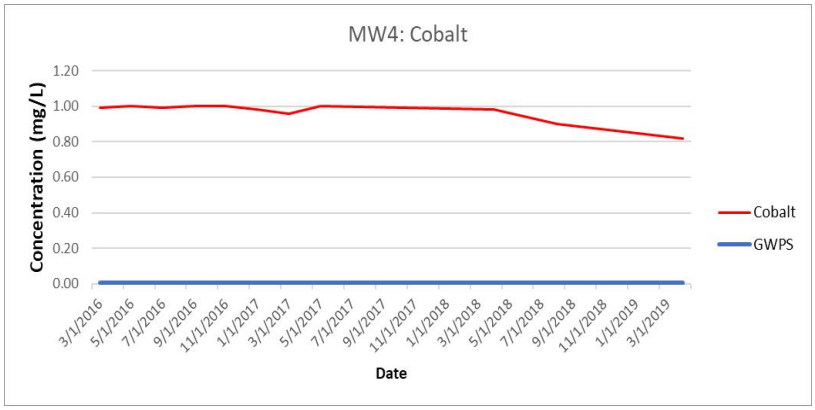


Figure 2-5 (cont)
COC in Groundwater Trend Graphs
Charles R. Lowman Power Facility







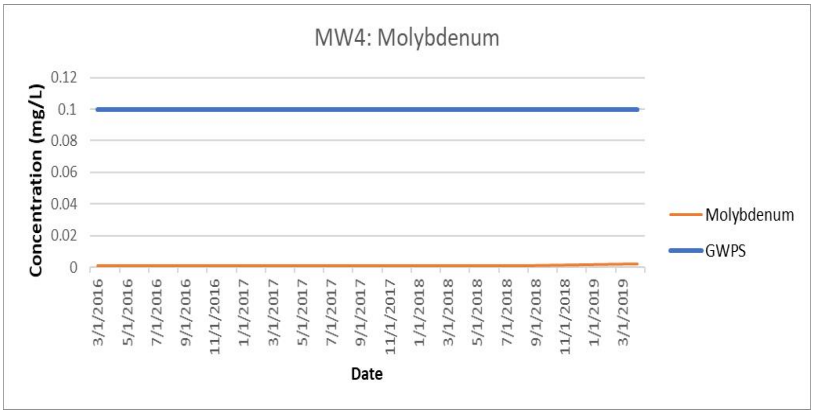
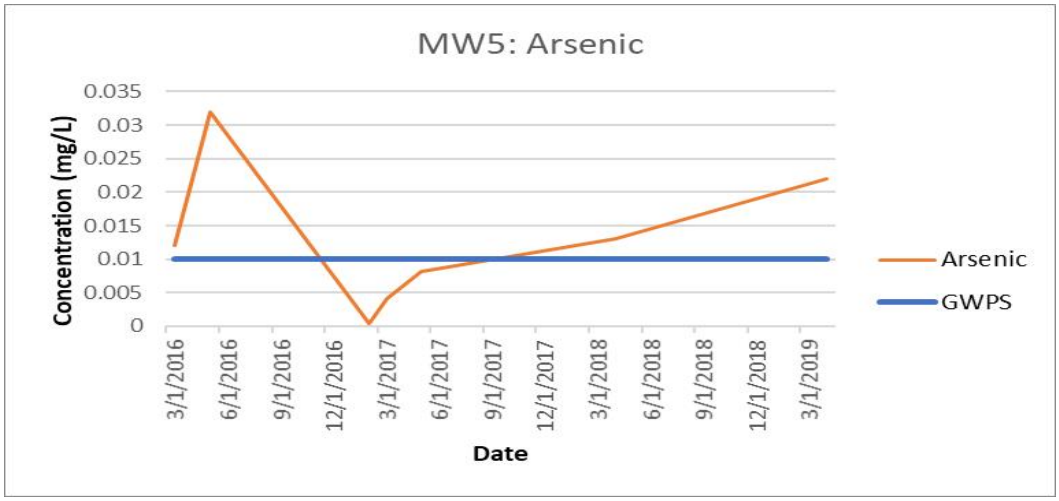
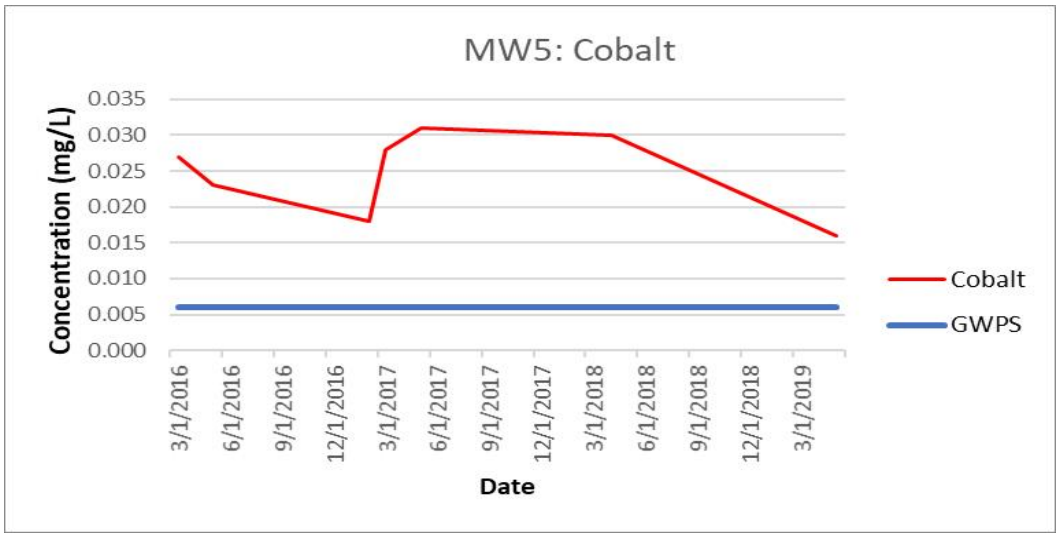


Figure 2-5 (cont)
COC in Groundwater Trend Graphs
Charles R. Lowman Power Facility





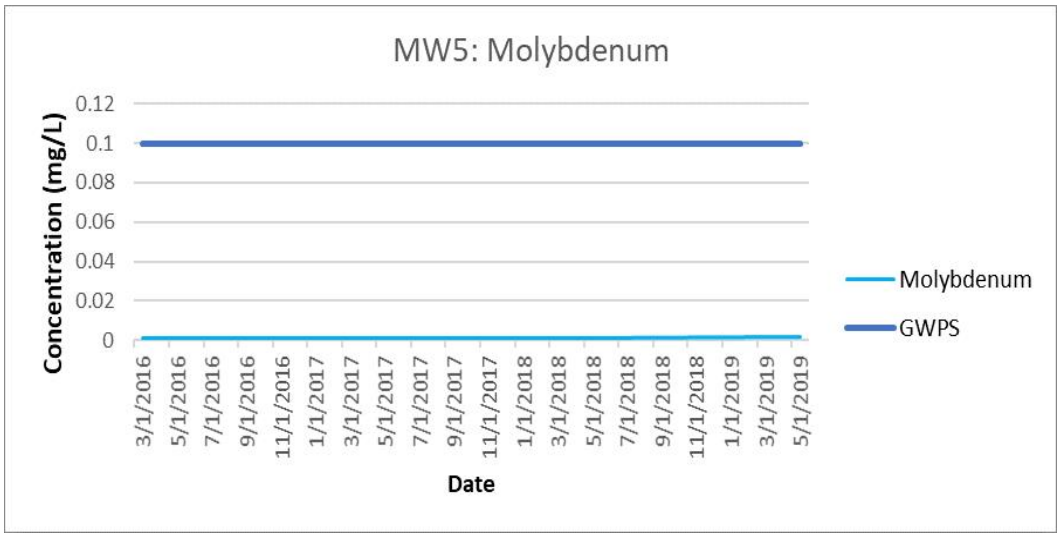
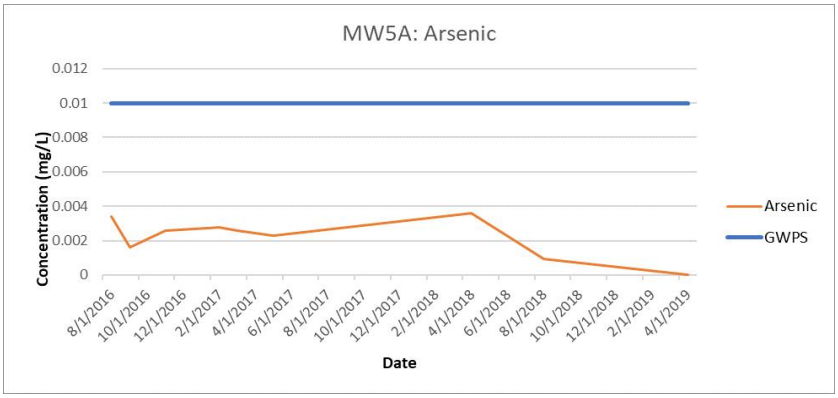
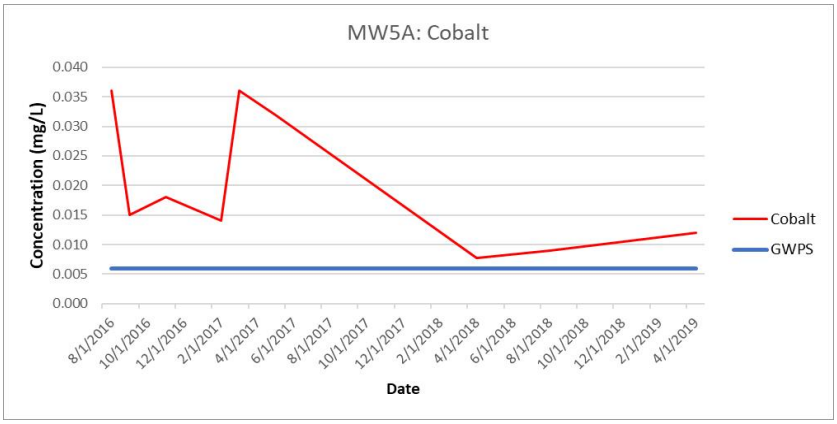
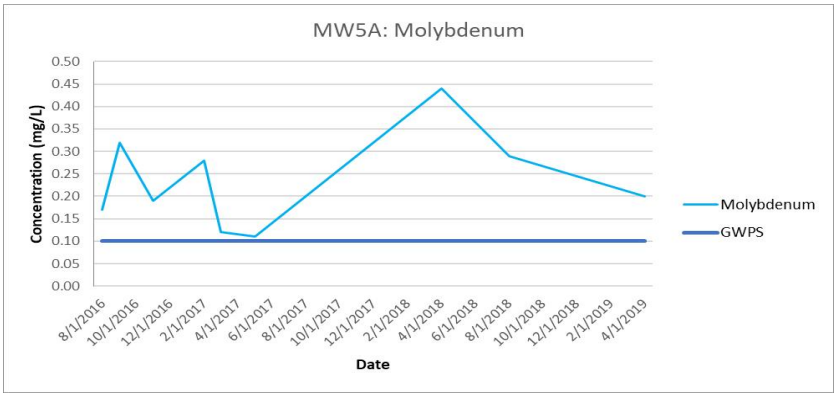


Figure 2-5 (cont)
COC in Groundwater Trend Graphs
Charles R. Lowman Power Facility







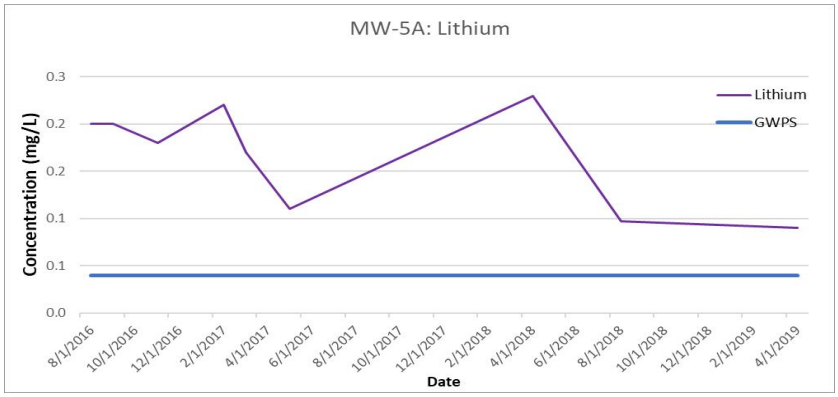
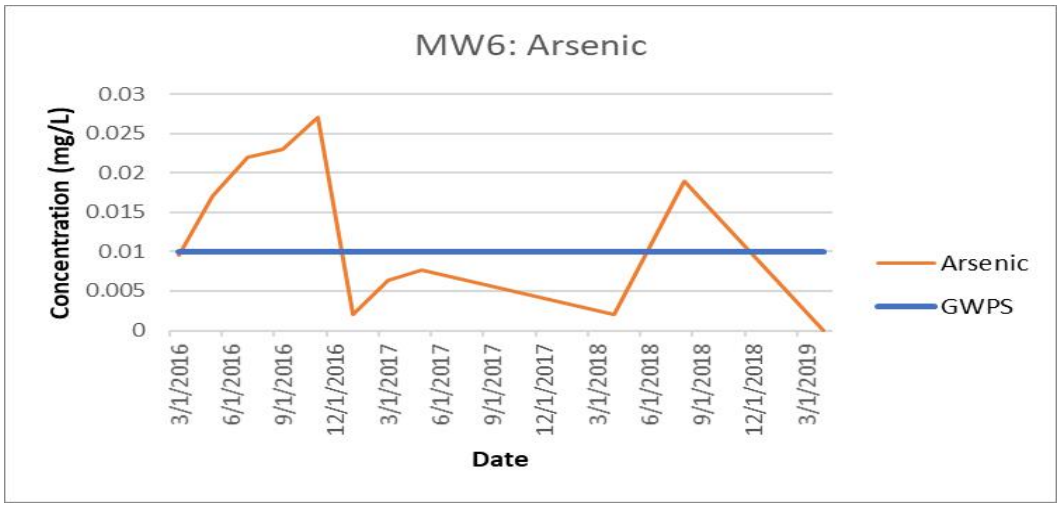
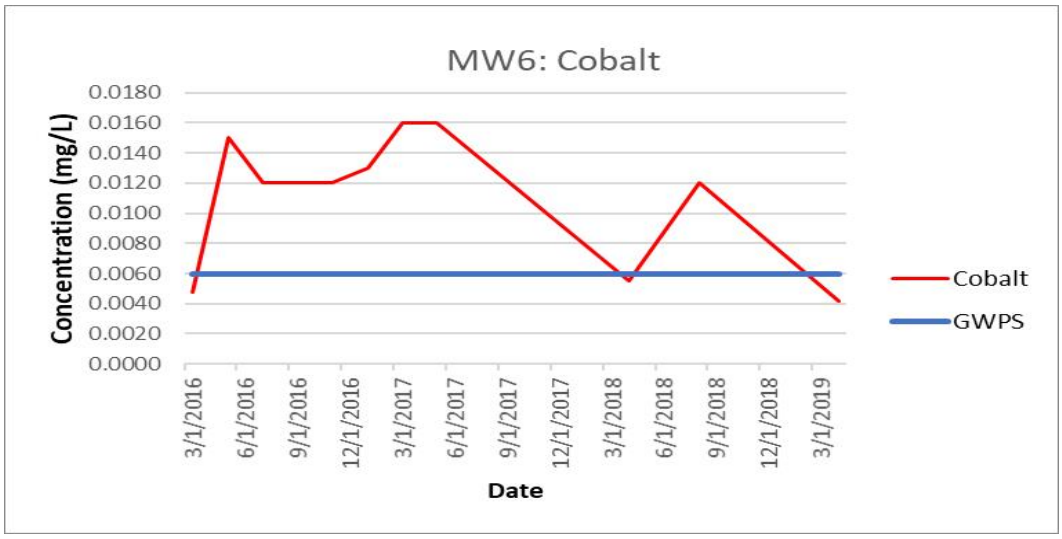


Figure 2-5 (cont)
COC in Groundwater Trend Graphs
Charles R. Lowman Power Facility





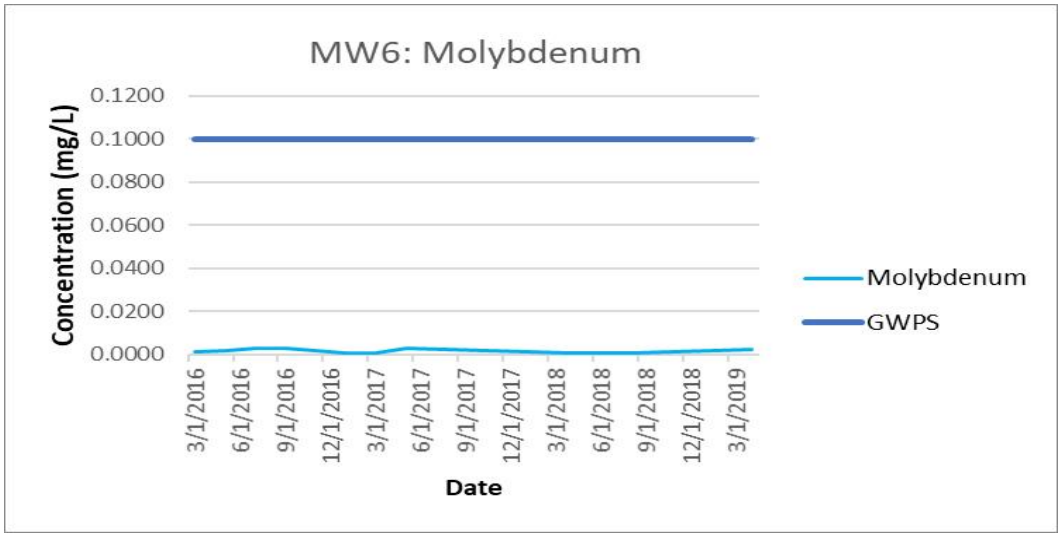
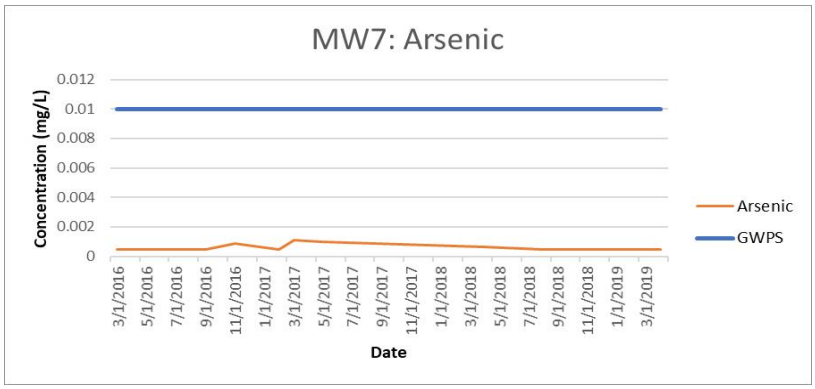
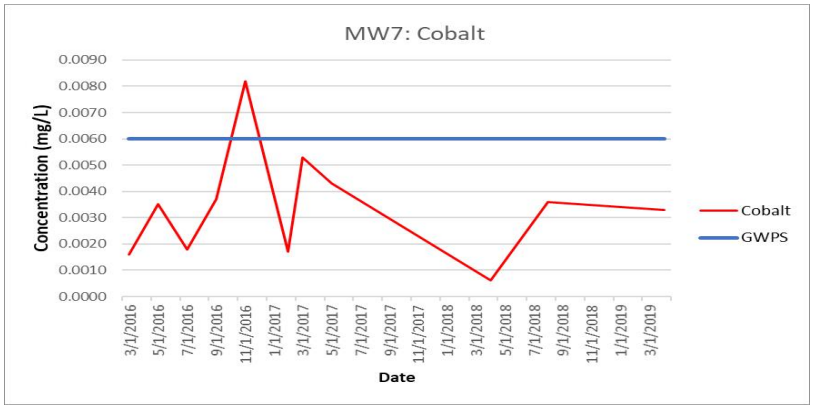
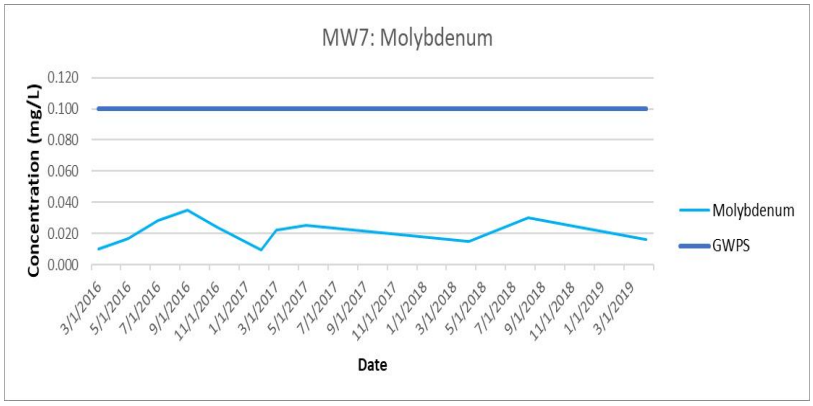


Figure 2-5 (cont)
COC in Groundwater Trend Graphs
Charles R. Lowman Power Facility







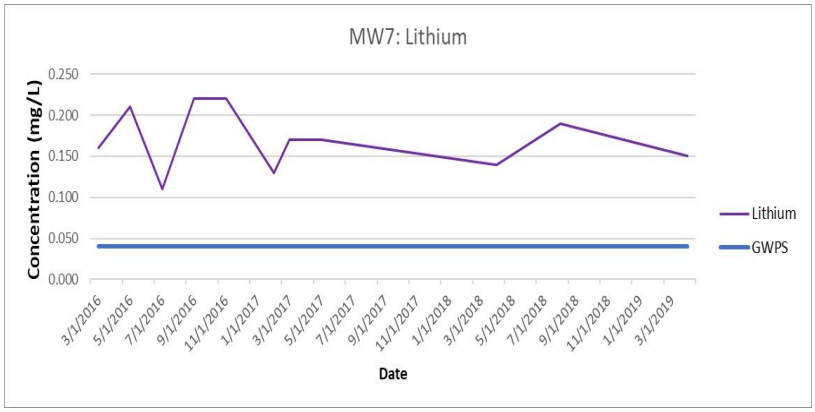
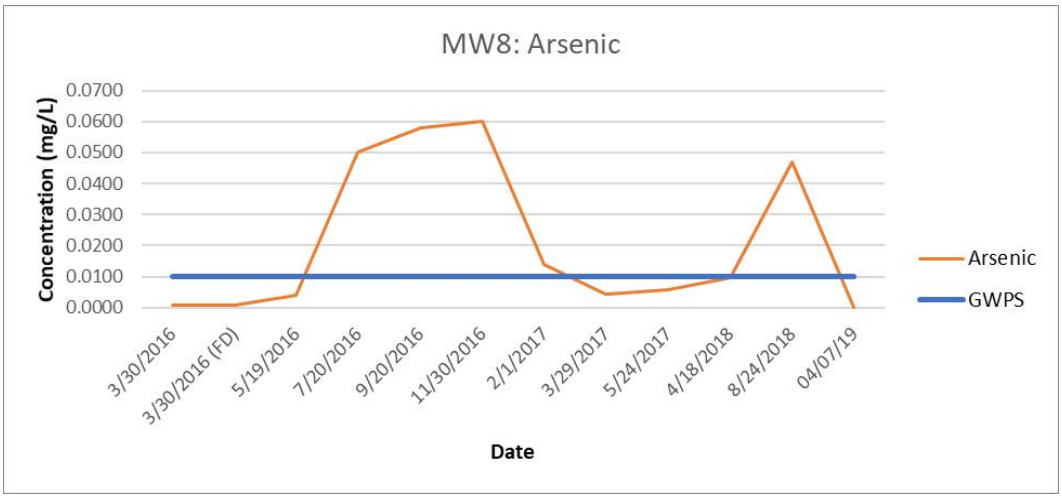
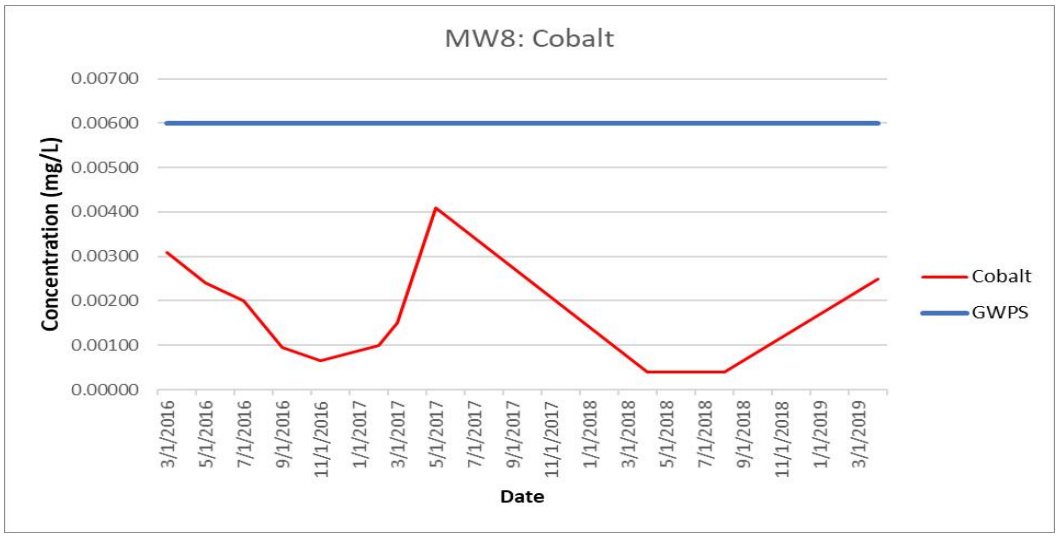


Figure 2-5 (cont)
COC in Groundwater Trend Graphs
Charles R. Lowman Power Facility





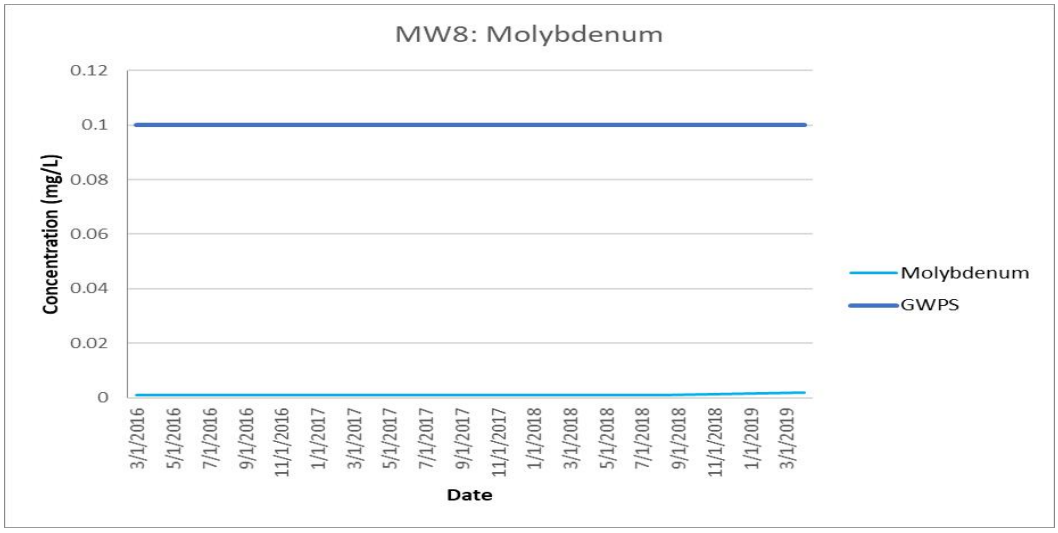
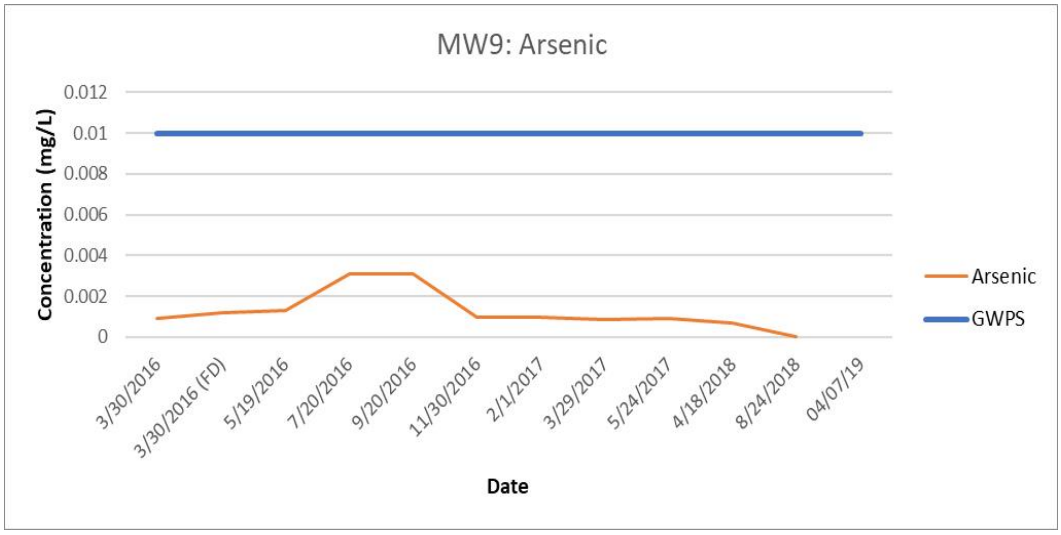
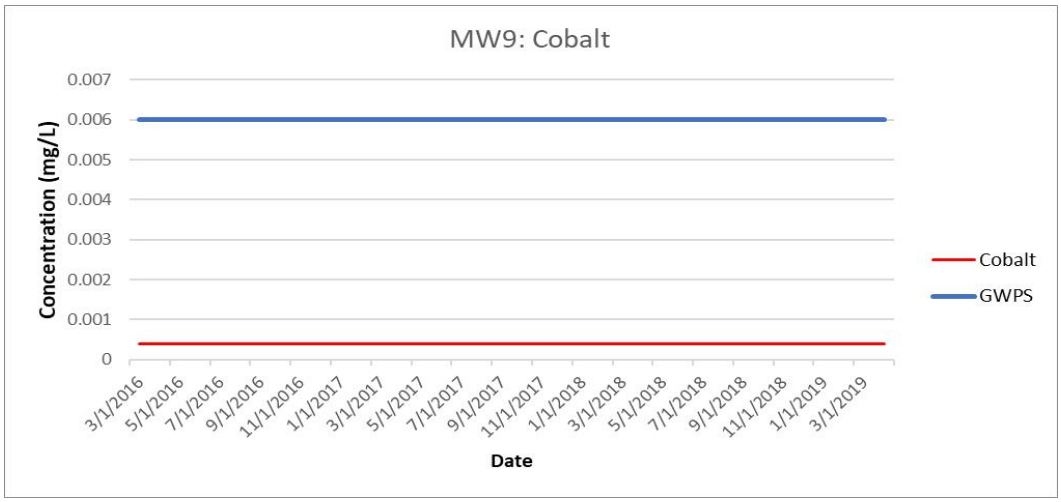


Figure 2-5 (cont)
COC in Groundwater Trend Graphs
Charles R. Lowman Power Facility





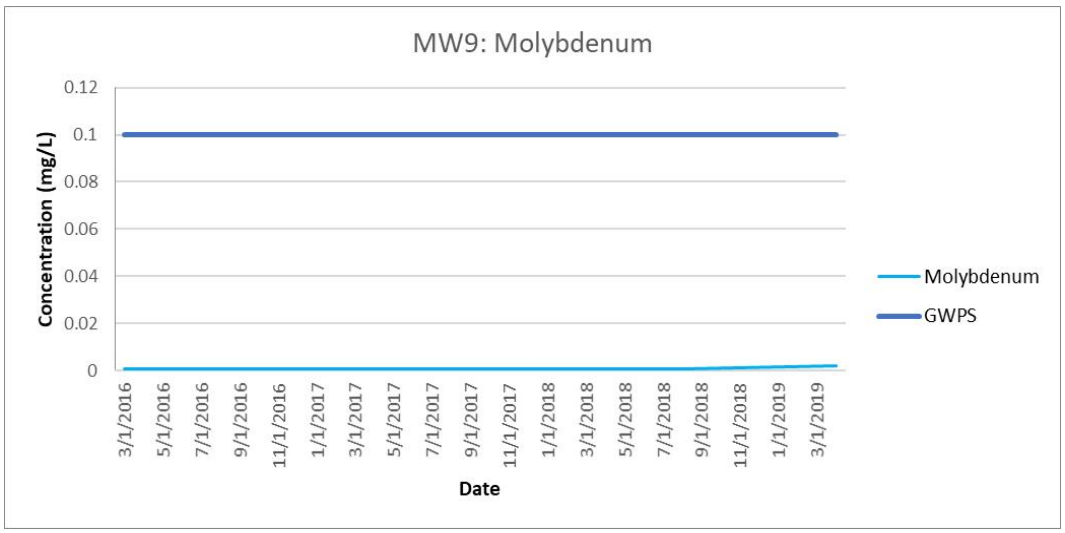
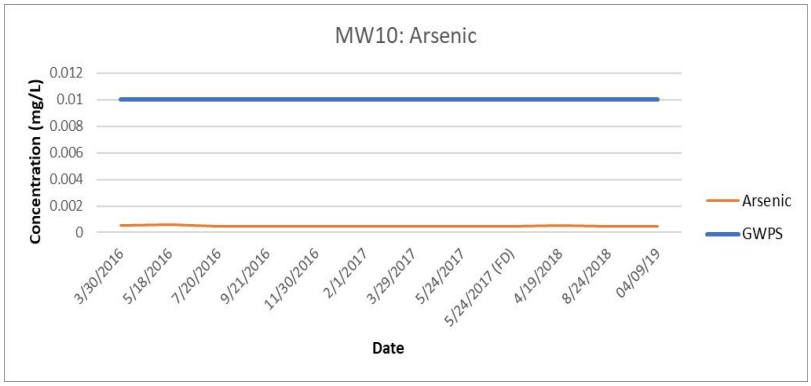
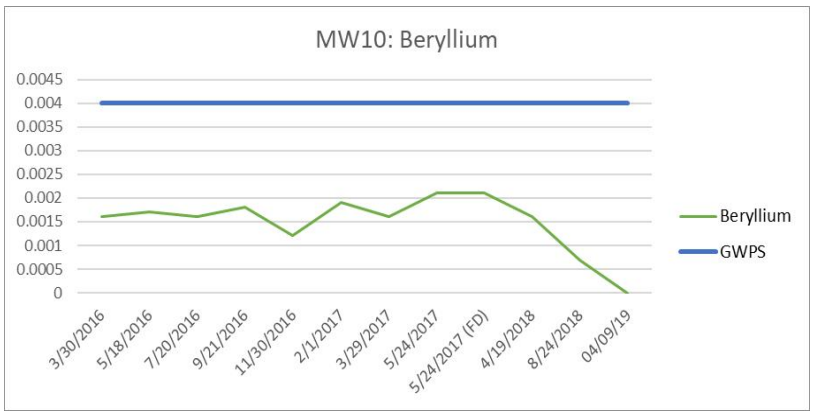
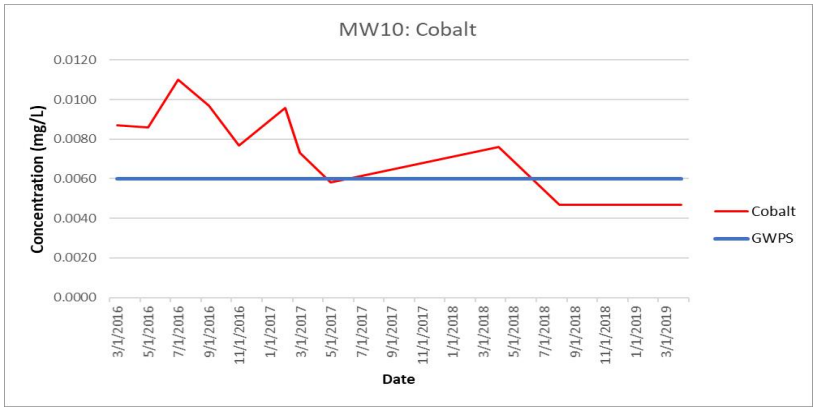


Figure 2-5 (cont)
COC in Groundwater Trend Graphs
Charles R. Lowman Power Facility







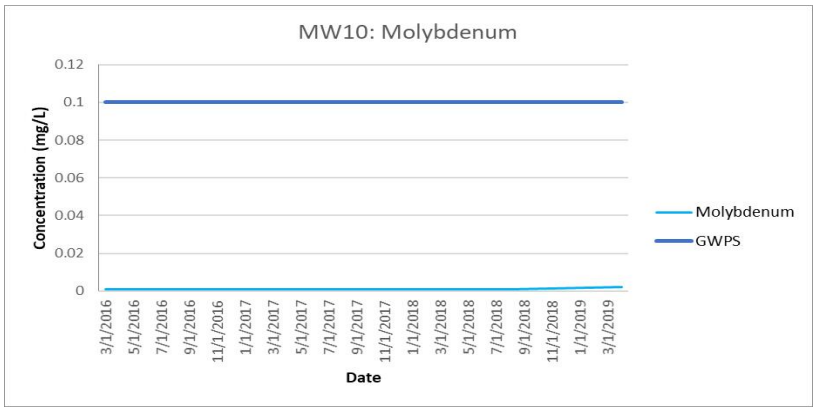
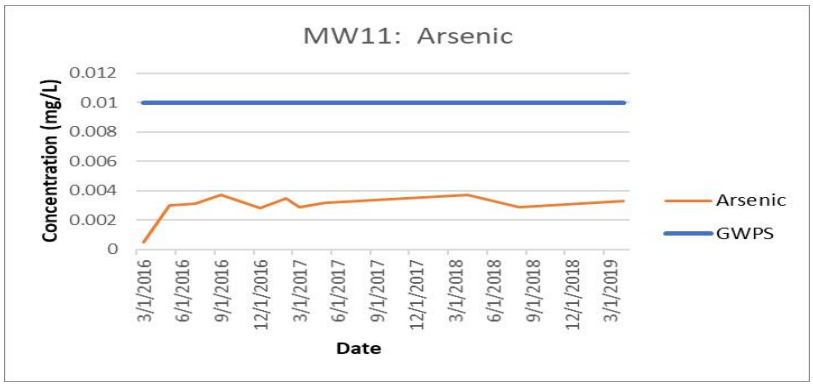
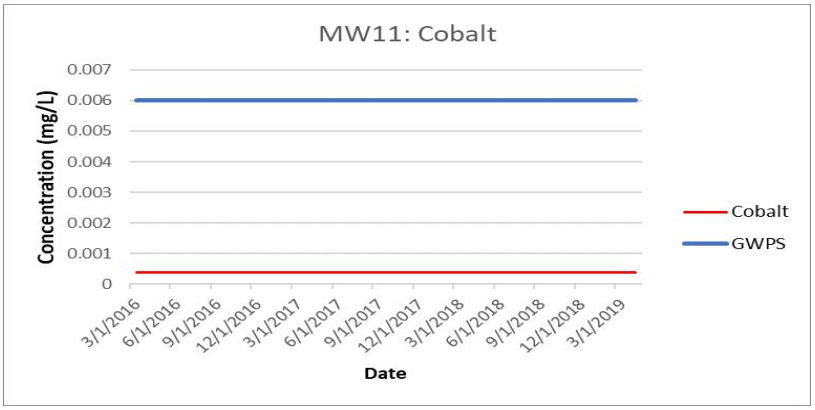
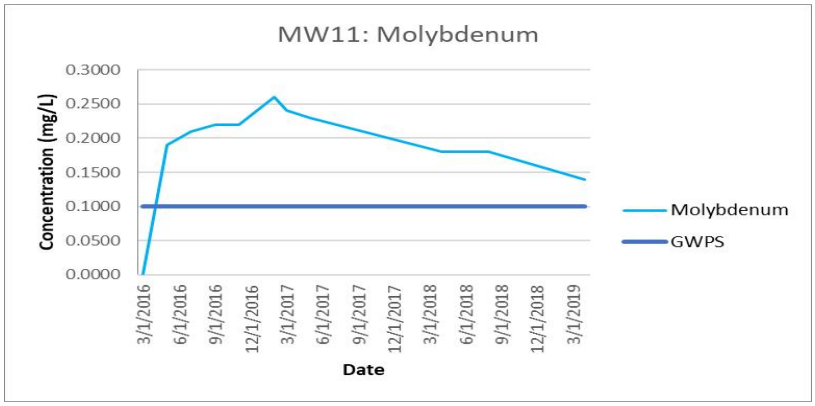


