January 31, 2020

Mr. Chris Holmes
New Mexico Environment Department
Petroleum Storage Tank Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505

Re: Final Remediation Plan
Atex 394 (Allsup's), Pino Fina, and Ross Texaco Sites, Las Vegas, New Mexico
Facility #26519/29980/1866, Release ID #817/879/719
WPIDs #4046/4043/4045

Dear Mr. Holmes:

Daniel B. Stephens & Associates, Inc. (DBS&A) is pleased to submit the enclosed Final Remediation Plan (FRP) for the above-referenced sites. The plan has been prepared in accordance with the approved work plan and applicable sections of the Petroleum Storage Tank Regulations. The FRP has been revised to address the consolidated set of PSTB comments and questions dated January 30, 2020. Pending approval of the FRP and potential responses to comments, DBS&A intends to invoice the full amounts budgeted for Deliverable IDs 4043-3, 4045-3, and 4046-3.

Please contact us at (505) 822-9400 if you have any questions or require additional information

Sincerely,

DANIEL B. STEPHENS & ASSOCIATES, INC.

Thomas Golden, P.E.
Project Engineer

Kelly Jayne, P.E.
Project Engineer

TG/ed
Attachment
cc: Katherine MacNeil, NMED PSTB

Final Remediation Plan

Atex 394, Pino Fina, and Ross Texaco Sites, Las Vegas, New Mexico

Facility ID #26519/29980/1866

Release ID #817/879/719

Prepared for **New Mexico Environment Department**
Petroleum Storage Tank Bureau

January 31, 2020

Daniel B. Stephens & Associates, Inc.

6020 Academy NE, Suite 100 • Albuquerque, New Mexico 87109

Table of Contents

Section **Page**

Table of Contents (Continued)

List of Figures

List of Tables

Table

List of Appendices

Appendix

1. Introduction

Daniel B. Stephens & Associates, Inc. (DBS&A) has prepared this Phase 3 Final Remediation Plan (FRP) for the Atex 394 (Allsup's), Pino Fina, and Ross Texaco sites, in Las Vegas, New Mexico (Figure 1). This FRP was prepared in accordance with applicable sections of Part 119 of the New Mexico Petroleum Storage Tank Regulations (PSTR) and work plan identification (WPID) number 4043, 4045, and 4046 (DBS&A, 2019a), which were approved by the New Mexico Environment Department (NMED) Petroleum Storage Tank Bureau (PSTB) on April 29, 2019 (NMED, 2019a, 2019b, and 2019c).

1.1 Site Summary

Releases of petroleum hydrocarbons in the vicinity of the intersection of University Avenue and Grand Avenue in Las Vegas, New Mexico have resulted in impacts to soil and groundwater in the area. Gasoline was historically sold at four stations with underground storage tanks (USTs) in the vicinity of the intersection. These stations include Sav-O-Mat, Atex 394, Ross Texaco, and Pino Fina. Confirmed releases were documented at Sav-O-Mat and Ross Texaco in 1991. Releases at Atex 394 (Allsup's) and Pino Fina were documented later in 1993 and 1997, respectively. In 2003 the PSTB requested that Sav-O-Mat (northwest corner of University Avenue and Fifth Street) proceed with groundwater monitoring as the responsible party and was detached from the State Lead corrective action associated with the other three sites. Historically, the "Ross Texaco State Lead Site" included Ross Texaco, Pino Fina, and Atex 394 (Allsup's). In 2010 these three sites were separated into individual State Lead Sites.

1.2 Site History

Gasoline releases occurred at three UST sites as follows:

- Atex 394 (Allsup's) had a confirmed release of gasoline of unknown quantity in 1993
- Pino Fina had a confirmed release of gasoline of unknown quantity in 1997
- Ross Texaco had a confirmed release of more than 5,000 gallons of unleaded gasoline in 1991

A brief history for each site is provided below.

1.2.1 Atex 394 (Allsup's)

The Atex 394 (Allsup's) site is located at 615 North Grand Avenue in Las Vegas, New Mexico (Figure 2). Investigation and groundwater monitoring activities have been ongoing at the Atex 394 (Allsup's) site under various consultants since the early 1990s. Tightness testing performed on a product distribution line servicing a 10,000-gallon UST containing regular gasoline in 1991 indicated a failure somewhere in the line. A review of inventory records at the time indicated a loss of 907 gallons of regular gasoline during the month of January 1991. In June 1992, Tank Management Services and Tracer Research Corporation performed leak testing on the three USTs located at the site. The final report indicated that neither the USTs nor the associated product lines were leaking. The PSTB issued a confirmed release letter in April 1993, and retained Billings & Associates, Inc. (BAI) to investigate the impacts related to the release. BAI installed five borings on the property, two of which were completed as monitor wells. In 1993 and 1994, Glorieta Geoscience, Inc. (GGI) installed two additional monitor wells during off-site investigations related to the Ross Texaco site. In November 2012, the three USTs were removed by EA Engineering, Science, and Technology, Inc. The Allsup's store was closed after removal of the tanks, and the building has been occupied by a number of businesses since then.

1.2.2 Pino Fina

The Pino Fina site is located at 701 North Grand Avenue in Las Vegas, New Mexico (Figure 3). The former Pino Fina building is currently unoccupied. Investigation and groundwater monitoring activities have been ongoing at the Pino Fina UST site under various consultants since June 1998. Four USTs were removed from the site in 1997. Holes and corrosion in the tanks were noted by the on-site PSTB inspector, and the inspector observed evidence of a fuel release. The quantity of the release was either unknown or not documented by the inspector. In 1993, GGI installed one monitor well on the Pino Fina property during off-site investigations related to the Ross Texaco site. Three additional monitor wells were installed at the site sometime around 1996. In 1998, AGRA Earth & Environmental, Inc. (AGRA) installed three soil borings as part of a minimum site assessment. The borings were advanced through the three former UST pits, and completed as monitor wells. One monitor well that had been destroyed was replaced in approximately 2000.

1.2.3 Ross Texaco

The Ross Texaco site is located at 700 Grand Avenue in Las Vegas, New Mexico (Figure 4) and is currently being operated as a Shell gasoline station and convenience store. A release from the UST system at Ross Texaco was suspected when petroleum hydrocarbon odors were detected emanating from a storm sewer adjacent to the site. A review of inventory records at that time indicated a release of more than 5,000 gallons of unleaded gasoline had occurred. Subsequently, two 2,000-gallon USTs containing unleaded gasoline, located on the south side of the building, and one 500-gallon waste oil tank, located on the north side of the building, were excavated in 1991, and 200 cubic yards of petroleum impacted soil were excavated and disposed of off-site. During removal, numerous holes were observed in one of the unleaded USTs. Field screening of soil samples collected from the tank pit after excavation of the two unleaded USTs revealed photoionization detector (PID) readings ranging from 3,850 to 7,435 parts per million. New USTs were installed on the north side of the building after excavation of the old tanks and the station was reopened in late December 1991.

From 1992 through 1994, GGI installed 20 monitor wells, and conducted four phases of investigation to assess soil and groundwater impacts associated with the releases at Sav-O-Mat, Ross Texaco, Atex 394 (Allsup's), and Pino Fina. DBS&A installed a soil vapor extraction (SVE) system in 1995 and operated it until early 1996. The system was put back into operation in early 1997 and operated until early 1998. Since that time, investigation and groundwater monitoring activities have been ongoing at the site under various consultants. In 2005, HAI installed two monitor wells, and plugged and abandoned one monitor well. In 2014, DBS&A installed four monitor wells to replace strategic wells that had been destroyed and installed two additional monitor wells to delineate the extent of light nonaqueous-phase liquid (LNAPL) and dissolved-phase groundwater contamination downgradient of MW-23.

1.2.4 Recent State Lead Site History

On April 12, 2018, the NMED PSTB issued a request for proposals (RFP No. 18-667-3200-0008) for State Lead Site Remediation Services for the three sites. DBS&A responded to the RFP with a proposal submitted to the PSTB on May 16, 2018. DBS&A was awarded the State Lead contract to complete remediation on August 17, 2018. Under the new State Lead contract, DBS&A installed two monitor wells (MW-17R and MW-26) to define the cross-gradient extent of contamination to the south and performed a baseline groundwater monitoring event in July 2019. Under subcontract to DBS&A, Cobb, Fendley & Associates, Inc. (Cobb-Fendley) of Albuquerque, New Mexico performed a detailed site survey that has been incorporated into the FRP engineering drawings (Appendix A).

1.3 Site Hydrogeology

The sites are located on the boundary between the eastern Sangre de Cristo Mountains and the Great Plains, at an elevation of approximately 6,400 feet above mean sea level. Unconsolidated alluvial sediments underlie the sites to a depth of approximately 10 to 20 feet below ground surface (bgs). The alluvial material is composed primarily of sandy clay soils with a basal gravel layer dominated by pebbles of reworked Graneros Shale in a clayey matrix. The basal gravelly clay is discontinuous and variable in thickness, but is generally less than 10 feet thick. This relatively thin veneer of superficial sediments rest on bedrock of the Cretaceous Graneros Shale, consisting of laminated black shales deposited as offshore marine sediments. The upper 1 to 3 feet of the Graneros Shale is typically soft and weathered.

Shallow groundwater is found at the sites approximately 12 to 17 feet bgs and is not thought to be in direct contact with the regional groundwater aquifer, which is hosted within the Dakota Sandstone underlying the Graneros Shale. Previous site investigations have concluded that the basal gravel layer is the primary water-bearing unit of the shallow aquifer, although water may also be present in the weathered portion of the shale bedrock and overlying sandy clay soils. Groundwater flow at the site is locally variable, reflecting the variable and discontinuous nature of the main water bearing unit, but is generally to the east-southeast at a gradient of 0.01 foot per foot (Figure 5).

1.4 Distribution of Contamination

1.4.1 Contaminants of Concern

The primary contaminants of concern (COCs) are gasoline fuel constituents, including benzene, toluene, ethylbenzene, and total xylenes (BTEX), 1,2-dibromoethane (EDB), 1,2-dichloroethane (EDC), and naphthalenes. Multiple investigations conducted at the three sites since the early 1990s indicate that soil and groundwater contamination are present in the vicinity of the intersection of University and Grand Avenues. Free product has not been recovered from monitoring wells associated with the three sites for the last several monitoring events, but a number of COC concentrations are still above New Mexico Water Quality Control Commission (NMWQCC) standards in groundwater samples collected from the wells.

1.4.2 Distribution of Contaminants in Soil

The lateral and vertical distribution of petroleum hydrocarbon impacts to soil is well characterized due to the large number of investigations that have been performed at the three sites over the last 25 years. Investigations conducted by GGI (1992, 1993, and 1994), BAI (1993), AGRA (1998), DBS&A (1995 through 1998 and 2014), and HAI (2005) have indicated that away from the known release sites, contamination in the vadose zone is largely limited to the contaminant smear zone near the water table. The widest distribution and greatest concentrations of petroleum hydrocarbon impacts in soil are generally found at depths of approximately 15 to 20 feet bgs in the shale gravel interval, or near the contact between the alluvial sediments and underlying weathered bedrock, and are roughly coincident with the water table. The cross-section provided in Figure 6 illustrates this relationship and also suggests that a significant portion of the remaining residual hydrocarbon mass resides in the smear zone under the right-of-way (ROW) for Grand Avenue.

In 2007, New Mexico Department of Transportation (NMDOT) completed a preliminary site investigation (PSI) of a ⅓-mile corridor along Grand Avenue to determine the extent of hydrocarbon impacts to soil ahead of re-construction of the Grand Avenue and University Avenue intersection, including 18 boreholes installed in proximity to the Pino Fina, Ross Texaco, and Atex 394 (Allsup's) sites. The PSI involved sampling soils from each borehole location at 5-feet intervals from surface to 20 feet bgs. Soil samples were screened in the field using a PID, and select samples were submitted for laboratory analysis. Where shallow soils (less than10 feet bgs) showed signs of hydrocarbon impacts, laboratory analysis indicated the presence of diesel and motor oil range hydrocarbons, which are not associated with the historical gasoline releases from the three sites. In many samples, relatively elevated PID values recorded during field screening did not correlate to elevated hydrocarbon results in laboratory analysis. This relationship is common with aged fuel releases where much of the residual contaminant mass has desorbed into the vapor phase. The NMDOT PSI and other site investigations indicate that the majority of the residual contaminant mass associated with these sites appears to reside near the water table in the Grand Avenue ROW, particularly east of the Atex 394 (Allsup's) site and south of the vacant NMDOT lot, and within the Grand Avenue and University Avenue intersection.

1.4.3 LNAPL Contamination

During the most recent groundwater monitoring event conducted in July 2019 (DBS&A 2019b), LNAPL was not detected in any of the wells associated with the three sites. Historically, monitor well MWAL-2, associated with the Atex 394 (Allsup's), contained LNAPL prior to its destruction during removal of the USTs in November 2012. However, the replacement well MWAL-2R has not contained LNAPL since its installation in March 2014. At the Pino Fina site, monitor wells MW-7 and PF-1 have historically contained LNAPL; however, neither well has contained LNAPL since July 2013. Five wells associated with the Ross Texaco site have historically contained LNAPL, including MW-1, MW-4, MW-10, MW-12, and MW-23. LNAPL has not been detected in MW-1 since March 2014, in MW-4, MW-10, and MW-23 since July 2013, and in MW-12 since February 2015.

When not influenced by a corrective action system, LNAPL thickness in wells tends to decrease when the water table rises and increase when the water table falls. This phenomenon is caused by LNAPL being trapped beneath the water table when it rises and then released or mobilized as LNAPL drains when water levels drop. The thickness and extent of LNAPL in wells at Atex 394 (Allsup's), Ross Texaco, and Pino Fina have been documented to fluctuate with seasonal variations in groundwater elevations (HAI, 2005; DBS&A, 2019b) (Table 1). During July 2013, the last time when all of the wells listed above contained LNAPL, water levels were at or near historic lows. Currently water levels are an average of approximately 2 feet higher than during that time.

1.4.4 Distribution of Contaminants in Water

Historically, BTEX constituents, naphthalenes, and MTBE have been detected above NMWQCC standards in groundwater samples collected from on-site wells at Sav-O-Mat, Atex 394 (Allsup's), Ross Texaco, and Pino Fina. In the 1990s to mid-2000s, the dissolved-phase benzene and MTBE plumes were approximately 1,000 feet long, extending from the Sav-O-Mat east-southeast to Hayes Storage (shown on Figure 5), and approximately 500 feet wide, extending from the northern-most well on the Pino Fina property (PF-3) south almost to well MW-16, located near the southern extent of the Atex 394 (Allsup's) property (HAI, 2005).

During the most recent monitoring event in July 2019, COCs were detected at concentrations above applicable NMWQCC standards in one well associated with Atex 394 (Allsup's) (MWAL-2R), three wells associated with Ross Texaco (MW-1, MW-10, and MW-12), and two wells associated with the Pino Fina site (PF-1 and AEE-1R). COC concentrations in the other 18 monitor wells sampled in July 2019 were below applicable standards or laboratory reporting limits (DBS&A 2019b).

Figures 7 through 10 show the extent of actionable dissolved-phase benzene, ethylbenzene, total xylenes, and total naphthalenes for the most recent monitoring event. The actionable dissolved-phase benzene and total naphthalene plumes are laterally extensive, approximately 250 feet wide and 400 feet long, incorporating wells associated with all three sites. The highest benzene concentrations are found along the northwestern boundary of the NMDOT property in MW-10 and MW-12 east and downgradient of the Atex 394 (Allsup's) site. The highest total naphthalene and ethylbenzene concentrations are found in Ross Texaco well MW-1. The ethylbenzene plume is approximately 150 feet wide and 250 feet long. Overall, the extent of dissolved-phase contamination is currently well defined by the existing monitor well network. The majority of residual dissolved-phase contamination is centered in the vicinity of the intersection of University and Grand Avenues.

2. Remediation Goals/Cleanup Standards

2.1 Exposure Pathways

Shallow soil at the locations of the historical fuel releases have been impacted and are likely to locally contain residual elevated concentrations of hydrocarbons. However, there are currently no occupied structures directly over the points of release, and the vast majority of the residual contaminant mass resides in the water table smear zone at depths of approximately 12 to 15 feet bgs or greater. Contaminants at these depths pose an exposure risk through direct contact or ingestion pathways only in the event of excavation activity.

The petroleum hydrocarbon contaminant mass present in the smear zone at the water table provides a residual source of groundwater contamination, as indicated by the persistence of actionable groundwater contaminant concentrations associated with the three sites. Residual LNAPL in the soil matrix may be trapped below the water table during periods when water levels are high and exposed when the water table drops. Based on current U.S. Environmental Protection Agency (EPA) guidance, accumulations of petroleum LNAPL at the water table or residual LNAPL in soil are considered an exposure risk through the vapor intrusion pathway if present at depths less than 15 feet bgs under occupied structures. If future monitoring or characterization data indicates LNAPL or LNAPL-equivalent soil concentrations are present under occupied structures along Grand Avenue, such as the Rocky Mountain Real Estate/Crow Insurance Agency building south of the NMDOT property (Figure 4), vapor intrusion assessment of those structures may be warranted.

Groundwater impacts to municipal or domestic production wells constitute another potential exposure pathway. However, there are no production wells in the vicinity of the sites, and neither domestic nor municipal wells are known to make use of the shallow aquifer, which yields relatively minimal quantities of generally poor quality water.

2.2 Remediation Goals/Performance Standards

The primary remedial objective is reducing dissolved-phase petroleum hydrocarbon concentrations to below NMWQCC standards. DBS&A's technical approach addresses contamination present under the highway ROW for Grand and University Avenues, which has the potential to contaminate clean groundwater downgradient of the site.

The following performance standards will be met to document the success of the remedial work performed:

- Within four years of system operation, reduce dissolved-phase hydrocarbon concentrations to below applicable regulatory standards.

- Maintain a minimum run-time of 90 percent for major remediation equipment. This is achievable through proper preventive maintenance of equipment and the use of telemetry to provide instant notification of system shutdowns through text message and/or email.

- Document efficacy of the water treatment system by collecting raw and treated water samples at a minimum frequency of once per month to demonstrate destruction of contaminants prior to discharge of treated water.

3. Description of Proposed Remediation System

3.1 Overview

DBS&A proposes to implement a pump and treat solution that using a single horizontal well installed along the east side of Grand Avenue (Figure 11 and Appendix A). The well will be constructed of 6-inch-diameter high density polyethylene (HDPE) materials, and will include approximately 240 feet of well screen centered on the solute contaminant plume. The long screen length will minimize drawdown by spreading groundwater extraction over a wider area than would be possible with vertical well installations. A 10-foot section of horizontal blank pipe will be installed immediately north of the well screen to house the submersible pump (Drawing C-3, Appendix A). This location will be at the lowest possible elevation to facilitate groundwater extraction, while minimizing sediment drawn into the well. DBS&A evaluated options to pull the pump along the length of the well screen, but the possibility of preferentially pulling sediment into the well screen outweighed any potential operational benefits.

The well will be drilled along the top of the shale at a depth of 20 to 21 feet bgs, or approximately 4 to 5 feet below the static water table measured in July 2019. The proposed horizontal well driller, Ellingson-DTD, has experience drilling in similar lithologic conditions in Watrous, New Mexico.

A submersible pump (Grundfos model 5-SQE05-90 or equivalent) will be used to extract groundwater from the well. This type of pump is equipped with a variable frequency drive (VFD), and also includes an integral level sensor that can be used to control pump operation relative to site groundwater elevations (Drawing M-2, Appendix A). The proposed pump model is able to operate within the range of 3 to 5 gallons per minute (gpm) that DBS&A expects from the well based on experience at the NMDOT District IV patrol yard. That flow regime, when spread across a 240-foot length of horizontal well screen, would be sufficient to draw groundwater across the smear zone without dewatering the shallow alluvial aquifer, as water would be allowed to drain into the well along the entire length of the screen. Assuming a pore volume within the solute plume of approximately 2 million gallons, a single pore volume flush would require approximately 16 months of system operation at a groundwater extraction rate of 3 gpm.

Extracted groundwater will be routed to a single equipment compound located on the Ross Texaco site near the former SVE system (Drawing C-2, Appendix A). Water quality laboratory results from wells along the bore path (MW-1, MW-10, and MW-12) from the last monitoring event in July 2019 are displayed in Table 2; these wells provide the best estimate of water quality that will enter the treatment system. DBS&A modeled air stripper efficiency using a QED Environmental Systems (QED) air stripper model. The highest reported concentrations of BTEX, MTBE, and total naphthalenes from the July 2019 monitoring event were assumed to be raw water concentrations, and DBS&A assumed a conservatively high groundwater extraction rate of 10 gpm. Using these parameters, the model estimates that a QED air stripper will reduce BTEX concentrations to below laboratory reporting limits, and the total naphthalene concentration in treated water will be below the NMWQCC standard (Appendix B).

Based on inorganic water quality data obtained from the July 2019 sampling event (DBS&A, 2019b), metals pretreatment is required upstream of the air stripping unit to mitigate excessive scaling on the trays. Treated water will be discharged to the sanitary sewer; therefore, DBS&A has contacted City of Las Vegas (City) Utilities and obtained their sampling and reporting requirements and permission to discharge to the sanitary sewer. Raw and treated water storage tanks and treatment equipment will be located within a modified shipping container, similar to a WaterPOD manufactured by AdEdge Water Technologies (Drawing M-2, Appendix A). Approximately 350 feet of conveyance piping will be installed from the wellhead to the treatment compound. Approximately 40 feet of discharge piping will be installed from the treatment compound to an existing sewer manhole (Drawings C-4 and C-5, Appendix A). Additional details on the equipment and piping is provided in Sections 3.2 and 3.3

3.2 Aboveground Treatment Equipment

The exact configuration of the proposed aboveground equipment will be determined by the selected equipment manufacturer, but will include the following (Drawings M-1 and M-2, Appendix A):

- *Modified shipping container enclosure:* Provides protection to equipment from weather and vandalism and is easily transportable. Reduces noise from operational equipment, such as blowers and pumps. The container size is anticipated to be 8 by 40 feet.

- *Raw groundwater influent storage tank:* Incoming groundwater will be stored in a HDPE tank inside the enclosure. The tank will contain a high and low level sensor to activate a booster pump.

- *Metals Treatment - Oxidation/filtration equipment:* The treatment train will include an iron and manganese removal system such as Adedge's AD26 design to co-precipitate metals then filter them from the water. This system will reduce potential scaling in the air stripper, decreasing the need for maintenance.

- *Anti-scalant dosing pump:* The dosing pump will regularly inject anti-scalant into the groundwater entering the air stripper reducing potential scaling and maintenance.

- *Air stripper:* Within the shipping container will be a skid mounted EZ-4.4P Stacker Air Stripper manufactured by QED or equivalent. The four trays in the unit are constructed out of heavy-duty HDPE for durability and corrosion resistance. The EZ-4.4P utilizes 280 CFM of air flow to strip volatile organic compounds (VOCs) from the extracted groundwater. The whole system can be taken apart easily for cleaning and has high and low level sensors. Modeling of VOC removal using QED software indicates the EZ-4.4P unit is capable of meeting NMWQCC standards, which will be required by the City for treated water discharge (Table 3). Air emissions will be at least three orders of magnitude below NMED standards of 10 pounds per hour (lb/hr) (Appendix B).

- *Treated water storage tank:* Within the enclosure, treated water will be stored in an HDPE tank. The tank will drain by gravity to the sanitary sewer. A booster pump will be connected to the tank for backwashing of the iron oxidation/filtration system.

- *Control panel:* All remediation equipment will be integrated to the control panel to provide automatic system operation. The control panel will possess a C-More 7-inch color touch screen HMI interface. An Allen Bradley Micrologix 1400 PLC will be installed inside the control panel for operation of the metals treatment system. Service, backwash, and rinse modes will be directed by the control system. The submersible pump control panel will also be integrated, so as to shutoff submersible pump operation with any remediation equipment alarms.

- *Instrumentation and monitoring:* Pressure gauges and sample ports will be present on each vessel's inlet and outlet.

- *Process valves and piping:* Each vessel will have a manual isolation valve at the inlet. Manual control valves will also be present on raw and treated water storage tanks. Connection piping within the enclosure will consist of schedule (SCH) 80 polyvinyl chloride (PVC) and fittings.

The exact remediation equipment components and configuration within the enclosure will be determined during implementation of the FRP, and a detailed description will be provided in an as-built report, including drawings of the interior enclosure. These equipment drawings will be available during the final PSTB walkthrough prior to system startup.

3.3 Horizontal Well, Piping, and Directional Drilling

One horizontal extraction well will be drilled from the vacant lot south of the Rocky Mountain Real Estate & Crow Insurance Agency building north under the University Avenue sidewalk to the former Ross Texaco site (Figures 11, 12, and Drawing C-3, Appendix A). A 10-inch nominal boring will be drilled for installation of the 6-inch-diameter HDPE SDR11 well casing and screen. A biodegradable drilling fluid will be used to cool the drill bit and keep the boring open during well installation. This fluid will make characterization of soil VOC concentrations infeasible, so no laboratory sampling will be performed during installation of the horizontal well.

Installation of well materials will be accomplished using a pull-back method of placement. After the boring is drilled, well materials will be pulled back through the hole, using a reaming bit if necessary. Construction of the horizontal well will require use of hand-carried, aboveground detection equipment above the bit. The aboveground equipment allows for precise location of the drilling head during horizontal drilling operations.

3.3.1 Horizontal Extraction Well

From the borehole entrance in the south, the well will be drilled at approximately a 5 to 1 slope until an elevation of 6,399 feet is reached (around 20 feet bgs and 100 feet horizontally). From this point in the vicinity of the southwest corner of the Rocky Mountain Real Estate & Crow Insurance Agency building, the well will be screened with machine-cut, longitudinally-slotted 6-inch HDPE screen with 0.02-inch slots and 2 percent open area. The screened interval will extend through the center of the dissolved contamination plume for approximately 240 feet under East University Avenue and terminate under the Former Ross Texaco property. Near the west pump island, the well will turn upward at a 5 to 1 slope and exit on the northwest corner of the Ross Texaco property (extending from about 21 feet bgs and 100 feet horizontally). Exact slopes and the screened interval length will be influenced by the drilling conditions encountered. During drilling, efforts will be made to extend the screen interval as far as possible through the contaminated groundwater plume. The exact bore path will be documented in an as-built report.

The horizontal screened portion of the well will maintain an elevation of 6,399 feet above mean sea level over its entire length. Historical monitoring data indicate that available drawdown over the proposed horizontal well screen has ranged from 3 to 6 feet (Figure 13). There is limited aquifer parameter characterization data available in this area, however, a basic drawdown calculation for the horizontal well was completed using information specific to this site (e.g. aquifer thickness) and information from the NMDOT patrol yard site (e.g. specific yield) (Appendix B). This calculation indicated that drawdown near the well can be maintained at less than 5 feet over the anticipated course of system operation at a continuous flow rate of around 3 gpm. Bore logs for wells along the screened interval (MW-1, MW-10, and MW-12) indicate gravelly clay and fractured shale, which should be water bearing. As previously stated, the screened interval should draw water equally along its length, minimizing drawdown. The pumping rate can be varied to maximize well production without excessively lowering of the water table, which is important given the shallow thickness of the aquifer.

The horizontal well boring pit will be located on the vacant lot north of the Quality Motor Company Chevrolet car lot, which will also be the staging area for drilling equipment and well materials (Figure 4). An entrance on the west side of the lot is in line with the borehole path and provides a 40-foot setback required by Ellingson-DTD for drilling equipment. After well completion, the borehole entrance will be encased in a 3-foot by 3-foot flush-mount, hinged, traffic-rated well vault surrounded by a 6-inch-thick, 3,000-pounds per square inch (psi), high-early-strength concrete pad (Drawing C-6, Appendix A). The well exit will be located in the northwest corner of the Ross One Stop convenience store and gas station between the sign and sidewalk. HDPE well piping will be laid out and welded north of this location along the sidewalk before being pulled through the borehole. The northern wellhead will be encased in a 3-foot by 5-foot concrete, flush-mounted well vault with steel, traffic-rated, hinged access doors. The larger vault is required to provide the required angles for pump installation, as well as sufficient room for electrical junction boxes (Drawing C-6, Appendix A).

3.3.2 Submersible Pump

A 3-inch Grundfos model 5-SQE-90 submersible pump (Appendix C) or equivalent will be inserted into the 6-inch casing from the north end of the well; an electrical junction box will be located inside the vault to connect downhole cables to wires routed to the equipment compound in buried conduit (Drawing M-2, Appendix A). This pump model is capable of producing the expected range of groundwater extraction rates (2 to 8 gpm) at the maximum total dynamic head (TDH) requirement of up to 50 feet (Appendix B). Steel skids will be fabricated and welded to the outside of the pump sleeve to facilitate pump installation within the well at its horizontal location.

The submersible pump will be attached to 1-inch threaded SCH 80 PVC drop pipe to convey water to the surface. Drop pipe will connect to a pitless adapter (Monitor Snappy pitless model 8PL61U or equivalent) tapped through the side of the HDPE well casing approximately 3 feet below the surface. The pitless adapter will route flow from the drop pipe to buried conveyance piping run to the equipment compound (Drawing C-6, Appendix A). Drop pipe will extend above the pitless adapter through a split well cap to facilitate pulling and reinstalling the pump as needed. An analog pressure gauge and an air release valve (ARV) will be installed on the end of the drop pipe, which is also the high point in the conveyance system.

A level sensor will be included with the submersible pump to mitigate dry operation of the pump. Pump leads and sensor cable will be attached at regular intervals to the drop pipe to facilitate pump installation and removal. These cables and wires will be routed through the cable port on the split well cap and extend to junction boxes in the well vault. Wires will then connect back to the equipment compound through 2-inch SCH 40 PVC conduit that will run parallel to the PVC water conveyance piping.

The submersible Grundfos pump will be connected by a CU300 control and communication unit mounted in the equipment enclosure. The CU300 with a R100 remote control can vary motor speed to adjust for pumping conditions. The unit can also shut down the pump for a variety of alarms, such as low level, dry running, and overheating. The CU300 will be connected to the equipment enclosure controls and will cease pumping as a result of any alarms relating to the water treatment system.

3.3.3 Conveyance Line Piping and Trenching

Details of conveyance piping trenches are shown on Drawing C-6 (Appendix A). The piping conveying extracted groundwater from the pitless adapter to the equipment compound will be 1.5-inch diameter SCH 40 PVC. Conveyance piping will be pressure tested at 100 psi following installation. A gate valve will be installed in a valve vault within 10 feet of the pitless adapter to facilitate pressure testing. Discharge piping conveying treated water from the equipment compound to the closest existing sanitary sewer manhole will be 4-inch-diameter SCH 40 PVC.

Conveyance and discharge piping will be placed a minimum of 3 feet below ground in narrow trenches, and the discharge piping will be slopped at approximately 2 percent for gravity drainage to the manhole. Aboveground piping will be heat-traced and insulated and is expected to be limited to the immediate vicinity of the equipment container. Piping will be backfilled with native soil and compacted in accordance with the specifications (Appendix D). Non-paved surfaces will be brought to grade with native soil and any existing vegetative matter to match the existing land surface. Paved surfaces will be machine-cut and replaced with similar material and thickness to the existing pavement materials.

Due to the shallow depth of the trenching and piping, it is not anticipated that contaminated media will be encountered during the installation of the remediation system. If hydrocarbon vapors are noted in any excavations, DBS&A will implement an air monitoring program in accordance with the site health and safety plan (HASP) (Appendix E). A NMDOT utility permit will be implemented prior to installation of the horizontal well. Although the well entrance and exit points are located on private property, DBS&A anticipates obtaining traffic control for shoulder work due to the proximity to the ROW.

3.4 Utility Requirements/Utility Clearances

PNM is the electric service provider in Las Vegas. A new three-phase electric service will be required for the remediation system, which will be supplied through aboveground power lines and utility poles. PNM stated that the new 230 volts alternating current (VAC) three-phase electric service is available from the overhead lines running parallel to the alley immediately adjacent to the proposed equipment location. Additional details will be provided by PNM during implementation of this FRP and incorporated into an as-built report.

New Mexico One-Call will be contacted prior to subsurface excavation activities. Special care will be required during horizontal well drilling, as the well path is parallel to a fiber optic line. Approximate locations of known utilities in the installation area are shown on the Drawings (Appendix A).

3.5 As-Built Report Preparation and Submittal

Following implementation of the FRP, record drawings signed and sealed by DBS&A's Engineer of Record will be prepared and submitted to the NMED PSTB project manager as part of an as-built report. The report will conform to the requirements of 20.5.119.1925.D NMAC and will include, but not be limited to, the following:

- Area/vicinity map
- Detailed site diagram with locations of underground utilities and other subsurface structures on or adjacent to the site's property boundaries, buildings, monitor wells, storage tanks and lines, sumps, impoundments, pit areas, water lines, and other relevant structures
- Summary of site conditions
- Any deviations from the drawings and specifications included in the FRP

- Tabulation of pertinent data including, but not limited to, flow rates, pressures, temperatures, contaminant concentrations, and groundwater elevations at startup
- Boring logs and well completion diagrams
- Inventory of purchased equipment
- Discussion of the data collection methods
- Laboratory results with chain of custody records and laboratory quality assurance/quality control
- Characterization of wastes, including handling and disposal (if any)
- Elevation survey results
- Detailed description of remedial system and as-built drawings
- Discussion of system startup and shakedown
- Identification and explanation of operational adjustments made for optimum system performance
- Discussion of the remedial system's performance criteria
- Summary and recommendations
- Familiarity statement by the DBS&A qualified representative

3.6 Operations

Operation of the remediation system will include initial startup activities and regular maintenance. Safety controls will be installed to automatically shut down the system under certain circumstances, including malfunction or failure of any integral system component or loss of power. System monitoring objectives include tracking the progress of mass removal, maximizing treatment efficiency, and documenting compliance with permits issued for this project. Additionally, controls will be implemented to protect equipment from weather and vandalism.

Progress of the source area abatement will be evaluated by monitoring the concentration of dissolved COC concentrations in the extracted groundwater. The total mass of COCs in the treatment system influent will be quantified and tracked. To document hydrocarbon recovery efficiency, raw and treated water will be tested as described in Section 4.2. Extracted groundwater concentrations are expected to be at their highest levels during the first month of system operation.

To ensure that the project objectives are achieved, an authorized representative of DBS&A will have direct supervisory control over all aspects of the project. All drilling, construction, and equipment setup activities conducted during the project will be performed under the direction of a New Mexico-licensed professional engineer. All activities proposed in this FRP will be conducted in accordance with approved work plans, DBS&A standard operating procedures (SOPs), applicable federal and state regulations, and with frequent communication with the PSTB project manager and other stakeholders.

3.7 Contingency Plan

If there is a change in site conditions that threatens public health, safety, or the environment, DBS&A will re-evaluate the pump and treatment system. The most likely change in conditions would be a substantial change in groundwater elevation or flow direction. Higher groundwater concentrations of COCs than expected are also a possibility. The submersible pump in the well will possess a variable frequency drive (VFD), which will allow the flow rate to be adjusted to address these contingencies. The pumping rate can be reduced to mitigate excessive drawdown of the water table along the screened interval. The VFD can be used to optimize the pumping rate as groundwater conditions change to maintain the greatest sustainable flow. In addition, if the air stripper is incapable of removing hydrocarbons to below discharge limits at a given pumping rate, the VFD can reduce the extraction rate to increase the air/water ratio which would reduce COC concentrations in treated water samples. Adjusting the pumping rate can address a wide range of variation in water level and contamination concentration.

Should dissolved-phase concentrations not decrease at a sufficient rate to meet remedial timeframe objectives, upgradient amendment injection could be added to the approach as a contingency. DBS&A would recommend injection of a chemical oxidant, such as RegenOx, a sodium percarbonate-based alkaline oxidant. When combined with groundwater extraction, this type of amendment would flush hydrocarbon contamination toward the extraction well and expedite cleanup of the smear zone. Combining this amendment with groundwater extraction would increase the effective radius of influence and allow application on a more targeted basis (i.e., focusing on hot spots). If needed due to site specific conditions, this contingency plan would be detailed in a later work plan.

4. Remediation System Operation and Maintenance

4.1 Overview

Operation and maintenance (O&M) of the remediation system and monitoring of the subsurface conditions is required at regular intervals to accomplish the following tasks:

- Collect data on system operation.
- Maximize the system's mechanical performance.
- Optimize the groundwater treatment operating configurations.
- Document groundwater quality in response to system operation.
- Perform general equipment preventive maintenance.
- Establish the maximum sustainable pumping rate.
- Demonstrate that the remediation system is complying with City requirements for discharge.

4.2 Extracted Groundwater

Hydrocarbon concentrations for raw and treated water will be measured to document system effectiveness, regulatory compliance, and hydrocarbon recovery rates. The City has approved the discharge of treated groundwater to their sanitary sewer system with the following stipulations (Appendix F):

- Monthly flow discharge readings to be provided to the City customer service division for billing purposes
- Laboratory testing of treated groundwater discharge to be performed weekly during the first two months and monthly thereafter
- Notification of any system changes or faults
- A written set of SOPs in case of emergency

- Sampling results may cause the city to request additional information or sampling

To meet NMED and City requirements, raw and treated water samples will be collected and analyzed for the constituents listed in Table 4. In addition, air stripper effluent vapor samples will be collected on the same sampling schedule and analyzed for VOCs and total petroleum hydrocarbons using EPA methods 8021 and 8015, respectively. Samples will be analyzed at Hall Environmental Analysis Laboratory (HEAL) in Albuquerque, New Mexico. Field and laboratory analytical data will be used to optimize system operation, demonstrate compliance with City discharge requirements, and to calculate system efficiency, extraction rates, emission rates, and quantities of recovered hydrocarbons.

To minimize the potential to emit regulated substances to the environment, the remediation system is designed and will be constructed and operated such that malfunction or failure of any integral component results in automatic shutdown of the entire system.

4.3 Groundwater Treatment System Operation and Maintenance

The groundwater extraction/treatment system startup will require daily site visits for the first week of operation to document system performance, water table drawdown, and hydrocarbon recovery rates. During this initial startup period, the remediation system will be adjusted to obtain optimum performance. The pumping rate and extracted volume from the horizontal well will be recorded using a form similar to the example provided in Appendix G. Water levels will be measured in monitoring wells along and up to 100 feet away from the bore path to assess the extent of influence and drawdown from the extraction well (e.g., MW-1, MW-6, MW-9, MW-10, MW-12, MW-16, MW-26, AEE-1R, and PF-3). This data will allow for optimization of the remediation system operational schedule and will maximize hydrocarbon removal from the site.

Because the actual subsurface conditions at the site are difficult to precisely predict, specific pumping rates and operating configurations can only be estimated from data collected during groundwater monitoring activities and extraction well design. Actual remediation system performance will be documented in the quarterly O&M reports submitted for the site.

After the startup period, the system will be operated and maintained for optimal efficiency. O&M and evaluation of the remediation system will be performed on a biweekly, quarterly, and annual basis. Informal reports on system performance will be provided electronically to the PSTB project manager monthly in conjunction with reports to the City. Quarterly reports will be provided both electronically (as a compiled PDF) and in hard copy using DBS&A standard report templates, unless otherwise requested.

In case of a change in site conditions that threatens public health, safety, and welfare or the environment, the system will be shut down immediately. The change in conditions will be evaluated and, if necessary, modifications will be made to the system and its operations to remedy the risk to the public or the environment. DBS&A will include one month of system operation in an as-built report to the PSTB documenting system installation, site activities, and system performance.

4.3.1 Quarterly Activities

DBS&A will evaluate the efficacy of remediation equipment and filters and will replace those materials that exhibit a decrease in performance on a quarterly basis. As discussed in Section 3.2, the remediation equipment will be programmed to backwash the metals treatment unit on a regular basis. The frequency of backwash will be established during system startup, but is expected to be on the order of every two days. DBS&A also anticipates cleaning air stripper trays on a quarterly basis. The horizontal well screen and submersible pump will be evaluated quarterly to assess whether additional maintenance might be warranted. These O&M activities and groundwater monitoring results for the previous quarter will be discussed in quarterly reports submitted to the PSTB project manager.

4.3.2 Biweekly Activities

DBS&A proposes to perform the following activities on a biweekly basis:

- Determine average pumping rate and extraction volume from the horizontal well.
- Adjust and maintain pumping rate to maximize contaminate mass removal while minimizing drawdown.

- Inspect and if necessary clean air stripper trays.
- Check for leaks and clean filters.
- Respond to system shutdowns.
- Conduct other miscellaneous activities necessary to ensure efficient and effective system performance.
- Perform routine preventive maintenance on all equipment, pumps, and motors.
- Collect raw and treated water samples and air stripper effluent vapor samples for laboratory analysis as discussed in Section 4.2. Take periodic field measurements of temperature, pH, dissolved oxygen, conductivity, and oxidation/reduction potential (ORP).
- Calculate system extraction and emission rates and removal efficiency.
- Measure water levels in wells adjacent to the bore path to determine the effect of the system on the local water table (MW-1, MW-2, MW-9, MW-10, MW-12, MW-23, MW-26, and AEE-1R). The frequency of this data collection will be adjusted after the first quarter of system operation.

4.4 One Year of Quarterly Monitoring and Reporting

Subsequent to system installation, DBS&A will initiate quarterly groundwater monitoring in accordance with DBS&A SOPs. During the first year of quarterly monitoring, 24 groundwater monitor wells associated with the site will be gauged (MW-1, MW-2, MW-4, MW-6, MW-7, MW-9, MW-10, MW-11R, MW-12, MW-13R, MW-15, MW-16, MW-17R, MW-22, MW-23, MW-24, MW-25, MW-26, MWAL-1, MWAL-2R, AEE-1R, AEE-2, PF-1, and PF-3). Any well that contains LNAPL will not be sampled. In the event that remedial activities cause a decrease in site concentrations, the sampling program may be adjusted in future years.

Fluid levels will be gauged in each of the 24 monitor wells using an electronic interface probe to determine if LNAPL is present and to determine the depth to water. If detected by the interface probe, the LNAPL thickness will be measured to within 0.01 foot. The interface probe will be decontaminated before each measurement using a solution of deionized water and soap.

DBS&A will attempt to sample wells from least to most contaminated using data from the most recent groundwater monitoring event. Prior to sampling, the wells will be purged using new dedicated, disposable, polyethylene hand bailers, by bailing a minimum of three casing volumes or until groundwater chemistry has stabilized. If a well is purged dry, it will be sampled when the well has recharged. During purging groundwater field parameters (dissolved oxygen [DO], ORP, electrical conductivity [EC], pH, and temperature) will be measured using a YSI Professional or equivalent device.

After purging, the 24 wells will be sampled for laboratory analysis, providing they contain a sufficient amount of groundwater. To minimize volatilization and ensure sample integrity, new dedicated, disposable, polyethylene bottom-emptying devices will be used to transfer groundwater samples from the bailers to the appropriate containers. Samples collected for VOC analysis will be transferred from bailers into laboratory-prepared 40-milliliter (mL) glass sample bottles that contain mercuric chloride as a preservative. The bottled groundwater samples will be labeled and preserved on ice in an insulated cooler for delivery to HEAL in Albuquerque, New Mexico for analysis.

Groundwater samples will be analyzed for VOCs using EPA method 8260B (full list). EDB concentrations from the baseline groundwater monitoring event were below laboratory reporting limits using EPA method 504.1; therefore, this additional analysis method is not recommended for ongoing monitoring activities. Groundwater samples will be accompanied by full chain of custody documentation at all times.

Following completion of each quarter of sampling and O&M, and upon receipt of laboratory analytical reports, DBS&A will prepare and submit to the NMED PSTB project manager a quarterly monitoring report conforming to 20.5.119.1926 NMAC. The report will include, but not be limited to, the following:

- Area/vicinity map
- Detailed site diagram with locations of buildings, monitor wells, storage tanks and lines, sumps, impoundments, pit areas, water lines, and other relevant structures
- Summary of site conditions

- Discussion of the sampling collection procedures
- Laboratory results with chain of custody records and quality assurance information
- Tabulation of groundwater and NAPL levels (if applicable) in each well
- Monitor well data in tabular form with recent and historical groundwater elevations, NAPL elevations, and laboratory data
- Groundwater elevation map
- Groundwater contaminant plume map with contaminant concentrations for each well
- Identification and explanation of any operational adjustments made for system optimization
- Discussion of actual system operation and effectiveness compared to expected parameters used for the remedial design
- Evaluation of contaminant reduction
- Familiarity statement by the DBS&A project manager
- Description of actions taken or future plans for the recovery of contaminant mass
- Summary and recommendations

4.5 Health and Safety Requirements

DBS&A has updated the current site-specific health and safety plan (HASP) for the proposed field activities at the site related to the remediation system installation and operation pursuant to the requirements of CFR 1910.120. The current HASP is provided as Appendix E. A copy of the HASP will be kept on-site during all field activities.

5. Permits

5.1 Air Quality Bureau Notice of Intent

Upon final approval of the FRP by the PSTB and prior to system operation, a request for a no permit required (NPR) status will be submitted to the NMED Air Quality Bureau using notice of intent (NOI) forms. A copy of the application is provided as Appendix G.

5.2 Office of the State Engineer Well Permits

A permit from the New Mexico Office of the State Engineer (NMOSE) will be required for the new horizontal well planned to be constructed at the site. The permit application will be submitted upon approval of the work plan for FRP implementation, and the permit approval will be provided with a subsequent report. DBS&A may also need to submit a WR-06 application to the NMOSE to change a place of use for extracted groundwater. DBS&A will evaluate this need and discuss options in the FRP implementation work plan.

5.3 NMDOT Utility Permit

An NMDOT utility permit will be required for installation of the horizontal well. Permit applications will be submitted upon approval of the work plan for FRP implementation, and permit approvals will be provided with subsequent reports.

6. Notifications

DBS&A will provide public notice in accordance with 20.5.119.1923.D.10 NMAC, as follows:

- Legal notice of the submission of the FRP will be published twice in the *Las Vegas Optic*, a newspaper of general circulation in Las Vegas, New Mexico on December 27, 2019 and January 3, 2020. The certified affidavit of publication for each legal notice will be provided to the PSTB project manager within 21 days of publication. The format for the legal notice will follow that dictated in 20.5.119.1923.D.10.b NMAC.

- A notice containing the specified information listed in the regulation will be posted at the Ross Texaco, Pino Fina, Atex 394, and Rocky Mountain Real Estate properties along Grand Avenue.

- In accordance with the regulation site above, DBS&A will provide notice of submission of the FRP by certified mail to adjacent property owners. DBS&A intends to mail a total of 15 certified letters.

A copy of the text of the legal notice and a list of certified addresses are provided in Appendix H.

7. Implementation Schedule

A schedule for implementing this FRP is provided in Appendix I. Implementation milestones include the following:

- Approval of the FRP
- Installation of the horizontal well and conveyance piping
- Installation of remediation equipment
- System startup
- Submittal of the final as-built report
- Quarterly O&M reports

8. Evaluation of Remedial Actions

The remediation system performance will be evaluated annually according to 20.5.119.127 NMAC. The system evaluation will be incorporated into the fourth quarter monitoring report and submitted to the NMED PSTB project manager. This evaluation will provide NMED with the information necessary to determine whether the remedial approach undertaken is successful in achieving the remedial action objectives and whether any contingency plans should be implemented. Key elements of the report include the following:

- Contaminant plume maps with contaminant levels from each well
- Groundwater maps showing evaluation of the groundwater treatment system
- Performance based on mass of fuel compounds removed; evaluation of the rate of natural attenuation
- Summary and recommendations

In the event that the data collected during the first six months of operation suggest that the system as installed has not been effective at removing or reducing contaminant mass, DBS&A may propose an alternative approach or change to the existing remediation plan. A variety of technologies could augment the removal. DBS&A believes that the remedial approach documented in this FRP is a prudent and cost-effective approach to achieve removal of contaminant mass in the quickest time frame and to ultimately bring the site to closure.

9. Statement of Familiarity

This FRP was prepared by DBS&A under contract number 19-667-3200-0002 for the Atex 394, Pino Fina, and Ross Texaco Sites. Preparation of all engineering drawings and specifications was conducted under the direction and supervision of Thomas Golden, a New Mexico-Licensed Professional Engineer (License #22750).

January 31, 2020

Thomas Golden, P.E.
Project Engineer

Date

References

Daniel B. Stephens & Associates, Inc. (DBS&A). 2019a. *Work plan for site investigation and final remediation plan development, Atex 356, Pino Fina, and Ross Texaco Sites, Las Vegas, New Mexico, Facility #: 26519/29980/1866, Release ID #: 817/879/719.* January 3, 2019.

DBS&A. 2019b. *Well installation and groundwater monitoring report Atex 356, Pino Fina, and Ross Texaco Sites, Las Vegas, New Mexico, Facility #: 26519/29980/1866, Release ID #: 817/879/719.* September 20, 2019.

Haller & Associates, Inc. (HAI). 2005. *Quarterly groundwater monitoring report, Ross Texaco, Las Vegas, New Mexico.* Submitted to New Mexico Petroleum Storage Tank Bureau, Santa Fe, New Mexico. October 6, 2005.

New Mexico Environment Department (NMED). 2019a*. Letter from Dana Bahar to Thomas Golden, DBS&A, regarding Phase 3 fixed-price workplan approval for Pino Fina, 701 Grand Ave., Las Vegas, New Mexico, Facility#: 29980 Release ID #: 879 WPID #:4043.* April 29, 2019.

NMED. 2019b*. Letter from Dana Bahar to Thomas Golden, DBS&A, regarding Phase 3 fixed-price workplan approval for Ross Texaco, 700 Grand Ave., Las Vegas, New Mexico, Facility#: 1866 Release ID #: 719 WPID #:4045.* April 29, 2019.

NMED. 2019c*. Letter from Dana Bahar to Thomas Golden, DBS&A, regarding Phase 3 fixed-price workplan approval for Atex 356, 615 Grand Ave., Las Vegas, New Mexico, Facility#: 26519 Release ID #: 817 WPID #:4046.* April 29, 2019.

Figures

Source: ESRI imagery tiles

N

ATEX 394 (ALLSUP'S), PINO FINA, AND ROSS TEXACO
LAS VEGAS, NEW MEXICO
Area Map

Daniel B. Stephens & Associates, Inc.
12/31/2019
DB18.1131.PR

Figure 1

S:\Projects\DB18.1277_Las_Vegas_Triple_Site\GIS\MXDs\Fig01_Area_map.mxd

Source: Google Earth May 2019

Explanation

Monitor well - buried or destroyed

Monitor well

ATEX 394 (ALLSUP'S), PINO FINA, AND ROSS TEXACO
LAS VEGAS, NEW MEXICO

Atex 394 (Allsup's) Site Map

Daniel B. Stephens & Associates, Inc.
12/9/2019 JN DB18.1277

Figure 2

Path: S:\Projects\DB18.1277_Las_Vegas_Triple_Site\GIS\MXDs\Report_201907\Fig02_Allsups_294_site_map.mxd

Source: Google Earth May 2019

Explanation

- Monitor well
- Monitor well - buried or destroyed

ATEX 394 (ALLSUP'S), PINO FINA, AND ROSS TEXACO
LAS VEGAS, NEW MEXICO

Pino Fina Site Map

Daniel B. Stephens & Associates, Inc.
12/20/2019
JN DB18.1277

Figure 3

Path: S:\Projects\DB18.1277_Las_Vegas_Triple_Site\GIS\MXDs\Report_201907\Fig03_Pinos_Fina_site_map.mxd

Source: Google Earth May 2019

0 50 100
Feet

Explanation

- Monitor well- plugged and abandoned (2005)
- Monitor well
- Monitor well - buried or destroyed

ATEX 394 (ALLSUP'S), PINO FINA, AND ROSS TEXACO
LAS VEGAS, NEW MEXICO

Ross Texaco Site Map

Daniel B. Stephens & Associates, Inc.
12/3/2019 JN DB18.1277

Figure 4

Path: S:\Projects\DB18.1277_Las_Vegas_Triple_Site\GIS\MXDs\Report_201907\Fig04_Ross Texaco_site_map.mxd

Source: Google Earth, May 2019

Explanation

- Monitor well
- Potentiometric surface elevation contour (ft msl) (dashed where inferred)
- **MW-1** Monitor well designation
- **6403.56** Potentiometric surface elevation (ft msl)
- Groundwater flow direction

Notes:
1. MW = Ross Texaco monitor well
2. MWAL = Atex 394 (Allsup's) monitor well
3. PF = Pino Fina monitor well
4. AEE = Pino Fina monitor well installed by AE&E

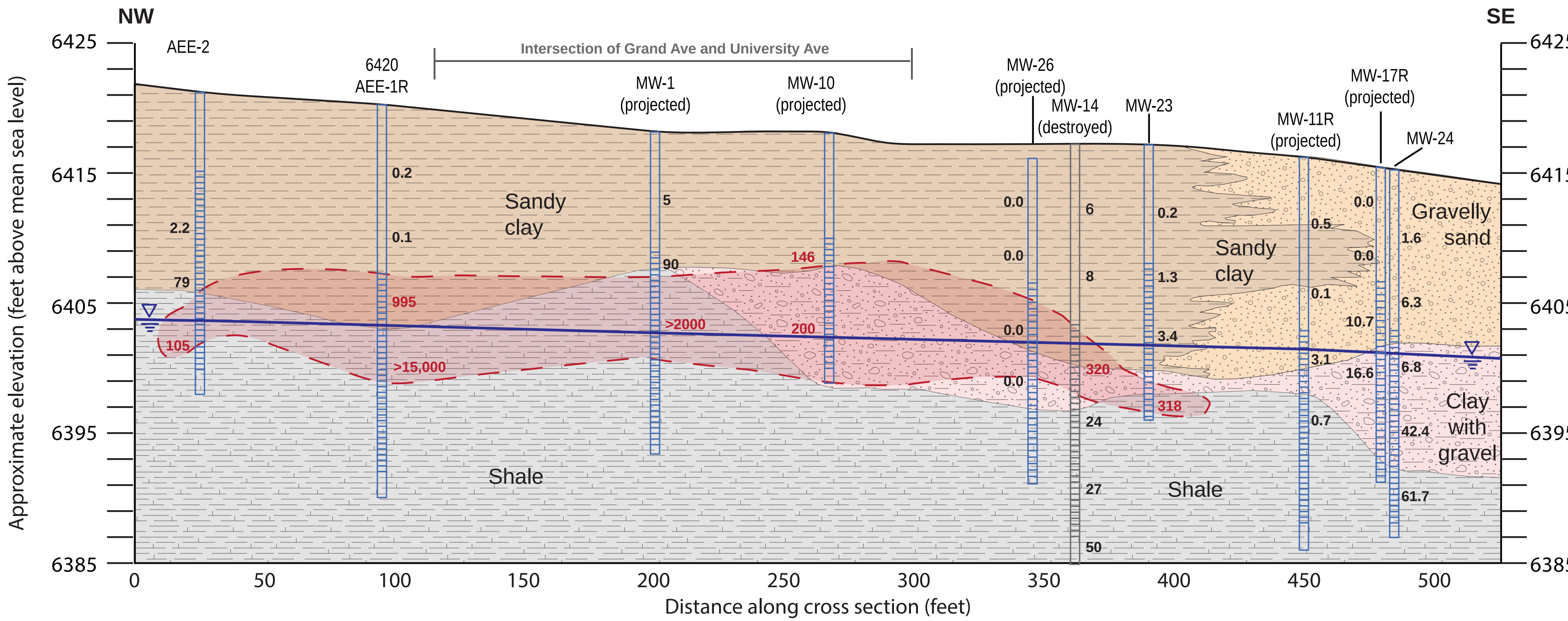
ATEX 394 (ALLSUP'S), PINO FINA, AND ROSS TEXACO
LAS VEGAS, NEW MEXICO

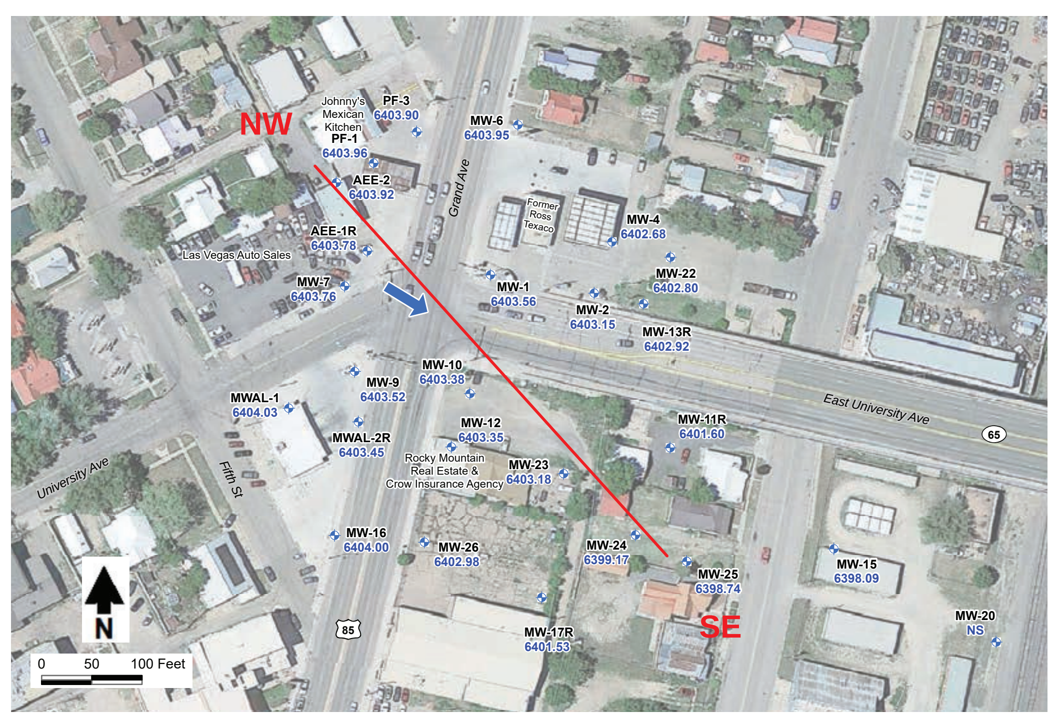
Potentiometric Surface Elevations

July 2019

Daniel B. Stephens & Associates, Inc.
12/30/2019 JN DB18.1277

S:\Projects\DB18.1277_Las_Vegas_Triple_Site\GIS\MXDs\Report_201907\Fig05_Potentiometric_Surface_Elevations.mxd





- Monitor well
- Cross section
- **MW-1** Monitor well designation
- 6403.56 Potentiometric surface eleation (ft msl)
- Groundwater flow direction

Note:
1. MW = Ross Texaco monitor well
2. MWAL = Allsup's monitor well
3. PF = Pino Fina monitor well
4. AEE = Pino Fina monitor well installed by AE&E

Note: The projected wells have been included on the cross section to show the locations of their respective screened intervals, but the lithology and extent of the actionable hydrocarbon soil contamination shown do not necessarily apply to these wells.

Explanation

Well
Screen
PID readings (ppmv) shown next to well

Destroyed Well

Approximate July 2019 water table

Geology
- Gravelly sand
- Sandy clay
- Clay with gravel
- Shale
- Approximate extent of actionable HC soil contamination

10
0
5x vertical exaggeration
horizontal: 1 inch = 50 feet vertical: 1 inch = 10 feet
0 50 100 200 Feet

ATEX 394 (ALLSUP'S), PINO FINA, AND ROSS TEXACO
LAS VEGAS, NEW MEXICO
Conceptual Cross Section

Daniel B. Stephens & Associates, Inc.
9/13/2019
JN DB18.1277

Figure 6

S:\Projects\DB18.1277_Las_Vegas_Triple_Site\VR_Drawings\Adobe Illustrator\Pino_Cross_Section_20191223\Pino_Cross_Section_20191223.ai

Path: S:\Projects\DB18.1277_Las_Vegas_Triple_Site\GIS\MXDs\Report_201907\Fig07_Benzene_GW_201907.mxd

Source: Google Earth May 2019

Explanation

Monitor well

Extent of actionable benzene in groundwater

MW-1 Monitor well designation

47 Benzene concentration (µg/L)

Notes:

1. NS = Well not sampled
2. Gray shading indicates concentration is below laboratory reporting limits.

ATEX 394 (ALLSUP'S), PINO FINA, AND ROSS TEXACO
LAS VEGAS, NEW MEXICO

Benzene in Groundwater
July 2019

Figure 7

Daniel B. Stephens & Associates, Inc.
9/24/2019
JN DB18.1277

Path: S:\Projects\DB18.1277_Las_Vegas_Triple_Site\GIS\MXDs\Report_201907\Fig08_Ethylbenzene_GW_201907.mxd

Source: Google Earth May 2019

Explanation

- Monitor well
- Extent of actionable ethylbenzene in groundwater
- **MW-1** Monitor well designation
- **2,100** Ethylbenzene concentration (µg/L)

Notes:
1. NS = Well not sampled
2. Gray shading indicates concentration is below laboratory reporting limits.

ATEX 394 (ALLSUP'S), PINO FINA, AND ROSS TEXACO
LAS VEGAS, NEW MEXICO

Ethylbenzene in Groundwater
July 2019

Figure 8

Daniel B. Stephens & Associates, Inc.
9/24/2019 JN DB18.1277

Path: S:\Projects\DB18.1277_Las_Vegas_Triple_Site\GIS\MXDs\Report_201907\Fig09_Total_Xylenes_GW_201907.mxd

Explanation

Monitor well

Extent of actionable total xylenes in groundwater

MW-12 Monitor well designation

1,300 Total xylenes concentration (µg/L)

Figure 9

Notes:
1. NS = Well not sampled
2. Gray shading indicates concentration is below laboratory reporting limits.

ATEX 394 (ALLSUP'S), PINO FINA, AND ROSS TEXACO
LAS VEGAS, NEW MEXICO

Total Xylenes in Groundwater July 2019

Daniel B. Stephens & Associates, Inc.
9/24/2019
JN DB18.1277

Path: S:\Projects\DB18.1277_Las_Vegas_Triple_Site\GIS\MXDs\Report_201907\Fig10_Total_Naphthalenes_GW_201907.mxd

Source: Google Earth May 2019

Explanation

Extent of actionable total naphthalenes in groundwater

MW-1 Monitor well designation

480 Total naphthalenes concentration (µg/L)

Notes:

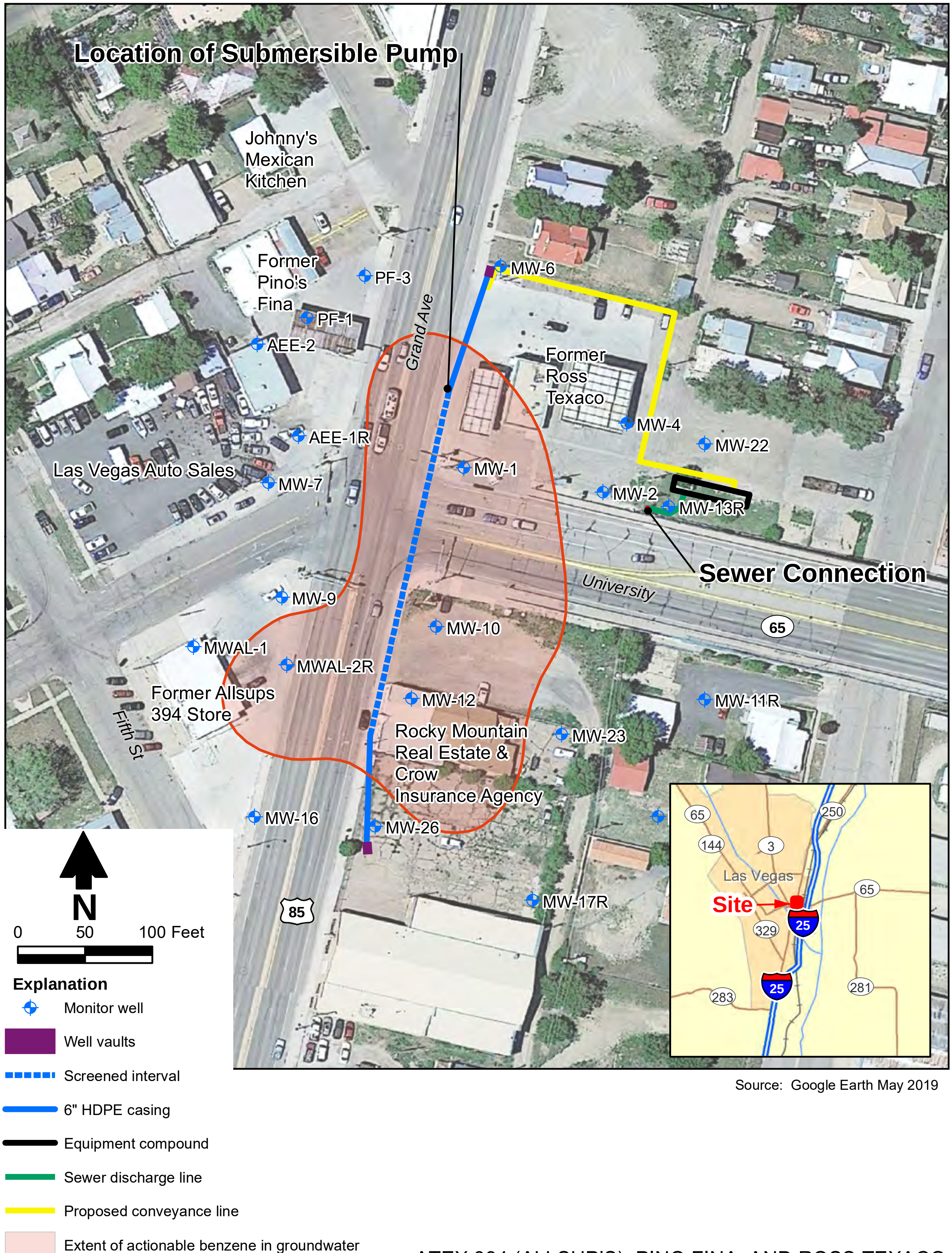
1. NS = Well not sampled
2. Gray shading indicates concentration is below laboratory reporting limits.

ATEX 394 (ALLSUP'S), PINO FINA, AND ROSS TEXACO
LAS VEGAS, NEW MEXICO

Total Naphthalenes in Groundwater
July 2019

Figure 10

Daniel B. Stephens & Associates, Inc.
9/24/2019
JN DB18.1277



Source: Google Earth May 2019

ATEX 394 (ALLSUP'S), PINO FINA, AND ROSS TEXACO

Proposed Technical Approach

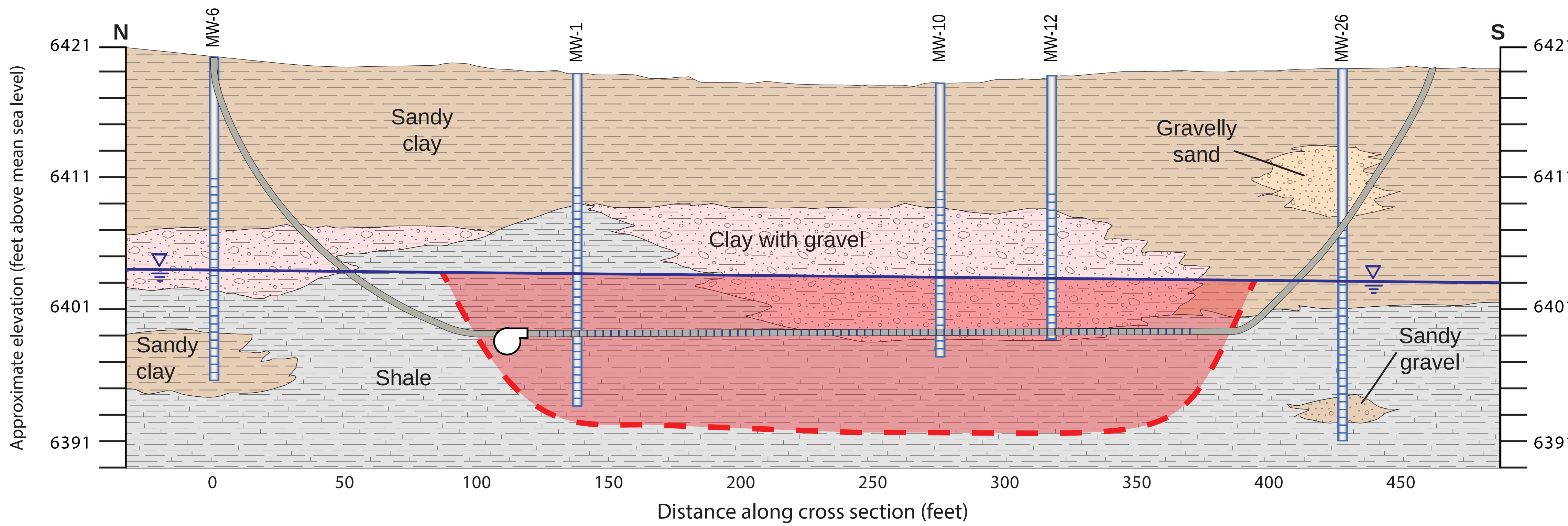
Daniel B. Stephens & Associates, Inc.

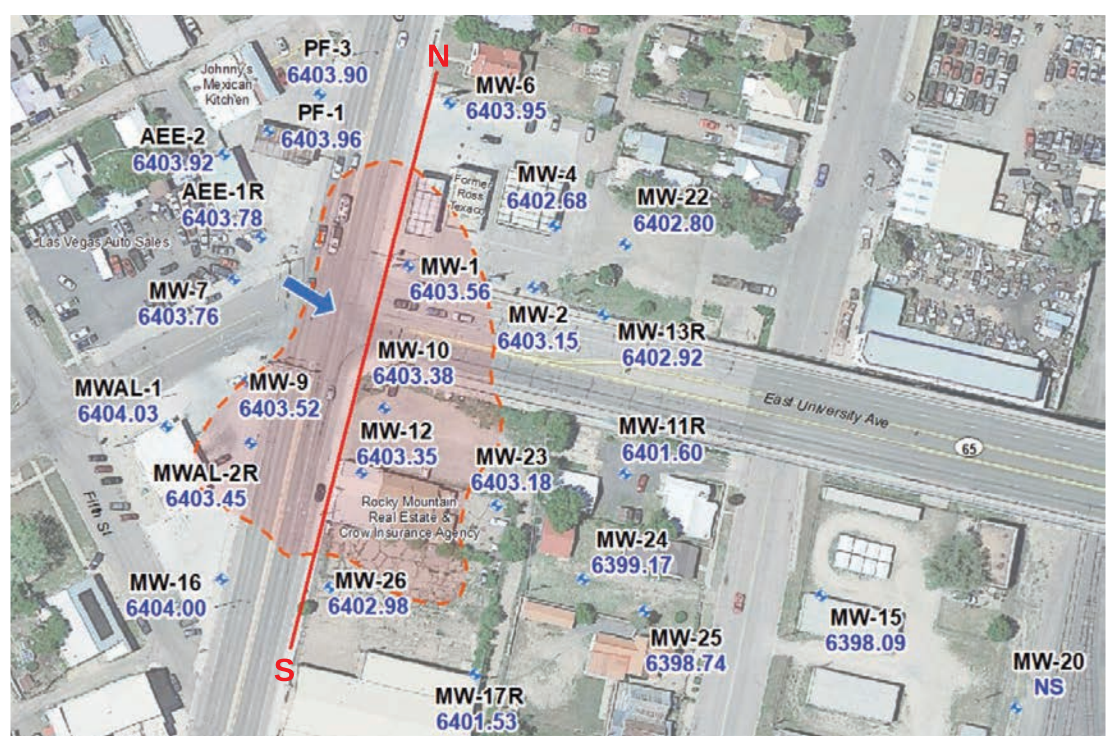
12/26/2019

JN DB18.1277

Figure 11

Path: S:\Projects\DB18.1277_Las_Vegas_Triple_Site\GIS\MXDs\Working\Technical_approach.mxd





N

0 50 100 Feet

Monitor well

5 µg/L benzene contour (Extent of actionable Benzene in groundwater)

MW-1 Monitor well designation

6403.56 Potentiometric surface elevation (ft msl)

Groundwater flow direction

Explanation

Well

Well Screen

Bore path (6” casing)

Screen

Approximate July 2019 water table

Pump

Geology

Sandy clay

Gravely sand

Sandy gravel

Clay with gravel

Shale

Approximate extent of actionable benzene groundwater contamination

5x vertical exaggeration

horizontal: 1 inch = 50 feet vertical: 1 inch = 10 feet

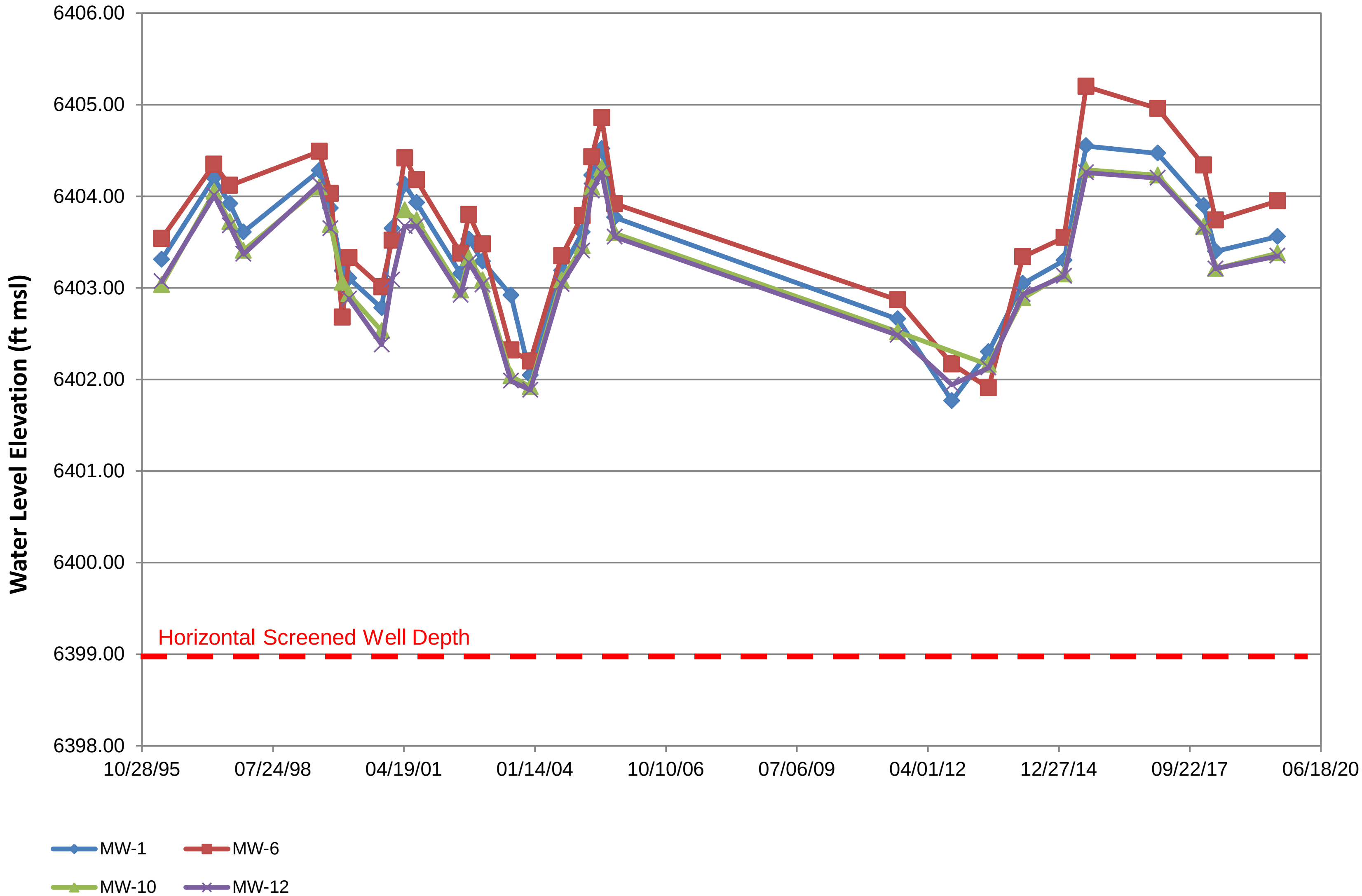
ATEX 394 (ALLSUP’S), PINO FINA, AND ROSS TEXACO
LAS VEGAS, NEW MEXICO

Conceptual Bore Path Cross Section

Daniel B. Stephens & Associates, Inc.

12-17-19 JN DB18.1277

S:\Projects\DB18.1277_Las_Vegas_Triple_Site\VR_Drawings\Adobe Illustrator\Cross_Section_20191104\Fig12_Las Vegas Tripple Site Cross Section_20191104.ai



ATEX 394 (ALLSUP'S), PINO FINA, AND ROSS TEXACO
LAS VEGAS, NEW MEXICO

Groundwater Elevations Relative to the Proposed Horizontal Well

Figure 13

Daniel B. Stephens & Associates, Inc.