Figure 2-5 (cont)
COC in Groundwater Trend Graphs
Charles R. Lowman Power Facility







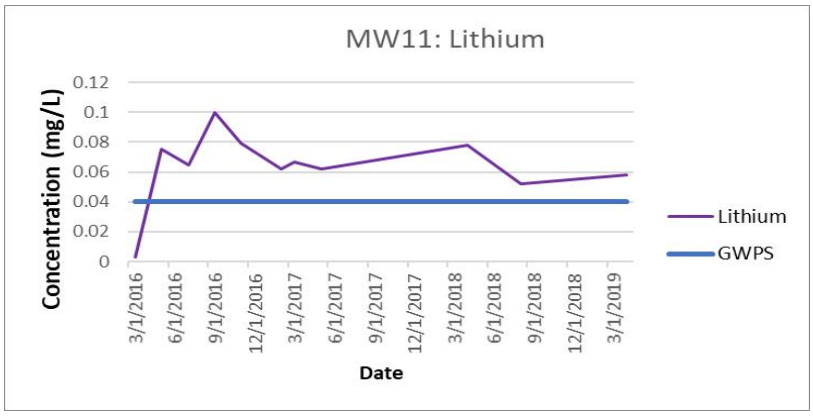
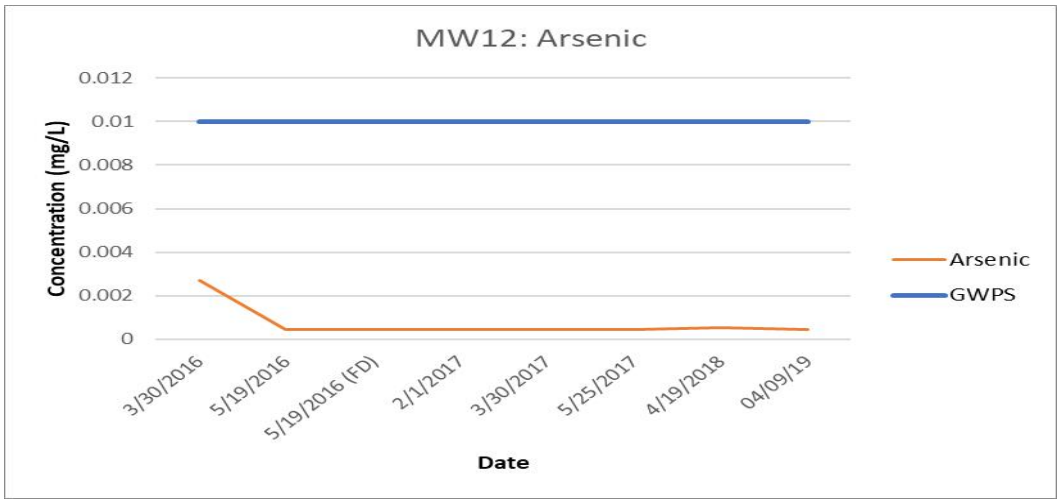
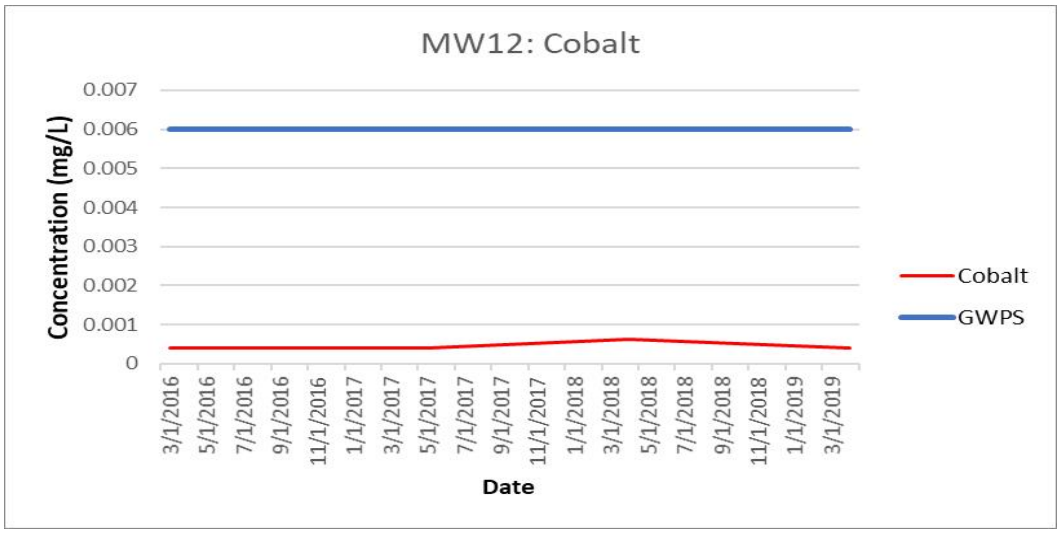


Figure 2-5 (cont)
COC in Groundwater Trend Graphs
Charles R. Lowman Power Facility





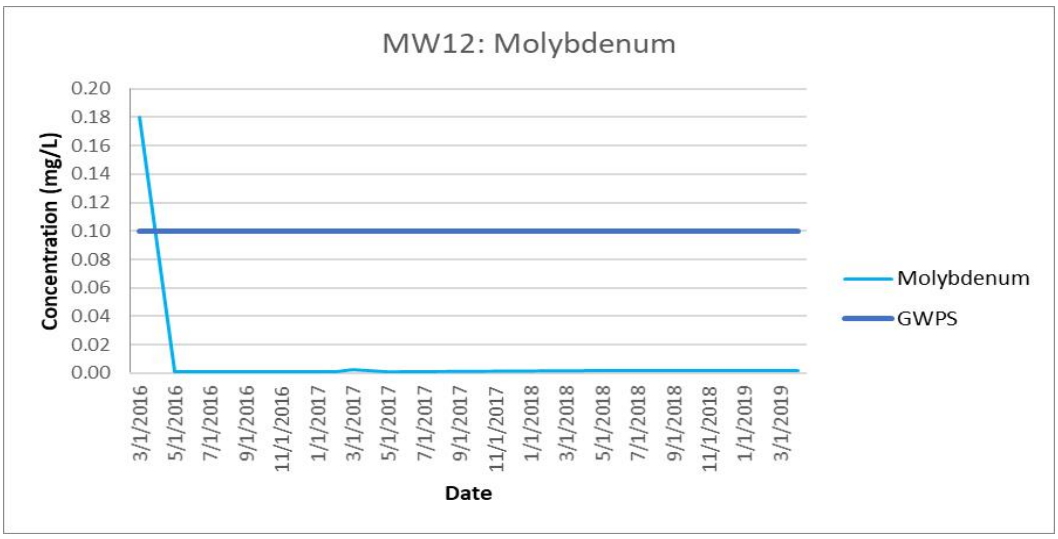
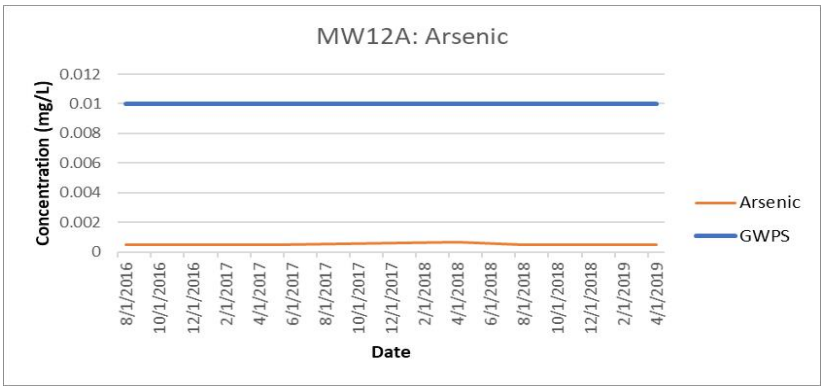
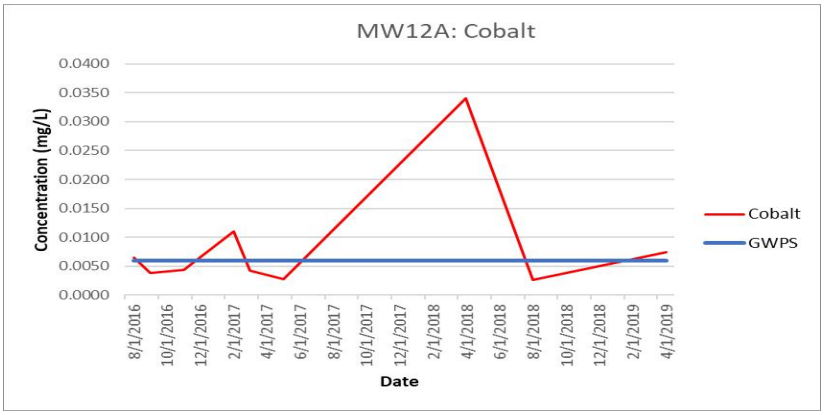
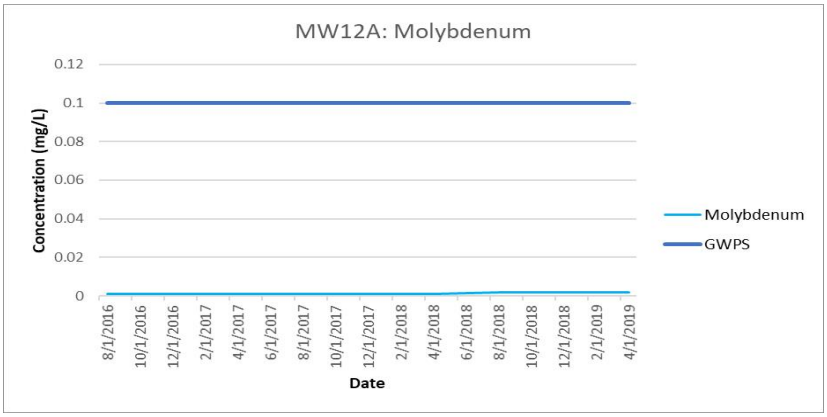


Figure 2-5 (cont)
COC in Groundwater Trend Graphs
Charles R. Lowman Power Facility







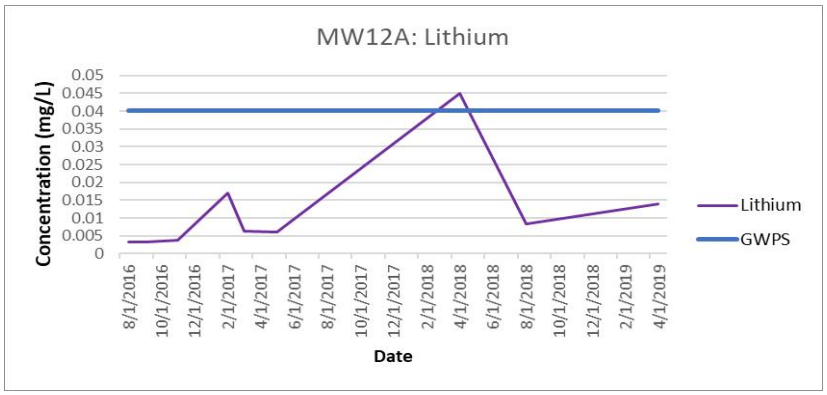
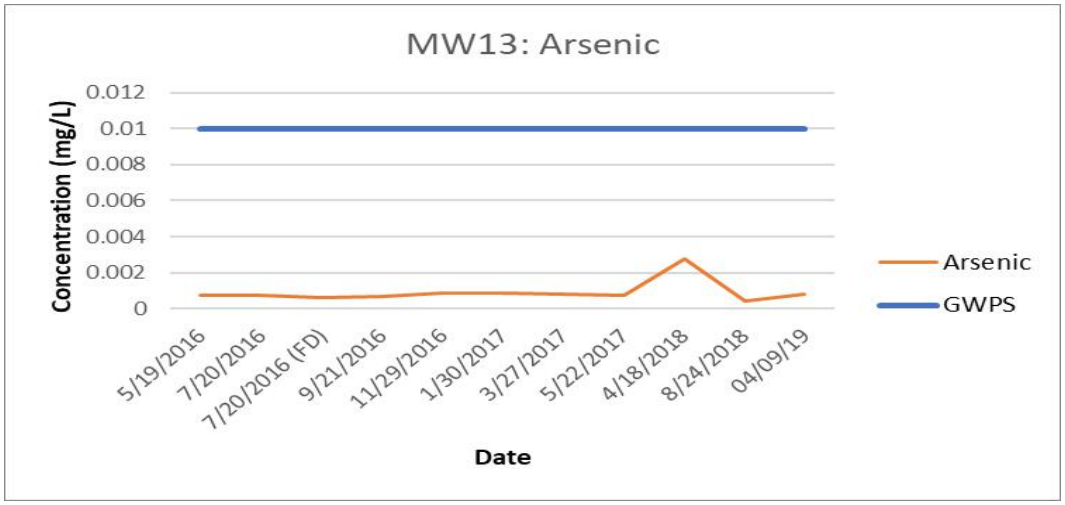
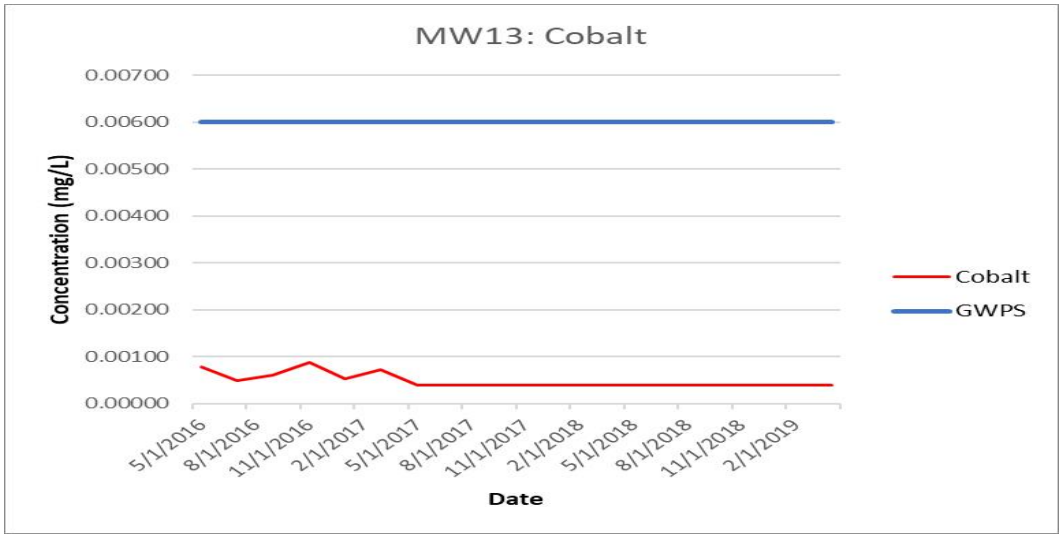


Figure 2-5 (cont)
COC in Groundwater Trend Graphs
Charles R. Lowman Power Facility





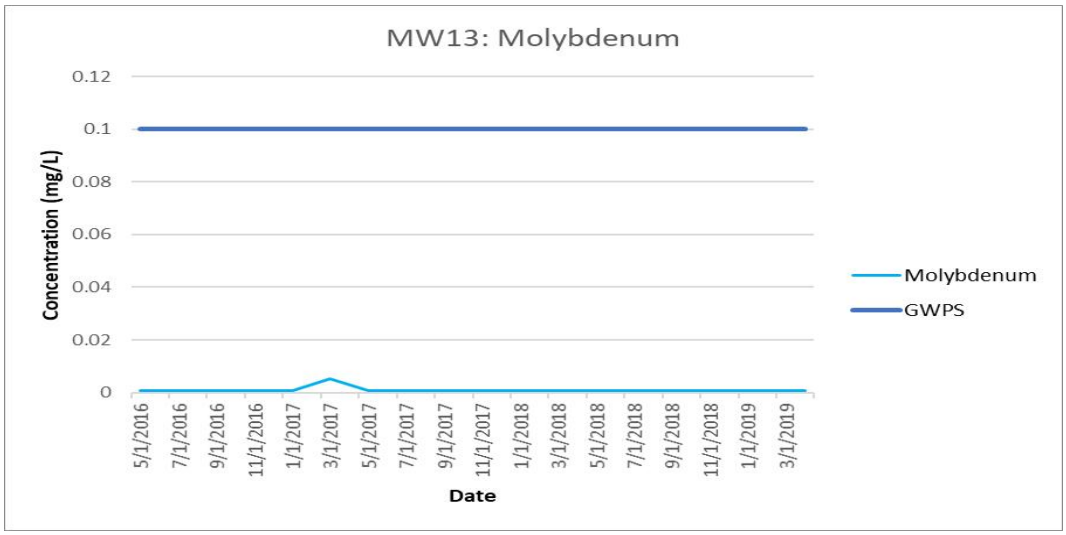
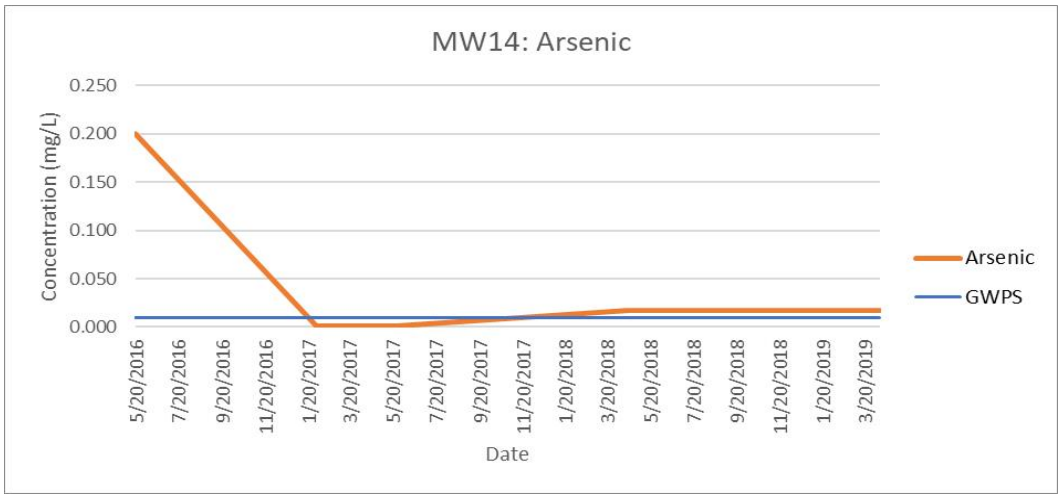
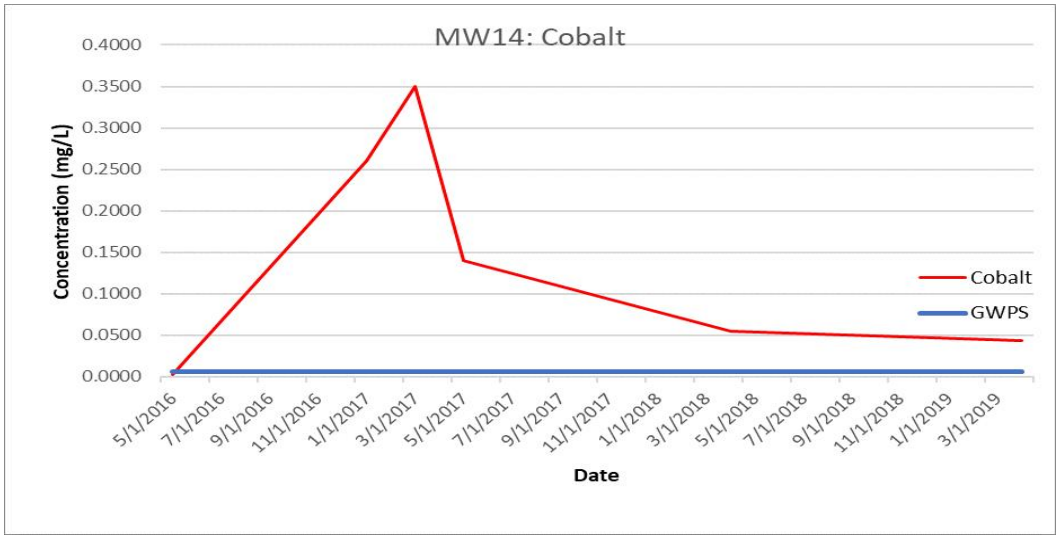


Figure 2-5 (cont)
COC in Groundwater Trend Graphs
Charles R. Lowman Power Facility





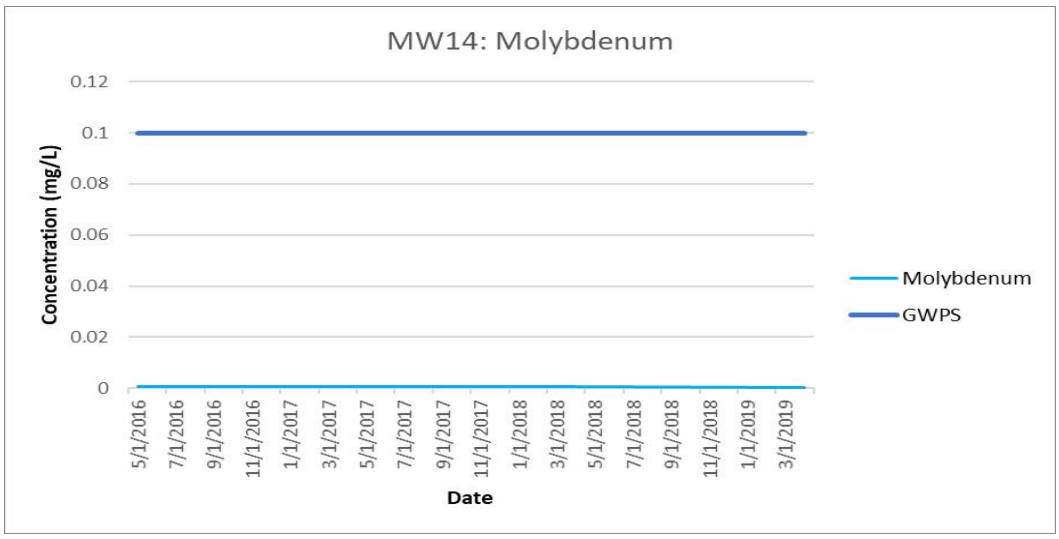
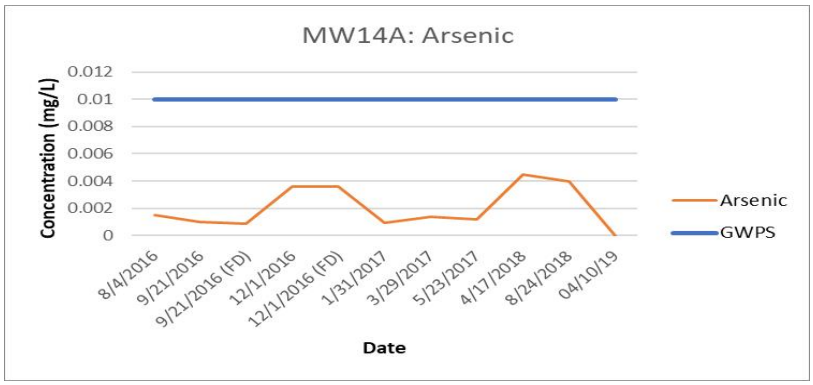
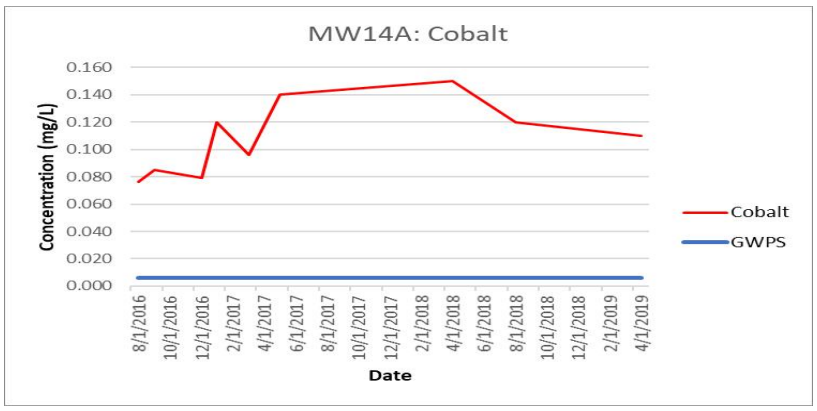
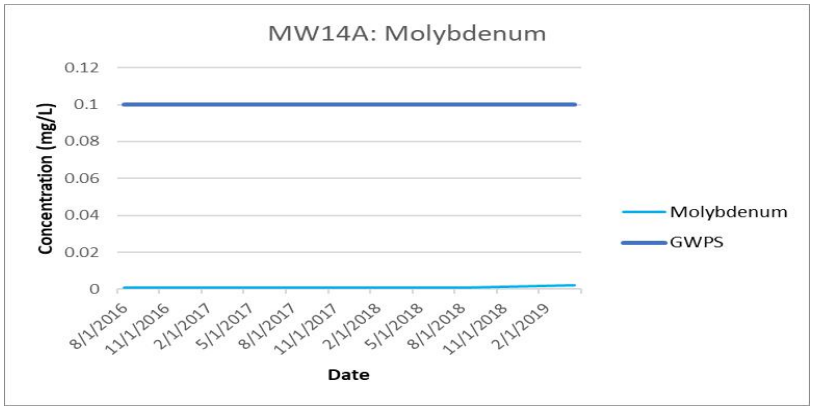
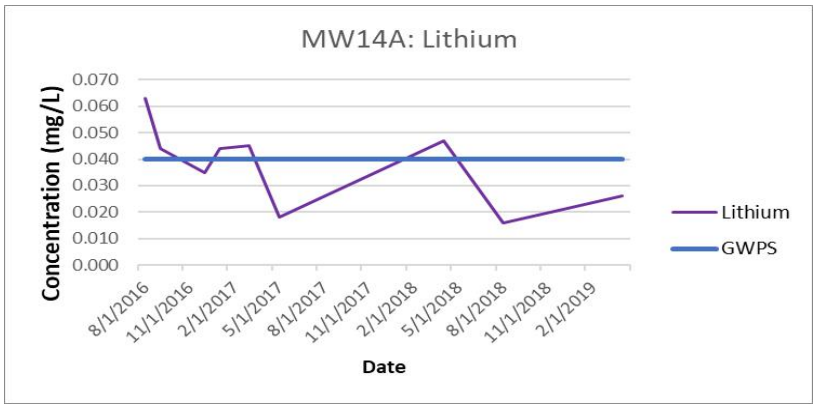


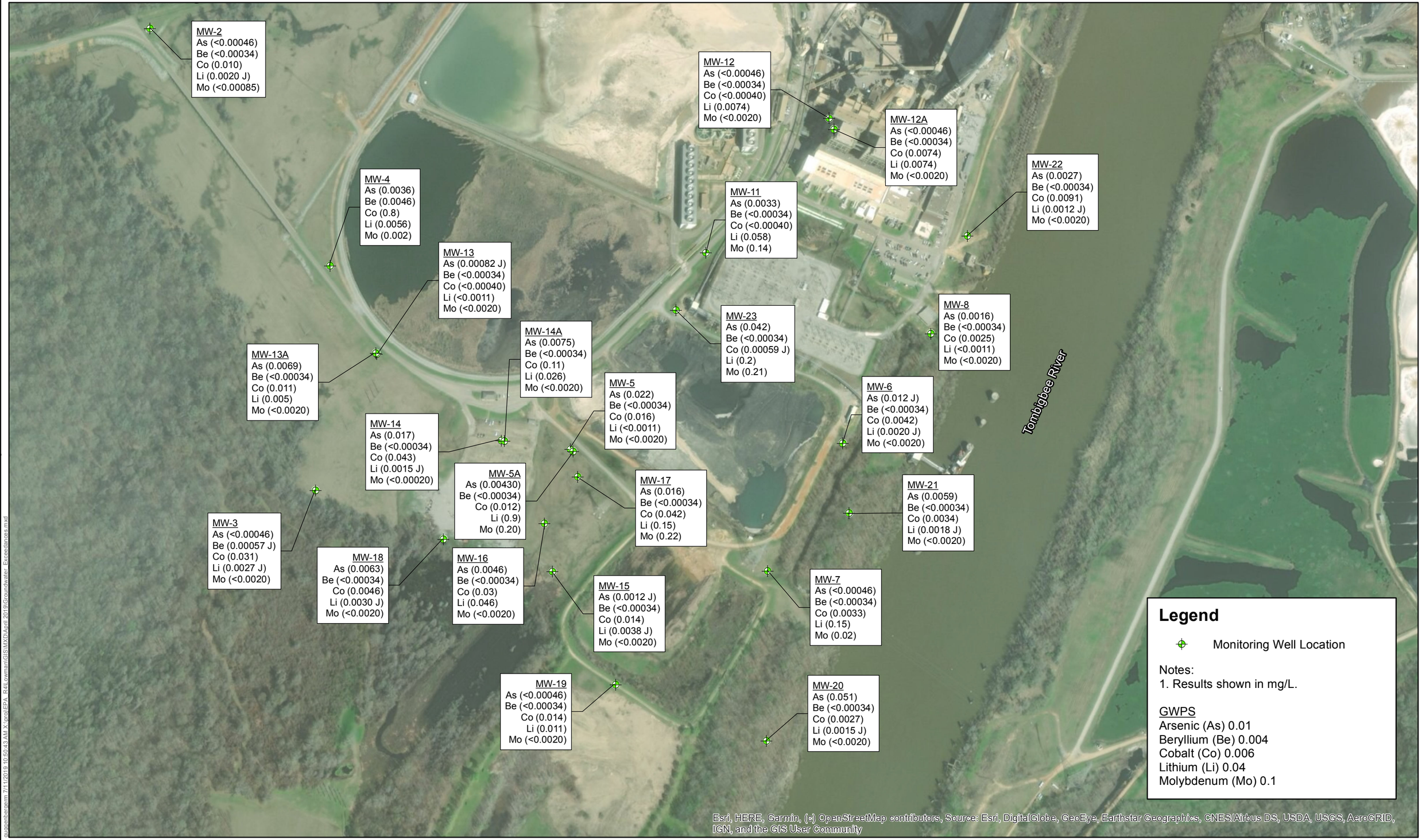
Figure 2-5 (cont)
COC in Groundwater Trend Graphs
Charles R. Lowman Power Facility











N 0 200 400 800
Feet
NAD83 StatePlane Alabama West, Feet

April 2019 Groundwater Exceedances
Lowman Power Plant
Leroy, Washington County, Alabama

Figure 2-6

Map Sources: ESRI, USGS

eugenebergam 7/11/2019 10:50:43 AM X:\proj\EPA_R4\Lowman\GIS\MXD\April_2019\Groundwater_Exceedances.mxd

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Appendix A. RSL Tables

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Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; W = TEF applied; E = RPF applied; G = user's guide Section 5; M = mutagen; V = volatile; R = RBA applied;
c = cancer; n = noncancer; * = where: n SL < 100X c SL; ** = where n SL < 10X c SL; SSL values are based on DAF=1; m = ceiling limit exceeded; s = Csat exceeded.