12/31/19

Tables

Table 3. Summary of Fluid Level Measurements
Atex 394 (Allsup's), Pino Fina, and Ross Texaco Sites, Las Vegas, New Mexico

Well	Top of Casing Elevation [a] (ft msl)	Date Measured	Depth to Water (ft btoc)	NAPL Thickness (feet)	Water Level Elevation [b] (ft msl)
MW-1	6418.01	03/27/96	14.70	0.00	6403.31
		04/29/97	13.81	0.00	6404.20
		08/29/97	14.09	0.00	6403.92
		12/10/97	14.40	0.00	6403.61
		07/13/99	13.73	0.00	6404.28
		10/06/99	14.14	Sheen	6403.87
		01/05/00	14.83	0.01	6403.19
		02/24/00	14.92	0.02	6403.11
		11/01/00	15.23	Sheen	6402.78
		01/18/01	14.72	0.48	6403.65
		04/25/01	13.88	0.00	6404.13
		07/25/01	14.08	0.00	6403.93
		06/26/02	14.87	0.02	6403.16
		08/28/02	14.48	0.00	6403.53
		12/10/02	14.72	0.00	6403.29
		07/16/03	16.32	1.64	6402.92
		12/09/03	16.25	0.38	6402.05
		08/05/04	14.82	0.00	6403.19
		01/10/05	14.40	0.00	6403.61
		03/23/05	13.78	0.00	6404.23
		06/07/05	13.49	0.00	6404.52
		09/14/05	14.24	0.00	6403.77
		08/15/11	15.35	0.00	6402.66
		10/01/12	16.70	0.61	6401.77
		07/08/13	15.73	0.03	6402.30
		03/26/14	14.97	0.01	6403.05
		02/05/15	14.71	0.00	6403.30
		07/23/15	13.46	0.00	6404.55
		01/19/17	13.54	0.00	6404.47
		01/05/18	14.11	0.00	6403.90
		04/06/18	14.61	0.00	6403.40
		07/23/19	14.45	0.00	6403.56
MW-2	6417.07	03/27/96	14.12	0.00	6402.95
		05/01/97	13.33	0.00	6403.74
		08/28/97	13.63	0.00	6403.44
		12/10/97	13.84	0.00	6403.23
		07/13/99	13.30	0.00	6403.77
		10/06/99	13.69	0.00	6403.38
		01/05/00	13.18	0.00	6403.89

Table 3. Summary of Fluid Level Measurements
Atex 394 (Allsup's), Pino Fina, and Ross Texaco Sites, Las Vegas, New Mexico

Well	Top of Casing Elevation [a] (ft msl)	Date Measured	Depth to Water (ft btoc)	NAPL Thickness (feet)	Water Level Elevation [b] (ft msl)
MW-2 (cont.)	6417.07 (cont.)	02/25/00	14.28	0.00	6402.79
		11/01/00	14.49	0.00	6402.58
		01/18/01	14.13	0.00	6402.94
		04/25/01	13.41	0.00	6403.66
		07/25/01	13.62	0.00	6403.45
		06/26/02	14.28	0.00	6402.79
		08/28/02	13.92	0.00	6403.15
		12/10/02	14.14	0.00	6402.93
		07/16/03	15.16	0.00	6401.91
		12/09/03	15.30	0.00	6401.77
		08/05/04	14.31	0.00	6402.76
		01/10/05	13.87	0.00	6403.20
		03/23/05	13.31	0.00	6403.76
		09/14/05	13.93	0.00	6403.14
		08/15/11	14.68	0.00	6402.39
		10/01/12	15.31	0.00	6401.76
		07/08/13	18.02	0.00	6399.05
		03/26/14	14.20	0.00	6402.87
		02/05/15	14.19	0.00	6402.88
		07/23/15	13.13	0.00	6403.94
		01/19/17	13.13	0.00	6403.94
		01/05/18	13.60	0.00	6403.47
		04/06/18	14.03	0.00	6403.04
		07/23/19	13.92	0.00	6403.15
MW-3	6409.73 [c]	03/27/96	16.07	0.00	6393.66
		05/01/97	Destroyed		
MW-4	6418.01	03/27/96	16.30	1.17	6402.59
		05/01/97	15.05	0.42	6403.28
		08/28/97	15.44	0.91	6403.25
		07/13/99	14.89	0.54	6403.53
		10/06/99	16.60	0.30	6401.64
		01/05/00	16.12	1.02	6402.66
		02/25/00	16.13	1.00	6402.63
		11/01/00	16.20	0.00	6401.81
		01/18/01	16.12	1.16	6402.76
		04/25/01	14.85	0.13	6403.26
		07/25/01	14.99	0.42	6403.34
		06/26/02	15.82	0.75	6402.75
		08/28/02	15.30	0.53	6403.11

Table 3. Summary of Fluid Level Measurements
Atex 394 (Allsup's), Pino Fina, and Ross Texaco Sites, Las Vegas, New Mexico

Well	Top of Casing Elevation [a] (ft msl)	Date Measured	Depth to Water (ft btoc)	NAPL Thickness (feet)	Water Level Elevation [b] (ft msl)
MW-4 (cont.)	6418.01 (cont.)	12/10/02	15.54	0.61	6402.93
		07/16/03	15.95	0.00	6402.06
		12/09/03	17.32	1.19	6401.58
		08/05/04	15.63	0.03	6402.40
		01/10/05	15.23	Sheen	6402.78
		03/23/05	14.65	Sheen	6403.36
		06/07/05	14.42	0.00	6403.59
		09/15/05	15.57	0.02	6402.46
		08/15/11	16.12	0.01	6401.90
		10/01/12	16.80	0.02 [d]	6401.23
		07/08/13	17.33	0.03	6400.70
		03/26/14	14.28	0.00	6403.73
		02/05/15	15.68	0.00	6402.33
		07/23/15	14.20	0.00	6403.81
		01/19/17	14.03	0.00	6403.98
		01/05/18	14.94	0.00	6403.07
		04/06/18	15.43	0.00	6402.58
		07/23/19	15.33	0.00	6402.68
MW-5	NA	Destroyed			
MW-6	6419.98	03/27/96	16.44	0.00	6403.54
		04/29/97	15.63	0.00	6404.35
		08/28/97	15.86	0.00	6404.12
		07/13/99	15.49	0.00	6404.49
		10/06/99	15.95	0.00	6404.03
		01/05/00	17.30	0.00	6402.68
		02/25/00	16.65	0.00	6403.33
		11/01/00	16.97	0.00	6403.01
		01/18/01	16.46	0.00	6403.52
		04/25/01	15.56	0.00	6404.42
		07/25/01	15.80	0.00	6404.18
		06/26/02	16.60	0.00	6403.38
		08/28/02	16.18	0.00	6403.80
		12/10/02	16.50	0.00	6403.48
		07/16/03	17.66	0.00	6402.32
		12/09/03	17.78	0.00	6402.20
		08/05/04	16.63	0.00	6403.35
		01/10/05	16.19	0.00	6403.79
		03/23/05	15.55	0.00	6404.43
		06/07/05	15.12	0.00	6404.86

Table 3. Summary of Fluid Level Measurements
Atex 394 (Allsup's), Pino Fina, and Ross Texaco Sites, Las Vegas, New Mexico

Well	Top of Casing Elevation [a] (ft msl)	Date Measured	Depth to Water (ft btoc)	NAPL Thickness (feet)	Water Level Elevation [b] (ft msl)
MW-6 (cont.)	6419.98 (cont.)	09/14/05	16.06	0.00	6403.92
		08/15/11	17.11	0.00	6402.87
		10/01/12	17.81	0.00	6402.17
		07/08/13	18.07	0.00	6401.91
		03/26/14	16.64	0.00	6403.34
		02/05/15	16.43	0.00	6403.55
		07/23/15	14.78	0.00	6405.20
		01/19/17	15.02	0.00	6404.96
		01/05/18	15.64	0.00	6404.34
		04/06/18	16.24	0.00	6403.74
		07/23/19	16.03	0.00	6403.95
MW-7	6420.76	03/27/96	17.08	0.00	6403.68
		05/01/97	16.34	0.00	6404.42
		08/28/97	16.66	0.00	6404.10
		12/11/97	16.65	0.00	6404.11
		07/13/99	16.26	0.00	6404.50
		10/07/99	16.74	0.00	6404.02
		01/05/00	17.30	0.00	6403.46
		02/24/00	17.47	0.00	6403.29
		11/01/00	17.70	0.00	6403.06
		01/20/01	17.28	0.00	6403.48
		04/25/01	16.41	0.00	6404.35
		07/25/01	16.63	0.00	6404.13
		06/26/02	17.43	0.00	6403.33
		08/28/02	17.05	0.00	6403.71
		12/10/02	17.34	0.00	6403.42
		07/16/03	18.51	0.00	6402.25
		12/09/03	18.81	0.33	6402.20
		08/05/04	17.39	0.00	6403.37
		01/10/05	16.99	0.01	6403.78
		03/23/05	16.32	0.00	6404.44
		06/07/05	15.99	0.00	6404.77
		09/14/05	16.83	0.00	6403.93
		08/15/11	18.01	0.00	6402.75
		10/01/12	18.85	0.00	6401.91
		07/08/13	18.30	0.08 [d]	6402.52
		03/24/14	17.61	0.00	6403.15
		02/06/15	17.31	0.00	6403.45
		07/22/15	15.89	0.00	6404.87

Table 3. Summary of Fluid Level Measurements
Atex 394 (Allsup's), Pino Fina, and Ross Texaco Sites, Las Vegas, New Mexico

Well	Top of Casing Elevation [a] (ft msl)	Date Measured	Depth to Water (ft btoc)	NAPL Thickness (feet)	Water Level Elevation [b] (ft msl)
MW-7 (cont.)	6420.76 (cont.)	01/19/17	16.10	0.00	6404.66
		01/04/18	16.69	0.00	6404.07
		04/05/18	17.22	0.00	6403.54
		07/23/19	17.00	0.00	6403.76
MW-8	6410.76 [c]	03/27/96	16.37	0.00	6394.39
		05/01/97	NM	0.00	NM
		08/28/97	15.72	0.00	6395.04
		10/06/99	Destroyed		
MW-9	6419.89	03/27/96	16.62	0.00	6403.27
		08/28/97	15.57	0.00	6404.32
		08/29/97	15.90	0.00	6403.99
		12/11/97	16.24	0.00	6403.65
		07/13/99	15.51	0.00	6404.38
		10/07/99	15.97	Sheen	6403.92
		01/05/00	16.59	Sheen	6403.30
		02/25/00	17.19	0.59	6403.14
		11/01/00	16.87	0.00	6403.02
		01/18/01	NM	0.00	NM
		04/25/01	15.68	0.00	6404.21
		07/25/01	15.87	0.00	6404.02
		06/26/02	16.66	0.02	6403.25
		08/28/02	16.28	0.00	6403.61
		12/10/02	16.57	0.00	6403.32
		07/16/03	17.87	0.30	6402.25
		12/09/03	17.73	0.01	6402.17
		08/05/04	16.58	0.00	6403.31
		01/10/05	16.18	0.00	6403.71
		03/23/05	15.52	0.00	6404.37
		06/07/05	15.23	0.00	6404.66
		09/14/05	16.02	0.00	6403.87
		08/15/11	17.17	0.00	6402.72
		10/01/12	18.00	0.00	6401.89
		07/08/13	18.50	0.00	6401.39
		03/24/14	16.82	0.00	6403.07
		02/06/15	16.51	0.00	6403.38
		07/22/15	15.22	0.00	6404.67
		01/20/17	15.49	0.00	6404.40
		01/04/18	16.03	0.00	6403.86
		04/05/18	16.57	0.00	6403.32

Table 3. Summary of Fluid Level Measurements
Atex 394 (Allsup's), Pino Fina, and Ross Texaco Sites, Las Vegas, New Mexico

Well	Top of Casing Elevation [a] (ft msl)	Date Measured	Depth to Water (ft btoc)	NAPL Thickness (feet)	Water Level Elevation [b] (ft msl)
MW-9 (cont.)	6419.89 (cont.)	07/23/19	16.37	0.00	6403.52
MW-10	6418.05	03/27/96	15.06	0.06	6403.04
		05/01/97	14.03	0.04	6404.05
		08/29/97	14.39	0.08	6403.72
		12/11/97	14.68	0.05	6403.41
		07/13/99	13.95	0.00	6404.10
		10/06/99	14.36	Sheen	6403.69
		01/05/00	15.02	0.04	6403.06
		02/24/00	15.20	0.11	6402.93
		11/01/00	15.52	0.00	6402.53
		01/18/01	NM	0.00	NM
		04/25/01	14.20	0.00	6403.85
		07/25/01	14.31	0.00	6403.74
		06/26/02	15.22	0.19	6402.97
		08/28/02	14.80	0.10	6403.33
		12/10/02	15.04	0.10	6403.09
		07/16/03	16.41	0.53	6402.04
		12/09/03	16.49	0.48	6401.92
		08/05/04	15.01	0.06	6403.09
		01/10/05	14.59	0.00	6403.46
		03/23/05	13.95	0.00	6404.10
		06/07/05	13.74	0.00	6404.31
		09/14/05	14.45	0.00	6403.60
		08/15/11	15.53	0.00	6402.52
		10/01/12	Not located		
		07/08/13	16.00	0.15	6402.16
		03/26/14	15.16	Sheen	6402.89
		02/05/15	14.90	0.00	6403.15
		07/23/15	13.76	0.00	6404.29
		01/19/17	13.82	0.00	6404.23
		01/05/18	14.38	0.00	6403.67
		04/06/18	14.84	0.00	6403.21
		07/23/19	14.67	0.00	6403.38
MW-11	6407.31 [c]	03/27/96	13.39	0.00	6393.92
		05/01/97	14.60	0.00	6392.71
		08/29/97	12.77	0.00	6394.54
		07/13/99	12.35	0.00	6394.96
		10/06/99	12.78	0.01	6394.53
		01/05/00	13.34	0.00	6393.97

Table 3. Summary of Fluid Level Measurements
Atex 394 (Allsup's), Pino Fina, and Ross Texaco Sites, Las Vegas, New Mexico

Well	Top of Casing Elevation [a] (ft msl)	Date Measured	Depth to Water (ft btoc)	NAPL Thickness (feet)	Water Level Elevation [b] (ft msl)
MW-11 (cont.)	6407.31 [c] (cont.)	02/24/00	Buried		
		11/01/00	13.58	0.00	6393.73
		01/18/01	NM	0.00	NM
		04/25/01	NM	0.00	NM
		07/25/01	NM	0.00	NM
		06/26/02	NM	0.00	NM
		08/28/02	NM	0.00	NM
		12/10/02	NM	0.00	NM
		07/16/03	NM	0.00	NM
		12/09/03	NM	0.00	NM
		08/05/04	13.31	0.00	6394.00
	6421.36 [c]	01/10/05	12.96	0.00	6408.40
		03/23/05	12.30	0.00	6409.06
		06/07/05	13.74	0.00	6409.37
		09/14/05	12.81	0.00	6408.55
		08/15/11	Buried or destroyed		
MW-11R	6413.78	03/26/14	12.67	0.00	6401.11
		02/05/15	12.65	0.00	6401.13
		07/23/15	11.70	0.00	6402.08
		01/19/17	11.91	0.00	6401.87
		01/05/18	12.02	0.00	6401.76
		04/06/18	12.38	0.00	6401.40
		07/23/19	12.18	0.00	6401.60
MW-12	6418.21	03/27/96	15.14	0.00	6403.07
		05/01/97	14.20	0.00	6404.01
		08/29/97	14.53	0.00	6403.68
		12/11/97	14.84	0.00	6403.37
		07/13/99	14.08	0.00	6404.13
		10/06/99	14.56	Sheen	6403.65
		01/05/00	Dry	0.00	Dry
		02/25/00	15.65	0.43	6402.88
		11/01/00	15.83	0.00	6402.38
		01/18/01	15.40	0.37	6403.09
		04/25/01	14.65	0.15	6403.67
		07/25/01	14.78	0.33	6403.68
		06/26/02	15.49	0.27	6402.92
		08/28/02	15.13	0.26	6403.28
		12/10/02	15.37	0.26	6403.04
		07/16/03	16.78	0.74	6401.99

Table 3. Summary of Fluid Level Measurements
Atex 394 (Allsup's), Pino Fina, and Ross Texaco Sites, Las Vegas, New Mexico

Well	Top of Casing Elevation [a] (ft msl)	Date Measured	Depth to Water (ft btoc)	NAPL Thickness (feet)	Water Level Elevation [b] (ft msl)
MW-12 (cont.)	6418.21 (cont.)	12/09/03	16.79	0.62	6401.89
		08/05/04	15.41	0.32	6403.04
		01/10/05	14.94	0.18	6403.41
		03/23/05	14.27	0.16	6404.06
		06/07/05	14.02	0.09	6404.26
		09/14/05	14.78	0.17	6403.56
		08/15/11	15.95	0.30	6402.49
		10/01/12	16.41	0.19 [d]	6401.94
		07/08/13	16.33	0.33	6402.13
		03/26/14	15.31	0.04	6402.93
		02/05/15	15.14	0.08	6403.13
		07/23/15	13.95	0.00	6404.26
		01/19/17	14.01	0.00	6404.20
		01/05/18	14.55	0.00	6403.66
		04/06/18	15.00	0.00	6403.21
		07/23/19	14.86	0.00	6403.35
MW-13	6406.22 [c]	03/27/96	12.64	0.00	6393.58
		05/01/97	Buried		
		07/13/99	Buried		
		08/05/04	Buried		
	6420.13 [c]	01/10/05	12.35	0.00	6407.78
		03/23/05	11.81	0.00	6408.32
		06/07/05	11.71	0.00	6408.42
		09/14/05	12.28	0.00	6407.85
		08/15/11	Buried or destroyed		
MW-13R	6415.75	03/26/14	13.43	0.00	6402.32
		02/05/15	Buried		
		07/23/15	12.30	0.00	6403.45
		01/19/17	12.30	0.00	6403.45
		01/05/18	12.62	0.00	6403.13
		04/06/18	13.05	0.00	6402.70
		07/23/19	12.83	0.00	6402.92
MW-14	6407.37 [c]	03/27/96	17.16	0.00	6390.21
		05/01/97	16.71	0.00	6390.66
		08/28/97	16.54	0.00	6390.83
		07/13/99	16.87	0.00	6390.50
		10/06/99	16.20	0.00	6391.17
		01/05/00	16.30	0.00	6391.07
		02/24/00	16.45	0.00	6390.92

Table 3. Summary of Fluid Level Measurements
Atex 394 (Allsup's), Pino Fina, and Ross Texaco Sites, Las Vegas, New Mexico

Well	Top of Casing Elevation [a] (ft msl)	Date Measured	Depth to Water (ft btoc)	NAPL Thickness (feet)	Water Level Elevation [b] (ft msl)
MW-14 (cont.)	6407.37 [c] (cont.)	11/01/00	NM	0.00	NM
		01/18/01	NM	0.00	NM
		04/25/01	12.61	0.00	6394.76
		07/25/01	12.73	0.00	6394.64
		06/26/02	13.46	0.00	6393.91
		08/28/02	13.12	0.00	6394.25
		12/10/02	13.33	0.00	6394.04
		07/16/03	14.35	0.00	6393.02
		12/09/03	NM	0.00	NM
		08/05/04	17.25	0.00	6390.12
	6421.48 [c]	01/10/05	16.36	0.00	6405.12
		03/23/05	16.37	0.00	6405.11
		06/07/05	16.44	0.00	6405.04
		09/14/05	16.44	0.00	6405.04
		08/15/11	Buried or destroyed		
MW-15	6410.53	03/27/96	12.45	0.00	6398.08
		05/01/97	10.72	0.00	6399.81
		08/28/97	11.28	0.00	6399.25
		12/11/97	11.74	0.00	6398.79
		07/13/99	11.01	0.00	6399.52
		10/06/99	11.39	0.00	6399.14
		01/05/00	12.28	0.00	6398.25
		02/24/00	12.44	0.00	6398.09
		11/01/00	12.19	0.00	6398.34
		01/18/01	NM	0.00	NM
		04/25/01	11.38	0.00	6399.15
		07/25/01	12.01	0.00	6398.52
		06/26/02	13.10	0.00	6397.43
		08/28/02	12.96	0.00	6397.57
		12/10/02	12.50	0.00	6398.03
		07/16/03	13.14	0.00	6397.39
		12/09/03	13.13	0.00	6397.40
		08/05/04	12.36	0.00	6398.17
		01/10/05	11.58	0.00	6398.95
		03/23/05	10.82	0.00	6399.71
		06/07/05	10.70	0.00	6399.83
		09/14/05	11.78	0.00	6398.75
		08/15/11	13.51	0.00	6397.02
		03/26/14	12.17	0.00	6398.36

Table 3. Summary of Fluid Level Measurements
Atex 394 (Allsup's), Pino Fina, and Ross Texaco Sites, Las Vegas, New Mexico

Well	Top of Casing Elevation [a] (ft msl)	Date Measured	Depth to Water (ft btoc)	NAPL Thickness (feet)	Water Level Elevation [b] (ft msl)
MW-15 (cont.)	6410.53 (cont.)	02/05/15	12.40	0.00	6398.13
		07/23/15	10.84	0.00	6399.69
		01/19/17	12.09	0.00	6398.44
		01/05/18	11.84	0.00	6398.69
		04/06/18	12.54	0.00	6397.99
		07/23/19	12.44	0.00	6398.09
MW-16	6418.89	03/27/96	14.80	0.00	6404.09
		05/01/97	13.67	0.00	6405.22
		08/28/97	14.30	0.00	6404.59
		07/13/99	14.15	0.00	6404.74
		10/07/99	14.22	0.00	6404.67
		01/05/00	14.64	0.00	6404.25
		02/25/00	14.83	0.00	6404.06
		11/01/00	14.81	0.00	6404.08
		01/18/01	NM	0.00	NM
		04/25/01	14.35	0.00	6404.54
		07/25/01	14.59	0.00	6404.30
		06/26/02	15.38	0.00	6403.51
		08/28/02	15.42	0.00	6403.47
		12/10/02	14.58	0.00	6404.31
		07/16/03	15.52	0.00	6403.37
		12/09/03	15.29	0.00	6403.60
		08/05/04	15.00	0.00	6403.89
		01/10/05	14.50	0.00	6404.39
		03/23/05	13.89	0.00	6405.00
		09/14/05	14.79	0.00	6404.10
		08/15/11	15.42	0.00	6403.47
		10/01/12	15.81	0.00	6403.08
		07/08/13	15.50	0.00	6403.39
		03/24/14	15.02	0.00	6403.87
		02/06/15	15.02	0.00	6403.87
		07/22/15	14.20	0.00	6404.69
		01/20/17	14.30	0.00	6404.59
		01/04/18	14.70	0.00	6404.19
		04/05/18	14.99	0.00	6403.90
		07/23/19	14.89	0.00	6404.00
MW-17	6407.88 [c]	03/27/96	18.19	0.00	6389.69
		05/01/97	16.20	0.00	6391.68
		08/28/97	16.98	0.00	6390.90

Table 3. Summary of Fluid Level Measurements
Atex 394 (Allsup's), Pino Fina, and Ross Texaco Sites, Las Vegas, New Mexico

Well	Top of Casing Elevation [a] (ft msl)	Date Measured	Depth to Water (ft btoc)	NAPL Thickness (feet)	Water Level Elevation [b] (ft msl)
MW-17 (cont.)	6407.88 [c] (cont.)	07/13/99	16.68	0.00	6391.20
		10/06/99	17.11	0.00	6390.77
		01/05/00	17.88	0.00	6390.00
		02/24/00	18.11	0.00	6389.77
		11/01/00	17.87	0.00	6390.01
		01/18/01	17.90	0.00	6389.98
		04/25/01	16.98	0.00	6390.90
		07/25/01	17.64	0.00	6390.24
		06/26/02	18.64	0.00	6389.24
		08/28/02	18.40	0.00	6389.48
	6407.88 [c]	12/10/02	18.02	0.00	6389.86
		07/16/03	18.80	0.00	6389.86
		12/09/03	18.85	0.00	6389.03
		08/05/04	18.03	0.00	6389.85
	6421.99 [c]	01/10/05	17.26	0.00	6404.73
		03/23/05	16.40	0.00	6405.59
		06/07/05	16.19	0.00	6405.80
		09/14/05	17.52	0.00	6404.47
		08/15/11	Destroyed		
MW-17R	6417.47	07/02/19	14.10	0.00	6403.37
		07/23/19	15.94	0.00	6401.53
MW-20	6406.24	03/27/96	8.66	0.00	6397.58
		05/01/97	6.87	0.00	6399.37
		08/28/97	7.40	0.00	6398.84
		07/13/99	7.09	0.00	6399.15
		10/06/99	7.51	0.00	6398.73
		01/05/00	8.36	0.00	6397.88
		02/24/00	8.54	0.00	6397.70
		11/01/00	8.16	0.00	6398.08
		01/18/01	NM	0.00	NM
		04/25/01	7.55	0.00	6398.69
		07/25/01	8.15	0.00	6398.09
		06/26/02	9.30	0.00	6396.94
		08/28/02	9.20	0.00	6397.04
		12/10/02	8.63	0.00	6397.61
		07/16/03	9.33	0.00	6396.91
		12/09/03	9.28	0.00	6396.96
		08/05/04	8.49	0.00	6397.75
		01/10/05	7.67	0.00	6398.57

Table 3. Summary of Fluid Level Measurements
Atex 394 (Allsup's), Pino Fina, and Ross Texaco Sites, Las Vegas, New Mexico

Well	Top of Casing Elevation [a] (ft msl)	Date Measured	Depth to Water (ft btoc)	NAPL Thickness (feet)	Water Level Elevation [b] (ft msl)
MW-20 (cont.)	6406.24 (cont.)	03/23/05	6.68	0.00	6399.56
		09/14/05	7.88	0.00	6398.36
		08/15/11	9.80	0.00	6396.44
		03/26/14	Not gauged		
		02/05/15	8.58	0.00	6397.66
		07/23/15	6.96	0.00	6399.28
		01/19/17	8.26	0.00	6397.98
		01/05/18	Inaccessible		
		04/06/18	8.62	0.00	6397.62
		07/23/19	Not located		
MW-21	6399.84 [c]	03/27/96	11.34	0.00	6388.50
		05/01/97	9.96	0.00	6389.88
		08/28/97	10.32	0.00	6389.52
		07/13/99	10.10	0.00	6389.74
		10/06/99	10.40	0.00	6389.44
		01/05/00	10.78	0.00	6389.06
		02/24/00	11.07	0.00	6388.77
		11/01/00	11.11	0.00	6388.73
		01/18/01	NM	0.00	NM
		04/25/01	10.67	0.00	6389.17
		07/25/01	11.05	0.00	6388.79
		06/26/02	Dry		
		08/28/02	Dry		
		12/10/02	NM	0.00	NM
		07/16/03	12.31	0.00	6387.53
		12/09/03	12.34	0.00	6387.50
		08/05/04	11.62	0.00	6388.22
	6413.99 [c]	01/10/05	10.82	0.00	6403.17
		03/23/05	9.96	0.00	6404.03
		06/07/05	9.71	0.00	6404.28
		09/14/05	10.83	0.00	6403.16
		08/15/11	Not gauged		
	--- [e]	03/26/14	Well not located		
		02/05/15	Well not located		
		07/23/15	Well not located		
		07/23/19	Presumed destroyed		
MW-22	6416.11	01/10/05	13.32	0.00	6402.79
		03/23/05	12.82	0.00	6403.29
		06/07/05	12.71	0.00	6403.40

Table 3. Summary of Fluid Level Measurements
Atex 394 (Allsup's), Pino Fina, and Ross Texaco Sites, Las Vegas, New Mexico

Well	Top of Casing Elevation [a] (ft msl)	Date Measured	Depth to Water (ft btoc)	NAPL Thickness (feet)	Water Level Elevation [b] (ft msl)
MW-22 (cont.)	6416.11 (cont.)	09/14/05	13.35	0.00	6402.76
		08/15/11	Well not located		
		03/26/14	Not gauged		
		02/05/15	13.60	0.00	6402.51
		07/23/15	12.66	0.00	6403.45
		01/19/17	12.62	0.00	6403.49
		01/05/18	12.98	0.00	6403.13
		04/06/18	13.37	0.00	6402.74
		07/23/19	13.31	0.00	6402.80
MW-23	6417.07	01/10/05	13.84	0.00	6403.23
		03/23/05	13.17	0.00	6403.90
		06/08/05	13.05	0.00	6404.02
		09/14/05	13.67	0.00	6403.40
		08/15/11	Well not located		
		10/01/12	15.40	0.08 [d]	6401.73
		07/08/13	15.80	0.20	6401.42
		03/26/14	14.38	Sheen	6402.69
		02/05/15	14.12	0.00	6402.95
		07/23/15	13.11	0.00	6403.96
		01/19/17	13.10	0.00	6403.97
		01/05/18	13.59	0.00	6403.48
		04/06/18	14.01	0.00	6403.06
		07/23/19	13.89	0.00	6403.18
MW-24	6415.39	03/26/14	16.17	0.00	6399.22
		02/05/15	16.21	0.00	6399.18
		07/23/15	No access		
		01/19/17	15.84	0.00	6399.55
		01/05/18	No access		
		04/06/18	16.34	0.00	6399.05
		07/23/19	16.22	0.00	6399.17
MW-25	6413.24	03/26/14	14.37	0.00	6398.87
		02/05/15	14.55	0.00	6398.69
		07/23/15	No access		
		01/19/17	No access		
		01/05/18	No access		
		04/06/18	14.63	0.00	6398.61
		07/23/19	14.50	0.00	6398.74
MW-26	6418.52	07/02/19	14.80	0.00	6403.72
		07/23/19	15.54	0.00	6402.98

Table 3. Summary of Fluid Level Measurements
Atex 394 (Allsup's), Pino Fina, and Ross Texaco Sites, Las Vegas, New Mexico

Well	Top of Casing Elevation [a] (ft msl)	Date Measured	Depth to Water (ft btoc)	NAPL Thickness (feet)	Water Level Elevation [b] (ft msl)
PF-1	6420.90	01/06/00	17.38	0.00	6403.52
		02/25/00	17.51	0.00	6403.39
		11/01/00	17.83	0.00	6403.07
		01/20/01	17.30	0.00	6403.60
		04/25/01	16.38	0.00	6404.52
		07/25/01	16.59	0.00	6404.31
		06/26/02	17.40	0.00	6403.50
		08/28/02	17.03	0.00	6403.87
		12/10/02	17.33	0.00	6403.57
		07/16/03	19.05	0.00	6401.85
		12/09/03	18.95	0.41	6402.26
		08/05/04	17.46	0.00	6403.44
		01/10/05	17.01	0.00	6403.89
		03/23/05	16.35	0.00	6404.55
		06/07/05	15.96	0.00	6404.94
		09/14/05	16.88	0.00	6404.02
		08/15/11	18.11	0.03	6402.81
		10/01/12	19.40	0.60	6401.95
		07/08/13	19.42	0.02	6401.50
		03/24/14	17.65	Sheen	6403.25
		02/06/15	17.30	0.00	6403.60
		07/22/15	15.70	0.00	6405.20
		01/19/17	15.99	0.00	6404.91
		01/04/18	16.56	0.00	6404.34
		04/05/18	17.17	0.00	6403.73
		07/23/19	16.94	0.00	6403.96
PF-2	6412.48 [c]	03/27/96	Dry		
		05/01/97	Dry		
		08/28/97	Under concrete slab		
PF-3	6420.82	03/27/96	17.83	0.00	6402.99
		05/01/97	17.08	0.00	6403.74
		08/28/97	17.34	0.00	6403.48
		07/13/99	17.05	0.00	6403.77
		10/06/99	17.39	0.00	6403.43
		01/05/00	18.00	0.00	6402.82
		02/25/00	18.07	0.00	6402.75
		11/01/00	18.28	0.00	6402.54
		01/19/01	17.89	0.00	6402.93
		04/25/01	17.14	0.00	6403.68

Table 3. Summary of Fluid Level Measurements
Atex 394 (Allsup's), Pino Fina, and Ross Texaco Sites, Las Vegas, New Mexico

Well	Top of Casing Elevation [a] (ft msl)	Date Measured	Depth to Water (ft btoc)	NAPL Thickness (feet)	Water Level Elevation [b] (ft msl)
PF-3 (cont.)	6420.82 (cont.)	07/25/01	17.36	0.00	6403.46
		06/26/02	17.97	0.00	6402.85
		08/28/02	17.62	0.00	6403.20
		12/10/02	17.82	0.00	6403.00
		07/16/03	18.91	0.00	6401.91
		12/09/03	19.04	0.00	6401.78
		08/05/04	18.00	0.00	6402.82
		01/10/05	17.53	0.00	6403.29
		03/23/05	16.98	0.00	6403.84
		06/07/05	16.61	0.00	6404.21
		09/14/05	17.44	0.00	6403.38
		08/15/11	18.41	0.00	6402.41
		10/01/12	19.20	0.00	6401.62
		07/08/13	18.90	0.00	6401.92
		03/24/14	17.79	0.00	6403.03
		02/06/15	17.33	0.00	6403.49
		07/22/15	15.75	0.00	6405.07
		01/19/17	15.95	0.00	6404.87
		01/04/18	16.55	0.00	6404.27
		04/05/18	17.13	0.00	6403.69
		07/23/19	16.92	0.00	6403.90
PF-4	6414.00 [c]	03/27/96	16.63	0.00	6397.37
		05/01/97	NM	0.00	NM
		08/28/97	17.10	0.00	6396.90
		Buried or Destroyed			
MWAL-1	6421.95	03/27/96	17.82	0.00	6404.13
		05/01/97	16.69	0.00	6405.26
		08/28/97	17.33	0.00	6404.62
		12/10/97	17.64	0.00	6404.31
		07/13/99	17.18	0.00	6404.77
		10/07/99	17.23	0.00	6404.72
		01/05/00	17.64	0.00	6404.31
		02/25/00	17.83	0.00	6404.12
		11/01/00	17.84	0.00	6404.11
		04/25/01	17.31	0.00	6404.64
		07/25/01	17.62	0.00	6404.33
		06/26/02	18.40	0.00	6403.55
		08/28/02	18.43	0.00	6403.52
		12/10/02	17.79	0.00	6404.16

Table 3. Summary of Fluid Level Measurements
Atex 394 (Allsup's), Pino Fina, and Ross Texaco Sites, Las Vegas, New Mexico

Well	Top of Casing Elevation [a] (ft msl)	Date Measured	Depth to Water (ft btoc)	NAPL Thickness (feet)	Water Level Elevation [b] (ft msl)
MWAL-1 (cont.)	6421.95 (cont.)	07/16/03	18.56	0.00	6403.39
		12/09/03	18.30	0.00	6403.65
		08/05/04	18.02	0.00	6403.93
		01/10/05	17.51	0.00	6404.44
		03/23/05	16.90	0.00	6405.05
		06/07/05	17.17	0.00	6404.78
		09/14/05	17.82	0.00	6404.13
		08/15/11	18.45	0.00	6403.50
		10/01/12	18.84	0.00	6403.11
		07/08/13	18.60	0.00	6403.35
		03/24/14	18.05	0.00	6403.90
		02/06/15	18.06	0.00	6403.89
		07/22/15	17.37	0.00	6404.58
		01/20/17	16.31	0.00	6405.64
		01/04/18	17.73	0.00	6404.22
		04/05/18	18.03	0.00	6403.92
		07/23/19	17.92	0.00	6404.03
MWAL-2	6412.90 [c]	03/27/96	16.00	0.00	6396.90
		05/01/97	15.56	0.00	6397.34
		08/29/97	15.39	0.00	6397.51
		12/11/97	15.70	0.00	6397.20
		07/13/99	15.00	0.00	6397.90
		10/07/99	15.46	0.00	6397.44
		01/05/00	16.01	0.00	6396.89
		02/25/00	16.19	0.00	6396.71
		11/01/00	16.29	0.00	6396.61
		01/18/01	17.70	0.00	6395.20
		04/25/01	15.15	0.00	6397.75
		07/25/01	15.33	0.00	6397.57
		06/26/02	16.06	0.00	6396.84
		08/28/02	15.71	0.00	6397.19
		12/10/02	15.96	0.00	6396.94
		07/16/03	17.02	0.00	6395.88
		12/09/03	17.47	0.46	6395.77
		08/05/04	15.96	0.00	6396.94
	6424.11 [c]	01/10/05	15.58	0.00	6408.53
		03/23/05	14.93	0.00	6409.18
		06/07/05	14.83	0.00	6409.28
		09/14/05	15.45	0.02	6408.67

Table 3. Summary of Fluid Level Measurements
Atex 394 (Allsup's), Pino Fina, and Ross Texaco Sites, Las Vegas, New Mexico

Well	Top of Casing Elevation [a] (ft msl)	Date Measured	Depth to Water (ft btoc)	NAPL Thickness (feet)	Water Level Elevation [b] (ft msl)
MWAL-2 (cont.)	6424.11 [c] (cont.)	08/15/11	16.71	0.23	6407.57
		10/01/12	17.73	0.43	6406.70
		07/08/13	Destroyed		
MWAL-2R	6419.36	03/24/14	16.50	0.00	6402.86
		02/06/15	16.23	0.00	6403.13
		07/22/15	15.10	0.00	6404.26
		01/20/17	15.05	0.00	6404.31
		01/04/18	15.56	0.00	6403.80
		04/05/18	16.09	0.00	6403.27
		07/23/19	15.91	0.00	6403.45
AEE-1	NA	07/13/99	16.26	0.00	NA
		10/07/99	16.31	0.00	NA
		01/05/00	17.07	0.00	NA
		02/25/00	17.00	0.00	NA
		11/01/00	17.28	0.00	NA
		01/20/01	16.82	0.00	NA
		04/25/01	15.92	0.00	NA
		07/25/01	16.12	0.00	NA
		06/26/02	16.90	0.00	NA
		08/28/02	16.53	0.00	NA
		12/10/02	16.85	0.00	NA
		07/16/03	18.00	0.00	NA
		12/09/03	18.06	0.00	NA
		08/05/04	Destroyed		
AEE-1R	6420.22	03/24/14	17.30	0.00	6402.92
		02/06/15	16.77	0.00	6403.45
		07/22/15	15.32	0.00	6404.90
		01/19/17	15.55	0.00	6404.67
		01/04/18	16.12	0.00	6404.10
		04/05/18	16.68	0.00	6403.54
		07/23/19	16.44	0.00	6403.78
AEE-2	6421.19	07/13/99	16.60	0.00	6404.59
		10/06/99	17.06	0.00	6404.13
		01/05/00	17.70	0.00	6403.49
		02/25/00	17.84	0.00	6403.35
		11/01/00	18.12	0.00	6403.07
		01/19/01	17.65	0.00	6403.54
		04/25/01	16.70	0.00	6404.49
		07/25/01	NM	0.00	NM

Table 3. Summary of Fluid Level Measurements
Atex 394 (Allsup's), Pino Fina, and Ross Texaco Sites, Las Vegas, New Mexico

Well	Top of Casing Elevation [a] (ft msl)	Date Measured	Depth to Water (ft btoc)	NAPL Thickness (feet)	Water Level Elevation [b] (ft msl)
AEE-2 (cont.)	6421.19 (cont.)	06/26/02	17.72	0.00	6403.47
		08/28/02	17.33	0.00	6403.86
		12/10/02	17.62	0.00	6403.57
		07/16/03	18.89	0.00	6402.30
		12/09/03	18.93	0.00	6402.26
		08/05/04	17.73	0.00	6403.46
		01/10/05	17.27	0.00	6403.92
		03/23/05	16.60	0.00	6404.59
		06/07/05	16.21	0.00	6404.98
		09/14/05	17.12	0.00	6404.07
		08/15/11	18.32	0.00	6402.87
		10/01/12	19.21	0.00	6401.98
		07/08/13	19.23	0.00	6401.96
		03/24/14	17.95	0.00	6403.24
		02/06/15	18.62	0.00	6402.57
		07/22/15	16.02	0.00	6405.17
		01/19/17	16.31	0.00	6404.88
		01/04/18	16.90	0.00	6404.29
		04/05/18	17.50	0.00	6403.69
		07/23/19	17.27	0.00	6403.92

Data prior to August 2011 reported by Haller & Associates (Haller, 2005).

[a] Top of casing elevations resurveyed by Surveying Control, Inc. on April 24, 2014 or CobbFendley on July 23, 2019.
Survey elevations have been projected back to historic data to provide a consistent datum for groundwater elevation data.

[b] Groundwater elevation (GWE) corrected for NAPL thickness using the following equation:
GWE = TOC Elevation - (DTW - [NAPL thickness x 0.75]).

[c] Previous survey data from Haller & Associates (Haller, 2005).

[d] NAPL not detected by interface probe; thickness confirmed with bailer.

[e] Well could not be located to resurvey on April 24, 2014.

ft msl = Feet above mean sea level

ft btoc = Feet below top of casing

NAPL = Nonaqueous-phase liquid

NA = Not available

Table 2. Summary of Analytical Inorganic Chemistry Data and Biological Indicator Parameters
Page 1 of 3

Parameter	Concentration (mg/L)				
	NMWQCC Standard	MW-1	MW-10	MW-12	Average [a]
Bicarbonate (as $CaCO_3$) (SM2320B)	NS	683.8	429.6	433.1	515.5
Carbonate (as $CaCO_3$) (SM2320B)	NS	<2	<2	<2	<2
Total Alkalinity (as $CaCO_3$) (SM2320B)	NS	683.8	429.6	433.1	515.5
Biological oxygen demand (BOD) (SM5210B)	NS	31	15	53	33
Chemical oxygen demand (COD) EPA 410.1	NS	90.5	73.7	50.2	71.5
Bromide (EPA 300.0)	NS	0.57	0.60	0.40	0.52
Chloride (EPA 300.0)	250	200	**430**	230	**287**
Fluoride (EPA 300.0)	1.6	<0.50	<0.50	0.76	0.42
Nitrate+nitrite (as N) (EPA 300.0)	10 [b]	<1.0	2.6	2.0	1.7
Phosphorous, Orthophosphate (EPA 300.0)	NS	<2.5 H	<2.5 H	<0.50 H	<2.5 H
Specific conductance (µS/cm) (SM2510B)	NS	1,900	2,600	2,500	2300
Sulfate (EPA 300.0)	600	49	410	**800**	420
Total dissolved solids (TDS) (SM2540C)	1,000	**1,180 D**	**1,830 D**	**1,910**	**1,640**
Total organic carbon (TOC) (SM5310B)	NS	9.8	11	7.1	9.3
pH (Field water quality meter)	NS	6.87	6.98	Not taken	6.93

Bold indicates concentration exceeds applicable standard.
[a] One half detection limit used when applicable
[b] The NMWQCC standards are 10 mg/L for nitrate, and 1.0 mg/L for nitrite
[c] Samples analyzed in accordance with EPA method 8260B, unless otherwise noted
[d] Laboratory reporting limit is equal to or greater than the NMWQCC standard

mg/L = Milligrams per liter
NMWQCC = New Mexico Water Quality Control Commission
$CaCO_3$ = Calcium carbonate
SM = Standard method
NS = No standard
EPA = U.S. Environmental Protection Agency
H = Holding times for preparation or analysis exceeded
D = Sample diluted due to matrix
µg/L = Micrograms per liter
µS/cm = Microsiemens per centimeter
BTEX = Benzene + toluene +ethylbenzene + total xylenes
BDL = Below detection limits

Table 2. Summary of Analytical Inorganic Chemistry Data and Biological Indicator Parameters

Parameter	Concentration (mg/L)				
	NMWQCC Standard	MW-1	MW-10	MW-12	Average [a]
Total suspended solids (TSS) (SM2540D)	NS	110 D	52 D	72	78
Dissolved Metals					
Arsenic (EPA 200.8)	0.01	0.0014	<0.0010	**0.015**	0.0056
Calcium (EPA 6010B)	NS	220	350	330	300
Chromium (EPA 6010B)	0.05	<0.0060	<0.0060	<0.0060	<0.0060
Iron (EPA 6010B)	1.0	**2.4**	**2.6**	**3.1**	**2.7**
Lead (EPA 200.8)	0.015	0.0034	<0.0005	0.0055	0.00305
Magnesium (EPA 6010B)	NS	50	49	51	50
Potassium (EPA 6010B)	NS	1.7	2.0	<5.0	2.1
Selenium (EPA 200.8)	0.05	<0.0010	<0.0010	<0.0010	<0.0010
Sodium (EPA 6010B)	NS	140	140	110	130
Hydrocarbons (Reported in µg/L) [c]					
Benzene	5	**47**	**180**	**690**	**306**
Toluene	1,000	<25	1.9	11	6
Ethylbenzene	700	**2,100**	170	590	**953**

Bold indicates concentration exceeds applicable standard.
[a] One half detection limit used when applicable
[b] The NMWQCC standards are 10 mg/L for nitrate, and 1.0 mg/L for nitrite
[c] Samples analyzed in accordance with EPA method 8260B, unless otherwise noted
[d] Laboratory reporting limit is equal to or greater than the NMWQCC standard

mg/L = Milligrams per liter
NMWQCC = New Mexico Water Quality Control Commission
$CaCO_3$ = Calcium carbonate
SM = Standard method
NS = No standard
EPA = U.S. Environmental Protection Agency
H = Holding times for preparation or analysis exceeded
D = Sample diluted due to matrix
µg/L = Micrograms per liter
µS/cm = Microsiemens per centimeter
BTEX = Benzene + toluene +ethylbenzene + total xylenes
BDL = Below detection limits

Table 2. Summary of Analytical Inorganic Chemistry Data and Biological Indicator Parameters

Parameter	Concentration (mg/L)				
	NMWQCC Standard	MW-1	MW-10	MW-12	Average [a]
Hydrocarbons (cont.)					
Total xylenes	620	160	48	**1,300**	503
Total BTEX	NS	2,307	399.9	2591	1766
1,2-Dibromoethane (EPA 8011/504.1)	0.05	<0.0094	<0.0093	<0.0094	<0.0094
1,2-Dichloroethane	5	<25 [d]	<1.0	<10 [d]	BDL
Methyl tertiary-butyl ether	100	<25	13	<10	10
Total naphthalenes	30	**480**	28	**357**	**288**

Bold indicates concentration exceeds applicable standard.
[a] One half detection limit used when applicable
[b] The NMWQCC standards are 10 mg/L for nitrate, and 1.0 mg/L for nitrite
[c] Samples analyzed in accordance with EPA method 8260B, unless otherwise noted
[d] Laboratory reporting limit is equal to or greater than the NMWQCC standard

mg/L = Milligrams per liter
NMWQCC = New Mexico Water Quality Control Commission
$CaCO_3$ = Calcium carbonate
SM = Standard method
NS = No standard
EPA = U.S. Environmental Protection Agency
H = Holding times for preparation or analysis exceeded
D = Sample diluted due to matrix
µg/L = Micrograms per liter
µS/cm = Microsiemens per centimeter
BTEX = Benzene + toluene +ethylbenzene + total xylenes
BDL = Below detection limits

Table 3. Modeled Groundwater Treatment System Effluent Volatile Organic Compound Concentrations

Parameter	Concentration (µg/L)		
	NMWQCC Standard	Expected Maximum [a]	Modeled Air-Stripper Effluent [b]
Benzene	5	690	0
Toluene	1,000	11	0
Ethylbenzene	700	2,100	0
Xylenes	620	1,300	0
MTBE	100	13	0
Naphthalene	30	480	23.2

[a] Based on maximum measured groundwater concentration at the site in July 2019
[b] Calculated using QED Environmental Systems software for the EZ Stacker 4.4.xp
µg/L = Micrograms per liter
NMWQCC = New Mexico Water Quality Control Commission
MTBE = Methyl-tertiary butyl ether

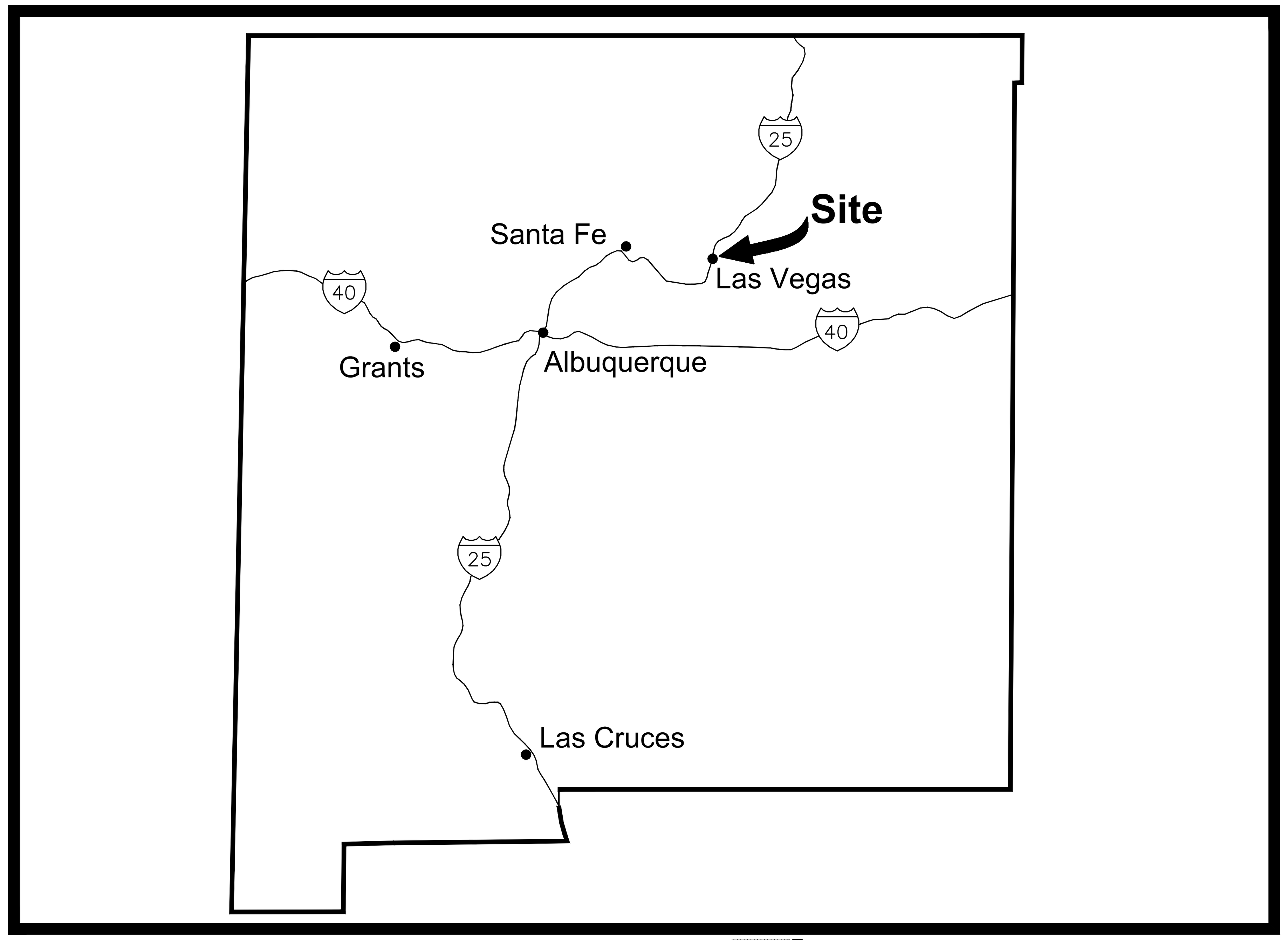
Table 4. Required Analytes for Treatment System Sampling

Analyte(s)	Analytical Method	Sample(s)
BTEX	EPA method 8260B	Raw and treated water
Methyl-tertiary butyl ether		
1,2-Dibromoethane		
1,2-Dichloroethane		
Iron	EPA method 6010B	
Manganese		
Total coliform	EPA method 9223B	Treated water only
E. Coli		
Total suspended solids	SM 2540D	
Ammonia	SM 4500	
pH	SM 4500/9040C	
Total Kjeldhal Nitrogen	SM 4500	
BTEX	EPA method 8021B	Air stripper vapor effluent
Methyl-tertiary butyl ether		
Air	TPH GRO 8015D	

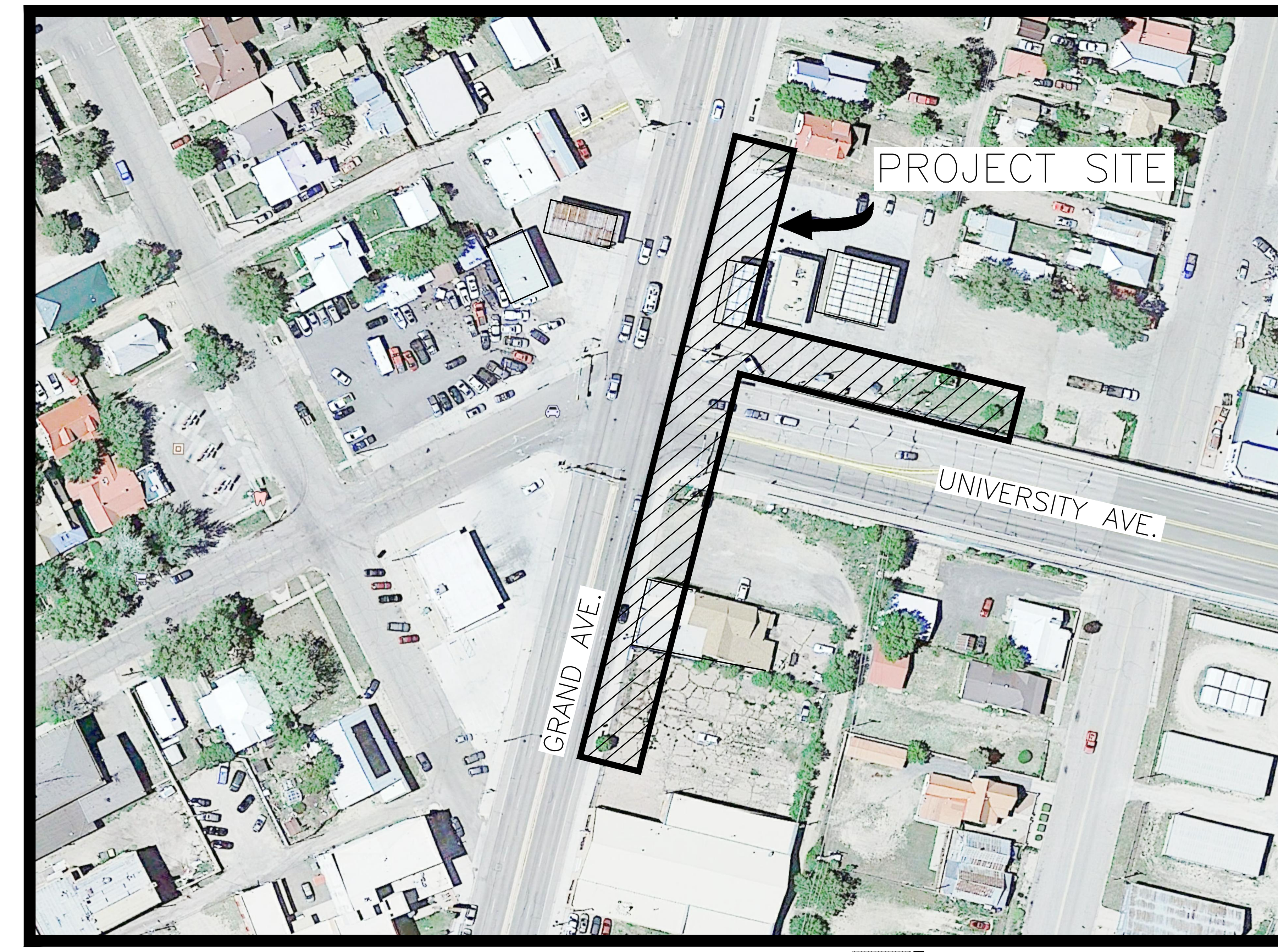
BTEX = Benzene, toluene, ethylbenzene, total xylenes
EPA = U.S. Environmental Protection Agency
SM = Standard method
TPH = Total petroleum hydrocarbons
GRO = Gasoline range organics

Appendix A

Engineering Drawings



VICINITY MAP
NTS
NORTH



SITE MAP
NTS
NORTH

ROSS TEXACO, PINO FINA AND ATEX 394 GROUNDWATER REMEDIATION SYSTEM INSTALLATION

LAS VEGAS, NEW MEXICO

PREPARED FOR NEW MEXICO ENVIRONMENT DEPARTMENT PETROLEUM STORAGE TANK BUREAU

INDEX OF DRAWINGS

NUMBER		TITLE	REVISION
		GENERAL	
1	G-0	COVER SHEET AND INDEX	0
2	G-1	GENERAL NOTES & LEGEND	0
3	G-2	SURVEY CONTROL PLAN	0
		CIVIL	
4	C-1	GENERAL SITE PLAN	0
5	C-2	REMEDIATION COMPOUND SITE PLAN	0
6	C-3	HORIZONTAL WELL PLAN AND PROFILE	0
7	C-4	CONVEYANCE LINE PLAN AND PROFILE	0
8	C-5	SEWER CONNECTION PLAN AND PROFILE	0
9	C-6	CIVIL DETAILS	0
		MECHANICAL	
10	M-1	PROCESS AND INSTRUMENTATION DIAGRAM	0
11	M-2	MECHANICAL ELEVATION AND DETAILS	0

REV. NO.	DATE	DESCRIPTION	APPROVED BY

DATE OF ISSUE: 12/31/19
DESIGNED BY: TH
DRAWN BY: JA/RT
CHECKED BY: KJ
APPROVED BY: TG

DBS&A
Daniel B. Stephens & Associates, Inc.
6020 Academy Rd. NE, Suite 100
Albuquerque, NM 87109-3315

22750
12/31/19

NEW MEXICO ENVIRONMENT DEPARTMENT
PETROLEUM STORAGE TANK BUREAU
2905 RODEO PARK DRIVE EAST
SANTA FE, NEW MEXICO 57505

ROSS TEXACO, PINO FINA, AND ATEX 394
GROUNDWATER REMEDIATION SYSTEM INSTALLATION
LAS VEGAS, NEW MEXICO

COVER SHEET AND INDEX

SHT. 1 OF 11
DWG NO. G-0
JOB NO. DB18.1277

GENERAL CONSTRUCTION NOTES:

A. ALL WORK ON THIS PROJECT SHALL BE PERFORMED IN ACCORDANCE WITH APPLICABLE FEDERAL, STATE AND LOCAL LAWS, ORDINANCES, AND REGULATIONS CONCERNING CONSTRUCTION SAFETY AND HEALTH.

B. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL REQUIRED CONSTRUCTION PERMITS AND APPROVALS OF LIKE KIND PRIOR TO START OF CONSTRUCTION.

C. PROJECT DOCUMENTS CONSIST OF THESE DRAWINGS, PROJECT SPECIFICATIONS, PROJECT CONTRACTS, AND ANY AND ALL SUBSEQUENT EXECUTED PROJECT DOCUMENTATION ISSUED AS, OR WITH, CHANGE ORDERS, AND RFI'S (REQUEST FOR INFORMATION.) THE CONTRACTOR SHALL REVIEW ALL PROJECT DOCUMENTS AND VERIFY ALL DIMENSIONS, QUANTITIES, AND FIELD CONDITIONS. ANY CONFLICTS OR OMISSIONS WITH THE DOCUMENTS SHALL BE REPORTED TO THE ENGINEER/PROJECT MANAGER FOR CLARIFICATION PRIOR TO PERFORMANCE OF ANY WORK IN QUESTION. IN THE EVENT THE CONTRACTOR DOES NOT NOTIFY THE ENGINEER/PROJECT MANAGER, THE CONTRACTOR ASSUMES FULL RESPONSIBILITY AND ANY AND ALL EXPENSE FOR ANY REVISIONS NECESSARY OR CORRECTIONAL WORK REQUIRED.

D. THE LOCATION OF BURIED UTILITIES ARE BASED UPON INFORMATION PROVIDED TO THE ENGINEER BY OTHERS AND MAY NOT REFLECT ACTUAL FIELD CONDITIONS. EXISTING BURIED UTILITIES SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL USE ANY MEANS APPROVED BY THE ENGINEER/PROJECT MANAGER TO LOCATE UNDERGROUND UTILITIES INCLUDING, BUT NOT LIMITED TO, ELECTRONIC LOCATING EQUIPMENT AND/OR POT HOLING. ANY DAMAGE TO ANY OTHER UTILITIES AND/OR COLLATERAL DAMAGE CAUSED BY THE CONTRACTOR SHALL BE THE FULL RESPONSIBILITY OF THE CONTRACTOR.

E. EXISTING FENCING THAT IS NOT DESIGNATED FOR REMOVAL SHALL NOT BE DISTURBED. ANY FENCING THAT IS DISTURBED OR ALTERED BY THE CONTRACTOR SHALL BE RESTORED TO ITS ORIGINAL CONDITION AT THE CONTRACTOR'S EXPENSE. IF THE CONTRACTOR DESIRES TO REMOVE FENCING TO ACCOMMODATE CONSTRUCTION ACTIVITIES, THE CONTRACTOR SHALL OBTAIN THE OWNER'S WRITTEN PERMISSION BEFORE FENCE IS REMOVED. CONTRACTOR SHALL RESTORE THE FENCE TO ITS ORIGINAL CONDITION AT THE EARLIEST OPPORTUNITY TO THE SATISFACTION OF THE OWNER. WHILE ANY FENCING IS REMOVED, THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR SECURITY OF THE SITE UNTIL THE FENCE IS RESTORED.

F. AT THE END OF EACH WORK DAY, THE CONTRACTOR SHALL CLEAN AND PICK UP THE WORK AREA TO THE SATISFACTION OF THE ENGINEER/PROJECT MANAGER. AT NO TIME SHALL THE WORK BE LEFT IN A MANNER THAT COULD ENDANGER THE WORKERS OR THE PUBLIC.

G. ALL MATERIALS AND WORKMANSHIP SHALL CONFORM TO PROJECT SPECIFICATIONS AND PLANS, AS AMENDED AND REVISED BY THE ENGINEER. ALL INSTALLATION DETAILS ARE TYPICAL AND MAY BE CHANGED TO BETTER FIT EXISTING LOCAL CONDITIONS UPON APPROVAL BY THE ENGINEER.

H. ONLY THE CONTRACTOR SHALL BE RESPONSIBLE FOR SAFETY OF ALL WORK. ALL WORK, INCLUDING WORK WITHIN TRENCHES, SHALL BE IN ACCORDANCE WITH THE OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA).

I. REFERENCES MADE TO STANDARD SPECIFICATIONS AND STANDARD DRAWINGS REFER TO THE NEW MEXICO CHAPTER OF THE AMERICAN PUBLIC WORKS ASSOCIATION (APWA-NM) STANDARDS FOR PUBLIC WORKS CONSTRUCTION.

J. THE CONTRACTOR SHALL NOT INSTALL ITEMS AS SHOWN ON THESE PLANS WHEN IT IS OBVIOUS THAT FIELD CONDITIONS ARE DIFFERENT THAN SHOWN IN THE PLANS. SUCH CONDITIONS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER IN A TIMELY MANNER. IN THE EVENT THE CONTRACTOR DOES NOT NOTIFY THE ENGINEER IN A TIMELY MANNER, THE CONTRACTOR ASSUMES FULL RESPONSIBILITY AND EXPENSE FOR ANY REVISIONS NECESSARY, INCLUDING ENGINEERING DESIGN FEES.

K. EXISTING SITE IMPROVEMENTS WHICH ARE DAMAGED OR DISPLACED BY THE CONTRACTOR SHALL BE REMOVED AND REPLACED BY THE CONTRACTOR AT THE CONTRACTOR'S EXPENSE. REPAIRS SHALL BE APPROVED BY THE OWNER PRIOR TO CONSTRUCTION OF THE REPAIRS. REPAIRS SHALL BE ACCEPTED BY THE OWNER PRIOR TO FINAL PAYMENT.

WORK WITHIN ADJACENT RIGHT-OF-WAY

L. PRIOR TO BEGINNING ANY CONSTRUCTION ACTIVITIES WITHIN ADJACENT RIGHT-OF-WAYS OR WITHIN PROPERTY NOT OWNED BY THE OWNER OF THE PROJECT SITE, THE CONTRACTOR SHALL ASSURE THAT ALL PERMITS AND PERMISSIONS REQUIRED HAVE BEEN OBTAINED IN WRITING.

SURVEY MONUMENTS, PROPERTY CORNERS, BENCHMARKS

M. THE CONTRACTOR SHALL NOTIFY THE OWNER AT LEAST SEVEN (7) DAYS BEFORE BEGINNING ANY CONSTRUCTION ACTIVITY THAT COULD DAMAGE OR DISPLACE SURVEY MONUMENTS, PROPERTY CORNERS, OR PROJECT BENCHMARKS SO THESE ITEMS MAY BE RELOCATED.

N. ANY SURVEY MONUMENTS, PROPERTY CORNERS, OR BENCHMARKS THAT ARE NOT IDENTIFIED FOR RELOCATION ARE THE RESPONSIBILITY OF THE CONTRACTOR TO PRESERVE AND PROTECT. RELOCATION OR REPLACEMENT OF THESE ITEMS SHALL BE DONE BY THE OWNER'S SURVEYOR AT THE EXPENSE OF THE CONTRACTOR.

DESIGN SURVEY

O. NO DESIGN SURVEY WAS OBTAINED FOR THIS PROJECT. ANY DISCREPANCIES BETWEEN THE ENGINEER'S DESIGN AND SITE SURFACE CONDITIONS SHALL BE BROUGHT TO THE ENGINEER'S ATTENTION IMMEDIATELY.

PAVEMENT

P. WHEN ABUTTING NEW PAVEMENT TO EXISTING PAVEMENT, CUT EXISTING PAVEMENT EDGE TO A NEAT, STRAIGHT LINE AS NECESSARY TO REMOVE ANY BROKEN OR CRACKED PAVEMENT AND MATCH NEW PAVEMENT ELEVATION TO EXISTING.

Q. ALL UTILITIES AND UTILITY SERVICE LINES SHALL BE INSTALLED AND APPROVED PRIOR TO PAVING.

CONSTRUCTION LIMITS

R. SHALL BE AS SHOWN ON PLANS.

UTILITIES

S. UTILITY LINES, PIPELINES, OR UNDERGROUND UTILITY LINES SHOWN ON THESE DRAWINGS ARE SHOWN IN AN APPROXIMATE LOCATION ONLY BASED ON THE INFORMATION PROVIDED TO THE ENGINEER BY OTHERS. THIS INFORMATION MAY BE INACCURATE OR INCOMPLETE. ADDITIONALLY, UNDERGROUND LINES MAY EXIST THAT ARE NOT SHOWN. THE CONTRACTOR SHALL VERIFY THE LOCATION OF ANY UTILITY LINE, PIPELINE, OR UNDERGROUND UTILITY LINE IN OR NEAR THE AREA OF THE WORK IN ACCORDANCE WITH CHAPTER 62, ARTICLE 14-1, THROUGH 14-8, NMSA 1978.

T. THE CONTRACTOR SHALL CONTACT THE STATEWIDE UTILITY LOCATOR SERVICE AT 811 AT LEAST FIVE WORKING DAYS BEFORE BEGINNING CONSTRUCTION. AFTER THE UTILITIES ARE SPOTTED, THE CONTRACTOR SHALL EXPOSE ALL PERTINENT UTILITIES TO VERIFY THEIR VERTICAL AND HORIZONTAL LOCATION. IF A CONFLICT EXISTS BETWEEN EXISTING UTILITIES AND PROPOSED CONSTRUCTION, THE CONTRACTOR SHALL NOTIFY THE ENGINEER SO THAT THE CONFLICT CAN BE RESOLVED WITH MINIMAL DELAY.

U. THE CONTRACTOR SHALL EXERCISE DUE CARE TO AVOID DISTURBING ANY EXISTING UTILITIES, ABOVE OR BELOW GROUND. UTILITIES THAT ARE DAMAGED BY CARELESS CONSTRUCTION SHALL BE REPAIRED OR REPLACED AT THE CONTRACTOR'S EXPENSE.

V. THE CONTRACTOR SHALL COORDINATE ANY REQUIRED UTILITY INTERRUPTIONS WITH THE OWNER AND AFFECTED UTILITY COMPANY A MINIMUM OF FIVE (5) WORKING DAYS BEFORE THE INTERRUPTION.

W. THE CONTRACTOR SHALL MAINTAIN A RECORD DRAWING SET OF PLANS AND PROMPTLY LOCATE ALL UTILITIES, EXITING OR NEW, IN THEIR CORRECT LOCATION, HORIZONTAL AND VERTICAL. THIS RECORD SET OF DRAWINGS SHALL BE MAINTAINED ON THE PROJECT SITE AND SHALL BE AVAILABLE TO THE OWNER AND ENGINEER AT ANY TIME DURING CONSTRUCTION. RECORD INFORMATION SHALL INCLUDE HORIZONTAL AND VERTICAL COORDINATE CALLOUTS, LINE SIZES, LINE TYPES, BURIAL DEPTHS, AND ALL OTHER PERTINENT INSTALLATION INFORMATION. IN ADDITION ALL ITEMS THAT ARE INSTALLED EXACTLY AS DESIGNED SHALL BE NOTED AS SUCH.

EROSION CONTROL, ENVIRONMENTAL PROTECTION, AND STORM WATER POLLUTION PREVENTION PLAN

X. THE CONTRACTOR SHALL CONFORM TO ALL SAN MIGUEL COUNTY, STATE OF NEW MEXICO, AND FEDERAL DUST AND EROSION CONTROL REGULATIONS. THE CONTRACTOR SHALL PREPARE AND OBTAIN ANY DUST CONTROL OR EROSION CONTROL PERMITS FROM THE APPROPRIATE REGULATORY AGENCIES.

Y. THE CONTRACTOR SHALL PROMPTLY REMOVE OR STABILIZE ANY MATERIAL EXCAVATED WITHIN THE RIGHT-OF-WAY OR ADJACENT PROPERTY TO KEEP IT FROM WASHING OFF THE PROJECT SITE.

Z. THE CONTRACTOR SHALL ENSURE THAT NO SOIL ERODES FROM THE SITE ONTO ADJACENT PROPERTY BY CONSTRUCTION OF TEMPORARY EROSION CONTROL BERMS OR INSTALLING SILT FENCES AT THE PROPERTY LINES (OR LIMITS OF CONSTRUCTION WHERE DESIGNATED) AND WETTING SOIL TO PREVENT IT FROM BLOWING.

AA. WATERING, AS REQUIRED FOR CONSTRUCTION DUST CONTROL, SHALL BE CONSIDERED INCIDENTAL TO CONSTRUCTION AND NO MEASUREMENT OR PAYMENT SHALL BE MADE. CONSTRUCTION AREAS SHALL BE WATERED FOR DUST CONTROL IN COMPLIANCE WITH CITY, COUNTY AND STATE ORDINANCES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING WITH THE CITY OF LAS VEGAS UTILITIES, FOR AVAILABILITY AND USE OF WATER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SUPPLYING ALL EQUIPMENT AND MATERIALS NECESSARY FOR OBTAINING, METERING, AND PAYING FOR WATER.

AB. THE CONTRACTOR SHALL PROPERLY HANDLE AND DISPOSE OF ALL ASPHALT AND CONCRETE REMOVED ON THE PROJECT BY HAULING TO AN APPROVED DISPOSAL SITE IN ACCORDANCE WITH THE REQUIREMENTS OF SAN MIGUEL COUNTY AND THE CITY OF LAS VEGAS.

AC. ALL WASTE PRODUCTS FROM THE CONSTRUCTION SITE, INCLUDING ITEMS DESIGNED FOR REMOVAL, CONSTRUCTION WASTE, CONSTRUCTION EQUIPMENT WASTE PRODUCTS (OIL, GAS, TIRES, ETC.), DRILLING MUD AND WATER, GARBAGE, GRUBBING, EXCESS CUT MATERIAL, VEGETATIVE DEBRIS, ETC. SHALL BE APPROPRIATELY DISPOSED OF OFFSITE AT NO ADDITIONAL COST TO THE OWNER. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO OBTAIN ANY PERMITS REQUIRED FOR HAUL OR DISPOSAL OF WASTE PRODUCTS. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO ENSURE THAT THE WASTE DISPOSAL SITE COMPLIES WITH APPROPRIATE REGULATIONS REGARDING THE ENVIRONMENT, ENDANGERED SPECIES, AND ARCHAEOLOGICAL RESOURCES.

AD. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CLEANUP AND REPORTING OF SPILLS OF HAZARDOUS MATERIALS ASSOCIATED WITH THE CONSTRUCTION SITE. HAZARDOUS MATERIALS INCLUDES GASOLINE, DIESEL FUEL, MOTOR OIL, SOLVENTS, CHEMICALS, PAINT, ETC. WHICH MAY BE A THREAT TO THE ENVIRONMENT. THE CONTRACTOR SHALL REPORT THE DISCOVERY OF PAST OR PRESENT SPILLS TO THE NEW MEXICO HAZARDOUS WASTE BUREAU AT 1-505-476-6000 AND THE ENGINEER.

AE. THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE REGULATIONS CONCERNING SURFACE AND UNDERGROUND WATER. CONTACT WITH SURFACE WATER BY CONSTRUCTION EQUIPMENT AND PERSONNEL SHALL BE MINIMIZED. EQUIPMENT MAINTENANCE AND REFUELING OPERATIONS SHALL BE PERFORMED IN AN ENVIRONMENTALLY SAFE MANNER IN COMPLIANCE WITH CITY, COUNTY, STATE, AND EPA REGULATIONS.

AF. THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE REGULATIONS CONCERNING CONSTRUCTION NOISE AND HOURS OF OPERATION AS STATED IN THE SPECIFICATIONS OR IMPOSED BY THE OWNER, CITY OR COUNTY AUTHORITIES.

TRAFFIC CONTROL

AG. THE CONTRACTOR SHALL PROVIDE ALL REQUIRED TRAFFIC CONTROL PLANS AND TRAFFIC CONTROL EQUIPMENT. ALL SIGNS, BARRICADES, CHANNELIZATION DEVICES, SIGN FRAMES AND ERECTION OF SUCH DEVICES SHALL CONFORM TO THE REQUIREMENTS OF "MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS" LATEST EDITION. TRAFFIC CONTROL PLANS SHALL BE APPROVED BY THE COUNTY AND NMDOT PRIOR TO CONSTRUCTION.

MISCELLANEOUS SYMBOLS:

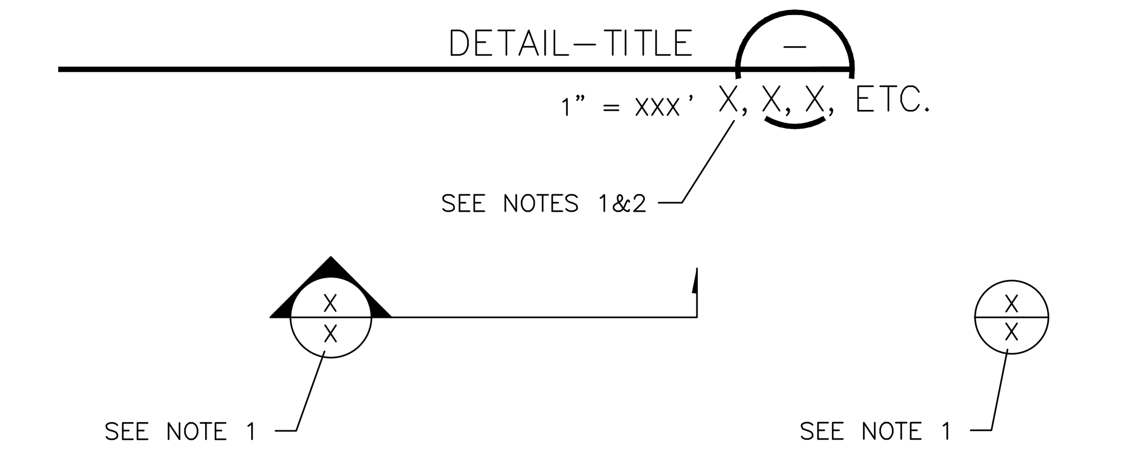
NOTE: SYMBOLS ARE NOT SHOWN TO SCALE ON PLAN OR PROFILE DRAWINGS, AND INDICATE APPROXIMATE LOCATION ONLY.

- ELECTRIC PANEL
- ELECTRIC TRANSFORMER
- ELECTRIC BOX
- ELECTRIC MANHOLE
- LIGHT POLE
- UTILITY POLE
- UTILITY POLE WITH RISER
- GUY ANCHOR
- ELECTRIC PULL BOX
- TELEPHONE PULL BOX
- TELEPHONE PEDESTAL
- TELEPHONE MANHOLE
- FIBER OPTIC PEDESTAL
- TELE HAND HOLE
- FO HAND HOLE
- COMM HAND HOLE
- EXIST. BOLLARD
- RD EXIST. ROOF DRAIN
- EXIST. SIGNS
- ACU AIR CONDITION UNIT
- WATER METER
- WATER VALVE
- FIRE HYDRANT
- WATER MANHOLE
- WATER FAUCET
- IRRIGATION CONTROL BOX
- GAS METER
- GAS VALVE
- GAS REGULATOR
- GAS TANK
- SANITARY SEWER MANHOLE
- STORM DRAIN MANHOLE
- DROP INLET
- CLEAN OUT
- CATV PEDESTAL
- CATV HAND HOLE
- ELEC HAND HOLE
- MONITORING WELL
- CONTROL POINT
- EXIST. TREES & SHRUBS
- EXIST. FENCES
- EXIST. CONCRETE
- EXIST. GRAVEL
- TOP SOIL
- COMPACTED NATIVE SOIL
- UNDISTURBED SOIL
- 5084 DEPRESSION CONTOUR
- 6070 EXISTING CONTOUR LINE AND ELEVATION DESIGNATION
- x 6070.7 SPOT ELEVATION (FT MSL)
- CENTERLINE

QUALITY LEVEL B	QUALITY LEVEL C/D	UTILITY:
	OHT	OVERHEAD TELE.
T	T(D)	TELEPHONE/COMM.
CTV	CTV(D)	CABLE TV
	OHE	OVERHEAD ELEC.
E	E(D)	ELECTRIC
	OHU	OVERHEAD UTILITY
FO	FO(D)	FIBER OPTIC
GAS	GAS(D)	NATURAL GAS
UNK		UNKNOWN UTILITY
W	W(D)	WATER
SS	SS(D)	SANITARY SEWER
SFM	SFM(D)	FORCE MAIN
	SD(D)	STORM SEWER

- PROPOSED FENCE
- C — C PROPOSED CONVEYANCE LINE
- SS PROPOSED SEWER LINE

LEGEND:



NOTES:

1. IF SECTION, DETAIL, SCHEMATIC, OR DIAGRAM IS DRAWN ON THE SAME SHEET THAT IT IS TAKEN FROM, THE SHEET NUMBER SHALL BE REPLACED WITH A HYPHEN.

2. IF THE SECTION, DETAIL, SCHEMATIC, OR DIAGRAM IS REFERENCED ON MULTIPLE SHEETS, ALL SHEETS SHOULD BE LISTED TO THE OUTSIDE RIGHT OF THE DETAIL-TITLE BUBBLE, AND SEPARATED WITH A COMMA.

ABBREVIATIONS:

ARV	AIR RELIEF VALVE
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS
BLDG	BUILDING
BMP	BEST MANAGEMENT PRACTICE
C-C	CENTER TO CENTER
CMP	CORRUGATED METAL PIPE
CMU	CONCRETE MASONRY UNIT
CS	CARBON STEEL
DI	DUCTILE IRON
DIA	DIAMETER
DW	DRIVEWAY
EG	EXISTING GRADE
EL	ELBOW
ELEV	ELEVATION
EOP	EDGE OF PAVEMENT
EXIST	EXISTING
FH	FLUSH HYDRANT
FT	FEET
FT MSL	FEET ABOVE MEAN SEA LEVEL
H	HEIGHT
HDPE	HIGH DENSITY POLYETHYLENE
HOR	HORIZONTAL
INV	INVERT ELEVATION
LB	POUND
LF	LINEAR FEET
MDWCA	MUTUAL DOMESTIC WATER CONSUMER ASSOCIATION
MIN	MINIMUM
MSL	MEAN SEA LEVEL
N/A	NOT APPLICABLE
NMDOT	NEW MEXICO DEPARTMENT OF TRANSPORTATION
NMED	NEW MEXICO ENVIRONMENT DEPARTMENT
NTS	NOT TO SCALE
OC	ON CENTER
P/L	PROPERTY LINE
POT	POTABLE WATER
PSI	POUNDS PER SQUARE INCH
PVC	POLY VINYL CHLORIDE
RED	REDUCER
ROW	RIGHT OF WAY
SCH	SCHEDULE
SDR	STANDARD DIMENSION RATIO
SS	STAINLESS STEEL
STA	STATION
STD	STANDARD
STL	SEWER TRANSIT LINE
SVE	SOIL VAPOR EXTRACTION
TBD	TO BE DETERMINED
THR	THREADED
TOP	TOP OF PIPE
VERT	VERTICAL
W	WIDTH
W/	WITH
WL	WATER LINE

REV. NO.	DATE	DESCRIPTION	APPROVED BY

DATE OF ISSUE: 12/31/19
DESIGNED BY: TH
DRAWN BY: JA/RT
CHECKED BY: KJ
APPROVED BY: TG

DBS&A Daniel B. Stephens & Associates, Inc.
6020 Academy Rd. NE, Suite 100
Albuquerque, NM 87109-3315

22750 12/31/19 PROFESSIONAL ENGINEER

NEW MEXICO ENVIRONMENT DEPARTMENT
PETROLEUM STORAGE TANK BUREAU
2905 RODEO PARK DRIVE EAST
SANTA FE, NEW MEXICO 57505

ROSS TEXACO, PINO FINA, AND ATEX 394
GROUNDWATER REMEDIATION SYSTEM INSTALLATION
LAS VEGAS, NEW MEXICO

GENERAL NOTES AND LEGEND

SHT. 2 OF 11
DWG NO. G-1
JOB NO. DB18.1277

UTILITY / SURVEY LEGEND

- ELECTRIC PANEL
- ELECTRIC TRANSFORMER
- ELECTRIC BOX
- ELECTRIC MANHOLE
- LIGHT POLE
- UTILITY POLE
- UTILITY POLE WITH RISER
- GUY ANCHOR
- ELECTRIC PULL BOX
- TELEPHONE PULL BOX
- TELEPHONE PEDESTAL
- TELEPHONE MANHOLE
- FIBER OPTIC PEDESTAL
- TELE HAND HOLE
- FO HAND HOLE
- COMM HAND HOLE
- EXIST. BOLLARD
- RD EXIST. ROOF DRAIN
- EXIST. SIGNS
- ACU AIR CONDITION UNIT
- WATER METER
- WATER VALVE
- FIRE HYDRANT
- WATER MANHOLE
- WATER FAUCET
- IRRIGATION CONTROL BOX
- GAS METER
- GAS VALVE
- GAS REGULATOR
- GAS TANK
- SANITARY SEWER MANHOLE
- STORM DRAIN MANHOLE
- DROP INLET
- CLEAN OUT
- CATV PEDESTAL
- CATV HAND HOLE
- ELEC HAND HOLE
- MONITORING WELL
- CONTROL POINT
- EXIST. TREES & SHRUBS
- EXIST. FENCES
- EXIST. CONCRETE
- EXIST. GRAVEL

QUALITY LEVEL B	QUALITY LEVEL C/D	UTILITY:
	OHT	OVERHEAD TELE.
T	T(D)	TELEPHONE/COMM.
CTV	CTV(D)	CABLE TV
	OHE	OVERHEAD ELEC.
E	E(D)	ELECTRIC
	OHU	OVERHEAD UTILITY
FO	FO(D)	FIBER OPTIC
GAS	GAS(D)	NATURAL GAS
UNK		UNKNOWN UTILITY
W	W(D)	WATER
SS	SS(D)	SANITARY SEWER
SFM	SFM(D)	FORCE MAIN
- - - - - -	SD(D)	STORM SEWER

SURVEY NOTES

SURVEY WAS PERFORMED BY COBB FENDLEY IN SEPTEMBER 2019

- HORIZONTAL DATUM AND VERTICAL DATUMS ARE NAD 83(2011), NAVD 88, RESPECTIVELY.
- GEOID 12B WAS USED TO MODEL THE VERTICAL PLANE.
  - COORDINATES ARE GROUND MODIFIED BASED ON THE NEW MEXICO STATE PLANE EAST ZONE.

  BEARINGS ARE NEW MEXICO STATE PLANE EAST ZONE NAD 83 GRID BEARING.
- UNITS ARE IN US SURVEY FEET.
- RECOVERED NGS MONUMENT "GOLF" (N.: 1679341.06 E.: 277915.98 EL.: 6523.77, NOT SHOWN) WAS USED AS THE COORDINATE AND ELEVATION BASIS OF THE CONTROL. RTK GPS PROCEDURES WERE USED TO ESTABLISH THE COORDINATE VALUES ON THE SET CONTROL POINTS. TRIMBLE R8 GPS RECEIVERS WERE USED IN THE SURVEY.
- THE CONTROL MONUMENTS WERE SET, OBSERVED, AND ADJUSTED IN JUNE 2019.
- THE DATA IS DELIVERED IN THE FOLLOWING FORMAT:
  - NEW MEXICO STATE PLANE COORDINATES (NAD 83–EAST ZONE)
  - ELEVATIONS REFERRED TO NAVD 88 AND MODELED BY GEOID 12B
  - COORDINATES AND ELEVATIONS ARE EXPRESSED IN U.S. SURVEY FEET.

REV. NO.	DATE	DESCRIPTION	APPROVED BY

DATE OF ISSUE: 12/31/19
DESIGNED BY: TH
DRAWN BY: JA/RT
CHECKED BY: KJ
APPROVED BY: TG

DBS&A
Daniel B. Stephens & Associates, Inc.
6020 Academy Rd. NE, Suite 100
Albuquerque, NM 87109-3315

12/31/19

NEW MEXICO ENVIRONMENT DEPARTMENT
PETROLEUM STORAGE TANK BUREAU
2905 RODEO PARK DRIVE EAST
SANTA FE, NEW MEXICO 57505

ROSS TEXACO, PINO FINA, AND ATEX 394
GROUNDWATER REMEDIATION SYSTEM INSTALLATION
LAS VEGAS, NEW MEXICO

SURVEY CONTROL PLAN

SHT. 3 OF 11
DWG NO. G-2

JOB NO.
DB18.1277

S:\PROJECTS\DB18.1277_LAS_VEGAS_TRIPLE_SITE\CAD\G-2 SURVEY CONTROL PLAN.DWG December 19, 2019 – 2:14 PM BY: THOMAS, RYAN

GENERAL NOTES:

1. UTILITY LOCATIONS ARE BASED ON DETAILED SITE SURVEY COMPLETED BY COBB FENDLEY IN SEPTEMBER 2019. ANY DEVIATIONS FROM THE LOCATIONS SHOWN SHALL BE BROUGHT TO THE ENGINEER'S ATTENTION IMMEDIATELY.

KEY NOTES:

(1) HORIZONTAL EXTRACTION WELL TO BE INSTALLED BY DIRECTIONAL DRILLING CONTRACTOR SELECTED BY THE ENGINEER. WELL ALIGNMENT SHOWN ON DWG C-3.

(2) INSTALL CONVEYANCE LINE PER DWG C-4

(3) INSTALL SEWER DISCHARGE LINE PER DWG C-5

(4) INSTALL REMEDIATION SYSTEM PER DWG'S C-2, M-1, M-2

(5) DEMOLISH AND DISPOSE OF EXISTING CONCRETE WALLS, SLAB AND OVERGROWN VEGETATION.

KEY NOTES SANITARY/STORM DRAIN MANHOLES:

(1) SSMH 200 3896
RIM ELEV. = 6421.36
12" PVC INV.(N) = 6410.48
12" PVC INV.(S) = 6410.57
12" PVC INV.(W) = 6410.64

(2) SDMH 100 3895
RIM ELEV. = 6420.68
UNABLE TO OPEN

(3) SDMH 101 3928
RIM ELEV. = 6419.74
UNABLE TO OPEN

(4) SSMH 201 3849
RIM ELEV. = 6420.02
12" PVC INV.(N) = 6409.15
12" PVC INV.(E) = 6409.08

(5) SSMH 202 1286
RIM ELEV. = 6419.48
PIPE SIZE AND MATERIAL NOT ACCESSIBLE
(N) = 6409.03
12" PVC INV.(E) = 6408.43
12" PVC INV.(NW) = 6408.97

(6) SDMH 102 1000
RIM ELEV. = 6419.61
UNABLE TO OPEN

(7) SDMH 105 4154
RIM ELEV. = 6418.12
24" RCP INV.(N) = 6411.68
60" RCP INV.(E) = 6403.53
UNABLE TO GET INV.(S)
48" CMP INV.(W) 6402.92

(8) SSMH 203 1448
RIM ELEV. = 6416.59
4" STEEL INV.(NE) = 6410.27
12" STEEL INV.(S) = 6407.19
12" STEEL INV.(W) = 6407.44

S:\PROJECTS\DB18.1277_LAS_VEGAS_TRIPLE_SITE\CAD\C-1 GENERAL SITE PLAN.DWG December 30, 2019 - 2:14 PM BY: THOMAS, RYAN

REV. NO.	DATE	DESCRIPTION	APPROVED BY

DATE OF ISSUE: 12/31/19
DESIGNED BY: TH
DRAWN BY: JA/RT
CHECKED BY: KJ
APPROVED BY: TG

DBS&A
Daniel B. Stephens & Associates, Inc.
6020 Academy Rd. NE, Suite 100
Albuquerque, NM 87109-3315

22750 PROFESSIONAL ENGINEER 12/31/19

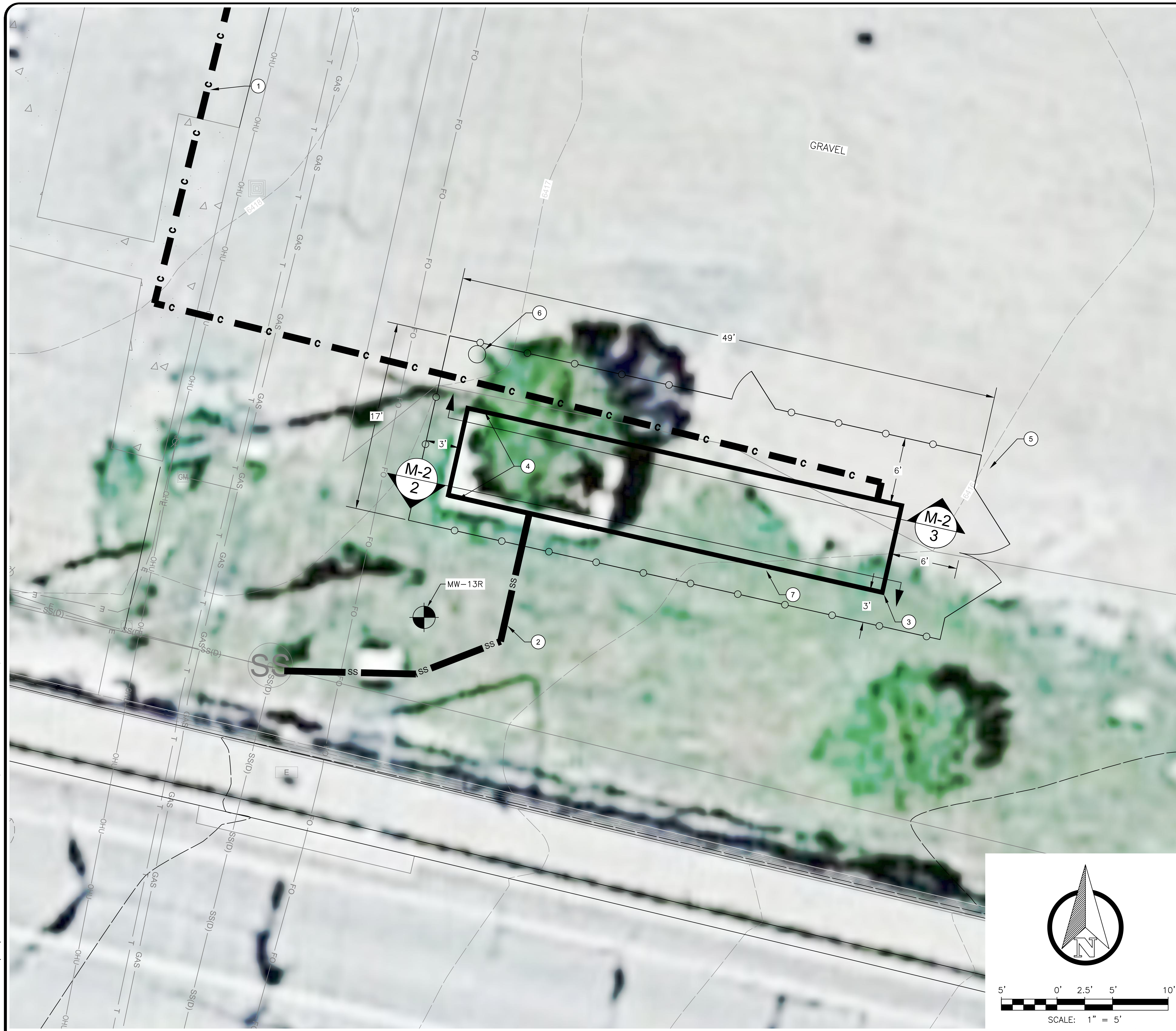
NEW MEXICO ENVIRONMENT DEPARTMENT
PETROLEUM STORAGE TANK BUREAU
2905 RODEO PARK DRIVE EAST
SANTA FE, NEW MEXICO 57505

ROSS TEXACO, PINO FINA, AND ATEX 394
GROUNDWATER REMEDIATION SYSTEM INSTALLATION
LAS VEGAS, NEW MEXICO

GENERAL SITE PLAN

SHT. 4 OF 11
DWG NO. C-1

JOB NO.
DB18.1277



GENERAL NOTES:

1. UTILITY LOCATIONS ARE BASED ON DETAILED SITE SURVEY COMPLETED BY COBB FENDLEY IN SEPTEMBER 2019. ANY DEVIATIONS FROM THE LOCATIONS SHOWN SHALL BE BROUGHT TO THE ENGINEER'S ATTENTION IMMEDIATELY.