Toxicity and Chemical-specific Information													Contaminant		Carcinogenic Target Risk (TR) = 1E-06				Noncancer CHILD Hazard Index (HI) = 0.1					Protection of Groundwater SSL	
SFO (mg/kg-day)$^{-1}$	key	IUR (ug/m^3)$^{-1}$	key	RfD_o (mg/kg-day)	key	RfC_i (mg/m^3)	key	vol	mutagen	LOGP	GIABS	FA	In EPD?	Analyte	CAS No.	Ingestion SL TR=1E-06 (ug/L)	Dermal SL TR=1E-06 (ug/L)	Inhalation SL TR=1E-06 (ug/L)	Carcinogenic SL TR=1E-06 (ug/L)	Ingestion SL Child THQ=0.1 (ug/L)	Dermal SL Child THQ=0.1 (ug/L)	Inhalation SL Child THQ=0.1 (ug/L)	Noncarcinogenic SL Child THI=0.1 (ug/L)	MCL (ug/L)	Risk-based SSL (mg/kg)	MCL-based SSL (mg/kg)
				1.2E-03	O					-0.85	1	1.0	Yes	Acephate	30560-19-1					2.4E+00	3.4E+03		2.4E+00		5.3E-04	
		2.2E-06	I			9.0E-03	I	V		-0.34	1	1.0	Yes	Acetaldehyde	75-07-0			2.6E+00	2.6E+00			1.9E+00	1.9E+00		3.8E-04	
				2.0E-02	I					3.03	1	0.9	Yes	Acetochlor	34256-82-1					4.0E+01	2.9E+02		3.5E+01		2.8E-02	
				9.0E-01	I	3.1E+01	A	V		-0.24	1	1.0	Yes	Acetone	67-64-1					1.8E+03	4.4E+05	6.4E+03	1.4E+03		2.9E-01	
						2.0E-03	X			-0.03	1	1.0	Yes	Acetone Cyanohydrin	75-86-5											
						6.0E-02	I	V		-0.34	1	1.0	Yes	Acetonitrile	75-05-8							1.3E+01	1.3E+01		2.6E-03	
				1.0E-01	I			V		1.58	1	1.0	Yes	Acetophenone	98-86-2					2.0E+02	4.6E+03		1.9E+02		5.8E-02	
3.8E+00	C	1.3E-03	C							3.12	1	1.0	Yes	Acetylaminofluorene, 2-	53-96-3	2.1E-02	6.7E-02		1.6E-02						7.2E-05	
				5.0E-04	I	2.0E-05	I	V		-0.01	1	1.0	Yes	Acrolein	107-02-8					1.0E+00	1.7E+02	4.2E-03	4.2E-03		8.4E-07	
5.0E-01	I	1.0E-04	I	2.0E-03	I	6.0E-03	I		M	-0.67	1	1.0	Yes	Acrylamide	79-06-1	5.0E-02	2.3E+01		5.0E-02	4.0E+00	2.1E+03		4.0E+00		1.1E-05	
				5.0E-01	I	1.0E-03	I	V		0.35	1	1.0	Yes	Acrylic Acid	79-10-7					1.0E+03	1.1E+05	2.1E-01	2.1E-01		4.2E-05	
5.4E-01	I	6.8E-05	I	4.0E-02	A	2.0E-03	I	V		0.25	1	1.0	Yes	Acrylonitrile	107-13-1	1.4E-01	1.4E+01	8.3E-02	5.2E-02	8.0E+01	8.9E+03	4.2E-01	4.1E-01		1.1E-05	
						6.0E-03	P			-0.32	1	1.0	Yes	Adiponitrile	111-69-3											
5.6E-02	C			1.0E-02	I					3.52	1	0.9	Yes	Alachlor	15972-60-8	1.4E+00	4.4E+00		1.1E+00	2.0E+01	6.9E+01		1.6E+01	2	8.7E-04	1.7E-03
				1.0E-03	I					1.13	1	1.0	Yes	Aldicarb	116-06-3					2.0E+00	1.4E+02		2.0E+00	3	4.9E-04	7.5E-04
				1.0E-03	I					-0.57	1	1.0	Yes	Aldicarb Sulfone	1646-88-4					2.0E+00	2.4E+03		2.0E+00	2	4.4E-04	4.4E-04
										-0.78	1	1.0	Yes	Aldicarb sulfoxide	1646-87-3									4		8.8E-04
1.7E+01	I	4.9E-03	I	3.0E-05	I			V		6.5	1	1.0	No	Aldrin	309-00-2	4.6E-03		1.1E-03	9.2E-04	6.0E-02			6.0E-02		1.5E-04	
				5.0E-03	I	1.0E-04	X	V		0.17	1	1.0	Yes	Allyl Alcohol	107-18-6					1.0E+01	1.3E+03	2.1E-02	2.1E-02		4.2E-06	
2.1E-02	C	6.0E-06	C			1.0E-03	I	V		1.93	1	1.0	Yes	Allyl Chloride	107-05-1	3.7E+00	3.5E+01	9.4E-01	7.3E-01			2.1E-01	2.1E-01		6.7E-05	
				1.0E+00	P	5.0E-03	P				1	1.0	Yes	Aluminum	7429-90-5					2.0E+03	4.6E+05		2.0E+03		3.0E+03	
				4.0E-04	I						1	1.0	Yes	Aluminum Phosphide	20859-73-8					8.0E-01	1.8E+02		8.0E-01			
				9.0E-03	I					2.98	1	1.0	Yes	Ametryn	834-12-8					1.8E+01	9.8E+01		1.5E+01		1.6E-02	
2.1E+01	C	6.0E-03	C							2.86	1	1.0	Yes	Aminobiphenyl, 4-	92-67-1	3.7E-03	1.5E-02		3.0E-03						1.5E-05	
				8.0E-02	P					0.21	1	1.0	Yes	Aminophenol, m-	591-27-5					1.6E+02	2.8E+04		1.6E+02		6.1E-02	
				4.0E-03	X					0.62	1	1.0	Yes	Aminophenol, o-	95-55-6					8.0E+00	7.5E+02		7.9E+00		3.1E-03	
				2.0E-02	P					0.04	1	1.0	Yes	Aminophenol, p-	123-30-8					4.0E+01	9.1E+03		4.0E+01		1.5E-02	
				2.5E-03	I					5.5	1	0.9	Yes	Amitraz	33089-61-1					5.0E+00	9.8E-01		8.2E-01		4.2E-01	
						5.0E-01	I	V		0.23	1	1.0		Ammonia	7664-41-7											
				2.0E-01	I						1	1.0	Yes	Ammonium Sulfamate	7773-06-0					4.0E+02	9.1E+04		4.0E+02			
						3.0E-03	X	V		0.89	1	1.0	Yes	Amyl Alcohol, tert-	75-85-4							6.3E-01	6.3E-01		1.3E-04	
5.7E-03	I	1.6E-06	C	7.0E-03	P	1.0E-03	I			0.9	1	1.0	Yes	Aniline	62-53-3	1.4E+01	6.9E+02		1.3E+01	1.4E+01	7.7E+02		1.4E+01		4.6E-03	
4.0E-02	P			2.0E-03	X					3.39	1	0.9	Yes	Anthraquinone, 9,10-	84-65-1	1.9E+00	5.1E+00		1.4E+00	4.0E+00	1.1E+01		3.0E+00		1.4E-02	
				4.0E-04	I						0.15	1.0	Yes	Antimony (metallic)	7440-36-0					8.0E-01	2.7E+01		7.8E-01	6	3.5E-02	2.7E-01
				5.0E-04	H						0.15	1.0	Yes	Antimony Pentoxide	1314-60-9					1.0E+00	3.4E+01		9.7E-01			
				4.0E-04	H						0.15	1.0	Yes	Antimony Tetroxide	1332-81-6					8.0E-01	2.7E+01		7.8E-01			
						2.0E-04	I				0.15	1.0	Yes	Antimony Trioxide	1309-64-4											
1.5E+00	I	4.3E-03	I	3.0E-04	I	1.5E-05	C				1	1.0	Yes	Arsenic, Inorganic	7440-38-2	5.2E-02	9.7E+00		5.2E-02	6.0E-01	1.4E+02		6.0E-01	10	1.5E-03	2.9E-01
				3.5E-06	C	5.0E-05	I				1	1.0	Yes	Arsine	7784-42-1					7.0E-03	1.6E+00		7.0E-03			
											1	0.0		Asbestos (units in fibers)	1332-21-4									7.0E+06 (G)		
				3.6E-02	O					-0.27	1	1.0	Yes	Asulam	3337-71-1					7.2E+01	5.8E+04		7.2E+01		1.8E-02	
2.3E-01	C			3.5E-02	I					2.61	1	1.0	Yes	Atrazine	1912-24-9	3.4E-01	2.8E+00		3.0E-01	7.0E+01	6.2E+02		6.3E+01	3	2.0E-04	2.0E-03
8.8E-01	C	2.5E-04	C							2.98	1	0.9	Yes	Auramine	492-80-8	8.9E-02	2.7E-01		6.7E-02						6.1E-04	
				4.0E-04	I					4.48	1	1.0	No	Avermectin B1	65195-55-3					8.0E-01			8.0E-01		1.4E+00	
				3.0E-03	A	1.0E-02	A			2.75	1	1.0	Yes	Azinphos-methyl	86-50-0					6.0E+00	8.3E+01		5.6E+00		1.7E-03	
1.1E-01	I	3.1E-05	I					V		3.82	1	1.0	Yes	Azobenzene	103-33-3	7.1E-01	7.3E-01	1.8E-01	1.2E-01						9.3E-04	
				1.0E+00	P	7.0E-06	P			-1.7	1	1.0	Yes	Azodicarbonamide	123-77-3					2.0E+03	6.8E+06		2.0E+03		6.8E-01	
				2.0E-01	I	5.0E-04	H				0.07	1.0	Yes	Barium	7440-39-3					4.0E+02	6.4E+03		3.8E+02	2000	1.6E+01	8.2E+01
				5.0E-03	O			V		5.29	1	0.8	Yes	Benfluralin	1861-40-1					1.0E+01	4.0E+00		2.8E+00		9.4E-02	
				5.0E-02	I					2.12	1	1.0	Yes	Benomyl	17804-35-2					1.0E+02	3.0E+03		9.7E+01		8.5E-02	
				2.0E-01	I					2.18	1	1.0	Yes	Bensulfuron-methyl	83055-99-6					4.0E+02	2.4E+04		3.9E+02		1.0E-01	
				3.0E-02	I					2.34	1	1.0	Yes	Bentazon	25057-89-0					6.0E+01	9.4E+02		5.7E+01		1.2E-02	
4.0E-03	P			1.0E-01	I			V		1.48	1	1.0	Yes	Benzaldehyde	100-52-7	1.9E+01	4.4E+02		1.9E+01	2.0E+02	4.9E+03		1.9E+02		4.2E-03	
5.5E-02	I	7.8E-06	I	4.0E-03	I	3.0E-02	I	V		2.13	1	1.0	Yes	Benzene	71-43-2	1.4E+00	9.8E+00	7.2E-01	4.6E-01	8.0E+00	6.1E+01	6.3E+00	3.3E+00	5	2.3E-04	2.6E-03
1.0E-01	X			3.0E-04	X					-3.7267	1	1.0	No	Benzenediamine-2-methyl sulfate, 1,4-	6369-59-1	7.8E-01			7.8E-01	6.0E-01			6.0E-01		1.7E-04	
				1.0E-03	P			V		2.52	1	1.0	Yes	Benzenethiol	108-98-5					2.0E+00	1.0E+01		1.7E+00		1.1E-03	
2.3E+02	I	6.7E-02	I	3.0E-03	I				M	1.34	1	1.0	Yes	Benzidine	92-87-5	1.1E-04	5.0E-03		1.1E-04	6.0E+00	3.0E+02		5.9E+00		2.8E-07	
				4.0E+00	I					1.87	1	1.0	Yes	Benzoic Acid	65-85-0					8.0E+03	1.2E+05		7.5E+03		1.5E+00	
1.3E+01	I							V		3.9	1	1.0	Yes	Benzotrichloride	98-07-7	6.0E-03	6.0E-03		3.0E-03						6.6E-06	
				1.0E-01	P					1.1	1	1.0	Yes	Benzyl Alcohol	100-51-6					2.0E+02	8.9E+03		2.0E+02		4.8E-02	
1.7E-01	I	4.9E-05	C	2.0E-03	P	1.0E-03	P	V		2.3	1	1.0	Yes	Benzyl Chloride	100-44-7	4.6E-01	3.4E+00	1.1E-01	8.9E-02	4.0E+00	3.2E+01	2.1E-01	2.0E-01		9.8E-05	
		2.4E-03	I	2.0E-03	I	2.0E-05	I				0.007	1.0	Yes	Beryllium and compounds	7440-41-7					4.0E+00	6.4E+00		2.5E+00	4	2.0E+00	3.2E+00
				9.0E-03	P					4.48	1	0.9	Yes	Bifenox	42576-02-3					1.8E+01	2.3E+01		1.0E+01		7.6E-02	
				1.5E-02	I					6	1	0.0	Yes	Biphenthrin	82657-04-3					3.0E+01			3.0E+01		1.4E+02	
8.0E-03	I			5.0E-01	I	4.0E-04	X	V		4.01	1	1.0	Yes	Biphenyl, 1,1'-	92-52-4	9.7E+00	6.5E+00		3.9E+00	1.0E+03	7.3E+02	8.3E-02	8.3E-02		8.7E-04	
				4.0E-02	I			V		2.48	1	1.0	Yes	Bis(2-chloro-1-methylethyl) ether	108-60-1					8.0E+01	6.5E+02		7.1E+01		2.6E-02	
				3.0E-03	P					1.3	1	1.0	Yes	Bis(2-chloroethoxy)methane	111-91-1					6.0E+00	3.0E+02		5.9E+00		1.4E-03	
1.1E+00	I	3.3E-04	I					V		1.29	1	1.0	Yes	Bis(2-chloroethyl)ether	111-44-4	7.1E-02	2.7E+00	1.7E-02	1.4E-02						3.6E-06	
2.2E+02	I	6.2E-02	I					V		0.57	1	1.0	Yes	Bis(chloromethyl)ether	542-88-1	3.5E-04	3.4E-02	9.1E-05	7.2E-05						1.7E-08	
				5.0E-02	I					3.32	1	1.0	Yes	Bisphenol A	80-05-7					1.0E+02	3.2E+02		7.7E+01		5.8E+00	
				2.0E-01	I	2.0E-02	H				1	1.0	Yes	Boron And Borates Only	7440-42-8					4.0E+02	9.1E+04		4.0E+02		1.3E+00	
				2.0E+00	P	2.0E-02	P	V		1.16	1	1.0	Yes	Boron Trichloride	10294-34-5					4.0E+03	9.1E+05	4.2E+00	4.2E+00			
				4.0E-02	C	1.3E-02	C	V		0.22	1	1.0	Yes	Boron Trifluoride	7637-07-2					8.0E+01	1.8E+04	2.7E+00	2.6E+00			
7.0E-01	I			4.0E-03	I						1	1.0	Yes	Bromate	15541-45-4	1.1E-01	2.1E+01		1.1E-01	8.0E+00	1.8E+03		8.0E+00	10	8.5E-04	7.7E-02
2.0E+00	X	6.0E-04	X					V		1.92	1	1.0	Yes	Bromo-2-chloroethane, 1-	107-04-0	3.9E-02	5.7E-01	9.4E-03	7.4E-03						2.1E-06	
				3.0E-04	X			V		2.92	1	1.0	Yes	Bromo-3-fluorobenzene, 1-	1073-06-9					6.0E-01	2.6E+00		4.9E-01		4.7E-04	
				3.0E-04	X			V		3.08	1	1.0	Yes	Bromo-4-fluorobenzene, 1-	460-00-4					6.0E-01	2.0E+00		4.6E-01		4.4E-04	
										0.41	1	1.0	Yes	Bromoacetic acid	79-08-3									6.0E+01 (G)		1.2E-02
				8.0E-03	I	6.0E-02	I	V		2.99	1	1.0	Yes	Bromobenzene	108-86-1					1.6E+01	5.4E+01	1.3E+01	6.2E+00		4.2E-03	
						4.0E-02	X	V		1.41	1	1.0	Yes	Bromochloromethane	74-97-5							8.3E+00	8.3E+00		2.1E-03	
6.2E-02	I	3.7E-05	C	2.0E-02	I			V		2	1	1.0	Yes	Bromodichloromethane	75-27-4	1.3E+00	1.9E+01	1.5E-01	1.3E-01	4.0E+01	6.5E+02		3.8E+01	8.0E+01 (G)	3.7E-05	2.2E-02
7.9E-03	I	1.1E-06	I	2.0E-02	I			V		2.4	1	1.0	Yes	Bromoform	75-25-2	9.9E+00	1.4E+02	5.1E+00	3.3E+00	4.0E+01	6.2E+02		3.8E+01	8.0E+01 (G)	8.7E-04	2.1E-02

TR=1E-06
THQ=0.1

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; W = TEF applied; E = RPF applied; G = user's guide Section 5; M = mutagen; V = volatile; R = RBA applied;
c = cancer; n = noncancer; * = where: n SL < 100X c SL; ** = where n SL < 10X c SL; SSL values are based on DAF=1; m = ceiling limit exceeded; s = Csat exceeded.

Toxicity and Chemical-specific Information													Contaminant		Carcinogenic Target Risk (TR) = 1E-06				Noncancer CHILD Hazard Index (HI) = 0.1					Protection of Groundwater SSL	
SFO (mg/kg-day)$^{-1}$	key	IUR (ug/m^3)$^{-1}$	key	RfD_o (mg/kg-day)	key	RfC_i (mg/m^3)	key	vol	mutagen	LOGP	GIABS	FA	In EPD?	Analyte	CAS No.	Ingestion SL TR=1E-06 (ug/L)	Dermal SL TR=1E-06 (ug/L)	Inhalation SL TR=1E-06 (ug/L)	Carcinogenic SL TR=1E-06 (ug/L)	Ingestion SL Child THQ=0.1 (ug/L)	Dermal SL Child THQ=0.1 (ug/L)	Inhalation SL Child THQ=0.1 (ug/L)	Noncarcinogenic SL Child THI=0.1 (ug/L)	MCL (ug/L)	Risk-based SSL (mg/kg)	MCL-based SSL (mg/kg)
				1.4E-03	I	5.0E-03	I	V		1.19	1	1.0	Yes	Bromomethane	74-83-9					2.8E+00	1.0E+02	1.0E+00	7.5E-01		1.9E-04	
				5.0E-03	H			V		5.21	1	0.8	Yes	Bromophos	2104-96-3					1.0E+01	5.5E+00		3.5E+00		1.5E-02	
						1.0E-01	A	V		2.1	1	1.0	Yes	Bromopropane, 1-	106-94-5							2.1E+01	2.1E+01		6.4E-03	
1.0E-01	O			1.5E-02	O					2.8	1	0.9	Yes	Bromoxynil	1689-84-5	7.6E-01	3.1E+00		6.1E-01	3.0E+01	1.3E+02		2.5E+01		5.2E-04	
1.0E-01	O			1.5E-02	O			V		5.4	1	0.8	Yes	Bromoxynil Octanoate	1689-99-2	7.6E-01	3.6E-01		2.4E-01	3.0E+01	1.6E+01		1.0E+01		2.1E-03	
6.0E-01	C	3.0E-05	I			2.0E-03	I	V		1.99	1	1.0	Yes	Butadiene, 1,3-	106-99-0	1.3E-01	9.2E-01	1.9E-01	7.1E-02			4.2E-01	4.2E-01		3.9E-05	
				3.0E-02	O					3.53	1	0.9	Yes	Butanoic acid, 4-(2,4-dichlorophenoxy)-	94-82-6					6.0E+01	1.8E+02		4.5E+01		4.2E-02	
				1.0E-01	I			V		0.88	1	1.0	Yes	Butanol, N-	71-36-3					2.0E+02	1.0E+04		2.0E+02		4.1E-02	
				2.0E+00	P	3.0E+01	P	V		0.61	1	1.0	Yes	Butyl alcohol, sec-	78-92-2					4.0E+03	3.0E+05	6.3E+03	2.4E+03		5.0E-01	
				5.0E-02	I			V		4.15	1	1.0	Yes	Butylate	2008-41-5					1.0E+02	8.5E+01		4.6E+01		4.5E-02	
2.0E-04	C	5.7E-08	C							3.5	1	0.8	Yes	Butylated hydroxyanisole	25013-16-5	3.9E+02	2.5E+02		1.5E+02						2.9E-01	
3.6E-03	P			3.0E-01	P					5.1	1	1.0	Yes	Butylated hydroxytoluene	128-37-0	2.2E+01	4.0E+00		3.4E+00	6.0E+02	1.2E+02		1.0E+02		1.0E-01	
				5.0E-02	P			V		4.38	1	1.0	No	Butylbenzene, n-	104-51-8					1.0E+02			1.0E+02		3.2E-01	
				1.0E-01	X			V		4.57	1	1.0	No	Butylbenzene, sec-	135-98-8					2.0E+02			2.0E+02		5.9E-01	
				1.0E-01	X			V		4.11	1	1.0	Yes	Butylbenzene, tert-	98-06-6					2.0E+02	1.1E+02		6.9E+01		1.6E-01	
				2.0E-02	A					0.36	1	1.0	Yes	Cacodylic Acid	75-60-5					4.0E+01	6.7E+03		4.0E+01		1.2E-02	
		1.8E-03	I	1.0E-03	I	1.0E-05	A				0.025	1.0		Cadmium (Diet)	7440-43-9											
		1.8E-03	I	5.0E-04	I	1.0E-05	A				0.05	1.0	Yes	Cadmium (Water)	7440-43-9					1.0E+00	1.1E+01		9.2E-01	5	6.9E-02	3.8E-01
				5.0E-01	I	2.2E-03	C			-0.19	1	1.0	Yes	Caprolactam	105-60-2					1.0E+03	9.0E+04		9.9E+02		2.5E-01	
1.5E-01	C	4.3E-05	C	2.0E-03	I					3.8	1	0.9	Yes	Captafol	2425-06-1	5.2E-01	1.8E+00		4.0E-01	4.0E+00	1.5E+01		3.2E+00		7.1E-04	
2.3E-03	C	6.6E-07	C	1.3E-01	I					2.8	1	1.0	Yes	Captan	133-06-2	3.4E+01	3.6E+02		3.1E+01	2.6E+02	3.0E+03		2.4E+02		2.2E-02	
				1.0E-01	I					2.36	1	1.0	Yes	Carbaryl	63-25-2					2.0E+02	2.4E+03		1.8E+02		1.7E-01	
				5.0E-03	I					2.32	1	1.0	Yes	Carbofuran	1563-66-2					1.0E+01	1.4E+02		9.4E+00	40	3.7E-03	1.6E-02
				1.0E-01	I	7.0E-01	I	V		1.94	1	1.0	Yes	Carbon Disulfide	75-15-0					2.0E+02	2.0E+03	1.5E+02	8.1E+01		2.4E-02	
7.0E-02	I	6.0E-06	I	4.0E-03	I	1.0E-01	I	V		2.83	1	1.0	Yes	Carbon Tetrachloride	56-23-5	1.1E+00	4.3E+00	9.4E-01	4.6E-01	8.0E+00	3.4E+01	2.1E+01	4.9E+00	5	1.8E-04	1.9E-03
						1.0E-01	P	V		-1.33	1	1.0	Yes	Carbonyl Sulfide	463-58-1							2.1E+01	2.1E+01		5.1E-02	
				1.0E-02	I					5.57	1	0.8	Yes	Carbosulfan	55285-14-8					2.0E+01	6.9E+00		5.1E+00		1.2E-01	
				1.0E-01	I					2.14	1	1.0	Yes	Carboxin	5234-68-4					2.0E+02	4.1E+03		1.9E+02		1.0E-01	
						9.0E-04	I				1	1.0	Yes	Ceric oxide	1306-38-3											
				1.0E-01	I			V		0.99	1	1.0	Yes	Chloral Hydrate	302-17-0					2.0E+02	1.5E+04		2.0E+02		4.0E-02	
				1.5E-02	I					1.9	1	1.0	Yes	Chloramben	133-90-4					3.0E+01	7.4E+02		2.9E+01		7.0E-03	
												0.0	No	Chloramines, Organic										4.0E+03 (G)		
4.0E-01	H									2.22	1	1.0	Yes	Chloranil	118-75-2	1.9E-01	3.5E+00		1.8E-01						1.5E-04	
3.5E-01	I	1.0E-04	I	5.0E-04	I	7.0E-04	I	V		6.16	1	0.7	Yes	Chlordane	12789-03-6	2.2E-01	3.6E-02	5.6E-02	2.0E-02	1.0E+00	1.8E-01	1.5E-01	7.4E-02	2	2.7E-03	2.7E-01
1.0E+01	I	4.6E-03	C	3.0E-04	I					5.41	1	0.8	Yes	Chlordecone (Kepone)	143-50-0	7.8E-03	6.5E-03		3.5E-03	6.0E-01	5.4E-01		2.9E-01		1.2E-04	
				7.0E-04	A					3.81	1	0.9	Yes	Chlorfenvinphos	470-90-6					1.4E+00	5.6E+00		1.1E+00		3.1E-03	
				9.0E-02	O					2.5	1	1.0	Yes	Chlorimuron, Ethyl-	90982-32-4					1.8E+02	6.8E+03		1.8E+02		6.0E-02	
				1.0E-01	I	1.5E-04	A	V		0.85	1	1.0	Yes	Chlorine	7782-50-5					2.0E+02	4.6E+04	3.0E-02	3.0E-02	4000	1.5E-05	2.0E+00
				3.0E-02	I	2.0E-04	I	V			1	1.0	Yes	Chlorine Dioxide	10049-04-4					6.0E+01	1.4E+04	4.2E-02	4.2E-02	800		
				3.0E-02	I						1	1.0	Yes	Chlorite (Sodium Salt)	7758-19-2					6.0E+01	1.4E+04		6.0E+01	1000		
						5.0E+01	I	V		2.05	1	1.0	Yes	Chloro-1,1-difluoroethane, 1-	75-68-3							1.0E+04	1.0E+04		5.2E+00	
		3.0E-04	I	2.0E-02	H	2.0E-02	I	V		2.53	1	1.0	Yes	Chloro-1,3-butadiene, 2-	126-99-8			1.9E-02	1.9E-02	4.0E+01	1.8E+02	4.2E+00	3.7E+00		9.9E-06	
4.6E-01	H									2.27	1	1.0	Yes	Chloro-2-methylaniline HCl, 4-	3165-93-3	1.7E-01	5.1E+02		1.7E-01						1.5E-04	
1.0E-01	P	7.7E-05	C	3.0E-03	X					2.27	1	1.0	Yes	Chloro-2-methylaniline, 4-	95-69-2	7.8E-01	6.6E+00		7.0E-01	6.0E+00	5.6E+01		5.4E+00		4.0E-04	
2.7E-01	X							V		0.09	1	1.0	Yes	Chloroacetaldehyde, 2-	107-20-0	2.9E-01	4.6E+01		2.9E-01						5.8E-05	
										0.22	1	1.0	Yes	Chloroacetic Acid	79-11-8									6.0E+01 (G)		1.2E-02
						3.0E-05	I			1.93	1	1.0	Yes	Chloroacetophenone, 2-	532-27-4											
2.0E-01	P			4.0E-03	I					1.83	1	1.0	Yes	Chloroaniline, p-	106-47-8	3.9E-01	5.9E+00		3.7E-01	8.0E+00	1.3E+02		7.6E+00		1.6E-04	
				2.0E-02	I	5.0E-02	P	V		2.84	1	1.0	Yes	Chlorobenzene	108-90-7					4.0E+01	1.3E+02	1.0E+01	7.8E+00	100	5.3E-03	6.8E-02
				1.0E-01	X					-0.52	1	1.0	Yes	Chlorobenzene sulfonic acid, p-	98-66-8					2.0E+02	1.8E+05		2.0E+02		4.7E-02	
1.1E-01	C	3.1E-05	C	2.0E-02	I					4.74	1	0.8	Yes	Chlorobenzilate	510-15-6	7.1E-01	5.6E-01		3.1E-01	4.0E+01	3.5E+01		1.9E+01		1.0E-03	
				3.0E-02	X					2.65	1	1.0	Yes	Chlorobenzoic Acid, p-	74-11-3					6.0E+01	3.4E+02		5.1E+01		1.3E-02	
				3.0E-03	P	3.0E-01	P	V		3.6	1	1.0	Yes	Chlorobenzotrifluoride, 4-	98-56-6					6.0E+00	9.3E+00	6.3E+01	3.5E+00		1.2E-02	
				4.0E-02	P			V		2.64	1	1.0	Yes	Chlorobutane, 1-	109-69-3					8.0E+01	3.1E+02		6.4E+01		2.6E-02	
						5.0E+01	I	V		1.08	1	1.0	Yes	Chlorodifluoromethane	75-45-6							1.0E+04	1.0E+04		4.3E+00	
				2.0E-02	P			V		0.03	1	1.0	Yes	Chloroethanol, 2-	107-07-3					4.0E+01	7.7E+03		4.0E+01		8.1E-03	
3.1E-02	C	2.3E-05	I	1.0E-02	I	9.8E-02	A	V		1.97	1	1.0	Yes	Chloroform	67-66-3	2.5E+00	2.9E+01	2.4E-01	2.2E-01	2.0E+01	2.5E+02	2.0E+01	9.7E+00	8.0E+01 (G)	6.1E-05	2.2E-02
						9.0E-02	I	V		0.91	1	1.0	Yes	Chloromethane	74-87-3							1.9E+01	1.9E+01		4.9E-03	
2.4E+00	C	6.9E-04	C					V		0.32	1	1.0	Yes	Chloromethyl Methyl Ether	107-30-2	3.2E-02	3.7E+00	8.1E-03	6.5E-03						1.4E-06	
3.0E-01	P			3.0E-03	P	1.0E-05	X			2.24	1	1.0	Yes	Chloronitrobenzene, o-	88-73-3	2.6E-01	2.6E+00		2.4E-01	6.0E+00	6.4E+01		5.5E+00		2.2E-04	
6.0E-02	P			7.0E-04	P	2.0E-03	P			2.39	1	1.0	Yes	Chloronitrobenzene, p-	100-00-5	1.3E+00	1.0E+01		1.2E+00	1.4E+00	1.2E+01		1.3E+00		1.1E-03	
				5.0E-03	I			V		2.15	1	1.0	Yes	Chlorophenol, 2-	95-57-8					1.0E+01	1.0E+02		9.1E+00		8.9E-03	
						4.0E-04	C	V		2.09	1	1.0	Yes	Chloropicrin	76-06-2							8.3E-02	8.3E-02		2.5E-05	
3.1E-03	C	8.9E-07	C	1.5E-02	I					3.05	1	0.9	Yes	Chlorothalonil	1897-45-6	2.5E+01	1.6E+02		2.2E+01	3.0E+01	2.1E+02		2.6E+01		5.0E-02	
				2.0E-02	I			V		3.42	1	1.0	Yes	Chlorotoluene, o-	95-49-8					4.0E+01	5.8E+01		2.4E+01		2.3E-02	
				2.0E-02	X			V		3.33	1	1.0	Yes	Chlorotoluene, p-	106-43-4					4.0E+01	6.6E+01		2.5E+01		2.4E-02	
2.4E+02	C	6.9E-02	C							-1.02	1	1.0	Yes	Chlorozotocin	54749-90-5	3.2E-04	1.0E+00		3.2E-04						7.1E-08	
				5.0E-02	O					3.51	1	0.9	Yes	Chlorpropham	101-21-3					1.0E+02	2.5E+02		7.1E+01		6.4E-02	
				1.0E-03	A					4.96	1	0.8	Yes	Chlorpyrifos	2921-88-2					2.0E+00	1.5E+00		8.4E-01		1.3E-02	
				1.0E-02	H					4.31	1	0.9	Yes	Chlorpyrifos Methyl	5598-13-0					2.0E+01	2.9E+01		1.2E+01		5.5E-02	
				5.0E-02	O					2	1	1.0	Yes	Chlorsulfuron	64902-72-3					1.0E+02	5.7E+03		9.9E+01		8.3E-02	
				1.0E-02	I					4.28	1	0.9	Yes	Chlorthal-dimethyl	1861-32-1					2.0E+01	3.3E+01		1.2E+01		1.5E-02	
				8.0E-04	H					5.8	1	0.8	Yes	Chlorthiophos	60238-56-4					1.6E+00	3.4E-01		2.8E-01		7.3E-03	
				1.5E+00	I						0.013	1.0	Yes	Chromium(III), Insoluble Salts	16065-83-1					3.0E+03	8.9E+03		2.2E+03		4.0E+06	
5.0E-01	C	8.4E-02	G	3.0E-03	I	1.0E-04	I		M		0.025	1.0	Yes	Chromium(VI)	18540-29-9	5.0E-02	1.2E-01		3.5E-02	6.0E+00	1.7E+01		4.4E+00		6.7E-04	
											0.013	1.0	Yes	Chromium, Total	7440-47-3									100		1.8E+05
				1.3E-02	I					3.1	1	0.9	Yes	Clofentezine	74115-24-5					2.6E+01	2.1E+02		2.3E+01		1.4E+00	
		9.0E-03	P	3.0E-04	P	6.0E-06	P				1	1.0	Yes	Cobalt	7440-48-4					6.0E-01	3.4E+02		6.0E-01		2.7E-02	
		6.2E-04	I					V	M		1	0.0		Coke Oven Emissions	8007-45-2											
				4.0E-02	H						1	1.0	Yes	Copper	7440-50-8					8.0E+01	1.8E+04		8.0E+01	1300	2.8E+00	4.6E+01
				5.0E-02	I	6.0E-01	C			1.96	1	1.0	Yes	Cresol, m-	108-39-4					1.0E+02	1.2E+03		9.3E+01		7.4E-02	
				5.0E-02	I	6.0E-01	C			1.95	1	1.0	Yes	Cresol, o-	95-48-7					1.0E+02	1.2E+03		9.3E+01		7.5E-02	

TR=1E-06
THQ=0.1

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; W = TEF applied; E = RPF applied; G = user's guide Section 5; M = mutagen; V = volatile; R = RBA applied;
c = cancer; n = noncancer; * = where: n SL < 100X c SL; ** = where n SL < 10X c SL; SSL values are based on DAF=1; m = ceiling limit exceeded; s = Csat exceeded.

Toxicity and Chemical-specific Information														Contaminant		Carcinogenic Target Risk (TR) = 1E-06				Noncancer CHILD Hazard Index (HI) = 0.1					Protection of Groundwater SSL	
SFO (mg/kg-day)$^{-1}$	key	IUR (ug/m^3)$^{-1}$	key	RfD_o (mg/kg-day)	key	RfC_i (mg/m^3)	key	vol	mutagen	LOGP	GIABS	FA	In EPD?	Analyte	CAS No.	Ingestion SL TR=1E-06 (ug/L)	Dermal SL TR=1E-06 (ug/L)	Inhalation SL TR=1E-06 (ug/L)	Carcinogenic SL TR=1E-06 (ug/L)	Ingestion SL Child THQ=0.1 (ug/L)	Dermal SL Child THQ=0.1 (ug/L)	Inhalation SL Child THQ=0.1 (ug/L)	Noncarcinogenic SL Child THI=0.1 (ug/L)	MCL (ug/L)	Risk-based SSL (mg/kg)	MCL-based SSL (mg/kg)
				1.0E-01	A	6.0E-01	C			1.94	1	1.0	Yes	Cresol, p-	106-44-5					2.0E+02	2.5E+03		1.9E+02		1.5E-01	
				1.0E-01	A					3.1	1	1.0	Yes	Cresol, p-chloro-m-	59-50-7					2.0E+02	5.2E+02		1.4E+02		1.7E-01	
				1.0E-01	A	6.0E-01	C			1.95	1	0.9	Yes	Cresols	1319-77-3					2.0E+02	6.7E+02		1.5E+02		1.3E-01	
1.9E+00	H			1.0E-03	P			V		0.6	1	1.0	Yes	Crotonaldehyde, trans-	123-73-9	4.1E-02	2.7E+00		4.0E-02	2.0E+00	1.5E+02		2.0E+00		8.2E-06	
				1.0E-01	I	4.0E-01	I	V		3.66	1	1.0	Yes	Cumene	98-82-8					2.0E+02	1.9E+02	8.3E+01	4.5E+01		7.4E-02	
2.2E-01	C	6.3E-05	C							-1.73	1	1.0	Yes	Cupferron	135-20-6	3.5E-01	1.3E+04		3.5E-01						6.1E-04	
8.4E-01	H			2.0E-03	H					2.22	1	1.0	Yes	Cyanazine	21725-46-2	9.3E-02	1.6E+00		8.8E-02	4.0E+00	7.6E+01		3.8E+00		4.1E-05	
														Cyanides												
				1.0E-03	I						1	1.0	Yes	~Calcium Cyanide	592-01-8					2.0E+00	4.6E+02		2.0E+00			
				5.0E-03	I						1	1.0	Yes	~Copper Cyanide	544-92-3					1.0E+01	2.3E+03		1.0E+01			
				6.0E-04	I	8.0E-04	G	V			1	1.0	Yes	~Cyanide (CN-)	57-12-5					1.2E+00	2.7E+02	1.7E-01	1.5E-01	200	1.5E-03	2.0E+00
				1.0E-03	I			V		0.07	1	1.0	Yes	~Cyanogen	460-19-5					2.0E+00	5.1E+02		2.0E+00			
				9.0E-02	I			V			1	1.0	Yes	~Cyanogen Bromide	506-68-3					1.8E+02	1.6E+05		1.8E+02			
				5.0E-02	I			V			1	1.0	Yes	~Cyanogen Chloride	506-77-4					1.0E+02	5.8E+04		1.0E+02			
				6.0E-04	I	8.0E-04	I	V		-0.25	1	1.0	Yes	~Hydrogen Cyanide	74-90-8					1.2E+00	2.7E+02	1.7E-01	1.5E-01		1.5E-03	
				2.0E-03	I						1	1.0	Yes	~Potassium Cyanide	151-50-8					4.0E+00	4.6E+02		4.0E+00			
				5.0E-03	I						0.04	1.0	Yes	~Potassium Silver Cyanide	506-61-6					1.0E+01	4.6E+01		8.2E+00			
				1.0E-01	I						0.04	1.0	Yes	~Silver Cyanide	506-64-9					2.0E+02	1.8E+03		1.8E+02			
				1.0E-03	I						1	1.0	Yes	~Sodium Cyanide	143-33-9					2.0E+00	4.6E+02		2.0E+00	200		
				2.0E-04	P						1	0.0	Yes	~Thiocyanates	E1790664					4.0E-01	9.1E+01		4.0E-01			
				2.0E-04	X			V		0.58	1	1.0	Yes	~Thiocyanic Acid	463-56-9					4.0E-01	9.1E+01		4.0E-01			
				5.0E-02	I						1	1.0	Yes	~Zinc Cyanide	557-21-1					1.0E+02	3.8E+04		1.0E+02			
						6.0E+00	I	V		3.44	1	1.0	Yes	Cyclohexane	110-82-7							1.3E+03	1.3E+03		1.3E+00	
2.0E-02	X			2.0E-02	X					4.72	1	0.9	Yes	Cyclohexane, 1,2,3,4,5-pentabromo-6-chloro-	87-84-3	3.9E+00	9.6E+00		2.8E+00	4.0E+01	1.1E+02		2.9E+01		1.6E-02	
				5.0E+00	I	7.0E-01	P	V		0.81	1	1.0	Yes	Cyclohexanone	108-94-1					1.0E+04	6.5E+05	1.5E+02	1.4E+02		3.4E-02	
				5.0E-03	P	1.0E+00	X	V		2.86	1	1.0	Yes	Cyclohexene	110-83-8					1.0E+01	2.5E+01	2.1E+02	7.0E+00		4.6E-03	
				2.0E-01	I			V		1.49	1	1.0	Yes	Cyclohexylamine	108-91-8					4.0E+02	9.3E+03		3.8E+02		1.0E-01	
				2.5E-02	I					5.95	1	0.7	Yes	Cyfluthrin	68359-37-5					5.0E+01	1.6E+01		1.2E+01		3.1E+00	
				1.0E-03	O					6.9	1	0.5	No	Cyhalothrin	68085-85-8					2.0E+00			2.0E+00		1.4E+00	
				5.0E-01	O					-0.061	1	1.0	Yes	Cyromazine	66215-27-8					1.0E+03	8.0E+04		9.9E+02		2.6E-01	
2.4E-01	I	6.9E-05	C	3.0E-05	X					6.02	1	0.8	Yes	DDD, p,p`- (DDD)	72-54-8	3.2E-01	3.5E-02		3.2E-02	6.0E-02	7.1E-03		6.3E-03		1.5E-03	
3.4E-01	I	9.7E-05	C	3.0E-04	X			V		6.51	1	0.8	No	DDE, p,p'-	72-55-9	2.3E-01		5.8E-02	4.6E-02	6.0E-01			6.0E-01		1.1E-02	
3.4E-01	I	9.7E-05	I	5.0E-04	I					6.91	1	0.7	No	DDT	50-29-3	2.3E-01			2.3E-01	1.0E+00			1.0E+00		7.7E-02	
				3.0E-02	I					0.78	1	1.0	Yes	Dalapon	75-99-0					6.0E+01	5.5E+03		6.0E+01	200	1.2E-02	4.1E-02
1.8E-02	C	5.1E-06	C	1.5E-01	I					-1.5	1	1.0	Yes	Daminozide	1596-84-5	4.3E+00	1.3E+04		4.3E+00	3.0E+02	1.0E+06		3.0E+02		9.5E-04	
7.0E-04	I			7.0E-03	I					12.11	1	0.0	No	Decabromodiphenyl ether, 2,2',3,3',4,4',5,5',6,6'- (BDE-209)	1163-19-5	1.1E+02			1.1E+02	1.4E+01			1.4E+01		7.8E+00	
				4.0E-05	I					3.21	1	0.8	Yes	Demeton	8065-48-3					8.0E-02	8.8E-02		4.2E-02			
1.2E-03	I			6.0E-01	I					6.11	1	0.0	Yes	Di(2-ethylhexyl)adipate	103-23-1	6.5E+01			6.5E+01	1.2E+03			1.2E+03	400	4.7E+00	2.9E+01
6.1E-02	H									4.49	1	0.9	Yes	Diallate	2303-16-4	1.3E+00	9.2E-01		5.4E-01						8.0E-04	
				7.0E-04	A					3.81	1	0.9	Yes	Diazinon	333-41-5					1.4E+00	3.9E+00		1.0E+00		6.5E-03	
				1.0E-02	X			V		4.38	1	1.0	Yes	Dibenzothiophene	132-65-0					2.0E+01	9.6E+00		6.5E+00		1.2E-01	
8.0E-01	P	6.0E-03	P	2.0E-04	P	2.0E-04	I	V	M	2.96	1	1.0	Yes	Dibromo-3-chloropropane, 1,2-	96-12-8	3.1E-02	1.7E-01	3.4E-04	3.3E-04	4.0E-01	2.4E+00	4.2E-02	3.7E-02	0.2	1.4E-07	8.6E-05
										0.7	1	1.0	Yes	Dibromoacetic acid	631-64-1									6.0E+01 (G)		1.2E-02
				4.0E-04	X			V		3.75	1	0.9	Yes	Dibromobenzene, 1,3-	108-36-1					8.0E-01	1.6E+00		5.3E-01		5.1E-04	
				1.0E-02	I			V		3.79	1	0.9	Yes	Dibromobenzene, 1,4-	106-37-6					2.0E+01	3.7E+01		1.3E+01		1.2E-02	
8.4E-02	I			2.0E-02	I			V		2.16	1	1.0	Yes	Dibromochloromethane	124-48-1	9.3E-01	1.4E+01		8.7E-01	4.0E+01	6.7E+02		3.8E+01	8.0E+01 (G)	2.3E-04	2.1E-02
2.0E+00	I	6.0E-04	I	9.0E-03	I	9.0E-03	I	V		1.96	1	1.0	Yes	Dibromoethane, 1,2-	106-93-4	3.9E-02	7.1E-01	9.4E-03	7.5E-03	1.8E+01	3.6E+02	1.9E+00	1.7E+00	0.05	2.1E-06	1.4E-05
						4.0E-03	X	V		1.7	1	1.0	Yes	Dibromomethane (Methylene Bromide)	74-95-3							8.3E-01	8.3E-01		2.1E-04	
				3.0E-04	P						1	0.0	No	Dibutyltin Compounds	E1790660					6.0E-01			6.0E-01			
				3.0E-02	I					2.21	1	1.0	Yes	Dicamba	1918-00-9					6.0E+01	1.0E+03		5.7E+01		1.5E-02	
												0.0	No	Dichloramine	3400-09-7									4.0E+03 (G)		
		4.2E-03	P					V		2.6	1	1.0	Yes	Dichloro-2-butene, 1,4-	764-41-0			1.3E-03	1.3E-03						6.6E-07	
		4.2E-03	P					V		2.6	1	1.0	Yes	Dichloro-2-butene, cis-1,4-	1476-11-5			1.3E-03	1.3E-03						6.2E-07	
		4.2E-03	P					V		2.6	1	1.0	Yes	Dichloro-2-butene, trans-1,4-	110-57-6			1.3E-03	1.3E-03						6.2E-07	
5.0E-02	I			4.0E-03	I					0.92	1	1.0	Yes	Dichloroacetic Acid	79-43-6	1.6E+00	9.6E+01		1.5E+00	8.0E+00	5.4E+02		7.9E+00	6.0E+01 (G)	3.1E-04	1.2E-02
				9.0E-02	I	2.0E-01	H	V		3.43	1	1.0	Yes	Dichlorobenzene, 1,2-	95-50-1					1.8E+02	2.9E+02	4.2E+01	3.0E+01	600	3.0E-02	5.8E-01
5.4E-03	C	1.1E-05	C	7.0E-02	A	8.0E-01	I	V		3.44	1	1.0	Yes	Dichlorobenzene, 1,4-	106-46-7	1.4E+01	2.1E+01	5.1E-01	4.8E-01	1.4E+02	2.2E+02	1.7E+02	5.7E+01	75	4.6E-04	7.2E-02
4.5E-01	I	3.4E-04	C							3.51	1	1.0	Yes	Dichlorobenzidine, 3,3'-	91-94-1	1.7E-01	4.5E-01		1.3E-01						8.2E-04	
				9.0E-03	X					4.44	1	0.9	Yes	Dichlorobenzophenone, 4,4'-	90-98-2					1.8E+01	1.4E+01		7.8E+00		4.7E-02	
				2.0E-01	I	1.0E-01	X	V		2.16	1	1.0	Yes	Dichlorodifluoromethane	75-71-8					4.0E+02	3.8E+03	2.1E+01	2.0E+01		3.0E-02	
5.7E-03	C	1.6E-06	C	2.0E-01	P			V		1.79	1	1.0	Yes	Dichloroethane, 1,1-	75-34-3	1.4E+01	1.8E+02	3.5E+00	2.8E+00	4.0E+02	5.8E+03		3.8E+02		7.8E-04	
9.1E-02	I	2.6E-05	I	6.0E-03	X	7.0E-03	P	V		1.48	1	1.0	Yes	Dichloroethane, 1,2-	107-06-2	8.6E-01	1.8E+01	2.2E-01	1.7E-01	1.2E+01	2.8E+02	1.5E+00	1.3E+00	5	4.8E-05	1.4E-03
				5.0E-02	I	2.0E-01	I	V		2.13	1	1.0	Yes	Dichloroethylene, 1,1-	75-35-4					1.0E+02	8.5E+02	4.2E+01	2.8E+01	7	1.0E-02	2.5E-03
				2.0E-03	I			V		1.86	1	1.0	Yes	Dichloroethylene, 1,2-cis-	156-59-2					4.0E+00	3.6E+01		3.6E+00	70	1.1E-03	2.1E-02
				2.0E-02	I			V		2.09	1	1.0	Yes	Dichloroethylene, 1,2-trans-	156-60-5					4.0E+01	3.6E+02		3.6E+01	100	1.1E-02	3.1E-02
				3.0E-03	I					3.06	1	1.0	Yes	Dichlorophenol, 2,4-	120-83-2					6.0E+00	1.9E+01		4.6E+00		2.3E-03	
				1.0E-02	I					2.81	1	1.0	Yes	Dichlorophenoxy Acetic Acid, 2,4-	94-75-7					2.0E+01	1.4E+02		1.7E+01	70	4.5E-03	1.8E-02
3.7E-02	P	3.7E-06	P	4.0E-02	P	4.0E-03	I	V		1.98	1	1.0	Yes	Dichloropropane, 1,2-	78-87-5	2.1E+00	2.3E+01	1.5E+00	8.5E-01	8.0E+01	9.6E+02	8.3E-01	8.2E-01	5	2.7E-04	1.7E-03
				2.0E-02	P			V		2	1	1.0	Yes	Dichloropropane, 1,3-	142-28-9					4.0E+01	4.6E+02		3.7E+01		1.3E-02	
				3.0E-03	I					0.78	1	1.0	Yes	Dichloropropanol, 2,3-	616-23-9					6.0E+00	5.0E+02		5.9E+00		1.3E-03	
1.0E-01	I	4.0E-06	I	3.0E-02	I	2.0E-02	I	V		2.04	1	1.0	Yes	Dichloropropene, 1,3-	542-75-6	7.8E-01	7.8E+00	1.4E+00	4.7E-01	6.0E+01	6.6E+02	4.2E+00	3.9E+00		1.7E-04	
2.9E-01	I	8.3E-05	C	5.0E-04	I	5.0E-04	I			1.43	1	1.0	Yes	Dichlorvos	62-73-7	2.7E-01	1.4E+01		2.6E-01	1.0E+00	5.6E+01		9.9E-01		8.1E-05	
				3.0E-05	O					0	1	1.0	Yes	Dicrotophos	141-66-2					6.0E-02	3.3E+01		6.0E-02		1.4E-05	
				8.0E-02	P	3.0E-04	X	V		3.16	1	1.0	Yes	Dicyclopentadiene	77-73-6					1.6E+02	3.5E+02	6.3E-02	6.3E-02		2.2E-04	
1.6E+01	I	4.6E-03	I	5.0E-05	I					5.4	1	0.8	Yes	Dieldrin	60-57-1	4.9E-03	2.7E-03		1.8E-03	1.0E-01	6.1E-02		3.8E-02		7.1E-05	
		3.0E-04	C			5.0E-03	I				1	0.0		Diesel Engine Exhaust	E17136615											
				2.0E-03	P	2.0E-04	P			-1.43	1	1.0	Yes	Diethanolamine	111-42-2					4.0E+00	8.4E+03		4.0E+00		8.1E-04	
				3.0E-02	P	1.0E-04	P			0.56	1	1.0	Yes	Diethylene Glycol Monobutyl Ether	112-34-5					6.0E+01	8.7E+03		6.0E+01		1.3E-02	
				6.0E-02	P	3.0E-04	P			-0.54	1	1.0	Yes	Diethylene Glycol Monoethyl Ether	111-90-0					1.2E+02	7.8E+04		1.2E+02		2.4E-02	
				1.0E-03	P			V		0.05	1	1.0	Yes	Diethylformamide	617-84-5					2.0E+00	4.3E+02		2.0E+00		4.1E-04	
3.5E+02	C	1.0E-01	C							5.07	1	0.9	Yes	Diethylstilbestrol	56-53-1	2.2E-04	6.6E-05		5.1E-05						2.8E-05	
				8.3E-02	O					0.65	1	1.0	Yes	Difenzoquat	43222-48-6					1.7E+02	7.5E+04		1.7E+02		2.6E+01	

TR=1E-06
THQ=0.1

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; W = TEF applied; E = RPF applied; G = user's guide Section 5; M = mutagen; V = volatile; R = RBA applied;
c = cancer; n = noncancer; * = where: n SL < 100X c SL; ** = where n SL < 10X c SL; SSL values are based on DAF=1; m = ceiling limit exceeded; s = Csat exceeded.

Toxicity and Chemical-specific Information													Contaminant		Carcinogenic Target Risk (TR) = 1E-06				Noncancer CHILD Hazard Index (HI) = 0.1					Protection of Groundwater SSL	
SFO (mg/kg-day)$^{-1}$	key	IUR (ug/m^3)$^{-1}$	key	RfD_o (mg/kg-day)	key	RfC_i (mg/m^3)	key	volatile	mutagen	LOGP	GIABS	FA	In EPD?	Analyte	CAS No.	Ingestion SL TR=1E-06 (ug/L)	Dermal SL TR=1E-06 (ug/L)	Inhalation SL TR=1E-06 (ug/L)	Carcinogenic SL TR=1E-06 (ug/L)	Ingestion SL Child THQ=0.1 (ug/L)	Dermal SL Child THQ=0.1 (ug/L)	Inhalation SL Child THQ=0.1 (ug/L)	Noncarcinogenic SL Child THI=0.1 (ug/L)	MCL (ug/L)	Risk-based SSL (mg/kg)	MCL-based SSL (mg/kg)
				2.0E-02	I					3.88	1	0.9	Yes	Diflubenzuron	35367-38-5					4.0E+01	1.0E+02		2.9E+01		3.3E-02	
						4.0E+01	I	V		0.75	1	1.0	Yes	Difluoroethane, 1,1-	75-37-6							8.3E+03	8.3E+03		2.8E+00	
						3.0E+01	X	V		2.29	1	1.0	Yes	Difluoropropane, 2,2-	420-45-1							6.3E+03	6.3E+03		1.4E+01	
4.4E-02	C	1.3E-05	C					V		3.58	1	1.0	Yes	Dihydrosafrole	94-58-6	1.8E+00	2.3E+00	4.3E-01	3.0E-01						1.9E-04	
						7.0E-01	P	V		1.52	1	1.0	Yes	Diisopropyl Ether	108-20-3							1.5E+02	1.5E+02		3.7E-02	
				8.0E-02	I			V		1.03	1	1.0	Yes	Diisopropyl Methylphosphonate	1445-75-6					1.6E+02	1.3E+04		1.6E+02		4.5E-02	
				2.2E-02	O					-0.17	1	1.0	Yes	Dimethipin	55290-64-7					4.4E+01	2.6E+04		4.4E+01		9.6E-03	
				2.2E-03	O					0.78	1	1.0	Yes	Dimethoate	60-51-5					4.4E+00	7.0E+02		4.4E+00		9.9E-04	
1.6E+00	P									1.81	1	1.0	Yes	Dimethoxybenzidine, 3,3'-	119-90-4	4.9E-02	1.6E+00		4.7E-02						5.8E-05	
1.7E-03	P			6.0E-02	P					-0.61	1	1.0	Yes	Dimethyl methylphosphonate	756-79-6	4.6E+01	2.8E+04		4.6E+01	1.2E+02	8.1E+04		1.2E+02		9.7E-03	
4.6E+00	C	1.3E-03	C							4.58	1	1.0	Yes	Dimethylamino azobenzene [p-]	60-11-7	1.7E-02	7.2E-03		5.0E-03						2.2E-05	
5.8E-01	H									2.17	1	1.0	Yes	Dimethylaniline HCl, 2,4-	21436-96-4	1.3E-01	5.2E+02		1.3E-01						1.2E-04	
2.0E-01	P			2.0E-03	X					1.68	1	1.0	Yes	Dimethylaniline, 2,4-	95-68-1	3.9E-01	7.1E+00		3.7E-01	4.0E+00	8.0E+01		3.8E+00		2.1E-04	
2.7E-02	P			2.0E-03	I			V		2.31	1	1.0	Yes	Dimethylaniline, N,N-	121-69-7	2.9E+00	2.0E+01		2.5E+00	4.0E+00	3.1E+01		3.5E+00		9.0E-04	
1.1E+01	P									2.34	1	1.0	Yes	Dimethylbenzidine, 3,3'-	119-93-7	7.1E-03	8.5E-02		6.5E-03						4.3E-05	
				1.0E-01	P	3.0E-02	I	V		-1.01	1	1.0	Yes	Dimethylformamide	68-12-2					2.0E+02	1.8E+05	6.3E+00	6.1E+00		1.2E-03	
				1.0E-04	X	2.0E-06	X	V		-1.19	1	1.0	Yes	Dimethylhydrazine, 1,1-	57-14-7					2.0E-01	3.5E+02	4.2E-04	4.2E-04		9.3E-08	
5.5E+02	C	1.6E-01	C					V		-0.54	1	1.0	Yes	Dimethylhydrazine, 1,2-	540-73-8	1.4E-04	5.0E-02	3.5E-05	2.8E-05						6.5E-09	
				2.0E-02	I					2.3	1	1.0	Yes	Dimethylphenol, 2,4-	105-67-9					4.0E+01	3.1E+02		3.6E+01		4.2E-02	
				6.0E-04	I					2.36	1	1.0	Yes	Dimethylphenol, 2,6-	576-26-1					1.2E+00	8.5E+00		1.1E+00		1.3E-03	
				1.0E-03	I					2.23	1	1.0	Yes	Dimethylphenol, 3,4-	95-65-8					2.0E+00	1.7E+01		1.8E+00		2.1E-03	
4.5E-02	C	1.3E-05	C					V		2.58	1	1.0	Yes	Dimethylvinylchloride	513-37-1	1.7E+00	6.5E+00	4.3E-01	3.3E-01						1.1E-04	
				8.0E-05	X					2.13	1	1.0	Yes	Dinitro-o-cresol, 4,6-	534-52-1					1.6E-01	2.6E+00		1.5E-01		2.6E-04	
				2.0E-03	I					4.12	1	0.9	Yes	Dinitro-o-cyclohexyl Phenol, 4,6-	131-89-5					4.0E+00	5.4E+00		2.3E+00		7.7E-02	
				1.0E-04	P					1.69	1	1.0	Yes	Dinitrobenzene, 1,2-	528-29-0					2.0E-01	5.3E+00		1.9E-01		1.8E-04	
				1.0E-04	I					1.49	1	1.0	Yes	Dinitrobenzene, 1,3-	99-65-0					2.0E-01	7.3E+00		2.0E-01		1.8E-04	
				1.0E-04	P					1.46	1	1.0	Yes	Dinitrobenzene, 1,4-	100-25-4					2.0E-01	7.6E+00		2.0E-01		1.8E-04	
				2.0E-03	I					1.67	1	1.0	Yes	Dinitrophenol, 2,4-	51-28-5					4.0E+00	1.2E+02		3.9E+00		4.4E-03	
6.8E-01	I									2.18	1	1.0	Yes	Dinitrotoluene Mixture, 2,4/2,6-	E1615210	1.1E-01	1.5E+00		1.1E-01						1.5E-04	
3.1E-01	C	8.9E-05	C	2.0E-03	I					1.98	1	1.0	Yes	Dinitrotoluene, 2,4-	121-14-2	2.5E-01	4.3E+00		2.4E-01	4.0E+00	7.5E+01		3.8E+00		3.2E-04	
1.5E+00	P			3.0E-04	X					2.1	1	1.0	Yes	Dinitrotoluene, 2,6-	606-20-2	5.2E-02	7.4E-01		4.9E-02	6.0E-01	9.3E+00		5.7E-01		6.7E-05	
				2.0E-03	G					1.84	1	1.0	Yes	Dinitrotoluene, 2-Amino-4,6-	35572-78-2					4.0E+00	1.0E+02		3.9E+00		3.0E-03	
				2.0E-03	G					1.84	1	1.0	Yes	Dinitrotoluene, 4-Amino-2,6-	19406-51-0					4.0E+00	1.0E+02		3.9E+00		3.0E-03	
4.5E-01	X			9.0E-04	X					2.18	1	0.8	Yes	Dinitrotoluene, Technical grade	25321-14-6	1.7E-01	2.6E-01		1.0E-01	1.8E+00	3.0E+00		1.1E+00		1.4E-04	
				1.0E-03	I					3.56	1	0.9	Yes	Dinoseb	88-85-7					2.0E+00	5.4E+00		1.5E+00	7	1.3E-02	6.2E-02
1.0E-01	I	5.0E-06	I	3.0E-02	I	3.0E-02	I	V		-0.27	1	1.0	Yes	Dioxane, 1,4-	123-91-1	7.8E-01	2.3E+02	1.1E+00	4.6E-01	6.0E+01	1.9E+04	6.3E+00	5.7E+00		9.4E-05	
														Dioxins												
6.2E+03	I	1.3E+00	I							8.21	1	0.0	No	~Hexachlorodibenzo-p-dioxin, Mixture		1.3E-05			1.3E-05						1.8E-05	
1.3E+05	C	3.8E+01	C	7.0E-10	I	4.0E-08	C	V		6.8	1	0.5	No	~TCDD, 2,3,7,8-	1746-01-6	6.0E-07		1.5E-07	1.2E-07	1.4E-06		8.3E-06	1.2E-06	0.00003	5.9E-08	1.5E-05
				3.0E-02	I					2.17	1	1.0	Yes	Diphenamid	957-51-7					6.0E+01	4.2E+02		5.3E+01		5.2E-01	
						4.0E-04	X	V		4.21	1	1.0	Yes	Diphenyl Ether	101-84-8							8.3E-02	8.3E-02		3.4E-04	
				8.0E-04	X					2.4	1	1.0	Yes	Diphenyl Sulfone	127-63-9					1.6E+00	2.0E+01		1.5E+00		3.6E-03	
				1.0E-01	O					3.5	1	1.0	Yes	Diphenylamine	122-39-4					2.0E+02	3.4E+02		1.3E+02		2.3E-01	
8.0E-01	I	2.2E-04	I							2.94	1	1.0	Yes	Diphenylhydrazine, 1,2-	122-66-7	9.7E-02	3.9E-01		7.8E-02						2.5E-04	
				2.2E-03	I					-4.6	1	1.0	No	Diquat	85-00-7					4.4E+00			4.4E+00	20	8.3E-02	3.8E-01
7.1E+00	C	1.4E-01	C							4.9	1	1.0	No	Direct Black 38	1937-37-7	1.1E-02			1.1E-02						5.3E+00	
7.4E+00	C	1.4E-01	C							2.6	1	1.0	No	Direct Blue 6	2602-46-2	1.1E-02			1.1E-02						1.7E+01	
6.7E+00	C	1.4E-01	C							-6.53	1	1.0	No	Direct Brown 95	16071-86-6	1.2E-02			1.2E-02						1.6E-01	
				4.0E-05	I					4.02	1	0.9	Yes	Disulfoton	298-04-4					8.0E-02	1.3E-01		5.0E-02		9.4E-05	
				1.0E-02	I			V		0.77	1	1.0	Yes	Dithiane, 1,4-	505-29-3					2.0E+01	1.6E+03		2.0E+01		9.7E-03	
				2.0E-03	I					2.68	1	1.0	Yes	Diuron	330-54-1					4.0E+00	3.6E+01		3.6E+00		1.5E-03	
				2.0E-02	O					1.15	1	1.0	Yes	Dodine	2439-10-3					4.0E+01	5.3E+03		4.0E+01		2.1E-01	
				5.0E-02	O			V		3.21	1	1.0	Yes	EPTC	759-94-4					1.0E+02	3.0E+02		7.5E+01		4.0E-02	
				6.0E-03	I			V		3.83	1	0.9	Yes	Endosulfan	115-29-7					1.2E+01	6.3E+01		1.0E+01		1.4E-01	
				6.0E-03	P					3.66	1	0.9	Yes	Endosulfan Sulfate	1031-07-8					1.2E+01	9.1E+01		1.1E+01		2.1E-01	
				2.0E-02	I					1.91	1	1.0	Yes	Endothall	145-73-3					4.0E+01	8.5E+02		3.8E+01	100	9.2E-03	2.4E-02
				3.0E-04	I					5.2	1	0.8	Yes	Endrin	72-20-8					6.0E-01	3.7E-01		2.3E-01	2	9.2E-03	8.1E-02
9.9E-03	I	1.2E-06	I	6.0E-03	P	1.0E-03	I	V		0.45	1	1.0	Yes	Epichlorohydrin	106-89-8	7.9E+00	7.9E+02	4.7E+00	2.9E+00	1.2E+01	1.3E+03	2.1E-01	2.0E-01		4.5E-05	
						2.0E-02	I	V		0.86	1	1.0	Yes	Epoxybutane, 1,2-	106-88-7							4.2E+00	4.2E+00		9.2E-04	
				4.0E-02	P					-1.18	1	1.0	Yes	Ethanol, 2-(2-methoxyethoxy)-	111-77-3					8.0E+01	3.9E+04		8.0E+01		1.6E-02	
				5.0E-03	I					-0.22	1	1.0	Yes	Ethephon	16672-87-0					1.0E+01	4.2E+03		1.0E+01		2.1E-03	
				5.0E-04	I					5.07	1	0.8	Yes	Ethion	563-12-2					1.0E+00	7.7E-01		4.3E-01		8.5E-04	
				1.0E-01	P	6.0E-02	P	V		0.59	1	1.0	Yes	Ethoxyethanol Acetate, 2-	111-15-9					2.0E+02	2.3E+04	1.3E+01	1.2E+01		2.5E-03	
				9.0E-02	P	2.0E-01	I	V		-0.32	1	1.0	Yes	Ethoxyethanol, 2-	110-80-5					1.8E+02	6.3E+04	4.2E+01	3.4E+01		6.8E-03	
				9.0E-01	I	7.0E-02	P	V		0.73	1	1.0	Yes	Ethyl Acetate	141-78-6					1.8E+03	1.2E+05	1.5E+01	1.4E+01		3.1E-03	
				5.0E-03	P	8.0E-03	P	V		1.32	1	1.0	Yes	Ethyl Acrylate	140-88-5					1.0E+01	3.0E+02	1.7E+00	1.4E+00		3.2E-04	
						1.0E+01	I	V		1.43	1	1.0	Yes	Ethyl Chloride (Chloroethane)	75-00-3							2.1E+03	2.1E+03		5.9E-01	
				2.0E-01	I			V		0.89	1	1.0	Yes	Ethyl Ether	60-29-7					4.0E+02	2.0E+04		3.9E+02		8.8E-02	
						3.0E-01	P	V		1.94	1	1.0	Yes	Ethyl Methacrylate	97-63-2							6.3E+01	6.3E+01		1.5E-02	
				1.0E-05	I					4.78	1	0.8	Yes	Ethyl-p-nitrophenyl Phosphonate	2104-64-5					2.0E-02	1.6E-02		8.9E-03		2.8E-04	
1.1E-02	C	2.5E-06	C	1.0E-01	I	1.0E+00	I	V		3.15	1	1.0	Yes	Ethylbenzene	100-41-4	7.1E+00	1.2E+01	2.2E+00	1.5E+00	2.0E+02	3.8E+02	2.1E+02	8.1E+01	700	1.7E-03	7.9E-01
				7.0E-02	P					-0.94	1	1.0	Yes	Ethylene Cyanohydrin	109-78-4					1.4E+02	1.1E+05		1.4E+02		2.8E-02	
				9.0E-02	P			V		-2.04	1	1.0	No	Ethylene Diamine	107-15-3					1.8E+02			1.8E+02		4.2E-02	
				2.0E+00	I	4.0E-01	C			-1.36	1	1.0	Yes	Ethylene Glycol	107-21-1					4.0E+03	5.7E+06		4.0E+03		8.1E-01	
				1.0E-01	I	1.6E+00	I			0.83	1	1.0	Yes	Ethylene Glycol Monobutyl Ether	111-76-2					2.0E+02	1.4E+04		2.0E+02		4.1E-02	
3.1E-01	C	3.0E-03	I			3.0E-02	C	V	M	-0.3	1	1.0	Yes	Ethylene Oxide	75-21-8	8.1E-02	1.7E+01	6.8E-04	6.7E-04			6.3E+00	6.3E+00		1.4E-07	
4.5E-02	C	1.3E-05	C	8.0E-05	I					-0.66	1	1.0	Yes	Ethylene Thiourea	96-45-7	1.7E+00	1.0E+03		1.7E+00	1.6E-01	1.0E+02		1.6E-01		3.6E-05	
6.5E+01	C	1.9E-02	C					V		-0.28	1	1.0	Yes	Ethyleneimine	151-56-4	1.2E-03	2.5E-01	3.0E-04	2.4E-04						5.2E-08	
				3.0E+00	I					2.19	1	1.0	Yes	Ethylphthalyl Ethyl Glycolate	84-72-0					6.0E+03	1.5E+05		5.8E+03		1.3E+01	
				2.5E-04	I					3.23	1	0.9	Yes	Fenamiphos	22224-92-6					5.0E-01	3.4E+00		4.4E-01		4.4E-04	
				2.5E-02	I					5.7	1	0.8	Yes	Fenpropathrin	39515-41-8					5.0E+01	7.3E+00		6.4E+00		2.9E-01	
				2.5E-02	I					6.2	1	0.7	No	Fenvalerate	51630-58-1					5.0E+01			5.0E+01		3.2E+01	

TR=1E-06
THQ=0.1

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; W = TEF applied; E = RPF applied; G = user's guide Section 5; M = mutagen; V = volatile; R = RBA applied;
c = cancer; n = noncancer; * = where: n SL < 100X c SL; ** = where n SL < 10X c SL; SSL values are based on DAF=1; m = ceiling limit exceeded; s = Csat exceeded.

Toxicity and Chemical-specific Information													Contaminant		Carcinogenic Target Risk (TR) = 1E-06				Noncancer CHILD Hazard Index (HI) = 0.1					Protection of Groundwater SSL	
SFO (mg/kg-day)$^{-1}$	key	IUR (ug/m^3)$^{-1}$	key	RfD_o (mg/kg-day)	key	RfC_i (mg/m^3)	key	vol	mutagen	LOGP	GIABS	FA	In EPD?	Analyte	CAS No.	Ingestion SL TR=1E-06 (ug/L)	Dermal SL TR=1E-06 (ug/L)	Inhalation SL TR=1E-06 (ug/L)	Carcinogenic SL TR=1E-06 (ug/L)	Ingestion SL Child THQ=0.1 (ug/L)	Dermal SL Child THQ=0.1 (ug/L)	Inhalation SL Child THQ=0.1 (ug/L)	Noncarcinogenic SL Child THI=0.1 (ug/L)	MCL (ug/L)	Risk-based SSL (mg/kg)	MCL-based SSL (mg/kg)
				1.3E-02	I					2.42	1	1.0	Yes	Fluometuron	2164-17-2					2.6E+01	3.4E+02		2.4E+01		1.9E-02	
				4.0E-02	C	1.3E-02	C				1	1.0	Yes	Fluoride	16984-48-8					8.0E+01	1.8E+04		8.0E+01	4000	1.2E+01	6.0E+02
				6.0E-02	I	1.3E-02	C				1	1.0	Yes	Fluorine (Soluble Fluoride)	7782-41-4					1.2E+02	2.7E+04		1.2E+02	4000	1.8E+01	6.0E+02
				8.0E-02	I					3.16	1	0.9	Yes	Fluridone	59756-60-4					1.6E+02	1.4E+03		1.4E+02		1.6E+01	
				4.0E-02	O					3.34	1	0.9	Yes	Flurprimidol	56425-91-3					8.0E+01	4.8E+02		6.9E+01		3.2E-01	
				2.0E-03	O					3.7	1	0.9	Yes	Flusilazole	85509-19-9					4.0E+00	1.4E+01		3.1E+00		5.1E-01	
				5.0E-01	O					3.7	1	0.9	Yes	Flutolanil	66332-96-5					1.0E+03	3.7E+03		7.9E+02		4.2E+00	
				1.0E-02	I					6.81	1	0.6	No	Fluvalinate	69409-94-5					2.0E+01			2.0E+01		2.9E+01	
				9.0E-02	O					2.85	1	1.0	Yes	Folpet	133-07-3					1.8E+02	1.9E+03		1.6E+02		3.9E-02	
				2.5E-03	O					2.9	1	1.0	Yes	Fomesafen	72178-02-0					5.0E+00	1.2E+02		4.8E+00		1.6E-02	
				2.0E-03	I					3.94	1	0.9	Yes	Fonofos	944-22-9					4.0E+00	6.3E+00		2.4E+00		4.7E-03	
2.1E-02	C	1.3E-05	I	2.0E-01	I	9.8E-03	A	V		0.35	1	1.0	Yes	Formaldehyde	50-00-0	3.7E+00	2.6E+02	4.3E-01	3.9E-01	4.0E+02	3.2E+04	2.0E+00	2.0E+00		7.8E-05	
				9.0E-01	P	3.0E-04	X	V		-0.54	1	1.0	Yes	Formic Acid	64-18-6					1.8E+03	6.4E+05	6.3E-02	6.3E-02		1.3E-05	
				2.5E+00	O					-2.4	1	1.0	No	Fosetyl-AL	39148-24-8					5.0E+03			5.0E+03		6.6E+01	
														Furans												
				1.0E-03	X			V		4.12	1	1.0	Yes	~Dibenzofuran	132-64-9					2.0E+00	1.3E+00		7.9E-01		1.5E-02	
				1.0E-03	I			V		1.34	1	1.0	Yes	~Furan	110-00-9					2.0E+00	4.8E+01		1.9E+00		7.3E-04	
				9.0E-01	I	2.0E+00	I	V		0.46	1	1.0	Yes	~Tetrahydrofuran	109-99-9					1.8E+03	1.7E+05	4.2E+02	3.4E+02		7.5E-02	
3.8E+00	H									-0.04	1	1.0	Yes	Furazolidone	67-45-8	2.1E-02	1.0E+01		2.0E-02						3.9E-05	
				3.0E-03	I	5.0E-02	H	V		0.41	1	1.0	Yes	Furfural	98-01-1					6.0E+00	7.1E+02	1.0E+01	3.8E+00		8.1E-04	
1.5E+00	C	4.3E-04	C							1.8	1	1.0	Yes	Furium	531-82-8	5.2E-02	1.9E+00		5.1E-02						6.9E-05	
3.0E-02	I	8.6E-06	C							4.38	1	0.9	Yes	Furmecyclox	60568-05-0	2.6E+00	2.0E+00		1.1E+00						1.2E-03	
				6.0E-03	O					-4.81	1	1.0	No	Glufosinate, Ammonium	77182-82-2					1.2E+01			1.2E+01		2.7E-03	
				1.0E-01	A	8.0E-05	C			-0.33	1	1.0	Yes	Glutaraldehyde	111-30-8					2.0E+02	6.0E+04		2.0E+02		4.0E-02	
				4.0E-04	I	1.0E-03	H	V		-0.12	1	1.0	Yes	Glycidyl	765-34-4					8.0E-01	1.8E+02	2.1E-01	1.7E-01		3.3E-05	
				1.0E-01	I					-3.4	1	1.0	No	Glyphosate	1071-83-6					2.0E+02			2.0E+02	700	8.8E-01	3.1E+00
				1.0E-02	X			V		-1.63	1	1.0	Yes	Guanidine	113-00-8					2.0E+01	4.2E+04		2.0E+01		4.5E-03	
				2.0E-02	P					-3.56	1	1.0	No	Guanidine Chloride	50-01-1					4.0E+01			4.0E+01			
				3.0E-02	X					-8.35	1	1.0	No	Guanidine Nitrate	506-93-4					6.0E+01			6.0E+01		1.5E-02	
				5.0E-05	I					4.07	1	0.9	Yes	Haloxyfop, Methyl	69806-40-2					1.0E-01	3.1E-01		7.6E-02		8.4E-04	
4.5E+00	I	1.3E-03	I	5.0E-04	I			V		6.1	1	0.8	Yes	Heptachlor	76-44-8	1.7E-02	2.3E-03	4.3E-03	1.4E-03	1.0E+00	1.5E-01		1.3E-01	0.4	1.2E-04	3.3E-02
9.1E+00	I	2.6E-03	I	1.3E-05	I			V		4.98	1	0.8	Yes	Heptachlor Epoxide	1024-57-3	8.6E-03	7.1E-03	2.2E-03	1.4E-03	2.6E-02	2.4E-02		1.2E-02	0.2	2.8E-05	4.1E-03
						3.0E-03	X	V		2.29	1	1.0	Yes	Heptanal, n-	111-71-7							6.3E-01	6.3E-01		1.4E-04	
				3.0E-04	X	4.0E-01	P	V		4.66	1	1.0	No	Heptane, N-	142-82-5					6.0E-01		8.3E+01	6.0E-01		4.8E-03	
				2.0E-03	I			V		6.07	1	0.7	No	Hexabromobenzene	87-82-1					4.0E+00			4.0E+00		2.3E-02	
				2.0E-04	I						1	0.0	No	Hexabromodiphenyl ether, 2,2',4,4',5,5'- (BDE-153)	68631-49-2					4.0E-01			4.0E-01			
1.6E+00	I	4.6E-04	I	8.0E-04	I			V		5.73	1	0.9	No	Hexachlorobenzene	118-74-1	4.9E-02		1.2E-02	9.8E-03	1.6E+00			1.6E+00	1	1.2E-04	1.3E-02
7.8E-02	I	2.2E-05	I	1.0E-03	P			V		4.78	1	0.9	Yes	Hexachlorobutadiene	87-68-3	1.0E+00	4.4E-01	2.6E-01	1.4E-01	2.0E+00	9.5E-01		6.5E-01		2.7E-04	
6.3E+00	I	1.8E-03	I	8.0E-03	A					3.8	1	0.9	Yes	Hexachlorocyclohexane, Alpha-	319-84-6	1.2E-02	1.8E-02		7.2E-03	1.6E+01	2.5E+01		9.7E+00		4.2E-05	
1.8E+00	I	5.3E-04	I							3.78	1	0.9	Yes	Hexachlorocyclohexane, Beta-	319-85-7	4.3E-02	6.1E-02		2.5E-02						1.5E-04	
1.1E+00	C	3.1E-04	C	3.0E-04	I					3.72	1	0.9	Yes	Hexachlorocyclohexane, Gamma- (Lindane)	58-89-9	7.1E-02	1.0E-01		4.2E-02	6.0E-01	9.3E-01		3.6E-01	0.2	2.4E-04	1.2E-03
1.8E+00	I	5.1E-04	I							4.14	1	0.9	Yes	Hexachlorocyclohexane, Technical	608-73-1	4.3E-02	6.1E-02		2.5E-02						1.5E-04	
				6.0E-03	I	2.0E-04	I	V		5.04	1	0.9	Yes	Hexachlorocyclopentadiene	77-47-4					1.2E+01	4.2E+00	4.2E-02	4.1E-02	50	1.3E-04	1.6E-01
4.0E-02	I	1.1E-05	C	7.0E-04	I	3.0E-02	I	V		4.14	1	1.0	Yes	Hexachloroethane	67-72-1	1.9E+00	1.7E+00	5.1E-01	3.3E-01	1.4E+00	1.4E+00	6.3E+00	6.2E-01		2.0E-04	
				3.0E-04	I					7.54	1	0.0	No	Hexachlorophene	70-30-4					6.0E-01			6.0E-01		8.1E-01	
8.0E-02	I			4.0E-03	I					0.87	1	1.0	Yes	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	121-82-4	9.7E-01	1.2E+02		9.7E-01	8.0E+00	1.1E+03		8.0E+00		3.7E-04	
						1.0E-05	I	V		3.2	1	1.0	Yes	Hexamethylene Diisocyanate, 1,6-	822-06-0							2.1E-03	2.1E-03		2.1E-05	
				4.0E-04	P					0.28	1	1.0	Yes	Hexamethylphosphoramide	680-31-9					8.0E-01	2.0E+02		8.0E-01		1.8E-04	
						7.0E-01	I	V		3.9	1	1.0	Yes	Hexane, N-	110-54-3							1.5E+02	1.5E+02		1.0E+00	
				2.0E+00	P					0.08	1	1.0	Yes	Hexanedioic Acid	124-04-9					4.0E+03	1.1E+06		4.0E+03		9.9E-01	
9.5E-03	P			7.0E-02	P	4.0E-04	P	V		2.73	1	1.0	Yes	Hexanol, 1-,2-ethyl- (2-Ethyl-1-hexanol)	104-76-7	8.2E+00	3.2E+01		6.5E+00	1.4E+02	5.9E+02	8.3E-02	8.3E-02			
				5.0E-03	I	3.0E-02	I	V		1.38	1	1.0	Yes	Hexanone, 2-	591-78-6					1.0E+01	2.8E+02	6.3E+00	3.8E+00		8.8E-04	
				3.3E-02	I					1.85	1	1.0	Yes	Hexazinone	51235-04-2					6.6E+01	2.4E+03		6.4E+01		3.0E-02	
				2.5E-02	I					5.57	1	0.8	Yes	Hexythiazox	78587-05-0					5.0E+01	1.4E+01		1.1E+01		5.0E-02	
				1.7E-02	O					2.31	1	1.0	Yes	Hydramethylnon	67485-29-4					3.4E+01	2.9E+03		3.4E+01		1.2E+04	
3.0E+00	I	4.9E-03	I			3.0E-05	P	V		-2.07	1	1.0	Yes	Hydrazine	302-01-2	2.6E-02	1.1E+02	1.1E-03	1.1E-03			6.3E-03	6.3E-03		2.2E-07	
3.0E+00	I	4.9E-03	I								1	1.0	Yes	Hydrazine Sulfate	10034-93-2	2.6E-02	4.9E+00		2.6E-02							
						2.0E-02	I	V			1	1.0	Yes	Hydrogen Chloride	7647-01-0							4.2E+00	4.2E+00			
				4.0E-02	C	1.4E-02	C	V		0.23	1	1.0	Yes	Hydrogen Fluoride	7664-39-3					8.0E+01	1.8E+04	2.9E+00	2.8E+00			
						2.0E-03	I	V		0.23	1	1.0	Yes	Hydrogen Sulfide	7783-06-4							4.2E-01	4.2E-01			
6.0E-02	P			4.0E-02	P					0.59	1	1.0	Yes	Hydroquinone	123-31-9	1.3E+00	1.2E+02		1.3E+00	8.0E+01	7.9E+03		7.9E+01		8.8E-04	
6.1E-02	O			2.5E-03	O					3.82	1	0.9	Yes	Imazalil	35554-44-0	1.3E+00	3.1E+00		9.0E-01	5.0E+00	1.3E+01		3.6E+00		1.6E-02	
				2.5E-01	I					1.86	1	1.0	Yes	Imazaquin	81335-37-7					5.0E+02	2.6E+04		4.9E+02		2.5E+00	
				2.5E+00	O					1.49	1	1.0	Yes	Imazethapyr	81335-77-5					5.0E+03	7.2E+04		4.7E+03		4.1E+00	
				1.0E-02	A					2.49	1	1.0	Yes	Iodine	7553-56-2					2.0E+01	4.6E+03		2.0E+01		1.2E+00	
				4.0E-02	I					3	1	0.9	Yes	Iprodione	36734-19-7					8.0E+01	9.1E+02		7.4E+01		2.3E-02	
				7.0E-01	P						1	1.0	Yes	Iron	7439-89-6					1.4E+03	3.2E+05		1.4E+03		3.5E+01	
				3.0E-01	I			V		0.76	1	1.0	Yes	Isobutyl Alcohol	78-83-1					6.0E+02	3.6E+04		5.9E+02		1.2E-01	
9.5E-04	I			2.0E-01	I	2.0E+00	C			1.7	1	1.0	Yes	Isophorone	78-59-1	8.2E+01	1.6E+03		7.8E+01	4.0E+02	8.6E+03		3.8E+02		2.6E-02	
				1.5E-02	I			V		5.8	1	0.8	Yes	Isopropalin	33820-53-0					3.0E+01	4.6E+00		4.0E+00		9.2E-02	
				2.0E+00	P	2.0E-01	P	V		0.05	1	1.0	Yes	Isopropanol	67-63-0					4.0E+03	6.5E+05	4.2E+01	4.1E+01		8.4E-03	
				1.0E-01	I					0.27	1	1.0	Yes	Isopropyl Methyl Phosphonic Acid	1832-54-8					2.0E+02	3.9E+04		2.0E+02		4.3E-02	
				5.0E-02	I					3.94	1	0.9	Yes	Isoxaben	82558-50-7					1.0E+02	2.7E+02		7.3E+01		2.0E-01	
						3.0E-01	A	V		8	1	0.0	No	JP-7	E1737665							6.3E+01	6.3E+01			
				8.0E-03	O					4.81	1	0.9	Yes	Lactofen	77501-63-4					1.6E+01	2.7E+01		1.0E+01		4.6E-01	
				2.0E-04	X					-0.94	1	1.0	Yes	Lactonitrile	78-97-7					4.0E-01	3.2E+02		4.0E-01		8.1E-05	
				5.0E-05	P						1	1.0	Yes	Lanthanum	7439-91-0					1.0E-01	2.3E+01		1.0E-01			
				2.1E-05	P						1	0.0	No	Lanthanum Acetate Hydrate	100587-90-4					4.2E-02			4.2E-02			
				1.9E-05	P						1	1.0	Yes	Lanthanum Chloride Heptahydrate	10025-84-0					3.8E-02	8.5E+00		3.7E-02			
				2.8E-05	P						1	1.0	Yes	Lanthanum Chloride, Anhydrous	10099-58-8					5.7E-02	1.3E+01		5.7E-02			
				1.6E-05	P						1	0.9	Yes	Lanthanum Nitrate Hexahydrate	10277-43-7					3.2E-02	7.3E+00		3.2E-02			
														Lead Compounds												

TR=1E-06
THQ=0.1

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; W = TEF applied; E = RPF applied; G = user's guide Section 5; M = mutagen; V = volatile; R = RBA applied;
c = cancer; n = noncancer; * = where: n SL < 100X c SL; ** = where n SL < 10X c SL; SSL values are based on DAF=1; m = ceiling limit exceeded; s = Csat exceeded.