KEY NOTES:

1. INSTALL CONVEYANCE LINE PER DWG C-4
2. INSTALL SEWER DISCHARGE LINE PER DWG C-5
3. INSTALL WATER TREATMENT REMEDIATION SYSTEM: EQUIPMENT INSTALLED IN PRE-FABRICATED 8'X40' ENCLOSED STORAGE CONTAINER. DETAILS SHOWN ON DWG'S M-1 AND M-2.
4. DEMOLISH AND DISPOSE OF EXISTING CONCRETE WALLS AND SLAB AND OVERGROWN VEGETATION
5. INSTALL 6' HIGH CHAIN LINK FENCE WITH 12' WIDE DOUBLE SWING GATE AND 4' WIDE MAN GATE
6. NEW ELECTRIC SERVICE POWER POLE AND METER
7. GRADE LEVEL AND ADD CRUSHED ROCK OR BASECOURSE (3" THICK MINIMUM)

S:\PROJECTS\DB18.1277_LAS_VEGAS_TRIPLE_SITE\CAD\C-2 REMEDIATION SITE PLAN.DWG December 30, 2019 - 2:14 PM BY: THOMAS, RYAN

REV. NO.	DATE	DESCRIPTION	APPROVED BY

DATE OF ISSUE: 12/31/19
DESIGNED BY: TH
DRAWN BY: JA/RT
CHECKED BY: KJ
APPROVED BY: TG

DBS&A
Daniel B. Stephens & Associates, Inc.
6020 Academy Rd. NE, Suite 100
Albuquerque, NM 87109-3315

22750
12/31/19
PROFESSIONAL ENGINEER

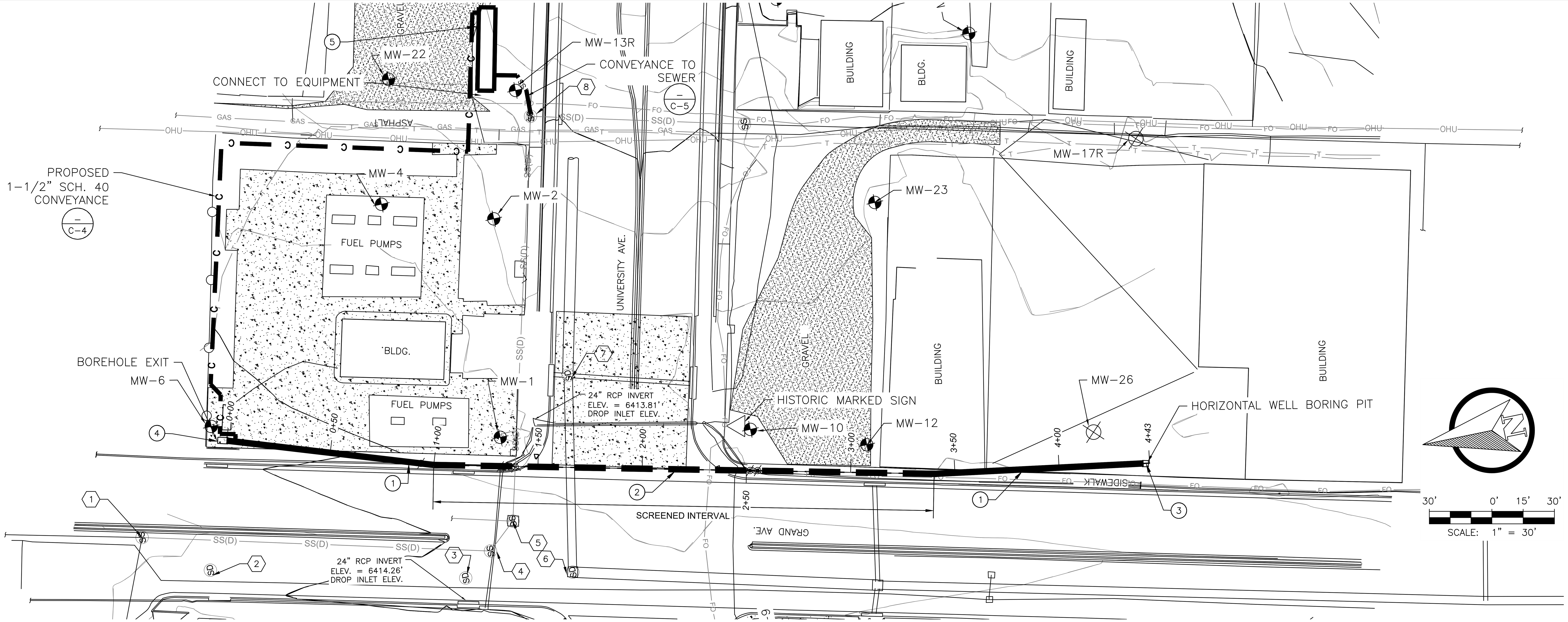
NEW MEXICO ENVIRONMENT DEPARTMENT
PETROLEUM STORAGE TANK BUREAU
2905 RODEO PARK DRIVE EAST
SANTA FE, NEW MEXICO 57505

ROSS TEXACO, PINO FINA, AND ATEX 394
GROUNDWATER REMEDIATION SYSTEM INSTALLATION
LAS VEGAS, NEW MEXICO

REMEDIATION COMPOUND SITE PLAN

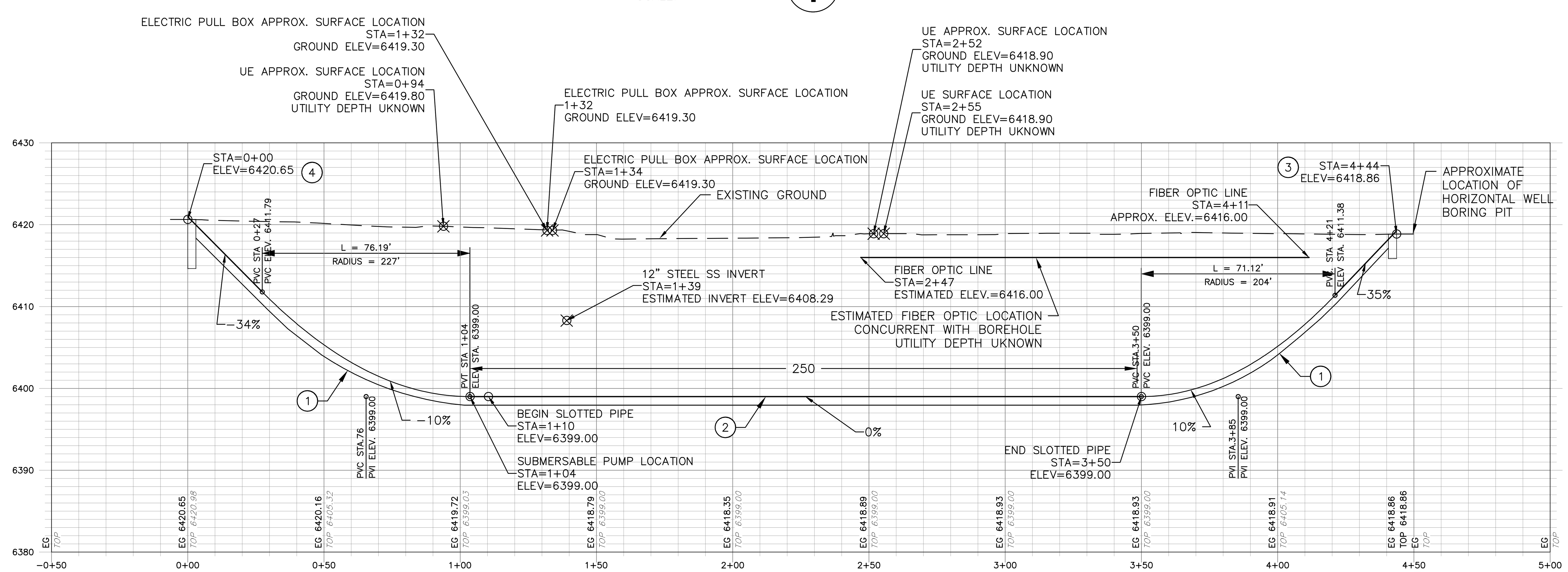
SHT. 5 OF 11
DWG NO. C-2

JOB NO.
DB18.1277



PLAN 1

SCALE:



PROFILE 1

SCALE: 1" = 30'
VERTICAL SCALE: 1"=10'

GENERAL NOTES:

1. UTILITY LOCATIONS ARE BASED ON DETAILED SITE SURVEY COMPLETED BY COBB FENDLEY IN SEPTEMBER 2019. ANY DEVIATIONS FROM THE LOCATIONS SHOWN SHALL BE BROUGHT TO THE ENGINEER'S ATTENTION IMMEDIATELY.
2. THE GROUND SURFACE SHALL BE RESTORED TO PREVIOUS CONDITIONS OR BETTER AFTER DISTURBANCE.
3. RECEIVE, STORE, AND INSTALL ALL PIPING MATERIAL IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

KEY NOTES:

1. 6" HDPE SDR 11
2. 6" HDPE SDR 11 MACHINE-CUT HORIZONTALLY-SLOTTED WELL SCREEN 0.02" SLOT, 2% OPEN AREA
3. INSTALL ENTRANCE VAULT PER DETAIL 5, DWG C-6.
4. INSTALL EXIT VAULT PER DETAILS 2 AND 3, DWG C-6.
5. EQUIPMENT CONTAINER AS SHOWN ON DWG M-2.

KEY NOTES SANITARY/STORM DRAIN MANHOLES:

1. SSMH 200 3896
RIM ELEV. = 6421.36
12" PVC INV.(N) = 6410.48
12" PVC INV.(S) = 6410.57
12" PVC INV.(W) = 6410.64
2. SDMH 100 3895
RIM ELEV. = 6420.68
UNABLE TO OPEN
3. SDMH 101 3928
RIM ELEV. = 6419.74
UNABLE TO OPEN
4. SSMH 201 3849
RIM ELEV. = 6420.02
12" PVC INV.(N) = 6409.15
12" PVC INV.(E) = 6409.08
5. SSMH 202 1286
RIM ELEV. = 6419.48
PIPE SIZE AND MATERIAL NOT ACCESSIBLE (N) = 6409.03
12" PVC INV.(E) = 6408.43
12" PVC INV.(NW) = 6408.97
6. SDMH 102 1000
RIM ELEV. = 6419.61
UNABLE TO OPEN
7. SDMH 105 4154
RIM ELEV. = 6418.12
24" RCP INV.(N) = 6411.68
60" RCP INV.(E) = 6403.53
UNABLE TO GET INV.(S)
48" CMP INV.(W) 6402.92
8. SSMH 203 1448
RIM ELEV. = 6416.59
4" STEEL INV.(NE) = 6410.27
12" STEEL INV.(S) = 6407.19
12" STEEL INV.(W) = 6407.44

REV. NO.	DATE	DESCRIPTION	APPROVED BY

DATE OF ISSUE: 12/31/19
DESIGNED BY: TH
DRAWN BY: JA/RT
CHECKED BY: KJ
APPROVED BY: TG

DBS&A
Daniel B. Stephens & Associates, Inc.
6020 Academy Rd. NE, Suite 100
Albuquerque, NM 87109-3315

22750
12/31/19
PROFESSIONAL ENGINEER

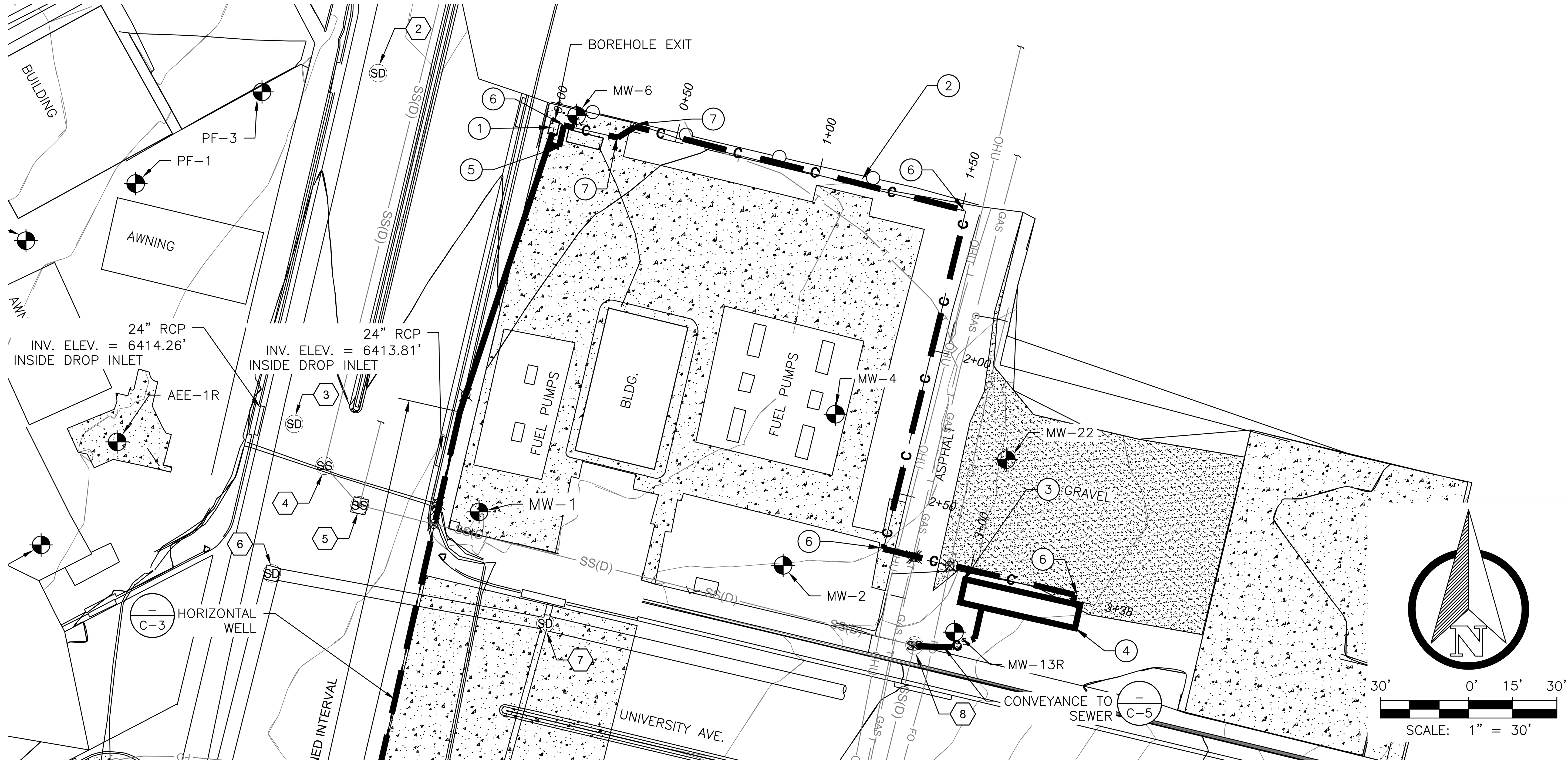
NEW MEXICO ENVIRONMENT DEPARTMENT
PETROLEUM STORAGE TANK BUREAU
2905 RODEO PARK DRIVE EAST
SANTA FE, NEW MEXICO 57505

ROSS TEXACO, PINO FINA, AND ATEX 394
GROUNDWATER REMEDIATION SYSTEM INSTALLATION
LAS VEGAS, NEW MEXICO

HORIZONTAL WELL PLAN AND PROFILE

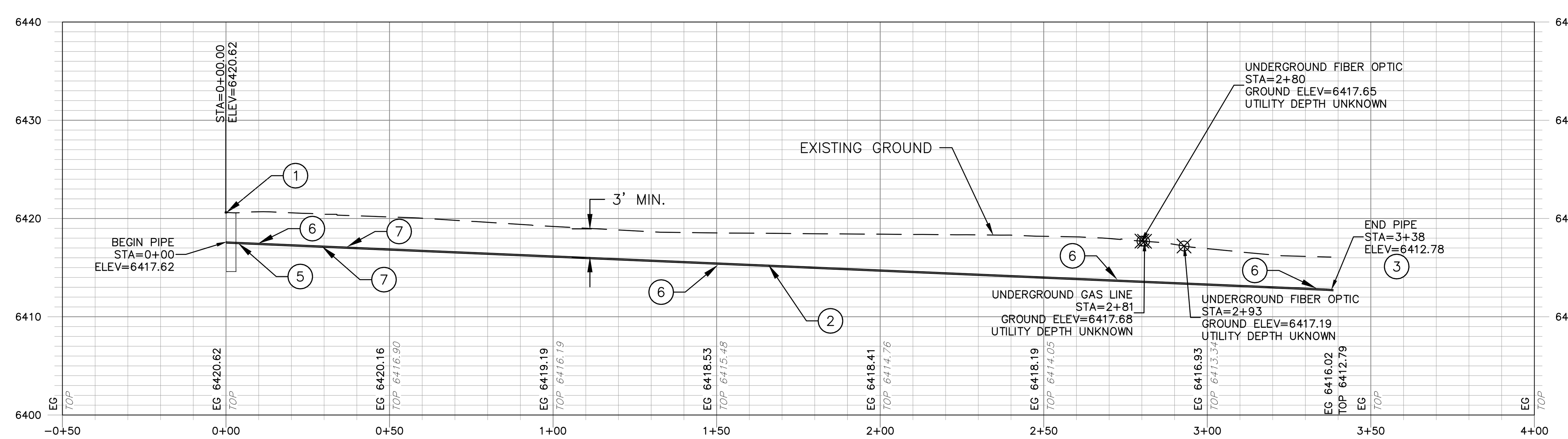
SHT. 6 OF 11
DWG NO. C-3

JOB NO. DB18.1277



PLAN 1 -

SCALE:



PROFILE 1 -

SCALE: 1" = 30'
VERTICAL SCALE: 1"=10'

GENERAL NOTES:

1. RECEIVE, STORE, AND INSTALL ALL PIPING MATERIAL IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
2. PRESSURE TEST PVC WITH WATER AT 100 PSI FOR ONE HOUR. PRESSURE DEVIATION OF MORE THAN 5 PSI OVER THE HOUR WILL REQUIRE CORRECTIVE ACTION.

KEY NOTES:

1. WELL VAULT & PITLESS ADAPTER PER DETAILS 2 AND 3, DWG C-6.
2. INSTALL 1.5" SCH. 40 PVC CONVEYANCE LINE PER DETAIL 1, DWG C-6.
3. CONNECT CONVEYANCE LINE TO EQUIPMENT CONTAINER AS SHOWN ON DWG. M-2.
4. EQUIPMENT STORAGE CONTAINER AS SHOWN ON DWG. M-2
5. 1.5" SS GATE VALVE AND VALVE VAULT
6. 1.5" SCH 40 PVC 90 DEG ELBOW
7. 1.5" SCH 40 PVC 45 DEG ELBOW

KEY NOTES SANITARY/STORM DRAIN MANHOLES:

1. SSMH 200 3896
RIM ELEV. = 6421.36
12" PVC INV.(N) = 6410.48
12" PVC INV.(S) = 6410.57
12" PVC INV.(W) = 6410.64
2. SDMH 100 3895
RIM ELEV. = 6420.68
UNABLE TO OPEN
3. SDMH 101 3928
RIM ELEV. = 6419.74
UNABLE TO OPEN
4. SSMH 201 3849
RIM ELEV. = 6420.02
12" PVC INV.(N) = 6409.15
12" PVC INV.(E) = 6409.08
5. SSMH 202 1286
RIM ELEV. = 6419.48
PIPE SIZE AND MATERIAL NOT ACCESSIBLE
(N) = 6409.03
12" PVC INV.(E) = 6408.43
12" PVC INV.(NW) = 6408.97
6. SDMH 102 1000
RIM ELEV. = 6419.61
UNABLE TO OPEN
7. SDMH 105 4154
RIM ELEV. = 6418.12
24" RCP INV.(N) = 6411.68
60" RCP INV.(E) = 6403.53
UNABLE TO GET INV.(S)
48" CMP INV.(W) 6402.92
8. SSMH 203 1448
RIM ELEV. = 6416.59
4" STEEL INV.(NE) = 6410.27
12" STEEL INV.(S) = 6407.19
12" STEEL INV.(W) = 6407.44

REV. NO.	DATE	DESCRIPTION	APPROVED BY

DATE OF ISSUE: 12/31/19
DESIGNED BY: TH
DRAWN BY: JA/RT
CHECKED BY: KJ
APPROVED BY: TG

DBS&A
Daniel B. Stephens & Associates, Inc.
6020 Academy Rd. NE, Suite 100
Albuquerque, NM 87109-3315

22750
12/31/19

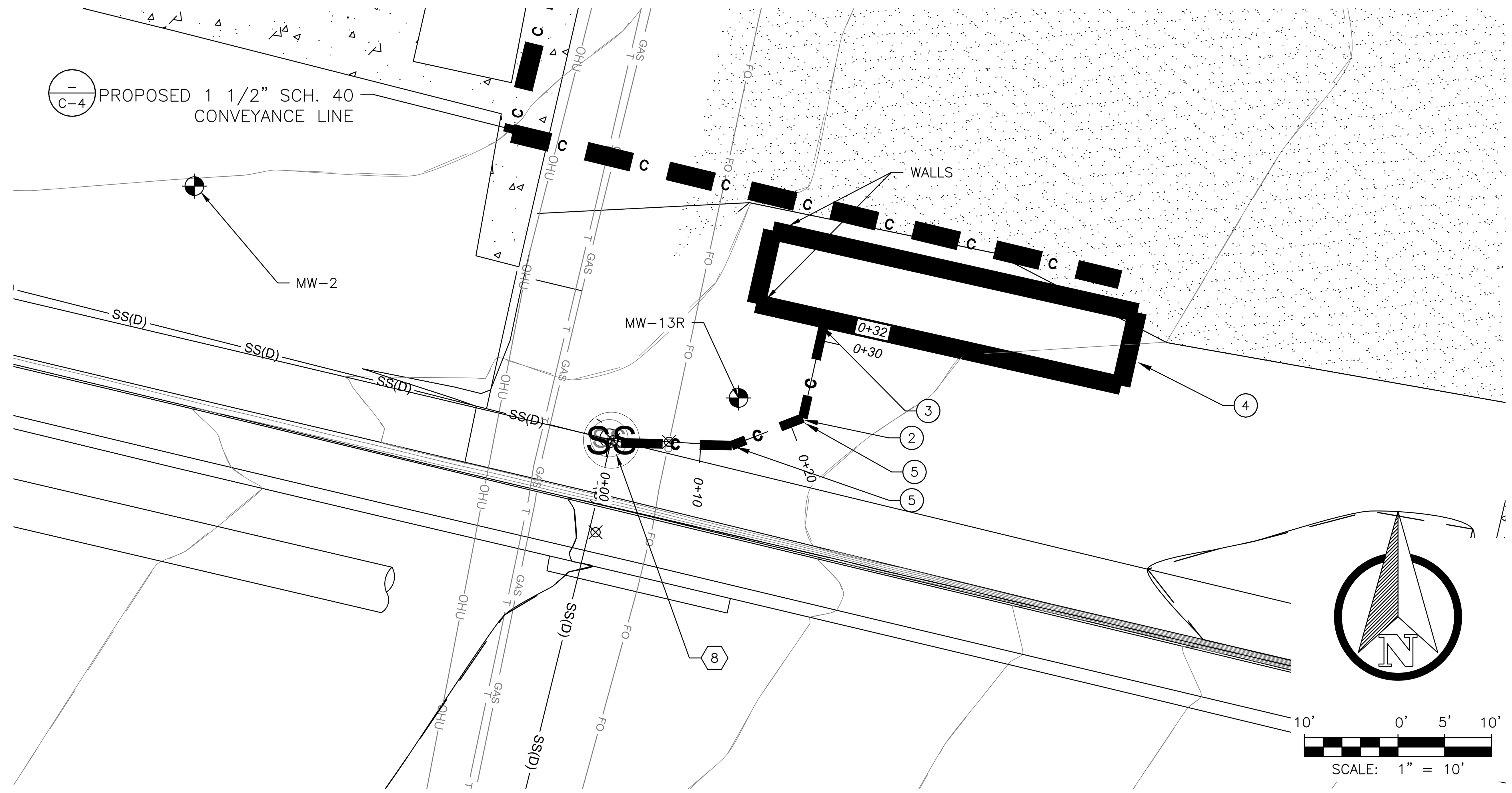
NEW MEXICO ENVIRONMENT DEPARTMENT
PETROLEUM STORAGE TANK BUREAU
2905 RODEO PARK DRIVE EAST
SANTA FE, NEW MEXICO 57505

ROSS TEXACO, PINO FINA, AND ATEX 394
GROUNDWATER REMEDIATION SYSTEM INSTALLATION
LAS VEGAS, NEW MEXICO

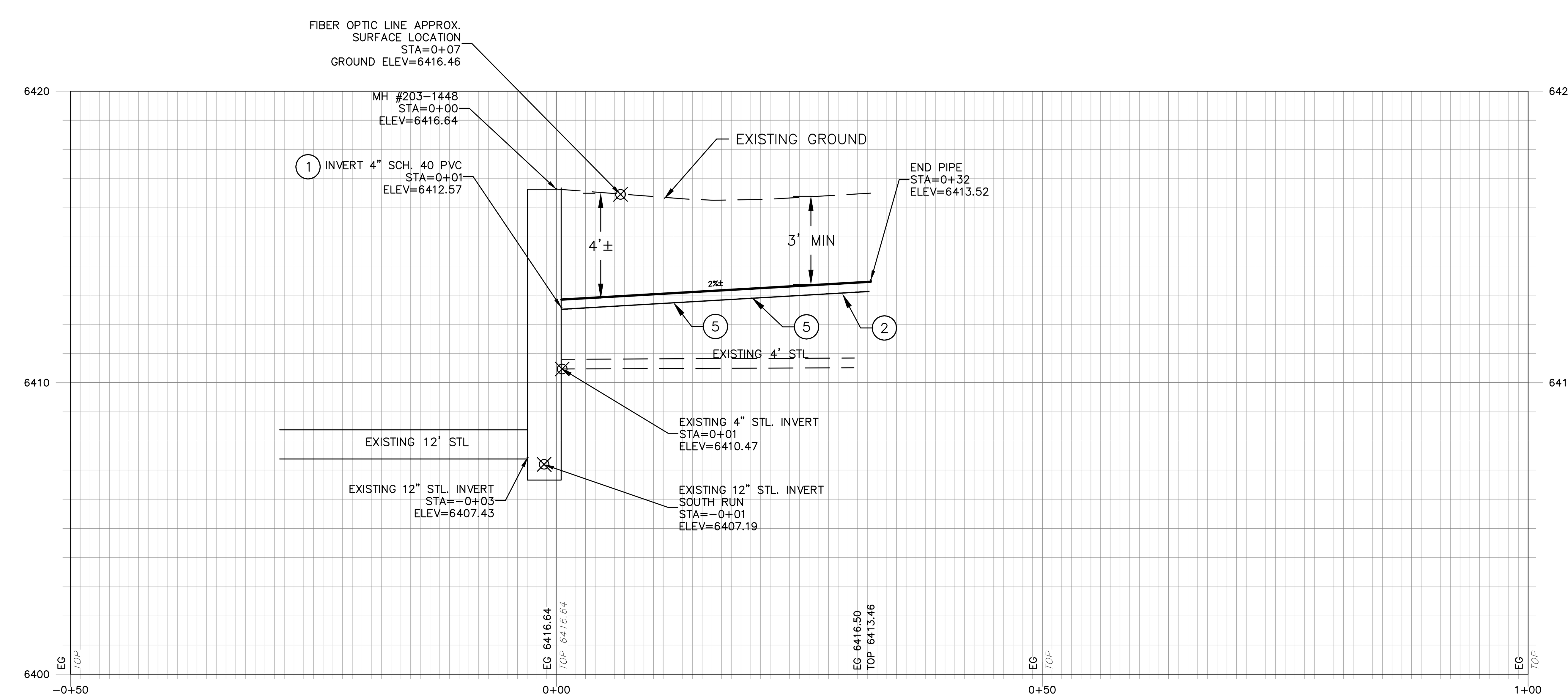
CONVEYANCE LINE PLAN AND PROFILE

SHT. 7 OF 11
DWG NO. C-4

JOB NO.
DB18.1277



PLAN
SCALE:



PROFILE
SCALE: 1" = 10'
VERTICAL SCALE: 1"=3.33'

GENERAL NOTES:

1. RECEIVE, STORE, AND INSTALL ALL PIPING MATERIAL IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

KEY NOTES:

1. CONNECT DISCHARGE LINE TO EXISTING SEWER MANHOLE PER DETAIL 6, DWG. C-6
2. INSTALL 4" SCH. 40 PVC CONVEYANCE LINE PER DETAIL 4, DWG C-6.
3. CONNECT DISCHARGE LINE TO EQUIPMENT CONTAINER PER DETAIL 2, DWG. M-2.
4. EQUIPMENT STORAGE CONTAINER AS SHOWN ON DWG. M-2
5. 4" SCH 40 PVC 45 DEG ELBOW

KEY NOTES SANITARY/STORM DRAIN MANHOLES:

1. SSMH 200 3896
RIM ELEV. = 6421.36
12" PVC INV.(N) = 6410.48
12" PVC INV.(S) = 6410.57
12" PVC INV.(W) = 6410.64
2. SDMH 100 3895
RIM ELEV. = 6420.68
UNABLE TO OPEN
3. SDMH 101 3928
RIM ELEV. = 6419.74
UNABLE TO OPEN
4. SSMH 201 3849
RIM ELEV. = 6420.02
12" PVC INV.(N) = 6409.15
12" PVC INV.(E) = 6409.08
5. SSMH 202 1286
RIM ELEV. = 6419.48
PIPE SIZE AND MATERIAL NOT ACCESSIBLE
(N) = 6409.03
12" PVC INV.(E) = 6408.43
12" PVC INV.(NW) = 6408.97
6. SDMH 102 1000
RIM ELEV. = 6419.61
UNABLE TO OPEN
7. SDMH 105 4154
RIM ELEV. = 6418.12
24" RCP INV.(N) = 6411.68
60" RCP INV.(E) = 6403.53
UNABLE TO GET INV.(S)
48" CMP INV.(W) 6402.92
8. SSMH 203 1448
RIM ELEV. = 6416.59
4" STEEL INV.(NE) = 6410.27
12" STEEL INV.(S) = 6407.19
12" STEEL INV.(W) = 6407.44

REV. NO.	DATE	DESCRIPTION	APPROVED BY

DATE OF ISSUE: 12/31/19
DESIGNED BY: TH
DRAWN BY: JA/RT
CHECKED BY: KJ
APPROVED BY: TG

DBS&A
Daniel B. Stephens & Associates, Inc.
6020 Academy Rd. NE, Suite 100
Albuquerque, NM 87109-3315

22750
12/31/19
PROFESSIONAL ENGINEER

NEW MEXICO ENVIRONMENT DEPARTMENT
PETROLEUM STORAGE TANK BUREAU
2905 RODEO PARK DRIVE EAST
SANTA FE, NEW MEXICO 57505

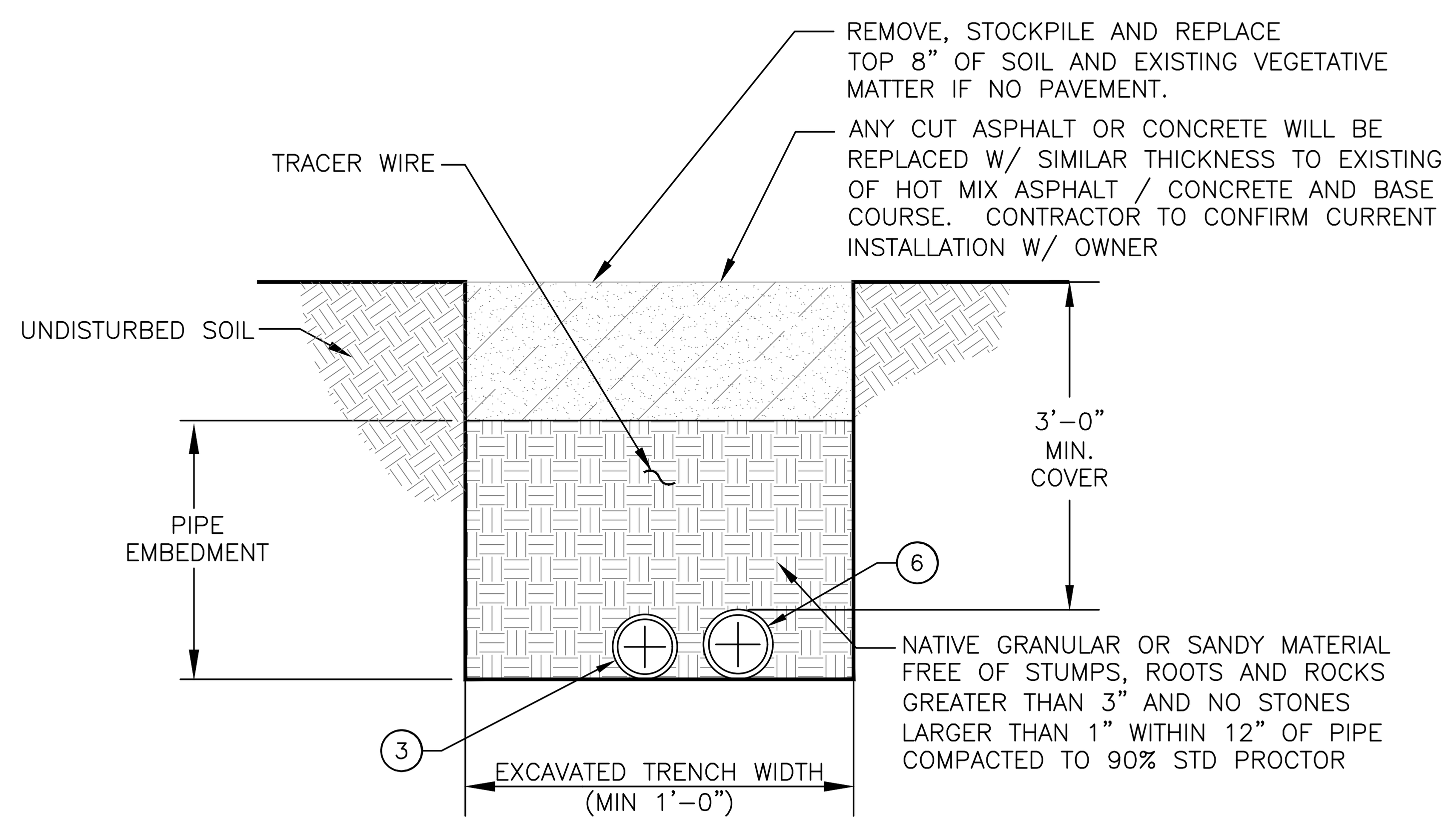
ROSS TEXACO, PINO FINA, AND ATEX 394
GROUNDWATER REMEDIATION SYSTEM INSTALLATION
LAS VEGAS, NEW MEXICO

SEWER CONNECTION PLAN AND PROFILE

SHT. 8 OF 11
DWG NO. C-
JOB NO. DB18.1277

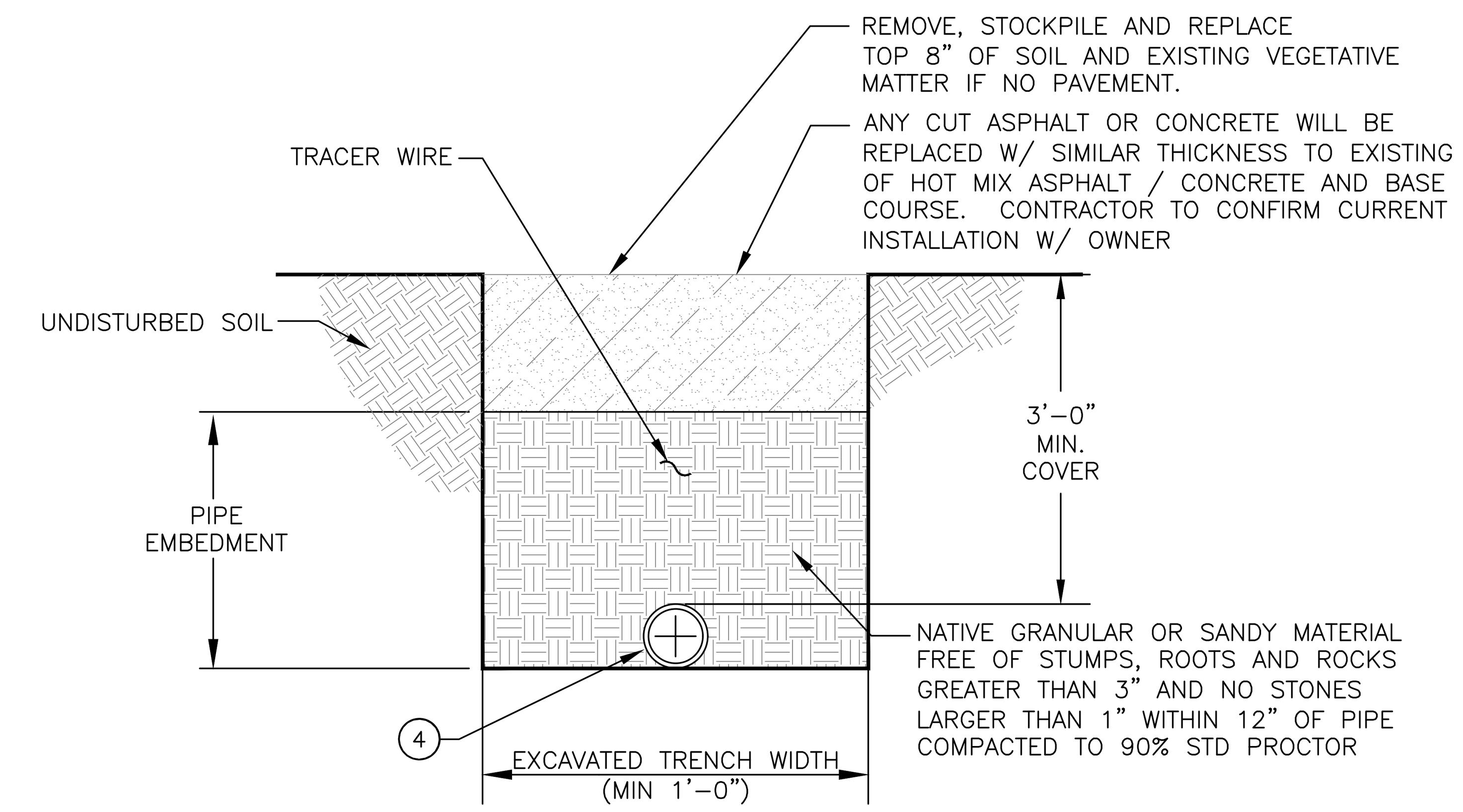
KEY NOTES:

1. 6" SOLID WALL HDPE SDR 11
2. 1" SCH 40 PVC PLUG, THREADED AND PRESSURE GAUGE
3. 1-1/2" SCH 40 PVC.
4. 4" SCH 40 PVC.
5. 1" SCH 80 PVC THREADED DROP PIPE
6. 2" SCH 40 PVC, ELECTRIC CONDUIT
7. MONITOR SNAPPY PITLESS ADAPTER GALVANIZED CAST IRON MODEL 8PL6IU OR APPROVED EQUAL
8. 1-1/2" SCH 40 PVC 90° ELBOW (TYP)
9. 4" SCH 40 PVC 90° ELBOW
10. 4" SCH 40 TEE
11. STEEL SAFETY CABLE
12. H-20 TRAFFIC COVER WITH TORSION SPRING ASSISTED HATCH ASSEMBLY, STEEL.
13. 6"x1" SPLIT WELL CAP, IRON 1" CABLE PORT AND 1/2" VENT PORT THREAD EYE BOLT INTO VENT PORT
14. 1/2" PLAST-O-MATIC ARV
15. PRESSURE GAUGE
16. 1" SCH 40 PVC TEE
17. 2" SCH 40 PVC 90° ELBOW, ELECTRIC CONDUIT



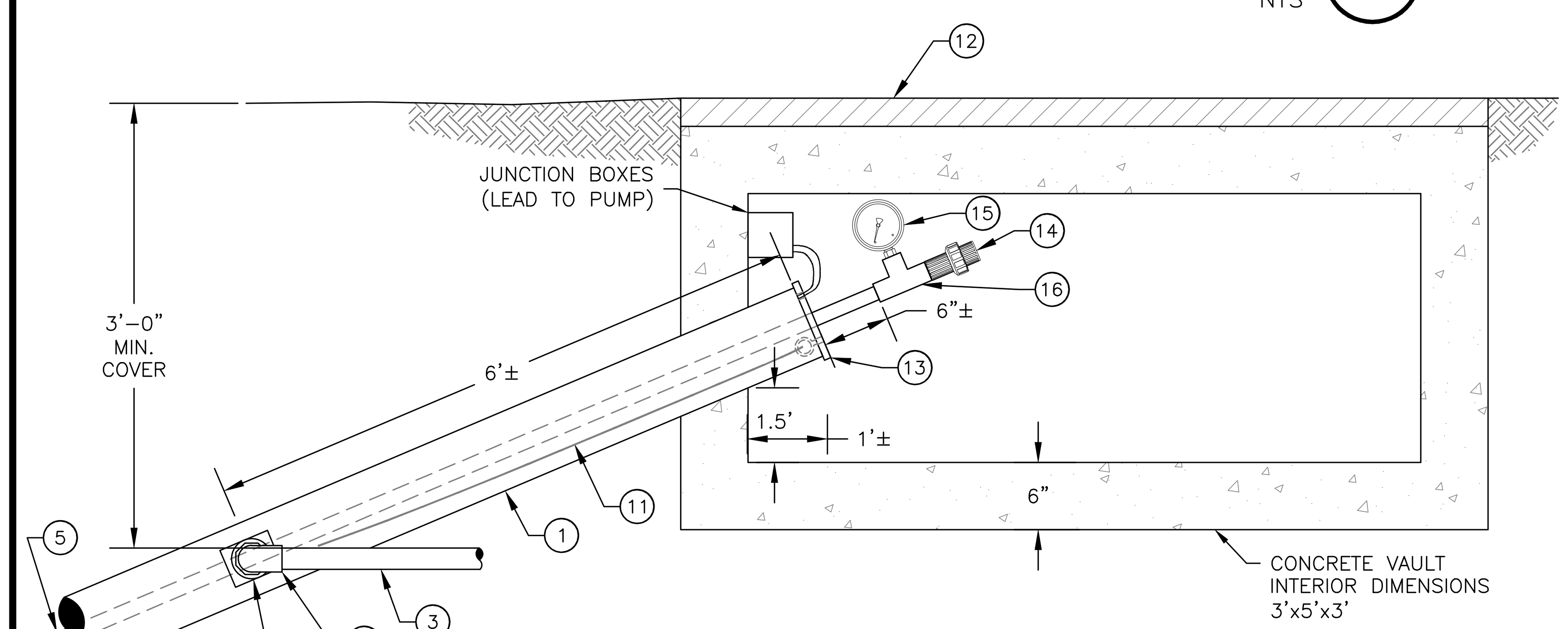
TYPICAL CONVEYANCE PIPING TRENCH SECTION 1 / -

NTS



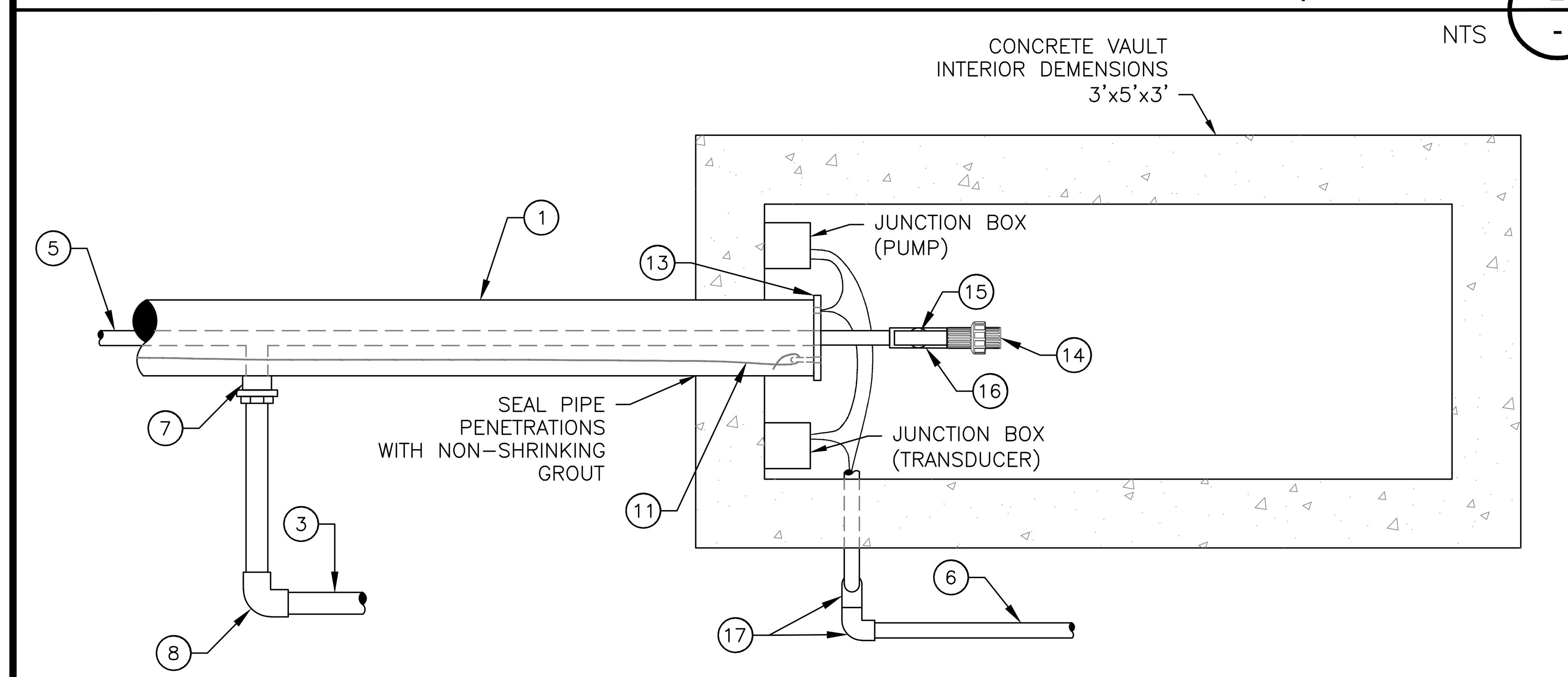
SEWER DISCHARGE CONVEYANCE PIPING TRENCH SECTION 4 / -

NTS



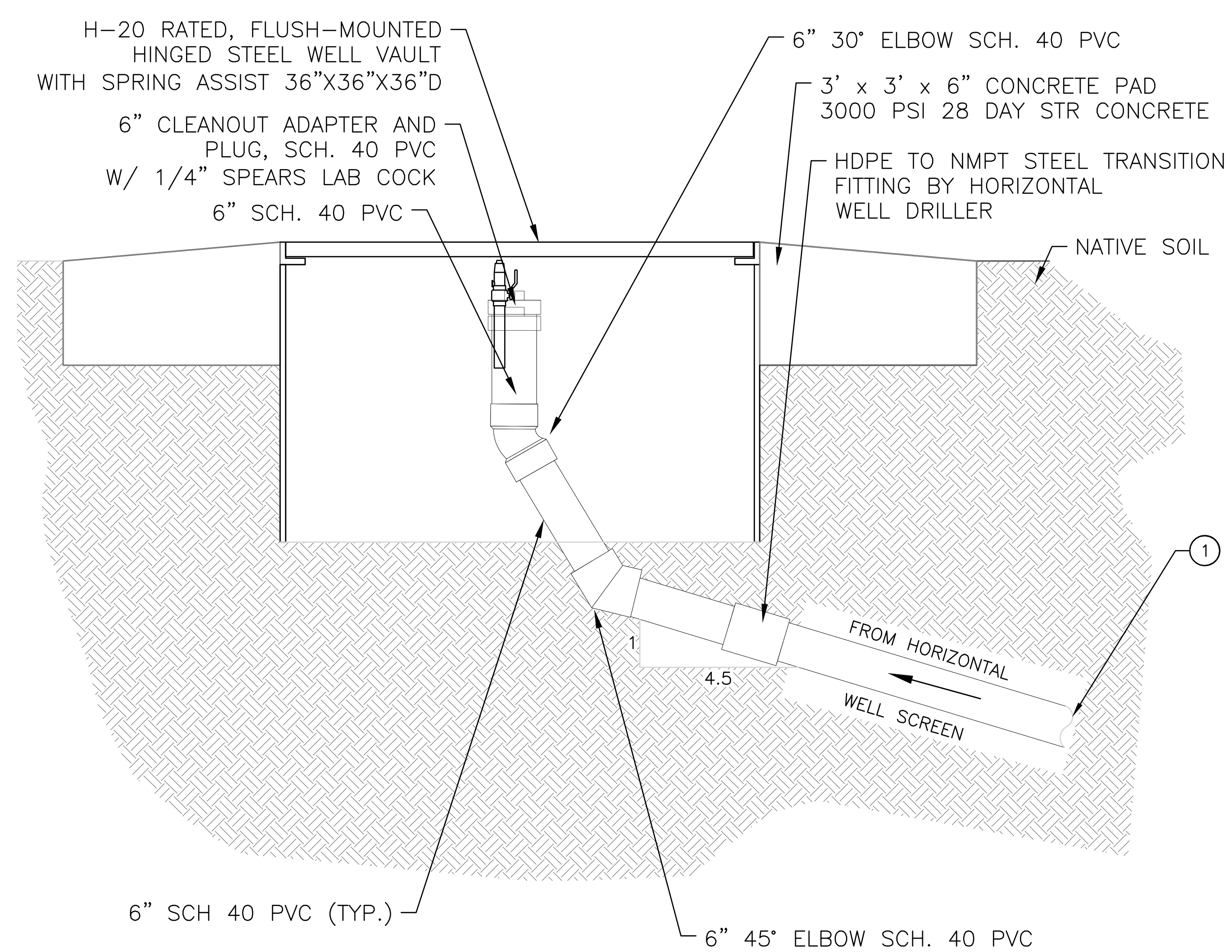
NORTHERN WELL VAULT DETAIL, PROFILE VIEW 2 / -

NTS



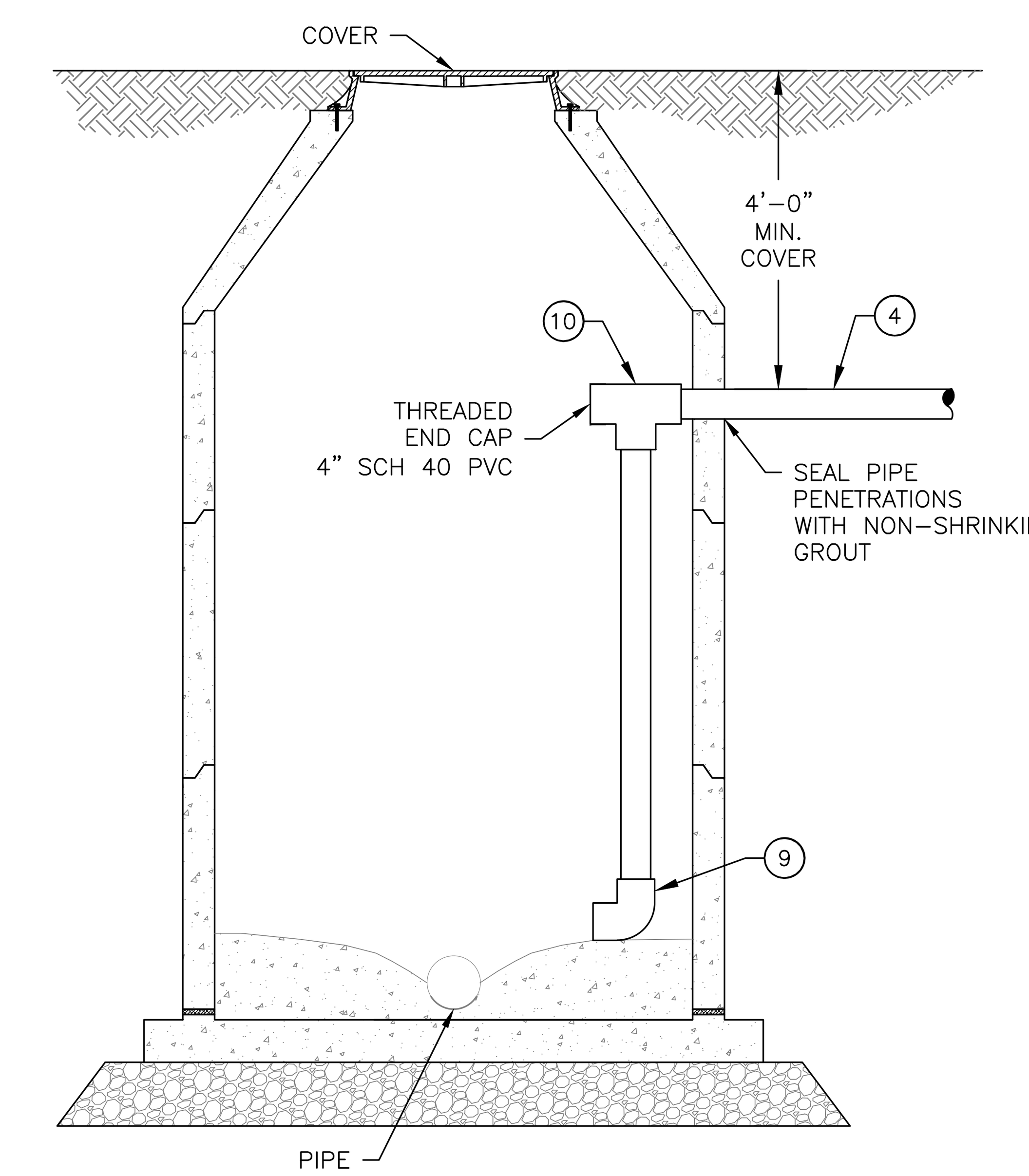
NORTHERN WELL VAULT DETAIL, PLAN VIEW 3 / -

NTS



SOUTHERN WELL VAULT DETAIL, PROFILE VIEW 5 / -

NTS



ELEVATION

SANITARY SEWER MANHOLE DROP CONNECTION 6 / -

NTS

REV. NO.	DATE	DESCRIPTION	APPROVED BY

DATE OF ISSUE: 12/31/19
DESIGNED BY: TH
DRAWN BY: JA/RT
CHECKED BY: KJ
APPROVED BY: TG

DBS&A
Daniel B. Stephens & Associates, Inc.
6020 Academy Rd. NE, Suite 100
Albuquerque, NM 87109-3315

22750
12/31/19
PROFESSIONAL ENGINEER

NEW MEXICO ENVIRONMENT DEPARTMENT
PETROLEUM STORAGE TANK BUREAU
2905 RODEO PARK DRIVE EAST
SANTA FE, NEW MEXICO 57505

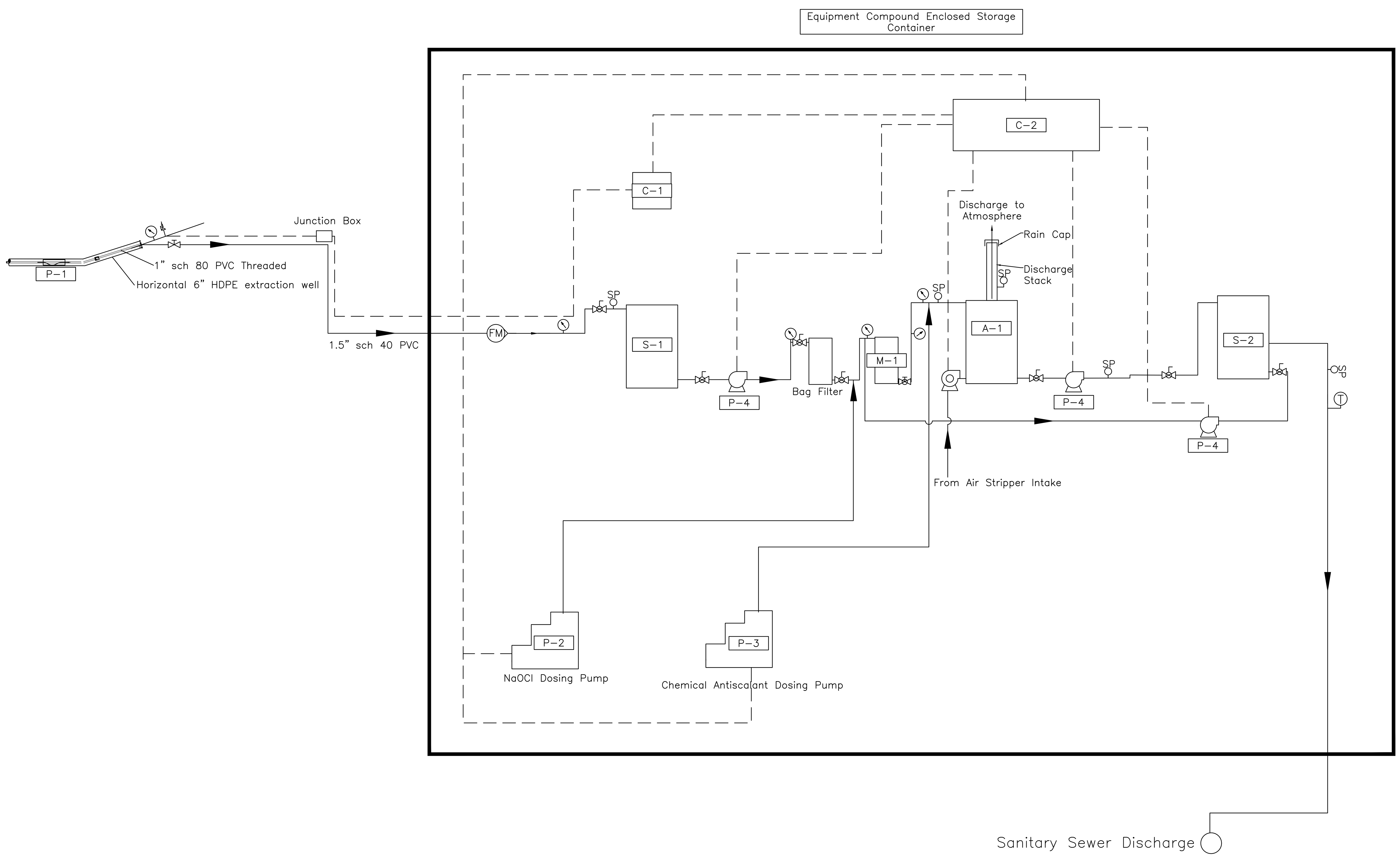
ROSS TEXACO, PINO FINA, AND ATEX 394
GROUNDWATER REMEDIATION SYSTEM INSTALLATION
LAS VEGAS, NEW MEXICO

CIVIL DETAILS

SHT. 9 OF 11
DWG NO. C-6

JOB NO. DB18.1277

P-1	C-1	S-1	M-1	A-1	S-2	C-2	P-2	P-3	P-4
Submersible Pump Provided by Grundfos Model 5 SQE05-140 5 GPM, 50' TDH, VF Drive 1/2 HP, 230VAC/1 PH/60 HZ	Pump Controller Provided by Grundfos Model CU 300 230VAC/1 PH/60 HZ	Raw Water Storage Tank 500 Gal HDPE	Metals Treatment Iron and Manganese Filter	Air Stripper Provided by QED Model EX 4.4P Stacker 10 GPM, 280 CFM Air 5 HP blower	Treated Water Storage Tank 710 Gal HDPE	Control Panel Automatic System Operation HMI Touch Screen	NaOCl Dosing Pump	Antiscalant Dosing Pump	Transfer pump to be specified by equipment vendor



ABBREVIATION KEY

CU	CONTROL UNIT
CFM	CUBIC FEET PER MINUTE
FM	FLOW METER
GAL	GALLONS
GPM	GALLONS PER MINUTE
HP	HORSE POWER
HMI	HUMAN MACHINE INTERFACE
HZ	HERTZ
PG	PRESSURE GAUGE
PH	PHASE
PVC	POLYVINYL CHLORIDE,
SP	SAMPLE PORT
TDH	TOTAL DYNAMIC HEAD
TP	TRANSFER PUMP
VAC	VOLTS ALTERNATING CURRENT
VF	VARIABLE FREQUENCY

SYMBOL LEGEND

- BALL VALVE
- BUTTERFLY VALVE
- CHECK VALVE
- ELECTRICAL
- FLOW METER
- GATE VALVE
- LEL SENSOR
- MOTOR
- PRESSURE RELIEF VALVE
- PRESSURE/VACUUM GAUGE
- REDUCING FITTING
- SAMPLE TAP
- SYSTEM FLOW DIRECTION
- TEMPERATURE GAUGE
- THERMOMETER

REV. NO.	DATE	DESCRIPTION	APPROVED BY

DATE OF ISSUE: 12/31/19
DESIGNED BY: TH
DRAWN BY: JA/RT
CHECKED BY: KJ
APPROVED BY: TG

DBS&A
Daniel B. Stephens & Associates, Inc.
6020 Academy Rd. NE, Suite 100
Albuquerque, NM 87109-3315

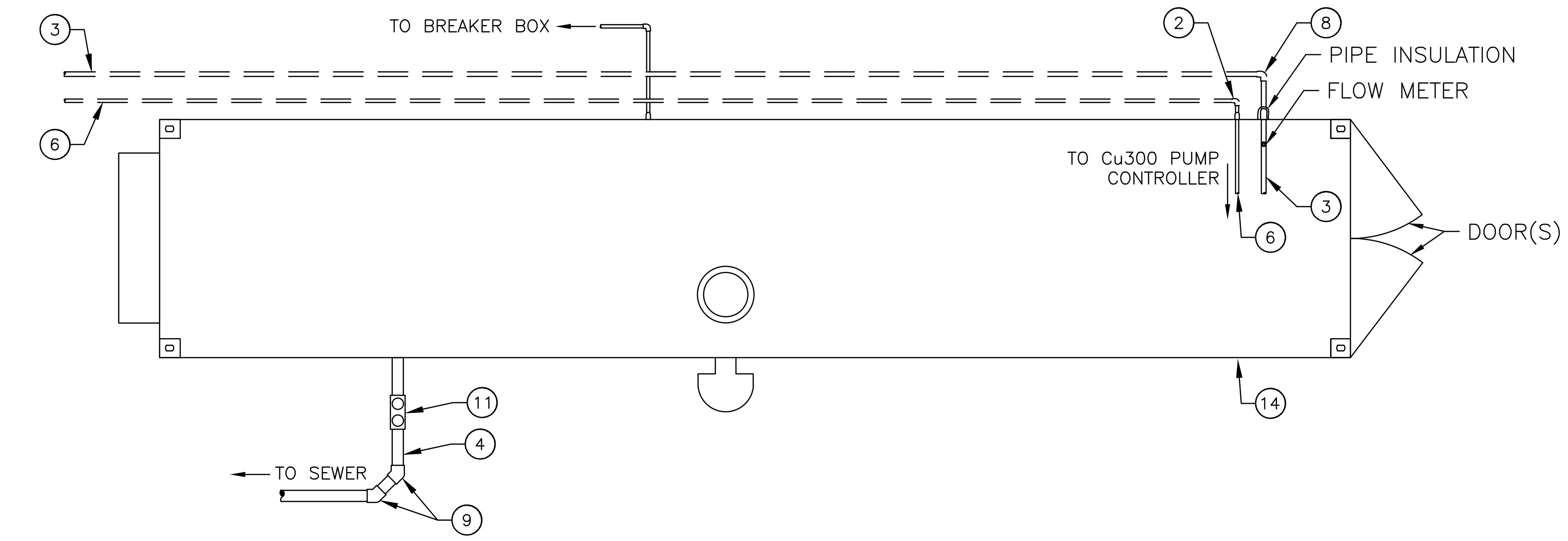
NEW MEXICO ENVIRONMENT DEPARTMENT
PETROLEUM STORAGE TANK BUREAU
2905 RODEO PARK DRIVE EAST
SANTA FE, NEW MEXICO 57505

ROSS TEXACO, PINO FINA, AND ATEX 394
GROUNDWATER REMEDIATION SYSTEM INSTALLATION
LAS VEGAS, NEW MEXICO

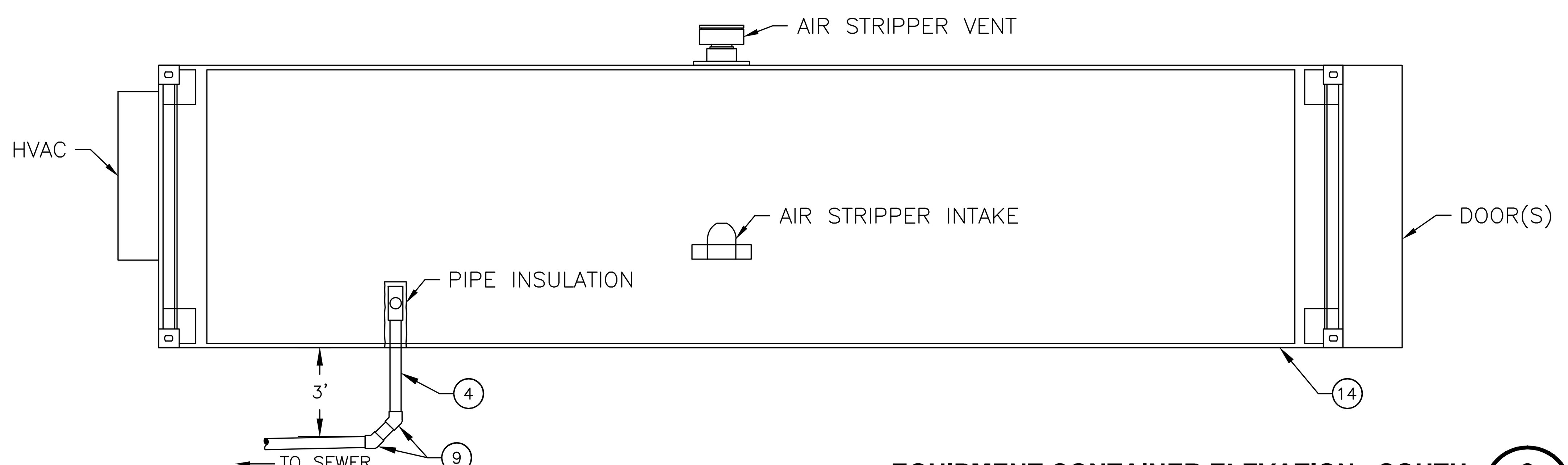
SHT. 10 OF 11
DWG NO. M-1

JOB NO.
DB18.1277

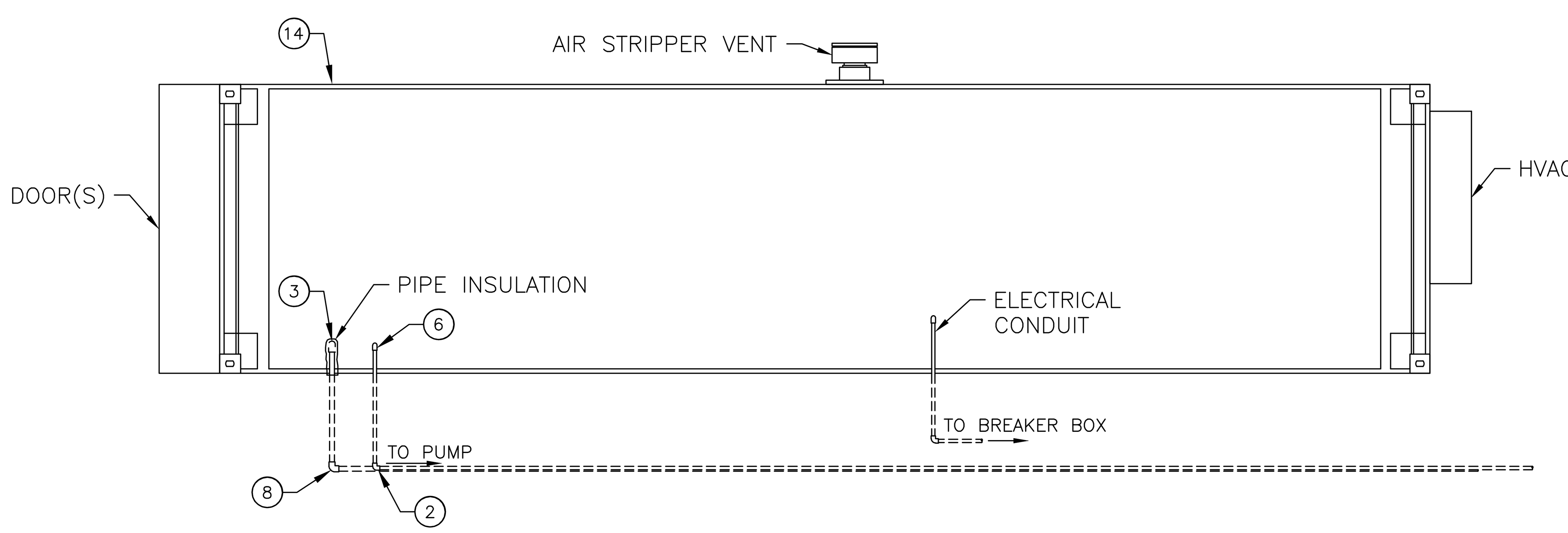
PROCESS AND INSTRUMENTATION DIAGRAM



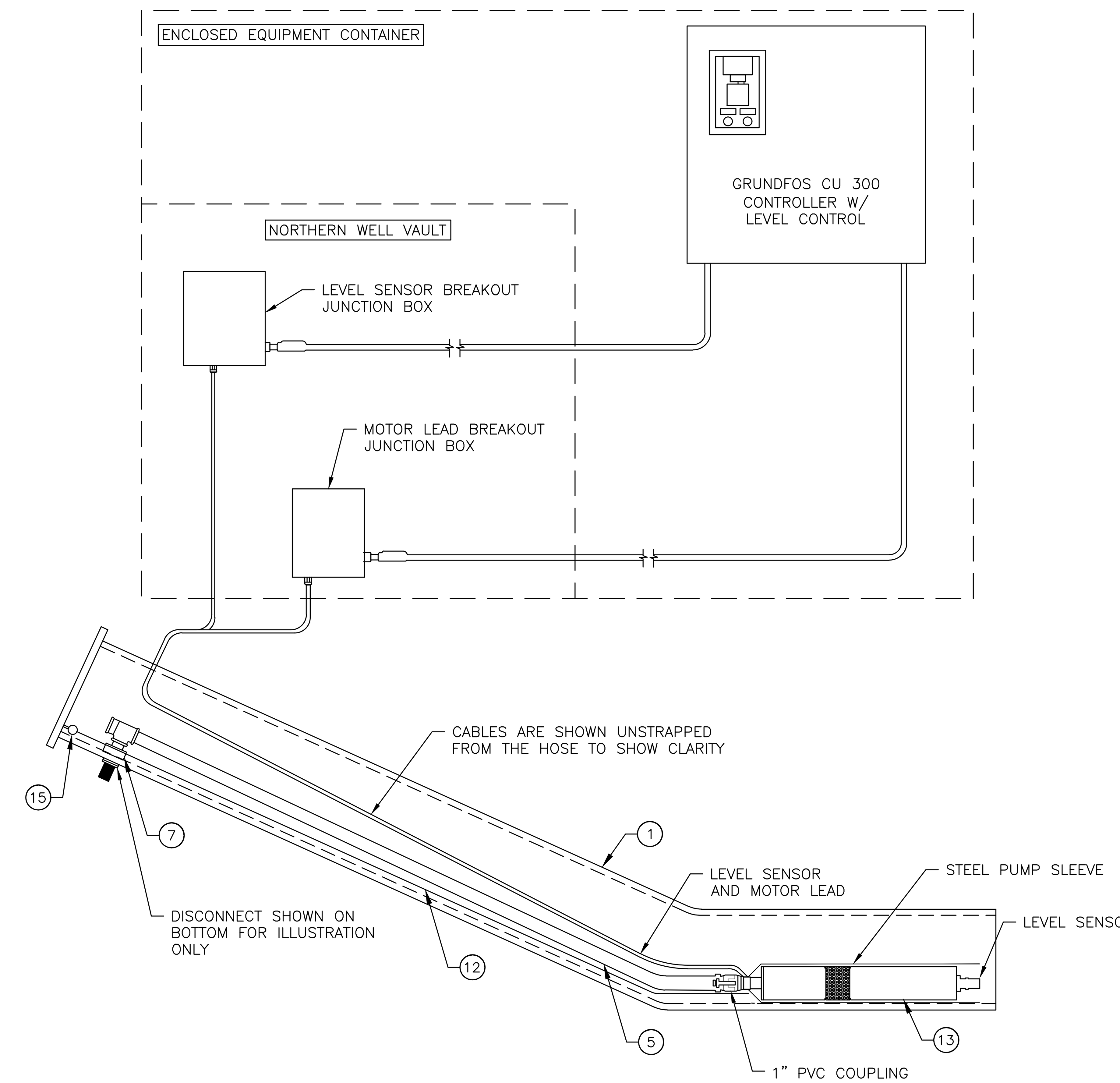
EQUIPMENT CONTAINER - PLAN VIEW 1 / -
NTS



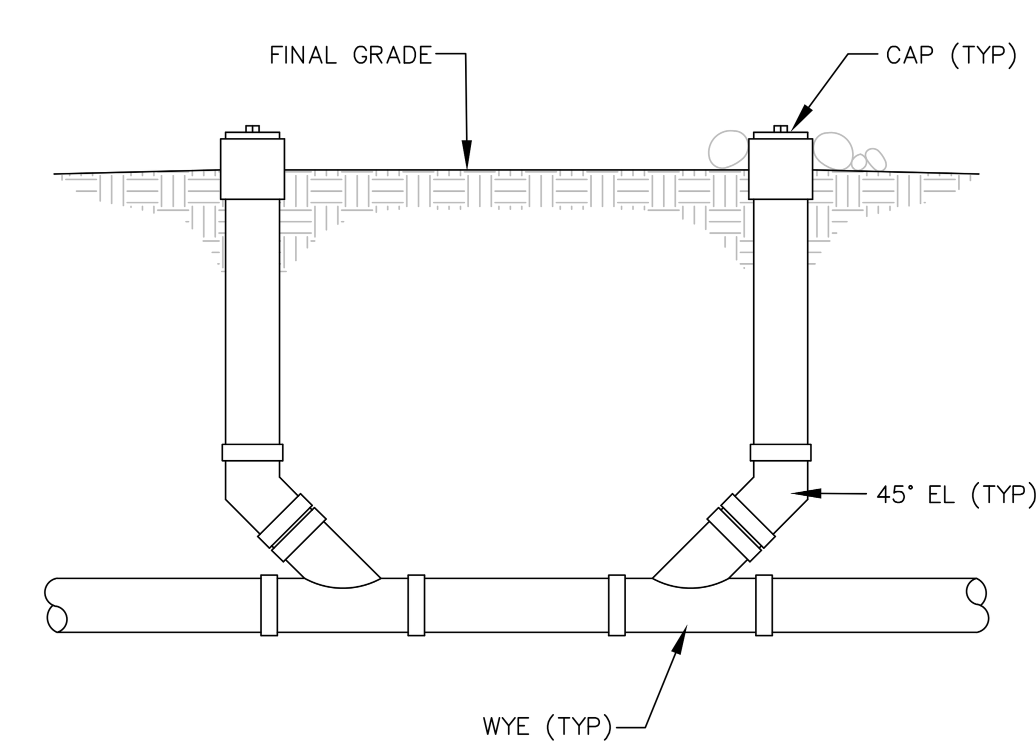
EQUIPMENT CONTAINER ELEVATION - SOUTH 2 / -
NTS



EQUIPMENT CONTAINER ELEVATION VIEW - NORTH 3 / -
NTS



SUBMERSIBLE PUMP INSTALLATION 4 / -
NTS



TYPICAL 2 - WAY CLEANOUT 5 / -
NTS

KEY NOTES:

1. 6" SOLID WALL HDPE SDR 11
2. 2" SCH 40 PVC 90° ELBOW, ELECTRICAL CONDUIT (TYP)
3. 1-1/2" SCH 40 PVC
4. 4" SCH 40 PVC
5. 1" SCH 80 PVC THREADED
6. 2" SCH 40 PVC, ELECTRIC CONDUIT
7. MONITOR SNAPPY PITLESS ADAPTER GALVANIZED CAST IRON MODEL 8PL6IU OR APPROVED EQUAL
8. 1-1/2" SCH 40 PVC ELBOW (TYP)
9. 4" SCH 40 PVC 45° ELBOW (TYP OF 2)
10. 4" SCH 40 PVC TEE
11. CLEAN-OUT
12. STEEL SAFETY CABLE
13. SUBMERSIBLE PUMP (P-1) CONTRACTOR TO FABRICATE AND WELD SKIDS TO PUMP SLEEVE
14. 8'x40' ENCLOSED EQUIPMENT CONTAINER ADEDGE WATERPOD OR APPROVED EQUAL
15. THREAD EYE BOLT INTO VENT PORT ON SPLIT WELL CAP

S:\PROJECTS\DB18.1277_LAS_VEGAS_TRIPLE_SITE\CAD\M-2 MECHANICAL ELEVATION AND DETAILS.DWG December 19, 2019 - 2:14 PM BY: THOMAS, RYAN

REV. NO.	DATE	DESCRIPTION	APPROVED BY

DATE OF ISSUE: 12/31/19
DESIGNED BY: TH
DRAWN BY: JA/RT
CHECKED BY: KJ
APPROVED BY: TG

DBS&A
Daniel B. Stephens & Associates, Inc.
6020 Academy Rd. NE, Suite 100
Albuquerque, NM 87109-3315

22750
12/31/19
PROFESSIONAL ENGINEER

NEW MEXICO ENVIRONMENT DEPARTMENT
PETROLEUM STORAGE TANK BUREAU
2905 RODEO PARK DRIVE EAST
SANTA FE, NEW MEXICO 57505

ROSS TEXACO, PINO FINA, AND ATEX 394
GROUNDWATER REMEDIATION SYSTEM INSTALLATION
LAS VEGAS, NEW MEXICO

MECHANICAL ELEVATION AND DETAILS

SHT. 11 OF 11
DWG NO. M-2

JOB NO.
DB18.1277

Appendix B

Calculations

Horizontal Well Drawdown Calculation

Objective

The purpose of the analysis was to assess well placement/planned pumping rate. A calculation was completed in the computer software MODFLOW and AQTESOLV to assess the potential drawdown in the well.

The design objective is to place the well high enough to maximize our contaminated water removal, but low enough that we won't dewater the aquifer and have to cycle our pumping to allow the aquifer to recover. We assumed continuous system operations for about 3 years.

Method

Aquifer parameters for this site are not available, so aquifer parameters developed at a nearby site were used in the analysis, as well as the following operational assumptions:

Q = 10 gpm
Thickness of aquifer = 10 feet
T = 72 ft^2/day so K = 7.2 ft/day
S =0.1
Length of horizontal well = 250 feet
Well Diameter = 6" (Borehole diameter is 10", there is no filter pack)
Distance from bottom of aquifer 7 feet.

Results

The email on the next page summarizes the analysis results. The analysis resulted in reduction of the planned pumping rate and selection of the well elevation shown on the drawings.

From: Botros, Farag
Sent: Monday, December 16, 2019 4:33 PM
To: Jayne, Kelly
Cc: Hopkins, Thomas
Subject: RE: Drawdown in Horizontal wells

Hi Kelly,

The horizontal well won't be able to sustain that much pumping, if it is placed at such shallow depth. I tested some parameters using MODFLOW and unconfined aquifer and it seems the well can pump 2.7 gpm for 3 years, if it is placed in the middle of the aquifer (i.e., at depth 5 feet).

I confirmed the solution using AQTESOLV which resulted for a pumping of 2.85 gpm. The AQTESOLV pumping is slightly higher than MODFLOW because AQTESOLV can only use confined conditions for horizontal well simulations (i.e., transmissivity is not decreased as a result of well drawdown).

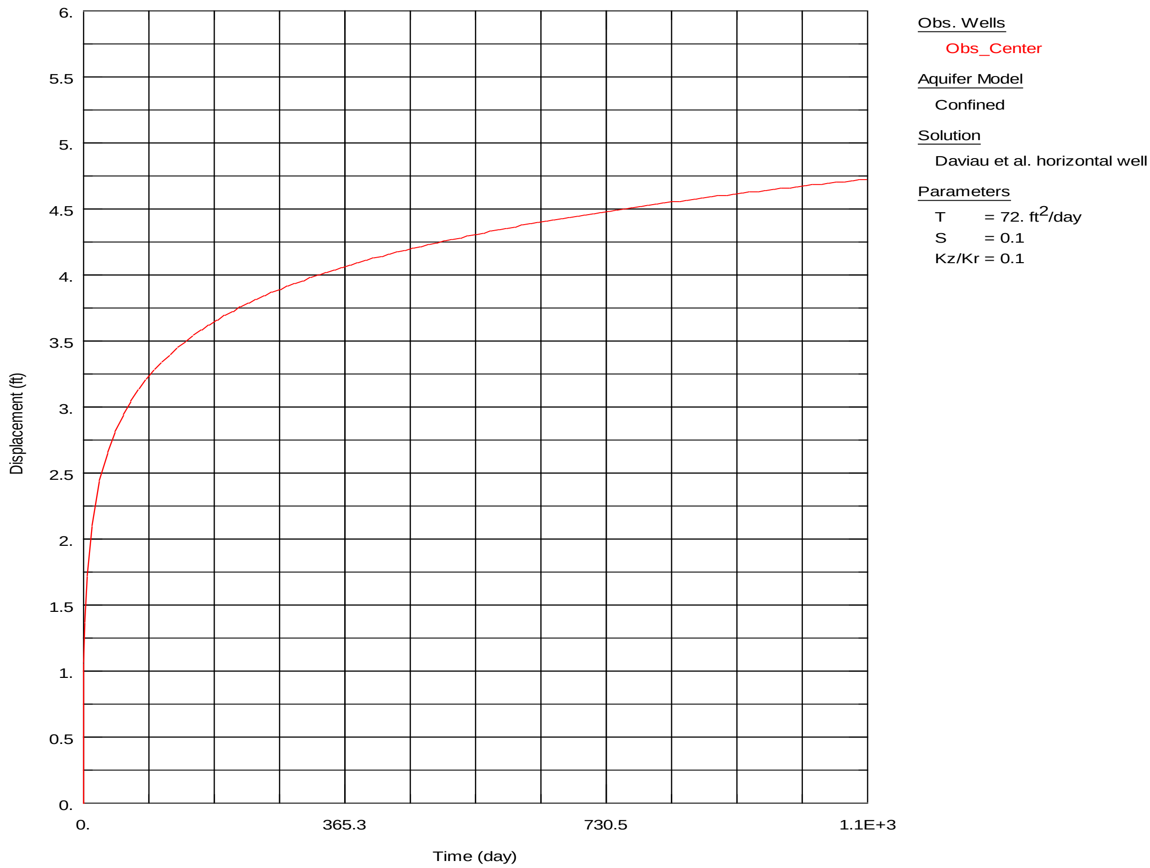
Please, note that the drawdown depicted in the attached figures are just outside the well casing. Drawdown inside the well is expected to be higher (because of well losses). If we account for the well losses, suggested pumping rates may be even less than what is reported in here.

Please, let me know if you need to change something or if we need to discuss.

Thanks!

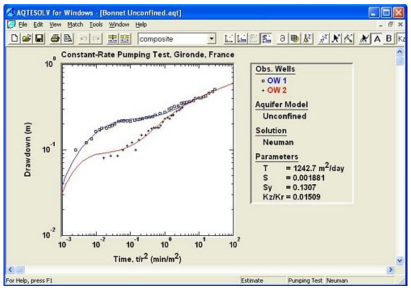
Farag Botros, PhD, PE
Senior Hydrogeologist

Daniel B. Stephens & Associates, Inc.
Office: (909) 626-2282 x5101| Mobile: (916) 741-8448



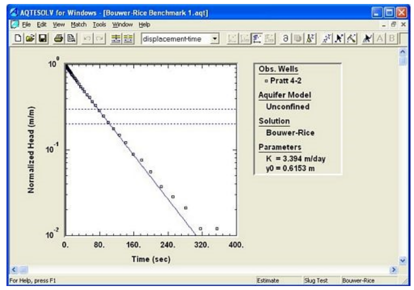
Drawdown at the center of a horizontal well of length 250 ft, pumping at a rate 2.85 gpm, and is located in the middle of 10-foot thick aquifer (Using AQTESOLV and confined aquifer).

The World's *LEADING* Aquifer Test Analysis Software Since 1989



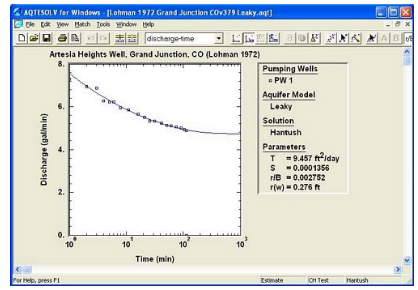
(/pumping_test_analysis.htm)

Pumping Tests



(/slug_test_analysis.htm)

Slug Tests



(/constant_head_test_analysis.htm)

Constant-Head Tests

Developed and Sold by HydroSOLVE, Inc. (/hydrosolve/default.htm)

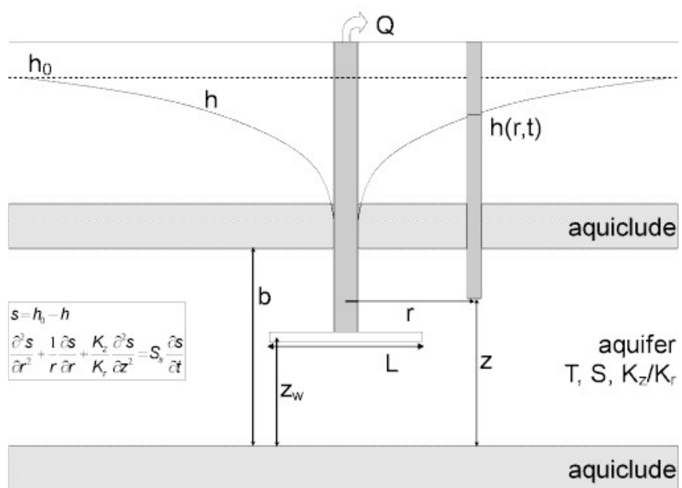
Daviau et al. Solution for Horizontal Wells in Confined Aquifers

AQTESOLV Since 1989 Celebrating 30 Years!

- Assumptions
- Equations
- Data requirements
- Solution options
- Estimated parameters
- Curve matching tips
- Benchmark
- Example
- References

▸ Related Solution Methods

▸ Additional Topics



A mathematical solution for **horizontal wells** by Daviau et al. (1985) (aquifer-tests/aquifer-testing-references.htm#Daviau_et_al_1985) is useful for determining the hydraulic properties (transmissivity (aquifer-tests/glossary-of-aquifer-testing-terms.htm#Transmissivity), storativity (aquifer-tests/glossary-of-aquifer-testing-terms.htm#Storativity) and hydraulic conductivity anisotropy ratio) of **nonleaky confined aquifers**. Analysis involves matching the Daviau et al. solution to drawdown data collected during a pumping test in a horizontal well.

When you choose a solution, **AQTESOLV** provides two options for the Daviau et al. solution: **uniform-flux** and **infinite-conductivity** horizontal wells.

> You are not restricted to constant-rate tests with the Daviau et al. solution. Using the principle of superposition in time, **AQTESOLV** can simulate variable-rate and recovery tests with this method.

Assumptions

- aquifer has infinite areal extent
- aquifer is homogeneous, isotropic and of uniform thickness
- potentiometric surface is initially horizontal
- aquifer is nonleaky confined
- pumping well is horizontal
- observation wells are fully or partially penetrating
- flow is unsteady
- water is released instantaneously from storage with decline of hydraulic head
- diameter of the horizontal well is very small so that storage in the well can be neglected

Equations

The following equation by Daviau et al. (1985) and Clonts and Ramey (1986) predicts drawdown around a uniform-flux horizontal well in an anisotropic nonleaky confined aquifer:

$$s = \frac{Q}{4\pi T}\frac{\sqrt{\pi}}{2}\int_0^{t_D}\left[\operatorname{erf}\frac{1-x_D}{2\sqrt{\tau}} + \operatorname{erf}\frac{1+x_D}{2\sqrt{\tau}}\right]\exp\left(-y_D^2/4\tau\right)$$
$$\times\left[1 + 2\sum_{n=1}^{\infty}\exp\left(-n^2\pi^2 L_D^2\tau\right)\cos(n\pi z_D)\cos(n\pi z_{wD})\right]\frac{\mathrm{d}\tau}{\sqrt{\tau}} \quad (1)$$

$$t_D = \frac{4Tt}{SL^2} \quad (2)$$

$$x_D = \frac{2x}{L} \quad (3)$$

$$y_D = \frac{2y}{L} \quad (4)$$

$$z_D = \frac{z}{b} \quad (5)$$

$$L_D = \frac{L}{2b}\sqrt{K_z/K_r} \quad (6)$$

$$r_{wD} = \frac{2r_w}{L}\sqrt{K_z/K_r} \quad (7)$$

$$s_D = \frac{4\pi T}{Q}s \quad (8)$$

where

- b is aquifer thickness [L]
- K_r is radial (horizontal) hydraulic conductivity [L/T]
- K_z is vertical hydraulic conductivity [L/T]
- L is length of the well open interval [L]
- Q is pumping rate [L³/T]
- r is radial distance from pumping well to observation well [L]
- r_w is well radius [L]
- s is drawdown [L]
- S is storativity [dimensionless]
- t is elapsed time since start of pumping [T]
- T is transmissivity [L²/T]
- x , y and z are coordinate distances [L]

Drawdown in an observation well may be found by integrating the preceding equations with respect to z.

Following the work of Daviau et al. (1985), Clonts and Ramey (1986) and Ozkan et al. (1989), drawdown in the wellbore is computed with $y_D = r_{wD}$.

Clonts and Ramey (1986) and Ozkan et al. (1989), citing the work of Gringarten, Ramey and Raghavan (1974), set x_D = 0.732 in the uniform-flux solution to compute drawdown in an infinite-conductivity horizontal well.

Data Requirements

- pumping and observation well locations
- pumping rate(s)
- observation well measurements (time and displacement)
- aquifer thickness
- length of horizontal well

Solution Options

- constant or variable pumping rate with recovery
- multiple horizontal wells
- multiple observation wells
- partially penetrating observation wells

Estimated Parameters

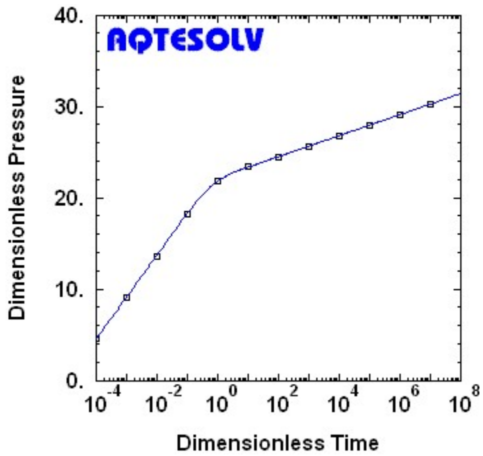
AQTESOLV provides visual (visual_curve_matching.htm) and automatic (automatic_curve_matching.htm) methods for matching the Daviau et al. method to data from pumping tests (pumping_test_analysis.htm) and recovery tests (recovery_tests.htm). The estimated aquifer properties are as follows:

- T (transmissivity)
- S (storativity)
- K_z/K_r (hydraulic conductivity anisotropy ratio)

Curve Matching Tips

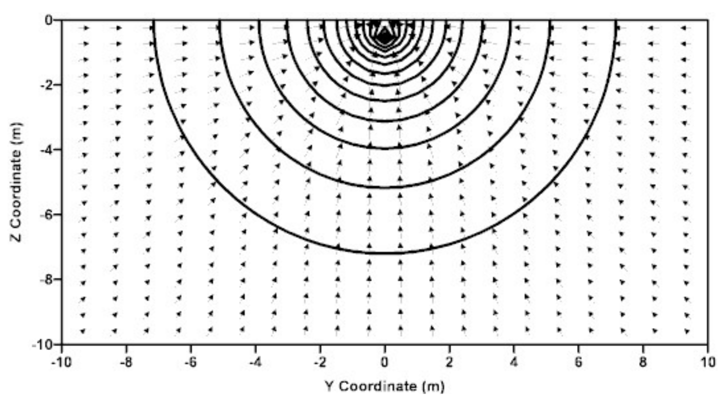
- Use the Cooper and Jacob (1946) solution (cooper-jacob.htm) to obtain preliminary estimates of aquifer properties.
- Choose Match>Visual to perform visual curve matching using the procedure for type curve solutions.
- Use active type curves for more effective visual matching with variable-rate pumping tests.
- Select values of K_z/K_r from the Family and Curve drop-down lists on the toolbar.
- Use parameter tweaking to perform visual curve matching and sensitivity analysis.
- Perform visual curve matching prior to automatic estimation to obtain reasonable starting values for the aquifer properties.

Benchmark



*Comparison of **AQTESOLV** (blue line) and published horizontal well function values (symbols) for Ld=0.125 (Clonts and Ramey 1986 (aquifer-tests/aquifer-testing-references.htm#Clonts_Ramey_1986)).*

Example



Cross-sectional view of hemiradial flow regime around horizontal well located near upper boundary of nonleaky confined aquifer.

References

Daviau, F., Mouronval, G., Bourdarot, G. and P. Curutchet, 1985. Pressure analysis for horizontal wells, SPE Paper 14251, presented at the 60th Annual Technical Conference and Exhibition in Las Vegas, NV, Sept. 22-25, 1985.

HydroSOLVE, Inc. (/hydrosolve/default.htm)
2303 Horseferry Court
Reston, Virginia 20191
USA
tel +1 703 264 9024 (tel:+1-703-264-9024)
fax +1 209 254 8831
hydrosolve@aqtesolv.com

Calculation Cover Sheet

Daniel B. Stephens & Associates, Inc.

Project Name Las Vegas Triple Site   Project Number DB18.1277

Calculation Number DB18.1277-2   Discipline Hydraulics   No. of Sheets 2

PROJECT: Groundwater Remediation System, Las Vegas Triple Site (Atex 394 (Allsup's), Pino Fina, and Ross Texaco State Lead Sites)

SITE: Las Vegas Triple Site

SUBJECT: QED Environmental Systems EZ-Stacker 4.4p hydrocarbon removal and air emissions

SOURCES OF DATA:

1. QED EZStacker 4.4p Drawing: https://www.qedenv.com/files/ezstacker44p.pdf
2. Well Installation and Baseline Groundwater Monitoring Report, Atex 394, Pino Fina, and Ross Texaco Sites, Las Vegas, New Mexico, September 2019

SOURCES OF FORMULAE & REFERENCES:

1. QED air stripper modeler: https://www.qedenv.com/TOOLS/modeler/

☒ Preliminary Calculation   ☐ Final Calculation   Supersedes Calculation No. ____________

Rev. No.	Revision	Calculation By	Date	Checked By	Date	Approved By	Date
1		TH	12/30/2019	KJ	12/30/19		

Project No. DB18.1277 Date 12/30/2019

Subject QED Air-stripper contaminant removal and emissions Sheet 1 of 2

By T. Hopkins Checked By Calculation No. DB18.1277-2

1.0 OBJECTIVE

To determine the hydrocarbon contaminants of concern (COC) removal efficiency and air emission assuming influent will possess the highest levels measured during the July 2019 groundwater sampling event.

2.0 GIVEN

Groundwater will be pumped at a maximum rate of 10 gallons per minute (gpm) by a submersible pump to an equipment compound containing a 4 tray QED Environmental Systems EZ Stacker 4.4p (Source #1). An operational flow of 2 to 5 gpm is expected, so the use of 10 gpm is conservative. The influent COC concentrations are assumed to be the maximum levels measured in bore path wells during groundwater monitoring in July 2019 as shown in Table 1 (Source #2). Actual groundwater hydrocarbon concentrations will likely be lower as the well will be extracting lower concentration water along its screened length and concentrations will decrease over time. An altitude of 6,400 feet above mean sea level and groundwater temperature of 65° F were also assumed which match field parameters measured onsite. The EZ Stacker will be inducing an air flow of 280 cubic feet per minute (cfm). Treated groundwater will be discharge to the City of Las Vegas' sanitary sewer.

Table 1: Assumed Influent Hydrocarbon COC Concentrations

Contaminant of Concern	Maximum Measured Concentration (µg/L)
Benzene	690
Toluene	11
Ethylbenzene	2,100
Total Xylenes	1,300
Methyl-t-Butyl-ether	13
Total naphthalenes	480
1,2-dichloroethane (EDC)	10

3.0 METHOD

The removal efficiency and air emissions of the 4 tray EZ Stacker 4.4p air stripper unit were calculated using the QED online air-stripper model software (Reference 1). The software code and method are proprietary.

4.0 SOLUTION

New Mexico Water Quality Control Commission (NMWQCC) standards, removal efficiency, and effluent concentrations are shown in Table 2. All removal efficiencies are close to 100% except naphthalene as a result of its lower Henry's constant. All effluent concentrations are lower than NMWQCC groundwater standards, which will be sufficient to discharge to the city's sanitary sewer system.

Project No. DB18.1277 Date 12/30/2019

Subject QED Air-stripper contaminant removal and emissions Sheet 2 of 2

By T. Hopkins Checked By Calculation No. DB18.1277-2

Table 2: QED Modeler Results

Contaminant of Concern	Influent Concentration (µg/L)	Removal Efficiency (%)	Effluent Concentration (µg/L)	NMWQCC Standard (µg/L)
Benzene	690	100	0	5
Toluene	11	100	0	1,000
Ethylbenzene	2,100	100	0	700
Total Xylenes	1,300	100	0	620
Methyl-t-Butyl-ether	13	100	0	100
Total naphthalenes	480	95.2	23.2	30
1,2-dichloroethane (EDC)	10	100	0	5

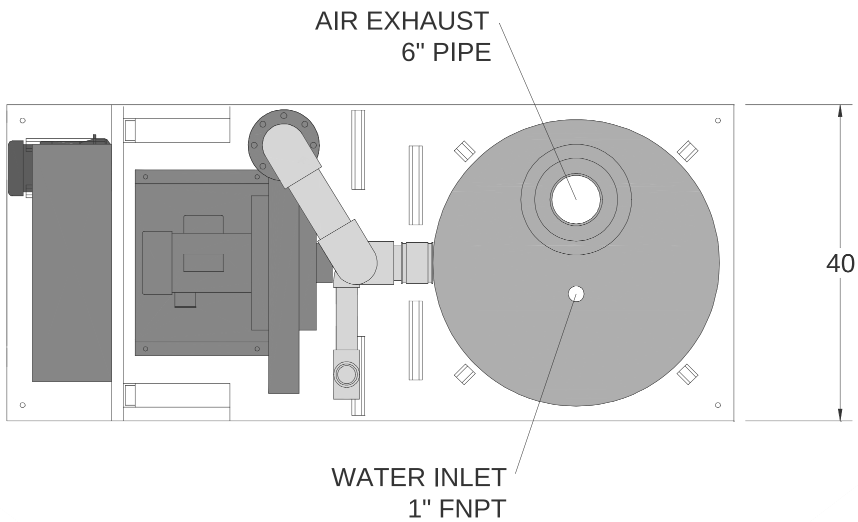
Modeled vapor concentrations and emission rates are listed in table 3. All emissions are at least two orders of magnitude below New Mexico air quality standards of 10 lb/hr.

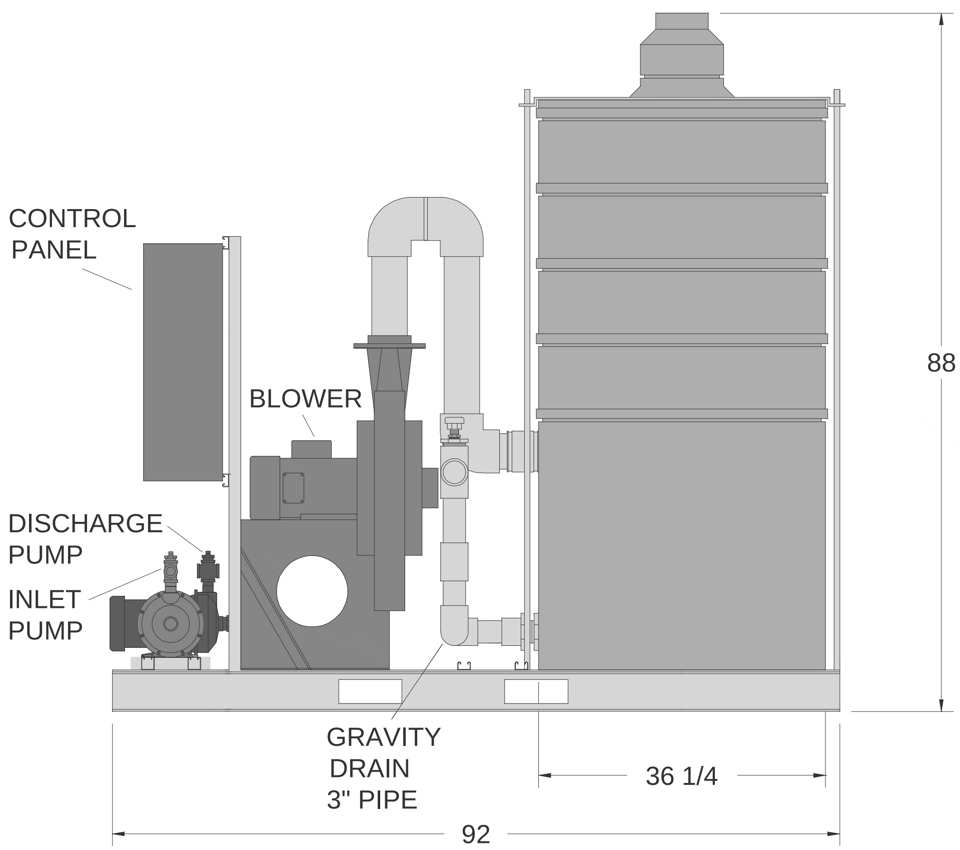
Table 3:

Contaminant of Concern	Vapor Concentration (ppmV)	Vapor Emissions (lb/hr)
Benzene	1.04	0.00
Toluene	0.01	0.00
Ethylbenzene	2.32	0.01
Total Xylenes	1.44	0.01
Methyl-t-Butyl-ether	0.02	0.00
Total naphthalenes	0.42	0.00
1,2-dichloroethane (EDC)	0.01	0.00

QED EZ-Stacker Model 4.4P

Source 1





Source 2

Daniel B. Stephens & Associates, Inc.

Table 1: Summary of organic and inorganic water quality parameters for monitoring wells along proposed horizontal groundwater extraction well. Atex 356, Pino Fina, and Ross Texaco Sites, Las Vegas, New Mexico

Parameter	*Concentration (mg/L)*				
	NMWQCC Standard[a]	MW-1	MW-10	MW-12	Average[b]
Bicarbonate (as $CaCO_3$) (SM2320B)	NS	683.8	429.6	433.1	515.5
Carbonate (as $CaCO_3$) (SM2320B)	NS	<2	<2	<2	<2
Total Alkalinity (as $CaCO_3$) (SM2320B)	NS	683.8	429.6	433.1	515.5
Biological oxygen demand (BOD) (SM5210B)	NS	31	15	53	33
Chemical oxygen demand (COD)	NS	90.5	73.7	50.2	71.5
Bromide (EPA 300.0)	NS	0.57	0.60	0.40	0.52
Chloride (EPA 300.0)	250	200	**430**	230	**287**
Fluoride (EPA 300.0)	1.6	<0.50	<0.50	0.76	0.42
Nitrate+nitrite (as N) (EPA 300.0)	10[e]	<1.0	2.6	2.0	1.7
Phosphorous, Orthophosphate (as P) (EPA 300.0)	NS	<2.5 H	<2.5 H	<0.50 H	<2.5 H
Specific conductance (µS/cm) (SM2510B)	NS	1,900	2,600	2,500	2300
Sulfate (EPA 300.0)	600	49	410	**800**	420
Total dissolved solids (TDS) (SM2540C)	1,000	**1,180 D**	**1,830 D**	**1,910**	1640
Total organic carbon (TOC) (SM5310B)	NS	9.8	11	7.1	9.3
pH (Field water quality meter)	NS	6.87	6.98	Not taken	6.93
Total suspended solids (TSS)	NS	110 D	52 D	72	78
Dissolved metals (concentration in mg/L)					
Arsenic (EPA 200.8)	0.01	0.0014	<0.0010	**0.015**	0.0056
Calcium (EPA 6010B)	NS	220	350	330	300
Chromium (EPA 6010B)	0.05	<0.0060	<0.0060	<0.0060	<0.0060
Iron (EPA 6010B)	1.0	**2.4**	**2.6**	**3.1**	**2.7**
Lead (EPA 200.8)	0.015	0.0034	<0.0005	0.0055	0.00305
Magnesium (EPA 6010B)	NS	50	49	51	50
Potassium (EPA 6010B)	NS	1.7	2.0	<5.0	2.1
Selenium (EPA 200.8)	0.05	<0.0010	<0.0010	<0.0010	<0.0010
Sodium (EPA 6010B)	NS	140	140	110	130
Hydrocarbons (concentration in µg/L) [d]					
Benzene	5	**47**	**180**	**690**	**306**
Toluene	1,000	<25	1.9	11	6
Ethylbenzene	700	**2100**	170	590	**953**

Total xylenes	620	160	48	**1,300**	503
Total BTEX	NS	2,307	399.9	2591	1766
EDB (EPA 8011/504.1)	0.05	<0.0094	<0.0093	<0.0094	<0.0094
EDC	5	<25[c]	<1.0	<10[c]	BDL
MTBE	100	<25	13	<10	10
Total Naphthalenes	30	**480**	28	**357**	**288**

Bold indicates concentration exceeds applicable standard.

[a] New Mexico Water Quality Control Commission (NMWQCC) standard.

[b] One half detection limit used when applicable.

[c] Laboratory reporting limit is equal to or greater than the NMWQCC standard.

[d] Samples analyzed in accordance with EPA method 8260B, unless otherwise noted.

e = The NMWQCC standards are 10 mg/L for nitrate, and 1.0 mg/L for nitrite.

D = Sample diluted due to matrix.

H = Holding times for preparation or analysis exceeded.
mg/L = Milligrams per liter

NMWQCC = New Mexico Water Quality Control Commission

NS = no standard

µg/L = Micrograms per liter

BTEX = Benzene + toluene +ethylbenzene + total xylenes

MTBE = Methyl tertiary-butyl ether

EDB = 1,2-Dibromoethane

EDC = 1,2-Dichloroethane

NAPL = Nonaqueous-phase liquid

— = Not analyzed

BDL = Below Detection Limits

QED Air Stripper Model ver. 3.0
SITE DATA

1/31/2020

Name: K Jayne
Project: BTEX System NM
Units: English
Air Temp: 80 F
Water Temp: 65 F
Ease: MN LW MD HI MX

e-mail: kjayne@geo-logic.com
Save ID: N/A
Altitude: 6400 ft
Flow: 10 gpm

Water Results (EZ-Stacker 4.xp / Air Flow - 280 cfm)

Contaminant	Influent (ppb)	Target (ppb)	4-Tray Results (ppb)	4-Tray %Removal	6-Tray Results (ppb)	6-Tray %Removal
benzene	690	5	0.0	100.0	0.0	100.0
ethylbenzene	2100	700	0.0	100.0	0.0	100.0
methyl-t-Butyl ether (MTBE)	13	100	0.0	100.0	0.0	100.0
naphthalene	480	30	23.2	95.2	6.6	98.6
p-xylene	1300	620	0.0	100.0	0.0	100.0
toluene	11	1000	0.0	100.0	0.0	100.0
1,2-dichloroethane	10	0	0.0	100.0	0.0	100.0

Air Results (EZ-Stacker 4.xp / Air Flow - 280 cfm)

Contaminant	4-Tray (ppmV)	4-Tray (lb/hr)	6-Tray (ppmV)	6-Tray (lb/hr)
benzene	1.04	0.00	1.04	0.00
ethylbenzene	2.32	0.01	2.32	0.01
methyl-t-Butyl ether (MTBE)	0.02	0.00	0.02	0.00
naphthalene	0.42	0.00	0.43	0.00
p-xylene	1.44	0.01	1.44	0.01
toluene	0.01	0.00	0.01	0.00
1,2-dichloroethane	0.01	0.00	0.01	0.00

Disclaimers

The QED modeler estimates unit performance for the listed contaminants. Results assume -

1. Contaminants are in the dissolved-phase, within a water matrix
2. Stripper Influent air is contaminant-free
3. Influent liquid does not have surfactants, oil, grease, other immiscible phase(s) or other Henry's constant altering additions present, such as dissolved phase polar organic contaminants
4. The air stripper is operated within the given parameters listed above and as instructed in the E-Z Tray O&M manual

Stripper performance shall meet or exceed either the required effluent concentration(s) or effluent estimates, whichever is greater, for the conditions supplied and assumes the influent concentrations of each contaminant are less than 25% solubility in water.

QED makes no claim of the model's accuracy beyond the 25% solubility in water limit.

Standard E-Z Tray material is 304SS - contact QED for other material options, 304SS is not recommended for chloride levels greater than 80-100ppm. Induced draft blower and piping is recommeneded for systems with off-gas treatment, such as VGAC. Check all downstream pipe and systems losses toensure that blower and discharge transfer pump(s) are sized correctly. Gravity drain discharge systems must include a water trap.

Remodel Link:

https://www.qedenv.com/cgi-bin/modeler_tool/remodel.pl?u=e&tw=65&ta=80&f=10&a=6400&s=4.xp&n=K+Jay&e=
kjayne@geo-logic.com&p=BTEX+&c=63,690;120,2100;149,13;154,480;162,1300;186,11;27,10;

URL

Daniel B. Stephens & Associates, Inc.

Calculation Cover Sheet

Project Name: Las Vegas Triple Site

Project Number: DB18.1277

Calculation Number: DB18.1277-1

Discipline: Hydraulics

No. of Sheets: 4

PROJECT: Groundwater Remediation System, Las Vegas Triple Site (Atex 394 (Allsup's), Pino Fina, and Ross Texaco State Lead Sites)

SITE: Las Vegas Triple Site

SUBJECT: Total dynamic head (TDH) from horizontal groundwater extraction well to proposed water treatment compound.

SOURCES OF DATA:

1. Pumping Test and Aquifer Properties Analysis NMDOT District 4 Service Center and Maintenance Patrol Yard Las Vegas, San Miguel County, New Mexico.
2. S:\Projects\DB18.1277_Las_Vegas_Triple_Site\Docs\FRP\Appendix - Drawings\C-1 GENERAL SITE PLAN.pdf

SOURCES OF FORMULAE & REFERENCES:

1. Hydraulic Engineering. Roberson, Cassidy, and Chaudhry, 1998
2. Water Resource Engineering. Wurbs and James, 2002
3. Fundamentals of Fluid Mechanics, fifth edition. Munson, Young, Okiishi, 2006

THOMAS A. GOLDEN
NEW MEXICO
22750
12/31/19
PROFESSIONAL ENGINEER

[X] Preliminary Calculation   [ ] Final Calculation   Supersedes Calculation No. ____________

Rev. No.	Revision	Calculation By	Date	Checked By	Date	Approved By	Date
1		TH	10/18/2019	JES	10/24/19		
2		TH	12/6/2019	KJ	12/30/19		

1.0 OBJECTIVE

Determine the Total Dynamic Head (TDH) at the horizontal groundwater extraction well in order to appropriately size a submersible pump.

2.0 GIVEN

Groundwater will be pumped from one 250 foot screened section of horizontal well located beneath the intersection of Grand Avenue and E. University Avenue in Las Vegas, NM. The conveyance line will consist of 100 feet of 1" schedule 80 PVC pipe and fittings from the pump to the pitless adaptor and 285 feet of 1.5" schedule 40 PVC pipe and fittings from the pitless adaptor to the equipment enclosure. Water will be pumped from a depth of 20 feet beneath ground surface to a height of 10 feet above ground surface (water level at top of storage tank). One 45° elbows will direct flow to the ground surface, and seven 90° elbows will direct water into the equalization tank. A gate valve will be located at the equipment enclosure. The well is expected to produce approximately 5 gallons per minute (gpm), and the pump will be sized for a maximum flowrate of 10 gpm. This is supported by aquifer testing at another site in Las Vegas, the NMDOT.

3.0 METHOD

The TDH is the sum of the static head, friction head, velocity head, and minor losses and is given by the equation [1]:

$$TDH = h_{stat} + \Sigma h_f + \Sigma h_m + h_v \qquad \text{Eqn. 1}$$

where:

h_{stat} = (water level elevation in storage tank) - (elevation of pump) Eqn. 2
h_f = friction head (feet)
h_v = velocity head (feet)
h_m = minor losses (feet)

Friction head from friction losses in the pipe is calculated using the Hazen-Williams equation[2].

$$h_f = L(4/D)^{1.17}\left(\frac{V}{C_w C_H}\right)^{1.85} \qquad \text{Eqn. 3}$$

Where:

L = length of the pipe (feet)
D = diameter of pipe (feet)
V = velocity of flow (feet/sec)
C_w = 1.318 for English units

C_H = Hazen-Williams coefficient

The velocity (V) of water in ft/s flowing through a pipe of diameter (D) in inches can be converted from flow in gpm (q) by first converting the flow to units of cubic feet per second (cfs) using equation 4:

$$q\ (cfs) = q\ (gpm) / (7.48\ gal/ft^3) / 60\ (sec/min) \qquad \text{Eqn. 4}$$

Then the flow in cfs can be divided by the area of the pipe to find the velocity (ft/s) as follows where D is in inches:

$$V = \frac{q}{\frac{\pi}{4}\left(\frac{D}{12}\right)^2} \qquad \text{Eqn. 5}$$

The velocity head is found from the equation:

$$h_v = V^2 / (2 * g) \qquad \text{Eqn. 6}$$

Where:

g = gravitational constant (32.2 ft/sec^2)

Minor losses are the result of changing flow conditions caused by elbows, valves, flow meters, and fittings. Minor losses (h_m) are calculated from the product of the velocity head and sum of the loss coefficients. Loss coefficients are determined from a table of known values for fittings[3]:

$$h_m = \Sigma K * h_v \qquad \text{Eqn. 7}$$

Where:

K = sum of minor loss coefficients

Calculations are performed for 5 and 10 gpm.

4.0 SOLUTION

The pump will be placed at 20 feet below ground surface and bring water to a storage tank with a maximum water level height 10 feet above grade. Thus,

$$h_{stat} = 20 + 10 = 30 \text{ feet} \qquad \text{Eqn. 2}$$

The velocity for 5 and 10 gpm flow in a 1 and 1.5 inch diameter pipe can be found by first converting gpm to cubic feet per second (cfs) and then dividing by the cross-sectional area of the pipe. Using 7.48 gallons per cubic foot (cf) and 60 seconds in a minute the flow in cfs would be,

q = 5 gal/min / 7.48 gal/cf / 60 sec/min = 0.0111 cfs Eqn. 4

q = 10 gal/min / 7.48 gal/cf / 60 sec/min = 0.0223 cfs Eqn. 4

Dividing by the cross-sectional area using a diameter of 1 inch yields the velocity in ft/sec:

V = 0.0111 cfs /(π/4*(1.00 in * 1 ft/12 in)^2) = 2.04 ft/sec Eqn. 5

V = 0.0223 cfs /(π/4*(1.00 in * 1 ft/12 in)^2) = 4.09 ft/sec Eqn. 5

Dividing by the cross-sectional area using a diameter of 1.5 inches yields the velocity in ft/sec:

V = 0.0111 cfs /(π/4*(1.50 in * 1 ft/12 in)^2) = 0.905 ft/sec Eqn. 5

V = 0.0223 cfs /(π/4*(1.50 in * 1 ft/12 in)^2) = 1.82 ft/sec Eqn. 5

Using the Hazen-Williams equation, a length of 100 feet, a diameter of 0.0833 ft (1 inch), and a conservative C_H value of 140 for PVC pipe [2], the friction head for 5 and 10 gpm flow is calculated using equation 3:

$$h_{f(5\ gpm)} = 100ft \times (4/0.0833)^{1.17} \times \left(\frac{2.04}{(1.318)(140)}\right)^{1.85} = 2.23\ ftH_2O \quad \text{Eqn. 3}$$

$$h_{f(10\ gpm)} = 100ft \times (4/0.0833)^{1.17} \times \left(\frac{4.09}{(1.318)(140)}\right)^{1.85} = 8.07\ ftH_2O \quad \text{Eqn. 3}$$

Using the Hazen-Williams equation, a length of 285 feet, a diameter of 0.125 ft (1.5 inch), and a conservative C_H value of 140 for PVC pipe [2], the friction head for 5 and 10 gpm flow is calculated using equation 3:

$$h_{f(5\ gpm)} = 285ft \times (4/0.125)^{1.17} \times \left(\frac{0.905}{(1.318)(140)}\right)^{1.85} = 0.878\ ftH_2O \quad \text{Eqn. 3}$$

$$h_{f(10\ gpm)} = 285ft \times (4/0.125)^{1.17} \times \left(\frac{1.82}{(1.318)(140)}\right)^{1.85} = 3.20\ ftH_2O \quad \text{Eqn. 3}$$

Summing the friction losses for the 1-inch and 1.5 inch PVC pipe yields the total losses

$$h_{f(5\ gpm\ total)} = 2.23\ ftH_2O + 0.878\ ftH_2O = 3.108\ ftH_2O$$

$$h_{f(10\ gpm\ total)} = 8.07\ ftH_2O + 3.20 ftH_2O = 11.27\ ftH_2O$$

Utilizing published loss coefficients [3], the minor head loss through a fully open gate valve at 5 gpm was calculated. Velocity for the 1.5-inch PVC pipe is assumed:

$$h_m = 0.15 * (0.905\ ft/s)^2 / (2 * 32.2\ ft/s^2) = 0.002\ ft \qquad \text{Eqn. 7}$$

Table 2 summarizes the calculations of minor losses from elbows and valves at 5 and 10 gpm.

Table 2: Calculated minor losses for valves and fittings

Fitting	Flow (gpm)	K	Head Loss (ft)
45° elbow flanged	5	0.2	0.003
90° elbow flanged	5	0.3	0.004
Gate valve fully open	5	0.15	0.002
45° elbow flanged	10	0.2	0.010
90° elbow flanged	10	0.3	0.015
Gate valve fully open	10	0.15	0.008

The head loss assuming one 45° elbows, seven 90° elbows, and one fully open gate valve for 5 and 10 gpm are listed in Table 3:

Table 3: Summary of minor losses for 5 and 10 gpm

Flow	45° Elbow Losses	90° Elbow Losses	Gate Valve	Total Minor Losses
5 gpm	0.003 ft	0.028 ft	0.002 ft	0.033 ft
10 gpm	0.010 ft	0.105 ft	0.008 ft	0.123 ft

Using eqn. 6 the velocity head for 5 and 10 gpm assuming 1.5-inch PVC would be as follows:

$$h_v = (0.905\ ft/sec)^2/(2*32.2\ ft/sec^2) = 0.0127 \text{ feet for 5 gpm} \qquad \text{Eqn. 6}$$

$$h_v = (1.82\ ft/sec)^2/(2*32.2\ ft/sec^2) = 0.0514 \text{ feet for 10 gpm} \qquad \text{Eqn. 6}$$

Table 4 summarizes the results for all components of TDH for flow at 5 and 10 gpm:

Table 4: Components of TDH calculation

Q (gpm)	static head (ft)	friction losses (ft)	minor losses (ft)	velocity head (ft)
5	30.00	3.108	0.033	0.0127
10	30.00	11.27	0.123	0.0514

Use data shown above to calculate the initial TDH from the pump to a influent equalization tank for 5 and 10 gpm:

$$\mathbf{TDH_{(5\ gpm)} = h_{stat} + \Sigma h_f + h_m + h_v = 30.00 + 3.108 + 0.033 + 0.0127 = 33.15\ ft.} \quad \text{Eqn. 1}$$

$$\mathbf{TDH_{(10\ gpm)} = h_{stat} + \Sigma h_f + h_m + h_v = 30.00 + 11.27 + 0.123 + 0.0514 = 41.44\ ft.} \quad \text{Eqn. 1}$$

Process Pump Summary

Assumptions

Pump efficiency =	85%	
Motor efficiency =	85%	
hp conversion =	3960	
Gravity	32.2	ft/sec^2

WHP = Water horsepower (how much horsepower required to move the water)
BHP = brake horsepower (how much power is required to be put into the pump, accounts for pump efficiency)
MHP = total horsepower (how much power is required to be put into the pump, accounts for drive efficiency and motor efficiency)

Well to equalization tank

Pipe Material	Flow (gpm)	Pipe Length (ft)	Dia (in)	V (ft/s)	Static	Friction slope (ft/ft)	Friction loss (ft)	Pipe length (ft)	Dia (in)	V (ft/s)	Friction slope (ft/ft)	Friction loss (ft)	Velocity Head (ft)	Minor (ft)	TDH (ft)
PVC	10	100	1	4.09	30	0.08046897	8.05	285.00	1.50	1.82	0.011	3.18	0.05	0.13	41.41

Minor Losses

Type	**Flow (gpm)**	**Quantity**	**K**	**Dia (in)**	h_v (ft)	h_m (ft)
45° elbow	10	1	0.2	1	0.05	0.010

Source A

May 18, 2012

Ms. Audrey Moore
Environmental Geology Bureau
New Mexico Department of Transportation
P.O. Box 1149, Room 126
Santa Fe, New Mexico 87504-1149

Re: Groundwater Remediation Treatment System
Pumping Test and Aquifer Properties Analysis
NMDOT District 4 Service Center and Maintenance Patrol Yard
Las Vegas, San Miguel County, New Mexico
NMED Facility No. 10463020

Dear Ms. Moore:

Daniel B. Stephens & Associates, Inc. (DBS&A) is pleased to submit this report summarizing a pumping test conducted at New Mexico Department of Transportation (NMDOT) District 4 Service Center and Maintenance Patrol Yard (Site) in Las Vegas, New Mexico on April 12-13, 2012.

Four groundwater containment trenches were installed by Camp Dresser & McKee Inc. (CDM) in 2006 as part of the Groundwater Hydraulic Containment and Water Treatment System. These trenches were intended to capture groundwater impacted by chlorinated solvents, hydrocarbons, chloride and total dissolved solids (TDS). A pumping test of the containment trenches was conducted in December of 2006 by CDM, for the purpose of obtaining aquifer and water quality parameters to aid in the design of the treatment facility. However, operation of the remedial system indicated that the design extraction rates appeared to be in excess of the production capacity of the trenches, resulting in frequent cycling and mechanical issues with the extraction system.

Activities described in this report where proposed to meet the objective of establishing an estimate of the potential extraction capacity of the containment trenches, and consisted of: 1) a site visit to locate and inspect the pumping wells for the groundwater containment trenches and nearby monitoring wells, and obtain access to wells that are still in operational condition, 2) a single 12-hour pumping test, and 3) assessment of aquifer properties and an estimate of sustainable groundwater extraction rates from the containment trenches.

Daniel B. Stephens & Associates, Inc.
6020 Academy NE, Suite 100 505-822-9400
Albuquerque, NM 87109 FAX 505-822-8877

Field Activities

Prior to initiating preparations for the pumping test, the status and accessibility of extraction and monitor wells was assessed, and access secured to well locations with the assistance of NMDOT personnel. The concrete vaults containing extraction wells TW-2 and TW-4 were found to be covered with steel trench plates and several inches of soil; the soil was excavated and trench plates removed. The vault containing extraction well TW-3 is secured with a hinged, locking access hatch. Extraction well TW-1 could not be located. Figure 1 shows the well locations.

Wells TW-2 and TW-4 were equipped with Grundfos Redi-Flo2 submersible electric pumps with variable frequency drives (VFDs). Pressure transducers were installed in the pumping wells, and in monitor wells TCAMW-07 and MW-09 (Figure 1). Water levels were also checked periodically in these wells, and well TW-3, using an electric water level sounder.

Flow rates were controlled by the VFD pump controller, and measured with a totalizing flow meter and/or calibrated bucket and stopwatch. Flow rates were monitored throughout the test and adjusted as necessary to maintain the appropriate rates. Field parameters were monitored at fixed intervals of approximately 30 minutes during the test for pH, electrical conductivity (EC), and temperature. The EC meter failed early in the test, and thus only pH and temperature were recorded.

Wells were initially pumped at a rate of 2 gallons per minute. Pumping rates were increased to 4 gpm after approximately 5 hours. Pumping from well TW-4 was further increased to 6 gpm at approximately 9 hours; the pumping rate at TW-2 remained at 4 gpm for the duration of the test. Pumping was ceased at each location after approximately 12 hours. Transducers were left in wells for an additional 6 hours to monitor water level recovery.

Groundwater extracted during the test was conveyed to two portable on-site temporary storage tanks, and later evacuated by NMDOT personnel and transported to the City of Las Vegas treatment facility for disposal. Following completion of field activities, the steel trench plates at TW-2 and TW-4 were replaced and covered with soil by NMDOT personnel.

Results and Analysis

Drawdown data were analyzed using the graphical method of Birsoy and Summers (1980), which is a modification Theis method designed to account for changing flow rates during a pumping test. Plots and calculations are presented in Attachment A. The data were also analyzed using AQTESOLV analytical software and a modified Cooper-Jacob straight-line method for variable-rate pumping tests. Output from the analytical program is presented in Attachment B.

Recovery data was not analyzed during this test, because the monitored recovery period was not of sufficient length.

Assumptions and Limitations

The method of Birsoy and Summers (1980) is a modification of Cooper-Jacob method and the Theis analytical equation, and incorporates the following assumptions:

1) the screened portion of the pumping well fully penetrates the aquifer
2) the static water table is flat and there are no other sources of discharge or recharge
3) water is instantaneously released from storage during pumping
4) an insignificant amount of water is stored in the borehole of the pumping well
5) the aquifer is homogenous, isotropic, and infinite

Assumption 1 is considered to have been met. The pumping wells are screened across the full thickness of the containment trenches, which were excavated to refusal at competent bedrock. The transmissivity of the underlying competent formation is considered negligible.

Although two trenches were pumped simultaneously, previous aquifer testing demonstrated that pumping effects were negligible in non-adjacent trenches (CDM, 2006). The static water table is not flat, but slopes to the east at approximately 0.02 ft/ft.

Time-drawdown curves from the later-time portion of this, and previous, tests exhibit a nearly straight-line trend when plotted in semi-log space, indicative of minimal delayed drainage.

The pumping wells are completed within containment trenches, which are backfilled with highly transmissive material. Thus, the “borehole” of each well effectively includes the volume of the containment trench. Due to the large storage capacity and highly transmissive nature of the containment trenches, withdrawal from storage in the trench constitutes a significant percentage of the discharge from the well during transient conditions. Because of the release of stored groundwater during the pumping phase, recovery period data may be more indicative of actual aquifer conditions.

The aquifer at the site is characterized by secondary porosity in fractured shale, and thus cannot be considered homogeneous or isotropic.

The Birsoy and Summers (1980) method, like the Cooper-Jacob method, is only valid for late-time pumping data and/or small distances from the pumping well. For the calculated values of storativity, transmissivity, and distance from the pumping locations, the time and distance criteria of the Birsoy-Summers method are not met for observation wells TCAMW-07 and MW-09.

Due to the above limitations, determinations of transmissivity and storativity should be considered approximations.

Results

Transmissivity values calculated from the test data range from 104.6 to 183.0 ft^2/day (Table 1). However, because release from trench storage constitutes a significant percentage of the discharge during the test, these determinations may be over-estimated by a factor of two or more. Taking half the calculated transmissivity values results in an estimated average value of 72 ft^2/day , which is only slightly greater than values determined from recovery data analyzed in the previous test (CDM, 2007). Due to the limitations of analyzing pumping data, the values determined from recovery tests may be more representative of aquifer conditions.

Storativity values calculated from drawdown in observations wells ranged from 0.005 in well TCAMW-07 to 0.003 in well MW-09. These values are consistent with the analytical results of the previous test. However, due to the lithology and unconfined nature of the aquifer, a value closer to 0.1 may be more representative of aquifer conditions.

Conclusions

Previous determinations of aquifer properties utilized an average of the transmissivity values calculated from recovery and pumping data. Based on observations during this test, release from storage in the containment trenches appears to constitute a significant portion of the discharge during transient conditions. Therefore, the significantly lower transmissivity values calculated from recovery data should be considered a better approximation of actual aquifer parameters. Yield calculations and capture zone analysis should be re-evaluated using the lower estimates of transmissivity.

Sustainable yields from containment trenches were estimated based on pumping data to range from 4.3 to 10.2 gpm, with a cumulative yield of 24.2 gpm (CDM, 2007). However, the provided data do not indicate that true steady-state conditions were achieved during the previous test, and the trench yield determination may therefore be an over-estimate. Subsequent operational difficulties at the containment trenches may be the result of trench dewatering due to over-pumping.

Steady-state conditions were not achieved during this test at trench wells TW-2 and TW-4 after 12 hours of pumping at maximum rates of 4 gpm and 6 gpm, respectively. Given that a significant portion of the extraction throughout the 12-hour test was derived from trench storage, sustainable steady-state groundwater extraction rates may be less than, or close to, 4 gpm from the tested trench wells, and the cumulative sustainable yield from the four containment trenches may be less than the previously estimated 24.2 gpm.

Because of these concerns, the previous design flow of 24.2 gpm should be considered an upper bound on estimates of extraction from the four containment trenches. However, trenches may be pumped at higher rates for extended periods, due to the large amount of storage contained within each trench. Trenches appeared to require 72 to 96 hours of recovery time to re-fill after dewatering, based on previous recovery data.

Sincerely,

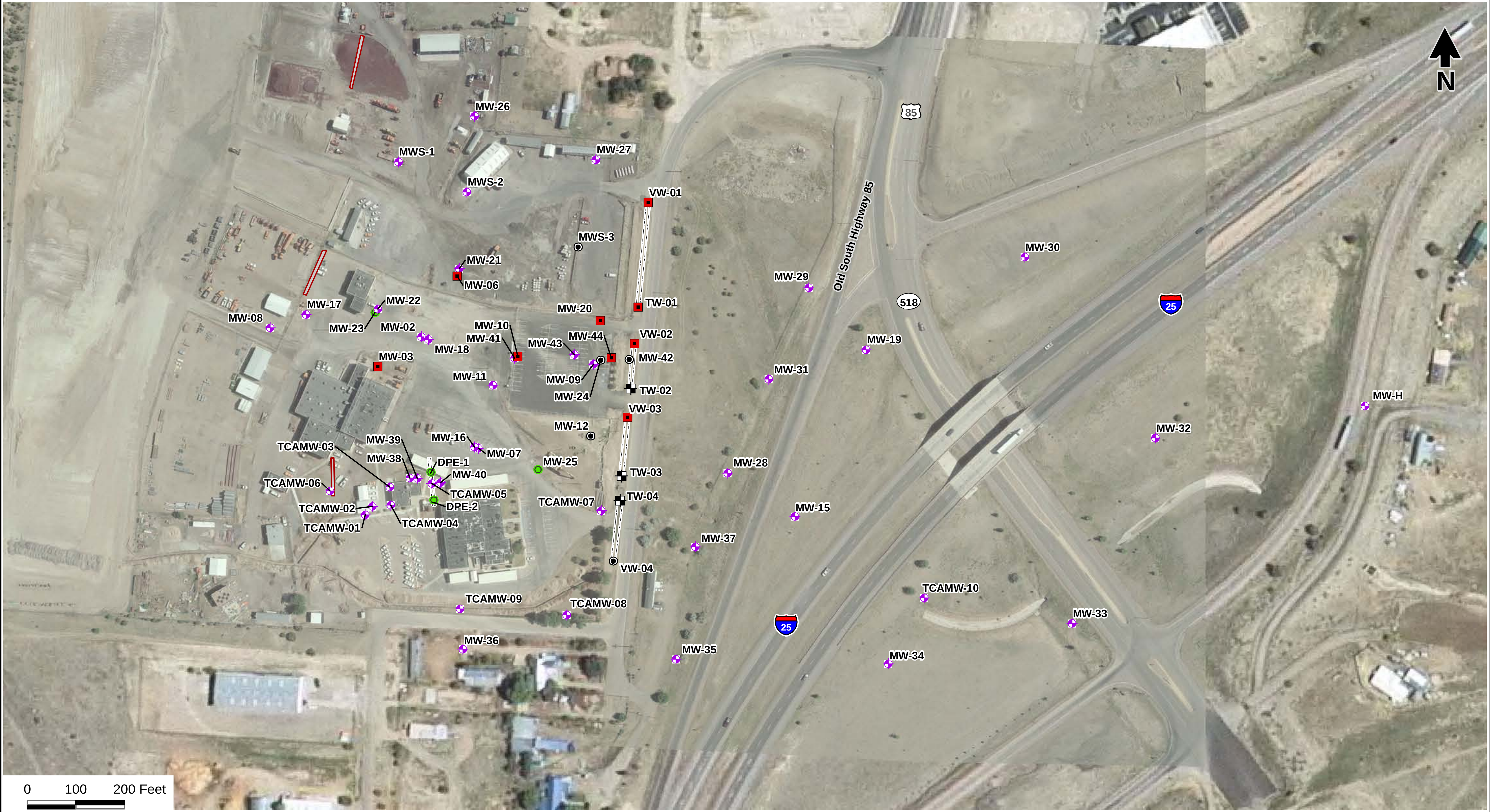
DANIEL B. STEPHENS & ASSOCIATES, INC.

Jason Raucci
Project Scientist

John R. Bunch, P.G.
Senior Scientist

JR/js
Attachments

Figure



Base Map Source: NMDOT aerial photograph dated June 24, 2006

Explanation

- Monitoring well
- Groundwater recovery well
- Groundwater containment trench extraction well
- Well casing blocked
- Well destoyed, plugged and abandoned or not located
- Extraction trench
- Infiltration gallery

NMDOT DISTRICT 4 PATROL YARD

Well Location Map

Figure 1

Daniel B. Stephens & Associates, Inc.
05/04/2012
JN ES11.0195.03

Path: S:\Projects\ES11.0195_NMDOT_EGB\ES11.0195.03_Las_Vegas\GIS\MXDs\Well_location_map.mxd

Table

Table 1. Results of Pumping Tests
NMDOT District 4 Patrol yard, Las Vegas, New Mexico

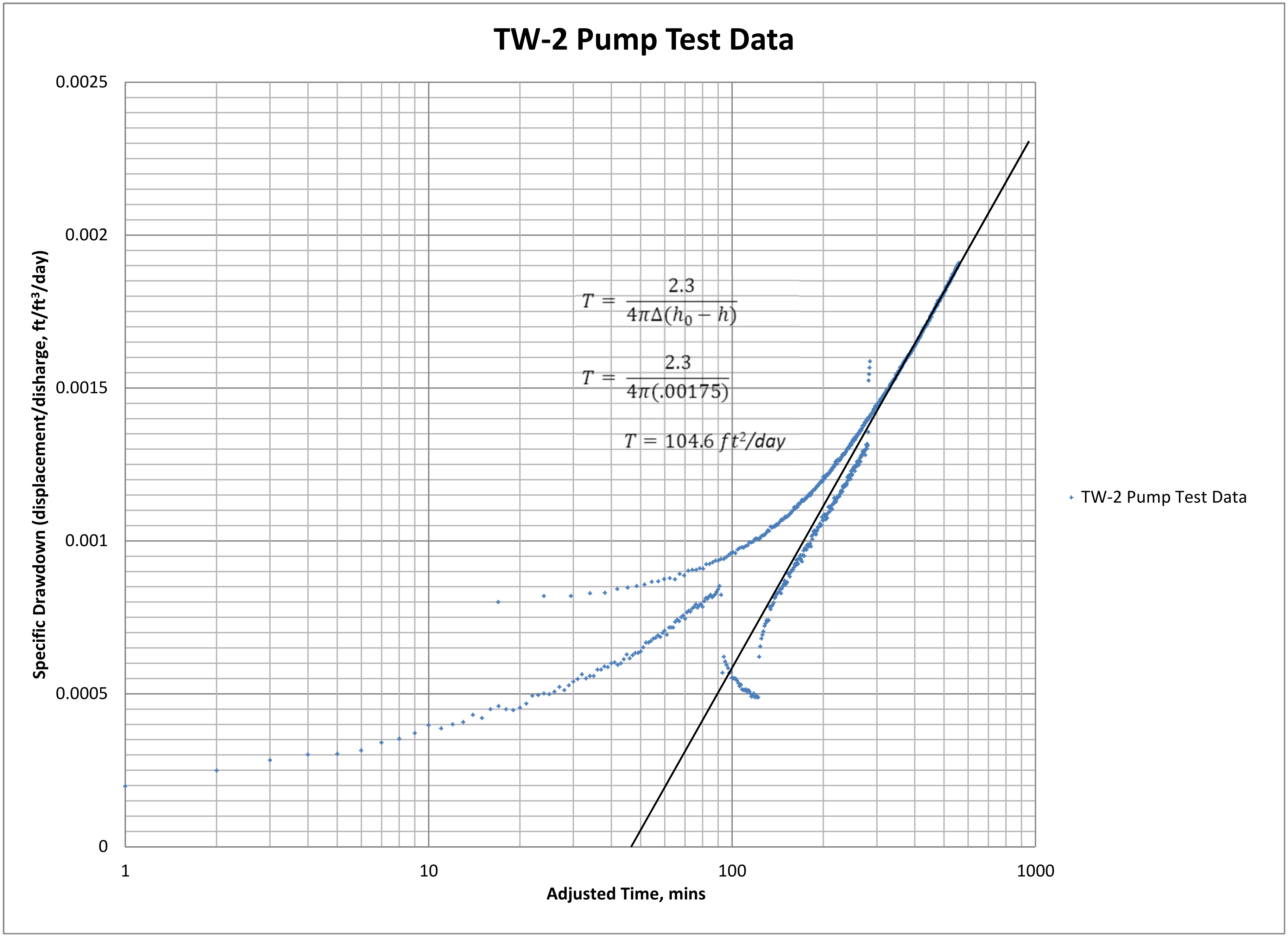
Pumping Well	Observation Well	Transmissivity (ft^2/d)	Storativity	Analysis Method
DBSA Pumping Test, April 12-13 2012				
TW-02	TW-02	104.6	---	BS
		112.5	---	CJ[1]
	MW-9	146.6	0.0036	BS
		142.3	0.0037	CJ[1]
TW-04	TW-04	152.5	---	BS
		160.8	---	CJ[1]
	TCAMW-07	183	0.005	BS
		149.4	0.0052	CJ[1]
CDM Pumping Test, December 6-15, 2006				
TW-1	MW-20	207	---	CJ
	MW-42	125	0.0066	CJ
	MW-43	120	0.012	CJ
	MW-44	111	0.006	CJ
	TW-1 (recovery)	36.9	0.01	CJ
TW-2	MW-9	175.4	0.003	CJ
	MW-42	75.5	0.168	CJ
	MW-43	311	0.0028	CJ
	MW-44	144	0.004	CJ
	MW-2 (recovery)	26.4	---	CJ
	MW-42 (recovery)	60.9	---	CJ
	TW-2 (recovery)	70.6	---	CJ
TW-3	MW-42	375	0.0025	CJ
	MW-43	470	0.0025	CJ
	MW-44	446	0.0027	CJ
TW-04	TW-3	179	---	CJ
	TW-3 (recovery)	22.5	---	CJ

ft^2/d = Square feet per day
ft/d = Feet per day
BS = method of Birsoy and Summers (1980) for analysis of variable-discharge pumping tests
CJ = Cooper-Jacob straight-line method,
CJ[1] = Cooper-Jacob straight-line method, modified for analysis of variable discharge pumping tests; run in AQTESOLV analytical software
--- = not analyzed

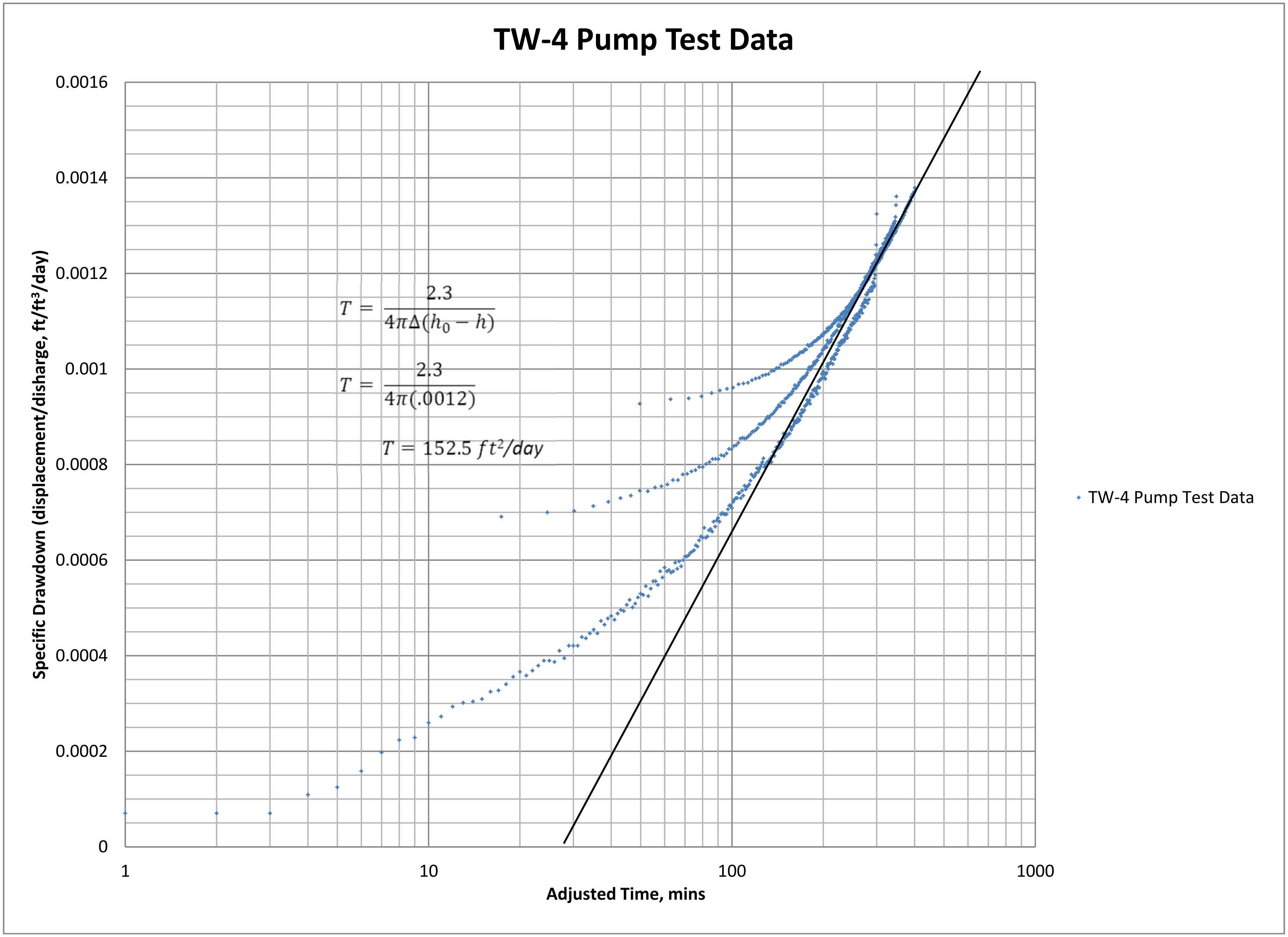
Attachment

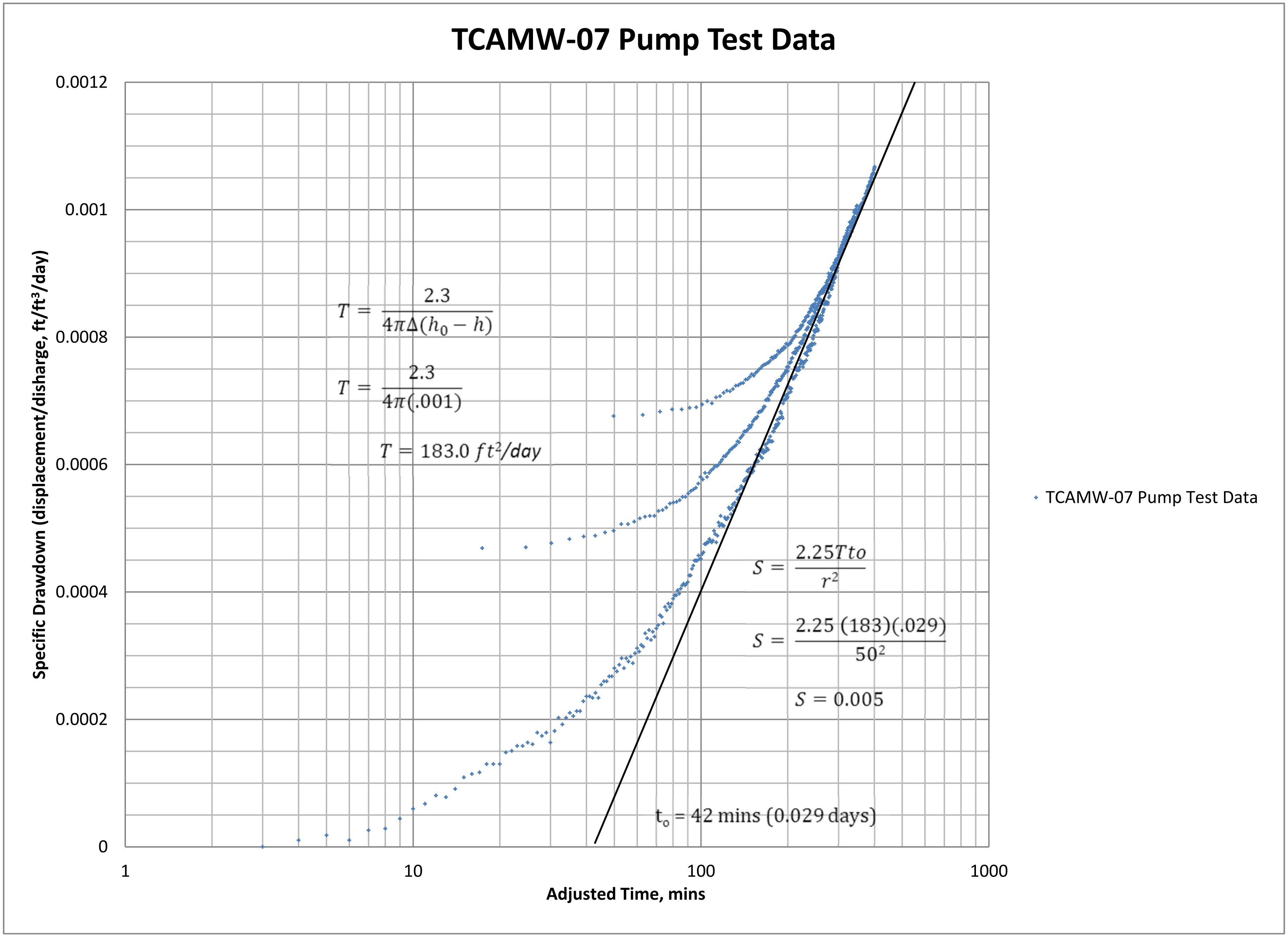
Attachment A

Pump Test Data Analysis

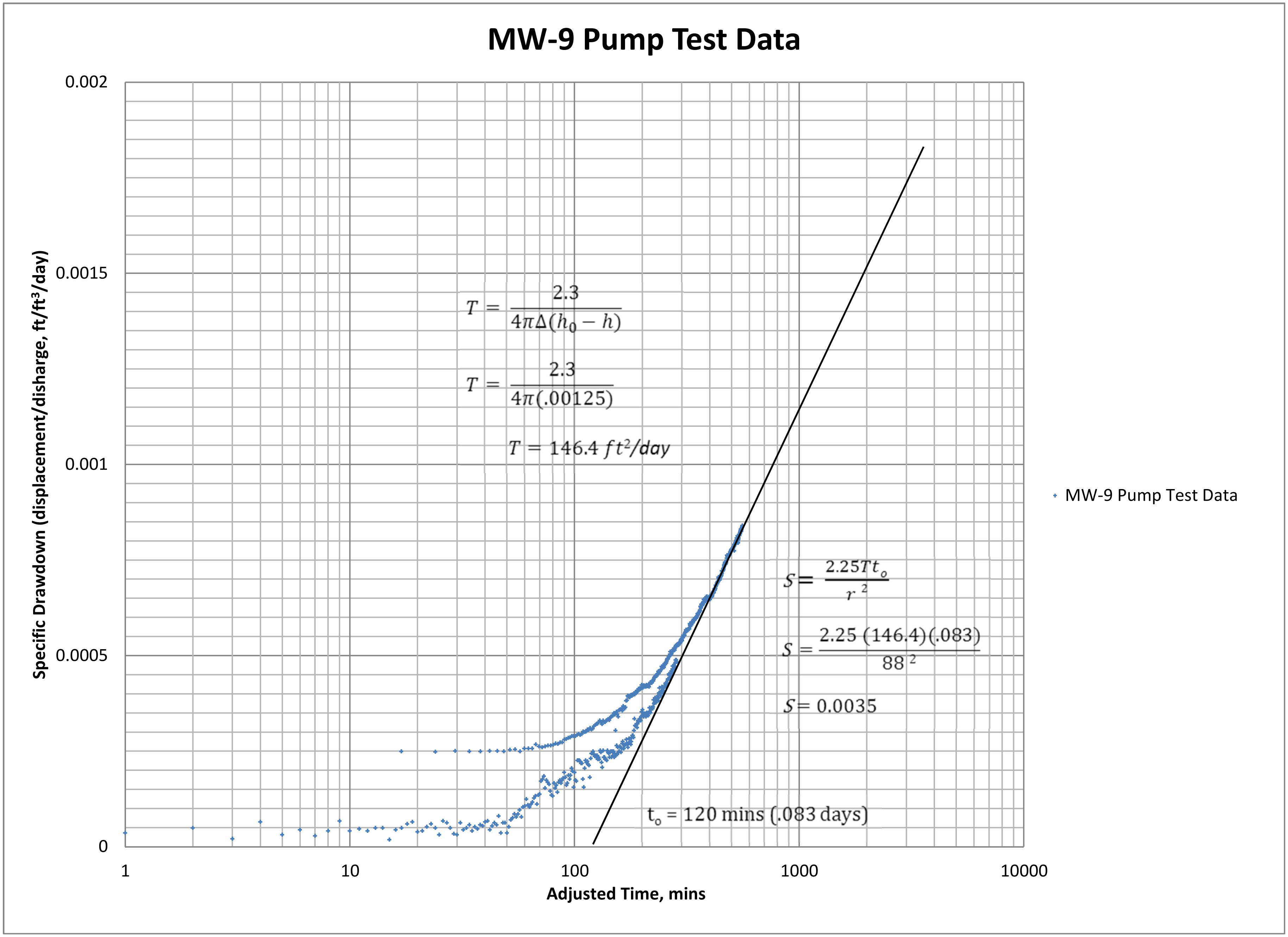


TW-2 Pump Test Data
0.0025
0.002
0.0015
0.001
0.0005
0
Specific Drawdown (displacement/disharge, ft/ft³/day)
1
10
100
1000
Adjusted Time, mins
$T = \frac{2.3}{4\pi\Delta(h_0 - h)}$
$T = \frac{2.3}{4\pi(.00175)}$
$T = 104.6\ ft^2/day$
TW-2 Pump Test Data


TW-4 Pump Test Data
Specific Drawdown (displacement/disharge, ft/ft³/day)
Adjusted Time, mins
0.0016
0.0014
0.0012
0.001
0.0008
0.0006
0.0004
0.0002
0
1
10
100
1000
$T = \frac{2.3}{4\pi\Delta(h_0 - h)}$
$T = \frac{2.3}{4\pi(.0012)}$
$T = 152.5\ ft^2/day$
TW-4 Pump Test Data

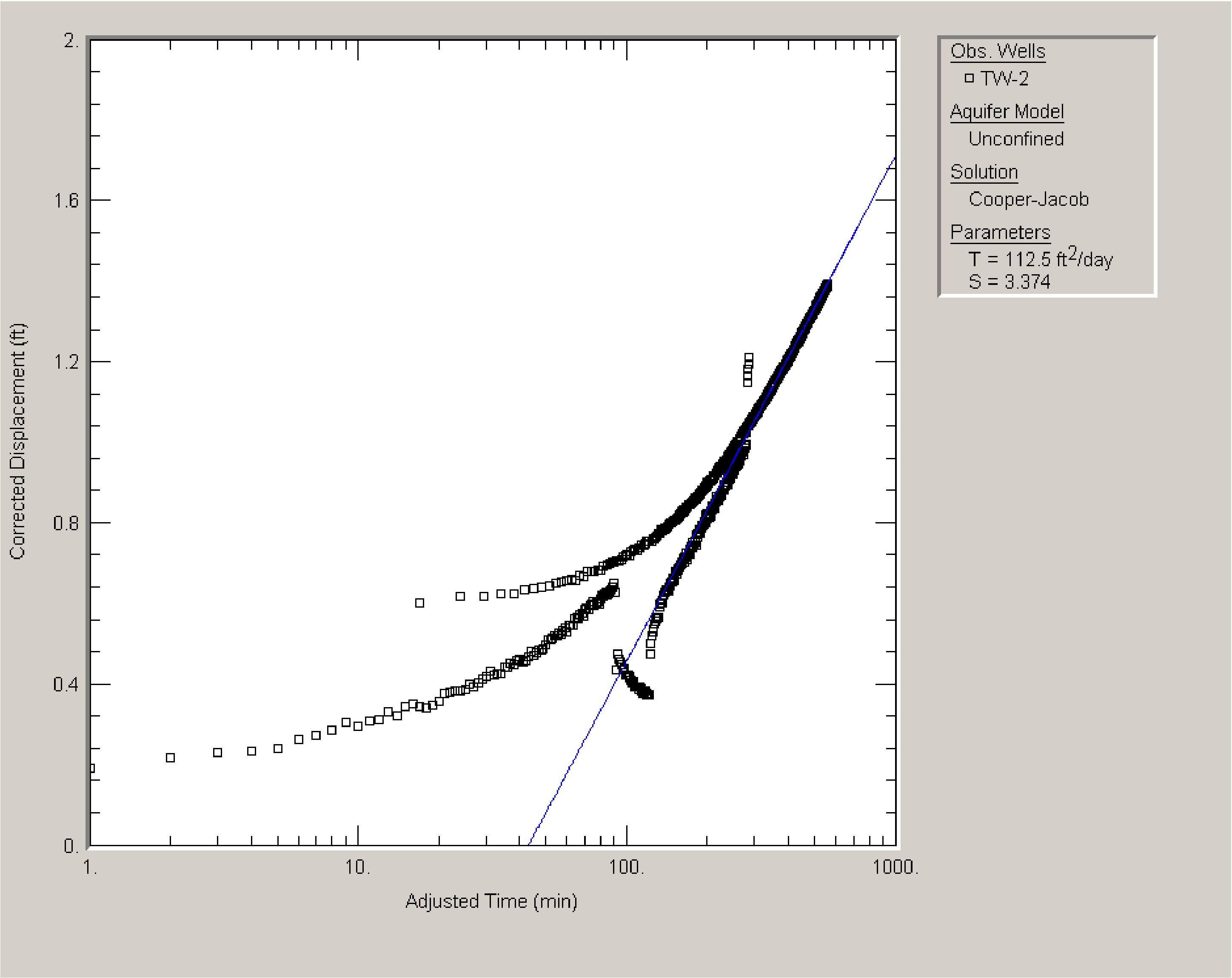


TCAMW-07 Pump Test Data
0.0012
0.001
0.0008
0.0006
0.0004
0.0002
0
1
10
100
1000
Adjusted Time, mins
Specific Drawdown (displacement/disharge, ft/ft³/day)
$T = \frac{2.3}{4\pi\Delta(h_0 - h)}$
$T = \frac{2.3}{4\pi(.001)}$
$T = 183.0\ ft^2/day$
$S = \frac{2.25Tto}{r^2}$
$S = \frac{2.25\ (183)(.029)}{50^2}$
$S = 0.005$
t_o = 42 mins (0.029 days)
TCAMW-07 Pump Test Data

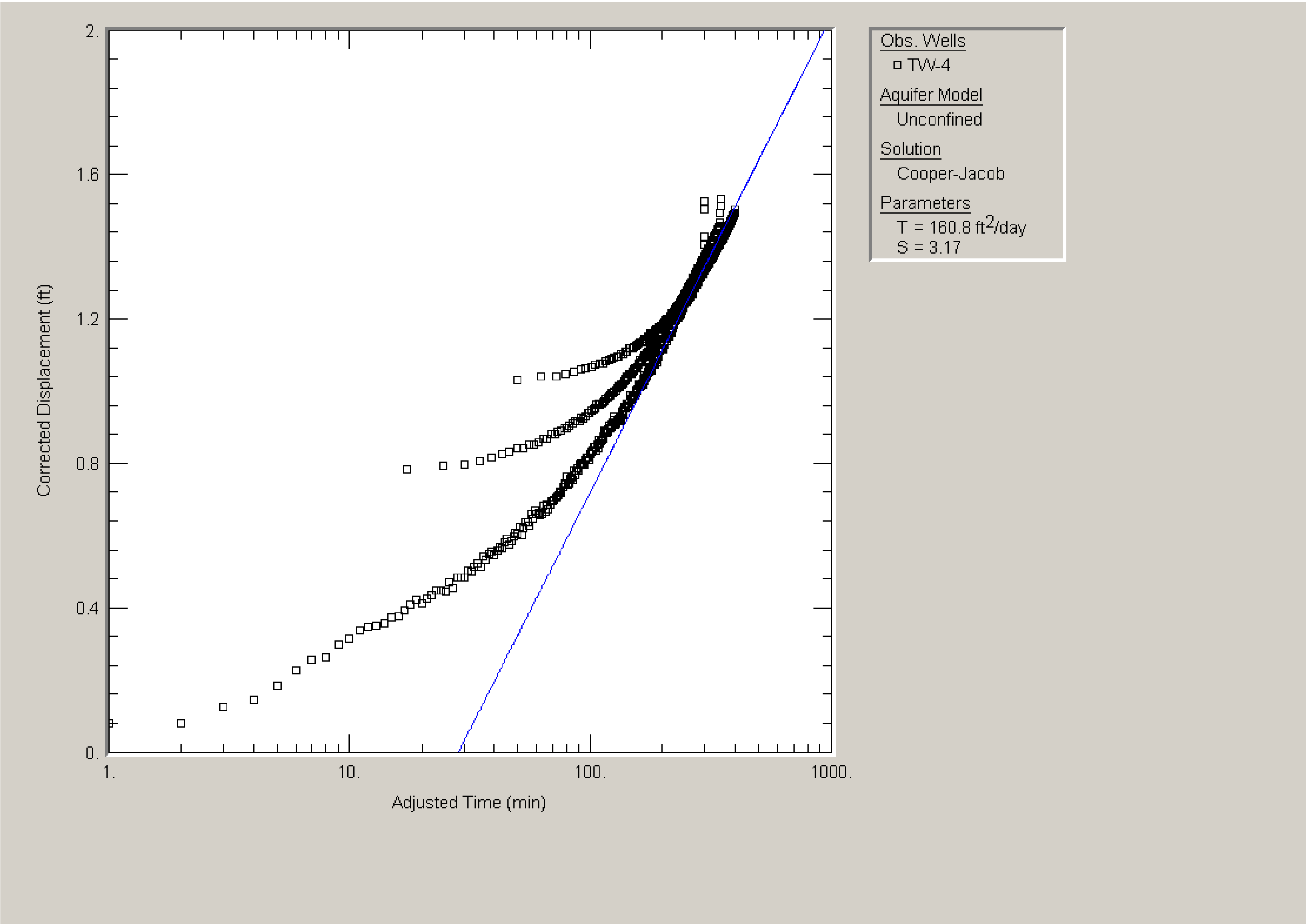

MW-9 Pump Test Data
Specific Drawdown (displacement/dishsarge, ft/ft³/day)
0.002
0.0015
0.001
0.0005
0
1
10
100
1000
10000
Adjusted Time, mins
$T = \frac{2.3}{4\pi\Delta(h_0 - h)}$
$T = \frac{2.3}{4\pi(.00125)}$
$T = 146.4\ ft^2/day$
$S = \frac{2.25Tt_o}{r^2}$
$S = \frac{2.25\ (146.4)(.083)}{88^2}$
$S = 0.0035$
t_o = 120 mins (.083 days)
MW-9 Pump Test Data

Attachment B

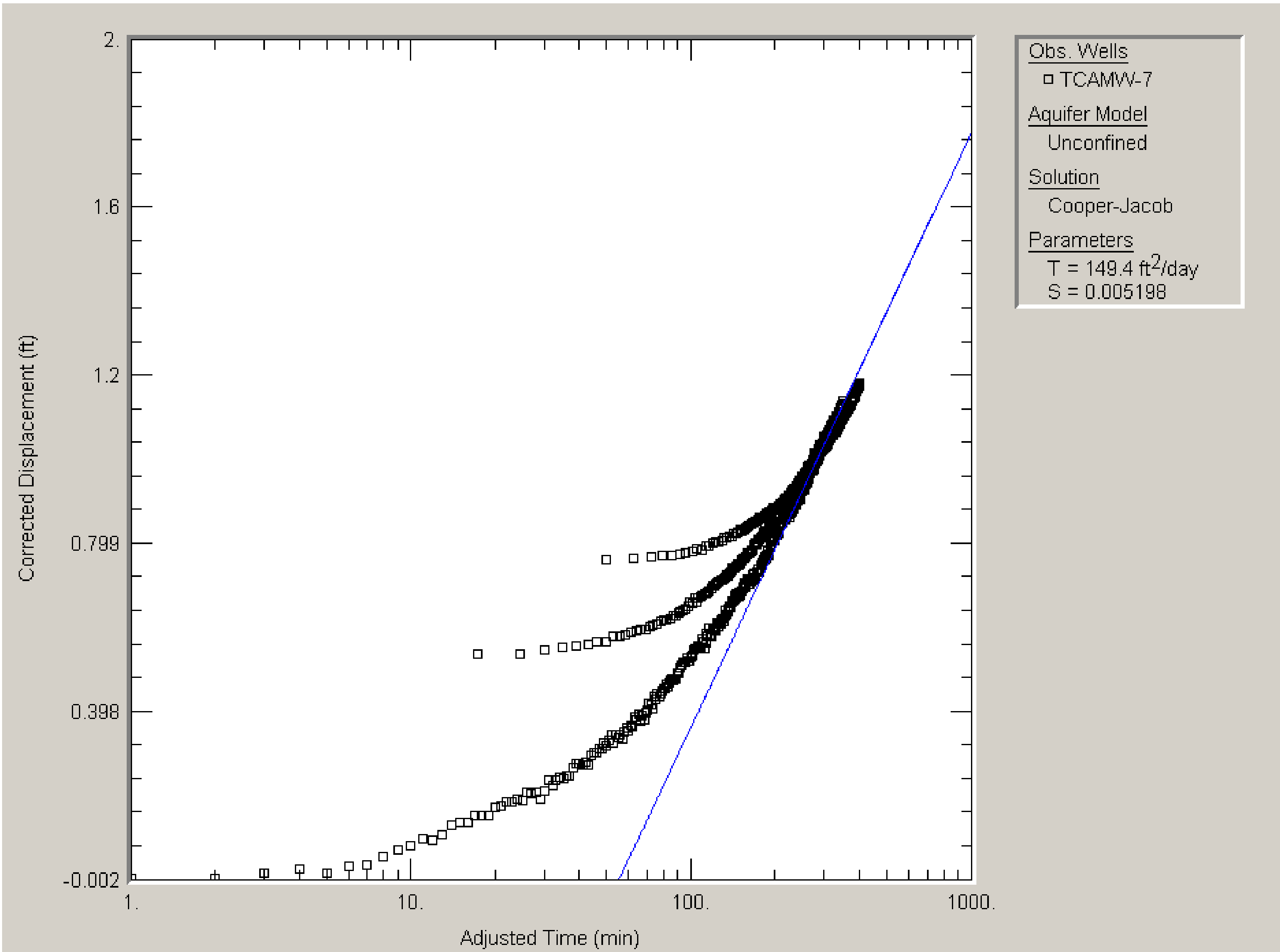
AQTESOLV Plots



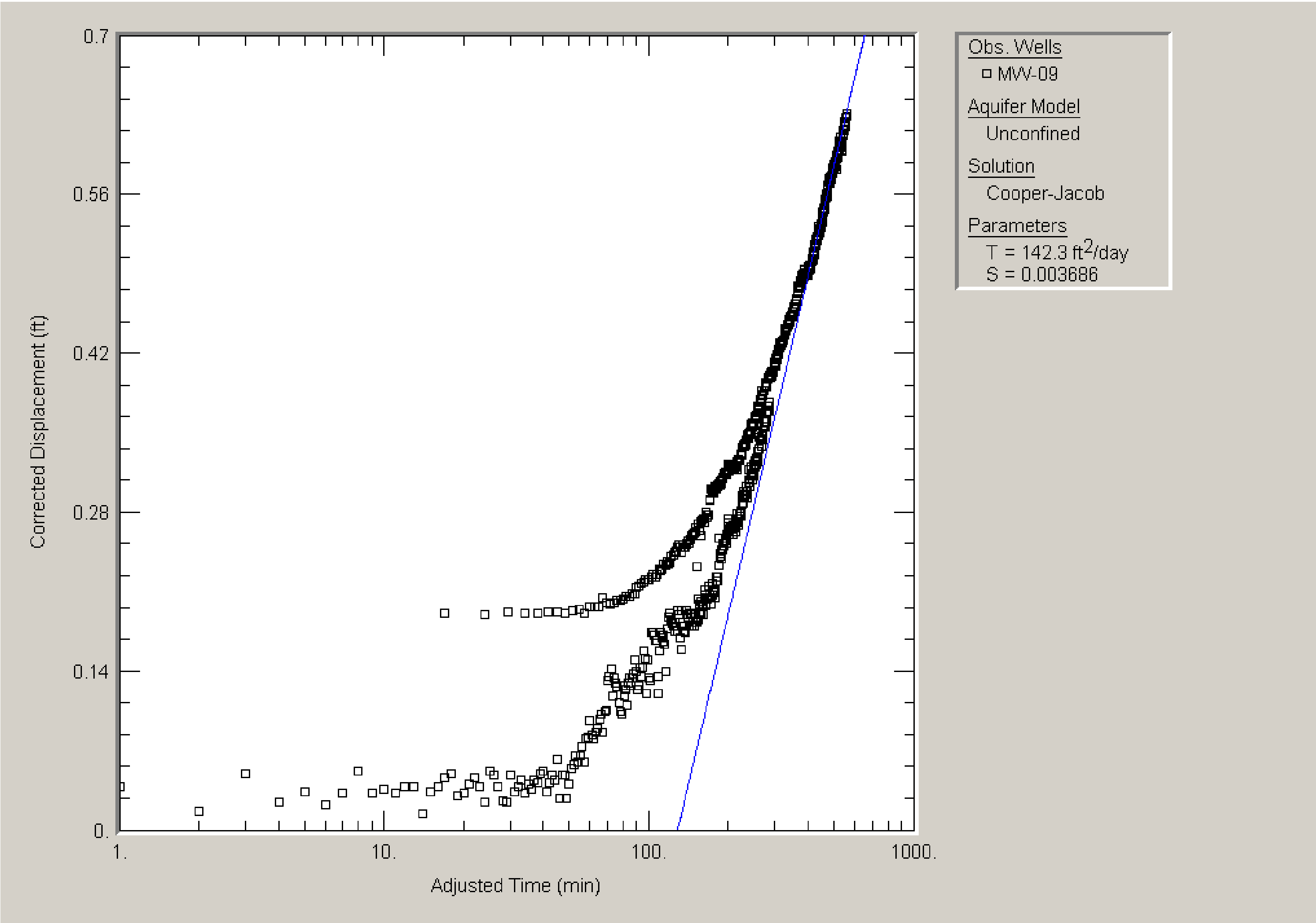
2.
1.6
1.2
0.8
0.4
0.
1.
10.
100.
1000.
Corrected Displacement (ft)
Adjusted Time (min)
Obs. Wells
TW-2
Aquifer Model
Unconfined
Solution
Cooper-Jacob
Parameters
T = 112.5 ft2/day
S = 3.374



Obs. Wells
TW-4
Aquifer Model
Unconfined
Solution
Cooper-Jacob
Parameters
T = 160.8 ft^2/day
S = 3.17
Corrected Displacement (ft)
Adjusted Time (min)
2.
1.6
1.2
0.8
0.4
0.
1.
10.
100.
1000.