Toxicity and Chemical-specific Information													Contaminant		Carcinogenic Target Risk (TR) = 1E-06				Noncancer CHILD Hazard Index (HI) = 0.1					Protection of Groundwater SSL	
SFO (mg/kg-day)$^{-1}$	key	IUR (ug/m^3)$^{-1}$	key	RfD$_o$ (mg/kg-day)	key	RfC$_i$ (mg/m^3)	key	volatile	mutagen	LOGP	GIABS	FA	In EPD?	Analyte	CAS No.	Ingestion SL TR=1E-06 (ug/L)	Dermal SL TR=1E-06 (ug/L)	Inhalation SL TR=1E-06 (ug/L)	Carcinogenic SL TR=1E-06 (ug/L)	Ingestion SL Child THQ=0.1 (ug/L)	Dermal SL Child THQ=0.1 (ug/L)	Inhalation SL Child THQ=0.1 (ug/L)	Noncarcinogenic SL Child THI=0.1 (ug/L)	MCL (ug/L)	Risk-based SSL (mg/kg)	MCL-based SSL (mg/kg)
8.5E-03	C	1.2E-05	C								1	0.8	Yes	~Lead Phosphate	7446-27-7	9.2E+00	1.7E+03		9.1E+00							
8.5E-03	C	1.2E-05	C							-0.08	1	1.0	Yes	~Lead acetate	301-04-2	9.2E+00	9.1E+03		9.2E+00						1.9E-03	
											1	1.0	Yes	~Lead and Compounds	7439-92-1								1.5E+01	15		1.4E+01
8.5E-03	C	1.2E-05	C							-4	1	1.0	No	~Lead subacetate	1335-32-6	9.2E+00			9.2E+00						2.0E-03	
				1.0E-07	I			V		4.15	1	0.9	Yes	~Tetraethyl Lead	78-00-2					2.0E-04	3.8E-04		1.3E-04		4.7E-07	
				5.0E-06	P			V		2.56	1	1.0	Yes	Lewisite	541-25-3					1.0E-02	9.1E-02		9.0E-03		3.8E-06	
				7.7E-03	O					3.2	1	0.9	Yes	Linuron	330-55-2					1.5E+01	7.6E+01		1.3E+01		1.1E-02	
				2.0E-03	P						1	1.0	Yes	Lithium	7439-93-2					4.0E+00	9.1E+02		4.0E+00		1.2E+00	
				5.0E-04	I					3.25	1	1.0	Yes	MCPA	94-74-6					1.0E+00	3.0E+00		7.5E-01		2.0E-04	
				4.4E-03	O					2.79	1	0.9	Yes	MCPB	94-81-5					8.8E+00	2.4E+01		6.5E+00		2.6E-03	
				1.0E-03	I					3.13	1	1.0	Yes	MCPP	93-65-2					2.0E+00	7.1E+00		1.6E+00		4.7E-04	
				2.0E-02	I					2.36	1	1.0	Yes	Malathion	121-75-5					4.0E+01	1.1E+03		3.9E+01		1.0E-02	
				1.0E-01	I	7.0E-04	C			1.62	1	1.0	Yes	Maleic Anhydride	108-31-6					2.0E+02	3.8E+03		1.9E+02		3.9E-02	
				5.0E-01	I					-0.84	1	1.0	Yes	Maleic Hydrazide	123-33-1					1.0E+03	8.9E+05		1.0E+03		2.1E-01	
				1.0E-04	P					-0.6	1	1.0	Yes	Malononitrile	109-77-3					2.0E-01	9.2E+01		2.0E-01		4.1E-05	
				3.0E-02	H					1.33	1	0.9	Yes	Mancozeb	8018-01-7					6.0E+01	4.9E+02		5.4E+01		7.6E-02	
				5.0E-03	I					0.62	1	1.0	Yes	Maneb	12427-38-2					1.0E+01	3.6E+02		9.8E+00		1.4E-02	
				1.4E-01	I	5.0E-05	I				1	1.0		Manganese (Diet)	7439-96-5											
				2.4E-02	G	5.0E-05	I				0.04	1.0	Yes	Manganese (Non-diet)	7439-96-5					4.8E+01	4.4E+02		4.3E+01		2.8E+00	
				9.0E-05	H					1.04	1	1.0	Yes	Mephosfolan	950-10-7					1.8E-01	2.5E+01		1.8E-01		2.6E-04	
				3.0E-02	I					-2.82	1	1.0	No	Mepiquat Chloride	24307-26-4					6.0E+01			6.0E+01		2.0E-02	
1.1E-02	P			4.0E-03	P					2.42	1	1.0	Yes	Mercaptobenzothiazole, 2-	149-30-4	7.1E+00	5.6E+01		6.3E+00	8.0E+00	6.9E+01		7.2E+00		1.8E-02	
														Mercury Compounds												
				3.0E-04	I	3.0E-04	G			-0.22	0.07	1.0	Yes	~Mercuric Chloride (and other Mercury salts)	7487-94-7					6.0E-01	9.6E+00		5.7E-01	2		
						3.0E-04	I	V		0.62	1	1.0	Yes	~Mercury (elemental)	7439-97-6							6.3E-02	6.3E-02	2	3.3E-03	1.0E-01
				1.0E-04	I						1	1.0	Yes	~Methyl Mercury	22967-92-6					2.0E-01	4.6E+01		2.0E-01		1.4E+00	
				8.0E-05	I					0.71	1	1.0	Yes	~Phenylmercuric Acetate	62-38-4					1.6E-01	5.7E+01		1.6E-01		5.0E-05	
				3.0E-05	I			V		7.67	1	0.3	No	Merphos	150-50-5					6.0E-02			6.0E-02		5.9E-03	
				1.0E-04	O					5.7	1	0.9	Yes	Merphos Oxide	78-48-8					2.0E-01	3.3E-02		2.8E-02		1.4E-04	
				6.0E-02	I					1.65	1	1.0	Yes	Metalaxyl	57837-19-1					1.2E+02	6.4E+03		1.2E+02		3.3E-02	
				1.0E-04	I	3.0E-02	P	V		0.68	1	1.0	Yes	Methacrylonitrile	126-98-7					2.0E-01	1.3E+01	6.3E+00	1.9E-01		4.4E-05	
				5.0E-05	I					-0.8	1	1.0	Yes	Methamidophos	10265-92-6					1.0E-01	1.0E+02		1.0E-01		2.1E-05	
				2.0E+00	I	2.0E+01	I	V		-0.77	1	1.0	Yes	Methanol	67-56-1					4.0E+03	1.8E+06	4.2E+03	2.0E+03		4.1E-01	
				1.5E-03	O					2.2	1	1.0	Yes	Methidathion	950-37-8					3.0E+00	8.7E+01		2.9E+00		7.1E-04	
				2.5E-02	I					0.6	1	1.0	Yes	Methomyl	16752-77-5					5.0E+01	6.8E+03		5.0E+01		1.1E-02	
4.9E-02	C	1.4E-05	C							1.47	1	1.0	Yes	Methoxy-5-nitroaniline, 2-	99-59-2	1.6E+00	5.4E+01		1.5E+00						5.3E-04	
				5.0E-03	I					5.08	1	0.8	Yes	Methoxychlor	72-43-5					1.0E+01	5.9E+00		3.7E+00	40	2.0E-01	2.2E+00
				8.0E-03	P	1.0E-03	P	V		0.1	1	1.0	Yes	Methoxyethanol Acetate, 2-	110-49-6					1.6E+01	3.5E+03	2.1E-01	2.1E-01		4.2E-05	
				5.0E-03	P	2.0E-02	I	V		-0.77	1	1.0	Yes	Methoxyethanol, 2-	109-86-4					1.0E+01	6.3E+03	4.2E+00	2.9E+00		6.0E-04	
				1.0E+00	X			V		0.18	1	1.0	Yes	Methyl Acetate	79-20-9					2.0E+03	2.9E+05		2.0E+03		4.1E-01	
						2.0E-02	P	V		0.8	1	1.0	Yes	Methyl Acrylate	96-33-3							4.2E+00	4.2E+00		8.9E-04	
				6.0E-01	I	5.0E+00	I	V		0.29	1	1.0	Yes	Methyl Ethyl Ketone (2-Butanone)	78-93-3					1.2E+03	1.5E+05	1.0E+03	5.6E+02		1.2E-01	
		1.0E-03	X	1.0E-03	P	2.0E-05	X	V		-1.05	1	1.0	Yes	Methyl Hydrazine	60-34-4			5.6E-03	5.6E-03	2.0E+00	1.5E+03	4.2E-03	4.2E-03		9.4E-07	
						3.0E+00	I	V		1.31	1	1.0	Yes	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	108-10-1							6.3E+02	6.3E+02		1.4E-01	
						1.0E-03	C	V		0.79	1	1.0	Yes	Methyl Isocyanate	624-83-9							2.1E-01	2.1E-01		5.9E-05	
				1.4E+00	I	7.0E-01	I	V		1.38	1	1.0	Yes	Methyl Methacrylate	80-62-6					2.8E+03	7.7E+04	1.5E+02	1.4E+02		3.0E-02	
				2.5E-04	I					2.86	1	1.0	Yes	Methyl Parathion	298-00-0					5.0E-01	4.1E+00		4.5E-01		7.4E-04	
				6.0E-02	X					-0.7	1	1.0	Yes	Methyl Phosphonic Acid	993-13-5					1.2E+02	1.2E+05		1.2E+02		2.4E-02	
				6.0E-03	H	4.0E-02	H	V		3.44	1	0.8	Yes	Methyl Styrene (Mixed Isomers)	25013-15-4					1.2E+01	4.3E+00	8.3E+00	2.3E+00		3.8E-03	
9.9E-02	C	2.8E-05	C							-0.66	1	1.0	Yes	Methyl methanesulfonate	66-27-3	7.9E-01	4.8E+02		7.9E-01						1.6E-04	
1.8E-03	C	2.6E-07	C			3.0E+00	I	V		0.94	1	1.0	Yes	Methyl tert-Butyl Ether (MTBE)	1634-04-4	4.3E+01	2.0E+03	2.2E+01	1.4E+01			6.3E+02	6.3E+02		3.2E-03	
				3.0E-04	X					-2.06	1	1.0	Yes	Methyl-1,4-benzenediamine dihydrochloride, 2-	615-45-2					6.0E-01	5.9E+03		6.0E-01		3.6E-04	
						3.0E+00	X	V		1.43	1	1.0	Yes	Methyl-2-Pentanol, 4-	108-11-2							6.3E+02	6.3E+02		1.4E-01	
9.0E-03	P			2.0E-02	X					1.87	1	1.0	Yes	Methyl-5-Nitroaniline, 2-	99-55-8	8.7E+00	1.4E+02		8.2E+00	4.0E+01	7.3E+02		3.8E+01		4.6E-03	
8.3E+00	C	2.4E-03	C							-0.92	1	1.0	Yes	Methyl-N-nitro-N-nitrosoguanidine, N-	70-25-7	9.4E-03	1.1E+01		9.4E-03						3.2E-06	
1.3E-01	C	3.7E-05	C							1.62	1	1.0	Yes	Methylaniline Hydrochloride, 2-	636-21-5	6.0E-01	3.9E+03		6.0E-01						2.6E-04	
				1.0E-02	A					-1.18	1	1.0	Yes	Methylarsonic acid	124-58-3					2.0E+01	3.6E+04		2.0E+01		5.8E-03	
				2.0E-04	X						1	0.0	No	Methylbenzene,1-4-diamine monohydrochloride, 2-	74612-12-7					4.0E-01			4.0E-01			
1.0E-01	X			3.0E-04	X						1	0.0	No	Methylbenzene-1,4-diamine sulfate, 2-	615-50-9	7.8E-01			7.8E-01	6.0E-01			6.0E-01			
2.2E+01	C	6.3E-03	C						M	6.42	1	0.8	No	Methylcholanthrene, 3-	56-49-5	1.1E-03			1.1E-03						2.2E-03	
2.0E-03	I	1.0E-08	I	6.0E-03	I	6.0E-01	I	V	M	1.25	1	1.0	Yes	Methylene Chloride	75-09-2	1.3E+01	3.5E+02	2.0E+02	1.1E+01	1.2E+01	3.7E+02	1.3E+02	1.1E+01	5	2.7E-03	1.3E-03
1.0E-01	P	4.3E-04	C	2.0E-03	P				M	3.91	1	0.9	Yes	Methylene-bis(2-chloroaniline), 4,4'-	101-14-4	2.5E-01	4.3E-01		1.6E-01	4.0E+00	7.5E+00		2.6E+00		1.8E-03	
4.6E-02	I	1.3E-05	C							4.37	1	1.0	Yes	Methylene-bis(N,N-dimethyl) Aniline, 4,4'-	101-61-1	1.7E+00	6.7E-01		4.8E-01						2.7E-03	
1.6E+00	C	4.6E-04	C			2.0E-02	C			1.59	1	1.0	Yes	Methylenebisbenzenamine, 4,4'-	101-77-9	4.9E-02	1.7E+00		4.7E-02						2.1E-04	
						6.0E-04	I			5.22	1	0.9	Yes	Methylenediphenyl Diisocyanate	101-68-8											
				7.0E-02	H			V		3.48	1	1.0	Yes	Methylstyrene, Alpha-	98-83-9					1.4E+02	1.7E+02		7.8E+01		1.3E-01	
				1.5E-01	I					3.13	1	1.0	Yes	Metolachlor	51218-45-2					3.0E+02	2.6E+03		2.7E+02		3.2E-01	
				2.5E-02	I					1.7	1	1.0	Yes	Metribuzin	21087-64-9					5.0E+01	1.8E+03		4.9E+01		1.5E-02	
				2.5E-01	I					2.2	1	1.0	Yes	Metsulfuron-methyl	74223-64-6					5.0E+02	2.4E+04		4.9E+02		1.9E-01	
				3.0E+00	P			V		6.1	1	1.0	No	Mineral oils	8012-95-1					6.0E+03			6.0E+03		2.4E+02	
1.8E+01	C	5.1E-03	C	2.0E-04	I			V		6.89	1	0.5	No	Mirex	2385-85-5	4.3E-03		1.1E-03	8.8E-04	4.0E-01			4.0E-01		6.3E-04	
				2.0E-03	I					3.21	1	1.0	Yes	Molinate	2212-67-1					4.0E+00	1.2E+01		3.0E+00		1.7E-03	
				5.0E-03	I						1	1.0	Yes	Molybdenum	7439-98-7					1.0E+01	2.3E+03		1.0E+01		2.0E-01	
				1.0E-01	I						1	1.0	Yes	Monochloramine	10599-90-3					2.0E+02	4.6E+04		2.0E+02	4.0E+03 (G)		
				2.0E-03	P					1.66	1	1.0	Yes	Monomethylaniline	100-61-8					4.0E+00	7.5E+01		3.8E+00		1.4E-03	
				2.5E-02	I					2.94	1	1.0	Yes	Myclobutanil	88671-89-0					5.0E+01	4.7E+02		4.5E+01		5.6E-01	
				3.0E-04	X					4.04	1	0.9	Yes	N,N'-Diphenyl-1,4-benzenediamine	74-31-7					6.0E-01	8.9E-01		3.6E-01		3.7E-02	
				2.0E-03	I			V		1.38	1	1.0	Yes	Naled	300-76-5					4.0E+00	6.8E+02		4.0E+00		1.8E-03	
				3.0E-02	X	1.0E-01	P	V			1	0.0	No	Naphtha, High Flash Aromatic (HFAN)	64742-95-6					6.0E+01		2.1E+01	1.5E+01			
1.8E+00	C	0.0E+00	C							2.28	1	1.0	Yes	Naphthylamine, 2-	91-59-8	4.3E-02	3.6E-01		3.9E-02						2.0E-04	
				1.2E-01	O					3.36	1	0.9	Yes	Napropamide	15299-99-7					2.4E+02	1.1E+03		2.0E+02		1.3E+00	
		2.6E-04	C	1.1E-02	C	1.4E-05	C			-1.38	1	1.0	Yes	Nickel Acetate	373-02-4					2.2E+01	6.8E+04		2.2E+01		4.5E-03	

TR=1E-06
THQ=0.1

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; W = TEF applied; E = RPF applied; G = user's guide Section 5; M = mutagen; V = volatile; R = RBA applied;
c = cancer; n = noncancer; * = where: n SL < 100X c SL; ** = where n SL < 10X c SL; SSL values are based on DAF=1; m = ceiling limit exceeded; s = Csat exceeded.

Toxicity and Chemical-specific Information													Contaminant		Carcinogenic Target Risk (TR) = 1E-06				Noncancer CHILD Hazard Index (HI) = 0.1					Protection of Groundwater SSL	
SFO (mg/kg-day)$^{-1}$	key	IUR (ug/m^3)$^{-1}$	key	RfD_o (mg/kg-day)	key	RfC_i (mg/m^3)	key	volatile	mutagen	LOGP	GIABS	FA	In EPD?	Analyte	CAS No.	Ingestion SL TR=1E-06 (ug/L)	Dermal SL TR=1E-06 (ug/L)	Inhalation SL TR=1E-06 (ug/L)	Carcinogenic SL TR=1E-06 (ug/L)	Ingestion SL Child THQ=0.1 (ug/L)	Dermal SL Child THQ=0.1 (ug/L)	Inhalation SL Child THQ=0.1 (ug/L)	Noncarcinogenic SL Child THI=0.1 (ug/L)	MCL (ug/L)	Risk-based SSL (mg/kg)	MCL-based SSL (mg/kg)
		2.6E-04	C	1.1E-02	C	1.4E-05	C			-2.12	1	1.0	Yes	Nickel Carbonate	3333-67-3					2.2E+01	1.4E+05		2.2E+01			
		2.6E-04	C	1.1E-02	C	1.4E-05	C	V			1	0.0	Yes	Nickel Carbonyl	13463-39-3			2.2E-02	2.2E-02	2.2E+01		2.9E-03	2.9E-03			
		2.6E-04	C	1.1E-02	C	1.4E-05	C				0.04	1.0	Yes	Nickel Hydroxide	12054-48-7					2.2E+01	2.0E+02		2.0E+01			
		2.6E-04	C	1.1E-02	C	2.0E-05	C				0.04	1.0	Yes	Nickel Oxide	1313-99-1					2.2E+01	2.0E+02		2.0E+01			
		2.4E-04	I	1.1E-02	C	1.4E-05	C				0.04	0.0	Yes	Nickel Refinery Dust	E715532					2.2E+01	1.0E+03		2.2E+01		3.2E+00	
		2.6E-04	C	2.0E-02	I	9.0E-05	A				0.04	1.0	Yes	Nickel Soluble Salts	7440-02-0					4.0E+01	1.8E+03		3.9E+01		2.6E+00	
1.7E+00	C	4.8E-04	I	1.1E-02	C	1.4E-05	C				0.04	1.0	Yes	Nickel Subsulfide	12035-72-2	4.6E-02	1.7E+00		4.5E-02	2.2E+01	1.0E+03		2.2E+01			
		2.6E-04	C	1.1E-02	C	1.4E-05	C				1	0.0	Yes	Nickelocene	1271-28-9					2.2E+01			2.2E+01			
				1.6E+00	I						1	1.0	Yes	Nitrate (measured as nitrogen)	14797-55-8					3.2E+03	7.3E+05		3.2E+03	10000		
											1	0.0	Yes	Nitrate + Nitrite (measured as nitrogen)	E701177									10000		
				1.0E-01	I						1	1.0	Yes	Nitrite (measured as nitrogen)	14797-65-0					2.0E+02	4.6E+04		2.0E+02	1000		
				1.0E-02	X	5.0E-05	X			1.85	1	1.0	Yes	Nitroaniline, 2-	88-74-4					2.0E+01	3.4E+02		1.9E+01		8.0E-03	
2.0E-02	P			4.0E-03	P	6.0E-03	P			1.39	1	1.0	Yes	Nitroaniline, 4-	100-01-6	3.9E+00	1.2E+02		3.8E+00	8.0E+00	2.8E+02		7.8E+00		1.6E-03	
		4.0E-05	I	2.0E-03	I	9.0E-03	I	V		1.85	1	1.0	Yes	Nitrobenzene	98-95-3			1.4E-01	1.4E-01	4.0E+00	6.2E+01	1.9E+00	1.3E+00		9.2E-05	
				3.0E+03	P					-4.56	1	1.0	No	Nitrocellulose	9004-70-0					6.0E+06			6.0E+06		1.3E+03	
				7.0E-02	H					-0.47	1	1.0	Yes	Nitrofurantoin	67-20-9					1.4E+02	1.6E+05		1.4E+02		6.1E-02	
1.3E+00	C	3.7E-04	C							0.23	1	1.0	Yes	Nitrofurazone	59-87-0	6.0E-02	1.7E+01		6.0E-02						5.4E-05	
1.7E-02	P			1.0E-04	P					1.62	1	1.0	Yes	Nitroglycerin	55-63-0	4.6E+00	1.8E+02		4.5E+00	2.0E-01	8.7E+00		2.0E-01		8.5E-05	
				1.0E-01	I					-0.89	1	1.0	Yes	Nitroguanidine	556-88-7					2.0E+02	1.8E+05		2.0E+02		4.8E-02	
		8.8E-06	P			5.0E-03	P	V		-0.35	1	1.0	Yes	Nitromethane	75-52-5			6.4E-01	6.4E-01			1.0E+00	1.0E+00		1.4E-04	
		2.7E-03	H			2.0E-02	I	V		0.93	1	1.0	Yes	Nitropropane, 2-	79-46-9			2.1E-03	2.1E-03			4.2E+00	4.2E+00		5.5E-07	
2.7E+01	C	7.7E-03	C						M	0.23	1	1.0	Yes	Nitroso-N-ethylurea, N-	759-73-9	9.3E-04	1.5E-01		9.2E-04						2.2E-07	
1.2E+02	C	3.4E-02	C						M	-0.03	1	1.0	Yes	Nitroso-N-methylurea, N-	684-93-5	2.1E-04	4.6E-02		2.1E-04						4.6E-08	
5.4E+00	I	1.6E-03	I				V			2.63	1	1.0	Yes	Nitroso-di-N-butylamine, N-	924-16-3	1.4E-02	7.9E-02	3.5E-03	2.7E-03						5.5E-06	
7.0E+00	I	2.0E-03	C							1.36	1	1.0	Yes	Nitroso-di-N-propylamine, N-	621-64-7	1.1E-02	3.5E-01		1.1E-02						8.1E-06	
2.8E+00	I	8.0E-04	C							-1.28	1	1.0	Yes	Nitrosodiethanolamine, N-	1116-54-7	2.8E-02	8.1E+01		2.8E-02						5.6E-06	
1.5E+02	I	4.3E-02	I						M	0.48	1	1.0	Yes	Nitrosodiethylamine, N-	55-18-5	1.7E-04	1.7E-02		1.7E-04						6.1E-08	
5.1E+01	I	1.4E-02	I	8.0E-06	P	4.0E-05	X	V	M	-0.57	1	1.0	Yes	Nitrosodimethylamine, N-	62-75-9	4.9E-04	2.0E-01	1.4E-04	1.1E-04	1.6E-02	7.4E+00	8.3E-03	5.5E-03		2.8E-08	
4.9E-03	I	2.6E-06	C							3.13	1	1.0	Yes	Nitrosodiphenylamine, N-	86-30-6	1.6E+01	5.2E+01		1.2E+01						6.7E-02	
2.2E+01	I	6.3E-03	C				V			0.04	1	1.0	Yes	Nitrosomethylethylamine, N-	10595-95-6	3.5E-03	6.4E-01	8.9E-04	7.1E-04						2.0E-07	
6.7E+00	C	1.9E-03	C							-0.44	1	1.0	Yes	Nitrosomorpholine [N-]	59-89-2	1.2E-02	5.3E+00		1.2E-02						2.8E-06	
9.4E+00	C	2.7E-03	C							0.36	1	1.0	Yes	Nitrosopiperidine [N-]	100-75-4	8.3E-03	1.1E+00		8.2E-03						4.4E-06	
2.1E+00	I	6.1E-04	I							-0.19	1	1.0	Yes	Nitrosopyrrolidine, N-	930-55-2	3.7E-02	1.0E+01		3.7E-02						1.4E-05	
				1.0E-04	X					2.45	1	1.0	Yes	Nitrotoluene, m-	99-08-1					2.0E-01	1.4E+00		1.7E-01		1.6E-04	
2.2E-01	P			9.0E-04	P			V		2.3	1	1.0	Yes	Nitrotoluene, o-	88-72-2	3.5E-01	2.8E+00		3.1E-01	1.8E+00	1.5E+01		1.6E+00		3.0E-04	
1.6E-02	P			4.0E-03	P					2.37	1	1.0	Yes	Nitrotoluene, p-	99-99-0	4.9E+00	3.4E+01		4.3E+00	8.0E+00	6.2E+01		7.1E+00		4.0E-03	
				3.0E-04	X	2.0E-02	P	V		5.65	1	1.0	No	Nonane, n-	111-84-2					6.0E-01		4.2E+00	5.3E-01		7.5E-03	
				1.5E-02	O					2.3	1	1.0	Yes	Norflurazon	27314-13-2					3.0E+01	7.5E+02		2.9E+01		1.9E-01	
				3.0E-03	I					8.71	1	0.3	No	Octabromodiphenyl Ether	32536-52-0					6.0E+00			6.0E+00		1.2E+00	
				5.0E-02	I					0.16	1	1.0	Yes	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2691-41-0					1.0E+02	6.3E+04		1.0E+02		1.3E-01	
				2.0E-03	H					-1.01	1	1.0	Yes	Octamethylpyrophosphoramide	152-16-9					4.0E+00	1.4E+04		4.0E+00		9.6E-04	
7.8E-03	O			1.4E-01	O					3.73	1	0.9	Yes	Oryzalin	19044-88-3	1.0E+01	3.8E+01		7.9E+00	2.8E+02	1.2E+03		2.3E+02		1.5E-02	
				5.0E-03	I					4.8	1	0.8	Yes	Oxadiazon	19666-30-9					1.0E+01	9.0E+00		4.7E+00		4.8E-02	
				2.5E-02	I					-0.47	1	1.0	Yes	Oxamyl	23135-22-0					5.0E+01	5.1E+04		5.0E+01	200	1.1E-02	4.4E-02
7.3E-02	O			3.0E-02	O					4.73	1	0.8	Yes	Oxyfluorfen	42874-03-3	1.1E+00	1.1E+00		5.4E-01	6.0E+01	6.7E+01		3.2E+01		4.3E-02	
				1.3E-02	I					3.2	1	0.9	Yes	Paclobutrazol	76738-62-0					2.6E+01	1.7E+02		2.3E+01		4.6E-02	
				4.5E-03	I					-4.5	1	1.0	No	Paraquat Dichloride	1910-42-5					9.0E+00			9.0E+00		1.2E-01	
				6.0E-03	H					3.83	1	0.9	Yes	Parathion	56-38-2					1.2E+01	3.0E+01		8.6E+00		4.3E-02	
				5.0E-02	H			V		3.83	1	1.0	Yes	Pebulate	1114-71-2					1.0E+02	1.3E+02		5.6E+01		4.5E-02	
				3.0E-01	O					5.2	1	0.9	Yes	Pendimethalin	40487-42-1					6.0E+02	1.8E+02		1.4E+02		1.6E+00	
				2.0E-03	I			V		6.84	1	0.6	No	Pentabromodiphenyl Ether	32534-81-9					4.0E+00			4.0E+00		1.8E-01	
				1.0E-04	I					7.66	1	0.6	No	Pentabromodiphenyl ether, 2,2',4,4',5- (BDE-99)	60348-60-9					2.0E-01			2.0E-01		8.7E-03	
				8.0E-04	I			V		5.17	1	0.9	Yes	Pentachlorobenzene	608-93-5					1.6E+00	3.9E-01		3.2E-01		2.4E-03	
9.0E-02	P							V		3.22	1	1.0	Yes	Pentachloroethane	76-01-7	8.7E-01	2.5E+00		6.5E-01						3.1E-04	
2.6E-01	H			3.0E-03	I			V		4.64	1	0.9	Yes	Pentachloronitrobenzene	82-68-8	3.0E-01	2.0E-01		1.2E-01	6.0E+00	4.4E+00		2.6E+00		1.5E-03	
4.0E-01	I	5.1E-06	C	5.0E-03	I					5.12	1	0.9	Yes	Pentachlorophenol	87-86-5	1.9E-01	5.2E-02		4.1E-02	1.0E+01	2.9E+00		2.3E+00	1	5.7E-05	1.4E-03
4.0E-03	X			2.0E-03	P					2.38	1	1.0	Yes	Pentaerythritol tetranitrate (PETN)	78-11-5	1.9E+01	4.3E+02		1.9E+01	4.0E+00	9.6E+01		3.9E+00		5.8E-03	
						1.0E+00	P	V		3.39	1	1.0	Yes	Pentane, n-	109-66-0							2.1E+02	2.1E+02		1.0E+00	
														Perchlorates												
				7.0E-04	I						1	1.0	Yes	~Ammonium Perchlorate	7790-98-9					1.4E+00	3.2E+02		1.4E+00			
				7.0E-04	I						1	1.0	Yes	~Lithium Perchlorate	7791-03-9					1.4E+00	3.2E+02		1.4E+00			
				7.0E-04	I						1	1.0	Yes	~Perchlorate and Perchlorate Salts	14797-73-0					1.4E+00	3.2E+02		1.4E+00	1.5E+01 (G)		
				7.0E-04	I						1	1.0	Yes	~Potassium Perchlorate	7778-74-7					1.4E+00	1.6E+02		1.4E+00			
				7.0E-04	I						1	1.0	Yes	~Sodium Perchlorate	7601-89-0					1.4E+00	3.2E+02		1.4E+00			
				2.0E-02	P						1	0.0	Yes	Perfluorobutane sulfonic acid (PFBS)	375-73-5					4.0E+01			4.0E+01		1.3E-02	
				2.0E-02	P						1	0.0	Yes	Perfluorobutanesulfonate	45187-15-3					4.0E+01			4.0E+01		1.3E-02	
				5.0E-02	I					6.5	1	0.6	No	Permethrin	52645-53-1					1.0E+02			1.0E+02		2.4E+01	
2.2E-03	C	6.3E-07	C							1.58	1	1.0	Yes	Phenacetin	62-44-2	3.5E+01	1.1E+03		3.4E+01						9.7E-03	
				2.4E-01	O					3.59	1	0.9	Yes	Phenmedipham	13684-63-4					4.8E+02	1.8E+03		3.8E+02		2.1E+00	
				3.0E-01	I	2.0E-01	C			1.46	1	1.0	Yes	Phenol	108-95-2					6.0E+02	1.4E+04		5.8E+02		3.3E-01	
				4.0E-03	I					1.52	1	1.0	Yes	Phenol, 2-(1-methylethoxy)-, methylcarbamate	114-26-1					8.0E+00	3.6E+02		7.8E+00		2.5E-03	
				5.0E-04	X					4.15	1	1.0	Yes	Phenothiazine	92-84-2					1.0E+00	7.6E-01		4.3E-01		1.4E-03	
				2.0E-04	X			V		3.28	1	1.0	Yes	Phenyl Isothiocyanate	103-72-0					4.0E-01	7.6E-01		2.6E-01		1.7E-04	
				6.0E-03	I					-0.33	1	1.0	Yes	Phenylenediamine, m-	108-45-2					1.2E+01	4.8E+03		1.2E+01		3.2E-03	
1.2E-01	P			4.0E-03	P					0.15	1	1.0	Yes	Phenylenediamine, o-	95-54-5	6.5E-01	1.1E+02		6.5E-01	8.0E+00	1.5E+03		8.0E+00		1.7E-04	
				1.0E-03	X					-0.3	1	1.0	Yes	Phenylenediamine, p-	106-50-3					2.0E+00	7.6E+02		2.0E+00		5.4E-04	
1.9E-03	H									3.09	1	1.0	Yes	Phenylphenol, 2-	90-43-7	4.0E+01	1.2E+02		3.0E+01						4.1E-01	
				2.0E-04	H					3.56	1	0.9	Yes	Phorate	298-02-2					4.0E-01	1.2E+00		3.0E-01		3.4E-04	
						3.0E-04	I	V		-0.71	1	1.0	Yes	Phosgene	75-44-5							6.3E-02	6.3E-02		1.7E-05	
				2.0E-02	I					2.78	1	1.0	Yes	Phosmet	732-11-6					4.0E+01	5.3E+02		3.7E+01		8.2E-03	
														Phosphates, Inorganic												
				4.9E+01	P						1	1.0	Yes	~Aluminum metaphosphate	13776-88-0					9.7E+04	2.2E+07		9.7E+04			

TR=1E-06
THQ=0.1

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; W = TEF applied; E = RPF applied; G = user's guide Section 5; M = mutagen; V = volatile; R = RBA applied;
c = cancer; n = noncancer; * = where: n SL < 100X c SL; ** = where n SL < 10X c SL; SSL values are based on DAF=1; m = ceiling limit exceeded; s = Csat exceeded.

Toxicity and Chemical-specific Information													Contaminant		Carcinogenic Target Risk (TR) = 1E-06				Noncancer CHILD Hazard Index (HI) = 0.1					Protection of Groundwater SSL	
SFO (mg/kg-day)$^{-1}$	key	IUR (ug/m^3)$^{-1}$	key	RfD_o (mg/kg-day)	key	RfC_i (mg/m^3)	key	vol	mutagen	LOGP	GIABS	FA	In EPD?	Analyte	CAS No.	Ingestion SL TR=1E-06 (ug/L)	Dermal SL TR=1E-06 (ug/L)	Inhalation SL TR=1E-06 (ug/L)	Carcinogenic SL TR=1E-06 (ug/L)	Ingestion SL Child THQ=0.1 (ug/L)	Dermal SL Child THQ=0.1 (ug/L)	Inhalation SL Child THQ=0.1 (ug/L)	Noncarcinogenic SL Child THI=0.1 (ug/L)	MCL (ug/L)	Risk-based SSL (mg/kg)	MCL-based SSL (mg/kg)
				4.9E+01	P						1	0.0	Yes	~Ammonium polyphosphate	68333-79-9					9.7E+04	2.2E+07		9.7E+04			
				4.9E+01	P						1	1.0	Yes	~Calcium pyrophosphate	7790-76-3					9.7E+04	2.2E+07		9.7E+04			
				4.9E+01	P						1	1.0	Yes	~Diammonium phosphate	7783-28-0					9.7E+04	2.2E+07		9.7E+04			
				4.9E+01	P						1	1.0	Yes	~Dicalcium phosphate	7757-93-9					9.7E+04	2.2E+07		9.7E+04			
				4.9E+01	P						1	1.0	Yes	~Dimagnesium phosphate	7782-75-4					9.7E+04	2.2E+07		9.7E+04			
				4.9E+01	P						1	1.0	Yes	~Dipotassium phosphate	7758-11-4					9.7E+04	2.2E+07		9.7E+04			
				4.9E+01	P						1	1.0	Yes	~Disodium phosphate	7558-79-4					9.7E+04	2.2E+07		9.7E+04			
				4.9E+01	P						1	1.0	Yes	~Monoaluminum phosphate	13530-50-2					9.7E+04	2.2E+07		9.7E+04			
				4.9E+01	P						1	1.0	Yes	~Monoammonium phosphate	7722-76-1					9.7E+04	2.2E+07		9.7E+04			
				4.9E+01	P						1	1.0	Yes	~Monocalcium phosphate	7758-23-8					9.7E+04	2.2E+07		9.7E+04			
				4.9E+01	P						1	1.0	Yes	~Monomagnesium phosphate	7757-86-0					9.7E+04	2.2E+07		9.7E+04			
				4.9E+01	P						1	1.0	Yes	~Monopotassium phosphate	7778-77-0					9.7E+04	2.2E+07		9.7E+04			
				4.9E+01	P						1	1.0	Yes	~Monosodium phosphate	7558-80-7					9.7E+04	2.2E+07		9.7E+04			
				4.9E+01	P						1	1.0	Yes	~Polyphosphoric acid	8017-16-1					9.7E+04	2.2E+07		9.7E+04			
				4.9E+01	P						1	0.9	Yes	~Potassium tripolyphosphate	13845-36-8					9.7E+04	2.2E+07		9.7E+04			
				4.9E+01	P						1	1.0	Yes	~Sodium acid pyrophosphate	7758-16-9					9.7E+04	2.2E+07		9.7E+04			
				4.9E+01	P						1	1.0	Yes	~Sodium aluminum phosphate (acidic)	7785-88-8					9.7E+04	2.2E+07		9.7E+04			
				4.9E+01	P						1	0.0	Yes	~Sodium aluminum phosphate (anhydrous)	10279-59-1					9.7E+04	2.2E+07		9.7E+04			
				4.9E+01	P						1	0.8	Yes	~Sodium aluminum phosphate (tetrahydrate)	10305-76-7					9.7E+04	2.2E+07		9.7E+04			
				4.9E+01	P						1	0.9	Yes	~Sodium hexametaphosphate	10124-56-8					9.7E+04	2.2E+07		9.7E+04			
				4.9E+01	P						1	1.0	Yes	~Sodium polyphosphate	68915-31-1					9.7E+04	2.2E+07		9.7E+04			
				4.9E+01	P						1	1.0	Yes	~Sodium trimetaphosphate	7785-84-4					9.7E+04	2.2E+07		9.7E+04			
				4.9E+01	P						1	1.0	Yes	~Sodium tripolyphosphate	7758-29-4					9.7E+04	2.2E+07		9.7E+04			
				4.9E+01	P						1	1.0	Yes	~Tetrapotassium phosphate	7320-34-5					9.7E+04	2.2E+07		9.7E+04			
				4.9E+01	P						1	1.0	Yes	~Tetrasodium pyrophosphate	7722-88-5					9.7E+04	2.2E+07		9.7E+04			
				4.9E+01	P						1	0.8	Yes	~Trialuminum sodium tetra decahydrogenoctaorthophosphate (dihydrate)	15136-87-5					9.7E+04	2.2E+07		9.7E+04			
				4.9E+01	P						1	1.0	Yes	~Tricalcium phosphate	7758-87-4					9.7E+04	2.2E+07		9.7E+04			
				4.9E+01	P						1	1.0	Yes	~Trimagnesium phosphate	7757-87-1					9.7E+04	2.2E+07		9.7E+04			
				4.9E+01	P						1	1.0	Yes	~Tripotassium phosphate	7778-53-2					9.7E+04	2.2E+07		9.7E+04			
				4.9E+01	P						1	1.0	Yes	~Trisodium phosphate	7601-54-9					9.7E+04	2.2E+07		9.7E+04			
				3.0E-04	I	3.0E-04	I	V		-0.27	1	1.0	Yes	Phosphine	7803-51-2					6.0E-01	1.4E+02	6.3E-02	5.7E-02			
				4.9E+01	P	1.0E-02	I				1	1.0	Yes	Phosphoric Acid	7664-38-2					9.7E+04	2.2E+07		9.7E+04			
				2.0E-05	I			V		3.08	1	1.0	Yes	Phosphorus, White	7723-14-0					4.0E-02	9.1E+00		4.0E-02		1.5E-04	
														Phthalates												
1.4E-02	I	2.4E-06	C	2.0E-02	I					7.6	1	0.8	No	~Bis(2-ethylhexyl)phthalate	117-81-7	5.6E+00			5.6E+00	4.0E+01			4.0E+01	6	1.3E+00	1.4E+00
1.9E-03	P			2.0E-01	I					4.73	1	0.9	Yes	~Butyl Benzyl Phthalate	85-68-7	4.1E+01	2.7E+01		1.6E+01	4.0E+02	2.9E+02		1.7E+02		2.4E-01	
				1.0E+00	I					4.15	1	0.9	Yes	~Butylphthalyl Butylglycolate	85-70-1					2.0E+03	4.1E+03		1.3E+03		3.1E+01	
				1.0E-01	I					4.5	1	0.9	Yes	~Dibutyl Phthalate	84-74-2					2.0E+02	1.6E+02		9.0E+01		2.3E-01	
				8.0E-01	I					2.42	1	1.0	Yes	~Diethyl Phthalate	84-66-2					1.6E+03	2.0E+04		1.5E+03		6.1E-01	
				1.0E-01	I			V		2.25	1	1.0	Yes	~Dimethylterephthalate	120-61-6					2.0E+02	2.7E+03		1.9E+02		4.9E-02	
				1.0E-02	P					8.1	1	0.0	No	~Octyl Phthalate, di-N-	117-84-0					2.0E+01			2.0E+01		5.7E+00	
				1.0E+00	H					2	1	1.0	Yes	~Phthalic Acid, P-	100-21-0					2.0E+03	3.3E+04		1.9E+03		6.8E-01	
				2.0E+00	I	2.0E-02	C			1.6	1	1.0	Yes	~Phthalic Anhydride	85-44-9					4.0E+03	1.1E+05		3.9E+03		8.5E-01	
				7.0E-02	I					1.9	1	1.0	Yes	Picloram	1918-02-1					1.4E+02	4.3E+03		1.4E+02	500	3.8E-02	1.4E-01
				1.0E-04	X					0.93	1	1.0	Yes	Picramic Acid (2-Amino-4,6-dinitrophenol)	96-91-3					2.0E-01	2.1E+01		2.0E-01		1.3E-04	
				9.0E-04	X					1.44	1	1.0	Yes	Picric Acid (2,4,6-Trinitrophenol)	88-89-1					1.8E+00	1.2E+02		1.8E+00		8.4E-03	
				7.0E-05	O					4.2	1	0.9	Yes	Pirimiphos, Methyl	29232-93-7					1.4E-01	2.2E-01		8.5E-02		8.1E-05	
3.0E+01	C	8.6E-03	C	7.0E-06	H						1	0.0	No	Polybrominated Biphenyls	59536-65-1	2.6E-03			2.6E-03	1.4E-02			1.4E-02			
														Polychlorinated Biphenyls (PCBs)												
7.0E-02	G	2.0E-05	G	7.0E-05	I			V		5.69	1	0.0	No	~Aroclor 1016	12674-11-2	1.1E+00		2.8E-01	2.2E-01	1.4E-01			1.4E-01		1.3E-02	
2.0E+00	G	5.7E-04	G					V		4.65	1	1.0	Yes	~Aroclor 1221	11104-28-2	3.9E-02	1.2E-02	9.8E-03	4.7E-03						8.0E-05	
2.0E+00	G	5.7E-04	G					V		4.4	1	1.0	Yes	~Aroclor 1232	11141-16-5	3.9E-02	1.2E-02	9.8E-03	4.7E-03						8.0E-05	
2.0E+00	G	5.7E-04	G					V		6.34	1	0.7	No	~Aroclor 1242	53469-21-9	3.9E-02		9.8E-03	7.8E-03						1.2E-03	
2.0E+00	G	5.7E-04	G					V		6.2	1	0.0	No	~Aroclor 1248	12672-29-6	3.9E-02		9.8E-03	7.8E-03						1.2E-03	
2.0E+00	G	5.7E-04	G	2.0E-05	I			V		6.5	1	0.5	No	~Aroclor 1254	11097-69-1	3.9E-02		9.8E-03	7.8E-03	4.0E-02			4.0E-02		2.1E-03	
2.0E+00	G	5.7E-04	G					V		7.55	1	0.0	No	~Aroclor 1260	11096-82-5	3.9E-02		9.8E-03	7.8E-03						5.5E-03	
				6.0E-04	X			V		6.34	1	0.7	No	~Aroclor 5460	11126-42-4					1.2E+00			1.2E+00		2.0E-01	
3.9E+00	W	1.1E-03	W	2.3E-05	W	1.3E-03	WV			8.27	1	0.0	No	~Heptachlorobiphenyl, 2,3,3',4,4',5,5'- (PCB 189)	39635-31-9	2.0E-02		4.9E-03	4.0E-03	4.7E-02		2.8E-01	4.0E-02		2.8E-03	
3.9E+00	W	1.1E-03	W	2.3E-05	W	1.3E-03	WV			7.5	1	0.0	No	~Hexachlorobiphenyl, 2,3',4,4',5,5'- (PCB 167)	52663-72-6	2.0E-02		4.9E-03	4.0E-03	4.7E-02		2.8E-01	4.0E-02		1.7E-03	
3.9E+00	W	1.1E-03	W	2.3E-05	W	1.3E-03	WV			7.6	1	0.0	No	~Hexachlorobiphenyl, 2,3,3',4,4',5'- (PCB 157)	69782-90-7	2.0E-02		4.9E-03	4.0E-03	4.7E-02		2.8E-01	4.0E-02		1.7E-03	
3.9E+00	W	1.1E-03	W	2.3E-05	W	1.3E-03	WV			7.6	1	0.0	No	~Hexachlorobiphenyl, 2,3,3',4,4',5- (PCB 156)	38380-08-4	2.0E-02		4.9E-03	4.0E-03	4.7E-02		2.8E-01	4.0E-02		1.7E-03	
3.9E+03	W	1.1E+00	W	2.3E-08	W	1.3E-06	WV			7.41	1	0.1	No	~Hexachlorobiphenyl, 3,3',4,4',5,5'- (PCB 169)	32774-16-6	2.0E-05		4.9E-06	4.0E-06	4.7E-05		2.8E-04	4.0E-05		1.7E-06	
3.9E+00	W	1.1E-03	W	2.3E-05	W	1.3E-03	WV			6.98	1	0.4	No	~Pentachlorobiphenyl, 2',3,4,4',5- (PCB 123)	65510-44-3	2.0E-02		4.9E-03	4.0E-03	4.7E-02		2.8E-01	4.0E-02		1.0E-03	
3.9E+00	W	1.1E-03	W	2.3E-05	W	1.3E-03	WV			7.12	1	0.3	No	~Pentachlorobiphenyl, 2,3',4,4',5- (PCB 118)	31508-00-6	2.0E-02		4.9E-03	4.0E-03	4.7E-02		2.8E-01	4.0E-02		1.0E-03	
3.9E+00	W	1.1E-03	W	2.3E-05	W	1.3E-03	WV			6.79	1	0.5	No	~Pentachlorobiphenyl, 2,3,3',4,4'- (PCB 105)	32598-14-4	2.0E-02		4.9E-03	4.0E-03	4.7E-02		2.8E-01	4.0E-02		1.0E-03	
3.9E+00	W	1.1E-03	W	2.3E-05	W	1.3E-03	WV			6.98	1	0.4	No	~Pentachlorobiphenyl, 2,3,4,4',5- (PCB 114)	74472-37-0	2.0E-02		4.9E-03	4.0E-03	4.7E-02		2.8E-01	4.0E-02		1.0E-03	
1.3E+04	W	3.8E+00	W	7.0E-09	W	4.0E-07	WV			6.98	1	0.4	No	~Pentachlorobiphenyl, 3,3',4,4',5- (PCB 126)	57465-28-8	6.0E-06		1.5E-06	1.2E-06	1.4E-05		8.3E-05	1.2E-05		3.0E-07	
2.0E+00	I	5.7E-04	I					V		7.1	1	0.7		~Polychlorinated Biphenyls (high risk)	1336-36-3									0.5		
4.0E-01	I	1.0E-04	I					V		7.1	1	0.7	No	~Polychlorinated Biphenyls (low risk)	1336-36-3	1.9E-01		5.6E-02	4.4E-02					0.5	6.8E-03	7.8E-02
7.0E-02	I	2.0E-05	I					V		7.1	1	0.7		~Polychlorinated Biphenyls (lowest risk)	1336-36-3									0.5		
1.3E+01	W	3.8E-03	W	7.0E-06	W	4.0E-04	W			6.63	1	0.6	No	~Tetrachlorobiphenyl, 3,3',4,4'- (PCB 77)	32598-13-3	6.0E-03			6.0E-03	1.4E-02			1.4E-02		9.4E-04	
3.9E+01	W	1.1E-02	W	2.3E-06	W	1.3E-04	WV			6.34	1	0.7	No	~Tetrachlorobiphenyl, 3,4,4',5- (PCB 81)	70362-50-4	2.0E-03		4.9E-04	4.0E-04	4.7E-03		2.8E-02	4.0E-03		6.2E-05	
						6.0E-04	I			10.46	1	0.0	No	Polymeric Methylene Diphenyl Diisocyanate (PMDI)	9016-87-9											
														Polynuclear Aromatic Hydrocarbons (PAHs)												
				6.0E-02	I			V		3.92	1	1.0	Yes	~Acenaphthene	83-32-9					1.2E+02	9.6E+01		5.3E+01		5.5E-01	
				3.0E-01	I			V		4.45	1	1.0	Yes	~Anthracene	120-12-7					6.0E+02	2.5E+02		1.8E+02		5.8E+00	
1.0E-01	E	6.0E-05	E					V	M	5.76	1	1.0	No	~Benz[a]anthracene	56-55-3	2.5E-01		3.4E-02	3.0E-02						1.1E-02	
1.2E+00	C	1.1E-04	C							6.11	1	0.9	No	~Benzo(j)fluoranthene	205-82-3	6.5E-02			6.5E-02						7.8E-02	
1.0E+00	I	6.0E-04	I	3.0E-04	I	2.0E-06	I		M	6.13	1	1.0	No	~Benzo[a]pyrene	50-32-8	2.5E-02			2.5E-02	6.0E-01			6.0E-01	0.2	2.9E-02	2.4E-01
1.0E-01	E	6.0E-05	E						M	5.78	1	1.0	No	~Benzo[b]fluoranthene	205-99-2	2.5E-01			2.5E-01						3.0E-01	
1.0E-02	E	6.0E-06	E						M	6.11	1	0.9	No	~Benzo[k]fluoranthene	207-08-9	2.5E+00			2.5E+00						2.9E+00	
				8.0E-02	I			V		3.9	1	1.0	Yes	~Chloronaphthalene, Beta-	91-58-7					1.6E+02	1.4E+02		7.5E+01		3.9E-01	

TR=1E-06
THQ=0.1

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; W = TEF applied; E = RPF applied; G = user's guide Section 5; M = mutagen; V = volatile; R = RBA applied;
c = cancer; n = noncancer; * = where: n SL < 100X c SL; ** = where n SL < 10X c SL; SSL values are based on DAF=1; m = ceiling limit exceeded; s = Csat exceeded.

Toxicity and Chemical-specific Information														Contaminant		Carcinogenic Target Risk (TR) = 1E-06				Noncancer CHILD Hazard Index (HI) = 0.1					Protection of Groundwater SSL	
SFO (mg/kg-day)$^{-1}$	key	IUR (ug/m^3)$^{-1}$	key	RfD_o (mg/kg-day)	key	RfC_i (mg/m^3)	key	vol	mutagen	LOGP	GIABS	FA	In EPD?	Analyte	CAS No.	Ingestion SL TR=1E-06 (ug/L)	Dermal SL TR=1E-06 (ug/L)	Inhalation SL TR=1E-06 (ug/L)	Carcinogenic SL TR=1E-06 (ug/L)	Ingestion SL Child THQ=0.1 (ug/L)	Dermal SL Child THQ=0.1 (ug/L)	Inhalation SL Child THQ=0.1 (ug/L)	Noncarcinogenic SL Child THI=0.1 (ug/L)	MCL (ug/L)	Risk-based SSL (mg/kg)	MCL-based SSL (mg/kg)
1.0E-03	E	6.0E-07	E						M	5.81	1	1.0	No	~Chrysene	218-01-9	2.5E+01			2.5E+01						9.1E+00	
1.0E+00	E	6.0E-04	E						M	6.75	1	0.6	No	~Dibenz[a,h]anthracene	53-70-3	2.5E-02			2.5E-02						9.6E-02	
1.2E+01	C	1.1E-03	C							7.71	1	0.3	No	~Dibenzo(a,e)pyrene	192-65-4	6.5E-03			6.5E-03						8.4E-02	
2.5E+02	C	7.1E-02	C						M	5.8	1	0.9	No	~Dimethylbenz(a)anthracene, 7,12-	57-97-6	1.0E-04			1.0E-04						9.9E-05	
				4.0E-02	I					5.16	1	1.0	No	~Fluoranthene	206-44-0					8.0E+01			8.0E+01		8.9E+00	
				4.0E-02	I			V		4.18	1	1.0	Yes	~Fluorene	86-73-7					8.0E+01	4.6E+01		2.9E+01		5.5E-01	
1.0E-01	E	6.0E-05	E						M	6.7	1	0.6	No	~Indeno[1,2,3-cd]pyrene	193-39-5	2.5E-01			2.5E-01						9.8E-01	
2.9E-02	P			7.0E-02	A			V		3.87	1	1.0	Yes	~Methylnaphthalene, 1-	90-12-0	2.7E+00	2.0E+00		1.1E+00	1.4E+02	1.1E+02		6.2E+01		6.0E-03	
				4.0E-03	I			V		3.86	1	1.0	Yes	~Methylnaphthalene, 2-	91-57-6					8.0E+00	6.5E+00		3.6E+00		1.9E-02	
		3.4E-05	C	2.0E-02	I	3.0E-03	I	V		3.3	1	1.0	Yes	~Naphthalene	91-20-3			1.7E-01	1.7E-01	4.0E+01	7.0E+01	6.3E-01	6.1E-01		5.4E-04	
1.2E+00	C	1.1E-04	C							4.75	1	0.9	Yes	~Nitropyrene, 4-	57835-92-4	6.5E-02	2.7E-02		1.9E-02						3.3E-03	
				3.0E-02	I			V		4.88	1	1.0	Yes	~Pyrene	129-00-0					6.0E+01	1.5E+01		1.2E+01		1.3E+00	
				2.0E-02	P						1	0.0	Yes	Potassium Perfluorobutane Sulfonate	29420-49-3					4.0E+01			4.0E+01			
1.5E-01	I			9.0E-03	I					4.1	1	0.9	Yes	Prochloraz	67747-09-5	5.2E-01	1.4E+00		3.8E-01	1.8E+01	5.1E+01		1.3E+01		1.9E-03	
				6.0E-03	H			V		5.58	1	0.8	Yes	Profluralin	26399-36-0					1.2E+01	3.3E+00		2.6E+00		1.6E-01	
				1.5E-02	I					2.99	1	1.0	Yes	Prometon	1610-18-0					3.0E+01	1.6E+02		2.5E+01		1.2E-02	
				4.0E-02	O					3.51	1	0.9	Yes	Prometryn	7287-19-6					8.0E+01	2.3E+02		6.0E+01		9.1E-02	
				7.5E-02	I					3.43	1	0.9	Yes	Pronamide	23950-58-5					1.5E+02	5.5E+02		1.2E+02		1.2E-01	
				1.3E-02	I					2.18	1	1.0	Yes	Propachlor	1918-16-7					2.6E+01	4.3E+02		2.5E+01		1.5E-02	
				5.0E-03	I					3.07	1	1.0	Yes	Propanil	709-98-8					1.0E+01	4.4E+01		8.2E+00		4.5E-03	
1.9E-01	O			4.0E-02	O					5	1	0.8	Yes	Propargite	2312-35-8	4.1E-01	2.5E-01		1.6E-01	8.0E+01	5.5E+01		3.3E+01		1.2E-02	
				2.0E-03	I			V		-0.38	1	1.0	Yes	Propargyl Alcohol	107-19-7					4.0E+00	1.2E+03		4.0E+00		8.2E-04	
				2.0E-02	I					2.93	1	1.0	Yes	Propazine	139-40-2					4.0E+01	2.4E+02		3.4E+01		3.1E-02	
				2.0E-02	I					2.6	1	1.0	Yes	Propham	122-42-9					4.0E+01	2.8E+02		3.5E+01		2.2E-02	
				1.0E-01	O					3.72	1	0.9	Yes	Propiconazole	60207-90-1					2.0E+02	8.2E+02		1.6E+02		5.3E-01	
						8.0E-03	I	V		0.59	1	1.0	Yes	Propionaldehyde	123-38-6							1.7E+00	1.7E+00		3.4E-04	
				1.0E-01	X	1.0E+00	X	V		3.69	1	1.0	Yes	Propyl benzene	103-65-1					2.0E+02	1.8E+02	2.1E+02	6.6E+01		1.2E-01	
						3.0E+00	C	V		1.77	1	1.0	Yes	Propylene	115-07-1							6.3E+02	6.3E+02		6.0E-01	
				2.0E+01	P					-0.92	1	1.0	Yes	Propylene Glycol	57-55-6					4.0E+04	3.2E+07		4.0E+04		8.1E+00	
						2.7E-04	A			1.83	1	1.0	Yes	Propylene Glycol Dinitrate	6423-43-4											
				7.0E-01	H	2.0E+00	I	V		-0.49	1	1.0	Yes	Propylene Glycol Monomethyl Ether	107-98-2					1.4E+03	3.9E+05	4.2E+02	3.2E+02		6.5E-02	
2.4E-01	I	3.7E-06	I			3.0E-02	I	V		0.03	1	1.0	Yes	Propylene Oxide	75-56-9	3.2E-01	4.7E+01	1.5E+00	2.7E-01			6.3E+00	6.3E+00		5.6E-05	
				1.0E-03	I			V		0.65	1	1.0	Yes	Pyridine	110-86-1					2.0E+00	1.5E+02		2.0E+00		6.8E-04	
				5.0E-04	I					4.44	1	0.9	Yes	Quinalphos	13593-03-8					1.0E+00	1.0E+00		5.1E-01		4.3E-03	
3.0E+00	I									2.03	1	1.0	Yes	Quinoline	91-22-5	2.6E-02	2.9E-01		2.4E-02						7.8E-05	
				9.0E-03	I					4.28	1	0.9	Yes	Quizalofop-ethyl	76578-14-8					1.8E+01	3.8E+01		1.2E+01		1.9E-01	
						3.0E+04	A				1	0.0		Refractory Ceramic Fibers (units in fibers)	E715557											
				3.0E-02	I					6.14	1	0.7	Yes	Resmethrin	10453-86-8					6.0E+01	7.6E+00		6.7E+00		4.2E+00	
				5.0E-02	H			V		4.88	1	0.8	Yes	Ronnel	299-84-3					1.0E+02	6.8E+01		4.1E+01		3.7E-01	
				4.0E-03	I					4.1	1	0.9	Yes	Rotenone	83-79-4					8.0E+00	2.6E+01		6.1E+00		3.2E+00	
2.2E-01	C	6.3E-05	C						M	3.45	1	1.0	Yes	Safrole	94-59-7	1.1E-01	6.0E-01		9.6E-02						5.9E-05	
				5.0E-03	I						1	1.0	Yes	Selenious Acid	7783-00-8					1.0E+01	2.3E+03		1.0E+01			
				5.0E-03	I	2.0E-02	C				1	1.0	Yes	Selenium	7782-49-2					1.0E+01	2.3E+03		1.0E+01	50	5.2E-02	2.6E-01
				5.0E-03	C	2.0E-02	C				1	1.0	Yes	Selenium Sulfide	7446-34-6					1.0E+01	2.3E+03		1.0E+01			
				1.4E-01	O					4.38	1	0.9	Yes	Sethoxydim	74051-80-2					2.8E+02	3.8E+02		1.6E+02		1.4E+00	
						3.0E-03	C				1	1.0	Yes	Silica (crystalline, respirable)	7631-86-9											
				5.0E-03	I						0.04	1.0	Yes	Silver	7440-22-4					1.0E+01	1.5E+02		9.4E+00		8.0E-02	
1.2E-01	H			5.0E-03	I					2.18	1	1.0	Yes	Simazine	122-34-9	6.5E-01	9.3E+00		6.1E-01	1.0E+01	1.6E+02		9.4E+00	4	3.0E-04	2.0E-03
				1.3E-02	I					0.37	1	1.0	Yes	Sodium Acifluorfen	62476-59-9					2.6E+01	2.1E+04		2.6E+01		2.1E-01	
				4.0E-03	I						1	1.0	Yes	Sodium Azide	26628-22-8					8.0E+00	1.8E+03		8.0E+00			
2.7E-01	H			3.0E-02	I					-1.43	1	1.0	Yes	Sodium Diethyldithiocarbamate	148-18-5	2.9E-01	8.5E+02		2.9E-01	6.0E+01	1.9E+05		6.0E+01		1.8E-04	
				5.0E-02	A	1.3E-02	C				1	1.0	Yes	Sodium Fluoride	7681-49-4					1.0E+02	2.3E+04		1.0E+02	4000	1.5E+01	6.0E+02
				2.0E-05	I					-3.78	1	1.0	No	Sodium Fluoroacetate	62-74-8					4.0E-02			4.0E-02		8.1E-06	
				1.0E-03	H						1	1.0	Yes	Sodium Metavanadate	13718-26-8					2.0E+00	4.6E+02		2.0E+00			
				8.0E-04	P						1	1.0	Yes	Sodium Tungstate	13472-45-2					1.6E+00	3.6E+02		1.6E+00			
				8.0E-04	P						1	1.0	Yes	Sodium Tungstate Dihydrate	10213-10-2					1.6E+00	3.6E+02		1.6E+00			
2.4E-02	H			3.0E-02	I					3.53	1	0.9	Yes	Strofos (Tetrachlorovinphos)	961-11-5	3.2E+00	1.9E+01		2.8E+00	6.0E+01	3.8E+02		5.2E+01		8.2E-03	
				6.0E-01	I						1	1.0	Yes	Strontium, Stable	7440-24-6					1.2E+03	2.7E+05		1.2E+03		4.2E+01	
				3.0E-04	I					1.93	1	1.0	Yes	Strychnine	57-24-9					6.0E-01	3.2E+01		5.9E-01		6.5E-03	
				2.0E-01	I	1.0E+00	I	V		2.95	1	1.0	Yes	Styrene	100-42-5					4.0E+02	1.0E+03	2.1E+02	1.2E+02	100	1.3E-01	1.1E-01
				3.0E-03	P					3.1	1	1.0	Yes	Styrene-Acrylonitrile (SAN) Trimer (THNA isomer)	57964-39-3					6.0E+00	2.4E+01		4.8E+00			
				3.0E-03	P					3.1	1	1.0	Yes	Styrene-Acrylonitrile (SAN) Trimer (THNP isomer)	57964-40-6					6.0E+00	2.4E+01		4.8E+00			
				1.0E-03	P	2.0E-03	X			-0.77	1	1.0	Yes	Sulfolane	126-33-0					2.0E+00	1.7E+03		2.0E+00		4.4E-04	
				8.0E-04	P					3.9	1	0.9	Yes	Sulfonylbis(4-chlorobenzene), 1,1'-	80-07-9					1.6E+00	3.5E+00		1.1E+00		6.5E-03	
						1.0E-03	C	V			1	1.0	Yes	Sulfur Trioxide	7446-11-9							2.1E-01	2.1E-01			
						1.0E-03	C				1	1.0	Yes	Sulfuric Acid	7664-93-9											
2.5E-02	I	7.1E-06	I	5.0E-02	H					4.82	1	0.8	Yes	Sulfurous acid, 2-chloroethyl 2-[4-(1,1-dimethylethyl)phenoxy]-1-methylethyl ester	140-57-8	3.1E+00	2.3E+00		1.3E+00	1.0E+02	8.2E+01		4.5E+01		1.5E-02	
				3.0E-02	H					3.3	1	0.9	Yes	TCMTB	21564-17-0					6.0E+01	2.4E+02		4.8E+01		3.3E-01	
				7.0E-02	I					1.79	1	1.0	Yes	Tebuthiuron	34014-18-1					1.4E+02	4.7E+03		1.4E+02		3.9E-02	
				2.0E-02	H					5.96	1	0.7	No	Temephos	3383-96-8					4.0E+01			4.0E+01		7.6E+00	
				1.3E-02	I					1.89	1	1.0	Yes	Terbacil	5902-51-2					2.6E+01	7.0E+02		2.5E+01		7.5E-03	
				2.5E-05	H			V		4.48	1	0.9	Yes	Terbufos	13071-79-9					5.0E-02	4.5E-02		2.4E-02		5.2E-05	
				1.0E-03	I					3.74	1	0.9	Yes	Terbutryn	886-50-0					2.0E+00	4.1E+00		1.3E+00		1.9E-03	
5.0E-03	C	1.3E-06	C					V		1.76	1	1.0	Yes	Tert-Butyl Acetate	540-88-5	1.6E+01	2.4E+02	4.3E+00	3.3E+00						7.6E-04	
				1.0E-04	I					6.77	1	0.6	No	Tetrabromodiphenyl ether, 2,2',4,4'- (BDE-47)	5436-43-1					2.0E-01			2.0E-01		5.4E-03	
				3.0E-04	I			V		4.64	1	1.0	Yes	Tetrachlorobenzene, 1,2,4,5-	95-94-3					6.0E-01	2.4E-01		1.7E-01		7.9E-04	
2.6E-02	I	7.4E-06	I	3.0E-02	I			V		2.93	1	1.0	Yes	Tetrachloroethane, 1,1,1,2-	630-20-6	3.0E+00	1.1E+01	7.6E-01	5.7E-01	6.0E+01	2.4E+02		4.8E+01		2.2E-04	
2.0E-01	I	5.8E-05	C	2.0E-02	I			V		2.39	1	1.0	Yes	Tetrachloroethane, 1,1,2,2-	79-34-5	3.9E-01	3.3E+00	9.7E-02	7.6E-02	4.0E+01	3.6E+02		3.6E+01		3.0E-05	
2.1E-03	I	2.6E-07	I	6.0E-03	I	4.0E-02	I	V		3.4	1	1.0	Yes	Tetrachloroethylene	127-18-4	3.7E+01	6.5E+01	2.2E+01	1.1E+01	1.2E+01	2.3E+01	8.3E+00	4.1E+00	5	1.8E-03	2.3E-03
				3.0E-02	I					4.45	1	0.9	Yes	Tetrachlorophenol, 2,3,4,6-	58-90-2					6.0E+01	3.9E+01		2.4E+01		1.8E-02	
2.0E+01	H							V		4.54	1	0.9	Yes	Tetrachlorotoluene, p- alpha, alpha, alpha-	5216-25-1	3.9E-03	2.0E-03		1.3E-03						4.5E-06	
				5.0E-04	I					3.99	1	0.9	Yes	Tetraethyl Dithiopyrophosphate	3689-24-5					1.0E+00	2.4E+00		7.1E-01		5.2E-04	

TR=1E-06
THQ=0.1

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; W = TEF applied; E = RPF applied; G = user's guide Section 5; M = mutagen; V = volatile; R = RBA applied;
c = cancer; n = noncancer; * = where: n SL < 100X c SL; ** = where n SL < 10X c SL; SSL values are based on DAF=1; m = ceiling limit exceeded; s = Csat exceeded.

Toxicity and Chemical-specific Information														Contaminant		Carcinogenic Target Risk (TR) = 1E-06				Noncancer CHILD Hazard Index (HI) = 0.1					Protection of Groundwater SSL	
SFO (mg/kg-day)$^{-1}$	key	IUR (ug/m^3)$^{-1}$	key	RfD$_o$ (mg/kg-day)	key	RfC$_i$ (mg/m^3)	key	vol	mutagen	LOGP	GIABS	FA	In EPD?	Analyte	CAS No.	Ingestion SL TR=1E-06 (ug/L)	Dermal SL TR=1E-06 (ug/L)	Inhalation SL TR=1E-06 (ug/L)	Carcinogenic SL TR=1E-06 (ug/L)	Ingestion SL Child THQ=0.1 (ug/L)	Dermal SL Child THQ=0.1 (ug/L)	Inhalation SL Child THQ=0.1 (ug/L)	Noncarcinogenic SL Child THI=0.1 (ug/L)	MCL (ug/L)	Risk-based SSL (mg/kg)	MCL-based SSL (mg/kg)
						8.0E+01	I	V		1.68	1	1.0	Yes	Tetrafluoroethane, 1,1,1,2-	811-97-2							1.7E+04	1.7E+04		9.3E+00	
				2.0E-03	P					1.64	1	1.0	Yes	Tetryl (Trinitrophenylmethylnitramine)	479-45-8					4.0E+00	2.5E+02		3.9E+00		3.7E-02	
				2.0E-05	G						1	0.9	Yes	Thallic Oxide	1314-32-5					4.0E-02	9.1E+00		4.0E-02			
				1.0E-05	X						1	1.0	Yes	Thallium (I) Nitrate	10102-45-1					2.0E-02	4.6E+00		2.0E-02			
				1.0E-05	X						1	1.0	Yes	Thallium (Soluble Salts)	7440-28-0					2.0E-02	4.6E+00		2.0E-02	2	1.4E-03	1.4E-01
				1.0E-05	X			V		-0.17	1	1.0	Yes	Thallium Acetate	563-68-8					2.0E-02	1.7E+01		2.0E-02		4.1E-06	
				2.0E-05	X			V		-0.86	1	1.0	Yes	Thallium Carbonate	6533-73-9					4.0E-02	9.3E+03		4.0E-02		8.3E-06	
				1.0E-05	X						1	1.0	Yes	Thallium Chloride	7791-12-0					2.0E-02	4.6E+00		2.0E-02			
				1.0E-05	G						1	1.0	Yes	Thallium Selenite	12039-52-0					2.0E-02	4.6E+00		2.0E-02			
				2.0E-05	X						1	0.9	Yes	Thallium Sulfate	7446-18-6					4.0E-02	9.1E+00		4.0E-02			
				4.3E-02	O					1.56	1	1.0	Yes	Thifensulfuron-methyl	79277-27-3					8.6E+01	1.2E+04		8.6E+01		2.6E-02	
				1.0E-02	I					3.4	1	0.9	Yes	Thiobencarb	28249-77-6					2.0E+01	7.7E+01		1.6E+01		5.5E-02	
				7.0E-02	X					-0.63	1	1.0	Yes	Thiodiglycol	111-48-8					1.4E+02	9.7E+04		1.4E+02		2.8E-02	
				3.0E-04	H					2.16	1	1.0	Yes	Thiofanox	39196-18-4					6.0E-01	4.4E+00		5.3E-01		1.8E-04	
1.2E-02	O			2.7E-02	O					1.4	1	1.0	Yes	Thiophanate, Methyl	23564-05-8	6.7E+00	7.9E+02		6.7E+00	5.4E+01	6.9E+03		5.4E+01		5.7E-03	
				1.5E-02	O					1.73	1	1.0	Yes	Thiram	137-26-8					3.0E+01	1.2E+03		2.9E+01		4.2E-02	
				6.0E-01	H						1	1.0	Yes	Tin	7440-31-5					1.2E+03	2.7E+05		1.2E+03		3.0E+02	
						1.0E-04	A	V			1	1.0	Yes	Titanium Tetrachloride	7550-45-0							2.1E-02	2.1E-02			
				8.0E-02	I	5.0E+00	I	V		2.73	1	1.0	Yes	Toluene	108-88-3					1.6E+02	5.3E+02	1.0E+03	1.1E+02	1000	7.6E-02	6.9E-01
3.9E-02	C	1.1E-05	C			8.0E-06	C	V		3.74	1	1.0	Yes	Toluene-2,4-diisocyanate	584-84-9	2.0E+00	2.2E-01	5.1E-01	1.4E-01			1.7E-03	1.7E-03		2.5E-05	
1.8E-01	X			2.0E-04	X					0.16	1	1.0	Yes	Toluene-2,5-diamine	95-70-5	4.3E-01	8.2E+01		4.3E-01	4.0E-01	8.3E+01		4.0E-01		1.2E-04	
3.9E-02	C	1.1E-05	C			8.0E-06	C	V		3.74	1	1.0	Yes	Toluene-2,6-diisocyanate	91-08-7	2.0E+00	2.2E+00	5.1E-01	3.4E-01			1.7E-03	1.7E-03		2.6E-05	
				5.0E-03	P					2.27	1	1.0	Yes	Toluic Acid, p-	99-94-5					1.0E+01	8.9E+01		9.0E+00		2.3E-03	
1.6E-02	P	5.1E-05	C							1.32	1	1.0	Yes	Toluidine, o- (Methylaniline, 2-)	95-53-4	4.9E+00	1.4E+02		4.7E+00						2.0E-03	
3.0E-02	P			4.0E-03	X					1.39	1	1.0	Yes	Toluidine, p-	106-49-0	2.6E+00	6.8E+01		2.5E+00	8.0E+00	2.3E+02		7.7E+00		1.1E-03	
				3.0E+00	P			V		6.1	1	1.0	No	Total Petroleum Hydrocarbons (Aliphatic High)	E1790670					6.0E+03			6.0E+03		2.4E+02	
						6.0E-01	P	V		3.9	1	1.0	Yes	Total Petroleum Hydrocarbons (Aliphatic Low)	E1790666							1.3E+02	1.3E+02		8.8E-01	
				1.0E-02	X	1.0E-01	P	V		5.65	1	1.0	No	Total Petroleum Hydrocarbons (Aliphatic Medium)	E1790668					2.0E+01		2.1E+01	1.0E+01		1.5E-01	
				4.0E-02	P					5.16	1	1.0	No	Total Petroleum Hydrocarbons (Aromatic High)	E1790676					8.0E+01			8.0E+01		8.9E+00	
				4.0E-03	P	3.0E-02	P	V		2.13	1	1.0	Yes	Total Petroleum Hydrocarbons (Aromatic Low)	E1790672					8.0E+00	6.1E+01	6.3E+00	3.3E+00		1.7E-03	
				4.0E-03	P	3.0E-03	P	V		3.58	1	1.0	Yes	Total Petroleum Hydrocarbons (Aromatic Medium)	E1790674					8.0E+00	9.0E+00	6.3E-01	5.5E-01		2.3E-03	
1.1E+00	I	3.2E-04	I	9.0E-05	P					5.9	1	0.8	No	Toxaphene	8001-35-2	7.1E-02			7.1E-02	1.8E-01			1.8E-01	3	1.1E-02	4.6E-01
				3.0E-05	X					5.9	1	0.8	No	Toxaphene, Weathered	E1841606					6.0E-02			6.0E-02		9.3E-03	
				7.5E-03	I					7.56	1	0.5	No	Tralomethrin	66841-25-6					1.5E+01			1.5E+01		5.8E+00	
				3.0E-04	A			V		4.1	1	0.9	Yes	Tri-n-butyltin	688-73-3					6.0E-01	9.9E-01		3.7E-01		8.2E-03	
				8.0E+01	X					0.25	1	1.0	Yes	Triacetin	102-76-1					1.6E+05	5.3E+07		1.6E+05		4.5E+01	
				3.4E-02	O					2.77	1	1.0	Yes	Triadimefon	43121-43-3					6.8E+01	7.8E+02		6.3E+01		5.0E-02	
7.2E-02	O			2.5E-02	O			V		4.6	1	0.9	Yes	Triallate	2303-17-5	1.1E+00	8.3E-01		4.7E-01	5.0E+01	4.2E+01		2.3E+01		1.0E-03	
				1.0E-02	I					1.1	1	1.0	Yes	Triasulfuron	82097-50-5					2.0E+01	6.0E+03		2.0E+01		2.1E-02	
				8.0E-03	I					0.78	1	1.0	Yes	Tribenuron-methyl	101200-48-0					1.6E+01	5.0E+02		1.6E+01		6.1E-03	
				5.0E-03	I			V		4.66	1	0.9	Yes	Tribromobenzene, 1,2,4-	615-54-3					1.0E+01	8.1E+00		4.5E+00		6.4E-03	
				9.0E-03	X					4.13	1	0.9	Yes	Tribromophenol, 2,4,6-	118-79-6					1.8E+01	3.7E+01		1.2E+01		2.2E-02	
9.0E-03	P			1.0E-02	P					4	1	0.9	Yes	Tributyl Phosphate	126-73-8	8.7E+00	1.3E+01		5.2E+00	2.0E+01	3.3E+01		1.2E+01		2.5E-02	
				3.0E-04	P						1	0.0	No	Tributyltin Compounds	E1790678					6.0E-01			6.0E-01			
				3.0E-04	I					4.05	1	1.0	Yes	Tributyltin Oxide	56-35-9					6.0E-01	9.5E+00		5.7E-01		2.9E+01	
												0.0	No	Trichloramine	10025-85-1									4000		
				3.0E+01	I	5.0E+00	P	V		3.16	1	1.0	Yes	Trichloro-1,2,2-trifluoroethane, 1,1,2-	76-13-1					6.0E+04	1.9E+05	1.0E+03	1.0E+03		2.6E+00	
7.0E-02	I			2.0E-02	I					1.33	1	1.0	Yes	Trichloroacetic Acid	76-03-9	1.1E+00	4.6E+01		1.1E+00	4.0E+01	1.8E+03		3.9E+01	6.0E+01 (G)	2.2E-04	1.2E-02
2.9E-02	H									-0.67	1	1.0	Yes	Trichloroaniline HCl, 2,4,6-	33663-50-2	2.7E+00	3.7E+03		2.7E+00						7.4E-03	
7.0E-03	X			3.0E-05	X					3.52	1	1.0	Yes	Trichloroaniline, 2,4,6-	634-93-5	1.1E+01	2.0E+01		7.1E+00	6.0E-02	1.2E-01		4.0E-02		3.6E-04	
				8.0E-04	X			V		4.05	1	1.0	Yes	Trichlorobenzene, 1,2,3-	87-61-6					1.6E+00	1.3E+00		7.0E-01		2.1E-03	
2.9E-02	P			1.0E-02	I	2.0E-03	P	V		4.02	1	1.0	Yes	Trichlorobenzene, 1,2,4-	120-82-1	2.7E+00	2.0E+00		1.2E+00	2.0E+01	1.6E+01	4.2E-01	4.0E-01	70	1.2E-03	2.0E-01
				2.0E+00	I	5.0E+00	I	V		2.49	1	1.0	Yes	Trichloroethane, 1,1,1-	71-55-6					4.0E+03	2.5E+04	1.0E+03	8.0E+02	200	2.8E-01	7.0E-02
5.7E-02	I	1.6E-05	I	4.0E-03	I	2.0E-04	X	V		1.89	1	1.0	Yes	Trichloroethane, 1,1,2-	79-00-5	1.4E+00	2.0E+01	3.5E-01	2.8E-01	8.0E+00	1.3E+02	4.2E-02	4.1E-02	5	1.4E-05	1.6E-03
4.6E-02	I	4.1E-06	I	5.0E-04	I	2.0E-03	I	V	M	2.42	1	1.0	Yes	Trichloroethylene	79-01-6	1.2E+00	7.4E+00	9.6E-01	4.9E-01	1.0E+00	6.9E+00	4.2E-01	2.8E-01	5	1.0E-04	1.8E-03
				3.0E-01	I			V		2.53	1	1.0	Yes	Trichlorofluoromethane	75-69-4					6.0E+02	3.6E+03		5.2E+02		3.3E-01	
				1.0E-01	I					3.72	1	1.0	Yes	Trichlorophenol, 2,4,5-	95-95-4					2.0E+02	2.9E+02		1.2E+02		4.0E-01	
1.1E-02	I	3.1E-06	I	1.0E-03	P					3.69	1	1.0	Yes	Trichlorophenol, 2,4,6-	88-06-2	7.1E+00	9.8E+00		4.1E+00	2.0E+00	3.0E+00		1.2E+00		1.2E-03	
				1.0E-02	I					3.31	1	0.9	Yes	Trichlorophenoxyacetic Acid, 2,4,5-	93-76-5					2.0E+01	8.7E+01		1.6E+01		6.8E-03	
				8.0E-03	I					3.8	1	0.9	Yes	Trichlorophenoxypropionic acid, -2,4,5	93-72-1					1.6E+01	3.6E+01		1.1E+01	50	6.1E-03	2.8E-02
				5.0E-03	I			V		2.43	1	1.0	Yes	Trichloropropane, 1,1,2-	598-77-6					1.0E+01	7.5E+01		8.8E+00		3.5E-03	
3.0E+01	I			4.0E-03	I	3.0E-04	I	V	M	2.27	1	1.0	Yes	Trichloropropane, 1,2,3-	96-18-4	8.4E-04	7.3E-03		7.5E-04	8.0E+00	7.7E+01	6.3E-02	6.2E-02		3.2E-07	
				3.0E-03	X	3.0E-04	P	V		2.78	1	1.0	Yes	Trichloropropene, 1,2,3-	96-19-5					6.0E+00	2.6E+01	6.3E-02	6.2E-02		3.1E-05	
				2.0E-02	A					5.11	1	0.8	Yes	Tricresyl Phosphate (TCP)	1330-78-5					4.0E+01	2.6E+01		1.6E+01		1.5E+00	
				3.0E-03	I					5.18	1	0.8	Yes	Tridiphane	58138-08-2					6.0E+00	2.6E+00		1.8E+00		1.3E-02	
						7.0E-03	I	V		1.45	1	1.0	Yes	Triethylamine	121-44-8							1.5E+00	1.5E+00		4.4E-04	
				2.0E+00	P					-1.75	1	1.0	Yes	Triethylene Glycol	112-27-6					4.0E+03	1.8E+07		4.0E+03		8.8E-01	
						2.0E+01	P	V		1.74	1	1.0	Yes	Trifluoroethane, 1,1,1-	420-46-2							4.2E+03	4.2E+03		1.3E+01	
7.7E-03	I			7.5E-03	I			V		5.34	1	0.8	Yes	Trifluralin	1582-09-8	1.0E+01	3.4E+00		2.6E+00	1.5E+01	5.5E+00		4.0E+00		8.4E-02	
2.0E-02	P			1.0E-02	P					-0.65	1	1.0	Yes	Trimethyl Phosphate	512-56-1	3.9E+00	2.8E+03		3.9E+00	2.0E+01	1.6E+04		2.0E+01		8.6E-04	
				1.0E-02	I	6.0E-02	I	V		3.66	1	1.0	Yes	Trimethylbenzene, 1,2,3-	526-73-8					2.0E+01	1.9E+01	1.3E+01	5.5E+00		8.1E-03	
				1.0E-02	I	6.0E-02	I	V		3.63	1	1.0	Yes	Trimethylbenzene, 1,2,4-	95-63-6					2.0E+01	2.0E+01	1.3E+01	5.6E+00		8.1E-03	
				1.0E-02	I	6.0E-02	I	V		3.42	1	1.0	Yes	Trimethylbenzene, 1,3,5-	108-67-8					2.0E+01	2.8E+01	1.3E+01	6.0E+00		8.7E-03	
				1.0E-02	X			V		4.08	1	1.0	Yes	Trimethylpentene, 2,4,4-	25167-70-8					2.0E+01	9.6E+00		6.5E+00		2.2E-02	
				3.0E-02	I					1.18	1	1.0	Yes	Trinitrobenzene, 1,3,5-	99-35-4					6.0E+01	4.7E+03		5.9E+01		2.1E-01	
3.0E-02	I			5.0E-04	I					1.6	1	1.0	Yes	Trinitrotoluene, 2,4,6-	118-96-7	2.6E+00	1.1E+02		2.5E+00	1.0E+00	4.5E+01		9.8E-01		5.7E-03	
				2.0E-02	P					2.83	1	1.0	Yes	Triphenylphosphine Oxide	791-28-6					4.0E+01	3.8E+02		3.6E+01		1.5E-01	
				2.0E-02	A					3.65	1	0.9	Yes	Tris(1,3-Dichloro-2-propyl) Phosphate	13674-87-8					4.0E+01	3.2E+02		3.6E+01		8.0E-01	
				1.0E-02	X					2.59	1	1.0	Yes	Tris(1-chloro-2-propyl)phosphate	13674-84-5					2.0E+01	3.8E+02		1.9E+01		6.5E-02	
2.3E+00	C	6.6E-04	C					V		4.29	1	1.0	No	Tris(2,3-dibromopropyl)phosphate	126-72-7	3.4E-02		8.5E-03	6.8E-03						1.3E-04	
2.0E-02	P			7.0E-03	P					1.44	1	1.0	Yes	Tris(2-chloroethyl)phosphate	115-96-8	3.9E+00	3.0E+02		3.8E+00	1.4E+01	1.2E+03		1.4E+01		3.8E-03	
3.2E-03	P			1.0E-01	P					9.49	1	0.0	No	Tris(2-ethylhexyl)phosphate	78-42-2	2.4E+01			2.4E+01	2.0E+02			2.0E+02		1.2E+02	

TR=1E-06
THQ=0.1

Key: I = IRIS; P = PPRTV; O = OPP; A = ATSDR; C = Cal EPA; X = PPRTV Screening Level; H = HEAST; W = TEF applied; E = RPF applied; G = user's guide Section 5; M = mutagen; V = volatile; R = RBA applied;
c = cancer; n = noncancer; * = where: n SL < 100X c SL; ** = where n SL < 10X c SL; SSL values are based on DAF=1; m = ceiling limit exceeded; s = Csat exceeded.