Obs. Wells
TCAMW-7
Aquifer Model
Unconfined
Solution
Cooper-Jacob
Parameters
T = 149.4 ft2/day
S = 0.005198
Corrected Displacement (ft)
Adjusted Time (min)
2.
1.6
1.2
0.799
0.398
-0.002
1.
10.
100.
1000.



0.7
0.56
0.42
0.28
0.14
0.
Corrected Displacement (ft)
1.
10.
100.
1000.
Adjusted Time (min)
Obs. Wells
MW-09
Aquifer Model
Unconfined
Solution
Cooper-Jacob
Parameters
T = 142.3 ft2/day
S = 0.003686

Source B

GENERAL NOTES:

1. UTILITY LOCATIONS ARE BASED ON DETAILED SITE SURVEY COMPLETED BY COBB FENDLEY IN SEPTEMBER 2019. ANY DEVIATIONS FROM THE LOCATIONS SHOWN SHALL BE BROUGHT TO THE ENGINEER'S ATTENTION IMMEDIATELY.

KEY NOTES:

1. INSTALL HORIZONTAL EXTRACTION WELL PER DWG C-3
2. INSTALL CONVEYANCE LINE PER DWG C-4
3. INSTALL SEWER DISCHARGE LINE PER DWG C-5
4. INSTALL REMEDIATION SYSTEM PER DWG'S C-2, M-1, M-2
5. DEMOLISH AND DISPOSE OF EXISTING CONCRETE WALLS, SLAB AND OVERGROWN VEGETATION.

KEY NOTES SANITARY/STORM DRAIN MANHOLES:

1. SSMH 200 3896
RIM ELEV. = 6421.36
12" PVC INV.(N) = 6410.48
12" PVC INV.(S) = 6410.57
12" PVC INV.(W) = 6410.64
2. SDMH 100 3895
RIM ELEV. = 6420.68
UNABLE TO OPEN
3. SDMH 101 3928
RIM ELEV. = 6419.74
UNABLE TO OPEN
4. SSMH 201 3849
RIM ELEV. = 6420.02
12" PVC INV.(N) = 6409.15
12" PVC INV.(E) = 6409.08
5. SSMH 202 1286
RIM ELEV. = 6419.48
PIPE SIZE AND MATERIAL NOT ACCESSIBLE
(N) = 6409.03
12" PVC INV.(E) = 6408.43
12" PVC INV.(NW) = 6408.97
6. SDMH 102 1000
RIM ELEV. = 6419.61
UNABLE TO OPEN
7. SDMH 105 4154
RIM ELEV. = 6418.12
24" RCP INV.(N) = 6411.68
60" RCP INV.(E) = 6403.53
UNABLE TO GET INV.(S)
48" CMP INV.(W) 6402.92
8. SSMH 203 1448
RIM ELEV. = 6416.59
4" STEEL INV.(NE) = 6410.27
12" STEEL INV.(S) = 6407.19
12" STEEL INV.(W) = 6407.44

S:\PROJECTS\DB18.1277_LAS_VEGAS_TRIPLE_SITE\CAD\C-1 GENERAL SITE PLAN.DWG December 27, 2019 - 2:14 PM BY: THOMAS, RYAN

REV. NO.	DATE	DESCRIPTION	APPROVED BY

DATE OF ISSUE: 12/31/19
DESIGNED BY: TH
DRAWN BY: JA/RT
CHECKED BY: KJ
APPROVED BY: TG

DBS&A
Daniel B. Stephens & Associates, Inc.
engineering geoscience hydrology
6020 Academy Rd. NE, Suite 100
Albuquerque, NM 87109-3315

NEW MEXICO ENVIRONMENT DEPARTMENT
PETROLEUM STORAGE TANK BUREAU
2905 RODEO PARK DRIVE EAST
SANTA FE, NEW MEXICO 57505

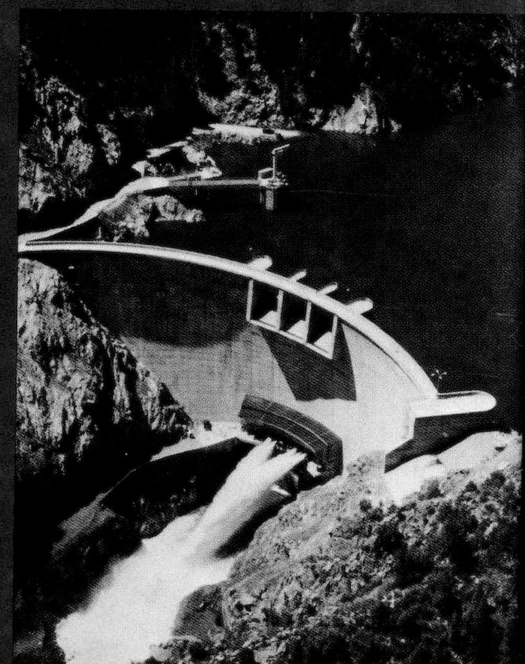
ROSS TEXACO, PINO FINA, AND ATEX 394
GROUNDWATER REMEDIATION SYSTEM INSTALLATION
LAS VEGAS, NEW MEXICO

GENERAL SITE PLAN

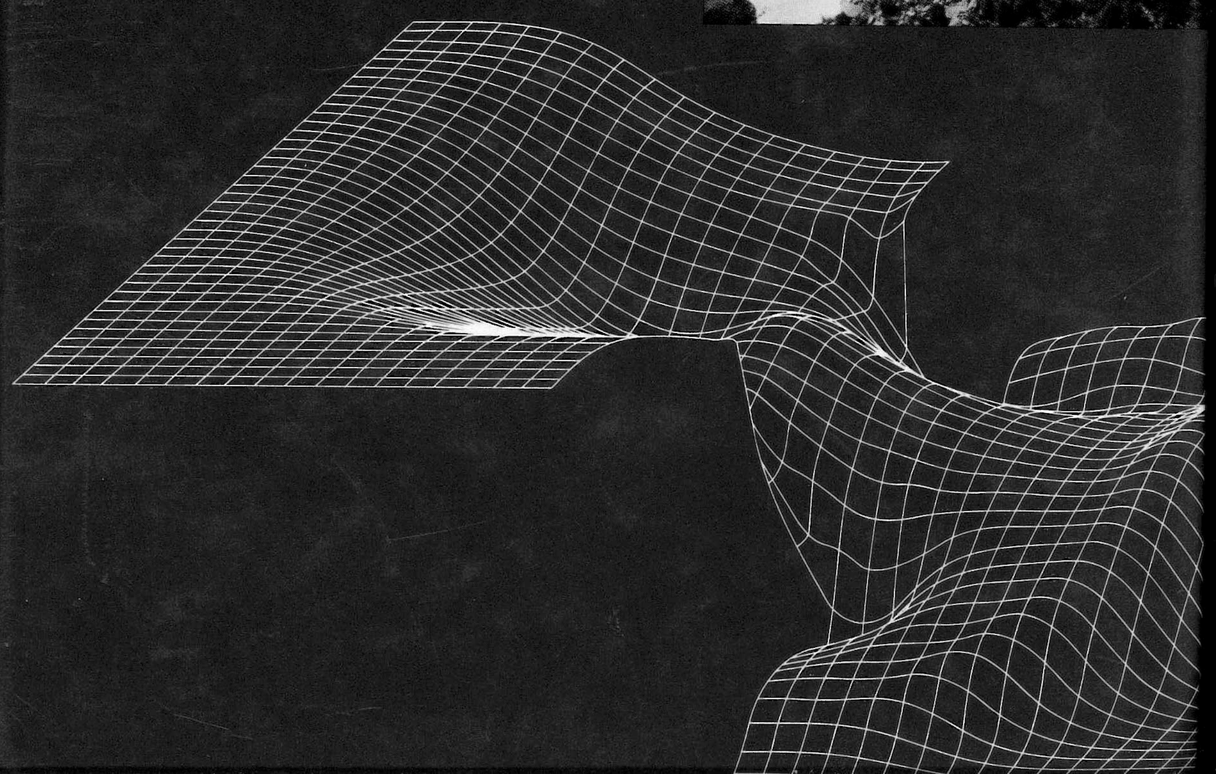
SHT. 4 OF 11
DWG NO. C-1

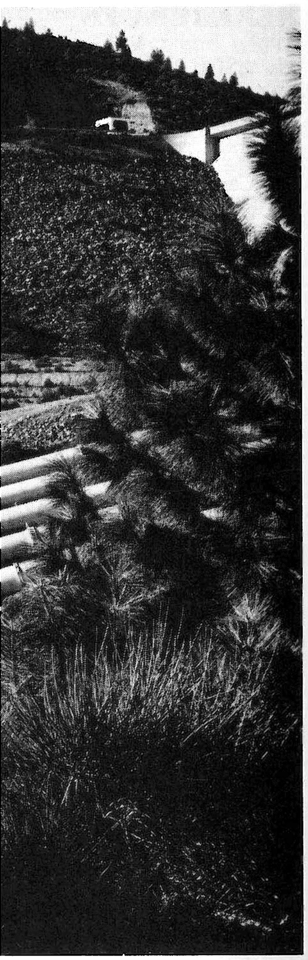
JOB NO. DB18.1277

Hydraulic Engineering



Roberson
Cassidy
Chaudhry





low

Source 1

5-1 General Considerations

In the design and operation of a pipeline, the main considerations are head losses, forces and stresses acting on the pipe material, and discharge. Head loss for a given discharge relates to flow efficiency; that is, an optimum size of pipe will yield the least overall cost of installation and operation for the desired discharge. Choosing a small pipe results in low initial costs; however, subsequent costs may be excessively large because of high energy cost from large head losses. Forces and stresses mainly result from fluid pressure in a pipe. Forces are also created by momentum change associated with flow around bends or through other types of pipe fittings.

The basic continuity, energy, and momentum equations of fluid mechanics are used in the solution of pipe-flow problems. For example, to design a pipe, you would use the continuity and energy equations to obtain the required pipe diameter. Then applying the momentum equation will yield the forces acting on bends for a given discharge. Applications of the aforementioned equations in the design and analysis of conduits are treated in this chapter. The energy equation is considered first.

5-2 Energy Equation

The initial design of a conduit involves determining the size of the conduit with the least cost for a required discharge. This cost includes first cost plus operating and maintenance costs. We only briefly discuss the economic aspect of conduit design. The hydraulic aspects of the problem require applying the one-dimensional steady flow form of the energy equation:

$$\frac{p_1}{\gamma} + \alpha_1 \frac{V_1^2}{2g} + z_1 + h_p = \frac{p_2}{\gamma} + \alpha_2 \frac{V_2^2}{2g} + z_2 + h_t + h_L \qquad (5\text{-}1)$$

where p/γ = pressure head
$\alpha V^2/2g$ = velocity head
z = elevation
h_p = head supplied by a pump
h_t = head supplied to a turbine
h_L = head loss between sections 1 and 2

A typical graphical representation of the terms of Eq. (5-1) is shown in Fig. 5-1. We give further explanation of the terms of Eq. (5-1) in the following paragraphs.

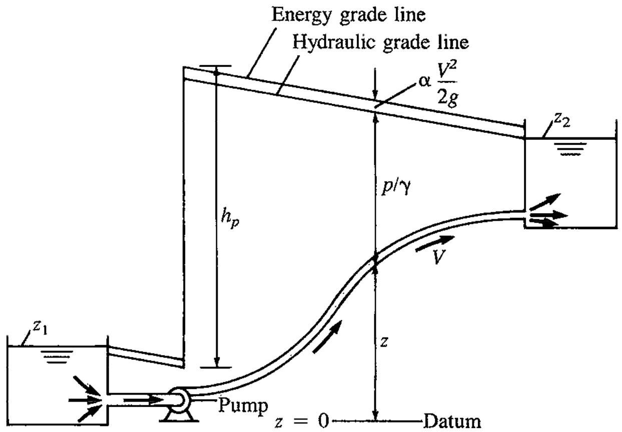


Figure 5-1 Definition sketch for terms in the energy equation

Velocity Head

In $\alpha V^2/2g$, the velocity V is the mean velocity in the conduit at a given section and is obtained by $V = Q/A$, where Q is the discharge, and A is the cross-sectional area of the conduit. The kinetic energy correction factor is given by α, and its definition is

$$\alpha = \frac{\int_A u^3\, dA}{V^3 A} \tag{5-2}$$

where u = velocity at any point in the section.

In Eq. (5-2), the integration is carried out over the cross section of the pipe. It can be shown that α has a minimum value of unity when the velocity is uniform across the section, and that it has values greater than unity depending on the degree of velocity variation across a section. It can also be shown that if laminar flow occurs in a pipe, the velocity distribution across the section will be parabolic, and α will have a value of 2.0 (36). However, if the flow is turbulent, as is the usual case for water flow in large conduits, the velocity is fairly uniform over most of the conduit section, and α has a value near unity (typically: $1.04 < \alpha < 1.06$). Therefore, in hydraulic engineering, for ease of application in pipe flow, the value of α is usually assumed to be unity, and the velocity head is then simply $V^2/2g$.

Head Loss Using the Hazen-Williams Formula

The head loss formulas we have presented up to now are general because they are applicable for any fluid and any system of units. Other more restrictive empirical equations are also useful for their limited range of application. The most notable one, used for decades by waterworks engineers in the United States, is the Hazen-Williams formula. In English units, the formula is given in Eq. (5-12):

$$V = 1.318 C_h R^{0.63} S^{0.54} \tag{5-12}$$

where V = mean velocity in ft/s
C_h = Hazen-Williams friction coefficient (depends on pipe roughness)
R = hydraulic radius in ft
$S = h_f/L$ (slope of energy grade line)

To solve for head loss using the Hazen-Williams equation, a little algebraic manipulation of Eq. (5-12) yields

$$h_f = 3.02 L D^{-1.167} \left(\frac{V}{C_h}\right)^{1.85} \tag{5-13}$$

The resistance coefficient C_h depends on the surface characteristics of the pipe

Table 5-2 Hazen-Williams C_h Values for Different Kinds of Pipe (5)

Character of Pipe	C_h
New or in excellent condition cast-iron and steel pipe with cement or bituminous linings centrifugally applied, concrete pipe centrifugally spun, cement-asbestos pipe, copper tubing, brass pipe, plastic pipe, and glass pipe	140
Older pipe listed above in good condition, and cement mortar-lined pipes in place with good workmanship, larger than 24 in. in diameter	130
Cement mortar-lined pipe in place, small diameter with good workmanship or large diameter with ordinary workmanship; wood stave; tar dipped cast-iron pipe new or old in inactive water	120
Old unlined or tar-dipped cast-iron pipe in good condition	100
Old cast-iron pipe severely tuberculated, or any pipe with heavy deposits	10–80

Source 2

WATER RESOURCES ENGINEERING

Ralph A. Wurbs ▪ Wesley P. James

Library of Congress Cataloging-in-Publication Data

Wurbs, Ralph Allen,
Water resources engineering / Ralph A. Wurbs, Wesley P. James.
p. cm.
Includes bibliographical references and index.
ISBN 0-13-081293-5
1. Hydraulic engineering. 2. Water resources development. 3. Hydrology. 4.
Water-supply--Management. I. James, Wesley P. II. Title.
TC145 W87 2001
627–dc21

2001054873

Vice President and Editorial Director, ECS: *Marcia J. Horton*
Acquisitions Editor: *Laura Fischer*
Editorial Assistant: *Erin Katchmar*
Vice President and Director of Production and Manufacturing, ESM: *David W. Riccardi*
Executive Managing Editor: *Vince O'Brien*
Managing Editor: *David A. George*
Production Editor: *Wendy Druck*
Composition: *Techbooks*
Director of Creative Services: *Paul Belfanti*
Creative Director: *Carole Anson*
Art Director: *Jayne Conte*
Art Editor: *Greg Dulles*
Cover Designer: *Bruce Kenselaar*
Manufacturing Manager: *Trudy Pisciotti*
Manufacturing Buyer: *Lynda Castillo*
Marketing Manager: *Holly Stark*

Prentice Hall

Prentice-Hall, Inc.
Upper Saddle River, NJ 07458

The author and publisher of this book have used their best efforts in preparing this book. These efforts include the development, research, and testing of the theories and programs to determine their effectiveness. The author and publisher make no warranty of any kind, expressed or implied, with regard to these programs or the documentation contained in this book. The author and publisher shall not be liable in any event for incidental or consequential damages in connection with, or arising out of, the furnishing, performance, or use of these programs.

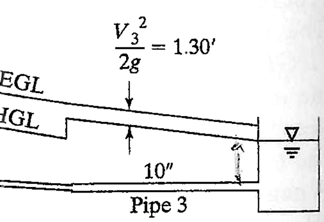
Printed in the United States of America

10 9 8 7 6 5 4 3

ISBN 0-13-081293-5

Pearson Education Ltd., *London*
Pearson Education Australia Pty. Ltd., *Sydney*
Pearson Education Singapore, Pte. Ltd.
Pearson Education North Asia Ltd., *Hong Kong*
Pearson Education Canada, Inc., *Toronto*
Pearson Educacíon de Mexico, S.A. de C.V.
Pearson Education—Japan, *Tokyo*
Pearson Education Malaysia, Pte. Ltd.
Pearson Education, *Upper Saddle River, New Jersey*

Content



$\overline{5} = 6.34$ fps

$\overline{9} = 14.3$ fps

$\overline{5} = 9.16$ fps

iction, transitions, valves, bends, and
erally the major component of head-
lected. Headlosses caused by transi-
as minor losses and in short pipelines
.

eadloss caused by pipe friction can be
on, Hazen–Williams equation, or the
rcy-Weisbach equation is

$$\frac{V^2}{2g} \quad \textbf{(4.5)}$$

n of the pipe, and D is the diameter
mated from the Moody diagram in
mber (Re $= DV/\nu$) of the flow and
most pipelines, the flow will be fully

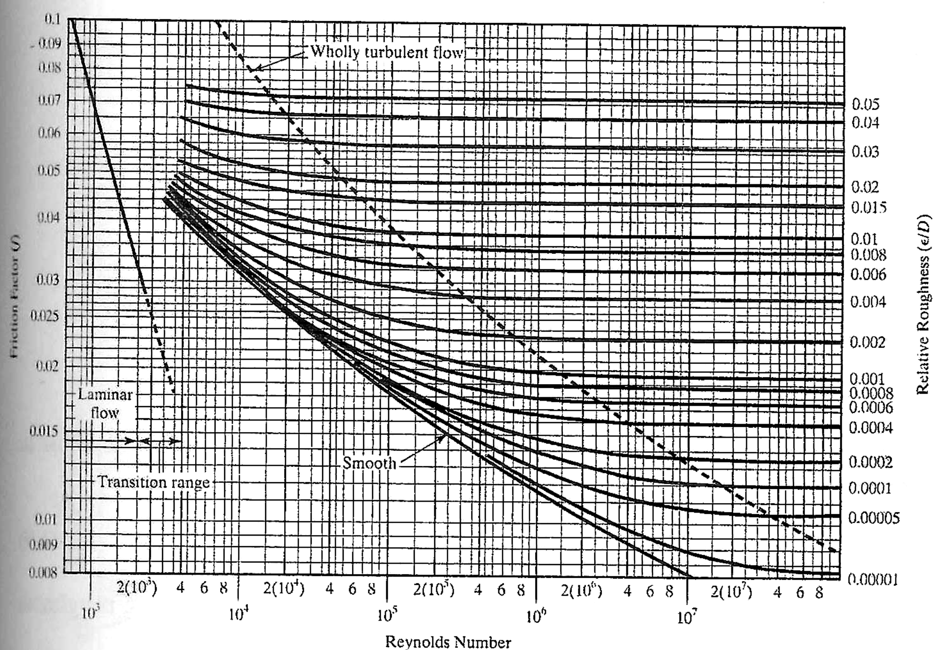


Figure 4.4 Moody diagram of Darcy-Weisbach friction factors.

The hydraulic radius (R) is defined as the area (A) of the flow cross-section divided by the wetted perimeter (P). For a circular pipe flowing full

$$R = \frac{A}{P} = \frac{\frac{1}{4}\pi D^2}{\pi D} = \frac{1}{4}D \qquad \textbf{(4.6)}$$

For noncircular pipes, the headloss can be estimated using the equations for circular pipe with $4R$ substituted for D. Pipe roughness values are listed in Table 4.1 for common pipe materials.

After a pipe has been in service for some time, the diameter and roughness of the pipe may change, and it may be difficult to estimate the roughness of the pipe. The Hazen–Williams equation is often used in pipe network analysis. Tables are available relating the Hazen–Williams coefficient (C_H) to the age of the pipe.

The Hazen–Williams equation is

$$Q = C_w C_H A R^{0.63} S^{0.54} \qquad \textbf{(4.7)}$$

where $C_w = 0.85$ for International System (SI) units [1.318 for British Gravitational (BG) units] and S is the slope of energy line. Writing the Hazen–Williams equation for headloss gives

$$H_L = S \times L = L\left(\frac{4}{D}\right)^{1.17}\left(\frac{V}{C_w C_H}\right)^{1.85} \qquad \textbf{(4.8)}$$

TABLE 4.1 PIPE ROUGHNESS VALUES

Material	ε mm	C_H Hazen–Williams	n Manning
Plastic, PVC	0.001	150	0.009
Asbestos cement	—	140	0.011
Welded steel	0.045	120	0.012
Riveted steel	0.9–9	110	0.015
Concrete	0.3–3	130	0.012
Asphalted iron	0.12	—	0.013
Galvanized iron	0.15	—	0.016
Cast iron (new)	0.25	130	0.013
Cast iron (old)	—	100	0.025
Corrugated metal	—	—	0.025

The Manning equation is commonly used to estimate the friction headlo culverts and storm sewers. The Manning equation is

$$Q = \frac{C_m}{n} AR^{2/3}S^{1/2}$$

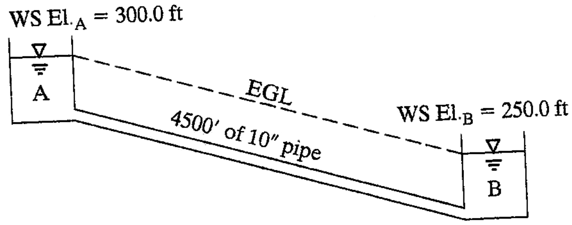
where $C_m = 1.00$ for SI units (1.49 for BG units) and n is the Manning roug coefficient. Writing the Manning equation for headloss gives

$$H_L = S \times L = \frac{n^2V^2L}{C_m^2R^{4/3}}$$

Example 4.2 Pipe Friction

Two reservoirs are connected with a 10-inch diameter pipeline 4500 ft long pipe roughness is 0.005 inches, determine the discharge rate in the pipeline. N minor losses.

Pipe roughness = 0.005 in



$$\text{Relative roughness } \frac{\varepsilon}{D} = 0.0005$$

$$\text{from the Moody diagram } f = 0.017 \quad \text{for} \quad R_e > 10^6$$

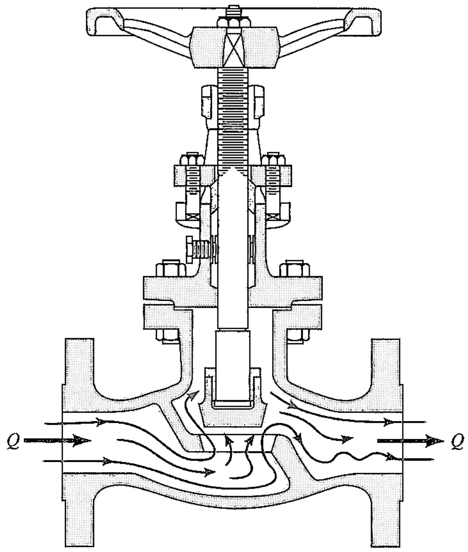
$$\text{headloss } H_L = \frac{fL}{D}\frac{V^2}{2g}$$

Source 3

Fundamentals of Fluid Mechanics

FIFTH EDITION

Munson Young Okiishi



■ FIGURE 8.21 **Flow through a valve.**

or

$$\boxed{h_{L\,\text{minor}} = K_L \frac{V^2}{2g}} \tag{8.36}$$

The pressure drop across a component that has a loss coefficient of $K_L = 1$ is equal to the dynamic pressure, $\rho V^2/2$.

The actual value of K_L is strongly dependent on the geometry of the component considered. It may also be dependent on the fluid properties. That is,

$$K_L = \phi(\text{geometry}, \text{Re})$$

For most flows the loss coefficient is independent of the Reynolds number.

where $\text{Re} = \rho VD/\mu$ is the pipe Reynolds number. For many practical applications the Reynolds number is large enough so that the flow through the component is dominated by inertia effects, with viscous effects being of secondary importance. This is true because of the relatively large accelerations and decelerations experienced by the fluid as it flows along a rather curved, variable area (perhaps even torturous) path through the component (see Fig. 8.21). In a flow that is dominated by inertia effects rather than viscous effects, it is usually found that pressure drops and head losses correlate directly with the dynamic pressure. This is the reason why the friction factor for very large Reynolds number, fully developed pipe flow is independent of the Reynolds number. The same condition is found to be true for flow through pipe components. Thus, in most cases of practical interest the loss coefficients for components are a function of geometry only, $K_L = \phi(\text{geometry})$.

Minor losses are sometimes given in terms of an *equivalent length*, ℓ_{eq}. In this terminology, the head loss through a component is given in terms of the equivalent length of pipe that would produce the same head loss as the component. That is,

$$h_{L\,\text{minor}} = K_L \frac{V^2}{2g} = f \frac{\ell_{\text{eq}}}{D} \frac{V^2}{2g}$$

or

$$\ell_{\text{eq}} = \frac{K_L D}{f}$$

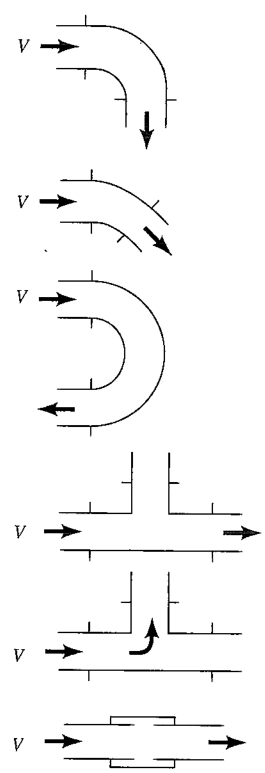
conventional globe valve) are designed for general use, providing convenient control between the extremes of fully closed and fully open. Others (such as a needle valve) are designed to provide very fine control of the flowrate. The check valve provides a diode type operation that allows fluid to flow in one direction only.

Loss coefficients for typical valves are given in Table 8.2. As with many system components, the head loss in valves is mainly a result of the dissipation of kinetic energy of a high-speed portion of the flow. This is illustrated in Fig. 8.33.

TABLE 8.2

Loss Coefficients for Pipe Components $\left(h_L = K_L \dfrac{V^2}{2g}\right)$ **(Data from Refs. 5, 10, 27)**

Component	K_L
a. Elbows	
Regular 90°, flanged	0.3
Regular 90°, threaded	1.5
Long radius 90°, flanged	0.2
Long radius 90°, threaded	0.7
Long radius 45°, flanged	0.2
Regular 45°, threaded	0.4
b. 180° return bends	
180° return bend, flanged	0.2
180° return bend, threaded	1.5
c. Tees	
Line flow, flanged	0.2
Line flow, threaded	0.9
Branch flow, flanged	1.0
Branch flow, threaded	2.0
d. Union, threaded	0.08
***e. Valves**	
Globe, fully open	10
Angle, fully open	2
Gate, fully open	0.15
Gate, $\frac{1}{4}$ closed	0.26
Gate, $\frac{1}{2}$ closed	2.1
Gate, $\frac{3}{4}$ closed	17
Swing check, forward flow	2
Swing check, backward flow	∞
Ball valve, fully open	0.05
Ball valve, $\frac{1}{3}$ closed	5.5
Ball valve, $\frac{2}{3}$ closed	210



*See Fig. 8.32 for typical valve geometry.

Appendix C

Product Cut Sheets

Statement of Qualifications:
Directed Technologies Drilling, Inc.

DTD™

Directed Technologies Drilling Incorporated

www.horizontaldrill.com

Directed Technologies Drilling Incorporated

Directed Technologies Drilling, Inc. (DTD) is the nation's most experienced provider of near-surface horizontal systems for environmental remediation and water resource development. DTD specializes in environmental applications of guided boring technology, including the installation of remediation wells and venting systems, groundwater resource development, and subsurface sampling. DTD is well known for successfully completing complicated river crossings, infiltration wells, and pipeline installations.

DTD is managed and staffed by environmental professionals, including registered professional geologists, engineers, and construction managers. Moreover, we support and invest in continual innovation to increase the sustainability of environmental and water resource development projects.

CORPORATE PROFILE

Veteran Owned Small Business

Office locations:

- Bremerton, Washington
- Bellefonte, Pennsylvania
- Mineral Wells, Texas

NAICS Codes: 213111, 237110, 237120, 237990, 541620, 562910

CAGE Code: 56P12

DUNS Number: 04-244-8022

Website: www.horizontaldrill.com

E-Mail: info@horizontaldrill.com

Contacts:

Dan Ombalski, PG -- President
800-239-5950
dan@horizontaldrill.com

James Doesburg, PG -- Vice-President
360-674-2180
jim@horizontaldrill.com

DTD uses horizontal and directional drilling technology to install environmental remediation wells, water resources wells, and associated infrastructure (conveyance lines, control systems, etc.) For larger non-environmental projects, we employ our midi-class HDD equipment to complete difficult stream or river crossings, and similar pipeline or utilities conduit installation. Our equipment inventory is maintained in a state of readiness, with regular maintenance, cleaning, and painting. Our standard is to maintain a high-quality image on your project site with clean equipment and a professional crew.

Environmental Applications

Soil Vapor Extraction	Soil Venting
Chemical Injection	Dewatering
Ozone Injection	Oxygenation
Treated Water Infiltration	Dual Phase Extraction
Bioaugmentation	Air Sparging
Soil Sampling	

Water Resources

Desalinization Wells	Potable Water Wells
Hydraulic Barrier Wells	Salt Water Intrusion Wells
Shallow Radial Wells	Radial Well Systems

Infrastructure

Pipelines	Railroad Crossings
Stream Crossings	Shore Approaches

Drilling Equipment

DTD owns and operates nine drill rigs manufactured by Vermeer, CMS, and American Augers. These rigs range in size from small rigs for residential or confined space operations, to large rigs for extended and difficult well installations, including specialized rigs for directional drilling in hard rock. With our equipment inventory, we have the appropriate drill rig to install remediation systems ranging from a few tens of feet of small diameter PVC pipe, to systems 2000 feet in length with large diameter steel casing. DTD's drilling equipment inventory includes:

Drill Rig	Thrust/ Pullback	Torque
Vermeer 7x11	7,000 lbs.	1,100 ft.-lbs.
Vermeer 10x15	10,000 lbs.	1,500 ft.-lbs.
Vermeer 24x40 (2)	24,000 lbs.	4,000 ft.-lbs.
Vermeer 36x50DR	36,000 lbs.	5,000 ft.-lbs.
CMS 6015	60,000 lbs.	15,000 ft.-lbs.
CMS 9030	100,000 lbs.	30,000 ft.-lbs.
American Augers DD10	100,000 lbs.	14,000 ft.-lbs.
American Augers D210	210,000 lbs.	25,000 ft.-lbs.

Support Equipment

To support our drill rigs, DTD owns mud mixing and recycling systems, as well as pumps, hoses and piping, and ancillary support equipment. We own self-contained trailers for equipment and tool transport. These trailers improve site security and prevent equipment theft and vandalism, as well as providing a discreet appearance at sensitive environmental remediation sites. DTD also owns and operates semi– and flatbed trucks for mobilization and project service.

Drilling Fluid Systems

Mud System	Capacity (gallons)	System Type
DTD 300 (2)	300	Mixer
DTD 750	750	Mixer
Vermeer ST 750 (2)	750	Mixer
Vermeer MX240	750	Mixer
Basic 200	1,200	Recycler: 160 gpm
Mudtech MCT-160	2,000	Recycler: 160 gpm cleaning
Mudtech MCT-800	3,600	Recycler: 800 gpm cleaning
American Augers MP400	5,000	Recycler: 400 gpm cleaning

DTD's drilling fluid systems are matched to the equipment and the project requirements. From small, single pass mixing units to large recyclers, we can select the proper system to accomplish the project objectives while minimizing waste and drilling fluid costs.

Drilling Tools

DTD works closely with manufacturers and custom machinists to fabricate specialized tools for installing remediation systems. One of DTD's significant contributions to the field is a set of tooling and a method (patent pending) that enables us to install single-ended, or "blind," wells through the drill string, but detaching and abandoning the drill bit downhole. This method provides a high level of assurance that the well screen and casing can be installed even in difficult, collapsing bore conditions.

Some additional examples of custom tools designed and fabricated to our specifications include custom locating sondes, pilot drills for hard coral formations and soft sand, borehole reamers, forward reaming assemblies, and pipe-pulling assemblies.

DTD has perfected soil sampling through directional bores. To advance this technology, we have developed new sampler designs to facilitate the collection of undisturbed samples for chemical analysis and geotechnical testing.

In addition to these tools, DTD engineers and geologists have also invented and patented specialized well casing and well construction methods, adapted to specific horizontal well applications. The patented EnviroFlex well casing is one such product, comprising a well screen with an integrated filter material to prevent silt or sand infiltration into a well in fine-grained formations. DTD holds the patent to this product and is the sole provider of the material. We have also developed a patent-pending method for the construction of water wells with radial collector systems.

Tracking and Steering Systems

The drill head tracking and steering systems used by DTD are designed and built by several manufacturers, and have been selected on the basis of their applicability to our typical drilling scenarios and conditions. Tracking and steering of the drill head are related functions based on detecting and interpreting a signal transmitted from the drill head during installation of the pilot hole.

DTD uses navigation systems that can operate at depths up to approximately 80 feet, depending on site conditions. We have walkover and remote systems available, and can typically maintain an accuracy of approximately two inches down to a depth of approximately 12 feet. Below 12 feet, we often maintain an accuracy of two percent.

For deeper bores, we frequently work with industry leaders like Sharewell and SlimDril, who provide navigation and steering services using external coil systems and gyroscopic steering tools. These systems provide highly-precise, real-time navigation and steering capabilities, with the ability to detect minute steering deviations and make corrections on-the-fly.

HEALTH AND SAFETY

DTD operates under a health and safety program that has been reviewed by federal and state agencies. DTD incorporates the special health and safety requirements of each of our clients as a normal part of our business. We work with our clients to ensure that all field operations are consistent with client expectations. Our Experience Modification Rating (EMR) is currently 0.71.

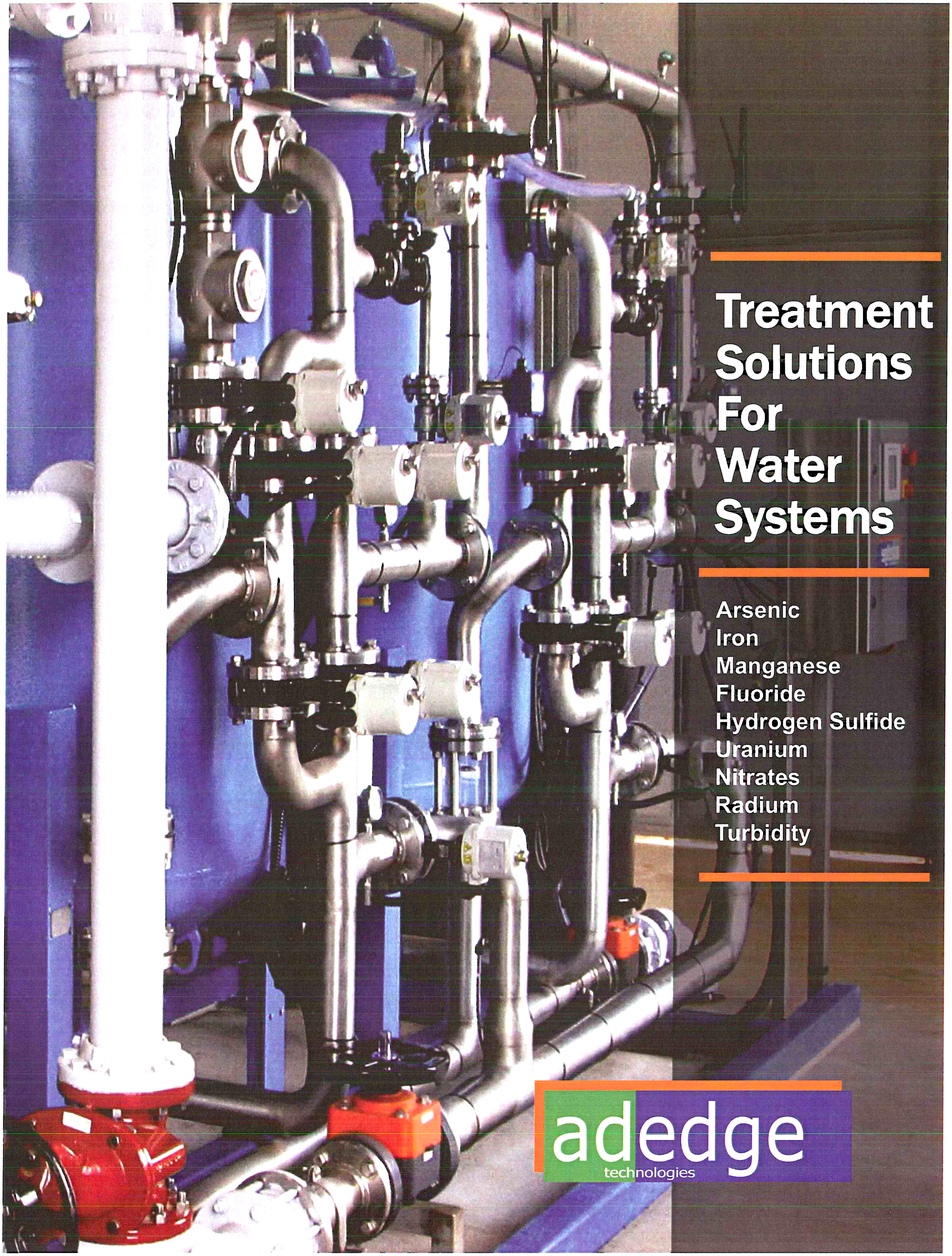
All field staff members are fully trained in accordance with CFR 1910.120 (e), and are subject to applicable medical surveillance requirements. Personal protective equipment is provided to meet expected site conditions and field staff is fully trained in its use. Daily safety meetings are held to ensure that health and safety measures are adhered to and to provide a mechanism for communicating and discussing potential safety issues. All field project managers have current first aid and blood borne pathogen training.

Directed Technologies Drilling, Inc.
100 Rolling Ridge Drive
Bellefonte, PA 16823
1-800-239-5950

Directed Technologies Drilling, Inc.
3476-B W. Belfair Highway
Bremerton, WA 98312
1-360-674-2180

Directed Technologies Drilling, Inc.
7701 Hwy 180 East
Mineral Wells, Texas 76067
1-800-239-5950

Directed Technologies Drilling Incorporated



Treatment Solutions For Water Systems

Arsenic
Iron
Manganese
Fluoride
Hydrogen Sulfide
Uranium
Nitrates
Radium
Turbidity

adedge
technologies

intelligent thinking..clean water

Founded in 2002 and headquartered just north of Atlanta, Georgia, USA, AdEdge Technologies specializes in the development and supply of innovative technologies, adsorbent-based products, and systems that remove contaminants from process or aqueous steams. We are an organization based on solid deliverable, scalable, scientifically proven technology and experience for the removal of arsenic, iron, manganese and other contaminants from water. Our technology and products enable our customers to manage the elements...in a variety of industries... with outstanding results. They include; drinking water, industrial process, environmental, chemical, energy, medical, and general waste water industries.

"We are an organization based on solid, deliverable, scalable, scientifically proven technology and experience for the removal of arsenic, iron, manganese and other contaminants from water."

-Rich Cavagnaro, President

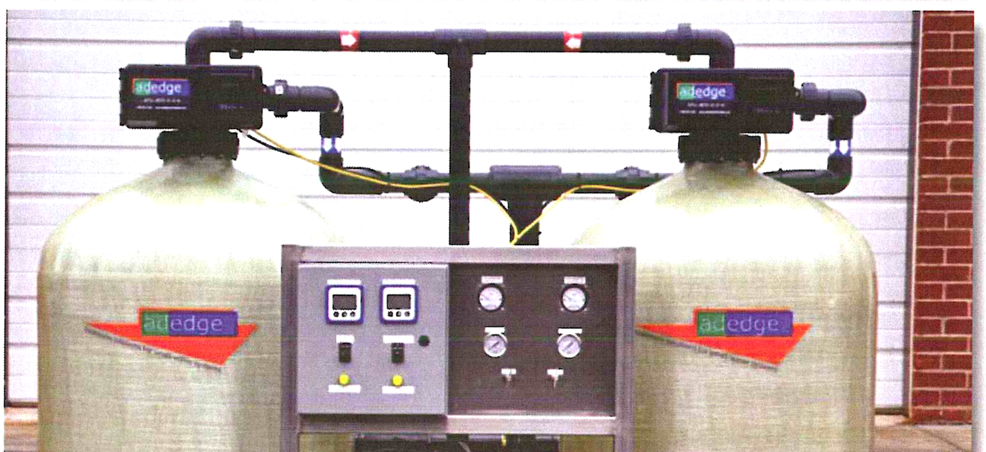
adedge technologies

AdEdge has extensive experience in the removal of arsenic, iron, manganese, fluoride and uranium from water, and to date has installed hundreds of water systems for public, municipal, and industrial clients throughout North America as well as some projects in some of the most challenging locations in the world including China and Indonesa.

Arsenic removal from drinking water is one of the company's core competencies and distinguishing competitive advantages. To date, AdEdge has been awarded 12 EPA demonstration projects...more than any other company in North America. We have also successfully implemented systems that serve larger communities, providing a low cost, low maintenance solution providing long term ROI with assured safe drinking water and no hazardous or environmental waste residuals.

Integrated Treatment Solutions For Water Systems.

AdEdge specializes in the design, development, manufacturing and supply of innovative technologies, adsorbent-based products, and integrated solutions that remove contaminants from process or aqueous steams. AdEdge offers a full range of conventional and innovative treatment technologies including adsorption, coagulation/filtration, ion exchange, metals precipitation, advanced oxidation, and membrane based solutions.

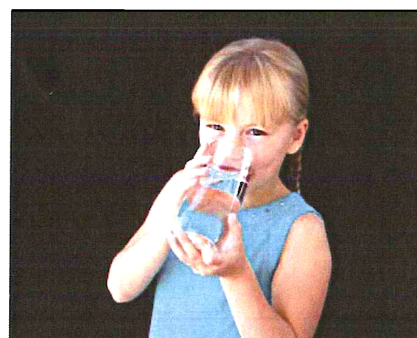


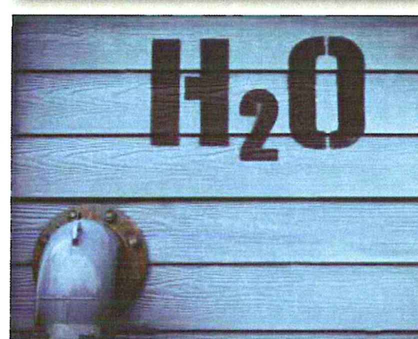
Primary Contaminants Treated:

Arsenic
Iron & Manganese
Flouride
Uranium
Hydrogen Sulfide
Nitrates
Radium
Turbidity

Industry Applications:

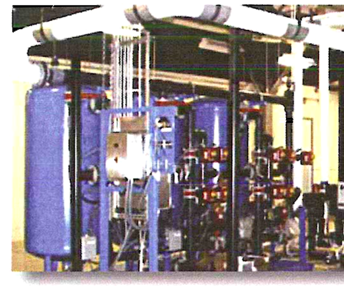
Groundwater Treatment
Remediation
Watstewater Treatment
Mininig
Residential Homes





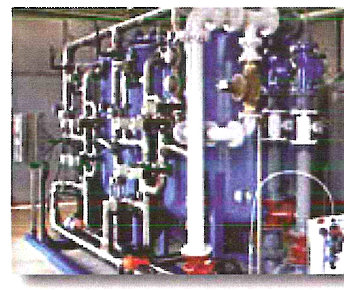
Treatment Solutions

Integrated Systems



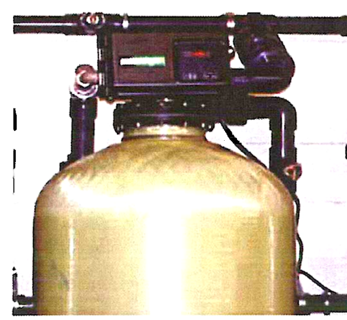
With our integrated system approach AdEdge can integrate a custom treatment solution to meet your needs. Using our APU (Adedge Packaged Unit), Modular, and/or Membrane systems, we integrate pre and post treatment processes to provide a "one stop shop" approach for managing your total treatment need.

APU Systems



AdEdge APU (AdEdge Package Unit) systems are designed, packaged and assembled as a turnkey treatment solution for a variety of contaminants. APU systems arrive at your site ready for hook up and operation. With a variety of custom options available, AdEdge APU systems are custom engineered to meet the specific needs of your site.

Modular Systems



AdEdge Modular Systems provide a treatment solution for small water systems that are simple, affordable, and effective. These systems are designed, pre-packaged and shipped un assembled to the field for installation by a qualified contractor or installer. AdEdge Modular systems generally require less engineering, space, and infrastructure.

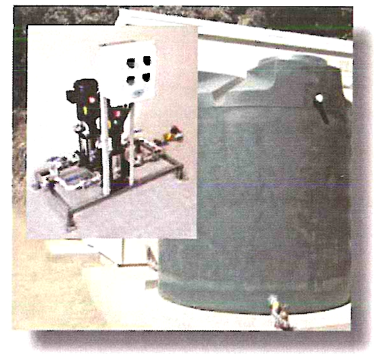
ADVANT EDGE™ Residential Systems

The AdVantEdge Series from AdEdge includes Point-of-Entry and Point-of-Use systems and replacement cartridges. AdVantEdge systems for arsenic removal feature Bayoxide® E-33 Granular Ferric Oxide media that is NSF 61 certified and effective over a wide range of water quality without the need for regeneration chemicals, salt or additives. In addition, the AdVantEdge series also features AdEdge AD26 media for co-occurrence of iron, arsenic, manganese and hydrogen sulfide removai.

AdEdge Fact: Our engineers are highly trained to design the best! solution to your water treatment needs.

adedge technologies

Recycle/Backwash Systems



H2Zero Recycle Backwash systems conserve water by storing and treating contaminated backwash water from filtration and treatment systems. AdEdge H2Zero systems can be customized and designed for most manufacturers' adsorption, oxidation and filtration systems, whether backwashing is infrequent or performed one or more times per week.

Chemical Pre/Post Treatment Systems

With certain water parameters, an essential aspect of effective treatment is adequate pretreatment of the raw water before reaching the primary treatment system and or post treatment for applications such as potable water. Pretreatment can be simple mechanical filtration for suspended solids, coagulation or dispersant chemical addition, chlorine or other oxidation chemical addition or removal, and/or removal of organics or other contaminants. With post treatment, the treated effluent may require pH correction or disinfection prior to the distribution.

Programable Logic Control Systems

AdEdge INGenius™ MCD control panels are skid mounted NEMA 4X stainless steel panel enclosures featuring Allen Bradley PLC controls. It features a Integrated PanelView 600 HMI Color touch screen (optional 10-inch) with operator graphics screens for; system overview, automatic / manual operation of filter control valves, backwash initiation and control, backwash recycle tank and pump settings and control plus flow measurment & totalization. Alarm outputs are included as well.

Media Replacement Services

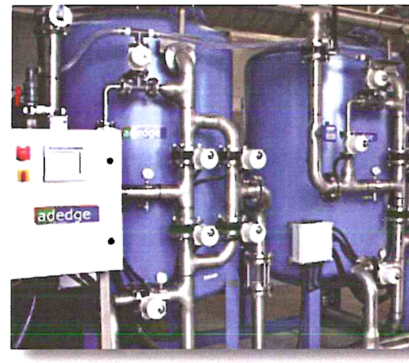
Regardless of your AdEdge system, AdEdge offers turnkey media replacement serrvices for our systems and others that use media we provide. Let us take the hassle of media replacement. Contact Us today for quote on your media replacement needs:

AdEdge Fact: 100% of our customers rate our performance as good to excellent!

Treatment Processes

Adsorption

In the adsorption process, contaminants in the aqueous stream break their bond with water molecules and chemically adhere to a filter media. In most systems this is accomplished by directing the water flow through pressure vessels containing the filter media at a rate that allows enough contact time for the adsorption to occur. Several medias have been developed to reduce a variety of contaminants such as arsenic and other heavy metals, fluoride, and dissolved organic chemicals like pesticides or petroleum products.



Ion Exchange

Ion exchange (IX) is a method of removing undesirable metallic salt ions dissolved in an aqueous stream by exchanging them with other ions attached to a media, such as a synthetic resin. AdEdge Technologies has systems for uranium reduction using AD92 IX resin. This resin has a very high capacity for uranium removal and is not as susceptible to organic fouling as other resins. It is easily and effectively regenerated with sodium chloride on site which provides a cost-effective way to extend the effective life of the media, reducing operating costs.

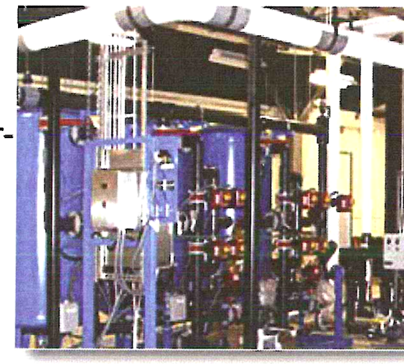
Coagulation/Filtration

AdEdge Technologies uses coagulation filtration to remove arsenic, iron, manganese, and sulfides with AD26 or ADGS+ media and ferric chloride as the coagulation agent. This process allows significantly higher flow rates per square feet of media, less backwash water than other conventional approaches, and smaller footprint systems which means lower capital and operating costs. There are no hazardous chemicals or waste involved and the systems may be automated which decreases operator involvement and expense.

AdEdge Fact: AdEdge has been awarded 12 EPA arsenic removal demonstration projects...more than any other company.

Oxidation Filtration

Oxidation/filtration refers to precipitative processes that are designed to remove naturally occurring iron, manganese, and sulfides from water. The processes involve the oxidation of the soluble forms of these contaminants to their insoluble forms and then removal by filtration of the precipitated particles.The AdEdge Technologies oxidation/ filtration medias have high catalytic and oxidation activity, superior handling properties and stability, NSF 61 certification, require no permanganate or coagulation addition and low capital and operating costs compared to other alternatives due to the smaller system footprints.



Membrane Systems

Designed for tap, well, or surface water applications, AdEdge Reverse Osmosis Systems reduce total dissolved solids using advanced membrane technology. Because almost all RO systems require pre-treatment for contaminates such as iron, manganese, suspended solids or organics, AdEdge offers a complete Integrated Membrane Solutions (IMS) system for a total treatment solution.

General Filtration

Filtration is a physical method of removing suspended solids from a solution. In water treatment applications, these solids may range from dirt, plant material, and debris washed into the water supply during heavy runoff to bacteria, viruses, and other microscopic particles that occur naturally.The removal of the larger-sized solids, down to approximately 10-20 microns, can be done in gravity beds or pressure vessels containing media such as sand, zeolite, anthracite, or multiple layers of these media.

AdEdge Fact: Our project management team consists of noted and published experts in the water treatment industry.

Experience / Case Studies

U.S. EPA Projects

AdEdge Technologies, Inc. was selected by USEPA for 12 arsenic treatment demonstration projects through an expert peer review process in cooperationwith the individual host sites to conduct full scale arsenic treatment demonstrations using its Granular Ferrric Oxide adsorption and AD26 oxidation/filtration technologies. The program gathers extensive cost and performance data on commercially available, proven technologies which are candidates to become Best Available Technology (BAT) for arsenic removal.

- Rimrock, Arizona APU-40LL system
- Rollinsford, New Hampshire APU-160 system
- Nambe Pueblo, New Mexico APU-160 system
- Goffstown, New Hampshire APU-20LL system
- Springfield, Ohio APU-250CS / AD26-250CS systems
- Stewart, Minnesota APU-300 / Iron treatment systems
- Bruni, Texas APU-50LL system
- Wellman, Texas APU-100 system
- Sells, Arizona APU-100 system
- Geneseo Hills, Illinois APU-200 system
- Clinton School, Indiana APU-25 / AD26 system
- Conneaut Lake Park, PA AD26-250 system

Arsenic Removal - RimRock, AZ

Indian Health Service Projects

Working closely with Indian Health Services officials, Tribal representatives and contracted engineering firms, AdEdge Technologies has installed treatment systems in many Native American locations throughout the west and midwest. From permitting to start-up and post evaluation, AdEdge is committed to providing the most effective treatment solutions available today backed by unprecedented customer service. AdEdge has more than 14 system installations on Native American locations.

Uranium Removal - Barona, CA

AdEdge Fact: Our principal business philosophy is exemplary customer service.

A Project Profile

Project Profile

McGraw Hill, East Windsor, NJ
Iron & Manganese Removal System

Background

In late 2007, AdEdge began working with Maser & Associates to assist with design and implementation of an iron and manganese removal system to serve the water supply for the McGraw Hill data center in East Windsor, New Jersey. The site had an existing groundwater supply well with unacceptably high levels of iron and manganese to serve as feed water for the facilities cooling towers. The water chemistry presented some challenges with a pH of 5 and iron levels of nearly 5 mg/L. AdEdge was selected to design, build, and startup an integrated treatment system to remove the iron and manganese to meet secondary MCLs of 0.3 mg/L and 0.05 mg/L respectively. AdEdge worked closely with the selected contractor Central Jersey Mechanical to supply the treatment system which included chemical feed (chorine and pH correction), an AdEdge AD26 packaged iron and manganese removal filtration system, treated water backwash pump skid, finished water supply booster pump package, and instrumentation. AdEdge also furnished the system with a PLC communications module to interface and allow for continuous monitoring via the data center's existing SCADA system. The system was constructed and deployed in the summer of 2008.

Priority Parameters		
pH **	4.4-4.9	
Total As **	n/a	mg/L As
As(III)	n/a	mg/L (if known)
Sulfides**	ND	mg/L
Hardness **	33.0	mg/L as CaCO3
Alkalinity **	10.0	mg/L @ CaCO3
Silica **	no data	mg/L SiO2
Calcium **	4.0	mg/L Ca
Sulfate **	10.0	mg/L SO4
Iron **	5.00	mg/L Fe
Manganese **	0.11	mg/L Mn

Treatment System

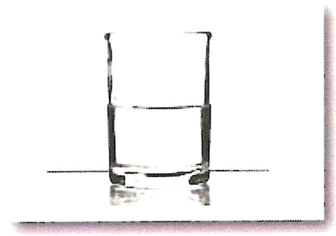
The AdEdge treatment system featured a skid-mounted AD26 oxidation and filtration package unit sized for a maximum design flow rate of 130 gpm. The model AD26-3660CS-S-3-AVH utilizes AdEdge AD26 MnO_2 media in a three vessel carbon steel configuration in parallel. The system is equipped with automated control valves and harness, central control panel with programmable logic controller (PLC) and a color user interface screen. System features also include differential pressure switches, control panel and local gauges, flow sensors & totalizers, and a central hydraulic panel with sample ports for a complete functioning packaged unit. A hypochlorite feed & monitoring Module and pH adjustment module using sodium hydroxide (NaOH) are also integrated into the system package. Each 36-inch diameter treatment vessel contains approximately 20 cubic feet of AdEdge AD26 oxidation filtration media. Other ancillary equipment which was totally integrated with the treatment module included the auxiliary finished water backwash supply, distribution booster pumps, the two 5,000 gallon finished water holding tanks and instrumentation. All of these components were integrated into the design and controlled by a single master control panel in the AD26 system.

Performance

The system was started up and commenced in July, 2008. The system has a very high utilization factor receiving water nearly 22 hours per day to meet the demand of the cooling towers. Approximately 100-110 gpm is being consistently treated with high iron and manganese levels exceeding 4 mg/L and 0.1 mg/L to below the treatment goals of 0.3 mg/L and 0.05 respectively. The system has experienced little to no down time since installation.

The values that drive our company!

Passion for Clean Water



We have a drive to apply and deliver water purification technologies to improve the quality of people's lives, enhance the environment, and grow economies throughout the world. We seek to steward the knowledge, resources, and blessings we've received to serve others and our community.

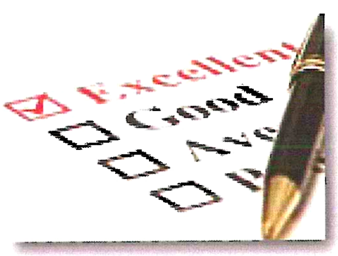
Integrity… Any Time…Any Place

We strive to conduct ourselves with honesty and integrity, exercising fair business practices in all dealings with our customers, vendors, suppliers, subcontractors, employees, and all those we work with. We strive to honor God, be truthful, and respectful of each other, and consider the customer's needs above our own interests.

Exemplary Service

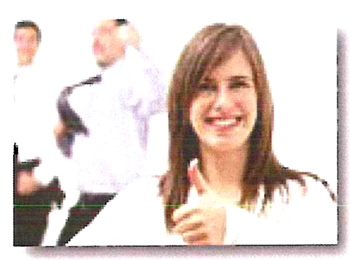
Our sincere goal is to go to extraordinary lengths to satisfy our customers and meet or exceed their expectations in our dealings and relationships. By providing exemplary customer service we have the opportunity to satisfy the needs of our partners and build long-term relationships. We will be responsive to our customer's requests, serve them competently, efficiently, and knowledgeably.

Excellence



It is our goal to bring passion and excellence to our work by creating unique andsustained value at competitive prices for the customers and markets we serve; not settling for mediocrity, but striving for continuous improvement and higher quality in our products, processes, and customer relationships. We challenge ourselves to constantly improve the value proposition to our customers.

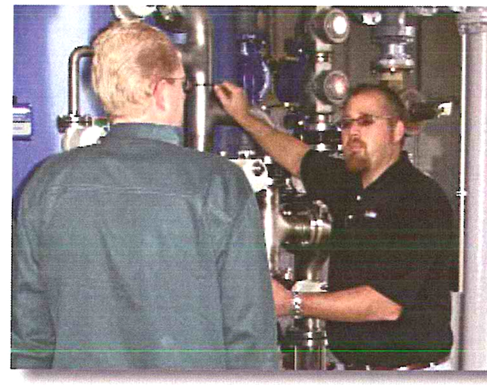
Enjoyment of Work



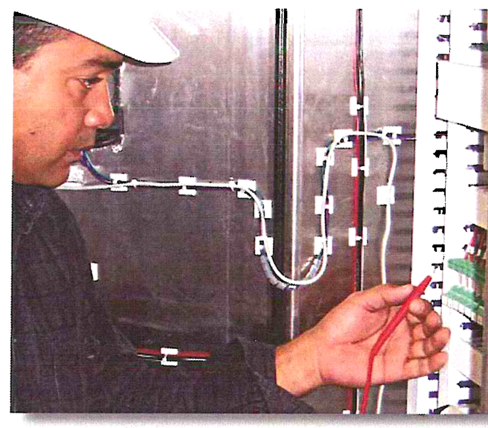
We believe work was designed and intended to be the source of professional fulfillment for employees and should be enjoyable. We endeavor to create an environment for employees to seek and obtain challenging work and professional growth; a place where employees demonstrate mutual respect, courtesy and concern for each other and employees are encouraged and permitted to afford time and attention to their families and other personal priorities.

when it comes to customer service...
...we're as reactive as our media!

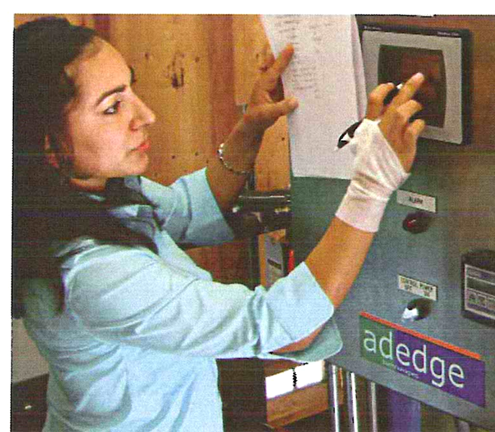
At AdEdge, We feel our most important attribute is our dedication to customer service. Because making successful water treatment systems takes more than just intelligent engineering, innovative technology, and high performance media. For our customers, it means delivering these essentials plus an exceptional level of customer service...its' the catalyst few companies possess that truly makes the difference between a completed project and a successful project.



"I'm very pleased with the Fe/Mn filtration plant AdEdge installed at AFP Mutual (Alpine Forest, CA). I not only help monitor this system - I am one of the owners of this system! The fact that the treatment plant happens to be on the lot next to my office and home gives me the opportunity to see the amount of actual staff time that is spent "servicing" the plant. And we have four (4) wells and over 250 connections! You probably already know there's not much time spent servicing the plant!"
Steve White - Alpine Forest, CA

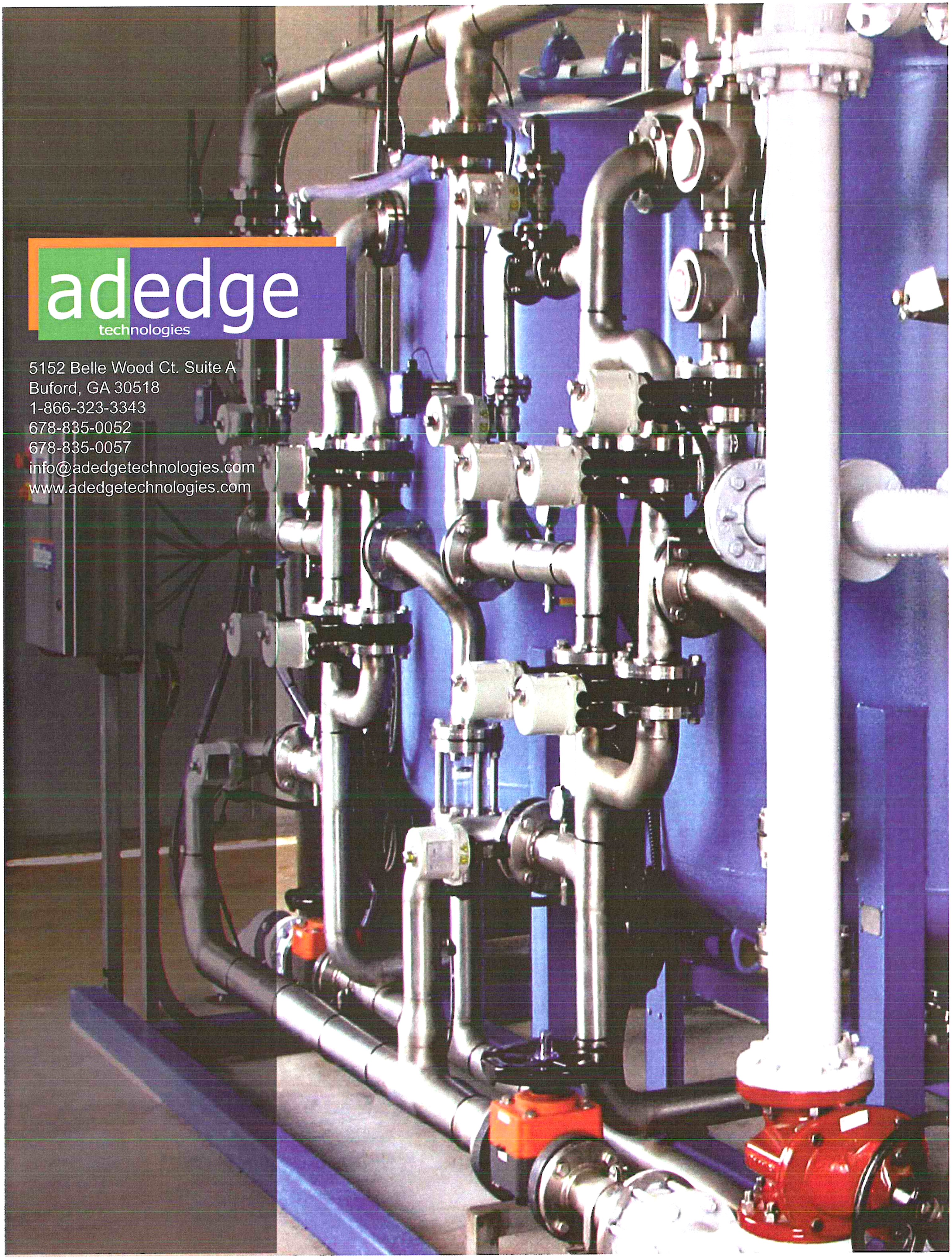


"The success of the AdEdge system at Genesseo Hills has allowed other communities in the area to benefit from having a simple to use, cost-effective arsenic removal system. The system we choose was the right one"
Merle Loete, Operator - Genesseo Hills



"Since the installation of our system, the water is PERFECT. It acutally sparkles!!! No more smell, no yellow spots on the white clothes, no more oily film on top of the water, no daily cleaning of the toilets. We have had 2 arsenic tests done and both times the level was less than 0.002mg/L."
Tom and Diane Eaton - Claredon Water Company.

adedge
technologies



adedge
technologies

5152 Belle Wood Ct. Suite A
Buford, GA 30518
1-866-323-3343
678-835-0052
678-835-0057
info@adedgetechnologies.com
www.adedgetechnologies.com

SCOPE OF SUPPLY & PRICING PROPOSAL

FOR ADEDGE WATER TECHNOLOGIES VOC TREATMENT SYSTEM IN WATERPOD CONTAINER

Site Name:

Triple Site Las Vegas, NM

Date:

November 22, 2019

Contacts:

Doug Craver

Regional Sales Manager

480-243-1824

dcraver@adedgetechnologies.com

AdEdge Water Technologies - Scope of Supply

Triple Site, Las Vegas NM

AdEdge System for VOC Treatment

Doug Craver, Western Regional Sales Manager
480-243-1824
dcraver@adedgetechnologies.com

11/22/2019

Parameter	Design
Model	Automated VOC Treatment

Item	Detail	Design	Supply	Install
A	**APU26-1354CO-2-275, Composite Vessel System, Automatic Operation**	**AdEdge**	**AdEdge**	**Others**
A1	**Composite Pressure Vessels**	**AdEdge**	**AdEdge**	**Others**
	Composite Vessels Operating in parallel with Media and Underbedding			
	150 psi @ 70° F Non-Code Vessels			
	Sch 80 PVC Internal Inlet Distributor and Sch 80 Hub and Lateral Design			
A2	**Process Valves and Piping**	**AdEdge**	**AdEdge**	**Others**
	Top-Mounted Automatic Control Valve with NHWBP Piston, One (1) per Vessel			
	Sch 80 PVC Inlet, Treated Outlet, and Backwash Outlet Headers with Flanged Tie Points			
	Sch 80 PVC Vessel Piping on Inlet and Treated Outlet, Fitted with Unions for Maintenance			
	Sch 80 PVC Vessel Piping on Backwash Outlet, Fitted with Unions for Maintenance			
	Manual Isolation Valve at the Inlet of Each Vessel			
	Manual Flow Control Valve on System Backwash Outlet			
	Auxiliary Backwash Inlet Connection for Treated Water Backwash Supply			
A3	**Oxidation Filtration Media and Underbedding**	**AdEdge**	**AdEdge**	**Others**
	AD26L Oxidation Filtration Media			
	2.5 cuft per vessel (5 cuft total)			
	Garnet Underbedding			
	0.5 cuft per vessel (1 cuft total)			
A4	**Instrumentation / Monitoring**	**AdEdge**	**AdEdge**	**Others**
	304SS Hydraulic Panel with System Inlet/Outlet Pressure Gauges and Sample Ports, One (1) per system			
	Pressure Gauges and Sample Ports on Each Vessel's Inlet and Outlet			
	E+H Electromagnetic Promag L400 Flow Meter on Each Vessel's Inlet			
	Pressure Sensors on System Inlet/Outlet for System DP measurement			
B	**Air Stripper**	**AdEdge**	**AdEdge**	**Others**
	EZ-4.4P Stacker Air Stripper			
	Blower with Piping Kit			
	Low Pressure Switch			
	Feed and Discharge Transfer Pumps			
	Sump Discharge Float Switch			
	Sump High Level Float Switch			
C	**APUGAC-3060CS-1-MVH, Carbon Steel Vessel System, Manual Operation**	**AdEdge**	**AdEdge**	**Others**
C1	**Carbon Steel Pressure Vessel**	**AdEdge**	**AdEdge**	**Others**
	Skid Mounted Carbon Steel Vessel with Media			
	100 psi Non-Code Vessel			
	Vessel is lined with internal NSF61 Epoxy Liner			
	One (1) Drain Valve			
	One (1) Manway for Media Loading			
	Internal Inlet Distributor and Hub and Lateral Design			
	One (1) Combination Air/Vacuum Release Valve			
C2	**Process Valves and Piping**	**AdEdge**	**AdEdge**	**Others**
	Inlet, Treated Outlet, and Backwash Headers with Flanged Tie Points			
	Harness Piping on Each Vessel			
	Valve Harness with Five (5) Lug-Style Butterfly Control Valves with Electric Actuators			
	Manual Isolation Valve at the Inlet of Each Vessel			
	Manual Flow Control Valve on Treated Effluent			
	Auxiliary Backwash Inlet Connection for Treated Water Backwash Supply			
C3	**GAC Media**	**AdEdge**	**AdEdge**	**Others**
	GAC Adsorption Media			
	16 cuft GAC			
C4	**Instrumentation / Monitoring**	**AdEdge**	**AdEdge**	**Others**
	Pressure Gauges and Sample Ports on Each Vessel's Inlet and Outlet			
	Pressure Sensors on System Inlet/Outlet for System DP measurement			
	E+H Electromagnetic Flow Meters on Vessel Inlets			
D	**PLC and Controls Detail**	**AdEdge**	**AdEdge**	**Others**
	Automatic System Operation (Service, Backwash, and Rinse Modes)			
	Integrated with APU26, Air Stripper, and APUGAC			
	Allen Bradley Micrologix 1400 PLC Installed Inside Control Panel for Automatic Operation of APU26			
	C-More 7" Color Touch Screen HMI Mounted on Control Panel			
	304SS NEMA 4X Skid-mounted Control Panel to House Electrical and System Controls			
	Terminal Locations on Control Panel for Ancillary Controls and Device Inputs/Outputs			
	eWon for remote monitoring			

AdEdge Water Technologies - Scope of Supply

Triple Site, Las Vegas NM

AdEdge System for VOC Treatment

Doug Craver, Western Regional Sales Manager
480-243-1824
dcraver@adedgetechnologies.com

11/22/2019

Parameter	Design
Model	Automated VOC Treatment

Item	Detail	Design	Supply	Install
E	**Chemical Feed Equipment**	AdEdge	AdEdge	NA
	One (1) Diaphragm Metering Pump, De-Gassing, for NaOCl			
	One (1) Diaphragm Metering Pump, Not De-Gassing, for Antiscalant			
	Two (2) Control Cables			
	Two (2) Chemical Storage Tanks, 35 Gallon, HDLPE			
	Two (2) Injection Quills with Mixers			
F	**Water Storage and Pumping**	AdEdge	AdEdge	NA
	One (1) Raw Water Storage Tank, 500 gallon, HDLPE - installed inside WaterPOD			
	One (1) Raw Water Booster Pump with Appurtenances			
	One (1) Treated Water Storage Tank, 710 gallon, HDLPE - installed inside WaterPOD			
	One (1) Backwash Supply Pump with Appurtenances			
G	**WaterPOD Enclosure**	AdEdge	AdEdge	Others
	External Dimensions: 40' Length x 8' Width x 9.5' Height			
	Exterior, Solid Desert Tan Marine Grade Industrial Enamel			
	Interior Overhead Fluorescent Lights			
	3-Ton Bard HVAC Unit			
	208/230VAC/3Ph Power Required for HVAC Unit			
H	**Included Field Services and Miscellaneous**	AdEdge	AdEdge	NA
	O&M Manuals (+1 Hardcopy, +1 Electronic Copy) including Engineering Drawings, Design Report, and Control Description			
	System Commissioning Plan and Coordination of Installation with Installer (Pre-Startup)			
	System Startup and Comissioning On-Site Including Media Loading Supervision and Initial Media Flush			
	Five (5) x 8 hour Days Included for Start-Up and Training. Additional Work Billed on Time and Materials Basis			
	Operator Training During System Startup			
I	**Factory Testing**	AdEdge	AdEdge	NA
	Factory Acceptance Testing in accordance with AdEdge QC procedures and SOPs			
	Hydraulic and Mechanical Testing to Ensure System Meets Requirements			
	Pressure Testing per AdEdge Standard Procedures to Test for Leaks			
J	**Warranty and Maintenance**	NA	AdEdge	NA
	Standard 1-year Equipment Warranty			
K	**Freight for Media, Sub-Fill, and System**		Not Included	
L	**Taxes (end use, sales or duty taxes as applicable)**		Not Included	

AdEdge Water Technologies - Scope of Supply

Triple Site, Las Vegas NM

AdEdge System for VOC Treatment

Doug Craver, Western Regional Sales Manager
480-243-1824
dcraver@adedgetechnologies.com

11/22/2019

Parameter	Design
Model	Automated VOC Treatment

Estimated Fabrication and Delivery Schedule

1	Produce Shop Drawings / Submittals from Award / PO	*3-4 weeks*
2	Fabrication of System upon approval of Shop Drawings (based on shop availability and project timing)	*14-16 weeks*
3	Shipping to the site	*TBD*
4	Installation of the System	*TBD by others*
5	Startup, Commissioning, Training following Mech/Electrical Completion	*5 days*

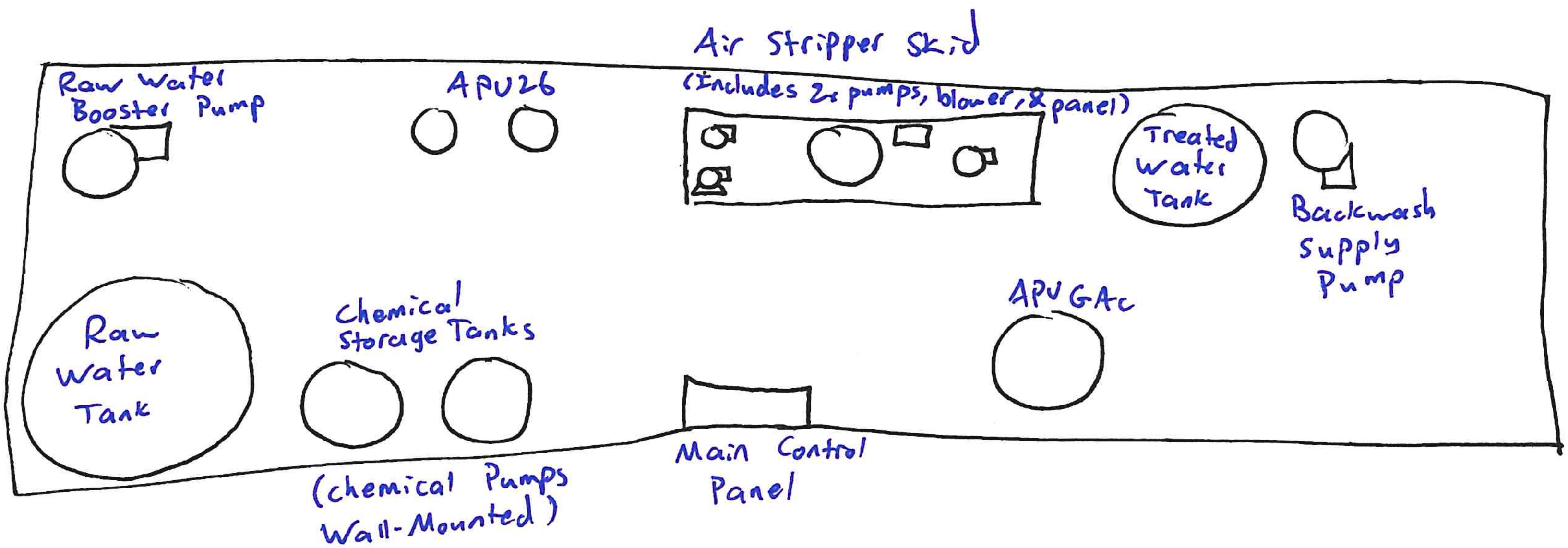
Notes, Clarifications and Exceptions

1. AdEdge will coordinate closely with Installer and the Engineer on all equipment and design related items
2. System will be shipped on a flatbed trailer for offloading by personnel other than AdEdge personnel with appropriate equipment and trained operator
3. Media will be shipped in bags on pallets for offloading by forklift - By Others
4. No seismic engineering or seismic related design or equipment modifications are considered in the pricing; can be incorporated as appropriate for the project
5. Costs of metal components, especially steel, in our system are subject to change due to the volatilities of market pricing and imposed taxes and tariffs, therefore AdEdge reserves the right to adjust pricing to pass along any such increases.
6. AdEdge Payment Schedule and Standard Terms and Conditions apply unless otherwise noted. A copy of T&Cs can be furnished prior to signing contract or upon request.
7. AdEdge will provide a 48-hour delivery window for treatment equipment delivery for systems with vessels 72" and greater, and a 24-hour delivery window for treatment equipment delivery for systems with vessels less than 72". AdEdge will closely coordinate with the customer/contractor during system shipment.
8. Raw water tank(s) by Others,installed outside of WaterPOD.
9. Scope assumes that 230V/3Ph power is available on site. If not, scope and cost adjustments may be required.
10. All backwash water management, during startup and operation, by Others.
11. Antiscalant feed system added in the scope based on previous experience at a similar site. Use of the components can be evaluated during system operation.
12. Due to nature of remediation sites, system should be monitored daily to ensure proper operation under challenging and variable water quality.
13. System operator should be familiar with antiscalant feed to ensure proper dosing.

Items Supplied By Others / Contractor

- **A** *Interconnecting pipe to the system, appropriate electrical connections to AdEdge Equipment*
- **B** *Pressurized water supply for use during start-up*
- **C** *Non-AdEdge system related site, civil, or structural engineering or support costs from Owner*
- **D** *Safety equipment as required for media loading, startup/commissioning*
- **E** *Offloading, storage and placement of all equipment and media*
- **F** *Site work and any building structure / facility or shade structure to be provided; HVAC*
- **G** *Construction of structural concrete pad as necessary for treatment equipment provided by AdEdge*
- **H** *Anchoring Equipment, tanks and other equipment to the building's foundation/structural pads*
- **I** *Dedicated power supply to AdEdge equipment; Interconnecting control and instrumentation wiring to control panel*
- **J** *Two laborers for one day for Media loading with AdEdge Supervision*
- **K** *Interface with Regulators / Permitting and all permits for successful completion of the project*

Triple Site
Las Vegas, NM



WaterPOD Dimensions: 40' L x 8' W x 9.5' H
Components Shown Not To Scale

Containerized Treatment Units (CTU)
AdEdge Technologies, Inc

Description

WaterPOD™ Packaged Containerized Treatment Units (CTU) from AdEdge Technologies have been developed to meet the growing U.S. and International demand for small footprint, cost-effective modular water treatment installations. The fully integrated, pre-engineered, pre-wired, packaged water treatment solution combines system performance with economy resulting in an ideal solution for sites where space, cost, and schedule are critical.

WaterPOD™ modular enclosures contain one of AdEdge's many types of Packaged Units or APUs treating a wide variety of contaminants for drinking water, remediation, or industrial/commercial applications. A single CTU-20 can accommodate design flows of up to 400 gpm (85 cubic meters/hr) inside the unit.

The treatment systems are designed, custom built, and delivered inside the pre-manufactured and customized water tight enclosure. The unit is constructed of painted carbon steel, with steel floor, and multiple other customizable options (insulation, lighting, ventilation, etc) available to meet the site specific requirements.

WaterPOD™ systems can be shipped in the U.S or internationally similar to a standard shipping container. Upon arrival at the site, installation and infrastructure is minimal resulting in an ideal solution without a compromise in performance.

Benefits

- Pre-designed, pre-piped and integrated treatment system ready for "plug & play" resulting in 25-50% reduction in installation costs compared to conventional building construction
- Reduced engineering time and expense
- Minimal on-site work including mechanical and electrical; system inlet / outlet are flanged connections that penetrate the enclosure for simple hookup to the well or water source
- Power connections available in 110V, 220V per site requirements
- Can be placed on a simple foundation or concrete slab base
- The modular concept can save from 15-50% on comparable building costs
- Can be deployed rapidly to meet aggressive project timelines
- Ideal for remote sites where construction labor or qualified companies may be less available
- Reduced time obtaining applicable regulatory or other local building permits

WaterPOD™ Product Specifications
AdEdge Technologies, Inc

Containerized Treatment Units (CTU)	Specifications / Description
Treatment System Type	AdEdge Packaged skid mounted Units (APUs) or Modular treatment systems for adsorption, filtration, ion exchange, membrane systems and pre- and post- treatment modules Pressure Filter Vessels, chemical feed with Media for Treatment Carbon Steel Painted Container to House Treatment System Valves, Controls, Meters, Other Options
Primary Contaminants Treated	Arsenic, Iron, Manganese, Fluoride, Uranium, Hydrogen Sulfide, Nitrates, Radium, Total Dissolved Solids, Color, Turbidity, others
Industry Applications	Groundwater or Wellhead Treatment, Remediation, Wastewater Treatment, Mining, and other applications
Treatment Processes	Adsorption, Ion Exchange, Coagulation/Filtration, Oxidation Filtration, Reverse Osmosis or Ultrafiltration
Flow	Up to 400 gpm
Pressure Filter Vessels	100 psi rated, ASME Code Vessels Available as options
Vessel Configuration	2, 3, or 4 Vessels in Parallel or Series

System Piping	Sch 80 PVC, Stainless Steel or other
Valves	Butterfly Vessel Control, Diaphragm System Control
Controls	Manual or Automatic Valve Control with Allen Bradley PLC Automatic Pump Control Available
Container Dimensions	Available in 20’ & 40’ Lengths x 8’ W x 9’6” H
Container Materials	Steel Frame, Corrugated Steel Walls, Treated Wood Floor with Steel Overlay
Heating, Ventilation, AC	Direct Drive Exhaust Fan, Louvers Intake Vents, Heaters, Air Conditioner Available
Insulation	2” High Density Polystyrene Foam w/optional weather proof backing
Doors	Double Swing Out Cargo Doors (One End), Optional Personnel Doors
Electrical & Lighting Systems	Florescent Lighting with Switch, Receptacles, Emergency Lighting, 100 amp Electrical Panel Stubbed to Exterior
Media Loading	Optional Roof Hatches for Ease of Filter Media Loading
Connections	Ready for Hook Up Operation With Flanged Connections Outside Container
Chemical Feed	Pre/Post Chemical Feed Modules for Chlorination, pH Control, Ferric Addition, Polymer Addition
Pumps	Skid Mounted Pumping Systems for Backwash and Recycle
Backwash Recycle System	Customized Minimal and Zero Discharge Backwash Recycle Solutions

FEATURES of SNAPPY® AND BULLDOG® PITLESS ADAPTERS

To install a Snappy or Bulldog pitless adapter, you must first excavate, per OSHA regulations, around the well casing and cut a hole in the casing below the frost-line. The Snappy or Bulldog casing fitting is then attached to the casing around the hole to provide a sanitary water service connection. The submersible pump and drop pipe are suspended from the Snappy or Bulldog drop pipe fitting. As the pump, drop pipe, and drop fitting are lowered into the well the drop fitting discharge is pointed toward the hole in the casing. When the drop fitting discharge reaches the open hole in the casing, the drop fitting actuator forces the discharge port into the inner machined surface of the casing fitting and locks it in place. Once the discharge port is properly seated within the machined surface of the casing fitting, and the actuator is fully engaged, the submersible pump and drop pipe are fully supported and secured. To remove the submersible pump, the drop fitting must first be supported by a pump hoist. This is accomplished by threading a pull pipe into the threaded pull pipe port located on the top side of the drop fitting and properly supporting the pull pipe with a pump hoist. Mark the pull pipe and top of well casing toward the direction of the water service connection. This will help locate the casing fitting during replacement. The Snappy or Bulldog drop fitting can then be disengaged from the casing fitting by pulling up on the stainless steel release cable. The motion of pulling up on the release cable will remove the drop fitting discharge port from within the casing fitting machine surface. Once the drop fitting is disengaged, the drop fitting, drop pipe, and submersible pump can be removed from the well.

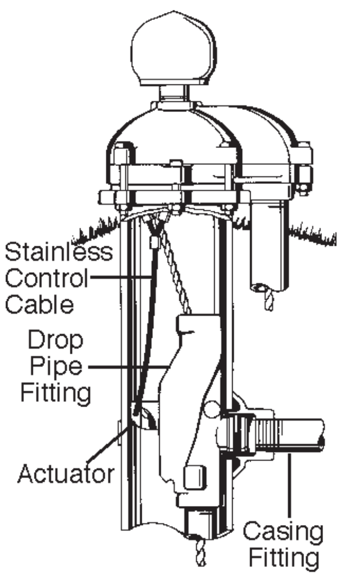
The Snappy is manufactured from lead-free galvanized cast iron and the Bulldog from brass. Snappy and Bulldog pitless adapters are certified under the standards of the Pitless Adapter Division of the Water Systems Council (PAS-I). Snappy pitless adapters are available for well sizes from 4 to 6-1/4 inches I.D. Bulldog pitless adapters are available for well sizes 4", 5" and 6" I.D. Both are for drop and discharge pipe sizes of 1 and 1-1/4 inches. **Conforms to Water System Council PAS-97(04) Standards.**

ECONOMICAL . . . Regular well casing is used all the way. Extra cost of larger upper well casing used with spool-type units and expensive pit or well house construction are eliminated.

FROSTPROOF . . . No heating required. All water passages are buried below the frostline.

SANITARY . . . No heated pump house or well pit is needed.

PUMP IS EASILY SET . . . by simply lowering pump into well suspended from drop pipe fitting with neck of the latter pointed in the casing fitting direction.



PUMP IS EASILY PULLED . . . by first supporting drop pipe with hoist, and then pulling control cable to free pump.

CORROSION PROTECTION . . . The Snappy Clamp-on casing fittings are lead-free galvanized gray iron. All parts within the well casing are either hot-dipped galvanized or constructed of corrosion resistant materials. All cast parts of the Bulldog pitless adapter are of high quality cast brass and conform to ASTM B584 specifications. Remaining parts are of 304 stainless steel or other corrosion resistant material. Springs are of phosphor bronze, O-rings are neoprene.

FULL CASING OPENING . . . provided by Snappy and Bulldog when pump is removed facilitates well and pump service, is often required by well codes and ordinarily necessary where a well screen is used.

MONITOR® AT-THE-WELL PITLESS ACCESSORIES. . . Allows for the pressure switch to be located in the well casing. For a description of the Monitor At-The-Well Control and ordering information, check the At-the-Well section of this catalog.

NOTE: Improper chlorination can lead to corrosion problem.
SNAPPY AND BULLDOG ADAPTERS WILL SUPPORT 1,000 LBS. PRESSURE RATED AT 250 PSI.

SNAPPY® PITLESS ADAPTER

The Snappy is manufactured from lead-free galvanized cast iron. Snappy pitless adapters are certified under the standards of the Pitless Adapter Division of the Water Systems Council (PAS-I). Snappy pitless adapters are available for well sizes from 4" to 6 1/4" I.D. and is for drop and discharge pipe sizes of 1" and 1-1/4". **Snappy adapters conform to Water System Council PAS-97(04) Standards.**

SNAPPY® PITLESS ADAPTER

Well Size I.D.	Min.-Max. I.D.	1" DROP PIPE & DISCHARGE Order No.	Wt.	1-1/4" DROP PIPE & DISCHARGE Order No.	Wt.
4"	3.981-4.130"	**8PL41U**	10	**8PL41.2U**	11
4"	3.981-4.130"	****8PL41U/3**	30	****8PL41.2U/3**	33
4-1/2"	4.444-4.607"	**8PL4.31U**	11	**8PL4.31.2U**	12
5"	4.991-5.166"	**8PL51U**	12	**8PL51.2U**	12
5-3/16"	5.137-5.286"	**8PL5.21U**	12		
5-3/16"	5.137-5.286"	**8PL5.25.61U**	10		
6"	5.906-6.201"	**8PL61U**	14	**8PL61.2U**	14
6-1/4"	6.189-6.367"	**8PL6.21U**	14	**8PL6.21.2U**	14

** 3 - Pack.

Note: To order Snappy Units with TAPPING for AT-THE-WELL controls INSERT the letter "P" after the number indicating the well size. Example: 8PL4P1U.

ILLINOIS & MICHIGAN SNAPPY PITLESS ADAPTERS (PRESSURIZED)

The Pressurized Snappy is equipped with dual o-rings on the casing fitting to insure a watertight seal at the well and to meet Illinois and Michigan code requirements.

Well Size I.D.	Min-Max. I.D.	Order No.	Drop Pipe & Discharge Size	Weight
4"	3.981-4.130"	**8PL04P1**	1"	12
5"	4.991-5.166"	**8PL05P1.2**	1-1/4"	13
6"	5.906-6.201"	**8PL06P1.2**	1-1/4"	15

Note: To order Snappy Pitless adapters with tapping for at-the-well controls, replace the "0" with "T" in the ordering number. Example: 8PLT4P1.

BULLDOG® PITLESS ADAPTER

The Bulldog is manufactured from brass. Bulldog pitless adapters are certified under the standards of the Pitless Adapter Division of the Water Systems Council (PAS-I). Bulldog pitless adapters are available for well sizes 4”, 5” and 6” I.D. and is for drop and discharge pipe sizes of 1 and 1-1/4 inches. **Bulldog adapters conform to Water System Council PAS-97(04) Standards.**

BULLDOG® PITLESS ADAPTER

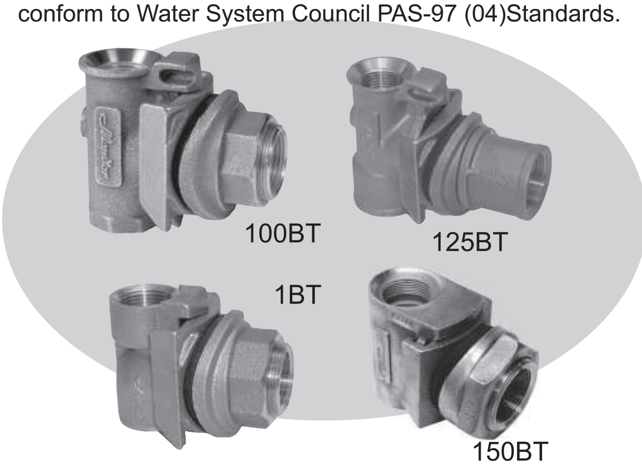
Well Size I.D.	Min.-Max. I.D.	1” DROP PIPE & DISCHARGE Order No.	Wt.	1-1/4” DROP PIPE & DISCHARGE Order No.	
4”	3.981-4.130”	**4A0**	7	**4B0**	8
5”	4.991-5.166”	**5A0**	7	**5B0**	8
6”	5.906-6.201”	**6A0**	7	**6B0**	8

SNAPPY® AND BULLDOG® PITLESS ADAPTERS O-RING SELECTION GUIDE

Description	O-Ring Part No.	O.D. Diameter
1” drop fitting, Std. or Pressurized	PL3	1-5/8”
1-1/4” drop fitting, Std. or Pressurized	PL40	1-7/8”
Std. Discharge fitting, all sizes	PL34	3-5/8”
Pressurized Discharge Fitting,		
4” well size, inner O-ring	PL86	2-7/8”
4” Well size outer O-ring	PL85	4-5/8”
5” & 6 well size, inner O-ring	PL84	3-3/8”
5” & 6” well size, outer O-ring	PL83	5-1/4”

BRASS SLIDE PITLESS ADAPTERS

Monitor® "Slide Type" brass pitless adapters are designed for greater strength and constructed of precision machined valve brass, with many features that provide for easier installation, more convenient servicing and improved sanitation. All conform to Water System Council PAS-97 (04)Standards.



FEATURES

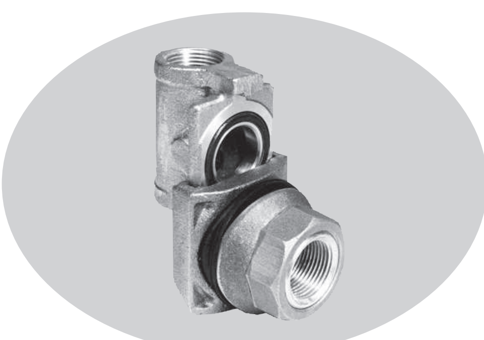
- All models (including 1 1/4" NPT sizes) are installed with a 1 3/4" diameter hole in the well casing, eliminating the need for several size of holesaws.
- Nipple and nut have fine pitch threads for secure seal.
- Vertical indicators.
- Generous molded gaskets for a sanitary, secure seal on the well casing.
- Large bevels on the edges of the male slides make it easier to insert the mating parts.
- Pressurized models have a small port in the nipple which allows the sealed area between the gaskets to fill with water under system pressure. The design prevents the entry of contamination as required by the State of Illinois.

BRASS PITLESS ADAPTERS

Well Size I.D.	Drop Pipe Size	Lift Out Pipe Size	Discharge Size	Order No.	Pressurized	Safe Load Limit	WT.
5-8"	1"	1"	1"	1BT	No	1500 lbs	3.5
5-8"	1"	**1"**	**1"**	**1BTB (boxed)**	No	1500 lbs.	3.5
5-8"	1"	1"	**1"**	**100BT**	No	2500 lbs.	3.75
5-8"	1 1/4"	1"	1 1/4"	**125BT**	No	2500 lbs.	4.5
5-7"	1"	1"	**1"**	**1BPT**	Yes	1500 lbs.	3.5
5-7"	1"	1"	**1"**	**100BPT**	Yes	2500 lbs.	3.75
5-7"	1 1/4"	1"	1 1/4"	**125BPT**	Yes	2500 lbs.	4.5
5-7"	1 1/4"	1"	**1"**	**1251BT**	No	2500 lbs.	3.8
6-8"	1 1/2"	1 1/4"	1 1/2"	**150BT**	No	6000 lbs.	8.2
6-8"	1 1/2"	1 1/4"	1 1/2"	**150BPT**	Yes	6000 lbs.	8.2
6-8"	1 1/2"	**1 1/4"**	1 1/2"	**150BTC**	No	6000 lbs.	8.2
6-8"	1 1/2"	1 1/4"	**1 1/2"**	**150BPTC**	Yes	6000 lbs.	8.2

NOTE: (C) = Tapped for At-The-Well Control Kits

BRASS PITLESS ADAPTER



BRASS PITLESS ADAPTERS - conform to Water System Council PAS-97(04)Standards.

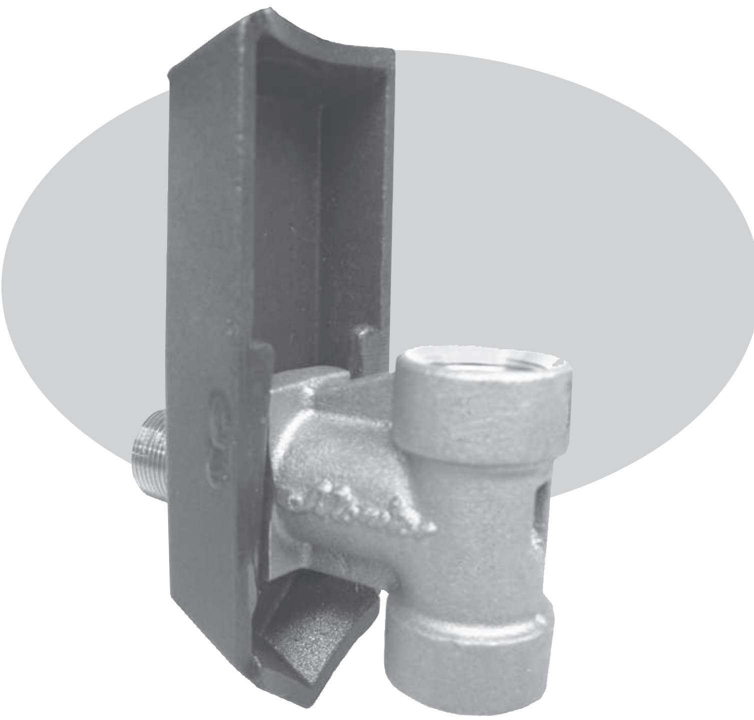
FEATURES

- All brass construction, reliable O-Ring seal, easy installation & servicing.
- Either a Monitor ventilated, Turtle or watertight cap may be used.
- Unit will support up to a 600' length of Sch. 40 Steel pipe.

BRASS PITLESS ADAPTER

Well Size I.D.	Order No.	Drop Pipe Size	Discharge Size	Weight
8"	**130BA**	2"	2"	10.5 lbs.

6123BEZ WELD ON PITLESS ADAPTERS



WELD ON PITLESS ADAPTER
FOR 4”, 5” & 6” I.D. & 7” O.D. WELLS

FEATURES

- 304 Stainless Steel 1” Male NPT Nipple
- 304 Stainless Steel locating support pins
- Steel housing has taper at the bottom to allow for easy bottom side welding
- Positive stop feature on interior of housing assures proper o-ring seal
- C84400 Red Brass 1” drop fitting with female NPT connection
- Maximum safe load rating: 1600 lbs.
- Chamfered 1” pull pipe port
- Large drainage hole in backside of drop fitting to prevent chlorine build-up
- Drop fitting has long sweep 90 degree turn
- Pump is more centrally located within well
- Large neoprene o-ring seal
- Factory pressure test to 100 lbs.

WELD ON PITLESS ADAPTER

Order No.	Well Size	Drop Pipe Size	Discharge Size	Weight (lbs)
6123BEZ	4”, 5” & 6” I.D. & 7” O.D.	1” Female NPT	1” Male NPT	5.4

SQ, SQE, SQE-NE, CU331SP

be
think
innovate

GRUNDFOS

Identification

Type key example SQ, SQE, SQE-NE

10 SQ E 05 - 160 N E

- 10: Rated gallons per minute
- SQ: Basic version (without communication)
- E: Electronic communication
- 05: Horsepower
- 160: Total Dynamic Head in (ft) at rated flow
- N: Stainless steel 316
- E: Environmental, PVDF impellers

Pumping from one tank to another

The SQE pump is ideal for pumping water from one tank to another.

Sensors

Level	Description	Light indication on CU 300
Level sensor (pos. 11, tank at top)		
Max. (stop)	When the water has reached this level, the pump stops.	Green indicator light in on/off button is flashing.
Min. (start)	When the water has dropped to this level, the pump starts.	Green indicator light in on/off button is permanently on.
Level sensor (pos. 11, tank at bottom)		
Max. (start)	When the water has reached this level, the pump starts.	Green indicator light in on/off button is on.
Min. (stop)	When the water has dropped to this level, the pump stops.	Green indicator light in on/off button is flashing.

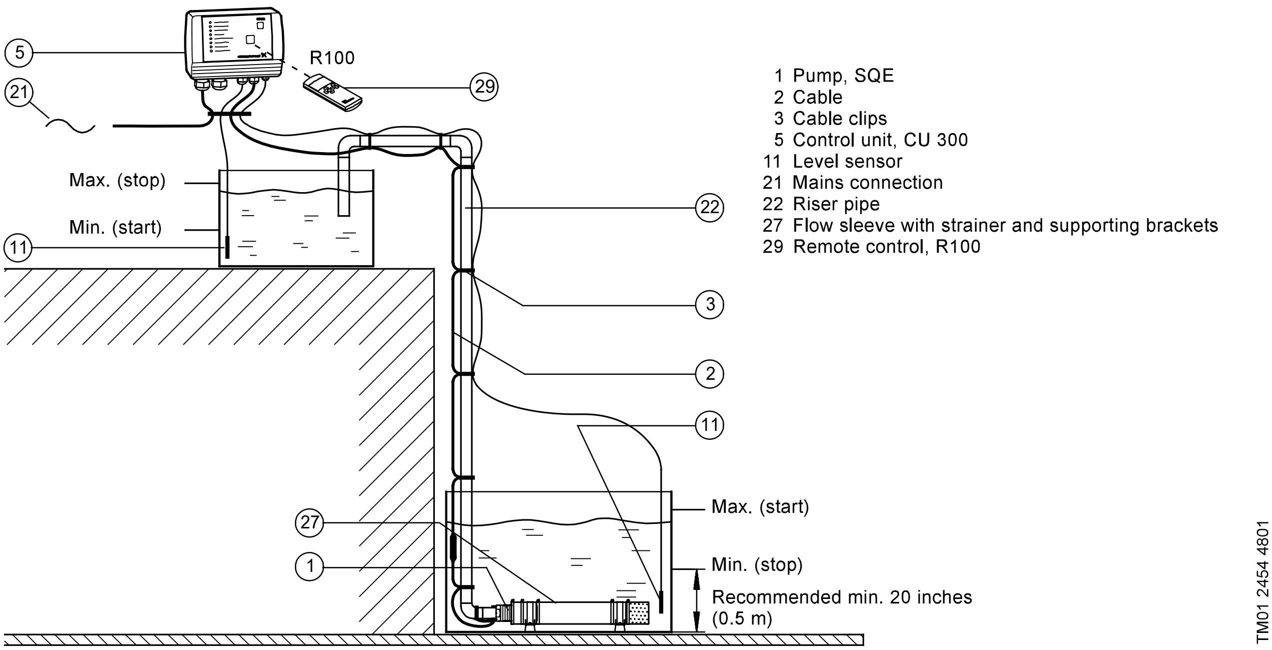


Fig. 10 Application example: Pumping from one tank to another

Pos.	Part	Type	No. of units	Product number	Unit price	Total price
1	Pump	SQE				
2	Cable					
3	Cable clips					
5	Control unit	CU 300				
11	Level sensor					
27	Flow sleeve with strainer and supporting brackets					
29	Remote control	R100				

Setting of operating parameters

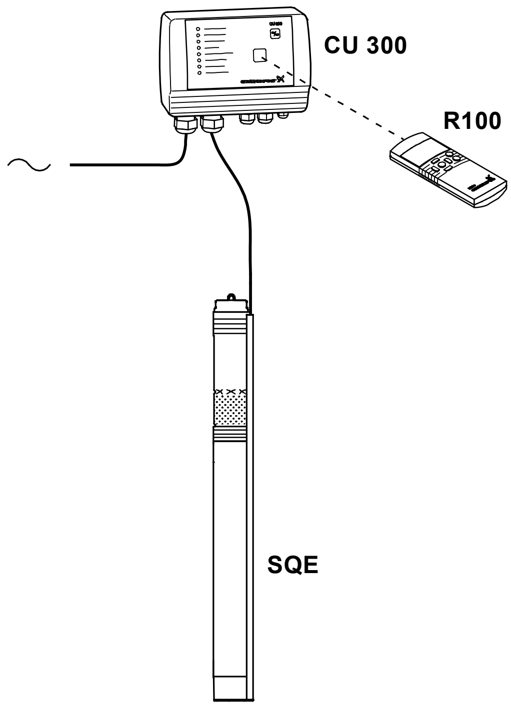
Using the R100 and the CU 300 enables change of the motor speed and thereby setting of the pump to a specific performance.

The software program "SQE Speed Calculation" has been developed for the calculation of the speed in order to obtain the required flow rate and head.

Dry-running protection

The value $P_{cut\text{-}out}$, ensuring dry-running protection, is factory-set for the SQE pump.

If the speed of the SQE pump is reduced by more than 1000 rpm, the $P_{cut\text{-}out}$ value must be readjusted by means of the CU 300 and R100.



Note: The SQE pump must not be started until the pump has been completely submerged below the water table. However, the change of the motor speed can be made even if the pump is not submerged.

Fig. 11 Application example: Workshop setting of operating parameters

Part	Type	No. of units	Product number	Unit price	Total price
Pump	SQE				
Remote control	R100				
Control unit	CU 300				
SQE Speed Calculation program					

5. Sizing and selection

System sizing guide

Step 1

Calculate minimum head requirements at no flow conditions:

H_{max} (required) = dynamic head + system pressure (in feet) + above grade elevation + friction loss

Step 2

Select pump from chart as follows:

- Choose model family based on the desired flow rate (i.e. 15SQE for a flow rate of 15 gpm)
- Select the first model with a value in Column 2 greater than the H_{max} calculated in Step 1 (For example: the choice for a 22 gpm model with an H_{max} of 140 ft would be the 22SQE-160).
- Double check your selection in the performance curves; see *7. SQ curve charts* on p. 18.

System sizing matrix		
	Column 1	Column 2
Pump type Model B	Shutoff head (0 gpm) @ 3000 rpm min. speed	Head @ rated gpm @ 10700 rpm max. speed
	TDH [feet]	TDH [feet]
5SQE-90	11	86
5SQE-140	17	131
5SQE-180	22	177
5SQE-230	28	222
5SQE-270	34	270
5SQE-320	39	315
5SQE-360	45	360
5SQE-410	51	405
5SQE-450	56	450
10SQE-110	12	105
10SQE-160	17	164
10SQE-200	23	215
10SQE-240	29	267
10SQE-290	34	328
10SQE-330	40	390
15SQE-70	10	75
15SQE-110	14	123
15SQE-150	19	164
15SQE-180	24	205
15SQE-220	29	246
15SQE-250	33	287
15SQE-290	38	328
22SQE-40	5	36
22SQE-80	9	77
22SQE-120	14	117
22SQE-160	18	159
22SQE-190	23	200
22SQE-220	27	240
30SQE-40	5	33
30SQE-90	11	82
30SQE-130	16	126

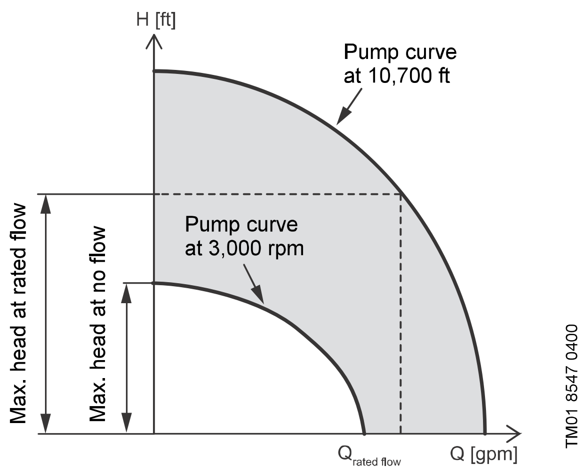
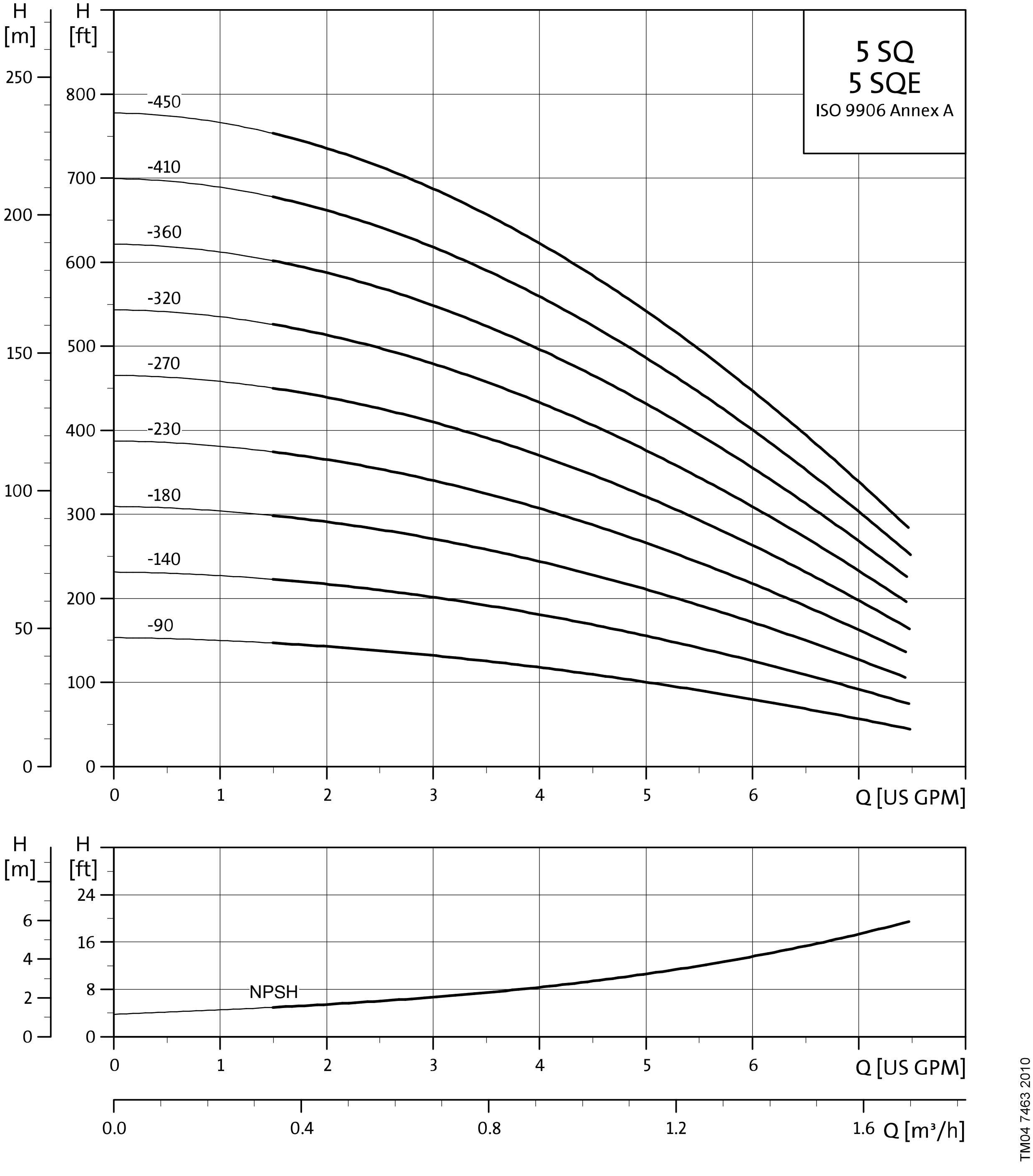


Fig. 14 Recommended sizing

Note: All calculated head requirements must lie between the selected pump models minimum and maximum speed curves.

7. SQ curve charts

5 SQ, SQE



Motor data

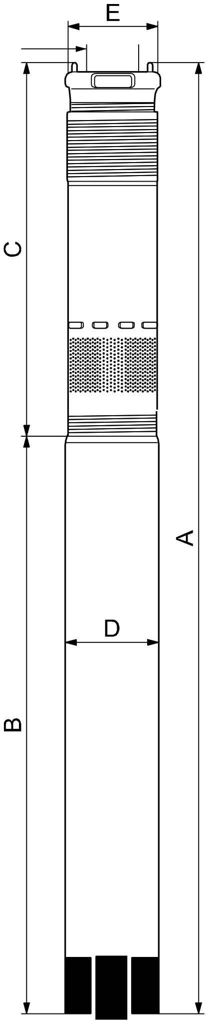
Pump type	Hp	Voltage	Full load amps		Overload amps		Min. well diameter	Discharge
			230V	115V	230V	115V		
5SQE05-90	1/2	230V / 115V	2.1	4.2	5	11	3"	1" NPT
5SQE05-140	1/2	230V / 115V	2.9	6.0	5	11	3"	1" NPT
5SQE05-180	1/2	230V / 115V	3.7	7.7	5	11	3"	1" NPT
5SQE07-230	3/4	230V	4.6	-	8	-	3"	1" NPT
5SQE07-270	3/4	230V	5.3	-	8	-	3"	1" NPT
5SQE07-320	3/4	230V	6.2	-	8	-	3"	1" NPT
5SQE10-360	1	230V	7.2	-	11	-	3"	1" NPT
5SQE10-410	1	230V	8.1	-	11	-	3"	1" NPT
5SQE15-450	1 1/2	230V	9.2	-	12	-	3"	1" NPT
10SQE05-110	1/2	230V / 115V	2.9	6.1	5	11	3"	1 1/4" NPT
10SQE05-160	1/2	230V / 115V	4.1	8.6	8	11	3"	1 1/4" NPT
10SQE07-200	3/4	230V	5.3	-	8	-	3"	1 1/4" NPT
10SQE7-240	3/4	230V	6.0	-	8	-	3"	1 1/4" NPT
10SQE10-290	1	230V	7.7	-	11	-	3"	1 1/4" NPT
10SQE15-330	1 1/2	230V	8.9	-	12		3"	1 1/4" NPT
15SQE05-70	1/2	230V / 115V	2.9	6.0	5	11	3"	1 1/4" NPT
15SQE05-110	1/2	230V / 115V	4.0	8.3	5	11	3"	1 1/4" NPT
15SQE07-150	3/4	230V	5.1	-	8	-	3"	1 1/4" NPT
15SQE07-180	3/4	230V	6.2	-	8	-	3"	1 1/4" NPT
15SQE10-220	1	230V	7.4	-	11	-	3"	1 1/4" NPT
15SQE10-250	1	230V	8.4	-	11	-	3"	1 1/4" NPT
15SQE15-290	1 1/2	230V	9.7	-	12	-	3"	1 1/4" NPT
22SQE05-40	1/2	230V / 115V	1.9	3.9	5	-	3"	1 1/2" NPT
22SQE05-80	1/2	230V / 115V	3.4	7.2	5	-	3"	1 1/2" NPT
22SQE07-120	3/4	230V	4.9	-	8	-	3"	1 1/2" NPT
22SQE10-160	1	230V	6.4	-	8	-	3"	1 1/2" NPT
22SQE10-190	1	230V	7.9	-	11	-	3"	1 1/2" NPT
22SQE15-220	1 1/2	230V	9.5	-	12	-	3"	1 1/2" NPT
30SQE05-40	1/2	230V / 115V	2.8	5.7	5	-	3"	1 1/2" NPT
30SQE07-90	3/4	230V	5.2	-	8	-	3"	1 1/2" NPT
30SQE10-130	1	230V	7.6	-	11	-	3"	1 1/2" NPT

9. Construction

Materials of construction

SQ, SQE	
Component	**Splined shaft**
Valve casing	Polyamide
Discharge chamber	304 stainless steel
Valve guide	Polyamide
Valve spring	316LN stainless steel
Valve cone	Polyamide
Valve seat	NBR rubber
O-ring	NBR rubber
Lock ring	310 stainless steel
Top bearing	NBR rubber
Top chamber	Polyamide
Guide vanes	Polyamide
Impeller	Polyamide w/ tungsten carbide bearings
Bottom chamber	Polyamide
Neck ring	TPU / PBT
Bearing	Aluminum oxide
Suction interconnector	Polyamide
Ring	304 stainless steel
Pump sleeve	304 stainless steel
Pressure equalization cone	Polyamide
Spacer	Polyamide
Sand trap	316 stainless steel
Shaft w/coupling	304 stainless steel
Cable guard	304 stainless steel

SQE-NE	
Component	**Splined shaft**
Valve casing	PVDF
Discharge chamber	316 stainless steel
O-ring	FPM rubber
Valve cone	PVDF
Valve seat	FPM rubber
Top chamber	PVDF
Empty chamber	PVDF
Top bearing	FPM rubber
Neck ring	PVDF
Lock ring	316 stainless steel
Guide vanes	PVDF
Bottom chamber	PVDF
Impeller w/ tungsten carbide bearing	PVDF
Suction interconnector	PVDF
Ring	316 stainless steel
Shaft w/coupling	Sintered steel
	316 stainless steel
Cable guard	316 stainless steel
Cable guard screws	316 stainless steel
Pressure equalization cone	PVDF
Valve spring	316 stainless steel
Pump sleeve	316 stainless steel
Valve guide	PVDF
Spacer	316 stainless steel



Discharge sizes:
1" NPT 5 SQ/SQE
1 1/4" NPT 10 - 15 SQ/SQE
1 1/2" NPT 22-30 SQ/SQE

CU 300

The CU 300 is a control and communication unit developed especially for the SQE submersible pumps for control applications other than constant pressure.

The CU 300 control unit provides:

- Flexible pump control based on various sensor inputs
- two-way communication with the SQE pumps
- alarm indication of pump operation by LED's on the front
- possibility of starting, stopping and resetting the pump simply by means of a push-button
- communication with R100 remote control.

The CU 300 communicates with the pump via mains borne signalling (Power Line Communication), meaning that no extra cables are required between the CU 300 and the pump.

The following alarms can be indicated by the CU 300:

- No contact
- overvoltage
- undervoltage
- dry running
- speed reduction
- overtemperature
- overload
- sensor alarm.

The CU 300 incorporates:

- External signal input for two analog sensors and one digital sensor
- relay output for external alarm indication
- control according to the signals received, e.g. of flow, pressure, water level and conductivity.

R100 remote control

Wireless infrared remote control of the CU 300 is possible by means of the R100.

Using the R100, it is possible to monitor and change the operating parameters, see the R100 menu structure on page 34.

The R100 is a valuable tool in case fault finding is required.

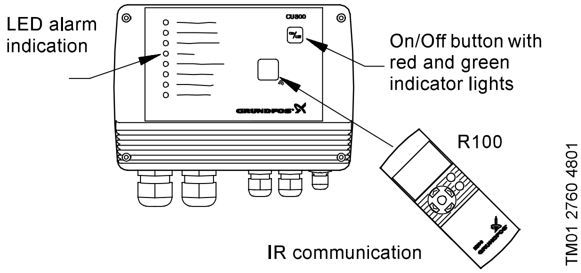


Fig. 18 CU 300 control unit with R100

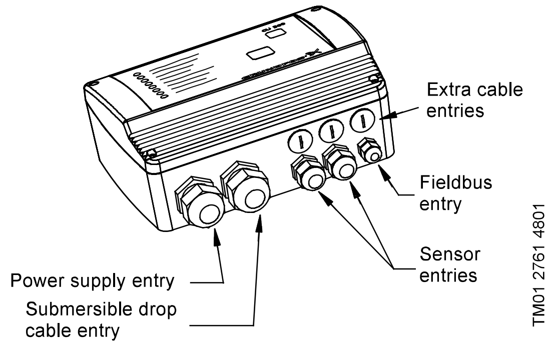


Fig. 19 CU 300 control unit, external entry ports

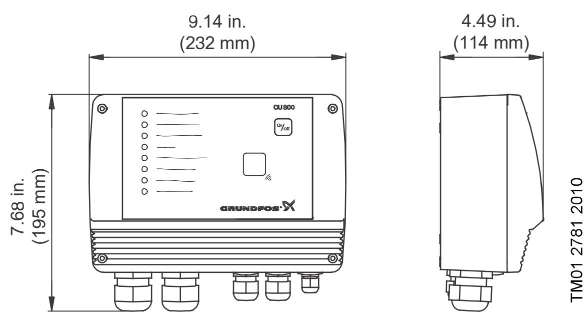
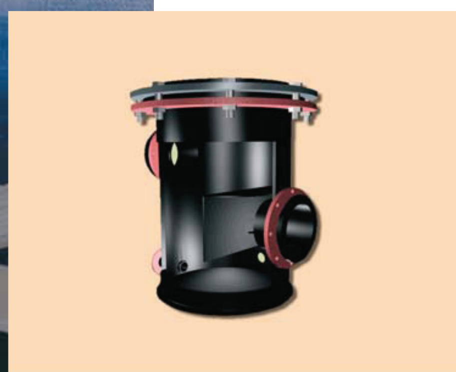


Fig. 20 CU 300 dimensions

HDPE Product Catalog

- > Pipe
- > Fittings
- > Fusion Equipment
- > Electrofusion
- > Mechanical Connections
- > Accessories



ISCO INDUSTRIES

800-345-ISCO

www.isco-pipe.com

Coming through.

Version 2.2 2007

www.isco-pipe.com

High-Density Polyethylene Pipe

Introduction

ISCO Industries, LLC is the largest high-density polyethylene pipe distributor in North America. ISCO can serve your needs anywhere in the USA and internationally. ISCO offers a complete package of HDPE piping products. Butt fusion machines are offered for sale or rental. Fusion technicians are available to provide on-site training or assistance to your project. Please call 1-800-345-ISCO for all your HDPE piping needs.

Some of The Characteristics of HDPE Pipe are:

- Economical
- Corrosion Resistant
- Zero Leak-Rate
- Hydraulically Smooth
- Fatigue and Surge Resistant
- Long Design Life
- Tappable
- Chemically Resistant
- Easily Installed
- Small to Large Diameters
- Non-Toxic, Non-Tasting
- Lightweight
- Reliable
- Flexible and Coilable
- Heat Fused
- Mechanically Joined (As Needed)
- Strong and Ductile
- Weather Resistant
- Impact Resistant
- Freeze Resistant
- Durable
- Abrasion Resistant
- Inert
- Self Restrained Pipe (Monolithic)
- Listed and Approved

Important Standards for High Density Polyethylene (HDPE) Pipe

Standards important for HDPE pipe relate to the resin the pipe is made from and the standards related to manufacturing sizes and tolerances. The American Society of Testing Materials (ASTM) standard for resin from which the pipe is made is **ASTM D 3350-05**, Standard Specification for Polyethylene Plastics Pipe and Fittings Materials. This standard defines the physical properties of the resin that the pipe is made from.

Pipe dimensions and manufacturing requirements:

ASTM F 714-05 Standard Specification for Polyethylene (PE) Pipe (SDR-PR) Based on Outside Diameter. This standard is used for most large diameter HDPE pipe (4” to 63”) applications other than gas pipe.

ASTM D 2513-05 Standard Specification for Thermoplastic Gas Pressure Pipe, Tubing and Fittings. Polyethylene pipe and other plastic for natural gas distribution are described in great detail in this standard.

ASTM D 3035-03a Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter. Most HDPE water tubing (1/2 inch to 3”) is made to the dimensions in this standard. While pipe sizes up to 24” are provided, very little large diameter pipe is made to this standard.

Intallation Standards:

ASTM D 2321-05 Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow Applications

ASTM D 2774-04 Standard Practice for Underground Installation of Thermoplastic Pressure Piping

ASTM F 1962 Standard Guide for Use of Maxi-Horizontal Directional Drilling for Placement of Polyethylene Pipe or Conduit under Obstacles, Including River Crossings

ASTM F 585-94 Standard Practice for Insertion of Flexible Polyethylene Pipe into Existing Sewers

American Water Works Association Standards

ANSI/AWWA C 901-2005 Polyethylene Pressure Pipe and Tubing, .5 in (13 mm) Through 3 in. (76 mm) for Water Services

ANSI/AWWA C 906-2006 Polyethylene Pipe and Fittings, 4 in (100 mm) Through 63 In (1,575 mm) for Water Distribution

Pipe Joining Standards:

ASTM F 2620 – Standard Practice for Heat Fusion of Polyethylene Pipe and Fittings

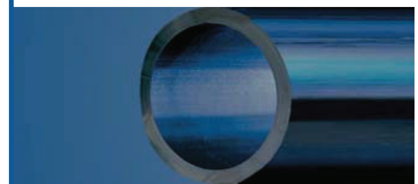
ASTM D 2657 – Standard Practice of Heat Fusion Joining of Polyolefin Pipe and Fittings

ASTM F 1290 – Standard Practice for Electrofusion Joining Polyolefin Pipe and Fittings

Fitting Standards

ASTM D 3261 Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Butt Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing

ASTM F 1055 Standard Specification for Electrofusion Fittings for Outside Diameter Controlled Polyethylene Pipe and Tubing



HDPE Pipe

1-800-345-ISCO

HDPE Pipe

Specifications for HDPE Pipe

The physical properties of high-density polyethylene pipe are described using ASTM D 3350-05, "Standard Specification for Polyethylene Plastic Pipe and Fittings Materials". Recently this standard was changed. The two key areas changed are, density and slow crack growth. In the 05 version, the cell classifications for density were increased from four cells to seven cells defining the density ranges for various resins.

New high performance bimodal resins, PE 4710 resins, have higher PENT test values. Slow crack grow properties can now be defined using eight cells.

As of December 2006, most HDPE pipe is made from resin with a cell classification of PE 345464C. The pipe is labeled as PE3408/3608. The physical properties for PE 345464C are:

PROPERTY VALUE		SPECIFICATION	UNIT	NOMINAL VALUE
Material Designation		PPI / ASTM		PE3408
Material Designation		PPI / ASTM		PE 3408/3608
Cell Classification		ASTM D 3350		345464C
Density	(3)	ASTM D 1505	g/cm3	0.941-943
Melt Index	(4)	ASTM D 1238	gm/ 10 min	0.05 -.11
Flexural Modulus	(5)	ASTM D 790	psi	110,000 to 140,000
Tensile Strength	(4)	ASTM D 638	psi	3,200
Slow Crack Growth				
ESCR		ASTM D 1693	hours in 100% igepal	>5,000
PENT	(6)	ASTM F 1473	hours	>100
HDB @ 73 deg F	(4)	ASTM D 2837	psi	1,600
UV Stabilizer	(C)	ASTM D 1603	%C	2 to 2.5%

The density provided is without carbon black. Typical HDPE pipe has a density of .955 to .957 with carbon black.

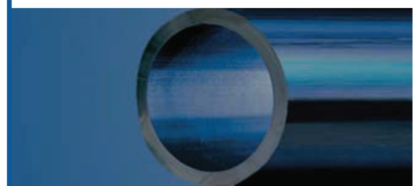
Types of Polyethylene Pipe

All polyethylene (PE) is not the same. In ASTM D 3350-05, low density PE is defined as having a density range of 0.919 to 0.925 g/cc; medium density has a range of 0.926 to 0.940 g/cc and high density is defined with a range from 0.941 to 0.955. All densities are without carbon black.

Density influences key properties in polyethylene materials. As the density increases, the tensile strength increases; also chemical resistance increases.

Medium density PE resins have been used for gas distribution. This original selection was made based on superior slow crack growth properties of medium density resins. Medium density pipe is designated as PE 2406 and PE 2708.

Today new bimodal resins are being used in gas distribution because of higher pressure ratings plus superior slow crack growth. These resins are designated PE 3408, PE 3608, PE 3708, PE 3710 and PE 4710.



HDPE Pipe

Slow Crack Growth

The Pent test is used to determine stress crack resistance for PE resins. The PENT test is conducted in accordance with ASTM F 1473, "Standard Test Method for Notch Tensile Test to Measure the Resistance to Slow Crack Growth of Polyethylene Pipes and Resins". This test uses a solid sample of material which is notched and tested.

The PENT test is a good test of slow crack growth. Scratches and gouges can cause crack propagation. Materials with high PENT numbers are less likely to fail because of slow crack growth.

Traditional PE 3408/3608 resins have PENT test values of about 100 hours. New bimodal resins used to make PE 3710 and PE 4710 pipes have values ranging from 600 hours to several thousand hours.

Physical Properties of PE 4710

HDPE pipe with a designation of PE 4710 is made from resin with a cell classification of PE 445474C or PE 445574C. We suggest using a specification calling for a minimum cell classification of PE 445474 C or higher. Both cell classifications can be used if specified in this way. The pipe is labeled as PE 4710. The physical properties for PE 445474C are provided below:

PROPERTY VALUE		SPECIFICATION	UNIT	NOMINAL VALUE
Material Designation		PPI / ASTM		PE 4710
Cell Classification		ASTM D 3350		445474 C
Density	(4)	ASTM D 1505	g/cm3	0.947-955
Melt Index	(4)	ASTM D 1238	gm/ 10 min	<.15
Flexural Modulus	(5)	ASTM D 790	psi	110,000 to 160,000
Tensile Strength	(5)	ASTM D 638	psi	3500-4000
Slow Crack Growth				
ESCR		ASTM D 1693	hours in 100% igepal	>5,000
PENT	(7)	ASTM F 1473	hours	>500
HDB @ 73 deg F	(4)	ASTM D 2837	psi	1,600
UV Stabilizer	(C)	ASTM D 1603	%C	2 to 2.5 %

The density provided is without carbon black. Typical PE 4710 HDPE pipe has a density of 0.956 to 0.964 with carbon black.

To be called a PE 4710, the pipe and resin has substantiation at 50 years.

HDPE Pipe

- **Items highlighted in Blue indicates standard stocking items that are more readily available.**
- **Pressures are based on using water at 23°C (73°F).**
- **Average inside diameter calculated using nominal OD and minimum wall plus 6% for use in estimating fluid flows. Actual ID will vary.**
- **Other piping sizes or DR's may be available upon request.**
- **Standard Lengths:**
  40' for 2"-24"
  50' for 26" and larger
  Coils available for 3/4"-6"(8" by special order)

1-800-345-ISCO

www.isco-pipe.com

PE 3608/3408 IPS HDPE Pipe Sizes

Pressure Rating	Nominal Size	3/4"	1"	1 1/4"	1 1/2"	2"	3"	4"	5"	5"	6"	7"	8"	10"	12"	14"	16"	18"
	Actual O.D.	1.05"	1.315"	1.66"	1.90"	2.375"	3.50"	4.50"	5.375"	5.563"	6.625"	7.125"	8.625"	10.75"	12.75"	14.00"	16.00"	18.00"
DR 7 (267psi)	Min. wall	0.150"	0.188"	0.237"	0.271"	0.339"	0.500"	0.643"	0.768"	0.795"	0.946"	1.018"	1.232"	1.536"	1.821"	2.000"	2.286"	2.571"
	Average I.D.	0.732"	0.917"	1.157"	1.325"	1.656"	2.440"	3.137"	3.747"	3.878"	4.619"	4.967"	6.013"	7.494"	8.889"	9.760"	11.154"	12.549"
	Weight lb/lf	0.184	0.289	0.460	0.603	0.943	2.047	3.384	4.830	5.172	7.336	8.195	12.433	19.314	27.170	32.758	42.786	54.151
DR 7.3 (254psi)	Min. wall	0.144"	0.180"	0.227"	0.260"	0.325"	0.479"	0.616"	0.736"	0.762"	0.908"	0.976"	1.182"	1.473"	1.747"	1.918"	2.192"	2.466"
	Average I.D.	0.745"	0.933"	1.178"	1.348"	1.685"	2.484"	3.193"	3.814"	3.947"	4.701"	5.056"	6.120"	7.628"	9.047"	9.934"	11.353"	12.773"
	Weight lb/lf	0.178	0.279	0.444	0.582	0.762	1.656	2.737	4.663	4.182	5.932	8.200	10.054	15.618	21.970	26.489	34.598	43.788
DR 9 (200psi)	Min. wall	0.117"	0.146"	0.184"	0.211"	0.264"	0.389"	0.500"	0.597"	0.618"	0.736"	0.792"	0.958"	1.194"	1.417"	1.556"	1.778"	2.000"
	Average I.D.	0.803"	1.005"	1.269"	1.452"	1.816"	2.676"	3.440"	4.109"	4.253"	5.064"	5.447"	6.593"	8.218"	9.747"	10.702"	12.231"	13.760"
	Weight lb/lf	0.150	0.234	0.372	0.488	0.762	1.656	2.737	3.903	4.182	5.932	6.863	10.054	15.618	21.970	26.489	34.598	43.788
DR 11 (160psi)	Min. wall	0.095"	0.120"	0.151"	0.173"	0.216"	0.318"	0.409"	0.489"	0.506"	0.602"	0.648"	0.784"	0.977"	1.159"	1.273"	1.455"	1.636"
	Average I.D.	0.848"	1.062"	1.340"	1.534"	1.917"	2.825"	3.633"	4.339"	4.491"	5.348"	5.752"	6.963"	8.678"	10.293"	11.302"	12.916"	14.531"
	Weight lb/lf	0.125	0.197	0.312	0.409	0.639	1.387	2.294	3.272	3.505	4.971	5.750	8.425	13.089	18.412	22.199	28.994	36.696
DR 13.5 (128psi)	Min. wall	---	---	---	---	0.176"	0.259"	0.333"	0.398"	0.412"	0.491"	0.528"	0.639"	0.796"	0.944"	1.037"	1.185"	1.333"
	Average I.D.	---	---	---	---	2.002"	2.950"	3.793"	4.531"	4.689"	5.585"	6.006"	7.271"	9.062"	10.748"	11.801"	13.487"	15.173"
	Weight lb/lf	---	---	---	---	0.531	1.153	1.906	2.718	2.912	4.130	4.779	7.001	10.875	15.298	18.445	24.092	30.491
DR 15.5 (110psi)	Min. wall	---	---	---	---	0.153"	0.226"	0.290"	0.347"	0.359"	0.427"	0.460"	0.556"	0.694"	0.823"	0.903"	1.032"	1.161"
	Average I.D.	---	---	---	---	2.050"	3.021"	3.885"	4.640"	4.802"	5.719"	6.150"	7.445"	9.280"	11.006"	12.085"	13.812"	15.538"
	Weight lb/lf	---	---	---	---	0.467	1.015	1.678	2.396	2.564	3.637	3.985	6.164	9.576	13.471	16.242	21.214	26.849
DR 17 (100psi)	Min. wall	---	---	---	---	0.140"	0.206"	0.265"	0.316"	0.327"	0.390"	0.419"	0.507"	0.632"	0.750"	0.824"	0.941"	1.059"
	Average I.D.	---	---	---	---	2.079"	3.064"	3.939"	4.705"	4.869"	5.799"	6.236"	7.549"	9.409"	11.160"	12.254"	14.005"	15.755"
	Weight lb/lf	---	---	---	---	0.429	0.932	1.540	2.197	2.353	3.338	3.860	5.657	8.788	12.362	14.905	19.467	24.638
DR 19 (89psi)	Min. wall	---	---	---	---	---	---	0.237"	0.283"	0.293"	0.349"	0.375"	0.454"	0.566"	0.671"	0.737"	0.842"	0.947"
	Average I.D.	---	---	---	---	---	---	3.998"	4.775"	4.942"	5.886"	6.330"	7.663"	9.551"	11.327"	12.438"	14.215"	15.992"
	Weight lb/lf	---	---	---	---	---	---	1.387	1.980	2.120	3.007	3.478	5.097	7.918	11.138	13.429	17.540	22.199
DR 21 (80psi)	Min. wall	---	---	---	---	---	---	0.214"	0.256"	0.265"	0.315"	0.339"	0.411"	0.512"	0.607"	0.667"	0.762"	0.857"
	Average I.D.	---	---	---	---	---	---	4.046"	4.832"	5.001"	5.956"	6.406"	7.754"	9.665"	11.463"	12.587"	14.385"	16.183"
	Weight lb/lf	---	---	---	---	---	---	1.262	1.801	1.929	2.736	3.165	4.637	7.204	10.134	12.218	15.959	20.198
DR 26 (64 psi)	Min. wall	---	---	---	---	---	---	0.173"	0.207"	0.214"	0.255"	0.274"	0.332"	0.413"	0.490"	0.538"	0.615"	0.692"
	Average I.D.	---	---	---	---	---	---	4.133"	4.937"	5.109"	6.085"	6.544"	7.922"	9.873"	11.710"	12.858"	14.695"	16.532"
	Weight lb/lf	---	---	---	---	---	---	1.030	1.470	1.574	2.233	2.582	3.784	5.878	8.269	9.970	13.022	16.480
DR 32.5 (51 psi)	Min. wall	---	---	---	---	---	---	0.138"	0.165"	0.171"	0.204"	0.219"	0.265"	0.331"	0.392"	0.431"	0.492"	0.554"
	Average I.D.	---	---	---	---	---	---	4.206"	5.024"	5.200"	6.193"	6.660"	8.062"	10.049"	11.918"	13.087"	14.956"	16.826"
	Weight lb/lf	---	---	---	---	---	---	0.831	1.186	1.270	1.801	2.083	3.053	4.742	6.671	8.044	10.506	13.296

ISCO INDUSTRIES

HDPE Fabricated and Molded Fittings

Pressure Ratings for Molded and Fabricated Fittings

Fittings serve the purpose of creating a change in direction in a short distance. There are two basic types of fittings, molded and fabricated. Molded fittings are made by injection molding. These fittings are fully pressure rated. The body of a molded fitting is thicker (greater OD except at ends) than pipe to maintain the pressure rating.

Fabricated fittings have reduced pressure rating because miter cuts create a change in the diameter of the fitting at this point. Stress is increased because of changes in flow direction. The larger the angle of the miter cut, the greater the stress and the greater the need to decrease the pressure rating to maintain a 2 to 1 safety factor.

In this Fitting Section, mitered fittings are shown with traditional three-piece 45 degree and five-piece 90 degree ells. Newly added are two-piece 45 degree ells and three-piece 90 degree ells. To maintain a 2 to 1 safety factor, the two-piece 45 degree ells and the three-piece 90 degree ells have a lower pressure rating for the same wall thickness (DR) than do the three-piece 45 degree and five-piece 90 degree ells.

The pressure ratings are based on standards for design established by the American Society of Mechanical Engineers (ASME). These standards are in ASME B31.3 paragraph number 304.2. Equations 4a and 4b are used to determine pressure ratings.

For five-piece mitered 90 degree and three-piece 45 degree ells based on 22.5 degree miter joints, the derating factor is 25% of the pressure rating of the pipe. A DR 11 wall thickness has a pressure rating of 160 psi. Fittings made from DR 11 pipe have a pressure rating of 120 psi. The 25% derating factor is based on a 2 to 1 safety factor.

For three-piece mitered 90 degree and two-piece 45 degree ells based 45 degree miter cuts, the derating factor is 38%. Fittings made from DR 11 pipe have a pressure rating of 100 psi. The 38% derating factor is based on a 2 to 1 safety factor.

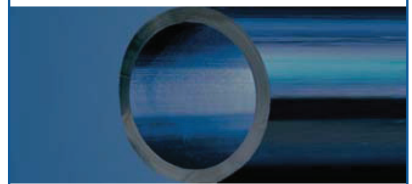
Derating factors for fittings are provided in Table 1, Derating Factors for HDPE Fittings. This table can assist in the selection of the correct fitting for a given application based on pressure rating requirements. Derating factor is the percentage that the pressure rating is lowered.

Table 1: Derating Factors For HDPE Fittings

Description	**Industry Practice**	**Derating ASME B31.3**
Fabricated 90 degree Ell - Five Segment	25%	25%
Fabricated 90 degree Ell Three	25%	38%
Fabricated 45 degree Ell Three	25%	25%
Fabricated 45 degree Ell Two	25%	38%
Fabricated 22.5 degree Ell Two	25%	25%
Fabricated Tees, Three Piece	25%	25%
Fabricated Tees, Two Piece	50%	25%
Fabricated Cross	50%	50%
Fabricated Wye, Three piece	40%	40%
Fabricated Wye, Two piece	50%	50%
Reducing Tee	none	none
Fabricated Cleanouts	***see note**	***see note**
Concentric Reducers	none	none
Transition Fittings	none	none
MJ Adapters	none	none
Bell MJ Adapters	none	none
Flange Adapters	none	none
Stub Ends	none	none
Molded Caps	none	none
Wall Anchors	none	none
Blind Flanges	***see note**	***see note**

Molded fittings such as 90 degree ells, 45 degree ells, tees, reducers, and end caps are normally not derated. These fittings have been designed and made with the needed radius and material in critical areas to handle the pressure for the thickness of the fitting. These fittings do not require derating when used at 73 degrees F with water or approved chemical service.

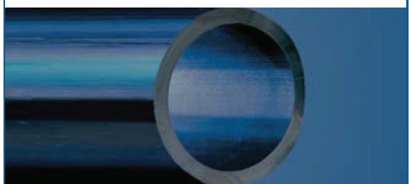
***NOTE: Plastic blind flanges are normally used for gravity or low pressure applications. Fabricated caps are typically designed to handle the required pressure. Blind Flanges and fabricated caps pressure ratings vary with size, type of material and thickness. Please indicate pressure requirements when ordering.**



HDPE Fabricated and Molded Fittings

1-800-345-ISCO

www.isco-pipe.com



HDPE Fabricated and Molded Fittings

ASME B 31.3 provides calculations to estimate derating factors for metal fittings. These values are applied to HDPE fittings in the table (refer to table 1). These ratings result in a 2 to 1 safety factor.

New three-piece miter 90 degree ells and two-piece 45 degree ells have been derated differently than ASME calculations by some HDPE fabricators. Using the BSME 31.3 method, its appears that the safety factor is less than 2 to 1.

ISCO Industries recognizes that these fittings are satisfactory for many applications using a lower derating factor and lower safety factor. This note has been provided to make you aware that critical applications may be better handled with five-piece mitered 90 degree ells. Critical applications are those that have high flow velocity (above 5 fps), higher temperature and those that may endanger people or the environment. Use good engineering judgment in the selection of fittings for your application.

Please call ISCO at 1-800-345-ISCO or go to our web site (www.isco-pipe.com) and use "Ask an Engineer" to answer your questions and get additional information.

TRANSITION FITTINGS

Transition fittings are mechanical connections between metal pipe and HDPE pipe. These fittings are used in a large number of applications. A common use is in natural gas systems to change from HDPE pipe to steel pipe where the pipe goes above ground.

Transition fittings for natural gas service are required to meet the requirements of ASTM D 2513, "Standard Specifications for Thermoplastic Gas Pressure Pipe, Tubing, and Fittings". Within this specification there are provisions for mechanical joints. The specification indicates that the mechanical connection must: 1) provide a seal plus resistance to force on the pipe which will cause permanent deformation of the pipe, 2) provide a seal only, and 3) provide a seal plus a pipe restraint.

Not all transition fittings will meet the requirements of ASTM 2513. If you need transitions that meet ASTM 2513, ask for this requirement.

Central Plastics test their products using ASTM D 638 tensile test. This testing qualifies their fittings as providing a seal plus resistance to force which will cause permanent deformation.

Quick burst test per ASTM D1599 are used to proof that the transition fittings provide a seal and resist axial pullout forces.

Transition fittings are made from different metals. Carbon steel is the standard. If you need greater corrosion resistance, please request stainless steel transition fittings.

Carbon Steel Transition Fittings

Features:

Compression design effectively resists creep and pullout
Carbon steel per ASTM A-53, Sch. 40 steel pipe
O-Ring design for added protection
Meets ASTM 2513

No Weld Design
Size range 3/4" through 12"
No shear points
Available with AWWA pipe

Stainless Steel Transition Fittings

Features:

Compression design effectively resists creep and pullout
Stainless Steel 304 Body (316 Available)
O-Ring design for added protection
Meets ASTM 2513

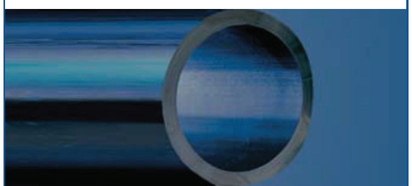
No Weld Design
Size range 3/4" through 2"
No shear points
Available with AWWA pipe

Threads per ANSI B1.20.1

HDPE Fabricated and Molded Fittings

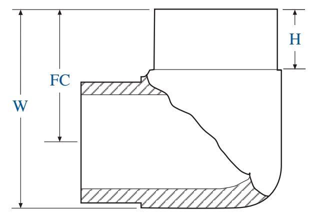
1-800-345-ISCO

www.isco-pipe.com



IPS
HDPE
Fittings

IPS Fittings Molded 90° Ell

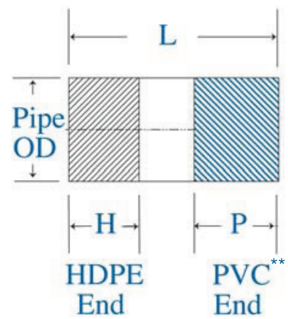


IPS Fittings Molded 90° Ell

Nominal Size(in)	Pipe OD(in)	DR	Pressure Rating	Part #	Dimensions H (in)	FC (in)	W (in)	Weight Lbs.	Shipping Method
3/4	1.05	11	160	ISMF9007511IPS	2.05	2.68	3.2	0.05	UPS
1	1.315	11	160	ISMF900111IPS	2.17	2.91	3.57	0.1	UPS
1-1/4	1.66	11	160	ISMF9012511IPS	2.44	3.35	4.18	0.15	UPS
1-1/2	1.9	11	160	ISMF901511IPS	2.64	3.7	4.65	0.22	UPS
2	2.375	09	200	ISMF900209IPS	2.5	4.25	5.815	0.5	UPS
		11	160	ISMF900211IPS	"	"	"	0.43	"
3	3.5	09	200	ISMF900309IPS	3	5.25	7.4	1.5	UPS
		11	160	ISMF900311IPS	"	"	"	1.2	"
		17	100	ISMF900317IPS	"	"	"	0.8	"
4	4.5	09	200	ISMF900409IPS	3	5.875	8.25	3	UPS
		11	160	ISMF900411IPS	"	"	"	2.4	"
		17	100	ISMF900417IPS	"	"	"	1.6	"
6	6.625	09	200	ISMF900609IPS	4.125	8	12.5	7	UPS
		11	160	ISMF900611IPS	"	"	"	6.7	"
		17	100	ISMF900617IPS	"	"	"	4.8	"
8	8.625	11	160	ISMF900811IPS	6	12	16.5	15	UPS
		17	100	ISMF900817IPS	"	"	"	10	"
10	10.75	11	160	ISMF901011IPS	6	13.25	18.875	27	UPS
		17	100	ISMF901017IPS	"	"	"	18	"
12	12.75	11	160	ISMF901211IPS	7.5	15.88	22.555	41	UPS
		17	100	ISMF901217IPS	"	"	"	27	"

IPS
HDPE
Fittings

IPS HDPE to PVC Transition Fitting



IPS HDPE To PVC Transition Fitting

Nominal Size (in)	Pipe OD (in)	Material	Part #	Dimensions H (in)	L (in)	P (in)	Weight Lbs.	Shipping Method
3/4	1.05	Steel	ISFFTF003/4PVC	3	8	3	0.7	UPS
		Stainless Steel	ISFFTF003/4PVCS		"	"	"	"
1	1.315	Steel	SFFTF0111PVC	3	8.5	3	0.8	UPS
		Stainless Steel	ISFFTF0111PVCSS		"	"	"	"
1 1/4	1.66	Steel	ISFFTF01.25PVC	4	11.5	4	1	UPS
		Stainless Steel	ISFFTF01.25PVCS		"	"	"	"
1 1/2	1.9	Steel	ISFFTF01.5PVC	4	12	4	1.25	UPS
		Stainless Steel	ISFFTF01.50PVCS		"	"	"	"
2	2.375	Steel	ISFFTF0211PVC	4	12.5	4	1.5	UPS
		Stainless Steel	ISFFTF0211PVCSS		"	"	"	"
3	3.5	Steel	ISFFTF0311PVC	4.5	14	4.5	3	UPS
		Stainless Steel	ISFFTF0311PVCSS		"	"	"	"
4	4.5	Steel	ISFFTF0411PVC	4.5	15	4.5	5	UPS
		Stainless Steel	ISFFTF0411PVCSS		"	"	"	"

** **PVC available as SCH 40 or SCH 80.**

DRISCOPIPE

FLEXIBILITY The flexibility of polyethylene pipe allows it to be curved over, under, and around obstacles as well as make elevation and directional changes. In some instances, the pipe's flexibility can eliminate the need for fittings and reduce installation costs.

Driscopipe HDPE pipe can be bent to a minimum radius between 20 to 40 times the pipe diameter.

TABLE 2: MINIMUM ALLOWABLE BEND RADIUS @ 73.4°F

SDR	Minimum Allowable Bend Radius, R_a
32.5	> 40 times outside diameter
26	> 35 times outside diameter
21	> 28 times outside diameter
19	> 27 times outside diameter
17	> 27 times outside diameter
15.5	> 27 times outside diameter
13.5	> 25 times outside diameter
11	> 25 times outside diameter
9	> 20 times outside diameter
7	> 20 times outside diameter

Example: Assume a 24" diameter DR 21 pipe was to be bent. The minimum bend radius can be calculated as follows:

$$R_a > 28 \times D \qquad R_a > 28 \times 24" \qquad R_a > 672"$$

Where: R_a is the radius of curvature of the bend in the pipe, in.
D is the outside diameter of the pipe, in.

The radius of the circular sector (bend) must be greater than 672" (56 ft).

FLOW FACTORS Driscopipe polyethylene pipe has a smooth inside surface. A "C" factor of 150 is recommended in the Hazen-Williams Formula. Polyethylene pipe has a recommended Manning's "n" value of 0.009. The smoothness factor, ε, is equal to 7×10^{-5} ft. Smooth walls and the non-wetting characteristic of polyethylene allow higher flow capacity and reduced friction loss with polyethylene pipe.

LIFE EXPECTANCY The hydrostatic design basis for Driscopipe pipe is based on extensive hydrostatic testing data evaluated by standardized industry methods. Based on ASTM D2837, regression curves project a life expectancy of approximately 50 years when transporting water at 73.4°F. Internal and external environmental conditions may alter the expected life or change the recommended design basis for a given application.

LIGHTWEIGHT Polyethylene pipe is much lighter than concrete, cast iron, or steel pipe. It is easier to handle and install. Reduced manpower and equipment requirements may result in installation savings.

PRESSURE RATINGS Phillips Driscopipe manufactures polyethylene pipe for gravity flow and pressure service through 267 psi at 73.4° F. Some applications or design codes require that the pipe be derated, resulting in lower design pressure ratings. The formulas used to design polyethylene piping systems include a 2:1 safety factor in hydrostatic stress and a greater than 2:1 safety factor in surge fatigue.

PVC White Schedule 40 Fittings, Unions, & Saddles

MADE IN THE U.S.A. WITH PRIDE

TECHNICAL INFORMATION WEIGHTS & DIMENSIONS

May 1, 2009

SUPERSEDES ALL PREVIOUS EDITIONS

SPEARS® MANUFACTURING COMPANY Since 1969 SYLMAR, CALIFORNIA

LOSS PREVENTION CERTIFICATION BOARD LPCB

UKAS QUALITY MANAGEMENT 007

Quality Systems Certificate No. 293
Corporate Facilities, Sylmar, CA
Assessed to ISO 9001: 2000

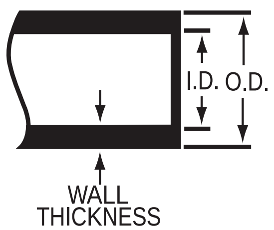
Visit our web site
www.spearsmfg.com

40-4-0509

PVC WHITE SCHEDULE 40 FITTINGS
UNIONS & SADDLES

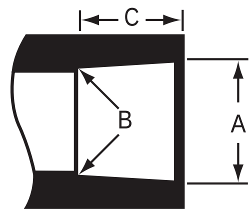
ASTM STANDARD DIMENSIONS

SCHEDULE 40 PIPE DIMENSIONS ASTM D 1785



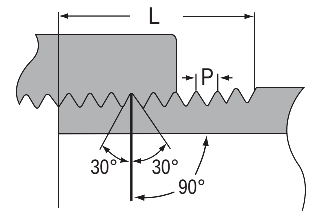
Nominal Pipe Size In.	Mean Outside Diameter In.	O. D. Tolerance In.	Minimum Wall Thickness In.
1/8	0.405	± 0.004	0.068
1/4	0.540	± 0.004	0.088
3/8	0.675	± 0.004	0.091
1/2	0.840	± 0.004	0.109
3/4	1.050	± 0.004	0.113
1	1.315	± 0.005	0.133
1-1/4	1.660	± 0.005	0.140
1-1/2	1.900	± 0.006	0.145
2	2.375	± 0.006	0.154
2-1/2	2.875	± 0.007	0.203
3	3.500	± 0.008	0.216
4	4.500	± 0.009	0.237
5	5.563	± 0.010	0.258
6	6.625	± 0.011	0.280
8	8.625	± 0.015	0.322
10	10.750	± 0.015	0.365
12	12.750	± 0.015	0.408

SCHEDULE 40 SOCKET DIMENSIONS ASTM D 2466



Nominal Size In.	Diameter			Socket Length Minimum C
	Entrance A	Bottom B	Tolerance A	
1/8	0.417	0.401	± 0.004	0.500
1/4	0.552	0.536	± 0.004	0.500
3/8	0.687	0.671	± 0.004	0.594
1/2	0.848	0.836	± 0.004	0.688
3/4	1.058	1.046	± 0.004	0.719
1	1.325	1.310	± 0.005	0.875
1-1/4	1.670	1.655	± 0.005	0.938
1-1/2	1.912	1.894	± 0.006	1.094
2	2.387	2.369	± 0.006	1.156
2-1/2	2.889	2.868	± 0.007	1.750
3	3.516	3.492	± 0.008	1.875
4	4.518	4.491	± 0.009	2.000
5	5.583	5.553	± 0.010	3.000
6	6.647	6.614	± 0.011	3.000
8	8.655	8.610	± 0.015	4.000
10	10.780	10.735	± 0.015	5.000
12	12.780	12.735	± 0.015	6.000

AMERICAN NATIONAL STANDARD TAPER PIPE THREADS (NPT) ANSI B1.20.1,ASTM F 1498



Nominal Size In.	Threads Per Inch.	Effective Thread Length L	Pitch Of Thread P
1/8	27	0.2639	0.03704
1/4	18	0.4018	0.05556
3/8	18	0.4078	0.05556
1/2	14	0.5337	0.07143
3/4	14	0.5457	0.07143
1	11-1/2	0.6828	0.08696
1-1/4	11-1/2	0.7068	0.08696
1-1/2	11-1/2	0.7235	0.08696
2	11-1/2	0.7565	0.08696
2-1/2	8	1.1375	0.12500
3	8	1.2000	0.12500
4	8	1.3000	0.12500
5	8	1.4063	0.12500
6	8	1.5125	0.12500
8	8	1.7125	0.12500

Molded Schedule 40 products are manufactured to ASTMD 2466 for use with pipe manufactured to ASTM D1785. Certain products carry reduced pressure handling capability and have maximum internal pressure ratings at 73° F noted.

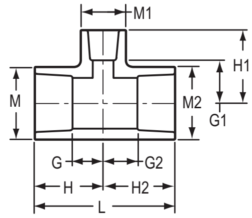
Fabricated Schedule 40 pressure fittings (part numbers ending with “F”) are manufactured to Spears® specifications for use with pipe manufactured to ASTM D1785. See publication FAB-7, General Specifications for Standard Fabricated Fittings for additional information.

All specified Schedule 40 products are manufactured from materials certified by NSF for use in potable water service.

PVC WHITE SCHEDULE 40 FITTINGS
UNIONS & SADDLES

REDUCING TEE **(continued)**

Socket x Socket x Socket



Part Number	Size	G	G1	G2	H	H1	H2	L	M	M1	M2	Approx. Wt. (Lbs.)
401-527[1]	6x6x1-1/2	1-3/8	3-7/8	1-3/8	4-27/32	5-3/16	4-27/32	9-11/16	7-1/4	2-11/16	7-1/4	3.60
401-528	6x6x2	1-3/8	3-19/32	1-3/8	4-27/32	4-31/32	4-27/32	9-11/16	7-3/16	2-11/16	7-3/16	3.39
401-529	6x6x2-1/2	2	3-15/16	2	5-1/2	5-15/16	5-1/2	10-15/16	7-3/16	3-15/16	7-3/16	4.29
401-530	6x6x3	2	3-23/32	2	5	5-19/32	5	10	7-1/4	4	7-1/4	3.89
401-532	6x6x4	2-17/32	3-5/8	2-17/32	6	5-5/8	6	12-1/16	7-3/16	5	7-3/16	4.54
401-533[1]	6x6x5	3-1/2	4-1/2	3-1/2	7	7-1/2	7	14	7-3/16	7-3/16	7-3/8	8.46
401-535[1]	6x6x8	5-3/8	5-1/2	5-3/8	8-7/8	9-1/2	8-7/8	17-3/4	9-1/2	9-3/4	9-1/2	19.21
401-537[1]	6x6x10	8	5-13/16	8	11-3/8	10-13/16	11-3/8	22-3/4	11-1/2	11-9/16	11-1/2	38.30
401-578[1]	8x8x2	2	5-7/8	2	6	7	6	12	9-1/4	4	9-1/4	11.71
401-579[1]	8x8x2-1/2	2	5-5/16	2	6	7-5/16	6	12	9-5/16	4	9-5/16	6.62
401-580	8x8x3	1-31/32	4-3/4	1-31/32	6-1/32	6-3/4	6-1/32	12-1/16	9-11/32	4	9-11/32	6.44
401-582	8x8x4	2-17/32	4-11/16	2-17/32	6-17/32	6-11/16	6-17/32	13-1/16	9-9/32	4-31/32	9-9/32	7.02
401-583[1]	8x8x5	3-21/32	5-1/4	3-21/32	7-21/32	8-1/4	7-21/32	15-5/16	9-5/16	7-1/4	9-5/16	10.60
401-585	8x8x6	3-5/8	4-3/4	3-5/8	7-21/32	7-25/32	7-21/32	15-11/32	9-11/32	7-1/4	9-11/32	8.90
401-589[1]	8x8x10	6-23/32	5-11/16	6-23/32	11-7/32	10-1/2	11-7/32	22-7/16	11-9/16	11-9/16	11-9/16	34.76
401-621F	10x10x2	4-7/8	7-1/4	4-7/8	10-1/8	9	10-1/8	20-1/4	11-1/2	2-11/16	11-1/2	19.60
401-623[1]	10x10x3	3-13/16	7	3-13/16	9-3/8	9	9-3/8	18-3/4	12	7-1/2	12	25.54
401-624[1]	10x10x4	3-27/32	7-3/8	3-27/32	9-11/32	9-3/8	9-11/32	18-11/16	12	7-1/2	12	25.63
401-628[1]	10x10x8	5-3/4	7-3/16	5-3/4	10-7/8	11-1/4	10-7/8	21-11/16	11-11/16	11-11/16	11-1/2	29.85
401-661F	12x12x2	5-1/4	8-1/4	5-1/4	11-1/2	10	11-1/2	23	13-1/2	2-11/16	13-1/2	25.00
401-663F	12x12x3	5-3/4	9	5-3/4	12	11-1/4	12	23	13-1/2	3-15/16	13-1/2	31.41
401-664F	12x12x4	7	9-5/16	7	13-1/4	11-9/16	13-1/4	26-1/2	13-9/16	5	13-9/16	32.40
401-666[1]	12x12x6	4-7/8	8-5/16	4-7/8	11-7/16	11-3/4	11-7/16	22-13/16	14-1/4	9-3/4	14-1/4	44.02
401-668	12x12x8	4-27/32	7-1/8	4-27/32	11-13/32	11-1/8	11-13/32	22-13/16	14-1/4	9-3/4	14-1/4	40.00
401-670	12x12x10	6-13/16	7-3/8	6-13/16	12-13/16	13-1/4	12-13/16	25-5/8	13-3/4	13-3/4	13-3/4	50.00
401-670F	12x12x10	10-1/4	10-3/8	10-1/4	16-1/2	15-5/8	16-1/2	33	13-9/16	11-1/2	13-9/16	50.00
401-676F	12x12x16	18-1/2	12-3/4	18-1/2	30-1/4	20-3/4	30-1/4	60-1/2	14-1/8	17	14-1/8	144.87
401-678F	12x12x18	14-1/4	13	17-7/8	23-1/4	22	23-7/8	47-3/4	19-1/8	19-1/8	19-1/8	252.00
401-691F	14x14x2	6	9-1/4	6	13	11	13	26	14-7/8	2-3/4	14-7/8	35.53
401-693F	14x14x3	6-1/2	9-9/16	6-1/2	13-1/2	11-13/16	13-1/2	27	14-7/8	3-15/16	14-7/8	38.35
401-694F	14x14x4	7-1/2	10	7-1/2	14-1/2	12-1/4	14-1/2	29	14-7/8	5	14-7/8	38.58
401-696F	14x14x6	8	10-1/4	8	15	13-1/2	15	30	14-7/8	7-1/8	14-7/8	45.70
401-698F	14x14x8	9-1/8	10-1/2	9-3/32	16-1/8	14-3/4	16-3/32	32-3/16	14-7/8	9-3/8	14-7/8	51.99

[1] Oultet sized with bushing

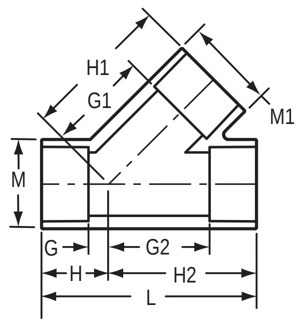
Made in the U.S.A.