Toxicity and Chemical-specific Information														Contaminant		Carcinogenic Target Risk (TR) = 1E-06				Noncancer CHILD Hazard Index (HI) = 0.1					Protection of Groundwater SSL	
SFO (mg/kg-day)$^{-1}$	key	IUR (ug/m^3)$^{-1}$	key	RfD_o (mg/kg-day)	key	RfC_i (mg/m^3)	key	vol	mutagen	LOGP	GIABS	FA	In EPD?	Analyte	CAS No.	Ingestion SL TR=1E-06 (ug/L)	Dermal SL TR=1E-06 (ug/L)	Inhalation SL TR=1E-06 (ug/L)	Carcinogenic SL TR=1E-06 (ug/L)	Ingestion SL Child THQ=0.1 (ug/L)	Dermal SL Child THQ=0.1 (ug/L)	Inhalation SL Child THQ=0.1 (ug/L)	Noncarcinogenic SL Child THI=0.1 (ug/L)	MCL (ug/L)	Risk-based SSL (mg/kg)	MCL-based SSL (mg/kg)
				8.0E-04	P						1	1.0	Yes	Tungsten	7440-33-7					1.6E+00	3.6E+02		1.6E+00		2.4E-01	
				2.0E-04	A	4.0E-05	A				1	1.0	Yes	Uranium (Soluble Salts)	E715565					4.0E-01	9.1E+01		4.0E-01	30	1.8E-01	1.4E+01
1.0E+00	C	2.9E-04	C						M	-0.15	1	1.0	Yes	Urethane	51-79-6	2.5E-02	6.1E+00		2.5E-02						5.6E-06	
		8.3E-03	P	9.0E-03	I	7.0E-06	P				0.026	1.0	Yes	Vanadium Pentoxide	1314-62-1					1.8E+01	1.1E+02		1.5E+01			
				5.0E-03	G	1.0E-04	A				0.026	1.0	Yes	Vanadium and Compounds	7440-62-2					1.0E+01	6.0E+01		8.6E+00		8.6E+00	
				1.0E-03	I			V		3.84	1	1.0	Yes	Vernolate	1929-77-7					2.0E+00	2.5E+00		1.1E+00		8.9E-04	
				1.2E-03	O					3.1	1	0.9	Yes	Vinclozolin	50471-44-8					2.4E+00	1.8E+01		2.1E+00		1.6E-03	
				1.0E+00	H	2.0E-01	I	V		0.73	1	1.0	Yes	Vinyl Acetate	108-05-4					2.0E+03	1.4E+05	4.2E+01	4.1E+01		8.7E-03	
		3.2E-05	H			3.0E-03	I	V		1.57	1	1.0	Yes	Vinyl Bromide	593-60-2			1.8E-01	1.8E-01			6.3E-01	6.3E-01		5.1E-05	
7.2E-01	I	4.4E-06	I	3.0E-03	I	1.0E-01	I	V	M	1.38	1	1.0	Yes	Vinyl Chloride	75-01-4	2.1E-02	2.8E-01	3.4E-01	1.9E-02	6.0E+00	8.9E+01	2.1E+01	4.4E+00	2	6.5E-06	6.9E-04
				3.0E-04	I					2.7	1	1.0	Yes	Warfarin	81-81-2					6.0E-01	8.4E+00		5.6E-01		5.9E-04	
				2.0E-01	G	1.0E-01	G	V		3.15	1	1.0	Yes	Xylene, P-	106-42-3					4.0E+02	7.6E+02	2.1E+01	1.9E+01		1.9E-02	
				2.0E-01	G	1.0E-01	G	V		3.2	1	1.0	Yes	Xylene, m-	108-38-3					4.0E+02	7.1E+02	2.1E+01	1.9E+01		1.9E-02	
				2.0E-01	G	1.0E-01	G	V		3.12	1	1.0	Yes	Xylene, o-	95-47-6					4.0E+02	8.0E+02	2.1E+01	1.9E+01		1.9E-02	
				2.0E-01	I	1.0E-01	I	V		3.16	1	1.0	Yes	Xylenes	1330-20-7					4.0E+02	7.5E+02	2.1E+01	1.9E+01	10000	1.9E-02	9.9E+00
				3.0E-04	I						1	1.0	Yes	Zinc Phosphide	1314-84-7					6.0E-01	2.3E+02		6.0E-01			
				3.0E-01	I						1	1.0	Yes	Zinc and Compounds	7440-66-6					6.0E+02	2.3E+05		6.0E+02		3.7E+01	
				5.0E-02	I					1.3	1	1.0	Yes	Zineb	12122-67-7					1.0E+02	9.7E+03		9.9E+01		2.9E-01	
				8.0E-05	X						1	1.0	Yes	Zirconium	7440-67-7					1.6E-01	3.6E+01		1.6E-01		4.8E-01	

TR=1E-06
THQ=0.1

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Appendix B. Historical Figures

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Figure 2-1
Site Map with Well Locations
Charles R. Lowman Power Plant
Leroy, AL

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Engineering. Environmental. Answers.

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Checked by:	JAB
Date:	July 2019

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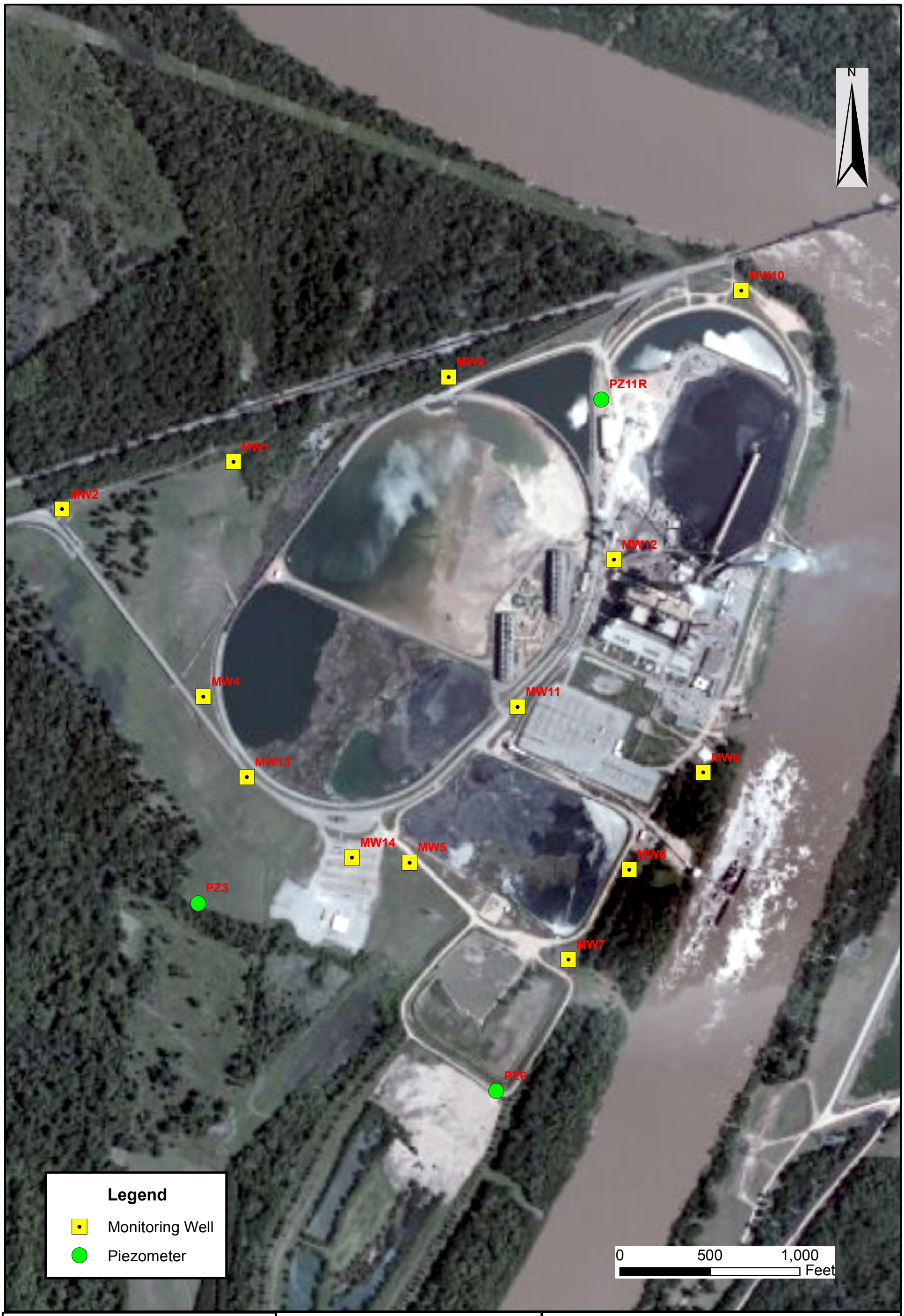

Lowman Power Plant
Leroy, Washington County, AL
061621202

CDG
Engineering. Environmental. Answers.

Figure 1
Site Map with Well Locations

Drafter: Ray Hollinghead

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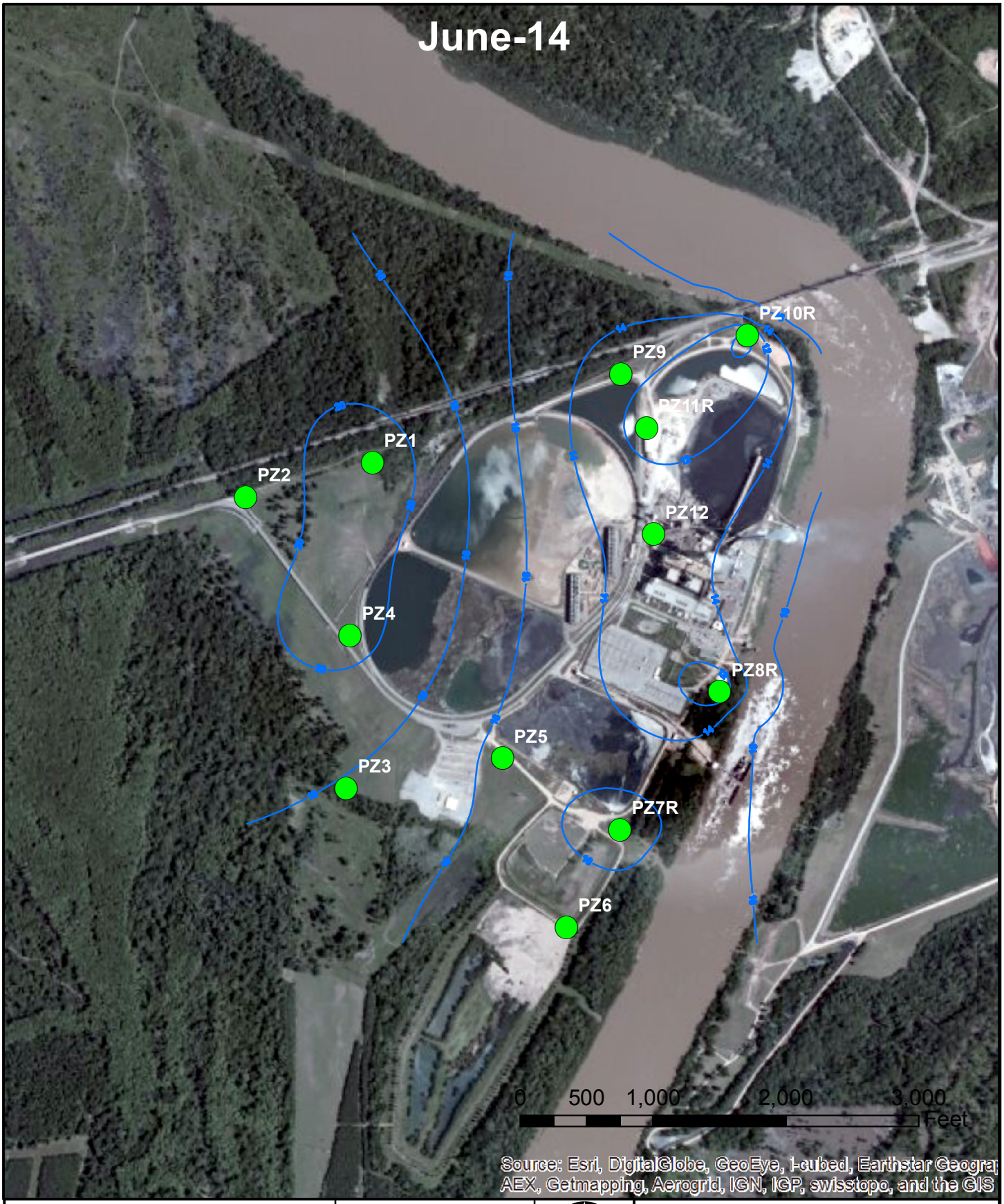

Figure 17-Potentiometric Contours for June-14

Lowman Power Plant
Leroy, AL

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Sheet No.
17

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Checked By: JAB
Date: December 2014

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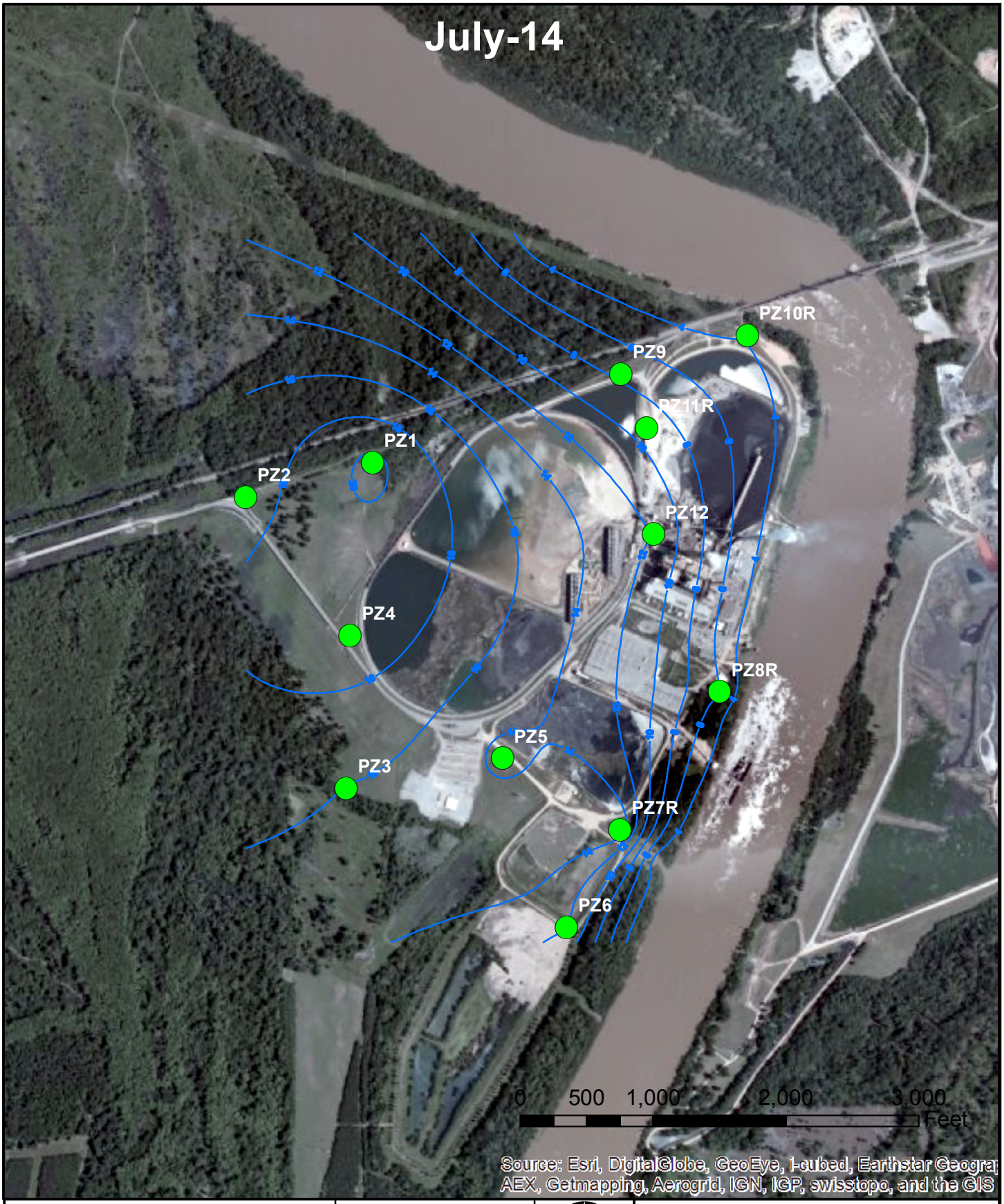

Figure 18-Potentiometric Contours for July-14

Lowman Power Plant
Leroy, AL

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Sheet No.
18

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Checked By: JAB
Date: December 2014

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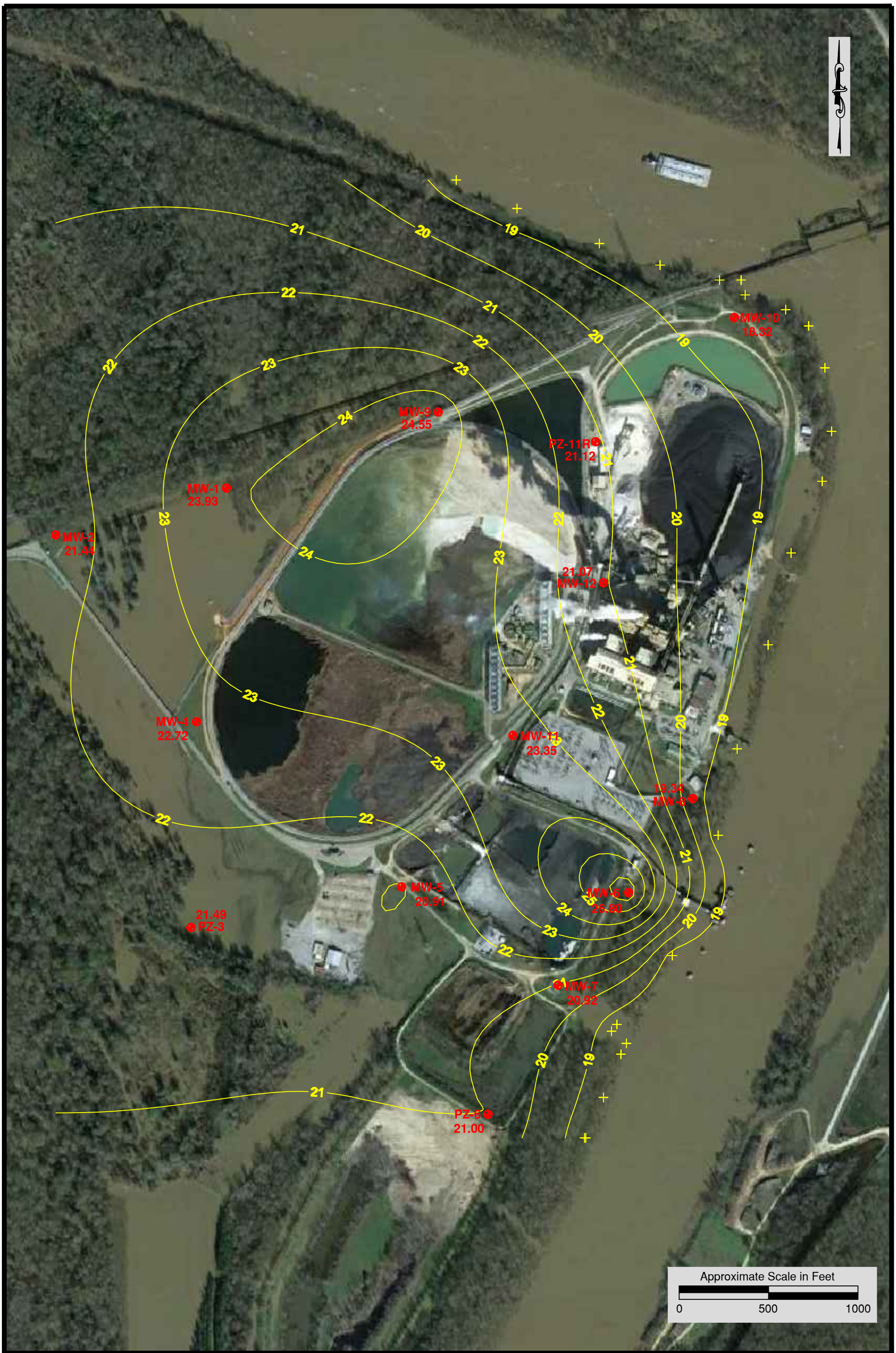

Lowman Power Plant
Leroy, Washington County, AL
061621202

ALBERTVILLE, ALABAMA
(256) 891-3458
ANDALUSIA, ALABAMA
(334) 222-9431
AUBURN, ALABAMA
(334) 466-9431

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BIRMINGHAM, ALABAMA
(205) 733-9431
DOTHAN, ALABAMA
(334) 677-9431
HUNTSVILLE, ALABAMA
(256) 539-7470

Potentiometric Surface Map
February 23, 2016

Drafter: Ray Hollinghead

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Appendix C. Historical Groundwater Data Tables

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Table C-1
Historical Groundwater Results - Appendix III
Charles R. Lowman Power Facility

	Analyte	Boron	Calciuim	Chloride	Fluoride	Sulfate	TDS	pH
	Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	SU
	SMCL	-	-	250	2.0	250	500	6.5 - 8.5
Well ID	Date							
MW-1	3/29/2016	< 0.021	26	2.5	0.04	15	100	5.46
	5/18/2016	< 0.021	25	2.1	0.04	14	150	5.52
	7/19/2016	0.024	17	2.2	0.04	12	90	5.31
	9/19/2016	< 0.021	17	1.4	< 0.032	14	80	5.21
	11/29/2016	< 0.021	14	3.5	< 0.032	18	110	5.30
	1/31/2017	<0.021	25	2.9	0.04	20	98	5.34
	3/28/2017	< 0.021	23	3.1	<0.032	18	72	5.35
	5/23/2017	<0.021	26	4	0.05	16	74	5.28
	10/9/2017	<0.021	29	3.8	0.06	12	150	4.70
	4/17/2018	<0.021	34	2.6	0.07	12	140	5.80
	8/14/2018	<0.021	26	2.7	0.07	11	110	5.36
	4/10/2019	<0.021	28	2.8	0.08 J	10	150	5.46
MW-2	3/29/2016	0.022	3.6	0.89	< 0.032	14	46	4.70
	5/18/2016	< 0.021	3.6	< 0.60	< 0.032	14	56	4.74
	7/19/2016	< 0.0042	3.0	< 0.60	< 0.032	14	42	4.71
	9/19/2016	< 0.021	3.2	< 0.60	< 0.032	16	30	4.59
	11/29/2016	< 0.021	3.0	2.2	< 0.032	17	76	4.82
	1/31/2017	<0.021	3.5	1.1	<0.032	15	32	4.51
	3/28/2017	<0.021	3.1	1	<0.032	14	12	4.54
	5/23/2017	<0.021	3.6	1.9	<0.032	16	26	4.45
	10/10/2017	<0.021	3.6	1.8	<0.032	15	46	4.33
	4/17/2018	<0.021	3.3	0.93	<0.032	15	38	4.76
	8/14/2018	<0.021	3.2	0.63	0.04	15	50	4.48
	4/10/2019	<0.021	3.0	<1.4	<0.032	14	44	4.54
MW-3	4/6/2019	<0.021	5.7	<1.4	0.04 J	21	24	4.53
MW-4	3/29/2016	1.8	290	460	0.31	610	1700	4.52
	5/18/2016	1.7	290	430	0.34	550	2000	4.45
	7/19/2016	1.4	270	400	0.37	490	1900	4.55
	9/19/2016	1.7	260	500	0.38	610	1800	4.57
	11/29/2016	2.9	300	560	0.34	710	2400	4.06
	1/31/2017	2.0	290	490	0.41	470	310	4.55
	3/28/2017	2.2	250	190	0.38	550	1400	4.53
	5/23/2017	2.8	310	500	0.36	640	1800	4.40
	10/10/2017	1.9	290	470	0.39	520	1900	4.63
	12/11/2017	2.2	310	430	0.45	500	2000	8.28
	4/18/2018	2.5	300	480	0.38	580	1700	4.71
	8/14/2018	1.8	270	470	0.47	560	1700	4.82
	4/10/2019	2.1	250	430	0.38	510	1800	4.87

Table C-1
Historical Groundwater Results - Appendix III
Charles R. Lowman Power Facility

	Analyte	Boron	Calciuim	Chloride	Fluoride	Sulfate	TDS	pH
	Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	SU
	SMCL	-	-	250	2.0	250	500	6.5 - 8.5
Well ID	Date							
MW-5	3/29/2016	1.3	130	71	0.1	150	770	5.96
	5/18/2016	0.29	130	41	0.15	20	680	6.03
	7/19/2016	Dry						
	9/19/2016	Dry						
	11/29/2016	Dry						
	2/1/2017	5.9	260	190	<0.032	140	1300	5.08
	3/28/2017	4.9	210	120	0.04	400	1100	5.23
	5/24/2017	3.1	160	120	0.08	230	940	5.50
	10/10/2017	Dry						
	4/18/2018	1.7	150	90	0.11	130	880	5.97
	8/13/2018	Dry						
	4/9/2019	0.55	120	43	0.18	<1.4	700	6.04
MW-5A	8/4/2016	17	480	340	1.2	790	2500	5.97
	9/19/2016	13	480	350	1.7	890	2300	6.01
	11/29/2016	13	340	240	1.5	660	1800	5.81
	2/1/2017	14	480	340	2.1	590	2200	5.98
	3/28/2017	14	370	170	1.4	560	1400	5.64
	5/24/2017	8.9	330	310	1.3	430	1600	5.63
	10/10/2017	7.4	300	230	2.2	140	1300	5.84
	12/12/2017	7.4	320	260	1.9	270	1400	8.50
	4/18/2018	6.7	330	290	<0.032	170	1300	6.39
	8/15/2018	4.8	220	180	2	130	1000	6.15
	4/9/2019	4.6	180	190	1.6	130	920	6.10
MW-6	3/29/2016	0.30	99	52	0.12	140	490	6.15
	5/18/2016	0.28	90	45	0.14	130	430	6.04
	7/19/2016	0.32	62	35	0.24	64	340	6.20
	9/19/2016	0.32	74	34	0.23	94	370	6.31
	11/29/2016	0.40	64	39	0.17	100	380	6.35
	1/31/2017	0.35	100	48	0.04	140	410	5.43
	3/29/2017	0.35	82	45	0.12	130	390	5.82
	5/24/2017	0.34	97	44	0.1	130	400	5.66
	10/11/2017	0.43	86	33	0.24	120	410	6.07
	12/12/2017	0.45	73	25	0.27	80	380	8.17
	4/17/2018	0.23	89	31	0.06	170	480	5.82
	8/15/2018	0.38	74	24	0.27	89	400	6.20
	4/7/2019	0.19	98	24	0.060 J	170	370	5.65

Table C-1
Historical Groundwater Results - Appendix III
Charles R. Lowman Power Facility

	Analyte	Boron	Calciuim	Chloride	Fluoride	Sulfate	TDS	pH
	Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	SU
	SMCL	-	-	250	2.0	250	500	6.5 - 8.5
Well ID	Date							
MW-7	3/29/2016	7	280	210	0.79	390	1200	5.94
	5/18/2016	11	410	180	1.1	480	1600	5.91
	7/19/2016	6	150	67	1.7	170	740	6.13
	9/19/2016	11	360	280	1.6	650	1800	6.03
	11/29/2016	13	490	440	1.4	870	2800	5.99
	2/1/2017	5.1	170	110	1.1	230	770	5.93
	3/29/2017	11	310	94	1.8	530	1500	6.05
	5/24/2017	8.9	260	150	1.7	370	1100	5.96
	10/11/2017	7.2	190	44	2.3	230	710	6.16
	12/12/2017	6.3	190	80	2.4	210	900	8.57
	4/18/2018	2.8	93	26	1.4	96	410	6.24
	8/15/2018	6.8	240	110	2.2	400	1100	6.03
	4/7/2019	4.7	180	81	1.5	280	860	6.04
MW-8	3/29/2016	0.051	63	7.9	0.13	12	210	6.11
	5/18/2016	0.16	85	14	0.16	12	270	6.29
	7/19/2016	0.13	70	51	0.16	< 1.4	330	6.43
	9/19/2016	0.49	73	54	0.14	< 1.4	320	6.48
	11/29/2016	0.071	69	47	0.12	< 1.4	300	6.43
	2/1/2017	0.37	61	58	0.16	21	300	6.42
	3/29/2017	0.1	87	11	0.11	13	290	6.19
	5/24/2017	0.097	88	28	0.19	9.6	280	6.17
	10/11/2017	0.098	76	45	0.19	2.9	280	6.40
	12/12/2017	0.085	70	45	0.18	< 1.4	290	8.07
	4/18/2018	0.25	44	32	0.19	<1.4	200	6.65
	8/15/2018	0.13	70	45	0.22	<1.4	320	6.47
	4/7/2019	0.13	68	6.0	0.17	3.4 J	190	6.26
MW-9	3/29/2016	2.7	61	66	0.12	77	430	6.26
	5/18/2016	3.1	76	78	0.12	180	530	6.26
	7/19/2016	4.1	82	120	0.12	200	760	6.20
	9/19/2016	4.1	110	180	0.11	310	920	6.13
	11/29/2016	5.7	180	390	0.090	570	1600	6.26
	1/31/2017	4.0	160	300	0.10	280	1100	6.00
	3/28/2017	4.4	150	140	0.09	370	1100	5.90
	5/22/2017	4.8	190	310	0.1	460	1300	5.95
	10/9/2017	5.5	190	310	0.12	420	1500	5.47
	12/12/2017	5.2	200	300	0.13	380	1600	7.34
	4/17/2018	2.9	140	180	0.15	230	720	6.39
	8/14/2018	4.9	260	430	0.12	720	1700	5.96
	4/10/2019	5.7	310	440	0.090 J	790	1900	5.91

Table C-1
Historical Groundwater Results - Appendix III
Charles R. Lowman Power Facility

	Analyte	Boron	Calciuim	Chloride	Fluoride	Sulfate	TDS	pH
	Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	SU
	SMCL	-	-	250	2.0	250	500	6.5 - 8.5
Well ID	Date							
MW-10	3/29/2016	0.35	110	110	0.06	250	550	3.78
	5/18/2016	0.41	130	100	0.06	250	650	3.95
	7/19/2016	0.34	94	100	0.070	190	590	3.81
	9/19/2016	0.26	110	110	0.060	260	590	3.79
	11/29/2016	0.39	90	91	0.040	260	570	3.83
	2/1/2017	0.69	150	150	0.06	270	750	4.06
	3/29/2017	0.41	94	93	0.05	240	560	3.90
	5/24/2017	0.48	110	100	0.08	250	570	3.84
	10/11/2017	0.40	94	86	0.06	230	520	4.05
	12/13/2017	0.35	100	75	0.09	220	560	8.02
	4/19/2018	0.57	100	110	0.07	290	670	4.01
	8/14/2018	0.36	87	71	0.07	200	490	4.32
	4/9/2019	0.53	78	68	0.060 J	210	460	3.87
MW-11	3/29/2016	0.95	140	83	0.05	230	620	6.76
	5/18/2016	14	650	390	1.6	990	2800	6.76
	7/19/2016	12	540	340	1.8	770	2700	6.75
	9/19/2016	11	600	510	1.8	1200	3300	6.93
	11/29/2016	13	430	390	1.7	830	2400	6.65
	2/2/2017	7.8	330	290	2.4	550	1700	6.80
	3/29/2017	6	350	340	2.2	700	1600	6.88
	5/24/2017	5.7	370	310	2.2	680	1700	6.73
	10/10/2017	7.8	580	460	2.1	920	2800	6.58
	12/12/2017	8.7	660	440	2.0	910	2700	10.58
	4/18/2018	8	470	320	2.0	780	2100	7.06
	8/15/2018	6.3	250	170	2.5	470	1300	7.00
	4/9/2019	8.6	390	310	1.9	690	1900	6.90
MW-12	3/29/2016	12	600	520	1.5	870	2700	6.13
	5/18/2016	1.2	140	80	0.040	250	690	5.67
	7/19/2016	Dry						
	9/19/2016	Dry						
	11/29/2016	Dry						
	2/1/2017	0.77	110	89	0.04	180	530	5.71
	3/30/2017	0.58	94	73	0.04	180	460	5.59
	5/25/2017	0.88	120	93	0.05	210	560	5.58
	10/10/2017	Dry						
	4/19/2018	1.3	140	130	0.04	250	800	5.71
	8/13/2018	Dry						
	4/9/2019	1.3	120	110	0.050 J	250	660	5.65

Table C-1
Historical Groundwater Results - Appendix III
Charles R. Lowman Power Facility

	Analyte	Boron	Calciuim	Chloride	Fluoride	Sulfate	TDS	pH
	Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	SU
	SMCL	-	-	250	2.0	250	500	6.5 - 8.5
Well ID	Date							
MW-12A	8/4/2016	0.75	170	91	0.04	310	810	5.67
	9/19/2016	0.75	160	91	0.04	330	750	5.59
	11/29/2016	0.97	150	98	< 0.032	350	770	5.39
	2/1/2017	1.3	130	120	0.04	200	670	5.69
	3/30/2017	0.59	92	74	0.04	170	460	5.57
	5/25/2017	0.68	110	90	0.05	210	550	5.44
	10/10/2017	0.83	120	83	0.04	230	620	5.38
	12/13/2017	0.7	120	77	0.045	220	630	8.68
	4/19/2018	2.4	190	180	0.05	320	900	5.67
	8/14/2018	0.78	110	91	0.05	210	520	5.45
	4/9/2019	1.3	110	110	0.050 J	240	660	5.50
MW-13	5/18/2016	1.4	120	44	0.070	230	520	6.05
	7/19/2016	0.97	72	34	0.080	130	370	5.97
	9/19/2016	0.79	63	36	0.080	90	310	6.18
	11/29/2016	1.4	100	170	0.060	120	740	6.19
	1/30/2017	0.8	130	130	0.06	170	570	6.01
	3/27/2017	1.1	110	74	0.07	160	480	6.23
	5/22/2017	1.1	90	39	0.09	120	350	6.18
	10/10/2017	0.55	72	13	0.1	63	250	5.92
	12/12/2017	0.41	73	13	0.11	58	270	8.34
	4/18/2018	0.31	48	7.2	0.11	41	170	6.46
	8/15/2018	0.46	60	10	0.13	49	200	6.26
	4/9/2019	0.36	50	6	0.10	32	200	6.25
MW-13A	4/9/2019	0.022 J	16	27	0.060 J	54	190	5.78
MW-14	5/18/2016	0.320	94	70	0.22	<1.4	470	6.09
	7/19/2016	Dry						
	9/19/2016	Dry						
	11/29/2016	Dry						
	1/31/2017	3.4	160	190	0.04	260	870	4.62
	3/29/2017	3.6	160	190	<0.032	440	1100	4.99
	5/23/2017	1.4	100	110	0.06	170	580	5.46
	10/10/2017	Dry						
	4/17/2018	1.7	180	140	0.15	260	970	6.11
	8/13/2018	Dry						
	4/10/2019	0.77	150	75	0.19	160	780	6.05
MW-14A	8/4/2016	4.4	200	210	0.050	340	1100	5.63
	9/19/2016	5.0	180	220	0.050	390	1100	5.75
	12/1/2016	6.0	170	220	0.050	360	1100	5.48
	1/31/2017	4.5	220	230	<0.032	300	1200	5.11
	3/29/2017	4.4	220	250	0.04	470	1200	5.38
	5/23/2017	4.2	230	240	0.04	480	1100	5.16
	10/10/2017	3.6	210	220	0.04	390	1200	5.09
	12/11/2017	3.6	250	220	0.07	460	1300	7.24
	4/17/2018	3.9	250	270	0.05	460	1400	5.53
	8/15/2018	2.3	170	210	0.05	360	1100	5.34
	4/10/2019	2.9	190	210	0.060 J	390	1000	5.41

Table C-1
Historical Groundwater Results - Appendix III
Charles R. Lowman Power Facility

	Analyte	Boron	Calciuim	Chloride	Fluoride	Sulfate	TDS	pH
	Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	SU
	SMCL	-	-	250	2.0	250	500	6.5 - 8.5
Well ID	Date							
MW-15	4/7/2019	0.05	22	14	0.060 J	34	150	5.49
MW-16	4/8/2019	2.5	120	130	0.090 J	210	700	5.90
MW-17	4/8/2019	5.6	220	240	1.1	220	1300	6.12
MW-18	4/7/2019	0.17	45	16	0.11	17	260	6.24
MW-19	4/7/2019	0.38	41	31	0.040 J	90	210	4.95
MW-20	4/6/2019	0.089	48	9	0.14	26	170	6.10
MW-21	4/6/2019	0.14	72	28	0.090 J	25	220	5.98
MW-22	4/7/2019	0.12	120	19	0.11	12	360	6.24
MW-23	4/8/2019	0.066	48	11	0.10	25	220	6.91