PVC WHITE SCHEDULE 40 FITTINGS
UNIONS & SADDLES

WYE

Socket x Socket x Socket

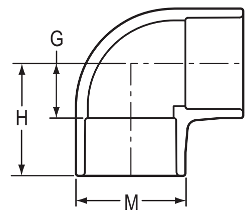
Pressure Rating
1/2" - 2" 235 psi @ 73°F
2-1/2" - 6" 200 psi @ 73°F
8" & Up 100 psi @ 73°F



Part Number	Size	G	G1	G2	H	H1	H2	L	M	M1	Approx. Wt. (Lbs.)
475-005	1/2	1/4	1-3/16	1-3/16	1-1/8	2-1/16	2-1/16	3-3/16	1-5/32	1-5/32	.12
475-007	3/4	1/8	1-9/16	1-9/16	1-1/8	2-9/16	2-9/16	3-11/16	1-3/8	1-3/8	.18
475-010	1	9/32	1-13/16	1-13/16	1-13/32	2-15/16	2-15/16	4-11/32	1-23/32	1-23/32	.31
475-012	1-1/4	3/8	2-1/4	2-1/4	1-5/8	3-1/2	3-1/2	5-1/8	2-1/16	2-1/16	.50
475-015	1-1/2	1/2	2-19/32	2-9/16	1-7/8	3-31/32	3-15/16	5-13/16	2-11/32	2-11/32	.69
475-020	2	19/32	3-7/32	3-7/32	2-1/8	4-3/4	4-3/4	6-7/8	2-7/8	2-7/8	1.20
475-025	2-1/2	1	5-1/4	4-3/4	3	7-1/4	6-3/4	9-3/4	4-1/8	4-1/8	2.59
475-030	3	11/16	4-5/8	4-3/16	2-19/32	6-17/32	6-3/32	8-11/16	4-5/32	4-5/32	2.68
475-040	4	7/8	6	5-3/8	3-1/8	8-1/4	7-5/8	10-3/4	5-9/32	5-9/32	4.76
475-050F	5	3-3/4	10-1/8	9-5/16	6-3/4	13-1/8	12-5/16	19-1/8	6-1/16	6-1/16	13.26
475-060	6	1-5/16	8-21/32	8-1/16	4-5/16	11-21/32	11-1/16	15-3/8	7-9/16	7-9/16	12.09
475-080	8	1-3/4	11-1/2	11-9/16	5-3/4	15-17/32	15-19/32	21-5/16	9-3/4	9-3/4	25.76
475-080F	8	5-1/2	13-1/2	13-1/2	9-3/4	17-3/4	17-3/4	27-1/2	9-1/4	9-1/4	25.46
475-100	10	2-1/2	16-7/8	13-31/32	7-1/2	22-1/8	18-31/32	26-15/32	11-9/16	11-9/16	26.92
475-100F	10	6-7/8	16-7/8	16-7/8	12-1/8	22-1/8	22-1/8	34-1/4	11-1/2	11-1/2	45.11
475-120	12	2-11/16	16-1/8	16-7/32	8-3/4	22-7/32	22-9/32	31-1/32	13-21/32	13-21/32	41.85
475-120F	12	6-3/4	19-3/4	19-3/4	13	26	26	39	13-9/16	13-9/16	63.02
475-140F	14	6-7/8	21-1/8	21-1/8	13-7/8	28-1/8	28-1/8	42	14-7/8	14-7/8	90.24
475-160F	16	8-1/2	26-1/4	24-1/2	16-1/2	34-1/4	32-1/2	49	17	17	93.06
475-180F	18	9	28	27-3/4	18	37	36-3/4	54-3/4	19-1/8	19-1/8	151.20
475-200F	20	11-7/16	30-5/16	30-5/16	21-7/16	40-5/16	40-5/16	61-3/4	21-3/16	21-3/16	191.78
475-240F	24	11-3/4	34-3/4	34-3/4	25-3/4	46-3/4	46-3/4	70-1/2	25-3/8	25-3/8	420.00

PVC WHITE SCHEDULE 40 FITTINGS
UNIONS & SADDLES

90° ELBOW
Socket x Socket

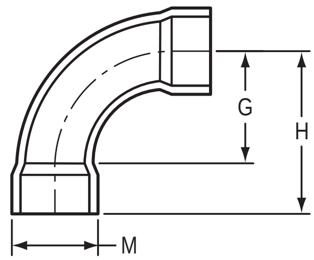


Part Number	Size	G	H	M	Approx. Wt. (Lbs.)
406-003	3/8	3/8	1-1/8	7/8	.03
406-005	1/2	1/2	1-1/4	1-1/16	.05
406-007	3/4	9/16	1-1/2	1-5/16	.07
406-010	1	11/16	1-13/16	1-5/8	.12
406-012	1-1/4	31/32	2-5/32	2	.20
406-015	1-1/2	1-1/16	2-3/8	2-7/32	.25
406-020	2	1-9/32	2-21/32	2-3/4	.37
406-025	2-1/2	1-15/16	3-7/32	3-5/16	.71
406-030	3	1-7/8	3-25/32	3-31/32	1.04
406-040	4	2-1/2	4-1/2	5	1.71
406-045F	4-1/2	7-1/8	9-5/8	5-1/2	3.13
406-050	5	3-1/16	6-1/8	6-5/32	3.58
406-060	6	3-1/2	6-29/32	7-9/32	5.03
406-080	8	4-7/16	8-15/32	9-5/16	8.75
406-100	10	5-29/32	10-7/8	11-5/8	17.82
406-100F	10	9-1/2	14-3/4	11-1/2	17.40
406-120	12	7-1/16	13-9/16	14-1/4	27.98
406-120F	12	10-1/2	16-3/4	13-9/16	25.94
406-140F	14	12-1/4	19-1/4	14-7/8	47.26
406-160F	16	14-1/8	22-1/8	17	69.70
406-180F	18	17-1/4	26-1/4	19-1/8	104.20
406-200F	20	18-3/4	28-3/4	21-3/16	131.93
406-240F	24	22-1/4	34-1/4	25-3/8	216.00

PVC WHITE SCHEDULE 40 FITTINGS
UNIONS & SADDLES

LONG SWEEP ELBOW

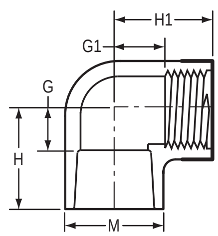
Socket x Socket



Part Number	Size	G	H	M	Approx. Wt. (Lbs.)
406-025LSF	2-1/2	5-7/16	7-7/16	3-1/4	1.26
406-030LSF	3	6-5/8	8-5/8	3-15/16	1.87
406-040LSF	4	8-3/8	10-5/8	5	2.69
406-060LSF	6	12-5/8	15-7/8	7-3/16	6.92
406-080LSF	8	22-9/16	26-13/16	9-1/4	19.43

90° ELBOW

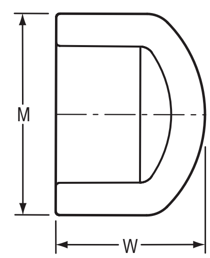
Socket x SR Fipt



Part Number		Size	G	G1	H	H1	M	Approx. Wt. (Lbs.)
407-005	407-005SR	1/2	1/2	9/16	1-1/4	1-1/4	1-1/16	.06
407-007	407-007SR	3/4	9/16	17/32	1-9/16	1-9/32	1-5/16	.08
407-010	---	1	11/16	21/32	1-13/16	1-9/16	1-5/8	.14
407-012	---	1-1/4	15/16	1-1/4	2-1/4	2-1/4	2	.25
407-015	---	1-1/2	1	1-1/16	2-5/16	2	2-1/4	.25
407-020	---	2	1-3/16	1-5/16	2-3/8	2-3/8	2-23/32	.46
407-025	---	2-1/2	1-1/2	1-1/2	3-1/2	3-1/16	3-5/16	.94
407-030	---	3	1-13/16	1-31/32	3-11/16	3-21/32	4	1.14
407-040	---	4	2-5/16	2-15/32	4-5/16	3-15/16	5-1/16	1.85

PVC WHITE SCHEDULE 40 FITTINGS UNIONS & SADDLES

CAP
Socket



Part Number	Size	M	W	Approx. Wt. (Lbs.)
447-003	3/8	7/8	1	.01
447-005	1/2	1-3/32	1-1/32	.02
447-007	3/4	1-5/16	1-5/16	.04
447-010	1	1-9/16	1-9/16	.06
447-012	1-1/4	1-31/32	1-3/4	.09
447-015	1-1/2	2-1/4	1-7/8	.11
447-020	2	2-23/32	2-1/32	.17
447-025	2-1/2	3-5/16	2-9/16	.33
447-030	3	4	2-29/32	.49
447-040	4	5-1/16	3-1/8	.85
447-045F	4-1/2	5-1/4	3-1/4	.31
447-050	5	6-5/32	4-1/2	1.43
447-060	6	7-1/4	5	2.36
447-080	8	9-5/16	6-3/8	4.35
447-100F	10	11-13/16	5-1/4	5.22
447-120F	12	13-7/8	6-3/4	8.22
447-140F	14	15	7-3/8	8.75
447-160F	16	17	9	12.15
447-180F	18	19-1/16	9	17.58
447-200F	20	21-3/16	12-1/4	26.48
447-240F	24	25-1/2	13-1/2	40.26

SPEARS®

THERMOPLASTIC FLANGES

MADE IN THE U.S.A. WITH PRIDE

TECHNICAL INFORMATION WEIGHTS & DIMENSIONS

January 1, 2009

SUPERSEDES ALL PREVIOUS EDITIONS

SPEARS® MANUFACTURING COMPANY
Since 1969
SYLMAR, CALIFORNIA

LOSS PREVENTION CERTIFICATION BOARD LPCB

UKAS QUALITY MANAGEMENT 007

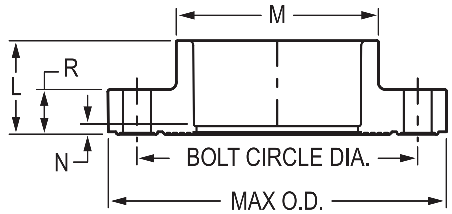
Quality Systems Certificate No. 293
Corporate Facilities, Sylmar, CA
Assessed to ISO 9001: 2000

Visit our web site
www.spearsmfg.com

FL-4-0109

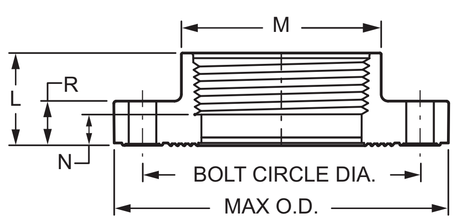
PVC & CPVC INJECTION MOLDED CLASS 150 FLANGES

F O P
Socket



P N		S		M	N	R	C	N	S	M	M O	A	
P C	CP C											P C	CP C
851-005	851-005C	1/2	1-1/16	1-9/32	1/8	9/16	2-3/8	4	1/2	2	3-1/2	.22	.24
851-007	851-007C	3/4	1-3/16	1-1/2	1/8	5/8	2-3/4	4	1/2	2	3-7/8	.31	.31
851-010	851-010C	1	1-5/16	1-13/16	3/16	3/4	3-1/8	4	1/2	2-1/4	4-1/4	.44	.47
851-012	851-012C	1-1/4	1-7/16	2-7/32	3/16	23/32	3-1/2	4	1/2	2-1/4	4-5/8	.41	.42
851-015	851-015C	1-1/2	1-23/32	2-1/2	1/4	3/4	3-7/8	4	1/2	2-1/2	5	.61	.64
851-020	851-020C	2	1-27/32	3	3/8	13/16	4-3/4	4	5/8	3	6	.82	.95
851-025	851-025C	2-1/2	2-1/4	3-1/2	1/2	1	5-1/2	4	5/8	3-1/4	7	1.63	1.67
851-030	851-030C	3	2-5/16	4-9/32	15/32	1-1/16	6	4	5/8	3-1/4	7-1/2	1.73	1.83
851-040	851-040C	4	2-5/8	5-7/16	1/4	1-1/4	7-1/2	8	5/8	3-1/2	9	2.88	3.00
851-050	851-050C	5	3-1/4	6-3/8	1/4	1	8-1/2	8	3/4	3-3/4	10-1/8	3.00	3.17
851-060	851-060C	6	3-1/4	7-9/16	1/4	1-3/8	9-1/2	8	3/4	4	11	4.06	4.34
851-080	851-080C	8	4-9/16	9-3/4	9/16	1-7/16	11-3/4	8	3/4	4-1/2	13-1/2	7.63	7.36

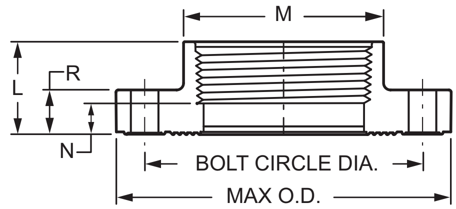
F O P
Fipt



P N		S		M	N	R	C	N	S	M	M O	A	
P C	CP C											P C	CP C
852-005	852-005C	1/2	1-1/16	1-5/16	9/32	9/16	2-3/8	4	1/2	2	3-1/2	.21	.22
852-007	852-007C	3/4	1-3/16	1-17/32	15/32	5/8	2-3/4	4	1/2	2	3-7/8	.30	.32
852-010	852-010C	1	1-5/16	1-13/16	7/16	3/4	3-1/8	4	1/2	2-1/4	4-1/4	.41	.48
852-012	852-012C	1-1/4	1-3/8	2-7/32	17/32	23/32	3-1/2	4	1/2	2-1/4	4-5/8	.44	.46
852-015	852-015C	1-1/2	1-3/4	2-1/2	19/32	3/4	3-7/8	4	1/2	2-1/2	5	.64	.74

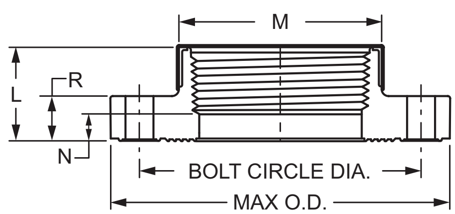
PVC & CPVC INJECTION MOLDED CLASS 150 FLANGES

F O P **(continued)**
Fipt



P N		S		M	N	R	C	N	S	M	M O	A	
P C	CP C											P C	CP C
852-020	852-020C	2	1-27/32	3	7/8	7/8	4-3/4	4	5/8	3	6	.96	1.00
852-025	852-025C	2-1/2	2-1/4	3-1/2	15/16	1	5-1/2	4	5/8	3-1/4	7	1.65	1.41
852-030	852-030C	3	2-5/16	4-9/32	29/32	1-1/16	6	4	5/8	3-1/4	7-1/2	1.83	1.86
852-040	852-040C	4	2-1/16	5-7/16	5/16	1-1/4	7-1/2	8	5/8	3-1/2	9	2.79	2.86
852-060F	852-060CF	6	7	7-1/4	5-1/2	1-1/4	9-1/2	8	3/4	4	11	7.16	7.69
852-080F	852-080CF	8	8-15/16	9-11/16	7-3/16	1-3/8	11-3/4	8	3/4	4-1/2	13-1/2	13.41	13.92
852-100F	852-100CF	10	10-1/2	11-9/16	8-9/16	1-11/16	14-1/4	12	7/8	5	16	20.65	20.72

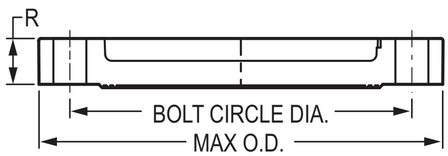
S R
F O P
SR Fipt



P N		S		M	N	R	C	N	S	M	M O	A	
P C	CP C											P C	CP C
852-005SR	852-005CSR	1/2	1-3/32	1-7/32	11/32	9/16	2-3/8	4	1/2	2	3-1/2	.20	.22
852-007SR	852-007CSR	3/4	1-3/16	1-3/8	7/16	5/8	2-3/4	4	1/2	2	3-7/8	.27	.30
852-010SR	852-010CSR	1	1-7/16	1-23/32	17/32	21/32	3-1/8	4	1/2	2-1/4	4-1/4	.37	.39
852-012SR	852-012CSR	1-1/4	1-9/16	2-1/16	19/32	21/32	3-1/2	4	1/2	2-1/4	4-5/8	.49	.52
852-015SR	852-015CSR	1-1/2	1-3/4	2-7/16	3/4	3/4	3-7/8	4	1/2	2-1/2	5	.63	.67
852-020SR	852-020CSR	2	1-7/8	3-1/32	7/8	11/16	4-3/4	4	5/8	3	6	.99	1.06
852-025SR	852-025CSR	2-1/2	2-1/8	3-19/32	3/8	1	5-1/2	4	5/8	3-1/4	7	1.58	1.69
852-030SR	852-030CSR	3	2-5/16	4-9/32	15/16	1-1/16	6	4	5/8	3-1/4	7-1/2	1.79	1.94
852-040SR	852-040CSR	4	2-1/2	5-1/4	1	1-5/32	7-1/2	8	5/8	3-1/2	9	2.74	2.89

PVC & CPVC INJECTION MOLDED CLASS 150 FLANGES

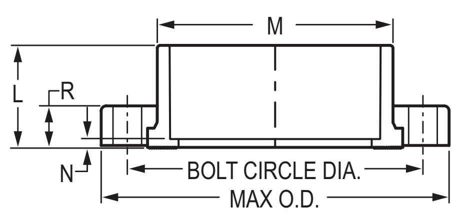
IN F ANGE



P N		S	R	C	N	S	M	M O	A	
P C	CP C								P C	CP C
853-005	853-005C	1/2	9/16	2-3/8	4	1/2	2	3-1/2	.21	.21
853-007	853-007C	3/4	5/8	2-3/4	4	1/2	2	3-7/8	.28	.30
853-010	853-010C	1	3/4	3-1/8	4	1/2	2-1/4	4-1/4	.41	.47
853-012	853-012C	1-1/4	23/32	3-1/2	4	1/2	2-1/4	4-5/8	.37	.40
853-015	853-015C	1-1/2	3/4	3-7/8	4	1/2	2-1/2	5	.62	.64
853-020	853-020C	2	13/16	4-3/4	4	5/8	3	5-15/16	.83	.88
853-025	853-025C	2-1/2	1	5-1/2	4	5/8	3-1/4	7	1.61	1.63
853-030	853-030C	3	1-1/16	6	4	5/8	3-1/4	7-5/8	1.56	1.64
853-040	853-040C	4	1-1/4	7-1/2	8	5/8	3-1/2	9	2.84	2.98
853-060	853-060C	6	1-3/8	9-1/2	8	3/4	4	11	4.36	4.45
853-080	853-080C	8	1-7/16	11-3/4	8	3/4	4-1/2	13-1/2	6.83	7.20
853-100	853-100C	10	1-11/16	14-1/4	12	7/8	5	16	11.32	11.80
853-120	853-120C	12	1-11/16	17	12	7/8	5	19	15.49	17.58

F S S

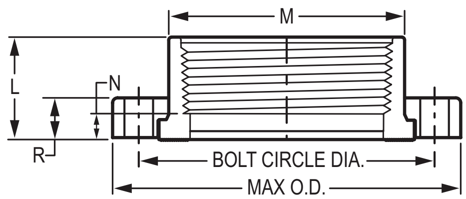
(Two Piece)
Socket



P N		S		M	N	R	C	N	S	M	M O	A	
P C	CP C											P C	CP C
854-005	854-005C	1/2	1-1/32	1-7/32	5/32	17/32	2-3/8	4	1/2	2	3-1/2	.19	.20
854-007	854-007C	3/4	1-1/8	1-7/16	5/32	9/16	2-3/4	4	1/2	2	3-7/8	.26	.27
854-010	854-010C	1	1-9/32	1-3/4	5/32	5/8	3-1/8	4	1/2	2-1/4	4-1/4	.36	.37
854-012	854-012C	1-1/4	1-13/32	2-5/32	5/32	11/16	3-1/2	4	1/2	2-1/4	4-5/8	.46	.45
854-015	854-015C	1-1/2	1-17/32	2-7/16	3/16	3/4	3-7/8	4	1/2	2-1/2	5	.56	.60
854-020	854-020C	2	1-11/16	2-15/16	3/16	13/16	4-3/4	4	5/8	3	6	.85	.91

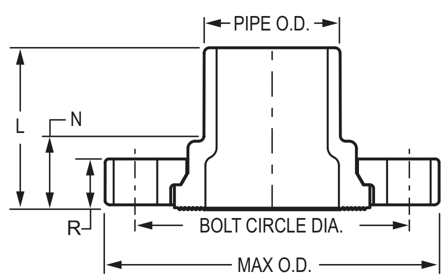
PVC & CPVC INJECTION MOLDED CLASS 150 FLANGES

F S S
(Two Piece)
Fipt



P N		S		M	N	R	C	N	S	M	M O	A	
P C	CP C											P C	CP C
855-005	855-005C	1/2	1-1/32	1-7/32	9/32	17/32	2-3/8	4	1/2	2	3-1/2	.19	.20
855-007	855-007C	3/4	1-5/32	1-3/8	13/32	9/16	2-3/4	4	1/2	2	3-7/8	.27	.28
855-010	855-010C	1	1-1/4	1-3/4	5/16	5/8	3-1/8	4	1/2	2-1/4	4-1/4	.36	.39
855-012	855-012C	1-1/4	1-3/8	2-1/8	13/32	11/16	3-1/2	4	1/2	2-1/4	4-5/8	.46	.47
855-015	855-015C	1-1/2	1-15/32	2-7/16	13/32	3/4	3-7/8	4	1/2	2-1/2	5	.55	.61
855-020	855-020C	2	1-9/16	2-31/32	1/2	13/16	4-3/4	4	5/8	3	6	.87	.94
855-025	855-025C	2-1/2	2	3-9/16	7/16	1	5-1/2	4	5/8	3-1/4	7	1.22	1.50
855-030	855-030C	3	2-1/8	4-1/4	1/2	1-1/16	6	4	5/8	3-1/4	7-1/2	1.73	1.79
855-040	855-040C	4	2-1/16	5-1/4	3/8	1-1/4	7-1/2	8	5/8	3-1/2	9	2.61	2.78
855-060F	855-060CF	6	7	7-1/4	5-1/2	1-1/4	9-1/2	8	3/4	4	11	7.62	7.69
855-080F	855-080CF	8	8-15/16	9-11/16	7-3/16	1-3/8	11-3/4	8	3/4	4-1/2	13-1/2	12.84	13.92
855-100F	855-100CF	10	10-1/2	11-9/16	8-9/16	1-11/16	14-1/4	12	7/8	5	16	20.65	20.72

F S S
(Two Piece)
Spigot

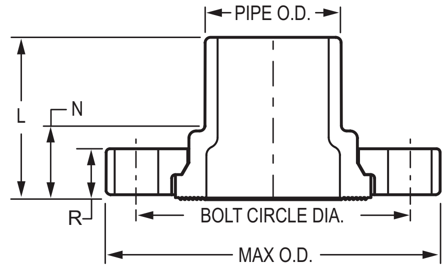


P N		S		N	R	C	N	S	M	M O	A	
P C	CP C										P C	CP C
856-005	856-005C	1/2	1-3/4	29/32	17/32	2-3/8	4	1/2	2	3-1/2	.20	.21
856-007	856-007C	3/4	1-15/16	31/32	9/16	2-3/4	4	1/2	2	3-7/8	.29	.30
856-010	856-010C	1	2-3/16	1-1/32	5/8	3-1/8	4	1/2	2-1/4	4-1/4	.39	.41
856-012	856-012C	1-1/4	2-11/32	1-3/32	11/16	3-1/2	4	1/2	2-1/4	4-5/8	.50	.50

PVC & CPVC INJECTION MOLDED CLASS 150 FLANGES

F S S (continued)

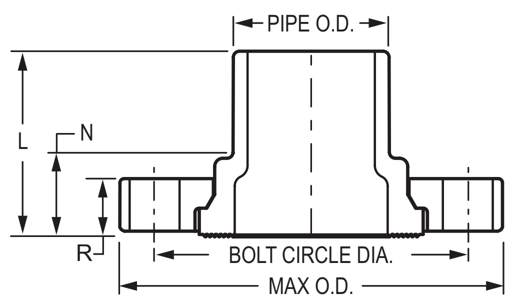
(Two Piece)
Spigot



P N		S		N	R	C	N	S	M	M O	A	
P C	CP C										P C	CP C
856-015	856-015C	1-1/2	2-5/8	1-9/32	3/4	3-7/8	4	1/2	2-1/2	5	.60	.65
856-020	856-020C	2	2-7/8	1-11/32	13/16	4-3/4	4	5/8	3	6	.94	1.00
856-025	856-025C	2-1/2	3-1/16	1-9/32	1	5-1/2	4	5/8	3-1/4	7	1.29	1.54
856-030	856-030C	3	3-3/8	1-7/16	1-1/16	6	4	5/8	3-1/4	7-1/2	1.82	1.88
856-040	856-040C	4	3-7/8	1-5/8	1-1/4	7-1/2	8	5/8	3-1/2	9	2.93	3.12
856-060	856-060C	6	4-3/4	1-25/32	1-9/32	9-1/2	8	3/4	4	11	4.62	4.79
856-080	856-080C	8	5-7/8	1-15/16	1-3/8	11-3/4	8	3/4	4-1/2	13-1/2	7.95	8.17
856-100	856-100C	10	8	2-1/4	1-5/8	14-1/4	12	7/8	5	16	15.61	16.09
856-120	856-120C	12	8-1/2	2-3/16	1-5/8	17	12	7/8	5	19	21.31	22.70

F S S

with Multi-Bolt Pattern Ring
(Two Piece)
Spigot



P N		S		N	R	C		N	S	M O	A	
P C	CP C					M	M				P C	CP C
M856-020	M856-020C	2	2-7/8	1-11/32	13/16	4-1/2	4-15/16	4	5/8	6	.94	1.00
M856-030	M856-030C	3	3-3/8	1-7/16	1-1/16	5-13/16	6-11/32	8	5/8	7-1/2	1.82	1.96
M856-040	M856-040C	4	3-7/8	1-5/8	1-1/4	7-3/32	7-1/2	8	5/8	9	2.98	3.24
M856-060	M856-060C	6	4-3/4	1-25/32	1-9/32	9-7/32	9-1/2	8	3/4	11	4.77	5.21
M856-080	M856-080C	8	5-7/8	1-15/16	1-3/8	11-1/2	11-3/4	8	3/4	13-1/2	7.95	8.32

SoftR® Duct Wrap White PSK

Enhanced Product Now Available

INNOVATIONS FOR LIVING®

The SoftR® Duct Wrap product line is providing consistent enhancements that will further meet your needs. Read below for details on SoftR® Duct Wrap with white PSK facing:

Features/Benefits:

- Light reflectance
- Professional appearance with white vinyl facing
- Excellent water vapor permanence
- Extremely resistant to water and inorganic chemical environments
- Easy to clean surface
- Highly resistant to deterioration by exposure to UV light
- Tough and highly resistant to damage such as punctures
- Dimensional stability helps resist wrinkling and sagging
- Durable to help resist environmental stress-cracking or yellowing

Uses:

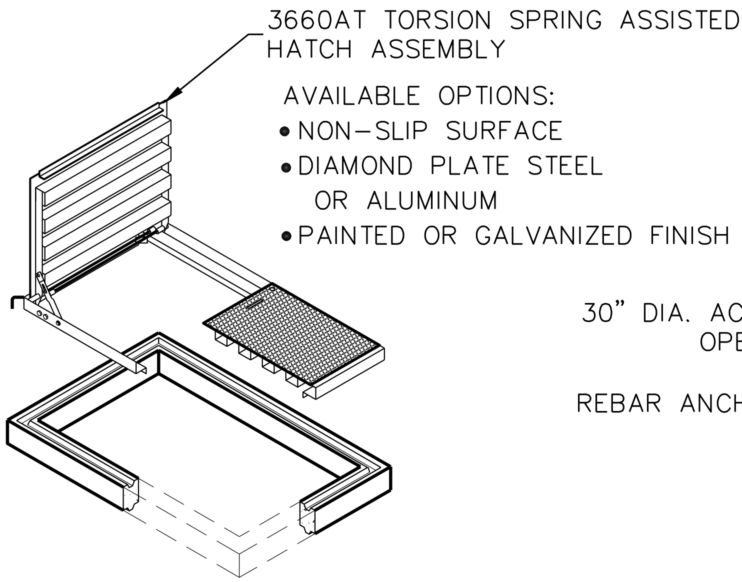
- External insulation on heating and air conditioning ducts
- Surfaces where temperature or condensation needs to be controlled.
- Professional appearance makes it suited for exposed applications, boiler and equipment rooms, and high humidity applications.
- Offered in R4.2, R6 and R8 in either 4' or 5' wide rolls.

This isn't all. We will continue bringing you new and innovative products.

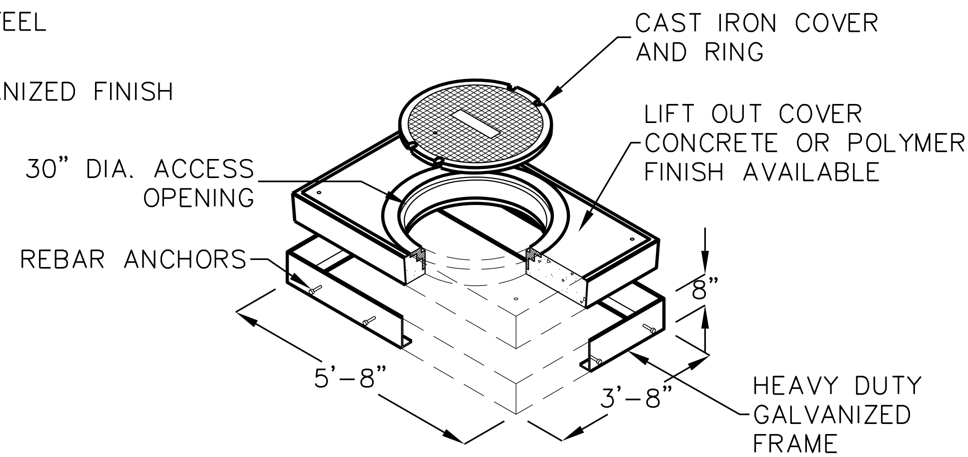
Look what's coming Next!

To learn more about Owens Corning™ SoftR® Duct Wrap go to www.owenscorningcommercial.com or call 1-800-GET-PINK®

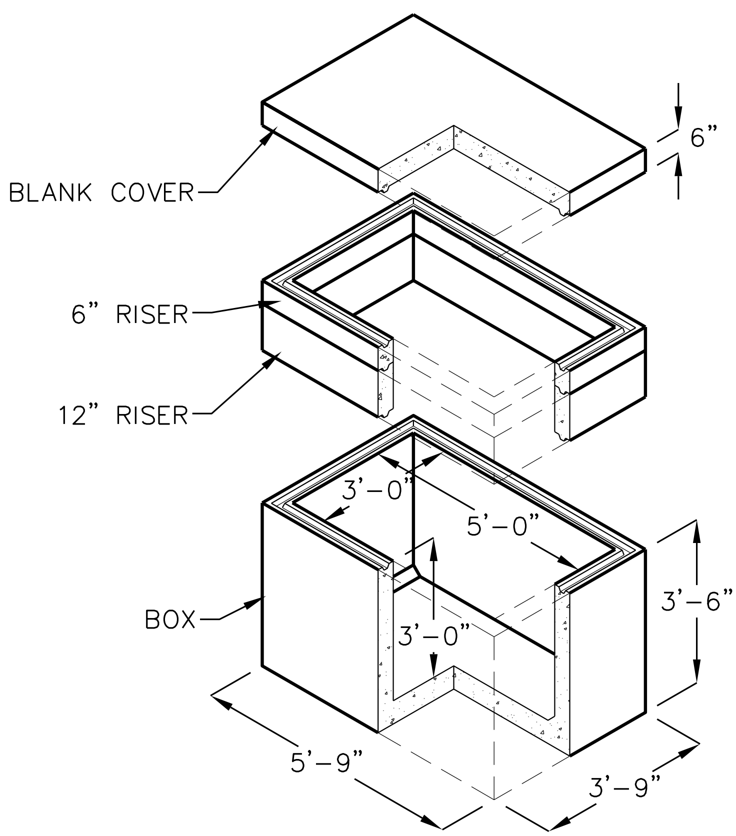
MODEL 3660 U
FULL AND INCIDENTAL TRAFFIC COVER OPTIONS
3'-0"x5'-0"x3'-0"
(NOMINAL DIMENSIONS)



3660AT COVER
INCIDENTAL H-20 TRAFFIC



3660HD30 COVER
H-20 FULL TRAFFIC



FOR COMPLETE DESIGN AND PRODUCT INFORMATION CONTACT JENSEN PRECAST.

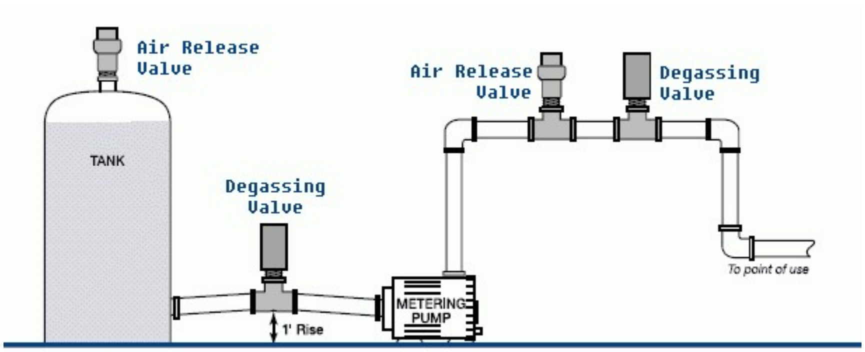
Jensen Precast reserves the right to make changes to product design and/or dimensions without notice. Please contact Jensen Precast whenever necessary for confirmation or advice on product design.

JENSEN PRECAST®

1/27/2012
3660_U_COVER OPTIONS_B.DWG

Plast-O-Matic Valves, Inc.
1384 Pompton Avenue
Cedar Grove, NJ 07009 USA
Email: info@plastomatic.com

Call Us: (973) 256-3000



ARV QUICK LINKS

ARV Cut Sheet
ARV DWG file
ARV Installation Instructions

Degassing Valve Info

Series ARV Thermoplastic Air Release Valves...

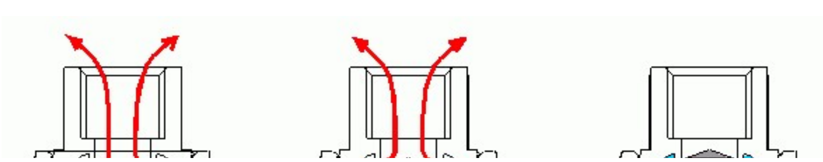
Self-Guided Poppet Assures Dependable, Repetitive Operation

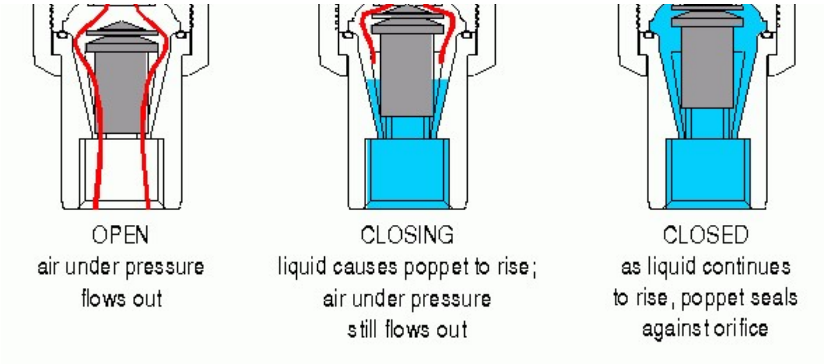
Features/Benefits:

- **Safety:** Allows safe expulsion of unwanted air in piping systems.
- **Dependability:** Unique self-guided poppet assures minimal emission of system liquid prior to sealing.
- **Convenience:** True-union simplifies valve inspection/removal with minimum piping breakdown. Optional dust cap available for appropriate installations.
- **Minimal Closing Pressure:** Closes at 0 PSI, as long as liquid is present. Valve closes as liquid rises, after virtually all unwanted air is forced out. Seals bubble tight at system pressures as low as 10 psi (EPDM seals).
- **Cost Efficient:** Designed to improve system performance and competitively priced.
- **Superior Design:** Poppet seals more reliably than ball designs; does not deform under pressure like a hollow ball.
- **Corrosion Resistant:** Top quality thermoplastics and elastomers resist chemical attack and protect system purity. No metal components in Series ARV.

How it Works:

Series ARV is a normally-open valve. Until your system is pressurized, the valve is simply open, and air is present. As pressure builds within the system, unwanted air is forced to the highest point in the system, i.e., the normally-open Air Release Valve. When pressure within the system exceeds atmospheric pressure, air is expelled. As liquid rises, the poppet becomes buoyant and eventually closes. (Note minimum specific gravity of liquid must be .9 or higher). It is possible that trace amounts of air will remain in the system, depending on the rapidity with which the valve closes. It is also likely that some trace amounts of process liquid will be emitted. At system pressure of 10 psi (with EPDM elastomer), the poppet will seal bubble tight against the orifice. When pressure and liquid level drop, the valve will automatically re-open.[1]

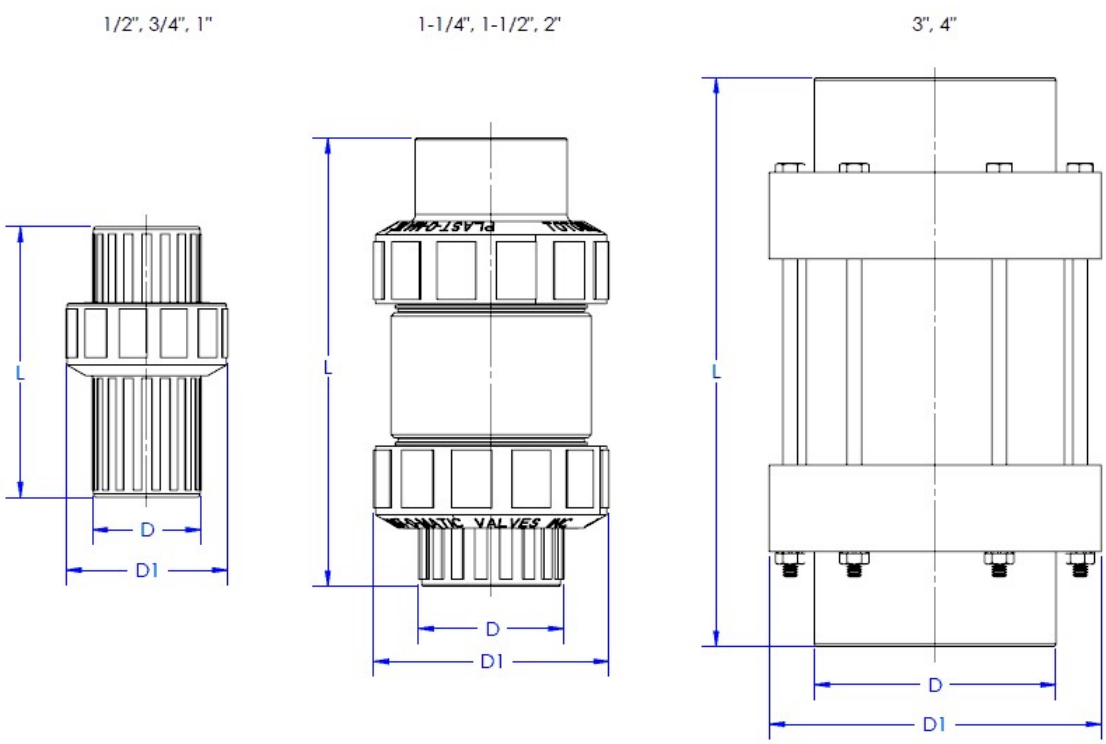




The poppet is guided by a series of thermoplastic ribs within the valve. The poppet is a unique design by Plast-O-Matic Valves, Inc. that is engineered to provide a balance of buoyancy and sealability. This balanced poppet is the key to the superior performance of this valve: It is dense enough to permit maximum emission of unwanted system air, yet buoyant enough to affect a quick seal and minimize emission of the process liquid. Historically, competitive air release valves have used ball-type sealing mechanisms that either seal too rapidly or allow excessive liquid to escape.

[1]Note that although Series ARV is a normally open valve, it should not be used in lieu of a vacuum breaker due to safety considerations. Under certain conditions, a normally-open air release valve will not perform properly as a vacuum breaker.

Dimensions, Specifications & Ordering Information:



Available in Geon® PVC & Corzan® CPVC

Series ARV Pipe Size (NPT)	L IN.	L mm	D IN.	D mm	D1 IN.	D1 mm	Model Number
1/2"	5.3	130	1.9	48	2.8	72	ARV050EPT-PV
3/4"	5.3	130	1.9	48	2.8	72	ARV075EPT-PV
1"	4.7	120	1.9	48	2.8	72	ARV100EPT-PV
1 1/4"	7.8	197	2.5	64	4.1	103	ARV125EPT-PV

1 1/2"	7.8	197	2.5	64	4.1	103	**ARV150EPT-PV**
2"	8.4	214	3.0	76	4.1	103	**ARV200EPT-PV**
3"	9.8	250	4.2	106	5.8	146	**ARV300EPT-PV**
4"	11.7	298	5.8	146	7.9	200	**ARV400EPT-PV**

ARV(series) **050**(size) **EP**(seal material) **T**(threaded) - **PV**(body material)
Part numbers shown are EPDM seals with PVC bodies.
Note that 1/2" and 3/4" are based on the 1" valve; the 1/2" and 3/4" sizes use reducing bushings.
- For Viton seals, change "EP" to "V" (ARV050VT-PV)
- For Corzan CPVC body, change "-PV" to "-CP" (ARV050VT-CP)
- Standard connections are threaded. For socket connection, change "T" to "S" after seal material (ARV050EPS-PV)
- For spigot or other connection types, consult factory.
- For optional dust cap, consult factory.

ADDITIONAL SPECIFICATIONS

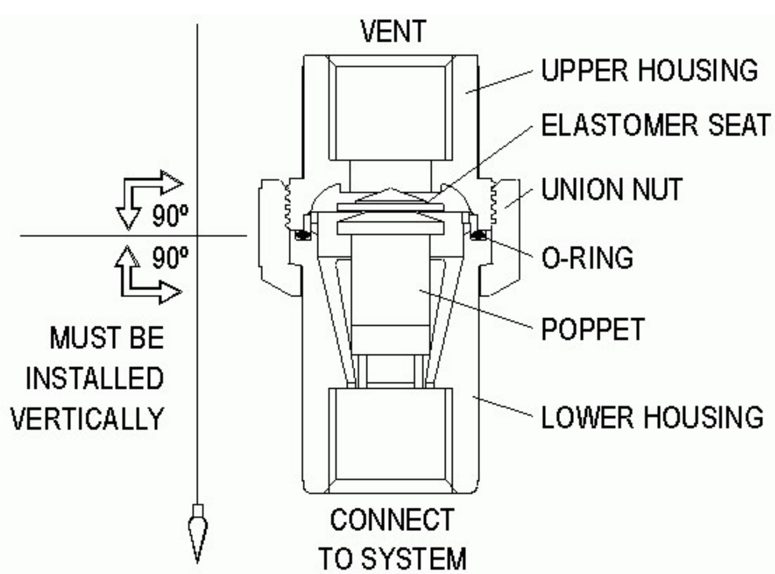
Pressure required for bubble-tight seal	EPDM Elastomer: 10 PSI	FKM Elastomer 15-20 PSI
Pressure Rating at 75°F (24°C)	150 PSI	

PIPE SIZE NPT	MODEL PREFIX	MAX. FLOW IN LINE SCFM	MAX. FLOW IN LINE GPM**
½"	ARV050	11	82
¾"	ARV075	11	82
1"	ARV100	12	89
1¼"	ARV125	38	284
1½"	ARV150	40	299
2"	ARV200	40	299
3"	ARV300	75	560
4"	ARV400	220	1645

** Note that excess of maximum pipeline GPM, airflow out of the valve will have sufficient force to lift and close the poppet, even though more air may be in the system. Liquid pumping into the system at flow rate exceeding maximum GPM will create air flow in excess of maximum SCFM.

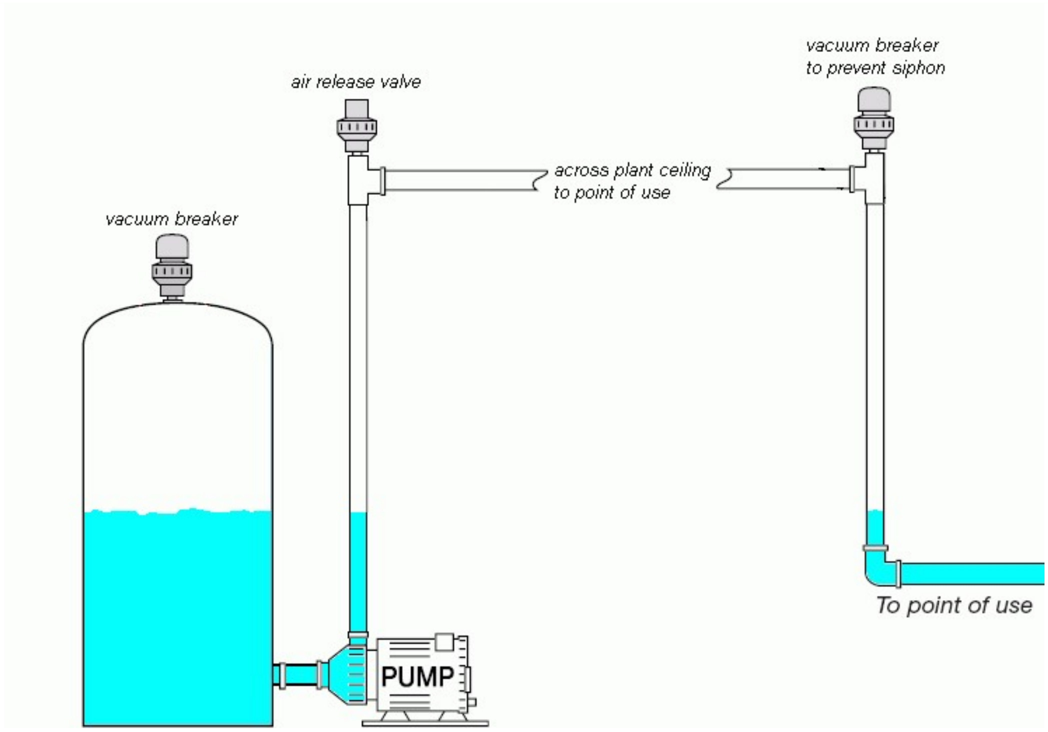
Installation Notes

Series ARV should be installed at the highest possible point in a piping system or vessel, and it **must** be oriented upright. In most cases, residual liquid and/or vapor in the valve may be expelled from the outlet port just prior to valve shut-off. Therefore, it is recommended to pipe the outlet port to a safe area for hazardous liquids, or use a standpipe for non-hazardous liquids.



For detailed installation instructions, please click here.

Use of Air Release Valve with Vacuum Breakers to Prevent Siphon



Air release valves are used mostly to expel pockets of air at system start-up, but as shown in the diagram above, they are also used in conjunction with vacuum breakers to eliminate siphon in piping systems. First, a vacuum breaker is positioned on top of the supply tank to prevent implosion when the tank is drained. A second vacuum breaker is shown on a tee to prevent siphon in a vertical drop. This creates a pocket of air in the riser, lateral line, and drop to "break" the suction that would otherwise be created in the drop when the pump is turned off. The blue color indicates liquid in the system when the pump is turned off. When the system is re-started, an air release valve positioned along the high point of the pipeline is necessary to expel the air pocket for safe and efficient operation. Additional air release valves may be necessary at other points, depending upon the size and complexity of the pipeline. Placement of degassing valves (not shown) varies from system to system.

Helpful Links:

CAD DRAWING -- ARV (1") 2D CAD drawing in .dwg format.

Catalog Sheet: For specifications and catalog page in .PDF format, please click here.

Self-Training Powerpoint: Specific to Series ARV; please click here.

Degassing Valve: Remember that an Air Release Valve is used to expel a large volume of air at system start up. A Degassing Valve sounds similar, but is different from an Air Release Valve...If your application requires continuous expulsion of trace amounts of outgassing throughout the day, please click here for degassing valve information.

For complete information request Catalog ARV.

Plast-O-Matic Valves, Inc. 1384 Pompton Avenue Cedar Grove, NJ 07009 USA Phone: (973) 256-3000 Fax: (973) 256-4745

California Warehouse 4054 Brewster Way Riverside, CA 92501
USA phone: (951) 686-2852 Fax: (951) 686-6328

Email: info@plastomatic.com

ALOYCO®

brands you trust.

ALOYCO® Corrosion Resistant Stainless Steel Valves

CRANE®

Crane ChemPharma & Energy

www.cranecpe.com

Dimensions Class 150 • OS&Y • Solid or Flexible Wedge Disc

Figure 110

Gate Valve, Raised Face, Threaded Ends,
Solid Wedge Disc (½ - 1")
Flexible Wedge Disc (1½ - 2")

Figure 114

Gate Valve, Raised Face, Socket Weld Ends,
Solid Wedge Disc (½ - 1")
Flexible Wedge Disc (1½ - 2")

Size Range:

½ through 2 inches

Design Features:

- Bolted Bonnet
- Rising Stem
- Integral Seat
- MSS SP-42
- API 603 (except for end connections)
- ASME B16.34

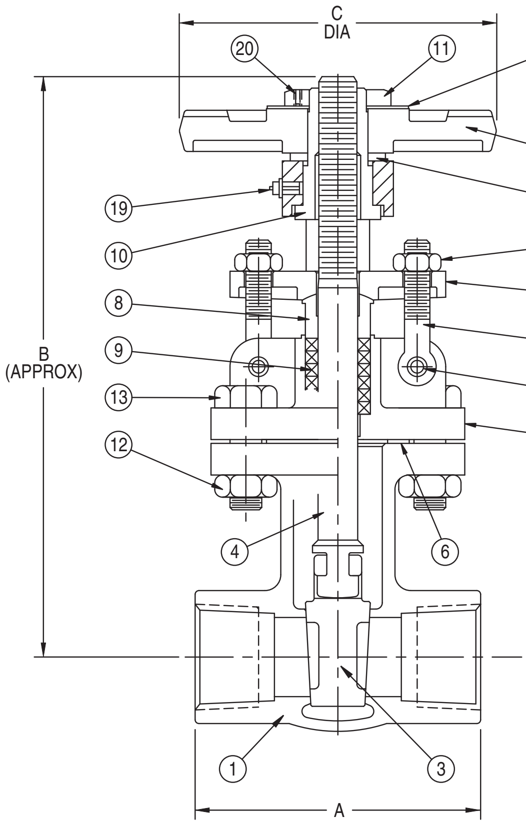


Fig. 110

Dimensions and Weights

Valve Size	Weight (lbs)	Dimensions (inches)		
		A	B (open)	C
½	6.8	2.76	8.1	3.9
¾	7.2	3.15	8.5	3.9
1	9.8	3.54	9.1	3.9
1 ½	14.9	4.13	11.0	5.5
2	20.1	4.72	12.6	6.3

Please refer to page 28 for Pressure-Temperature Ratings.

Industry Standards

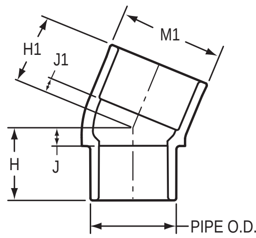
Pipe Threads	ASME B1.20.1
Wall Section	ASME B16.34
Socket Weld Ends	ASME B16.11
End-to-End	Manufacturer's Standard
Pressure-Temp Rating	ASME B16.34
Testing	API 598

Materials of Construction

1	Body	ASTM A351 CF3M
2	Bonnet	ASTM A351 CF8M
3	Disc	ASTM A351 CF8M
4	Stem	ASTM A276 T316
5	Handwheel	ASTM A536
6	Gasket	PTFE
7	Gland Flange	ASTM A351 CF8
8	Gland	ASTM A276 T316
9	Packing	PTFE
10	Stem Nut	ASTM A439, D2
11	Handwheel Nut	ASTM A276 T316
12	Bonnet Bolt Nut	ASTM A194 GR 8
13	Bonnet Bolt	ASTM A193 GR B8
14	Eyebolt Pin	ASTM A276 T304
15	Eyebolt	ASTM A193 GR B8
16	Eyebolt Nut	ASTM A194 GR 8
17	ID Tag	304 Stainless
18	Washer	ASTM A536
19	Grease Fitting	Nickel-plated Copper
20	Set Screw	Steel

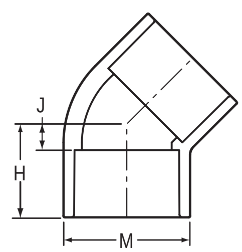
PVC WHITE SCHEDULE 40 FITTINGS
UNIONS & SADDLES

22-1/2° STREET ELBOW
Spigot x Socket



Part Number	Size	H	H1	J	J1	M1	Approx. Wt. (Lbs.)
442-005	1/2	1-1/16	1	1/4	1/4	1-5/32	.05
442-010	1	1-15/32	1-3/8	11/32	9/32	1-11/16	.13
442-012	1-1/4	1-1/2	1-3/8	3/16	1-11/16	2-1/16	.20
442-015	1-1/2	1-7/8	1-11/16	15/32	11/32	2-5/16	.26
442-020	2	1-15/16	1-19/32	9/16	1/4	2-7/8	.39
442-025F	2-1/2	4-1/8	2-3/4	1-3/4	3/4	3-1/4	.81
442-030	3	2-1/2	2-5/16	21/32	7/16	4-5/32	.95
442-040	4	4-3/8	2-7/8	1-7/8	5/8	5-1/4	2.14
442-060	6	5-11/16	3-15/16	2-3/8	7/8	7-5/8	5.87
442-080	8	7-3/8	5-1/8	3-1/8	1-1/8	9-3/4	11.34

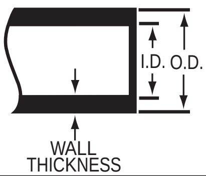
45° ELBOW
Socket x Socket



Part Number	Size	H	J	M	Approx. Wt. (Lbs.)
417-005	1/2	1	7/32	1-1/8	.04
417-007	3/4	1-1/4	5/16	1-5/16	.06
417-010	1	1-3/8	5/16	1-5/8	.10
417-012	1-1/4	1-5/8	3/8	1-31/32	.14
417-015	1-1/2	1-3/4	7/16	2-7/32	.19
417-020	2	2	5/8	2-3/4	.30
417-025	2-1/2	2-7/16	11/16	3-11/32	.56
417-030	3	2-27/32	27/32	4	.80
417-040	4	3-3/32	1-3/32	5-1/32	1.22
417-045F	4-1/2	4-3/8	1-7/8	5-1/2	1.59
417-050	5	4-3/8	1-3/8	6-1/16	2.41
417-060	6	5-7/8	1-13/16	7-5/16	3.45
417-080	8	6-7/16	2	9-9/32	6.56
417-100	10	8-1/8	3-1/8	11-1/2	20.72

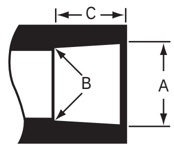
ASTM STANDARD DIMENSIONS

SCHEDULE 80 PIPE DIMENSIONS ASTM D 1785



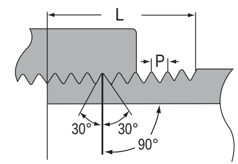
Nominal Pipe Size In.	Mean Outside Diameter In.	O. D. Tolerance In.	Minimum Wall Thickness In.
1/8	0.405	± 0.004	0.095
1/4	0.540	± 0.004	0.119
3/8	0.675	± 0.004	0.126
1/2	0.840	± 0.004	0.147
3/4	1.050	± 0.004	0.154
1	1.315	± 0.005	0.179
1-1/4	1.660	± 0.005	0.191
1-1/2	1.900	± 0.006	0.200
2	2.375	± 0.006	0.218
2-1/2	2.875	± 0.007	0.276
3	3.500	± 0.008	0.300
4	4.500	± 0.009	0.337
5	5.563	± 0.010	0.375
6	6.625	± 0.011	0.432
8	8.625	± 0.015	0.500
10	10.750	± 0.015	0.593
12	12.750	± 0.015	0.687

SCHEDULE 80 SOCKET DIMENSIONS ASTM D 2467



Nominal Size In.	Diameter			Socket Length Minimum C
	Entrance A	Bottom B	Tolerance A	
1/8	0.417	0.401	± 0.004	0.500
1/4	0.552	0.536	± 0.004	0.625
3/8	0.687	0.671	± 0.004	0.750
1/2	0.848	0.836	± 0.004	0.875
3/4	1.058	1.046	± 0.004	1.000
1	1.325	1.310	± 0.005	1.125
1-1/4	1.670	1.655	± 0.005	1.250
1-1/2	1.912	1.894	± 0.006	1.375
2	2.387	2.369	± 0.006	1.500
2-1/2	2.889	2.868	± 0.007	1.750
3	3.516	3.492	± 0.008	1.875
4	4.518	4.491	± 0.009	2.250
5	5.583	5.553	± 0.010	2.625
6	6.647	6.614	± 0.011	3.000
8	8.655	8.610	± 0.015	4.000
10	10.780	10.735	± 0.015	5.000
12	12.780	12.735	± 0.015	6.000

AMERICAN NATIONAL STANDARD TAPER PIPE THREADS (NPT) ANSI B1 .20.1 ASTM F 1498



Nominal Size In.	Threads Per Inch	Effective Thread Length L	Pitch Of Thread P
1/8	27	0.2639	0.03704
1/4	18	0.4018	0.05556
3/8	18	0.4078	0.05556
1/2	14	0.5337	0.07143
3/4	14	0.5457	0.07143
1	11-1/2	0.6828	0.08696
1-1/4	11-1/2	0.7068	0.08696
1-1/2	11-1/2	0.7235	0.08696
2	11-1/2	0.7565	0.08696
2-1/2	8	1.1375	0.12500
3	8	1.2000	0.12500
4	8	1.3000	0.12500
5	8	1.4063	0.12500
6	8	1.5125	0.12500
8	8	1.7125	0.12500

STANDARD COMPARISONS

SPEARS® IPS-to-Metric transition unions are listed by nominal size. The chart below compares nominal and actual* pipe O.D. for each size according to the designated standard.

JIS K6741 (mm)		DIN 8062 (mm)		ASTM D1785 (in.)		NPT—ANSI B1.20.1** Tapered Thread		BSP—BS21,DIN 2999,ISO 7/1 Thread	
Nominal	Actual*	O.D.	Actual*	Nominal	Actual*	Designation	Threads/in.	Designation	Threads/ 25.4mm
16	22	20	20	1/2	.840	1/2	14	1/2	14
20	26	25	25	3/4	1.050	3/4	14	3/4	14
25	32	32	32	1	1.315	1	11.5	1	11
30	38	40	40	1-1/4	1.660	1-1/4	11.5	1-1/4	11
40	48	50	50	1-1/2	1.900	1-1/2	11.5	1-1/2	11
50	60	63	63	2	2.375	2	11.5	2	11
75	89	90	90	3	3.500	3	8	3	11
100	114	110	110	4	4.500	4	8	4	11

*Specified dimension, certain tolerances apply **NPT and BSP have different thread angles and not compatible.

Appendix D

Technical Specifications

Groundwater Remediation System
Atex 394, Pino Fina, and Ross Texaco Sites

Table of Contents

SECTION 03 48 00

PRECAST CONCRETE VAULTS

PART 1 GENERAL

1.1 Summary

A. Section Includes:
   1. Precast concrete vaults

1.2 References

A. ASTM International:
   1. ASTM A185/A185M - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
   2. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement.
   3. ASTM C33 - Standard Specification for Concrete Aggregates.
   4. ASTM C150 - Standard Specification for Portland Cement.
   5. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
   6. ASTM C890 - Standard Practice for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures.
   7. ASTM C913 - Standard Specification for Precast Concrete Water and Wastewater Structures.
   8. ASTM C990 - Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.

1.3 Design Requirements

A. Design Criteria:
   1. Watertight precast reinforced air-entrained concrete structures designed to ASTM C890 live loading and installation conditions, and manufactured to conform to ASTM C913.
   2. Minimum 28-day Compressive Strength: 4,000 psi.
   3. Honeycombed or retempered concrete is not permitted.

1.4 Submittals

A. Shop Drawing: Indicate plan, location, and inverts of connecting piping.

B. Product Data: Submit data on vaults and covers.

C. Manufacturer’s Certificates: Submit Statement of Compliance and supporting data from materials suppliers attesting that precast concrete vaults provided meet or exceed ASTM Standards and specification requirements.

D. Manufacturer’s Installation Instructions: Submit special procedures for precast concrete vaults installation.

1.5 Closeout Submittals

A. Project Record Documents: Accurately record actual locations and inverts of buried pipe, components, and connections.

1.6 Delivery, Storage, and Handling

A. Transport and handle precast concrete units with equipment designed to protect units from damage.

B. Do not place concrete units in position to cause overstress, warp, or twist.

1.7 Environmental Requirements

A. Conduct operations not to interfere with, interrupt, damage, destroy, or endanger integrity of surface or subsurface structures or utilities, or landscape in immediate or adjacent areas.

1.8 Coordination

A. Coordinate work with installation of piping and appurtenances for the vault.

PART 2 PRODUCTS

2.1 Precast Concrete Vaults and Meter Boxes

A. Manufacturers:
1. Jensen Precast
2. Albuquerque Vault Company
3. Vaughn Concrete Products, Inc.
4. Substitutions: Permitted with Engineer’s approval

B. Materials:
1. Portland Cement: ASTM C150, Type II.
2. Coarse Aggregates: ASTM C33; Graded 1 inch to No. 4 Sieve.
3. Sand: ASTM C33; 2.35 fineness modulus.
4. Water: Potable; clean and free of injurious amounts of acids, alkalis, salts, organic materials, and substances incompatible with concrete or steel.
5. Air-Entraining Admixtures: ASTM C260.

6. Reinforcing Steel:
   a. Deformed Bars: ASTM A615/A615M, Grade 60.
   b. Welded Wire Fabric: ASTM A1064/A1064M.
7. Joint Sealant:
   a. ASTM C990.

C. Mixes:
1. Design concrete mix to produce required concrete strength, air-entrainment, watertight properties, and loading requirements.

D. Vault Frames and Covers:
1. Vault frame shall be galvanized steel with hinged ¼-inch steel diamond plate covers with drop handles suitable for occasional AASHTO H-20-44 loadings (not designed for high-density traffic). Additional required features:
   a. Spring assisted cover with stand.
   b. Covers bolt closed with ½-inch bolts.
   c. Covers shall include interior emergency release handles.

2.2 Bedding Materials

A. Aggregate Bedding Material: ¼-inch to ½-inch crushed rock.

2.3 Fabrication and Manufacture

A. Fabricate precast reinforced concrete structures in accordance with ASTM C913, to dimensions indicated on drawings and to specified design criteria.

PART 3 EXECUTION

3.1 Examination

A. Verify existing conditions before starting work.

B. Verify that piping connection, size, location, and invert are as indicated on drawings.

3.2 Preparation

A. Remove scale and dirt from components before assembly.

B. Establish invert elevations for each component in system.

C. Hand trim excavation to suit vault. Remove rocks, roots or other obstructions.

3.3 Installation

A. Excavate in accordance with NMAPWA Section 701 for work of this Section. Hand trim excavation for accurate placement of vaults to elevations indicated.

B. Place bedding material level in one continuous layer not exceeding 6 inches compacted depth. Foundation and bedding materials shall be placed in accordance with NMAPWA Section 701.

C. Backfill around sides of vaults, tamped in place. Ensure vault is level and stable after placement and after each lift.

D. Install vault and related components on bedding.

3.4 Connecting Piping

A. Connect piping in accordance with appropriate Section. Ensure that no part of the vault is resting on any of the piping after installation.

3.5 Field Quality Control

A. Request inspection by Engineer prior to placing aggregate cover over piping.

END OF SECTION

SECTION 11 54 00

CONTAINERIZED TREATMENT EQUIPMENT

PART 1 GENERAL

1.1 Summary

A. Section includes:
  1. Containerized treatment equipment
  2. Control system
  3. Telemetry

B. Related Sections
  1. 11 97 00 Submersible Pumps
  2. 22 05 03.02 PVC Piping
  3. 22 05 23 General Duty Valves
  4. 22 07 00 Plumbing Insulation

1.2 References

A. Air Movement and Control Association, Inc. (AMCA):
  1. AMCA Publication 211 - Product Rating Manual for Fan Air Performance

B. American National Standards Institute (ANSI):
  1. ANSI/NFPA 70 - National Electric Code (NEC)
  2. ANSI Z358.1 - Emergency Eyewash and Shower Equipment

C. American Society of Mechanical Engineers (ASME)
  1. ASME B31.3 - Process Piping Design

D. American Society for Testing and Materials
  1. ASTM D 1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120

1.3 Performance Requirements

A. The system shall be a fully automatic, integrated, and containerized treatment system capable of meeting the discharge standards designated in Table 1 for the effluent water. For design purposes, the flow rate through the system shall range from 3 to 5 gpm of groundwater with maximum concentrations of contaminants as defined in Table 1. This represents typical flow from the extraction well and the highest measured contaminant concentrations to date.

B. In addition to all tanks, pumps, and controls needed for a completely integrated package, the containerized treatment system shall have three treatment processes, at a minimum, to meet the target concentrations listed in Table 1:
1. Metals treatment vessels for removal of iron and manganese.
2. Antiscalant dosing to reduce system maintenance
3. Air stripper for removal of volatile organics.

C. The system shall meet or be below the effluent concentrations given in Table 1 given the following operational parameters:
1. The altitude of the site is 6,420 feet above mean sea level.
2. The average water temperature is 60°F.
3. The ambient air temperature at the site varies from approximately –10°F to 110°F.

Table 1. Discharge Groundwater Standard and Assumed Groundwater Concentration

Parameter	Concentration (µg/L)	
	Maximum Expected Influent	Discharge Standard
Benzene	690	5
Toluene	11	1,000
Ethylbenzene	2100	700
Total xylenes	1300	620
Total BTEX	2591	No Standard
1,2-Dibromoethane	<0.0094	0.05
1,2-Dichloroethane	<1.0	5
Methyl tertiary-butyl ether	13	100
Total Naphthalenes	480	30

µg/L = Micrograms per liter
BTEX = Benzene + toluene + ethylbenzene + total xylenes

1.4 Submittals

A. The following Manufacturer information shall be submitted with the Bid to evaluate conformance with the Contract Documents prior to award of the Contract:
1. Product data for the selected metals treatment unit, including manufacturer and model, rated flow capacity, media information, dimensions, weights (dry and operating), accessories, and warranty coverage.
2. Product data for the selected air stripper model, including manufacturer and model, rated flow capacity, dimensions, weights (dry and operating), accessories, and warranty coverage.
3. Product data for selected air stripper blower, including manufacturer and model, rated output capacity, electrical requirements, and warranty coverage.

4. Shop drawings and/or product data containing all information necessary to correlate the equipment to the specifications.
5. List of all instrumentation to be provided, with descriptive information for each component and an overall controls strategy. Include a process and instrumentation diagram for the containerized treatment system.

B. The selected Contractor shall submit the following upon award of the Contract:
1. Manufacturer's written installation instructions and shop drawings.
2. Manufacturer's Certificate: Certify Products and treatment processes meet or exceed specified requirements.
3. Color palettes for equipment enclosure module exteriors.

1.5 Closeout Submittals

A. Project Record Documents: Record actual location of process, power, and electrical connections on the As-Built Drawings.

B. Operation and Maintenance Manual to include:
1. Operating instructions for all treatment system components.
2. Three copies of the operation and maintenance manual for each piece of equipment.
3. Summary of system components.
4. Summary of system operation principles.
5. Summary of operation controls and fail safes.
6. Summary of maintenance requirements for each piece of equipment.

1.6 Qualifications

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum 10 years documented experience, including design, fabrication, and assembly of containerized treatment equipment. Equipment manufacturer or supplier shall have at least five (5) treatment system installations in New Mexico.

B. Installer: Company specializing in performing work of this section and approved by Manufacturer.

1.7 Warranty

A. Furnish a minimum 1-year Manufacturer’s warranty for the containerized treatment system, including process equipment, vessels, media, blowers, pumps, and all other ancillary equipment. Warranty period shall begin upon completion and acceptance of the Functional Demonstration Test. Warranty shall cover materials, labor, shipping, and appurtenances required to remove and replace defective equipment.

PART 2 PRODUCTS

2.1 Containerized Treatment Equipment

B. Manufacturer:
   1. AdEdge, EPG or other qualified equipment vendor
   2. Substitutions: Substitutions permitted with Engineer’s Approval.
   3. Alternate suppliers are acceptable but demonstrations of equivalency must be submitted to the Engineer and approved in writing at least 10 days prior to bid date for consideration and approved in writing. Included must be drawings, submittals, and cut sheets of sufficient detail to determine equivalency for Engineer review and approval prior to bid.

C. Containerized treatment system: Self-contained and fully constructed and functional prior to delivery at the site, including installation of all plumbing, valves, treatment equipment, tanks, flow meters, and other ancillary equipment.
   1. Manufacturer to provide all labor, materials, equipment, tools, shipping, startup services, testing, training, superintendence, and incidental items necessary for a complete installation.
   2. Contractor to install containerized treatment system in accordance with Manufacturer’s written instructions.

D. Treatment processes are specified below based on performance characteristics.
   1. Major treatment components will include at a minimum:
      a. Metals treatment.
      b. Air stripper.
      c. Water storage tanks.
      d. Chemical feed modules.
      e. Monitoring devices.
      f. Tanks, pumps, and controls.

E. Additional components:
   1. Provide all appurtenances required to facilitate an automatically controlled, fully functioning treatment system, including actuated control valves, flow meters, pressure gauges, and transfer and chemical feed pumps appropriately sized for the prescribed flow rate and contaminants listed in Table 1.
   2. Manual isolation valves shall be provided on the upstream and downstream side of all process pumps and equipment to facilitate easy isolation for maintenance and repair.
   3. Appropriately sized pressure gauges shall be installed on the upstream and downstream side of each process pump to monitor performance of the major process components.
   4. Engineering controls shall be provided to minimize scaling and improve performance period intervals between maintenance/replacement, including but not limited to, the use of chemicals and cartridge filters. Any such chemicals or cartridge filters shall be readily available.

5. Sample ports shall be provided at key locations in the treatment system. At a minimum: raw water influent, post metals treatment, post air stripping, and post treated water storage. A sample port shall be provided on the air stripper discharge stack for collection of effluent air samples. Final locations shall be as directed by Engineer.
6. An eyewash station compliant with ANSI Z358.1 for a site without potable water access shall be provided as part of the containerized equipment package. Any container with chemical storage or usage shall be equipped with an eyewash station.
7. Chemical storage tanks: Compatible for long-term use with the chemicals they are storing. Each tank must have appropriate venting. Minimum chemical storage for 30 days of normal operation shall be provided, unless a shorter duration is approved in writing by the Engineer.
8. Manufacturer's plumbers working with PVC/CPVC shall be certified to applicable ASTM and ASME training requirements for PVC and CPVC materials.
9. Ability for the control panel to be integrated with a Grundfos CU300 pump controller. The control panel will stop operation of the Grundfos submersible pump if the water treatment system shuts down.
10. The influent flow rate and totalizer volume in gallons shall be displayed on the outside of the equipment enclosure to be read by The City of Las Vegas Utility personnel.

F. Equipment Design Requirements.
1. Metals treatment
    a. Oxidation/filtration media: Designed for 95 to 99% removal efficiency for metallic compounds, such as iron and manganese, and greater than 80% purity.
    b. Vessel: Fully accessible for media change out and loading from the top of the vessel as installed in the equipment enclosure.
2. Air stripper
    a. Air stripper: Low-profile, multi-tray for removal of volatile organic compounds (VOCs). Primarily stainless steel construction with individual trays that can be removed without requiring removal of influent, effluent, or air discharge piping.
    b. Shell construction: Durable plastic or stainless steel and suitable for all loads placed on the shell, including but not limited to loads resulting from internally supported parts, weight of the operating liquid, piping, structural supports, and internal or external pressure.
    c. Provide one spare tray for the air stripper unit.
    d. Provide manufacturer-recommended particulate filters for the blower ambient air intake.
    e. The dry weight of individual trays or other removable components shall not exceed 75 pounds (to allow one-person cleaning).
    f. The air to water ratio shall be kept in accordance with generally accepted chemical engineering practice, as defined in Perry's Handbook.

g. The blower shall be an industrial quality model rated for continuous duty, certified and licensed to bear the AMCA (Air Movement and Control Association, Inc.) seal, in accordance with AMCA Publication 211.
h. The blower shall be factory balanced and motor-coupled.
i. The blower shall be sized to allow turn-up to overcome fouling of the stripper, extending the time between cleanings.

3. Storage tanks
   a. A minimum influent storage capacity of 500 gallons shall be provided inside the containerized treatment system. If this capacity is provided with two tanks, these tanks shall be hydraulically connected.
   b. A minimum effluent storage capacity of 710 gallons shall be provided inside the containerized treatment system. If this capacity is provided with two tanks, these tanks shall be hydraulically connected.
   c. An air release or anti-siphoning valve shall be provided at the inlet of the influent tank and the inlet and outlet of the effluent tank to mitigate potential for siphoning.
   d. All water storage tanks shall have access hatches and drains to facilitate cleaning.
   e. Provide level controls using ultrasonic level meters, float switches, or a pressure-type transducer.
   f. Tanks should be constructed out of a durable plastic such as HDPE.

G. Instrumentation and Controls: The containerized treatment equipment Manufacturer shall provide an equipment control strategy that will allow for a fully automated treatment system. All hardware, software, and programming required for the control system shall be the responsibility of the Manufacturer. The control strategy shall include the containerized treatment equipment and the submersible extraction pumps. The controls strategy shall be provided for Engineer approval as outlined in this section.

H. Telemetry: The containerized treatment equipment Manufacturer shall provide a cellular-based telemetry system to provide remote access to system data. The telemetry system shall provide the ability to monitor system data through a secure web-based interface. Additionally, alarm conditions shall be sent electronically via e-mail and/or phone-based text messaging. At a minimum, the following parameters shall be able to be monitored remotely:
   1. Operating status for the system and each major process component.
   2. Alarm conditions for any major process component.
   3. Water flow rates from influent and effluent equalization tanks and the extraction well.
   4. Air flow rates for the air stripper.
   5. Water levels in the influent and effluent equalization tanks.
   6. Water pressures for the inlet and outlet of the major process components, including metals treatment media.

2.2 Equipment Enclosure Modules

A. Equipment enclosure module: lined and coated container with a steel frame, corrugated steel walls, and treated wood floor with steel overlay.
   1. The Work is based on provision of one 30- to 40-foot-long equipment enclosure module. Alternate configurations will be considered a request for substitution. Engineer will record Engineer's costs in evaluating substitution and any required adjustments to Contract Documents. Whether or not Engineer approves a substitute item so proposed or submitted by Contractor, Contractor shall reimburse Owner for the charges of Engineer for evaluating each such proposed substitute and any associated changes to the Contract Documents.

B. The equipment enclosure module shall be insulated and rated for the expected ambient air temperatures for the site specified in this section.

C. The module shall come equipped with fluorescent lighting, receptacles, emergency lighting, and a heating, ventilating, and air conditioning (HVAC) system appropriately sized for the expected ambient air temperatures specified in this section.

D. The container shall be ready for connection to the water conveyance piping system with flanged connections outside the equipment enclosure module for connection to 1.5-inch PVC piping.

E. A single electrical service shall be provided to the module as indicated on the drawings. All interior wiring shall be NEC compliant and complete prior to delivery at the site. The container shall be ready for installation of a Grundfos CU 300 controller and connection to the submersible pump power/controls (conveyed in a 1-inch PVC conduit).

F. Each container shall have at least one set of double swing-out doors on one end and a minimum of one personnel door on the side of the container. All of these doors shall be lockable with either a deadbolt (installed by Manufacturer) or configured for a padlock.

G. Each module shall have all visible exterior surfaces coated with marine-grade industrial enamel. Custom colors to be as specified by Owner.

PART 3 EXECUTION

3.1 Shipping

A. Upon arrival at the destination, the Contractor and/or his agent shall be responsible for inspection for damage in transit. If damage has occurred, a claim should be filed with the carrier by the Contractor, and the Manufacturer should be notified prior to the system being put into service.

3.2 Installation

A. The containerized equipment shall be installed in accordance with the Manufacturer's written instructions and installation drawings and the Contract Drawings and specifications.

B. Mechanical service connections:
   1. Contractor to furnish materials and labor to connect conveyance line from the extraction well to the equipment enclosure module.

C. Electric service connections:
   1. Installed by a licensed electrician. The NEC and all applicable state and local codes shall be followed when installing this equipment. This includes but is not limited to any provisions for intrinsically safe or explosion-proof wiring. The installation shall be executed in a neat and workmanlike manner.
   2. At no time shall any individual tamper with or change any of the wiring in the control panel without the knowledge and consent of the vendor’s personnel. The Contractor shall only land wires on the field terminals provided and install or remove any jumpers as shown and indicated on the control schematics to achieve proper operation. Any changes made to the panel wiring other than those just mentioned or those approved by the Manufacturer, in writing, will result in the voiding of any warranty associated with the control panel or any of the connected equipment.

D. The Contractor shall ensure that all Manufacturer checklist items are completed prior to requesting startup assistance.

3.3 Startup and Training

A. Services of a factory trained representative shall be supplied by the Manufacturer to start up and provide operator training for the remediation system.

B. Inspection and startup:
   1. Five (5) days startup instruction and operator training. This startup period may coincide with the operational readiness test.

3.4 Factory Testing

A. Factory Testing: Manufacturer-certified factory tests of each module and the overall treatment system will be required. The factory test of the module shall include at a minimum the following information:
   1. The factory test shall be conducted on the actual unit(s) to be installed in the field. Each module shall be tested to ensure that all treatment equipment, transfer and chemical feed pumps, flow meters, actuated control valves, pressure transducers, and appurtenances operate properly, cycle as directed by the system controls, open and close as directed, and correctly meter flow as required.

2. Factory testing shall confirm that connections and piping inside each module are leak-free. Any leaks encountered shall be repaired at the factory.
3. All controls within the modules shall be tested to ensure proper operation to the extent practicable.
4. All alarms on and between equipment within the module shall be triggered to ensure proper system response to all alarms.
5. Factory testing is intended to test system hydraulic performance and not to confirm treatment objectives. No water quality samples are expected to be analyzed.

B. The factory test shall be conducted on the actual units to be installed in the field; including transfer and chemical feed pumps, treatment equipment, and control systems. The factory test shall be conducted after the containerized treatment equipment to be shipped to the field has been fully assembled. A copy of the certified factory test results shall be furnished to the Engineer within three days after completion (and included in the operation and maintenance manuals).

3.5 Operational Readiness Tests

A. All required on-site testing is the responsibility of the Contractor and shall be performed by persons with a minimum of 24-hour Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response (HAZWOPER) training.

B. Prior to startup and the Functional Demonstration Test, the entire system shall be tested in the field by the Contractor to certify that it is ready for operation in the form of an Operational Readiness Test (ORT). The entire system shall be checked for proper installation. The entire system shall be calibrated and adjusted on a loop-by-loop and component-by-component basis to ensure that it is in conformance with related submittals and these Specifications. This testing shall include all submersible pumps, treatment equipment, transfer and chemical feed pumps, flow meters, actuated control valves, pressure transducers, instrumentation and controls, telemetry, and appurtenances. Recycling of water will be permitted during this testing period. Alarms shall be triggered to ensure proper system response to all alarms. Proper communication between the well and the treatment equipment shall be verified.
1. The Contractor shall be required to maintain all documentation and reports generated during the ORT at the job site and make them available to the Engineer/Owner at any time.
2. These inspections and tests do not require witnessing. However, the Engineer shall review documentation generated during testing and spot-check their entries periodically and upon completion of the ORT. Any deficiencies found shall be corrected.
3. The Contractor shall coordinate and allocate time to assist the Owner personnel on all telemetry system integration prior to completion of the ORT.

C. ORT shall confirm that connections and piping inside each module are leak-free. Any leaks encountered shall be repaired prior to the functional demonstration test.

D. All chemical feed systems shall be calibrated during the ORT. Documentation of successful calibration shall be furnished as part of the documentation of the ORT.

E. Costs for as many field visits as are necessary for proper system operations by Manufacturer representatives to perform and/or assist with ORT shall be considered incidental to the Work and no separate payment will be made.

3.6 Functional Demonstration Tests

A. Prior to startup, the entire installed instrument and control system shall be inspected by the manufacturer/supplier and contractor and certified that it is ready for operation. All preliminary testing, inspection, and calibration shall be complete as defined in the ORT.

B. Once the facility has been started up and is operating, a witnessed Functional Demonstration Test (FDT) shall be performed on the complete system to demonstrate that it is operating and in compliance with these Specifications. This testing will require active participation by the Contractor, Owner, and the Engineer. This testing shall be performed by persons with a minimum of 24-hour OSHA HAZWOPER training.

C. Updated versions of the documentation specified to be provided during the ORT shall be made available to the Engineer at the job site both before and during the tests. In addition, one (l) copy of all O&M Manuals shall be made available to the Engineer at the job-site both before and during testing.

D. The daily schedule specified to be followed during the Factory Tests shall also be followed during the Functional Demonstration Testing.

E. After startup, the system shall operate for a continuous 100 hours without failure before the FDT will be considered successful. The system must operate without interference for 100 continuous hours and appropriately cycle all pumps, chemical feeds, treatment equipment, and extraction well. Normal system downtime while the well refills the influent equalization tank shall be included in the 100-hour test, as needed. The performance test shall be performed at the design flow rate of 3 to 5 gpm, or whatever flow rate is sustainable from the extraction well, unless otherwise directed by the Engineer.

F. Water sampling: Performed during the FDT to ensure the system meets effluent water quality standards. Sample collection and laboratory analysis shall be coordinated by the Engineer. During the 100-hour test, samples shall be collected as detailed below.
1. All samples collected during the FDT shall have laboratory results reported within 24 hours of collection. Preliminary results from the laboratory are acceptable.
2. Official laboratory reports shall be provided to the Engineer.
3. Samples may only be collected by persons with a minimum of 24-hour OSHA HAZWOPER training
4. Sample locations and schedule are defined in Table 2 below.

Table 2. FDT Sample Schedule

Matrix	Sample Point	Type	Sampling Frequency	Total Number of Samples
Process water	Raw water influent (after influent tanks)	Grab	Sample after four hours of operation, every day for rest of FDT	5
Process water	Process water post-metals treatment	Grab	Sample after four hours of operation, every day for rest of FDT	5
Process water	Process water post-air stripper	Grab	Sample after four hours of operation, every day for rest of FDT	5
Process water	Treated effluent (after effluent tank)	Grab	Sample after four hours of operation, every day for rest of FDT	5
Air	Air stripper effluent	Grab	Sample after four hours of operation, every day for rest of FDT	5

1. Analytes
   a. Raw and treated water samples
      1) VOCs: EPA Method 8260B (full list)
      2) Total manganese: EPA Method 6010C
      3) Iron: EPA 6010B
      4) TDS: Standard Method 2540C
      5) Field parameters
         a) pH
         b) Temperature
         c) Conductivity
         d) Dissolved oxygen
         e) Oxidation reduction potential
   b. Treated water samples only
      1) Total coliform and E. coli: EPA Method 9223B
      2) Total suspended solids (TSS): EPA Method SM2540D
      3) Ammonia: EPA Method SM4500
      4) pH: EPA Method SM4500/9040C
      5) Total Kjeldhal Nitrogen (TKN): EPA Method SM4500
   c. Air samples
      1) BTEX and MTBE: EPA Methods 8021B
      2) TPH: EPA method 8015D

G. Upon successful completion of the FDT and subsequent review and approval of complete system final documentation, the system shall be considered substantially complete and the warranty period and operations and maintenance period shall commence.

END OF SECTION

SECTION 11 97 00

SUBMERSIBLE PUMPS

PART 1 GENERAL

1.1 Summary

A. Section Includes:
   1. Submersible Pumps

B. Related Sections:
   1. Section 11 54 00 Containerized Treatment Equipment
   2. Section 22 05 03.02 PVC Piping

1.2 References

A. National Electric Code
   1. NEC Section 250 43
   2. NEC Section 250 95
   3. NEC Section 310 11

1.3 Scope of Work

A. Installation of submersible pump, drop pipe, electrical wire, well cap, pressure transducer, and appurtenances at one (1) proposed extraction well. Contractor to provide all labor, materials, equipment, tools, shipping, startup services, testing, training, superintendence, and incidental items necessary for a complete installation.

B. The Contractor shall familiarize himself with local conditions at the project site. Failure to do so shall in no way relieve Contractor of the responsibility for performing any of the Work or operations required as a part of this contract.

1.4 Submittals

A. Contractor shall submit the following upon award of the Contract:
   1. Product Data:
      a. Pump
      b. Drop pipe
      c. Motor
      d. Submersible pump cable
      e. Controller
   2. Manufacturer's Installation Instructions.

1.5 Closeout Submittals

A. Pump Installation Report and O&M Manuals.

1.6 Qualifications

A. Installer: Company specializing in performing work of this section with minimum three (3) years experience.

1.7 Warranty

A. Contractor shall warrant against defects for all materials provided and work performed under this contract for a period of one (1) year from the date of Substantial Completion. The Contractor shall replace promptly, at the Contractor's own expense, any materials and workmanship that fail during this warranty period as determined by the Owner or Engineer.

PART 2 PRODUCTS

2.1 Submersible Pumping Units

A. Manufacturer:
   1. Grundfos Model 5-SQE05-90.
   2. Substitutions: Substitutions permitted with Engineer’s Approval

B. Submersible pumping unit:
   1. Furnish and install submersible pump, motor, cable, and appurtenances. Materials of construction shall be suitable for the influent water quality parameters shown in Table 1, Specification Section 11 54 00.
   2. The pump shall be selected for best efficiency at a water flow rate of 5 gpm and total dynamic head (TDH) of approximately 100 feet.
   3. Pump and motor to be powered using a variable frequency drive (VFD).
   4. Stainless steel rails shall be welded on by the contractor for easier installation/removal down a 6-inch HDPE well casing.
   5. Additional electrical design resulting from selection of substitute equipment will be at the Contractor’s expense.

C. The motor shall be sized so that its nameplate horsepower is not exceeded throughout the entire range of the pump. The motor shall be designed for continuous underwater operation on 208/240-volt, 1-phase, and 60-Hz current.

2.2 Submersible Pump Cable

A. Use manufacturer recommended materials of construction for insulation and jacketing of the submersible pump cable. Unless otherwise indicated, the conductors shall be sized based upon the motor nameplate full-load amps, the capacity of the conductor, and the allowable voltage drop. In general, the allowable voltage drop shall be less than the difference between the service voltage and the nameplate voltage. In no case shall the voltage drop from the motor to the electrical service exceed 5 percent.

2.3 Cable Splices

A. The submersible pump cable shall be spliced to the conductors from the motor starter in a National Electrical Manufacturer's Association (NEMA) 3R junction box attached to the well vault. For No. 8 AWG and larger conductors, the splice shall be made with split bolt connectors. The split bolt connectors shall be tin-plated copper alloy with spacer, sized for the conductors to be joined or equal to ILSCO SK series. The sharp edges of the split bolt shall be cushioned with electrical putty filler tape prior to wrapping with at least four layers of plastic electrical tape. No. 10 AWG and smaller conductors may be spliced with wire nuts.

B. The submersible pump cable shall be spliced to the motor pigtails with splice kits manufactured for that purpose. If crimp type connectors are used, the crimps shall be made with the tool recommended by the sleeve manufacturer. If solder is used, it shall be resin core or pure solder with non-acid flux. It will not be possible to pull the joint apart by hand. If the Contractor wants to make another kind of splice, he shall submit the details for approval to the Engineer.

2.4 Drop Pipe

A. Drop pipe: 1-inch Schedule 80 flush-threaded polyvinyl chloride (PVC).

2.5 Check Valves

A. Drop Pipe Check Valves:
   1. Manufacturers:
      a. Simmons, Series 600 SB Submersible Check Valve
      b. Substitutions: Permitted with Engineer’s Approval.
   2. Silicon bronze body, 400 psi WOG, PTFE, Viton, or approved equal O-ring, stainless steel spring, stainless steel washer and stainless steel locknut.

2.6 Pressure Type Level Transducer

A. Provide submersible hydrostatic transducer and cable as required.

B. The liquid level of the well shall be sensed by a submersible hydrostatic transducer. The transducer shall be a loop-powered type to produce an instrumentation signal in direct proportion to the measured level in the well to generate a 4-20mA signal sent to the level relay panel.
   1. Manufacturer: In-Situ model TROLL 700 or Engineer-approved equivalent.
   2. Sensor Construction: Titanium body.
   3. Accuracy: 0.1% of full scale.
   4. Minimum Ambient Operating Temperature Range: 5 to 30°C (41 to 86°F).
   5. Mounting: Per Drawings.

C. Provide the required amount of manufacturer’s supplied interconnecting cable from the hydrostatic transducer to the level relay panel. Refer to Drawings for well depth and panel location. Cable shall be vented to compensate for barometric fluctuations.

2.7 Pump Installation Report and O&M Manuals

A. The Contractor shall prepare a well pump installation report. All applicable information shall be included, and "NA" will be shown for those items that are not applicable.

B. Upon completion of the project, the Contractor shall furnish four (4) sets of operations and maintenance (O&M) manuals to the Owner. The manuals shall include:
1. Operations manuals for all pumps, valves, and controls installed.
2. Piping diagrams of all installed plumbing, valves, and controls.
3. Safety data sheets for all chemical substances and solvents used in installation and construction.
4. Electrical circuit diagrams of all controls, power supplies, transformers, and any other electrical equipment installed.

PART 3 EXECUTION

3.1 Installation

A. Install the submersible pump and appurtenances complete in place, to provide for a fully functioning extraction well. Install pump and motor in accordance with manufacturer's written instructions.

B. Pump Installation:
1. Contractor shall verify that the well casing and screen are free of sediment. If sediment has accumulated, clean by bailing or other Engineer-approved method.
2. Prior to installation of pumping equipment, Contractor to ensure pump outside diameter is at least 2 inches less than the inside diameter of the well casing to the pump installation depth.

C. Submersible pump cable:
1. Padded to prevent abrasion and fastened to the drop pipe at approximate 10-foot intervals with stainless steel clamps or other fastening system approved by the Engineer.
2. In accordance with NEC Section 250 43, a separate ground wire will be run down the well to the installed submersible pump motor. The ground wire is to be based on circuit amp rating (not motor amp rating) according to NEC Section 250 95. The ground wire may be insulated or bare and does not have to be larger than the supply cable. If the wire is insulated, it must be green, with or without yellow stripe(s) (NEC Section 310 11). All external metal parts of the pump and motor must be bonded together (metal to metal). Wire may be connected to the pump using an Underwriters Laboratories, Inc. (UL) approved compression (crimp or set screw) type with terminal attached to the pump frame or motor bolt.

D. Column check valves: install at the location indicated on the Drawings and in conformance with manufacturer installation instructions.

E. Submersible pumping unit: install to the depth shown on the Drawings and in conformance with manufacturer installation instructions.

3.2 Field Test of Pump Performance

A. Initial Testing of Submersible Pumps
1. Untreated discharge from pump testing must be containerized or recirculated back to the same extraction well. Discharge to surface or sewer will not be permitted. If untreated water is containerized, it is the Contractor's responsibility to properly dispose of the containerized water and all associated costs will be considered incidental to the Work. Temporary plumbing may be installed to allow recirculation of water back to the same extraction well.
2. Start motor and verify immediately correct shaft rotation.
3. Check and record motor running volts and amps.
4. Verify correct operation of all interlocking and protective devices.

B. Field testing of submersible pumps shall be included as part of the Operation Readiness Testing (ORT) performed for the containerized treatment equipment as specified under Section 11 54 00 Containerized Treatment Equipment.

3.3 Cleanup

A. After the work is completed, the Contractor shall remove all debris, tools, equipment, supplies, and excess material from the site and shall restore the site to its original condition, as approved by the Owner/Engineer.

END OF SECTION

SECTION 22 05 03.01

HIGH DENSITY POLYETHYLENE PIPING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. HDPE pipe.
   2. HDPE fittings.
   3. HDPE burial.
   4. HDPE joining.
   5. HDPE testing.