Notes:

SMCL - secondary maximum contaminant level

TDS - total dissolved solids

mg/L - milligram per liter

Table C-2
Historical Groundwater Results - Appendix IV
Charles R. Lowman Power Facility

	Analyte	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Fluoride	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium	Combined Radium
	Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	pCi/L
	GWPS	0.006	0.01	2.0	0.004	0.005	0.1	0.006	4.0	0.015	0.04	0.002	0.1	0.05	0.002	5
Well ID	Date															
MW-1	3/29/2016	< 0.001	0.00072	0.11	< 0.00034	< 0.00034	< 0.0011	0.010	0.04	< 0.00035	< 0.0032	< 0.000070	< 0.00085	< 0.00024	< 0.000085	0.584
	5/18/2016	< 0.001	< 0.00046	0.11	< 0.00034	< 0.00034	< 0.0011	0.0089	0.04	< 0.00035	< 0.0032	< 0.000070	< 0.00085	< 0.00024	< 0.000085	0.494
	7/19/2016	< 0.001	0.0014	0.096	< 0.00034	< 0.00034	< 0.0011	0.0069	0.04	< 0.00035	< 0.0032	0.00008	< 0.00085	< 0.00024	< 0.000085	0.607
	9/19/2016	< 0.001	< 0.00046	0.10	< 0.00034	< 0.00034	< 0.0011	0.0057	< 0.032	< 0.00035	< 0.0032	< 0.000070	< 0.00085	< 0.00024	< 0.000085	0.533
	11/29/2016	< 0.001	< 0.00046	0.093	< 0.00034	< 0.00034	< 0.0011	0.0060	< 0.032	< 0.00035	< 0.0032	< 0.000070	< 0.00085	< 0.00024	< 0.000085	0.205
	1/31/2017	<0.0010	0.0011	0.091	<0.00034	<0.00034	<0.0011	0.0072	0.04	<0.00035	<0.0032	<0.000070	0.00088	<0.00024	<0.000085	
	3/28/2017	0.0014	0.0013	0.094	< 0.00034	< 0.00034	<0.0011	0.0082	<0.032	<0.00035	<0.0032	<0.000070	<0.00085	<0.00024	<0.000085	0.489
	5/23/2017	<0.0010	0.00083	0.11	<0.00034	<0.00034	<0.0011	0.0094	0.05	<0.00035	<0.0032	<0.000070	<0.00085	<0.00024	<0.000085	-0.112
	10/9/2017								0.06							
	4/17/2018	<0.0010	0.0019	0.12	<0.00034	<0.00034	<0.0011	0.011	0.07	<0.00035	0.0022	<0.000070	<0.00085	0.00065	<0.000085	
	8/14/2018	<0.0010	0.00073	0.12	<0.00034	<0.00034	<0.0011	0.0077	0.07	<0.00035	0.0025	<0.000070	<0.00085	<0.00024	<0.000085	0.480
	4/10/2019	<0.0010	0.00140	0.12	<0.00034	<0.00034	<0.0011	0.0086	0.08 J	<0.00035	0.0018 J	<0.000070	<0.0020	<0.00071	<0.000085	
MW-2	3/29/2016	< 0.001	< 0.00046	0.070	< 0.00034	< 0.00034	< 0.0011	0.012	< 0.032	< 0.00035	0.0034	< 0.000070	< 0.00085	0.0003	< 0.000085	0.605
	5/18/2016	< 0.001	< 0.00046	0.075	< 0.00034	< 0.00034	< 0.0011	0.013	< 0.032	< 0.00035	< 0.0032	< 0.000070	< 0.00085	< 0.00024	< 0.000085	0.43
	7/19/2016	< 0.001	0.00055	0.067	0.000068	< 0.00034	< 0.0011	0.011	< 0.032	< 0.00035	<0.00064	0.000083	< 0.00085	< 0.00024	< 0.000085	0.393
	9/19/2016	< 0.001	< 0.00046	0.067	< 0.00034	< 0.00034	< 0.0011	0.011	< 0.032	< 0.00035	< 0.0032	< 0.000070	< 0.00085	< 0.00024	< 0.000085	0.0786
	11/29/2016	< 0.001	< 0.00046	0.070	< 0.00034	< 0.00034	< 0.0011	0.011	< 0.032	< 0.00035	< 0.0032	< 0.000070	< 0.00085	< 0.00024	< 0.000085	0.249
	1/31/2017	<0.0010	<0.00046	0.075	0.00037	<0.00034	<0.0011	0.012	<0.032	<0.00035	<0.0032	<0.000070	<0.00085	<0.00024	<0.000085	
	3/28/2017	<0.0010	<0.00046	0.072	<0.00034	<0.00034	<0.0011	0.012	<0.032	<0.00035	<0.0032	<0.000070	<0.00085	<0.00024	<0.000085	0.698
	5/23/2017	<0.0010	<0.00046	0.078	<0.00034	<0.00034	<0.0011	0.012	<0.032	<0.00035	<0.0032	<0.000070	<0.00085	<0.00024	<0.000085	0.223
	10/10/2017								<0.032							
	4/17/2018	<0.0010	<0.00046	0.07	0.00035	<0.00034	<0.0011	0.012	<0.032	<0.00035	0.0022	<0.000070	<0.00085	0.0003	<0.000085	
	8/14/2018	<0.0010	<0.00046	0.067	<0.00034	<0.00034	<0.0011	0.011	0.04	<0.00035	0.0027	<0.000070	<0.00085	<0.00024	<0.000085	0.392
	4/10/2019	<0.0010	<0.00046	0.064	<0.00034	<0.00034	<0.0011	0.010	<0.032	<0.00035	0.0020 J	<0.000070	<0.00085	<0.00024	<0.000085	
MW-3	4/6/2019	<0.0010	<0.00046	0.13	0.00057 J	<0.00034	<0.0011	0.031	0.04 J	<0.00035	0.0027 J	<0.000070	<0.0020	<0.00071	<0.000085	
MW-4	3/29/2016	< 0.0010	0.0054	0.030	0.0053	0.00095	< 0.0011	0.99	0.31	0.0018	0.0093	< 0.000070	< 0.00085	0.0028	0.00023	0.583
	5/18/2016	< 0.0010	0.0073	0.032	0.0055	0.00076	< 0.0011	1.00	0.34	0.0020	0.0069	< 0.000070	< 0.00085	0.0028	0.00025	0.599
	7/19/2016	< 0.0010	0.0049	0.031	0.0044	0.00099	< 0.0011	0.99	0.37	0.0019	0.0060	0.000083	< 0.00085	0.0036	0.00023	0.908
	9/19/2016	< 0.0010	0.0059	0.041	0.0056	0.00110	< 0.0011	1.00	0.38	0.0018	0.0062	< 0.000070	< 0.00085	0.0067	0.00027	0.684
	11/29/2016	< 0.0010	0.0040	0.31	0.0070	0.00100	< 0.0011	1.00	0.34	0.0024	0.0087	< 0.000070	< 0.00085	0.0030	0.00031	1.2
	1/31/2017	<0.0010	0.0064	0.05	0.0066	0.00085	<0.0011	0.98	0.41	0.0020	0.0045	<0.000070	<0.00085	0.0027	0.0003	
	3/28/2017	<0.0010	0.0053	0.045	0.0055	0.00095	<0.0011	0.96	0.38	0.0019	0.0073	<0.000070	<0.00085	0.0029	0.00029	0.803
	5/23/2017	<0.0010	0.0039	0.041	0.0056	<0.0017	<0.0011	1.00	0.36	0.0021	0.0065	<0.000070	<0.00085	0.0037	0.00027	0.673
	10/10/2017								0.39							
	12/11/2017								0.45							
	4/18/2018	<0.0010	0.0034	0.04	0.0057	0.00076	<0.0011	0.98	0.38	0.0019	0.0086	<0.000070	<0.00085	0.0022	0.0003	
	8/14/2018	<0.0010	0.0048	0.057	0.0053	0.0008	<0.0011	0.9	0.47	0.0017	0.0071	<0.000070	<0.00085	0.0015	0.00023	0.985
	4/10/2019	<0.0010	0.0036	0.044	0.0046	0.00057 J	<0.0011	0.82	0.38	0.0014	0.0056	<0.000070	0.002	0.0013	0.00023 J	

Table C-2
Historical Groundwater Results - Appendix IV
Charles R. Lowman Power Facility

	Analyte	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Fluoride	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium	Combined Radium
	Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	pCi/L
	GWPS	0.006	0.01	2.0	0.004	0.005	0.1	0.006	4.0	0.015	0.04	0.002	0.1	0.05	0.002	5
Well ID	Date															
MW-5	3/29/2016	< 0.0010	0.012	0.23	< 0.00034	< 0.00034	< 0.0011	0.027	0.1	< 0.00035	<0.0032	< 0.000070	< 0.00085	0.0033	< 0.000085	0.842
	5/18/2016	< 0.0010	0.032	0.33	< 0.00034	< 0.00034	< 0.0011	0.023	0.15	< 0.00035	<0.0032	< 0.000070	< 0.00085	0.0047	< 0.000085	0.738
	7/19/2016	Dry														
	9/19/2016	Dry														
	11/29/2016	Dry														
	2/1/2017	<0.0010	<0.00046	0.075	<0.00034	0.002	<0.0011	0.018	<0.032	<0.00035	0.0096	<0.000070	<0.00085	<0.00024	<0.000085	
	3/28/2017	<0.0010	0.0042	0.055	<0.00034	0.00061	<0.0011	0.028	0.04	<0.00035	0.0075	<0.000070	<0.00085	<0.00024	0.000085	0.472
	5/24/2017	<0.0010	0.0082	0.22	<0.00034	0.00063	<0.0011	0.031	0.08	<0.00035	0.0034	<0.000070	<0.00085	0.0021	<0.000085	0.532
	10/10/2017	Dry														
	4/18/2018	<0.0010	0.013	0.26	<0.00034	<0.00034	<0.0011	0.03	0.11	<0.00035	0.0045	<0.000070	<0.00085	0.0027	<0.000085	
	8/13/2018	Dry														
	5/9/2019	<0.0010	0.022	0.36	<0.00034	<0.00034	<0.0011	0.016	0.18	<0.00035	<0.0011	<0.000070	<0.0020	0.0033	<0.000085	
MW-5A	8/4/2016	< 0.0010	0.0034	0.035	< 0.00034	< 0.00034	< 0.0011	0.036	1.2	< 0.00035	0.2	< 0.000070	0.17	0.00033	0.00012	0.469
	9/19/2016	< 0.0010	0.0016	0.028	< 0.00034	< 0.00034	< 0.0011	0.015	1.7	< 0.00035	0.2	< 0.000070	0.32	< 0.00024	< 0.000085	0.529
	11/29/2016	< 0.0010	0.0026	0.024	< 0.00034	< 0.00034	< 0.0011	0.018	1.5	< 0.00035	0.18	< 0.000070	0.19	< 0.00024	0.000085	0.267
	2/1/2017	<0.0010	0.0028	0.029	<0.00034	<0.00034	<0.0011	0.014	2.1	<0.00035	0.22	<0.000070	0.28	<0.00024	<0.000085	
	3/28/2017	<0.0010	0.0026	0.033	<0.00034	<0.00034	<0.0011	0.036	1.4	<0.00035	0.17	<0.000070	0.12	<0.00024	<0.000085	1.04
	5/24/2017	<0.0010	0.0023	0.04	<0.00034	<0.00034	<0.0011	0.032	1.3	<0.00035	0.11	<0.000070	0.11	<0.00024	<0.000085	0.288
	10/10/2017								2.2							
	12/12/2017								1.9							
	4/18/2018	<0.0010	0.0036	0.098	<0.00034	<0.00034	<0.0011	0.0078	<0.032	<0.00035	0.23	<0.000070	0.44	<0.00024	<0.000085	
	8/15/2018	<0.0010	0.00094	0.073	<0.00034	<0.00034	<0.0011	0.009	2	<0.00035	0.097	<0.000070	0.29	<0.00024	<0.000085	0.469
	4/9/2019	<0.0010	0.00430	0.078	<0.00034	<0.00034	<0.0011	0.012	1.6	<0.00035	0.09	<0.000070	0.20	<0.00071	<0.000085	
MW-6	3/29/2016	< 0.001	0.0095	0.25	< 0.00034	< 0.00034	< 0.0011	0.0048	0.12	< 0.00035	< 0.0032	< 0.000070	0.0012	0.00032	< 0.000085	0.859
	5/18/2016	< 0.001	0.017	0.13	< 0.00034	< 0.00034	< 0.0011	0.015	0.14	< 0.00035	< 0.0032	< 0.000070	0.0016	< 0.00024	< 0.000085	0.528
	7/19/2016	< 0.001	0.022	0.10	< 0.00034	< 0.00034	< 0.0011	0.012	0.24	< 0.00035	0.0046	0.000084	0.003	< 0.00024	< 0.000085	0.313
	9/19/2016	< 0.001	0.023	0.12	< 0.00034	< 0.00034	< 0.0011	0.012	0.23	< 0.00035	0.0055	< 0.000070	0.0026	< 0.00024	< 0.000085	0.495
	11/29/2016	< 0.001	0.027	0.13	< 0.00034	< 0.00034	< 0.0011	0.012	0.17	< 0.00035	0.011	< 0.000070	0.0019	< 0.00024	< 0.000085	0.19
	1/31/2017	<0.0010	0.0021	0.075	<0.00034	0.00037	<0.0011	0.013	0.04	<0.00035	<0.0032	<0.000070	<0.00085	0.0022	<0.000085	
	3/29/2017	<0.0010	0.0063	0.082	<0.00034	<0.00034	<0.0011	0.016	0.12	<0.00035	<0.0032	<0.000070	<0.00085	<0.00024	<0.000085	0.258
	5/24/2017	<0.0010	0.0076	0.087	<0.00034	<0.00034	<0.0011	0.016	0.1	<0.00035	<0.0032	<0.000070	0.0027	0.00097	<0.000085	0.167
	10/11/2017								0.24							
	12/12/2017								0.27							
	4/17/2018	<0.0010	0.0021	0.046	<0.00034	<0.00034	<0.0011	0.0055	0.06	<0.00035	0.0019	<0.000070	<0.00085	0.00036	<0.000085	
	8/15/2018	<0.0010	0.019	0.078	<0.00034	<0.00034	<0.0011	0.012	0.27	<0.00035	0.0054	<0.000070	<0.00085	<0.00024	<0.000085	0.666
	4/7/2019	<0.0010	0.012 J	0.043	<0.00034	<0.00034	<0.0011	0.0042	0.060 J	<0.00035	0.0020 J	<0.000070	<0.0020	<0.00071	<0.000085	

Table C-2
Historical Groundwater Results - Appendix IV
Charles R. Lowman Power Facility

	Analyte	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Fluoride	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium	Combined Radium
	Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	pCi/L
	GWPS	0.006	0.01	2.0	0.004	0.005	0.1	0.006	4.0	0.015	0.04	0.002	0.1	0.05	0.002	5
Well ID	Date															
MW-7	3/29/2016	< 0.001	< 0.00046	0.052	< 0.00034	< 0.00034	< 0.0011	0.0016	0.79	< 0.00035	0.160	< 0.000070	0.010	0.00026	< 0.000085	0.414
	5/18/2016	< 0.001	< 0.00046	0.043	< 0.00034	< 0.00034	< 0.0011	0.0035	1.1	< 0.00035	0.210	< 0.000070	0.017	0.00045	< 0.000085	0.602
	7/19/2016	< 0.001	< 0.00046	0.041	< 0.00034	< 0.00034	< 0.0011	0.0018	1.7	< 0.00035	0.110	0.086	0.028	0.00025	< 0.000085	0.454
	9/19/2016	< 0.001	0.00047	0.057	< 0.00034	< 0.00034	< 0.0011	0.0037	1.6	< 0.00035	0.220	< 0.000070	0.035	< 0.00024	< 0.000085	1.01
	11/29/2016	< 0.001	0.00085	0.050	< 0.00034	< 0.00034	< 0.0011	0.0082	1.4	< 0.00035	0.220	< 0.000070	0.024	< 0.00024	< 0.000085	0.400
	2/1/2017	<0.0010	<0.00046	0.09	<0.00034	<0.00034	<0.0011	0.0017	1.1	<0.00035	0.130	<0.000070	0.0095	<0.00024	<0.000085	
	3/29/2017	<0.0010	0.0011	0.039	<0.00034	<0.00034	<0.0011	0.0053	1.8	<0.00035	0.170	0.00011	0.022	<0.00024	<0.000085	0.598
	5/24/2017	<0.0010	0.00098	0.037	<0.00034	<0.00034	<0.0011	0.0043	1.7	<0.00035	0.170	<0.000070	0.025	<0.00024	<0.000085	0.476
	10/11/2017								2.3							
	12/12/2017								2.4							
	4/18/2018	<0.0010	0.00065	0.093	<0.00034	<0.00034	<0.0011	0.00062	1.4	<0.00035	0.140	<0.000070	0.015	0.0017	<0.000085	
	8/15/2018	<0.0010	<0.00046	0.081	<0.00034	<0.00034	<0.0011	0.0036	2.2	<0.00035	0.19	<0.000070	0.03	<0.00024	<0.000085	1.14
	4/7/2019	<0.0010	<0.00046	0.089	<0.00034	<0.00034	<0.00034	0.0033	1.5	<0.00035	0.15	<0.000070	0.02	<0.00071	<0.000085	
MW-8	3/29/2016	< 0.0010	0.0007	0.066	< 0.00034	< 0.00034	< 0.0011	0.00310	0.13	< 0.00035	< 0.0032	< 0.000070	< 0.00085	0.0014	< 0.000085	0.206
	5/18/2016	< 0.0010	0.0041	0.07	< 0.00034	< 0.00034	< 0.0011	0.00240	0.16	< 0.00035	< 0.0032	< 0.000070	< 0.00085	0.00046	< 0.000085	-0.139
	7/19/2016	< 0.0010	0.05	0.10	< 0.00034	< 0.00034	< 0.0011	0.00200	0.16	< 0.00035	< 0.0032	0.000081	< 0.00085	0.00024	< 0.000085	0.542
	9/19/2016	< 0.0010	0.058	0.10	< 0.00034	< 0.00034	< 0.0011	0.00096	0.14	< 0.00035	< 0.0032	< 0.000070	< 0.00085	< 0.00024	< 0.000085	0.937
	11/29/2016	< 0.0010	0.06	0.11	< 0.00034	< 0.00034	< 0.0011	0.00065	0.12	< 0.00035	< 0.0032	< 0.000070	< 0.00085	< 0.00024	< 0.000085	0.401
	2/1/2017	<0.0010	0.014	0.085	<0.00034	<0.00034	<0.0011	0.001	0.16	<0.00035	<0.0032	<0.000070	<0.00085	<0.00024	<0.000085	
	3/29/2017	<0.0010	0.0043	0.079	<0.00034	<0.00034	0.028	0.0015	0.11	<0.00035	<0.0032	<0.000070	<0.00085	<0.00024	<0.000085	0.375
	5/24/2017	<0.0010	0.0059	0.077	<0.00034	<0.00034	<0.0011	0.0041	0.19	<0.00035	<0.0032	<0.000070	0.0011	0.00056	<0.000085	-0.0523
	10/11/2017								0.19							
	12/12/2017								0.18							
	4/18/2018	<0.0010	0.0098	0.063	<0.00034	<0.00034	<0.0011	<0.00040	0.19	<0.00035	<0.0011	<0.000070	<0.00085	<0.00024	<0.000085	
	8/15/2018	<0.0010	0.047	0.1	<0.00034	<0.00034	<0.0011	<0.00040	0.22	<0.00035	0.0011	<0.000070	<0.00085	<0.00024	<0.000085	0.434
	4/7/2019	<0.0010	0.0016	0.055	<0.00034	<0.00034	<0.0011	0.0025	0.17	<0.00035	<0.0011	<0.000070	<0.0020	<0.00071	<0.000085	
MW-9	3/29/2016	< 0.0010	0.00094	0.1	< 0.00034	< 0.00034	< 0.0011	< 0.00040	0.12	< 0.00035	< 0.0032	< 0.000070	< 0.00085	< 0.00024	< 0.000085	0.65
	5/18/2016	< 0.0010	0.0012	0.16	< 0.00034	< 0.00034	< 0.0011	< 0.00040	0.12	< 0.00035	< 0.0032	< 0.000070	< 0.00085	< 0.00024	< 0.000085	0.982
	7/19/2016	< 0.0010	0.0013	0.14	< 0.00034	< 0.00034	< 0.0011	< 0.00040	0.12	< 0.00035	< 0.0032	0.000083	< 0.00085	< 0.00024	< 0.000085	1.07
	9/19/2016	< 0.0010	0.0031	0.14	< 0.00034	< 0.00034	< 0.0011	< 0.00040	0.11	< 0.00035	< 0.0032	< 0.000070	< 0.00085	< 0.00024	< 0.000085	1.02
	11/29/2016	< 0.0010	0.0031	0.17	< 0.00034	< 0.00034	< 0.0011	< 0.00040	0.090	< 0.00035	< 0.0032	< 0.000070	< 0.00085	< 0.00024	< 0.000085	1.55
	1/31/2017	<0.0010	0.00095	0.096	<0.00034	<0.00034	<0.0011	<0.00040	0.10	<0.00035	<0.0032	<0.000070	<0.00085	<0.00024	<0.000085	
	3/28/2017	<0.0010	0.001	0.13	<0.00034	<0.00034	<0.0011	<0.00040	0.09	<0.00035	<0.0032	<0.000070	<0.00085	<0.00024	<0.000085	0.608
	5/22/2017	<0.0010	0.00084	0.14	<0.00034	<0.00034	<0.0011	<0.00040	0.1	<0.00035	<0.0032	<0.000070	<0.00085	<0.00024	<0.000085	0.614
	10/9/2017								0.12							
	12/12/2017								0.13							
	4/17/2018	<0.0010	0.00094	0.094	<0.00034	<0.00034	<0.0011	<0.00040	0.15	<0.00035	<0.0011	<0.000070	<0.00085	0.00025	<0.000085	
	8/14/2018	<0.0010	0.00071	0.14	<0.00034	<0.00034	<0.0011	<0.00040	0.12	<0.00035	<0.0011	<0.000070	<0.00085	<0.00024	<0.000085	1.21
	4/10/2019	<0.0010	0.00066 J	0.07	<0.00034	<0.00034	<0.0011	<0.00040	0.090 J	<0.00035	<0.0011	<0.000070	<0.0020	<0.00071	<0.000085	

Table C-2
Historical Groundwater Results - Appendix IV
Charles R. Lowman Power Facility

	Analyte	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Fluoride	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium	Combined Radium
	Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	pCi/L
	GWPS	0.006	0.01	2.0	0.004	0.005	0.1	0.006	4.0	0.015	0.04	0.002	0.1	0.05	0.002	5
Well ID	Date															
MW-10	3/29/2016	<0.0010	0.00054	0.03	0.0016	0.0019	< 0.0011	0.0087	0.06	< 0.00035	0.017	< 0.000070	< 0.00085	0.0064	< 0.000085	0.279
	5/18/2016	<0.0010	0.00063	0.024	0.0017	0.0023	0.0014	0.0086	0.06	< 0.00035	0.016	< 0.000070	< 0.00085	0.0078	< 0.000085	0.431
	7/19/2016	<0.0010	< 0.00046	0.038	0.0016	0.0013	< 0.0011	0.0110	0.070	< 0.00035	0.013	0.000084	< 0.00085	0.0029	< 0.000085	0.748
	9/19/2016	<0.0010	< 0.00046	0.033	0.0018	0.0012	< 0.0011	0.0097	0.060	< 0.00035	0.019	< 0.000070	< 0.00085	0.0022	< 0.000085	0.122
	11/29/2016	<0.0010	< 0.00046	0.028	0.0012	0.0006	< 0.0011	0.0077	0.040	< 0.00035	0.013	< 0.000070	< 0.00085	0.0015	< 0.000085	0.489
	2/1/2017	<0.0010	<0.00046	0.039	0.0019	0.0018	<0.0011	0.0096	0.06	<0.00035	0.015	<0.000070	<0.00085	0.0035	<0.000085	
	3/29/2017	<0.0010	<0.00046	0.032	0.0016	0.00097	<0.0011	0.0073	0.05	<0.00035	0.015	<0.000070	<0.00085	0.002	<0.000085	0.312
	5/24/2017	<0.0010	<0.00046	0.041	0.0021	0.00072	<0.0011	0.0058	0.08	<0.00035	0.013	<0.000070	<0.00085	0.0023	<0.000085	0.256
	10/11/2017								0.06							
	12/13/2017								0.09							
	4/19/2018	<0.0010	0.00054	0.034	0.0016	0.0011	<0.0011	0.0076	0.07	<0.00035	0.021	<0.000070	<0.00085	0.0025	<0.000085	
	8/14/2018	<0.0010	<0.00046	0.03	0.00068	0.00067	<0.0011	0.0047	0.07	<0.00035	0.016	<0.000070	<0.00085	0.0019	<0.000085	0.423
	4/10/2019	<0.0010	<0.00046	0.034	0.00082 J	0.00082 J	<0.0011	0.0047	0.060 J	<0.00035	0.012	<0.000070	<0.0020	0.0030	<0.000085	
MW-11	3/29/2016	< 0.0010	<0.00046	0.039	< 0.00034	< 0.00034	0.0018	< 0.00040	0.05	< 0.00035	< 0.0032	< 0.000070	0.0013	0.0014	< 0.000085	0.253
	5/18/2016	< 0.0010	0.0	0.02	< 0.00034	< 0.00034	< 0.0011	< 0.00040	1.6	< 0.00035	0.075	< 0.000070	0.19	< 0.00024	< 0.000085	1.12
	7/19/2016	< 0.0010	0.0031	0.022	< 0.00034	< 0.00034	< 0.0011	< 0.00040	1.8	< 0.00035	0.065	0.000086	0.21	< 0.00024	< 0.000085	0.875
	9/19/2016	< 0.0010	0.0037	0.026	< 0.00034	< 0.00034	< 0.0011	< 0.00040	1.8	< 0.00035	0.100	< 0.000070	0.22	0.00036	< 0.000085	1.08
	11/29/2016	< 0.0010	0.0028	0.022	< 0.00034	< 0.00034	< 0.0011	< 0.00040	1.7	< 0.00035	0.079	< 0.000070	0.22	< 0.00024	< 0.000085	1.24
	2/2/2017	<0.0010	0.0035	0.024	<0.00034	<0.00034	<0.0011	<0.00040	2.4	<0.00035	0.062	<0.000070	0.26	<0.00024	<0.000085	
	3/29/2017	<0.0010	0.0029	0.025	<0.00034	<0.00034	<0.0011	<0.00040	2.2	<0.00035	0.067	0.000075	0.24	<0.00024	<0.000085	1.14
	5/24/2017	<0.0010	0.0032	0.025	<0.00034	<0.00034	<0.0011	<0.00040	2.2	<0.00035	0.062	<0.000070	0.23	<0.00024	<0.000085	0.684
	10/10/2017								2.1							
	12/12/2017								2.0							
	4/18/2018	<0.0010	0.0037	0.024	<0.00034	<0.00034	<0.0011	<0.00040	2.0	<0.00035	0.078	<0.000070	0.18	<0.00024	<0.000085	
	8/15/2018	<0.0010	0.0029	0.029	<0.00034	<0.00034	<0.0011	<0.00040	2.5	<0.00035	0.052	<0.000070	0.18	<0.00024	<0.000085	0.855
	4/9/2019	<0.0010	0.0033	0.30	<0.00034	<0.00034	<0.0011	<0.00040	1.9	<0.00035	0.058	<0.000070	0.14	<0.00071	<0.000085	
MW-12	3/29/2016	< 0.001	0.0027	0.021	< 0.00034	< 0.00034	< 0.0011	< 0.00040	1.5	< 0.00035	0.1	< 0.000070	0.18	0.00025	< 0.000085	0.794
	5/18/2016	< 0.001	< 0.00046	0.030	< 0.00034	< 0.00034	0.0028	< 0.00040	0.040	< 0.00035	0.0034	< 0.000070	0.0011	0.0042	< 0.000085	0.369
	7/19/2016	Dry														
	9/19/2016	Dry														
	11/29/2016	Dry														
	2/1/2017	<0.0010	<0.00046	0.048	<0.00034	<0.00034	<0.0011	<0.00040	0.04	<0.00035	<0.0032	<0.000070	<0.00085	0.00046	<0.000085	
	3/30/2017	<0.0010	<0.00046	0.033	<0.00034	<0.00034	0.0013	<0.00040	0.04	<0.00035	0.0035	<0.000070	0.0023	0.00024	<0.000085	0.0806
	5/25/2017	<0.0010	<0.00046	0.033	<0.00034	<0.00034	0.0023	<0.00040	0.05	<0.00035	0.0053	<0.000070	<0.00085	<0.00024	<0.000085	0.322
	10/10/2017	Dry														
	4/19/2018	<0.0010	0.00053	0.037	<0.00034	0.0011	<0.0011	0.00062	0.04	<0.00035	0.02	<0.000070	0.0016	0.00027	<0.000085	
	8/13/2018	Dry														
	4/9/2019	<0.0010	<0.00046	0.027	<0.00034	0.00037 J	<0.0011	<0.00040	0.050 J	<0.00035	0.0074	<0.000070	<0.0020	<0.00071	<0.000085	
MW-12A	8/4/2016	< 0.0010	0.00051	0.033	< 0.00034	0.00072	< 0.0011	0.0065	0.04	< 0.00035	< 0.0032	< 0.000070	< 0.00085	0.012	< 0.000085	0.406
	9/19/2016	< 0.0010	< 0.00046	0.025	< 0.00034	0.00061	< 0.0011	0.0038	0.04	< 0.00035	0.0034	< 0.000070	< 0.00085	0.0077	< 0.000085	0.351
	11/29/2016	< 0.0010	< 0.00046	0.026	< 0.00034	0.00077	< 0.0011	0.0044	< 0.032	< 0.00035	0.0037	< 0.000070	< 0.00085	0.0083	< 0.000085	0.208
	2/1/2017	<0.0010	<0.00046	0.076	<0.00034	0.00068	<0.0011	0.0110	0.04	<0.00035	0.0170	<0.000070	<0.00085	0.00037	<0.000085	
	3/30/2017	<0.0010	<0.00046	0.046	<0.00034	<0.00034	<0.0011	0.0042	0.04	<0.00035	0.0064	0.000073	<0.00085	<0.00024	<0.000085	0.4
	5/25/2017	<0.0010	<0.00046	0.037	<0.00034	0.00069	0.0011	0.0028	0.05	<0.00035	0.0061	<0.000070	0.00088	0.002	<0.000085	SD
	10/10/2017								0.04							
	12/13/2017								0.045							
	4/19/2018	<0.0010	0.00068	0.055	<0.00034	0.0011	<0.0011	0.034	0.05	<0.00035	0.045	<0.000070	<0.00085	0.00046	0.0001	
	8/14/2018	<0.0010	<0.00046	0.028	<0.00034	0.00047	0.0018	0.0026	0.05	<0.00035	0.0084	<0.000070	0.0019	0.00091	<0.000085	0.424
	4/9/2019	<0.0010	<0.00046	0.028	<0.00034	0.00056 J	<0.0011	0.0074	0.050 J	<0.00035	0.014	<0.000070	<0.0020	<0.00071	<0.000085	

Table C-2
Historical Groundwater Results - Appendix IV
Charles R. Lowman Power Facility

	Analyte	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Fluoride	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium	Combined Radium
	Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	pCi/L
	GWPS	0.006	0.01	2.0	0.004	0.005	0.1	0.006	4.0	0.015	0.04	0.002	0.1	0.05	0.002	5
Well ID	Date															
MW-13	5/18/2016	< 0.0010	0.00074	0.11	< 0.00034	< 0.00034	< 0.0011	0.00078	0.070	< 0.00035	< 0.0032	< 0.000070	< 0.00085	0.00074	< 0.000085	0.403
	7/19/2016	< 0.0010	0.00074	0.057	< 0.00034	< 0.00034	< 0.0011	0.00048	0.080	< 0.00035	< 0.0032	0.000083	< 0.00085	0.00027	< 0.000085	0.743
	9/19/2016	< 0.0010	0.00067	0.059	< 0.00034	< 0.00034	< 0.0011	0.00061	0.080	< 0.00035	< 0.0032	< 0.000070	< 0.00085	0.00086	< 0.000085	0.358
	11/29/2016	< 0.0010	0.00088	0.091	< 0.00034	< 0.00034	< 0.0011	0.00088	0.060	< 0.00035	< 0.0032	< 0.000070	< 0.00085	0.0016	< 0.000085	1.04
	1/30/2017	<0.0010	0.00088	0.12	<0.00034	<0.00034	<0.0011	0.00053	0.06	<0.00035	<0.0032	<0.000070	<0.00085	0.0009	<0.000085	
	3/27/2017	<0.0010	0.00083	0.11	<0.00034	<0.00034	<0.0011	0.00072	0.07	<0.00035	<0.0032	0.000091	0.0051	0.0035	<0.000085	0.306
	5/22/2017	<0.0010	0.00078	0.08	<0.00034	<0.00034	<0.0011	<0.00040	0.09	<0.00035	<0.0032	<0.000070	<0.00085	0.0003	<0.000085	0.351
	10/10/2017								0.1							
	12/12/2017								0.11							
	4/18/2018	<0.0010	0.0028	0.067	<0.00034	<0.00034	<0.0011	<0.00040	0.11	<0.00035	<0.0011	<0.000070	<0.00085	0.0014	<0.000085	
	8/15/2018	<0.0010	<0.00046	0.08	<0.00034	<0.00034	<0.0011	<0.00040	0.13	0.00088	<0.0011	<0.000070	<0.00085	0.00088	<0.000085	0.318
	4/9/2019	<0.0010	0.00082 J	0.07	<0.00034	<0.00034	<0.0011	<0.00040	0.10	<0.00035	<0.0011	<0.000070	<0.00085	0.00076 J	<0.000085	
MW-13A	4/9/2019								0.22							
MW-14A	5/18/2016	< 0.0010	0.200	0.29	< 0.00034	< 0.00034	< 0.0011	0.0022	0.22	< 0.00035	< 0.0032	< 0.000070	< 0.00085	0.0011	< 0.000085	1.03
	7/19/2016	Dry														
	9/19/2016	Dry														
	11/29/2016	Dry														
	1/31/2017	<0.0010	0.00078	0.21	0.00075	0.0026	<0.0011	0.26	0.04	<0.00035	0.0035	<0.000070	<0.00085	<0.00024	0.00015	
	3/29/2017	<0.0010	0.0012	0.063	0.00053	0.0015	<0.0011	0.35	<0.032	<0.00035	<0.0032	<0.000070	<0.00085	<0.00024	0.00014	0.502
	5/23/2017	<0.0010	0.0013	0.12	<0.00034	0.0012	<0.0011	0.14	0.06	<0.00035	<0.0032	<0.000070	<0.00085	<0.00024	0.00013	0.375
	10/10/2017	Dry														
	4/17/2018	<0.0010	0.017	0.23	<0.00034	<0.00034	<0.0011	0.055	0.15	<0.00035	<0.0011	<0.000070	<0.00085	0.00085	<0.000085	
	8/13/2018	Dry														
	4/10/2019	<0.0010	0.017	0.19	<0.00034	<0.00034	<0.0011	0.043	0.19	<0.00035	0.0015 J	<0.000070	<0.00020	<0.00071	<0.000085	
MW-14A	8/4/2016	< 0.0010	0.0015	0.49	< 0.00034	0.00087	< 0.0011	0.076	0.050	< 0.00035	0.063	< 0.000070	< 0.00085	< 0.00024	< 0.000085	1.21
	9/19/2016	< 0.0010	0.00099	0.035	< 0.00034	0.0012	< 0.0011	0.085	0.050	< 0.00035	0.044	< 0.000070	< 0.00085	< 0.00024	< 0.000085	0.817
	12/1/2016	< 0.0010	0.0036	0.060	< 0.00034	0.0012	< 0.0011	0.079	0.050	< 0.00035	0.035	< 0.000070	< 0.00085	< 0.00024	< 0.000085	0.983
	1/31/2017	<0.0010	0.00094	0.037	<0.00034	0.0025	<0.0011	0.12	<0.032	<0.00035	0.044	<0.000070	<0.00085	<0.00024	<0.000085	
	3/29/2017	<0.0010	0.0014	0.035	<0.00034	0.00073	<0.0011	0.096	0.04	<0.00035	0.045	0.00011	<0.00085	<0.00024	<0.000085	0.648
	5/23/2017	<0.0010	0.0012	0.046	<0.00034	0.0018	<0.0011	0.14	0.04	<0.00035	0.018	<0.000070	<0.00085	0.00034	0.000095	0.587
	10/10/2017								0.04							
	12/11/2017								0.07							
	4/17/2018	<0.0010	0.0045	0.05	<0.00034	0.0016	<0.0011	0.15	0.05	<0.00035	0.047	<0.000070	<0.00085	<0.00024	<0.000085	
	8/15/2018	<0.0010	0.004	0.056	<0.00034	0.0027	<0.0011	0.12	0.05	<0.00035	0.016	<0.000070	<0.00085	<0.00024	<0.000085	0.739
	4/10/2019	<0.0010	0.0075	0.072	<0.00034	<0.00034	<0.0011	0.11	0.060 J	<0.00035	0.026	<0.000070	<0.0020	<0.00071	<0.000085	
MW-15	4/7/2019	<0.0010	0.0012 J	0.093	<0.00034	<0.00034	<0.0011	0.014	0.060 J	<0.00035	0.0038 J	<0.000070	<0.0020	<0.00071	<0.000085	
MW-16	4/8/2019	<0.0010	0.0046	0.29	<0.00034	<0.00034	<0.0011	0.03	0.090 J	<0.00035	0.046	<0.000070	<0.0020	<0.00071	<0.000085	
MW-17	4/8/2019	<0.0010	0.016	0.26	<0.00034	<0.00034	<0.0011	0.042	1.1	<0.00035	0.15	<0.000070	0.22	<0.00071	<0.000085	
MW-18	4/7/2019	<0.0010	0.0063	0.29	<0.00034	<0.00034	<0.0011	0.0046	0.11	<0.00035	0.0030 J	<0.000070	<0.0020	<0.00071	<0.000085	
MW-19	4/7/2019	<0.0010	<0.00046	0.095	<0.00034	0.00049 J	<0.0011	0.014	0.040 J	<0.00035	0.011	<0.000070	<0.0020	<0.00071	<0.000085	
MW-20	4/6/2019	<0.0010	0.051	0.15	<0.00034	<0.00034	<0.0011	0.0027	0.14	<0.00035	0.0015 J	<0.000070	<0.0020	<0.00071	<0.000085	
MW-21	4/6/2019	<0.0010	0.0059	0.096	<0.00034	<0.00034	<0.0011	0.0034	0.090 J	<0.00035	0.0018 J	<0.000070	<0.0020	<0.00071	<0.000085	
MW-22	4/7/2019	<0.0010	0.0027	0.2	<0.00034	<0.00034	<0.0011	0.0091	0.11	<0.00035	0.0012 J	<0.000070	<0.0020	<0.00071	<0.000085	
MW-23	4/8/2019	<0.0010	0.042	0.12	<0.00034	<0.00034	<0.0011	0.00059 J	0.10	<0.00035	0.2	<0.000070	0.21	<0.00071	<0.000085	

Notes:

GWPS - groundwater protection standard (MCL except for cobalt, lithium, and molybdum. These based on ADEM variance letter dated April 15, 2019)

mg/l - milligram per liter

pCi/L - picocuries per liter

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