B. Related Sections:
   1. Section 31 23 17 - Trenching and Backfill

1.2 REFERENCES

A. ASTM International:
   1. ASTM D1248 - Standard Specification for Polyethylene Molding and Extrusion Materials.
   2. ASTM D2239 - Standard Specification for Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameters.
   3. ASTM D2122 - Determining Dimensions of Thermoplastic Pipe and Fittings.
   4. ASTM D2241 - Standard Specification for Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter.
   5. ASTM D2447 - Standard Specification for Polyethylene (PE) Plastic Pipe, Schedules 40 and 80, Based on Outside Diameter.
   6. ASTM D2513 - Standard Specification for Thermoplastic Gas Pressure Pipe, Tubing, and Fittings.
   7. ASTM D2609 - Standard Specification for Plastic Insert Fittings for Polyethylene (PE) Plastic Pipe.
   8. ASTM D2657 - Standard Practice for Heat-Joining Polyolefin Pipe and Fittings.
   9. ASTM D2683 - Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing.
   10. ASTM D2774 - Underground Installation of Thermoplastic Pressure Piping.
   11. ASTM D2837 - Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pressure Piping.
   12. ASTM D3035 - Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter.
   13. ASTM D3350 - Standard Specification for Polyethylene Plastics Pipe and Fitting Materials.
   14. ASTM F412 - Standard Terminology Relating to Plastic Piping System.

15. ASTM F1248 - Standard Test Method for Determination of Environmental Stress Crack Resistance (ESCR) of Polyethylene Pipe.

B. American Water Works Association:
   1. AWWA C901 - Polyethylene (PE) Pressure Pipe and Tubing, ½ in. through 3 in., for Water Service.

1.3 SUBMITTALS

A. Product Data: Submit data on pipe sizes, materials and fittings. Submit manufacturers catalog information.

1.4 QUALITY ASSURANCE

A. Manufacturer Quality Assurance:
   1. Manufacturer shall maintain a continuous quality control program.
   2. Material certification shall be included verifying that the materials have been tested for conformance with ASTM D3350 and that the pipe material has exceeded 5,000 hours without failure when tested under F1248.

B. HDPE pipe and fittings shall be provided from one approved manufacturer.

C. Maintain one copy of each document on site.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum five years documented experience.

B. Installer: Company specializing in performing work of this section with minimum five years documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. All necessary precautions shall be taken to prevent damage or contamination to pipe and other materials during shipment and delivery.

B. All materials shall be securely fastened to truck or rail car to prevent movement or damage during shipment.

C. Furnish temporary end caps and closures on piping and fittings. Maintain in place until installation.

D. Protect piping from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.

E. All pipe materials shall be handled in such a manner as to prevent damage. HDPE pipe shall not be dropped, rolled or pushed off from any height during delivery, storage or installation.

F. All pipe materials shall be stored off the ground in a dry location.

G. All pipe materials shall be stored in such a manner as to prevent sagging or bending.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Do not install underground piping when bedding is wet or frozen.

1.8 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.9 COORDINATION

A. Coordinate installation of buried piping with trenching.

PART 2 PRODUCTS

2.1 POLYETHYLENE PRODUCTS

A. Manufacturers:
   1. ISCO Industries.
   2. Polypipe, Inc.
   3. Performance Pipe, Inc.
   4. Substitutions: Permitted with the Engineer's approval.

B. Polyethylene Pipe: Pipe shall be provided in diameters, pressure classes, and dimension ratios (DR) as shown on the plans and in accordance with ASTM D3035. Also:
   1. HDPE pipe shall be manufactured from extra high molecular weight polyethylene pipe materials meeting the requirements of cell classification PE345464C Standard PE Code Designation PE3408 as defined by ASTM D3350.
   2. Fittings: AWWA C901, molded.
   3. Joints: Butt fusion by a qualified technician, trained by an approved manufacturer's representative, and in accordance with the manufacturer's recommended procedures.

C. Typical Material Physical Properties: All pipe and fitting materials shall meet these typical physical properties:

D. HDPE Fittings:
   1. The fittings shall be manufactured from the same cell class resin and fully pressure rated to the same pressure rating as the designed piping system.
   2. Shall have a controlled outside diameter and produced to the SDR/DR rating for the pressure specified by the Engineer.
   3. Shall be specifically manufactured to the standardized dimensions noted on the Drawings.

4. Where applicable, fittings shall meet the requirement of AWWA C901 or AWWA C906.
5. Butt fusion fittings shall be manufactured from the same material as the extruded pipe, shall be rated for the pressure service at least equal to that of the system pipe, and shall have outlets manufactured to the same DR as that of system pipe.
6. Molded fittings shall be manufactured in accordance with ASTM D3261.
7. Socket fittings shall be manufactured in accordance with ASTM D2683.

2.2 UNDERGROUND PIPE MARKERS

A. Underground pipe marker shall be metallic detectable brightly colored plastic tape.

2.3 BEDDING AND COVER MATERIALS

A. Bedding, cover, and backfill shall be as specified in Sections 31 23 17 and as indicated on the Drawings.

PART 3 EXECUTION

3.1 EXAMINATION

A. Contractor shall inspect all piping to assure that the piping is free from defects in material and workmanship.

B. Compatibility of all pipe and fittings shall be verified.

C. Pipe, fittings and accessories that are cracked, damaged, not identified or in poor condition shall be rejected.

D. The Engineer shall have free access to all joints and test joints for determining the suitability of the joining process.

E. Where construction restrictions limit inspection of joints, the Engineer may have the person joining the pipe and or fittings perform a test joint in the presence of the Engineer.

F. The Engineer shall determine the method of testing either by visual examination or bent strap testing.

G. Verify excavations are to required grade, dry, and not over-excavated.

H. Verify trenches are ready to receive piping.

3.2 PREPARATION

A. Remove burrs.

B. Remove scale and dirt on inside and outside before assembly.

C. Prepare piping connections to equipment with flanges or unions.

D. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.

3.3 INSTALLATION - BURIED PIPING SYSTEMS

A. Verify connection size, location, and inverts are as indicated on Drawings.

B. Joining
1. The pipe and fittings shall be heat fused creating a homogeneous joint.
2. Joining shall be in accordance with the manufacturer's heat fusion recommendations.
3. Joints shall not be of the solvent welded type.
4. Each person making heat fusion joints shall demonstrate proficiency by making joints and test the trial fusion by bent strap testing in accordance with ASTM D2657.
5. Trial joints shall be allowed to cool completely prior to testing and shall not fail at the joint.
6. During construction, at the Engineer’s discretion, a trial fusion shall be made which shall then be allowed to cool and destructively bent strap tested.
7. If the trial fusion should fail, additional trial fusions shall be made and tested until successful fusions are completed.
8. The procedure used to join the trial fusion shall be used for the balance of the day's work, proved the procedure is within the limitations recommended by the manufacturer.
9. The Engineer shall have the authority to disallow any installer's from completing heat fusion of polyethylene pipe if that technician has consecutively failed trial joints.
10. Any person deemed unqualified by the Engineer will require training per Manufacturer’s guidelines at the expense of the Contractor and training shall be documented and submitted to the Engineer.
11. The equipment used to make the heat fusion joint shall be capable of recording the heating and fusion pressures used to join the pipe, recording heater temperature, and storing this information for retrieval.
12. Each field fusion shall be recorded by such equipment and this information shall be made available to the Engineer's representative.

C. Excavate pipe trench in accordance with Section 31 23 17.

D. Install pipe as indicated on Drawings.

E. Install pipe to allow for expansion and contraction without stressing pipe or joints.

F. Install detectable plastic ribbon tape continuously 12 inches above pipeline; coordinate with Section 31 23 17.

3.4 BURIAL

A. All polyethylene pipe must be installed to minimize shear and tensile stresses.

B. Pipe shall be installed in a trench as specified in the construction drawings.

C. Minimum burial depth is specified in the Drawings.

D. The Contractor shall take care to insure haunching material is well placed as to not disturb the pipeline.

E. Final backfill material may consist of the excavated material as specified in the Drawings provided it is free of unsuitable matter, such as clumps of clay, stones, construction debris, and frozen clods of dirt, unless final backfill is under a roadway.

F. Final backfill material shall be compacted as shown on the Drawings. Proctor density shall be determined by ASTM D698 for compaction and density of soils.

G. All polyethylene pipe shall use warning tape for future location.

END OF SECTION

SECTION 22 05 03.02

PVC PIPING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Pipe and pipe fittings for the following systems: Groundwater treatment system

B. Related Sections:
   1. Section 22 05 23 - General Duty Valves.
   2. Section 31 23 17 - Trenching and Backfill.

C. ASTM International:
   1. ASTM D1785 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
   2. ASTM D2235 - Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings.
   3. ASTM D2464 - Standard Specification for Threaded Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
   4. ASTM D2466 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
   5. ASTM D2564 - Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.

1.2 SUBMITTALS

A. Product Data: Submit data on pipe sizes, materials and fittings. Submit manufacturers catalog information.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Furnish temporary end caps and closures on piping and fittings. Maintain in place until installation.

B. Protect piping from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.

1.4 ENVIRONMENTAL REQUIREMENTS

A. Do not install underground piping when bedding is wet or frozen.

1.5 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.6 COORDINATION

A. Coordinate installation of buried piping with trenching.

PART 2 PRODUCTS

2.1 PVC PRODUCTS

A. PVC Pipe: ASTM D1785, Schedule 40, polyvinyl chloride (PVC) material.
   1. Fittings:ASTM D2466, Schedule 40, PVC.
   2. Joints: ASTM D2855, solvent weld with ASTM D2564 solvent cement.

B. PVC Pipe: ASTM D1785, Schedule 80, polyvinyl chloride (PVC) material.
   1. Fittings: ASTM D2466, Schedule 80, PVC.
   2. Joints: ASTM D2855, solvent weld with ASTM D2564 solvent cement.

2.2 UNDERGROUND PIPE MARKERS

A. Plastic Ribbon Tape: Bright colored, continuously printed, detectable metallic, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.

2.3 BEDDING AND COVER MATERIALS

A. Bedding, cover, and backfill shall be as specified in Sections 31 23 17 and as indicated on the Drawings.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify excavations are to required grade, dry, and not over-excavated.

B. Verify trenches are ready to receive piping.

3.2 PREPARATION

A. Remove burrs.

B. Remove dirt on inside and outside before assembly.

C. Prepare piping connections to equipment with flanges or unions.

D. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.

3.3 INSTALLATION - BURIED PIPING SYSTEMS

A. Verify connection sizes, locations, and inverts are as indicated on Drawings.

B. Excavate pipe trench in accordance with Section 31 23 17.

C. Install pipe to elevation as indicated on Drawings.

D. Install pipe on prepared bedding.

E. Install valves at locations indicated on Drawings in accordance with this Section.

F. Install plastic ribbon tape continuously buried 12 inches, above pipe line; coordinate with Section 31 23 17.

G. Pipe Cover and Backfilling:
   1. Backfill trench in accordance with Sections 31 23 17 and as indicated on the Drawings.

3.4 INSTALLATION - ABOVE GROUND PIPING

A. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.

B. Install piping to maintain headroom without interfering with use of space or taking more space than necessary.

C. Group piping whenever practical at common elevations.

D. Sleeve pipe passing through partitions, walls and floors.

E. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. Provide access where valves and fittings are not accessible.

F. Install non-conducting dielectric connections wherever jointing dissimilar metals.

G. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.

H. Install piping penetrating roofed areas to maintain integrity of roof assembly.

I. Install valves in accordance with the manufacturer's instructions.

J. Insulate piping as shown in the Drawings.

END OF SECTION

SECTION 22 05 19

GAUGES AND SENSORS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Analog dial-type vacuum gauges.
   2. Analog dial-type pressure gauges.
   3. Analog differential pressure gauges.
   4. Flow sensors.
   5. Temperature sensors.

B. Accessories to be furnished and installed at the locations indicated on Drawings.

C. Allowances:
   1. Gauges and sensors shall be considered incidental.

1.2 REFERENCES

A. Except as modified or supplemented herein, all gauges shall conform to the requirements of:
   1. ANSI/ASME B40.100
   2. ANSI Grade 2A or better

1.3 SUBMITTALS

A. Shop Drawings: Required.

B. Product Data: Required.

C. Manufacturer's Installation Instructions: Required.

1.4 CLOSEOUT SUBMITTALS

A. Project Record Documents: Required.

B. Operation and Maintenance Data: Required.

1.5 WARRANTY

A. Furnish manufacturer’s warranty.

PART 2 PRODUCTS

2.1 PRESSURE GAUGES

A. Manufacturers:
   1. Dwyer Series SG1 Industrial Pressure Gauge.
   2. Substitutions: Permitted with the Engineer's approval.

2.2 GAUGE AND SENSOR CONSTRUCTION:

A. Dwyer Series SG1
   1. Unless otherwise specified, gauges shall be indicating dial type with:
      a. 304 stainless steel housing.
      b. Shatter-proof safety glass lens.

2.3 OPERATION

A. The dial shall be 3 inches diameter or less with a white background and black markings.

B. The units of measurement shall be indicated on the dial face.

C. Subdivisions of scale shall conform to the requirements of the governing standard.

D. Point travel shall be not less than 200 degrees or more than 270 degrees.

E. Connection shall be 1/4 in. male NPT.

2.4 MOUNTING

A. The mounting configuration of each gauge shall be as indicated on the Drawings.

B. Connections
   1. As necessary, depending on the thickness class and size of the gauged pipe, a tap or saddle shall be located on the pipe, fitting or appurtenance to be gauged.
   2. The attachment shall be made by an appropriately sized NPT nipple in the tap or saddle.
   3. Nipples or elbows or combination thereof shall be long enough such that the edge of the gauge case does not contact the pipe; however, in no case shall the distance from the edge of the pipe to the centerline of the gauge exceed 6 inches without prior approval of the Engineer.

PART 3 EXECUTION

3.1 INSTALLATION

A. Gauges shall be installed at the locations indicated on the Drawings.

B. Gauges shall be installed per the manufacturer's guidelines and directions.

C. All gauges shall be installed in the vertical upright position, unless indicated otherwise in the Drawings.

D. Threaded connections shall be assembled using Teflon thread tap or Teflon thread sealer, as specified in the miscellaneous piping section.

3.2 FIELD QUALITY CONTROL

A. Test: Verify all gauge and sensor installations are free from leaks.

END OF SECTION

SECTION 22 05 23

GENERAL DUTY VALVES

PART 1 GENERAL

1.1 SUMMARY

A. Furnish all labor, materials, equipment, and incidentals required to install all valves necessary for groundwater extraction and treatment systems including but not limited to wells, piping, and equipment.

B. Section Includes:
1. Gate valves.
2. Ball valves.
3. Butterfly valves.
4. Check valves.

1.2 REFERENCES

A. ASTM International:
1. ASTM D1785 - Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
2. ASTM D4101 - Standard Specification for Polypropylene Injection and Extrusion Materials

B. Manufacturers Standardization Society of the Valve and Fittings Industry:
1. MSS SP 67 - Butterfly Valves.
2. MSS SP 71 - Cast Iron Swing Check Valves, Flanged and Threaded Ends.
3. MSS SP 110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

1.3 SUBMITTALS

A. Product Data: Submit manufacturers catalog information with valve data and ratings for each service.

B. Manufacturer's Installation Instructions: Submit hanging and support methods, joining procedures.

C. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.4 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of valves.

B. Operation and Maintenance Data: Submit installation instructions, spare parts lists, exploded assembly views.

1.5 QUALITY ASSURANCE

A. Maintain one copy of each document on site.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

B. Provide temporary protective coating on cast iron and steel valves.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Do not install valves underground when bedding is wet or frozen.

1.8 WARRANTY

A. Furnish one year manufacturer warranty for valves excluding packing.

1.9 EXTRA MATERIALS

A. Furnish two packing kits for each size valve.

PART 2 PRODUCTS

2.1 GATE VALVES

A. Manufacturers:
   1. Aloyco, Model 110.
   2. Substitutions: Permitted with the Engineer's approval.

B. Stainless steel, Class 150 construction, flexible wedge disc, rising stem, threaded ends.

2.2 BALL VALVES

A. Ball Valves:
   1. Manufacturers:
      a. Milwaukee Valve Company, 20 Series
      b. Substitutions: Permitted with the Engineer's approval.
   2. Pressure class 150 ASME, reduced port, rated for steam at 365 degrees F, fire safe, and female NPT.
   3. Pressure class 2000 WOG, rated for steam, fire safe, and male NPT.

2.3 CHECK VALVES

A. Ball Check Valves:
   1. Manufacturers:
      a. Spears, True Union 2000 Industrial Ball Check Valve.
      b. Substitutions: Permitted with the Engineer's approval.

2. 235 psi at 73 degrees F water temperature, maximum service temperature: 140 degrees F, ASTM D1785 PVC, spigot end.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify piping system is ready for valve installation.

3.2 INSTALLATION

A. Install valves with stems upright or horizontal, not inverted, unless indicated otherwise on the Drawings.

B. Install valves with clearance for installation of insulation and allowing access.

C. Provide access where valves and fittings are not accessible.

3.3 VALVE APPLICATIONS

A. Install valves at locations indicated on the Drawings in accordance with this Section.

B. Install ball, butterfly, or gate valves for shut-off and to isolate equipment, part of systems, or vertical risers.

C. Install ball, butterfly, or globe valves for throttling, bypass, or manual flow control services.

D. Install vertical ball check valves on discharge of condensate transfer pumps.

E. Install lug end butterfly valves adjacent to equipment when functioning to isolate equipment.

END OF SECTION

SECTION 22 07 00

PLUMBING INSULATION

PART 1 GENERAL

1.1 Summary

A. Section Includes:
   1. Plumbing heat trace, insulation, jackets, and accessories for exterior, aboveground piping.

B. Related Sections
   1. Section 22 05 23 General Duty Valves
   2. Section 22 05 03.02 PVC Piping

1.2 References

A. ASTM International:
   1. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement.
   2. ASTM C449/C449M - Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement.
   3. ASTM C450 - Standard Practice for Fabrication of Thermal Insulating Fitting Covers for NPS Piping, and Vessel Lagging.
   4. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation.
   5. ASTM C585 - Standard Practice for Inner and Outer Diameters of Thermal Insulation for Nominal Sizes of Pipe and Tubing (NPS System).
   6. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.
   7. ASTM C1136 - Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation
   8. ASTM D1785 - Standard Specification forPoly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
   9. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

1.3 Submittals

A. Product Data: Submit product descriptions, thermal characteristics, and material thickness for each service, and location.

B. Samples: Submit two samples of representative size illustrating each insulation type.

C. Manufacturer's Installation Instructions: Submit manufacturer's published literature indicating proper installation procedures.

D. Manufacturer's Certificate: Certify that products meet or exceed the specified requirements.

1.4 Quality Assurance

A. Test pipe insulation for maximum flame spread index of 25 and maximum smoke developed index not exceeding 450, in accordance with ASTM E84.

B. Pipe insulation manufactured in accordance with ASTM C585 for inner and outer diameters.

C. Factory fabricated fitting covers manufactured in accordance with ASTM C450.

D. Maintain 2 copies of each document on-site.

1.5 Qualifications

A. Manufacturer: A company specializing in manufacturing products specified in this section, with a minimum of three (3) years of experience.

B. Applicator: A company specializing in performing the Work described in this section, with a minimum of three (3) years of experience.

1.6 Delivery, Storage, and Handling

A. Accept materials on-site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.

B. Protect materials from weather and construction traffic, dirt, water, chemicals, and damage, by storing in original wrapping and in a dry storage area.

1.7 Environmental Requirements

A. Install insulation only when ambient temperature and humidity conditions are within the range recommended by the manufacturer.

B. Maintain the temperature before, during, and after installation, for a minimum period of 24 hours.

1.8 Field Measurements

A. Verify field measurements prior to fabrication.

1.9 Warranty

A. Furnish 1-year manufacturer warranty for insulation and jacketing.

B. Furnish 1-year manufacturer warranty for heat trace.

PART 2 PRODUCTS

2.1 Manufacturers

A. Heat Trace Manufacturers:
   1. Thermon FLX.
   2. Chromalox SRF.
   3. Substitutions: Permitted with Engineer's Approval

B. Manufacturers for Insulation and Jacketing Products:
   1. CertainTeed.
   2. Knauf.
   3. Johns Manville.
   4. Substitutions: Permitted with Engineer's Approval

2.2 Heat Trace

A. Heat trace shall conform to the following:
   1. Traced surface type: Metal and plastic piping.
   2. Outer jacket chemical resistance:
      a. Aqueous inorganic chemical: (modified polyolefin outer jacket).
      b. Organic chemicals or corrosives: (flouropolymer outer jacket).
   3. Voltage: 120V AC
   4. Minimum expected ambient temperature: –20°F.
   5. Maximum operating temperature: 150°F.
   6. Ground-fault protection required.
   7. Bus wire size: 16 AWG.

B. Self-regulating heat trace shall be low temperature and have a tinned copper braid. Thermostat shall be line sensing electronic thermostat. Installations shall include a splice and tee for each cut in the wire and be covered to protect against corrosion.

C. Furnish appurtenances recommended by manufacturer for a fully functioning heat trace system on exposed piping, including attachment tape, cable end terminations, and "Electric Heat Tracing" labels.

2.3 Pipe Insulation

A. Product Description: ASTM C547, molded glass fiber pipe insulation. Conform to ASTM C795 for application on Austenitic stainless steel.
   1. Thermal Conductivity: 0.23 at 75°F.
   2. Operating Temperature Range: 0 to 450°F.
   3. Vapor Barrier Jacket: ASTM C1136, Type I, factory applied reinforced foil kraft with self-sealing adhesive joints.
   4. Jacket Temperature Limit: –20 to 150°F.
   5. Minimum thickness: 2 inches.

2.4 Pipe Insulation Jackets

A. PVC Plastic Pipe Jacket:
   1. Product Description: ASTM D1785, One piece molded type fitting covers and sheet material, off-white color.
   2. Thickness: 30 mil.
   3. Connections: Brush on welding adhesive.

B. Field Applied Glass Fiber Fabric Jacket System:
   1. Insulating Cement/Mastic: ASTM C195; hydraulic setting on mineral wool.
   2. Glass Fiber Fabric:
      a. Cloth: Untreated; 9 oz/sq yd weight.
      b. Blanket: 1.0 lb/cu ft density.
      c. Weave: 10 x 10.
   3. Indoor Vapor Retarder Finish:
      a. Cloth: Untreated; 9 oz/sq yd weight.
      b. Vinyl emulsion type acrylic, compatible with insulation, white color.

2.5 Pipe Insulation Accessories

A. Adhesives: Compatible with insulation.

B. Piping 1½-inch-diameter and smaller: Galvanized steel insulation protection shield. MSS SP-69, Type 40.
   1. Length: Based on pipe size and insulation thickness.

C. Piping 2-inch-diameter and larger: Wood insulation saddle, hard maple.
   1. Inserts length: Not less than 6 inches long, matching thickness and contour of adjoining insulation.

D. Closed Cell Elastomeric Insulation Pipe Hanger: Polyurethane insert with aluminum single piece construction and self adhesive closure. Thickness to match pipe insulation.

E. Tie Wire: 0.048-inch stainless steel with twisted ends on maximum 12-inch centers.

F. Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement: ASTM C449/C449M.

PART 3 EXECUTION

3.1 Examination

A. Verify piping has been tested before applying insulation materials per Section 22 10 00 Plumbing and Piping.

B. Verify surfaces are clean and dry, with foreign material removed.

3.2 Installation: Heat Trace

A. Heat Trace: Install on all exterior pipes beneath pipe insulation according to manufacturer instructions.

B. Heat Trace Exposed to View in Outdoor Finished Spaces: Locate heat trace and cover seams in least visible locations.

C. Heat trace shall be labeled in order to identify and warn of heat trace location.

D. Gland entry kit shall be used to transition heat trace into a junction box when making connections of a pipe or tank. It may be used for power splice or tee connections.

3.3 Installation: Piping Systems

A. Exterior Piping: Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor retarder cement. Cover with jacket with seams located at 3 or 9 o'clock position on side of horizontal piping with overlap facing down to shed water or on bottom side of horizontal piping.

END OF SECTION

SECTION 31 10 00

SITE CLEARING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Removing surface debris.
   2. Removing designated paving, curbs, and sidewalks.
   3. Removing designated trees, shrubs, and other plant life.
   4. Removing abandoned utilities.
   5. Excavating topsoil.

B. Related Sections:
   1. Section 31 23 17 - Trenching and Backfill

1.2 DEFINITIONS

A. Clearing: Clearing is the removal from the ground surface and disposal of trees, brush, shrubs, down timber, decayed wood, other vegetation, concrete, rubbish, and debris, as well as the removal of fences, stockpiled materials, and incidental structures.

B. Grubbing: Grubbing is the removal and disposal of all stumps, buried logs, roots, matted roots, and organic materials.

1.3 QUALITY ASSURANCE

A. Perform Work in accordance with applicable State of New Mexico Standard Specifications.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 DISPOSITION OF TREES AND SHRUBS

A. General
   1. Trees and shrubs within the limits of work shall be removed only where shown on the Drawings. Do not cut or damage trees unless so indicated or unless written permission has been obtained from the affected property owner. Three

copies of such permission shall be furnished to the ENGINEER before removal operations commence.

B. Trees and Shrubs To Be Removed
   1. Trees and shrubs felled within the limits of work shall have their stumps grubbed and removed to a licensed disposal site. Depressions created by such removal shall be filled with structural backfill.

3.2 CLEARING AND GRUBBING

A. Clear all items specified herein to the limits indicated or as directed by the ENGINEER and stockpile cleared and grubbed material onsite. Do not start earthwork operations in areas where clearing and grubbing is not complete, with the exception that stumps and large roots may be removed concurrent with excavation. Comply with erosion and sediment control and storm water management measures. Super silt fence shall be installed prior to earth-moving activities.

B. Clear and grub areas to be excavated, areas to receive fill, and areas upon which structures are to be constructed, as directed by the ENGINEER. Remove all trees, stumps, and root mats in these areas and dispose of them offsite at no cost to the property owner. Depressions made by the removal of stumps or roots shall be filled with suitable backfill.

C. The CONTRACTOR shall clear, grub, and strip the site area to the limits of disturbance shown on the Contract Drawings. Clearing and grubbing shall not be performed more than 60 days before excavation is to begin.

END OF SECTION

SECTION 31 23 17

TRENCHING AND BACKFILL

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. This Section shall be supplemental to 701 of the New Mexico Standard Specifications for Public Works Construction. Section 701 shall apply except as modified in this Section.

B. Related Sections:
   1. Section 31 10 00 - Site Clearing.

1.2 REFERENCES

A. New Mexico Standard Specifications for Public Works Construction:
   1. Section 701 - Trenching, Excavation and Backfill

1.3 DEFINITIONS

A. Utility: Any buried pipe, duct, conduit, or cable.

B. Trench Zone: The trench zone includes the portion of the trench from the top of the pipe zone to the existing surface in unpaved areas.

C. Pipe Zone: The pipe zone shall include the full width of trench from the bottom of the pipe or conduit to a horizontal level 12 inches above the top of the pipe. Where multiple pipes or conduits are placed in the same trench, the pipe zone shall extend from the bottom of the lowest pipes to a horizontal level 12 inches above the top of the highest or topmost pipe.

D. Pipe Bedding: The pipe bedding shall be defined as a layer of material immediately below the bottom of the pipe or conduit and extending over the full trench width in which the pipe is bedded. Thickness of pipe bedding shall be as shown on the drawings or as described in these specifications for the particular type of pipe installed.

E. Excess Excavated Material
   1. The Contractor shall make the necessary arrangements for and shall remove and dispose of all excess excavated material.
   2. No excavated material shall be deposited on private property unless written permission from the Engineer is secured by the Contractor.

1.4 TRENCH SAFETY

A. All excavations shall be performed, protected, and supported as required for safety. In all cases, Contractor shall ensure that all excavation and trenching methods meet or exceed safety requirements as set forth by local, state and federal agencies.

B. Barriers shall be placed at each end of all excavations and at such places as may be necessary along excavations to warn all traffic of such excavations.

C. No trench or excavation shall remain open and exposed to vehicular or foot traffic during non-working hours. The trench or excavation shall be fenced off, or covered with steel plates, spiked in place, or backfilled.

D. The Contractor shall notify the Engineer of all work-related accidents which may occur to persons or property at or near the project site, and shall provide the Engineer with a copy of all accident reports. All accident reports shall be signed by the Contractor or its authorized representative and submitted to the Engineer within twenty-four (24) hours of the accident's occurrence.

1.5 ACCESS

A. Unobstructed access must be provided to all driveways or other property or facilities that require routine use. Temporary closures of driveways require written approval of the property owner and confirmation from the Engineer.

1.6 PERMITS

A. The Contractor shall keep a copy of all the required permits in the job site and comply with all the terms and conditions of said permits.

1.7 QUALITY ASSURANCE

A. Perform Work in accordance with applicable State of New Mexico Standard Specifications for Public Works Construction.

1.8 COORDINATION

A. Verify Work associated with lower elevation utilities is complete before placing higher elevation utilities.

PART 2 PRODUCTS

2.1 FILL MATERIALS

A. Native Earth Backfill: Native earth backfill, acceptable for use, shall be fine-grained material free from roots, debris, and rocks with a maximum dimension not larger than 3 inches.

B. Imported Backfill Material: Whenever the excavated material is not suitable for backfill, the Contractor shall arrange for and furnish suitable imported backfill material that is capable of attaining the required relative density.

C. The Contractor shall dispose of the excess trench excavation material as specified in the preceding section. Backfilling with imported material shall be done in accordance with the methods described herein.

PART 3 EXECUTION

3.1 COMPACTION REQUIREMENTS

A. Determine the density of soil in place by the use of a nuclear testing gauge or similar.

B. Determine laboratory moisture-density relations of existing soils by ASTM D698.

C. Determine the relative density of cohesionless soils by ASTM D2049.

D. Sample backfill materials by ASTM D75.

E. Express "relative compaction" as the ratio, expressed as a percentage; of the in place dry density to the laboratory maximum dry density.

F. Compaction shall be deemed to comply with the specifications when no test falls below the specified relative compaction.

G. The Contractor will secure the services of a soils tester and pay the costs of all compaction testing. The Contractor will be responsible for the cost of all retests in failed areas. Test results will be furnished to the Engineer immediately upon conclusion of the test.

H. If the backfill fails to meet the specified relative compaction requirements, the Contractor shall rework the backfill until the requirements are met. The Contractor shall make all necessary excavations for density tests as directed by the Engineer. The Contractor will be responsible for the cost of all additional compaction tests in the reworked areas.

I. Compaction tests shall be performed at 2 foot depths and at 200-foot intervals or as per section A-1 of Standard Specification 701.

J. Unless otherwise shown on the drawings or otherwise described in the specifications for the particular type of pipe installed, relative compaction in pipe trenches shall be as described below:
   1. Pipe zone and pipe base: 90% relative compaction.
   2. Trench zone not beneath paving: 90% relative compaction.

3. Work performed in roadways shall be done in accordance with section A-1 of Standard Specification 701 and approval of the roadway Owner.

3.2 MATERIAL REPLACEMENT

A. Removal and replacement of any trench and backfill material which does not meet the specifications shall be the Contractor's responsibility.

3.3 TRENCHING

A. Excavation for pipe, fittings, and appurtenances shall be open trench to the depth and in the direction necessary for the proper installation of the facilities as shown on the plans.

B. Trench banks shall be kept as near to vertical as possible and shall be properly braced and sheeted.

3.4 BRACING

A. The Contractor's design and installation of bracing and shoring shall be consistent with OSHA rules, orders, and regulations.

B. Excavations shall be so braced, sheeted, and supported that they will be safe such that the walls of the excavation will not slide or settle and all existing improvements of any kind, either on public or private property, will be fully protected from damage.

C. The sheeting, shoring, and bracing shall be arranged so as not to place any stress on portions of the completed work until the general construction thereof has proceeded far enough to provide ample strength.

D. Care shall be exercised in the drawing or removal of sheeting, shoring, bracing, and timbering to prevent the caving or collapse of the excavation faces being supported.

3.5 TRENCH WIDTHS

A. Excavation and trenching shall be true to line with a minimum width of the largest outside diameter of the pipe + 12 inches and a maximum width of the largest outside diameter of the pipe + 24 inches. Width of trenches for multiple pipes shall be according to the Drawings.

3.6 LENGTH OF OPEN TRENCH

A. The maximum allowable length of open trench shall be the distance necessary to accommodate the amount of pipe installed in a single day.

3.7 GRADE

A. Excavate the trench to the lines and grades shown on the Drawings with allowance for pipe thickness and for pipe base or special bedding.

B. The trench bottom shall be graded to provide a smooth, firm, and stable foundation that is free from rocks and other obstructions and shall be at a reasonably uniform grade.

3.8 CORRECTION OF OVER EXCAVATION

A. Where excavation is inadvertently carried below the design trench depth, suitable provision shall be made by the Contractor to adjust the excavation, as directed by the Engineer, to meet requirements incurred by the deeper excavation.

B. Over excavations shall be corrected by backfilling with approved graded crushed rock or gravel and shall be compacted to provide a firm and unyielding subgrade or foundation, as directed by the Engineer.

3.9 FOUNDATION STABILIZATION

A. Whenever the trench bottom does not afford a sufficiently solid and stable base to support the pipe or appurtenances, the Contractor shall excavate to a depth below the design trench bottom, as directed by the Engineer, and the trench bottom shall be backfilled with 3/4-inch rock and compacted to provide uniform support and a firm foundation.

B. Where rock is encountered, (see Section 3.10 C) it shall be removed to a depth at least 6 inches below grade and the trench shall be backfilled with 3/4-inch crushed rock to provide uniform support and a firm foundation.

C. If excessively wet, soft, spongy, unstable, or similarly unsuitable material is encountered at the surface upon which the bedding material is to be placed, the unsuitable material shall removed to a depth as determined in the field by the Engineer and replaced by crushed rock to provide uniform support and a firm foundation..

3.10 EXCAVATED MATERIAL

A. All excavated material shall not be stockpiled in a manner that will create an unsafe work area or obstruct sidewalks or driveways.

B. In confined work areas, the Contractor may be required to stockpile the excavated material off-site, as determined by the Engineer.

C. Rock excavation is defined as boulders, sedimentary, or igneous rock that cannot be removed without continuous use of pneumatic tools or blasting.

3.11 PLACING OF PIPE BEDDING

A. Place the thickness of pipe bedding material over the full width of trench necessary to produce the required bedding thickness when the material is compacted to the specified relative density. Grade the top of the pipe bedding ahead of the pipe to provide firm, uniform support along the full length of pipe.

3.12 BACKFILLING WITHIN PIPE ZONE

A. After pipe has been installed in the trench, place pipe zone material simultaneously on both sides of the pipe, keeping the level of backfill the same on each side. Carefully place the material around the pipe so that the pipe barrel is completely supported and that no voids or uncompacted areas are left beneath the pipe. Use particular care in placing material on the underside of the pipe to prevent lateral movement during subsequent backfilling.

3.13 BACKFILLING WITHIN TRENCH ZONE

A. Push the backfill material carefully onto the backfill previously placed in the pipe zone. Do not permit free fall of the material until at least 2 feet of cover is provided over the top of the pipe. Do not drop sharp, heavy pieces of material directly onto the pipe or the tamped material around the pipe.

B. The remaining portion of the trench to the street zone or ground surface, as the case may be, shall be backfilled, compacted and/or consolidated by approved methods to obtain the specified relative compaction.

1. Compaction using vibratory equipment, tamping rollers, pneumatic tire rollers, or other mechanical tampers shall be done with the type and size of equipment necessary to accomplish the work. The backfill shall be placed in horizontal layers of not greater than 12-inches depth. Each layer shall be evenly spread, properly moistened, and compacted to the specified relative density as given on the drawings. The Contractor shall repair or replace any utility, pipe, fittings, manholes, or structures as directed by the Engineer damaged by the Contractor's operations.

3.14 REPLACEMENT OF ASPHALT CEMENT

A. Perform replacement of asphalt cement in accordance with New Mexico Standard Specifications for Public Works Construction, Section 701 and as specified on the Drawings.

END OF SECTION

Appendix E

Health and Safety Plan

Health and Safety Plan
Las Vegas Triple Site
Las Vegas, New Mexico

Project Manager: Thomas Golden

Site Health and Safety Manager: Thomas Hopkins

September 13, 2019

Daniel B. Stephens & Associates, Inc.

6020 Academy NE, Suite 100 • Albuquerque, New Mexico 87109

Table of Contents

Section **Page**

List of Figures

Figure

List of Tables

Table

List of Appendices

Appendix

Site Health and Safety Plan Summary

This summary provides critical, site-specific health and safety information that all site workers should be familiar with. This summary is an integral part of the site-specific health and safety plan (HASP) and must be attached to the complete plan.

Site Name and Location

Las Vegas Triple Site
Las Vegas, New Mexico

Project Personnel *(refer to Section 3 for description of duties)*

Project Manager (PM)	Thomas Golden
Site Safety Officer (SSO)	Thomas Hopkins
Site Supervisor	Various personnel

Emergency Response

Table S-1 lists the Emergency Contacts that might be needed in the event of a site emergency. The complete Emergency Response Plan is contained in Appendix B of this plan.

Site Activities and Hazard Assessment

Table S-2 identifies each of the tasks that will be performed during the field program and the hazards associated with each task. Table S-3 identifies the appropriate personal protective equipment (PPE) to be used for each task, including respiratory protection, and the air monitoring equipment that will be used. Air monitoring is further discussed in Section 7.1 of this plan. In the event that new tasks become necessary or new hazards are encountered, the SSO will update Tables S-2 and S-3 accordingly, and notify all site workers of the changes.

Contaminants of Concern

Tables S-4 and S-5 identify the contaminants of concern that might reasonably be encountered during site activities and respectively provide summaries of the chemical properties and worker exposure/health information. This information is typically summarized from safety data sheets (SDSs) and other sources.

Hospital Route

Figure S-1 depicts the route and provides written instructions from the site to the hospital.

Medical Monitoring *(refer to Section 12 of the DBS&A Health and Safety Manual)*

All site workers must be currently participating in a medical monitoring program that includes baseline and annual medical evaluation and testing.

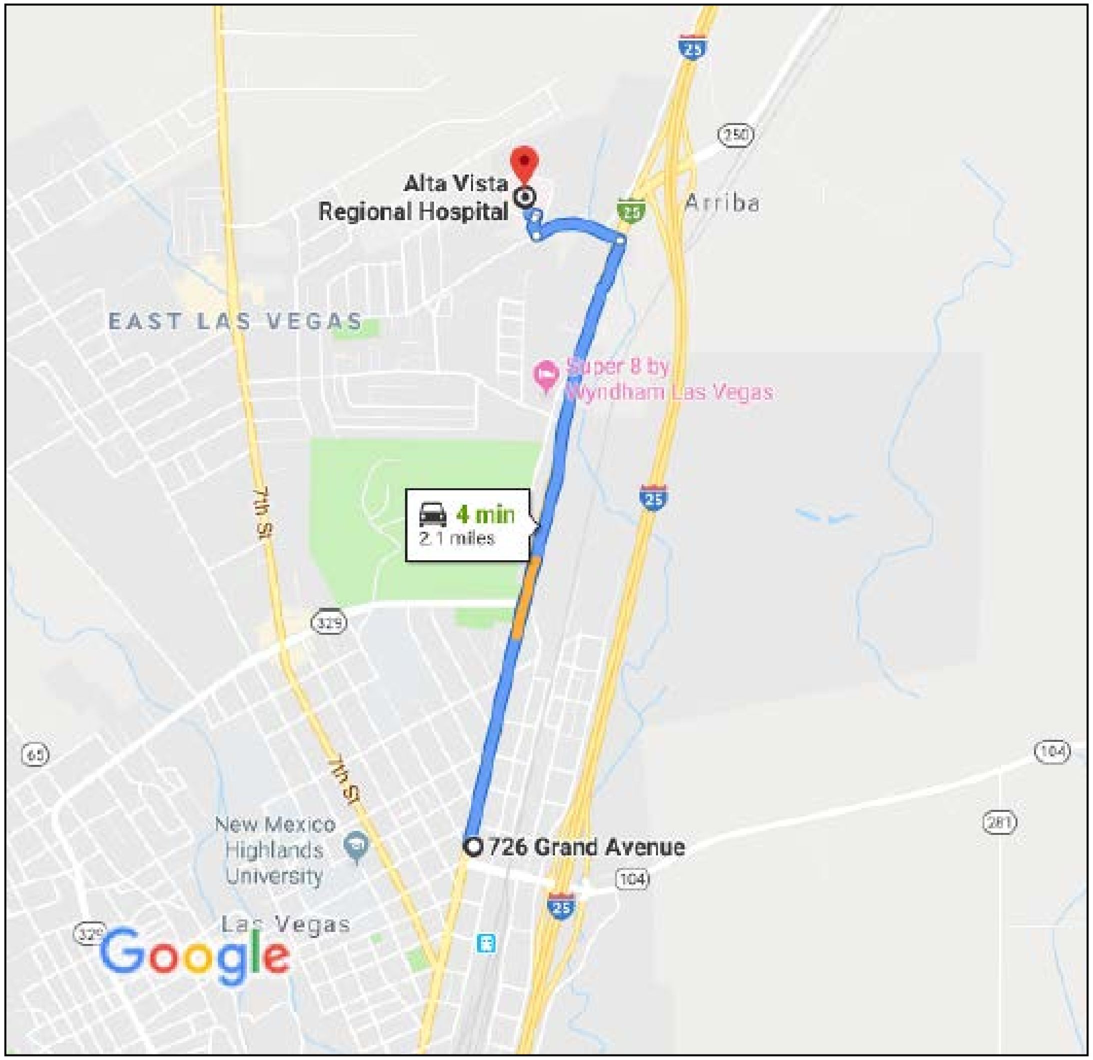
Site Control Plan *(refer to Section 9 of this plan)*

Site control measures will be implemented during any activity that presents a hazard to workers outside the immediate work area or to unauthorized personnel in the vicinity. These measures can range from erecting barricades or barriers to prevent unauthorized entry, to establishing and enforcing work zones to mitigate the spread of contaminants beyond the work area.

Traffic control plans may be required for sites where work activities may impact traffic flow on adjacent roadways. These plans must be submitted to and approved by the local traffic control authority. The Project Manager or their designee shall be responsible for ensuring that the necessary site control measures and plans are prepared and implemented.

Confined Spaces *(refer to Section 10 of this plan)*

No confined space entries will be performed during this investigation. In the event that confined space entries become necessary, this site-specific HASP will be amended. Confined space entries can only be performed by trained personnel in accordance with the DBS&A Confined Space Entry Program.



Directions from Site

(Drive 2.1 miles, 4 minutes

726 Grand Ave

Las Vegas, NM 87701

1. Head north on I-25BL/Grand Ave toward E National Ave
   - Continue to follow I-25BL
   - Pass by KFC (on the left in 0.5 mi)

   1.7 mi
2. Turn left onto Legion Dr

   0.3 mi
3. Turn right

   253 ft
4. Continue straight

   75 ft
5. Turn left
   - Destination will be on the right

   102 ft

Alta Vista Regional Hospital

104 Legion Dr, Las Vegas, NM 87701

ATEX 394 (ALLSUP'S), PINO FINA, AND ROSS TEXACO
LAS VEGAS, NEW MEXICO

Hospital Route to Alta Vista Regional Hospital

Daniel B. Stephens & Associates, Inc.

1/31/20

Figure S-1

Table S-1: Emergency Resources

Location and Number of Nearest Telephone:	DBS&A and Contractor Vehicles
In Case of Fire or Explosion (Telephone Number):	
Call Fire Dept:	911
Call Police/Sheriff:	911
In Case of Personal Injury or Exposure (Telephone Number):	
Call Hospital:	(505) 426-3500
Call Poison Control Center:	(800) 432-6866
Call Ambulance:	911
Call Air Ambulance:	911
DBS&A and Other Contacts	
DBS&A (Albuquerque):	(505) 822-9400
DBS&A Project Manager: Tom Golden (cell)	(505) 249-9402
DBS&A H&S Officer: Chad Johannesen (cell)	(505) 250-4630
DBS&A H&S Coordinator: Chad Johannesen (cell)	(505) 250-4630
DBS&A Personnel Department: Linda Osdale	(714) 630-5855
Medical Contact: WorkCare, Dr. Peter Greaney (Anaheim, CA)	(800) 455-6155
Emergency Response Telephone Numbers	
Local Chemical Emergency Response Team:	911
National Response Center, Oil & Toxic Chemical Spills:	(800) 424-8802
CHEMTREC (24-hour):	(800) 424-9300
Other Contacts:	

Table S-2: Proposed Tasks and Hazard Assessment
Page 1 of 2

Potential Hazards	Proposed Tasks: Drilling, Well Installation, and Development	Soil Sampling	Groundwater Sampling	GW Treatment System Installation and Operation	Trenching and Excavations
Heavy equipment	X			X	X
Hazardous energy	X			X	X
Pinch points	X			X	X
Unstable ground					X
Noise hazards (>85 dbA)	X			X	X
Eye hazards	X	X	X	X	X
Head hazards	X				X
Dermal contact	X	X	X	X	X
Slips, trips, and/or falls	X	X	X	X	X
Heavy lifting	X	X	X	X	
Vehicle traffic	X	X	X	X	
Unauthorized site entry	X			X	X
Buried utilities	X	X		X	X
Overhead utilities	X			X	X
Respiratory Concerns					
Particulates	X	X			X
Vapors and/or gases	X	X	X	X	X
Oxygen depletion					
Asbestos					
Contaminated soil or liquids	X	X	X	X	X
Explosive atmospheres					
Heat/cold stress	X	X	X	X	X
Sunburn	X	X	X	X	X
Electrical hazards				X	
Compressed air or gases	X		X		
Fire hazards (hot work)	X			X	
Chemical hazards (other than COCs)			X		
Insects and vermin	X	X	X	X	X
Confined spaces					
Ionizing Radiation					

GW = Groundwater
dBA = A-weighted decibels
COCs = Contaminants of concern

Table S-2: Proposed Tasks and Hazard Assessment
Page 2 of 2

Potential Hazards	Proposed Tasks				
	Drilling, Well Installation, and Development	Soil Sampling	Groundwater Sampling	GW Treatment System Installation and Operation	Trenching and Excavations
Unexploded Ordnance/Munitions					
HAZARD RANKING					
(Low, Medium, High)	Medium	Low	Low	Low-Medium	Medium

GW = Groundwater
dBA = A-weighted decibels
COCs = Contaminants of concern

Table S-3: Requirements for Personal Protective Equipment and Air Monitoring

Personal Protective Equipment	Proposed Tasks: Drilling, Well Installation, and Development	Soil Sampling	Groundwater Sampling	GW treatment System Installation and Operation	Trenching and Excavations
Level D (Long pants, shirt, steel-toed boots, and safety glasses)	Minimum required for all site activities				
Hard hat	X			X	X
Hearing protection	X			X	X
Faceshield	X (decon)				
Respiratory Protection	(Selection matrix and cartridge change schedule in Project Files)				
Half-mask with organic vapor/HEPA cartridge	X				X
Full-face with organic vapor/HEPA cartridge					
Cartridge change schedule	Breakthrough, 8 hours, or end of shift				Breakthrough, 8 hours, or end of shift
Air Monitoring Equipment					
Particulate monitor	X				X
Photoionization detector	X	X		X	X
Flame-ionization detector					
Combustible gas indicator	X				
O_2 monitor					
Colorimetric tubes	X				
H_2S detector					
Methane gas monitor					
Other ________________					

GW = Groundwater
decon = Decontamination
HEPA = High-efficiency particulate air
O_2 = Oxygen
H_2S = Hydrogen sulfide

Table S-4. Chemical and Physical Properties for Primary Contaminants of Concern

Compound	Vapor Pressure (mm Hg)	Vapor Density [a] (air=1)	Specific Gravity	Odor Threshold [b] (ppm)	LEL-UEL (%)	Ionization Potential (eV)	Physical Description
Silica, crystalline as respirable dust **[Ca]**	NA	NA	2.66	NA	Unknown	NA	Colorless, odorless solid - a component of many mineral dusts.
Benzene **[Ca]**	75	2.7	0.88	24-119 (P)	1.2-7.8	9.24	Colorless to light yellow liquid with aromatic odor
Toluene	21	3.18	0.87	1.6 (G)	1.1-7.1	8.82	Colorless liquid with a sweet, pungent, benzene-like odor
Ethylbenzene	7	3.66	0.87	0.092-0.6 (G)	0.8-6.7	8.76	Colorless liquid with an aromatic odor
Xylene (o-, m-, p-isomers)	7-9	3.66	0.86-0.88	0.62-20 (G)	0.9-1.1	8.44-8.56	Colorless liquid with an aromatic odor (p-Xylene is a solid below 56°F)
Methyl tertiary butyl ether (MTBE) **[Ca]**	8.5-10	3.1	0.74	0.053 (G)	NA	NA	Clear, colorless, low viscosity liquid with a terpene-like odor
Tertiary butyl alcohol (TBA)	40-42	2.55	0.79	21.5	2.4-8		
Gasoline **[Ca]**	38-300	NA	0.72-0.76	0.3 (G)	1.4-7.6	NA	Clear liquid with a characteristic odor
Diesel fuel	NA	<1	0.81	NA	0.7 [a]	NA	Clear white liquid with kerosene odor
1,2-Dichloroethane **[Ca]**	64	3.42	1.24	6-10 (G)	4.2-16	11.05	Colorless liquid with a slightly acrid, chloroform-like odor
1,2-Dibromoethane **[Ca]**	11	6.5	2.17	10 (P)	NA	9.45	Colorless liquid or solid with a sweet odor
1,2-Dichloropropane **[Ca]** (Propylene dichloride)	40	3.90	1.16	0.26 (G)	3.4-14.5	10.87	Colorless liquid with a chloroform-like odor
Methylene chloride **[Ca]**	350	2.93	1.33	160 (P)	13-23	11.32	Colorless liquid with a chloroform-like odor

Sources: NIOSH *Pocket Guide to Chemical Hazards* (2013 - accessed on-line).
[a] Vapor density data from *Groundwater Chemicals Desk Reference* (Montgomery, 2000) and product material safety data sheets.
[b] Odor threshold data from (1) MSA *RESPONSE® Guide*, on-line at http://webapps.msanet.com/responseguide/ChemicalDatabase.aspx, and (2) 3M *Respirator Selection Guide* (2012).
[c] PID cannot be used to detect this compound because ionization potential (IP) of compound exceeds energy potential of available lamps.

mm Hg = Millimeters of mercury
ppm = Parts per million
LEL/UEL = Lower/Upper explosive limit
% = Percent
eV = Electron volts
NA = Not available or unknown
[Ca] = Known or suspected carcinogen
(P) (G) = Warning properties - poor - good

Table S-5. Exposure Limit, Hazard, and First Aid Information for Primary Contaminants of Concern
Page 1 of 2

Compound	Applicable Exposure Limit	IDLH	Primary Acute Symptoms from Inhalation and Dermal Exposures	Target Organs	First Aid
Silica, crystalline as respirable dust **[Ca]**	0.05 mg/m^3 [a]	50 mg/m^3	Cough, dyspnea (breathing difficulty), wheezing; decreased pulmonary function, progressive respiratory symptoms (silicosis); irritation eyes	Eyes, respiratory system	*Eyes:* irrigate immediately; *Skin:* no recommendation; *Breathing:* remove to fresh air; *Ingestion:* no recommendation
Benzene **[Ca]**	0.1 ppm [a] 1.0 ppm [b]	500 ppm	Irritates eyes, skin, and nose; causes headache, nausea, giddiness, staggered gait, weakness, exhaustion; dermatitis	Eyes, skin, respiratory system, blood, CNS, bone marrow	*Eyes:* irrigate immediately; *Skin:* soap wash immediately; *Breathing:* remove to fresh air, provide respiratory support; *Ingestion:* medical attention immediately
Toluene	100 ppm [a] 150 ppm [b]	500 ppm	Irritates eyes and nose; causes headache, weakness, fatigue	Eyes, skin, respiratory system, CNS, liver, kidneys	As above
Ethylbenzene	100 ppm [a,c] 125 ppm [b]	800 ppm	Irritates eyes, skin and mucous membranes	Eyes, skin, respiratory system, CNS	As above
Xylene, o-, m-, p-	100 ppm [a,c] 150 ppm [b]	900	Irritates eyes, skin, nose and throat; causes dizziness, excitement	Eyes, skin, respiratory system, CNS, GI tract, blood, liver, kidneys (o-, m- and p-Xylene)	As above

Sources: NIOSH *Pocket Guide to Chemical Hazards* (2013- accessed on-line) and manufacturer's safety data sheets (SDS).
MSA *Response®* Guide (2013 - accessed on-line)

[a] National Institute of Safety and Health recommended exposure limit (NIOSH REL) - 10-hour time-weighted average (TWA)
[b] NIOSH short-term exposure limit (STEL) - 15 minute TWA - not to be exceeded
[c] Occupational Safety and Health Administration permissible exposure limit (OSHA PEL) - 8-hour TWA
[d] American Conference for Governmental Industrial Hygienists (ACGIH) - 8-hr TWA
[e] No exposure limit established; limits for naphthalene presented as a guide only
[f] OSHA Ceiling limit - not to be exceeded
[g] ACGIH Ceiling limit - not to be exceeded

mg/m^3 = Milligrams per cubic meter
ppm = Parts per million
[Ca] = Known or suspected carcinogen
CNS = Central nervous system
CVS = Cardiovascular system
NE = None established

Table S-5. Exposure Limit, Hazard, and First Aid Information for Primary Contaminants of Concern
Page 2 of 2

Compound	Applicable Exposure Limit	IDLH	Primary Acute Symptoms from Inhalation and Dermal Exposures	Target Organs	First Aid
Methyl tertiary butyl ether (MTBE) **[Ca]**	50 ppm [d]	NE	Irritates eyes, skin, and respiratory tract	Eyes, skin, respiratory system, CNS	As above
Tertiary butyl alcohol (TBA)	100 ppm [a,c] 150 ppm [b]	1,600 ppm	Irritates eyes, skin, nose, throat; causes drowsiness, narcosis	Eyes, skin, respiratory system, CNS	As above
1,2-Dichloroethane	1 ppm [b]	50 ppm	Irritates eyes, CNS depression, nausea, vomiting, dermatitis	Eyes, skin, kidneys, liver, CNS, cardiovascular system	As above
1,2-Dibromoethane	0.045 ppm [b]	100 ppm	Irritates eyes, skin, respiratory system, dermatitis	Eyes, skin, respiratory system, liver, kidneys, reproductive system	As above
Gasoline **[Ca]**	300 ppm [a]	NE.	Irritates eyes, skin, mucous membrane; causes dermatitis, headache, weakness, exhaustion, blurred vision, dizziness, slurred speech, confusion, convulsions; possible liver, kidney damage	Eyes, skin, respiratory system, CNS, liver, kidneys	As above

Sources: NIOSH *Pocket Guide to Chemical Hazards* (2013- accessed on-line) and manufacturer's safety data sheets (SDS).
MSA *Response*® Guide (2013 - accessed on-line)

[a] National Institute of Safety and Health recommended exposure limit (NIOSH REL) - 10-hour time-weighted average (TWA)
[b] NIOSH short-term exposure limit (STEL) - 15 minute TWA - not to be exceeded
[c] Occupational Safety and Health Administration permissible exposure limit (OSHA PEL) - 8-hour TWA
[d] American Conference for Governmental Industrial Hygienists (ACGIH) - 8-hr TWA
[e] No exposure limit established; limits for naphthalene presented as a guide only
[f] OSHA Ceiling limit - not to be exceeded
[g] ACGIH Ceiling limit - not to be exceeded

mg/m^3 = Milligrams per cubic meter
ppm = Parts per million
[Ca] = Known or suspected carcinogen
CNS = Central nervous system
CVS = Cardiovascular system
NE = None established

Site-Specific Health and Safety Plan

Project Name: Las Vegas Triple Site
Project Location: Las Vegas, New Mexico
DBS&A Project Manager: Thomas Golden

1. Introduction

This Health and Safety Plan (HASP) establishes the responsibilities, requirements, and procedures for Daniel B. Stephens and Associates, Inc. (DBS&A) personnel while performing surface and subsurface investigations at the above-named site. The Site Summary is an integral part of this HASP and must be attached for the plan to be considered complete.

The objective of this HASP is to establish a safe work environment for all site personnel, provide a uniform and concise plan of action in an emergency, and furnish the necessary guidance to adhere to these policies. This HASP meets the requirements set forth by the Occupational Safety and Health Administration (OSHA) in Title 29 of the Code of Federal Regulations (CFR), Part 1910.120 (Hazardous Waste Operations and Emergency Response) and 29 CFR, Part 1926 (Safety and Health Regulations for Construction). This HASP is designed to augment the health and safety policies and procedures established in the DBS&A Health and Safety Program Manual (H&S Manual) (DBS&A, 2013).

Safety is considered a priority during all field activities. Field personnel will not perform any task for which they have not received adequate training, or which they personally feel is unsafe.

2. Description of Site Activities

During this project, DBS&A will perform hydrogeologic investigations at the site. This HASP addresses the hazards associated with the following activities:

- Drilling, installation, and development of monitor wells
- Soil sampling
- Groundwater sampling

- Groundwater treatment system installation and operation
- Trenching and excavations

Table S-2 in the site HASP summary identifies the tasks that will be performed during the field program and the hazards associated with those tasks. The measures that will be employed to protect worker safety are described in Table S-3 and Sections 4 and 5 of this plan. Assuming that the site tasks do not change and that data from follow-up testing do not change the hazard assessment, this HASP will also apply to any subsequent field events. This HASP must be revised to address activities beyond those described above and listed in Tables S-2 and S-3.

The specific field activities are described in detail in the Scope of Work and the related Sampling and Analysis Plan. The site-specific field methods and procedures are based on standard procedures established by DBS&A and on applicable regulatory agency guidance.

Special site entry procedures:

- The suspect sites are considered to be uncontrolled hazardous waste sites. All workers and visitors are subject to the OSHA requirements for hazardous waste workers in 29 CFR 1910.120.

- Workers must be aware of traffic and pedestrians entering and exiting the site.

Nearest telephone:	DBS&A and Contractor personnel
Nearest water:	Potable water will be supplied
Nearest bathroom facilities:	Hotel or other public bathrooms
Nearest fire extinguisher:	DBS&A and Contractor vehicles
Nearest first aid kit:	DBS&A and Contractor vehicles
Warning/method signal for site evacuation:	Verbal

3. Project Personnel

The DBS&A Health and Safety Manual (DBS&A, 2013) establishes the roles and responsibilities for health and safety at various levels within the company. The DBS&A personnel responsible for the activities at the site are listed in the site HASP summary. Their roles are described below.

3.1 Project Manager

The Project Manager (PM) is responsible for implementing the DBS&A H&S Program at the site and designating the Site Safety Officer. The PM will oversee the preparation of this site-specific HASP, ensuring that the hazards associated with each task have been identified and that appropriate protective measures have been established. The PM will approve the final HASP.

3.2 Site Safety Officer

The SSO will be responsible for ensuring that all personnel entering an active work area comply with this HASP, meet appropriate OSHA medical and safety training requirements, and utilize the required level of personal protective equipment (PPE). The SSO will conduct site safety meetings prior to the start of work and before the start of each new activity. Workers will acknowledge their attendance by signing the tailgate safety meeting form (Appendix A). Accidents or incidents at the job site that affect or could potentially affect worker safety will be documented using the DBS&A Injury/Illness Report form and the Accident/Incident Investigation Report form (Appendix A).

In accordance with the Hazard Communication standard (29 CFR 1910.1200), the SSO will coordinate with contractor representatives to identify hazardous materials being used on the site and to ensure that safety data sheets (SDSs, formerly referred to as material safety data sheets or MSDSs) are available for each material. Site workers will be briefed on hazardous materials at the job site. The SSO will maintain SDSs for the hazardous chemicals routinely used on site; the contractor will maintain SDSs for the hazardous chemicals they bring to the site.

In order to maintain a safe job site, all potentially dangerous conditions or practices must be corrected before proceeding with field work. The SSO will notify contractors and the PM of any unsafe work practices, and will stop all work on DBS&A projects if contractors do not abide by this plan.

The SSO will establish the initial level of PPE and respiratory protection and will upgrade or downgrade levels of protection in response to field conditions. Information and guidance concerning the PPE Program and the Respiratory Protection Program are found in the DBS&A H&S Manual (DBS&A, 2013).

The SSO will establish the physical limits of the work areas at the site and shall instruct all personnel and visitors on the boundaries of the exclusion zones. Only authorized personnel will be allowed in active work areas. It is also the responsibility of the SSO to ensure that all personnel enter and leave active work areas through the decontamination station, if necessary. Specific site control measures are addressed in Section 9 of this plan.

3.3 Site Supervisor

The Site Supervisor is responsible for directing all field activities at the site and ensuring that the scope of work is completed. The Site Supervisor will serve as the Site Safety Officer in their absence.

3.4 Site Workers and Visitors

Additional workers and visitors may be authorized to enter the site under the direction of the PM or the SSO. All workers must be properly trained in their assigned duties, including standard safety procedures. All workers and visitors entering the work zone will be familiar with the contents of this site HASP and will sign the plan acceptance form (Appendix A). Constructive comments regarding the HASP should be directed to the PM, the SSO or the DBS&A Health and Safety (H&S) Program Coordinator.

3.5 Contractors

Contractors to DBS&A are obligated to conform with OSHA regulations and standard industry safety practices for their profession. If a contractor proposes changes in the HASP, the SSO will obtain permission from the H&S Program Coordinator and the DBS&A PM, and this authorization will be documented in the project site log. A modification to the HASP will be issued reflecting the changes. Additional contractor responsibilities are described in Section 14 of the DBS&A H&S Manual (DBS&A, 2013).

4. General Hazard Review and Assessment

The hazard review for the site is based on DBS&A's extensive experience conducting similar field operations at similar sites. Table S-2 in the site HASP summary identifies the hazards associated with each task and provides a hazard ranking (from low to high) for each task. The controls (elimination, substitution, engineering, administrative, or PPE) that will be employed to protect worker safety are described in Sections 4 and 5 of this plan. Table S-3 in the site HASP summary lists the PPE required to protect workers during each task and identifies the air monitoring equipment that will be used on site.

Tables S-4 and S-5 in the site HASP summary provide information on the physical and chemical characteristics, symptoms of exposure, and first aid procedures for each of the contaminants known or suspected to be present at the site. The OSHA permissible exposure limits (PELs) or the National Institute of Occupational Safety and Health (NIOSH) recommended exposure limits (RELs) for each contaminant of concern are also presented in Table S-5. The PEL and REL are levels to which workers may be exposed for 8 hours per day, 5 days per week for one's working lifetime without resulting in adverse health effects.

4.1 Sunburn and Temperature Hazards

Sunburn is perhaps the most common hazard for field site workers. Sunburn is caused by overexposure to ultraviolet (UV) radiation from the sun. Chronic overexposure to sunlight, especially the UV-B component, accelerates skin aging and increases the risk of skin cancer. The following guidelines can be used to avoid overexposure to UV rays from the sun:

- Wear protective clothing (long sleeves, hats with protective brims, and long pants) that provide the most coverage, and are consistent with the job to be performed.

- Protect eyes with UV-absorbing sunglasses or tinted safety glasses.

- Use a commercial sunscreen with a skin protection factor (SPF) of at least 30 and protection against both UV-A and UV-B rays. Sunscreen should be applied 15 to 30 minutes before exposure and reapplied at 60 to 90 minute intervals. If possible, avoid exposure to the sun between 10:00 a.m. and 2:00 p.m., because rays are the most powerful during this period.

Heat stress is often the most critical hazard for field site workers. The effects can range from transient heat fatigue to serious illness and even death. Heat stress is caused by a number of interacting factors including environmental conditions, clothing, workload, and the individual characteristics of the worker. Because heat stress is fairly common during the summer and fall, preventive measures and alertness are especially important during these seasons.

Protective clothing and equipment affect the way the body controls its temperature. A previous heat injury (including sunburn) can also increase an individual's susceptibility to further heat injury. Workers who have suffered a previous heat injury or who have sunburn must be especially vigilant in preventing heat stress and injury.

In order to ensure against heat stress-related problems, personnel should take frequent breaks in shaded areas. Workers should wear loose fitting clothing (except around rotating equipment) and will unzip or remove coveralls during breaks. Cool drinking water with added electrolytes will be made available and sufficient amounts of fluids should be consumed to avoid dehydration.

During hot weather, heat stress monitoring will be part of the daily regimen. DBS&A personnel will count their pulse rate for 30 seconds as early as possible in the rest period. If the pulse rate exceeds 110 beats per minute, the length of the next work period shall be reduced by 20 minutes and the heat stress parameters will be observed again at that time. If the pulse rate at the beginning of the next test period exceeds 100 and the last reading was over 110, the work cycle shall be reduced by one-third. Whenever the pulse rate is elevated, work should not be resumed until the pulse rate is below 100 beats per minute. These heat stress indicators shall be observed at least once every hour.

During cold weather, DBS&A personnel should wear multilayer, wind-resistant outfits and drink warm fluids. Warm shelter will be available during breaks.

4.2 Weather Hazards

In addition to the hazards of UV radiation from the sun and extreme ambient temperatures, general weather conditions may present a hazard to field workers. Rain and snow may result in muddy, slippery conditions that make foot and vehicle travel hazardous. Lightning and tornadoes, common summertime phenomena, can be extremely hazardous. In the event of adverse weather (e.g., high wind and airborne dust, lightning, extreme cold or heat, or rain) that could compromise worker's health and safety during outdoor activities, the SSO will shut down operations. Additional safety measures for weather-related hazards are described in Section 7.5.2 of the DBS&A H&S Manual (DBS&A, 2013).

If lightning is visible, and the sound of thunder is heard less than 30 seconds after lightning is observed, stop field operations and move to a sturdy, completely enclosed building. If a sturdy shelter is not available, get inside a hardtop automobile and keep the windows up. Automobiles offer excellent lightning protection.

In the event of a tornado, move to a pre-designated shelter. If an underground shelter is not available, move to an interior room or hallway on the lowest floor and get under a sturdy piece of furniture. Stay away from windows. If caught outside or in a vehicle, do not try to outrun a tornado in your car; instead lie flat in a nearby ditch or depression. Remember that flying debris from tornadoes causes most deaths and injuries.

4.3 Biological Hazards

Venomous snakes and arthropods (e.g., insects, spiders, ticks, scorpions, and centipedes) create a hazard when their habitats are disturbed. Awareness and avoidance are the best defenses. Fieldwork shall be performed in a manner that minimizes disturbances of these creatures. Should a bite or sting occur, first aid shall be immediately applied and medical treatment sought as soon as possible.

The feces and urine of some desert rodents may be carriers of the hantavirus, and fleas on living or dead animals may carry bubonic plague. Both hantavirus and bubonic plague occur in New Mexico and the southwestern United States. Field workers should avoid all contact with rodent nests, droppings, or bodies. Professional medical treatment should be sought immediately if a worker suffers an animal bite of any kind.

- **Important Note:** Any individual with a known allergy to wasps and bees must notify the SSO and/or PM/task leader prior to working at the project site. If an individual has a history of allergic reactions to insect bites or is subject to attacks of hay fever or asthma, or if they are not promptly relieved of symptoms after first aid is administered, a physician will be called or immediate emergency medical treatment will be sought. In a highly sensitive person, do not wait for symptoms to appear, since delay can be fatal.

4.4 Emergency Response

Table S-1 in the site HASP summary lists the names and telephone numbers of people and agencies that might be contacted in the event of an emergency. The Emergency Response (ER) Plan is included as Appendix B. The ER Plan includes instructions and procedures for emergency vehicular access, evacuation procedures for personnel, methods of containing a fire, and instructions on how to handle a variety of specific medical emergencies.

5. Task-Specific Safety Guidelines

Table S-2 in the site HASP summary identifies each of the tasks that will be performed during the field investigation and the physical and chemical hazards associated with each task. Table S-3 in the site HASP summary identifies the requirements for PPE, and the air monitoring that will be performed. This section identifies the measures that will be taken to eliminate or minimize potential exposures to site workers for each task listed in Tables S-2 and S-3.

5.1 Drilling, Monitor Well Installation, and Well Development

Hazards associated with drilling operations at this site will be primarily physical (e.g., slips, trips, falls, etc.), as identified in Table S-2. Attention to site conditions, good housekeeping, and use of standard safety procedures will help to control or minimize the physical hazards.

This task includes drilling and installation of monitor wells. Associated activities include well development, soil sampling, groundwater sampling, and NAPL bail-down and recovery testing. Drilling and monitoring well installation will be conducted using the hollow-stem auger drilling method. All workers should be aware that dust-size particles are easily inhaled and can lead to serious diseases like silicosis and cancer. Chemical hazards associated with drilling and sample collection include inhalation of organic vapors and dermal contact with potentially contaminated soil and groundwater. Physical hazards may include typical construction hazards due to work with and around heavy equipment; pinch hazards; pressurized hoses; heat stress; and trips, falls, and slips.

Air monitoring will be conducted during drilling and well installation operations as discussed in Section 7. The minimum PPE for drilling will include steel-toed boots, hard hats, and safety glasses. Hearing protection will be worn while drilling and whenever the noise levels approach 85 decibels (refer to Section 7). Chemical-resistant gloves will be worn when handling samples. Diligent air monitoring and the use of appropriate PPE and standard safety procedures will minimize the risk of exposure and physical injury.

Chemical hazards associated with drilling and monitoring well installation include potential inhalation of dusts and possibly organic vapors, and skin and eye contact with contaminated material. The discharge of dust can be nearly eliminated by using direct-push methods and controlled somewhat by other drilling technologies, such as reverse circulation, where long blooey lines can be used to discharge cuttings away from the work area. Injecting small amounts of water during the drilling process can suppress the amount of airborne dust. Direct-reading personal dust monitors (e.g., Thermo Scientific pDR-1500 personal DataRAM) should be used to identify and quantify airborne dust concentrations that a worker is exposed to while working. A photoionization detector (PID) will be used to screen for organic contaminants during both drilling and monitoring well installation activities. Appropriate PPE for these activities, including respiratory protection, is described in Table S-3.

The following safety guidelines and practices can be used to mitigate some of the hazards associated with drilling activities.

- The state one-call utility notification center (dial 811) must be contacted at least 48 hours before starting work so that local utility owners can be contacted to identify and mark the location of any underground cables, pipes, or utility installations in the area of the proposed excavation. The location of utilities should be discussed with the property owner to identify private utilities. For additional guidance, please refer to DBS&A's *Underground Utility Locating Guidelines.*

- Before starting work, a tailgate safety meeting will be held with all site workers. The DBS&A PM or Site Supervisor should thoroughly instruct the equipment operator as to the nature of the work to be performed and point out any special safety hazards. The SSO should ask the operator to identify and discuss any hazards associated with his particular equipment. All kill switches and safety devices on the drill rig shall be located and tested prior to drilling. Drilling shall not commence without a properly operating kill switch.

- A 15-foot radius work area shall be established around the drill rig. All DBS&A field personnel are to maintain a safe distance from the immediate area of the drill rig, and shall enter this work zone only when absolutely necessary for the performance of the task at hand.

- Appropriate and adequate barricades and/or warning lights shall be used to prevent accidental entry by workers and unauthorized persons, animals or vehicles.

- Under no circumstance shall DBS&A personnel become directly involved in drilling operations, other than those immediately required for sample collection and for the performance of vapor monitoring and geologic logging.

- When appropriate, the contractor will provide an operator's assistant to help watch for safety hazards, such as buried lines, overhead hazards, ditches, or posts.

- All equipment should maintain at least 20 feet of clearance from overhead power lines. Working within less than 20 feet of overhead utilities must be coordinated with the utility.

- Be aware of and monitor for potentially hazardous levels of toxic vapors that can be displaced from the borehole during installation of the monitor well materials.

Additional safety guidelines to be considered when working around heavy equipment are provided in Section 7.5.5 of the H&S Manual (DBS&A, 2013).

5.2 Soil Sampling

Soil samples will be collected using the drilling rig and a continuous core sampler. Physical hazards may include any of those identified in Table S-2 and Section 5.1 regarding drilling and monitoring well installation. Chemical hazards associated with soil sampling include potential inhalation of dusts and possibly organic vapors, and skin and eye contact with contaminated material. Attention to site conditions, good housekeeping, and use of standard safety procedures will help to control or minimize the physical hazards. A PID will be used to screen for organic contaminants during soil sampling activities. Appropriate PPE for soil sampling is described in Table S-3.

5.3 Groundwater Sampling and NAPL Recovery

Groundwater samples will be collected from groundwater monitoring wells. Prior to sampling, water level measurements will be collected using a water level indicator. NAPL recovery will be performed on wells with sufficient NAPL thickness. Physical hazards may include any of those identified in Table S-2. Chemical hazards associated with groundwater sampling and NAPL recovery include potential skin and eye contact with NAPL, contaminated groundwater and sample preservatives. Attention to site conditions, good housekeeping, and use of standard safety procedures will help to control or minimize the physical and chemical hazards. Appropriate PPE for well development, groundwater sampling, and NAPL recovery will include that described in Table S-3.

5.4 Groundwater Treatment System Installation and Operation

Site activities will include installation and operation of a groundwater pump and treat system. The treatment system will incorporate an air stripper and/or granular activated carbon canisters (GAC). Chemical hazards associated with this work include inhalation of organic vapors and exposure to contaminated groundwater. Physical hazards may include typical construction hazards due to work with and around heavy equipment; heat stress; trips, falls, and slips; and electrical hazards when working in and around open electrical panels. Use caution when working around blower discharge piping; it is insulated but may be hot. Blowers have sound attenuating enclosures, but ear protection may be needed when working around equipment. Exposure to contaminated groundwater should be avoided. Remediation well vaults are located in an active hotel parking lot and car sales lot so utilize reflective safety vests and traffic cones when working in well vaults.

Appropriate PPE will include safety glasses or goggles, steel-toed boots, nitrile gloves, and long-legged pants. Air monitoring will be conducted using a PID to monitor organic vapors in the breathing zones of workers and around piping joints. Diligent air monitoring and the use of appropriate PPE and standard safety procedures will minimize the risk of exposure and physical injury. Work in and around electrical panels shall be conducted by qualified professionals and shall include locking and tagging of affected equipment.

5.5 Trenching and Excavating

Excavating and trenching operations will be conducted using a backhoe or a larger excavator (trackhoe). The hazards associated with excavating operations at this site will be primarily physical (e.g., slips, trips, falls, etc.), as identified in Table S-2. Chemical hazards associated with excavating and trenching activities include potential skin and eye contact with airborne particulates and contaminated soil. Attention to site conditions, good housekeeping, and use of standard safety procedures will help to control or minimize the physical and chemical hazards. Appropriate PPE for well development and groundwater sampling will include that described in Table S-3.

Any excavation/trenching operations will be performed in accordance with OSHA regulations in 29 CFR 1926, Subpart P (Excavations). Properly trained contractor personnel will operate excavating equipment; at no time will an employee of GLA operate excavating equipment. Personnel should be sure they have eye contact with equipment operators before approaching heavy equipment. Never approach equipment from or work within an operator's blind spots. GLA employees will be familiar with and avoid hazards associated with work near or in trenches.

A “competent person” trained to interpret soil conditions and to identify the proper safety protection devices or procedures needed for each particular situation shall be in charge of all excavation and trenching activities at the job site. “Competent person” means one who is capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them. The GLA competent person shall be designated by the PM and will be familiar with their role and responsibilities (refer to the H&S manual). All site workers should be familiar with basic soil mechanics related to excavations (refer to the H&S manual) and pay particular attention to identify evidences of distress in the excavation.

The following safety guidelines and practices can be used to mitigate some of the hazards associated with excavation activities:

- Contact the local utility locator to identify and mark the locations of any underground cables, pipes, or utility installations in the area of the proposed excavation. Discuss the locations of utilities with the property owner to identify private utilities.

- Take additional precautions when excavating a backfilled trench, or when working near railroads, highways, or other sources of vibrations.

- Provide appropriate and adequate barricades and warning lights to prevent accidental entry by workers and unauthorized persons, animals, or vehicles.

- Do not leave a hazard unguarded. Secure the site or surround the excavation with plastic high-visibility fencing to prevent accidental entry.

- If personnel are required to enter a trench or excavation that is greater than 5 feet in depth or excavated in soft or unstable materials, the sides of the excavation will be shored or sloped in accordance with OSHA regulations in 29 CFR Part 1926.652.

- If the excavation cannot be sloped adequately (usually at 1.5 horizontal to 1 vertical), trench boxes, shoring, sheeting, bracing, or other equivalent methods are required to keep the trench wall from collapsing.

- When workers are required to enter trenches that are 4 feet or greater in depth, an adequate means of exit, such as ladders or steps, shall be provided. Exit points shall be spaced no more than 50 feet apart.

- If the trench is 4 feet or more in depth and hazardous atmospheres exist or could reasonably be expected to exist, the trench shall be considered a confined space. Workers entering the trench shall be properly trained in confined space entries, and atmospheric testing for oxygen content, flammability, and organic or other vapors shall be performed before entering the trench. For additional information on the GLA Confined Space Program, refer to the H&S manual or contact the H&S Program Coordinator.

6. Standard Safe Work Practices

The following guidelines are meant to cover operations by the DBS&A field staff and DBS&A contractors (e.g., the drill crew and support personnel) during field activities at the site. DBS&A contractors may choose to establish and enforce more stringent safety guidelines for personnel under their employ. Health and safety issues for other personnel working or visiting on-site *and not involved in the site activities* are the responsibility of the Client and their respective contractors, not DBS&A.

Prior to the initiation of any on-site activities, the SSO will conduct a safety meeting to discuss the contents of this site-specific HASP, describe the field activities, identify any high-risk activities, and familiarize personnel with emergency procedures, including the route to the hospital. The DBS&A field supervisor will establish that all equipment is in good condition. The DBS&A supervisor should properly and thoroughly instruct the contractor on exactly what results are to be accomplished and point out all known safety hazards.

During the field activities, all participants will be expected to follow standard safe work practices as outlined below:

- Do not eat, drink, smoke, or chew tobacco in the work area.
- Avoid contact with potentially contaminated substances.
- Report any unsafe conditions to the SSO.
- Be aware of the physical characteristics of investigations, including:
  - Wind direction in relation to the contaminated area
  - Accessibility to associates, equipment, vehicles, etc.
  - Communication
  - Areas of known or suspected contamination
  - Site access
  - Nearest water sources
- Dispose of all wastes generated during field activities in accordance with applicable regulatory guidelines.

7. Air and Noise Monitoring

This section describes the measures that will be taken to protect workers from exposures to hazardous atmospheres and noise during the site activities.

7.1 Air Monitoring

This site is contaminated with fuel-related petroleum hydrocarbons (gasoline) and the potential exists for the development of toxic or explosive atmospheres in or near the borehole, monitor well, or excavation. Drilling and excavating activities also have the potential to create hazardous levels of dust and airborne particulates. Respiratory protection will be used if air monitoring shows the presence of a hazardous atmosphere at concentrations above occupational exposure limits.

Respiratory protection will be used in accordance with OSHA regulations in 29 CFR 1910.134 and the DBS&A Respiratory Protection Program Plan. All persons using respiratory protection must be medically cleared to do so and should be aware of the following important definitions:

- Assigned Protection Factor (APF) is the level of protection that a respirator or class of respirators is expected to provide to employees and is used to select the appropriate class of respirators. Level C PPE includes an air-purifying respirator (APR). A half-face APR has an APF of 10; a full-facepiece APR has an APF of 50.

- Maximum Use Concentration (MUC) is the maximum atmospheric concentration of a hazardous substance from which an employee can expect to be protected when wearing a respirator. The MUC is calculated by multiplying the occupational exposure limit by the APF. For example, in the case of benzene, OSHA has established a permissible exposure level (PEL) of 1 ppm (for an 8-hour time-weighted average [TWA)]), and a short-term exposure limit (STEL) of 5 ppm. Therefore, the MUC for benzene is 10 ppm for a half-face APR and 50 ppm for a full-facepiece APR. The half-face and full-facepiece APRs may be used for short periods of time (up to 15 minutes) in benzene concentrations up to 50 and 250 ppm, respectively (STEL x APF).

Table S-3 in the site HASP summary identifies each of the tasks to be performed at the site and the air monitoring requirements for each task. Targets of such monitoring may include organic vapors, particulates, combustible gases, and oxygen. Table S-4 lists each of the contaminants of concern for the site. Table 1 lists the types of hazardous atmospheres that could be present at a site, the air monitoring equipment used for each, and the action levels to be used at this site. When in use, all meters will be calibrated daily in accordance with manufacturer's instructions.

Table 1. Air Monitoring Equipment, Action Levels, and Protective Measures

Hazard	Equipment	Action Levels in BZ	Action Response
Organic Vapors	PID, FID	Background	Level D PPE
		OEL of most toxic contaminant sustained for 5 minutes	Use Level C respiratory protection; evaluate specific compounds.
		MUC for respiratory protection in use.	Stop work; upgrade to Level B
	Colorimetric (Drager) Tubes	Chemical specific >1 ppm for benzene >1 ppm for vinyl chloride >1 ppm for 1,1-DCE	Use Level C respiratory protection if compounds exceed OELs.
Particulates	Dust Monitor	Visible dust	Suppress with water
		<5 mg/m3	Level D PPE
		>5 mg/m3	Use Level C respiratory protection
Flammable/Explosive Atmosphere	Explosimeter	<10% scale reading	Proceed with work
		10 - 15% scale reading	Stop work
		>15% scale reading	Evacuate site
Oxygen-deficient Atmosphere	Oxygen Meter	19.5 -- 23.5%	Normal - continue work
		<19.5%	Evacuate - oxygen deficient
		>23.5%	Evacuate - fire hazard
Ionizing Radiation	Gamma radiation meter	>0.1 millirem/hr	Radiation sources may be present
		>1 millirem/hr	Evacuate - radiation hazard

BZ = Breathing zone
PID = Photoionization detector
FID = Flame ionization detector
PPE = Personal protective equipment
OEL = Occupational exposure limit
MUC = Maximum use concentration
ppm = Parts per million
mg/m^3 = Milligrams per cubic meter
1,1-DCE = 1,1-Dichloroethene

The SSO or his/her designee will obtain PID readings of organic vapor concentrations in the breathing zone of the workers. Readings will be made after each section of drill pipe is advanced and at the working face of the excavation as the excavation progresses. The person making the PID measurements will determine the extent of the affected area, record the readings, and advise workers of the results.

7.1.1 Organic Vapors

The need for respiratory protection from toxic vapors is based on the most hazardous constituent that is likely to be present or known to be present, based on soil, soil gas, and/or groundwater sampling. Table S-4 lists each of the volatile contaminants of concern for the site.

A release of gasoline has occurred at this site. Gasoline is a complex mixture of petroleum hydrocarbons, additives, and blending agents, whose composition varies widely. The most hazardous constituent is benzene, a known human carcinogen. A PID will be used to monitor organic vapor concentrations; in the absence of other data, the PID readings are assumed to be due to benzene. If testing shows that benzene is not present or does not occur at significant concentrations, toluene, the next most volatile aromatic hydrocarbon in gasoline would be considered the most hazardous constituent. The OSHA PEL and STEL for benzene are 1 and 5 ppm, respectively. The OSHA PEL for toluene is 200 ppm.

Assuming the presence of benzene, work will stop and workers in the affected area will upgrade to Level C respiratory protection if PID readings exceed 5 meter units (usually parts per million by volume or ppmv) above background in the breathing zone for 5 minutes, or if unusual or unpleasant odors are detected. Workers will leave the work zone when PID readings exceed the MUC for the respiratory protection being used (10 ppm for a half-face APR; 50 ppm for a full-facepiece APR). All personnel within the work zone will continue to wear respiratory protection until vapor levels dissipate below 5 meter units. APRs will be equipped with organic vapor cartridges that will be changed at the end of each 8-hour shift.

All personnel should be aware that the detection capabilities of PIDs may be enhanced or dampened by high humidity or by the presence of certain gases, such as methane. Direct evidence of contamination, such as visible staining of soils or strong odors, should be used to further evaluate these quantitative instrument readings.

7.2 Noise Monitoring

All site personnel who are exposed to average noise levels of 85 A-weighted decibels (dBA) or greater during an 8-hour workday must participate in their companies Hearing Protection Program. Workers must use appropriate hearing protection whenever noise levels exceed

90 dBA. The DBS&A H&S Program Coordinator has used a noise meter to survey a variety of equipment that may be used during the site activities and found that work around heavy equipment is most likely to require hearing protection. Noise levels are highest near the engines and compressors, but generally do not exceed 85 dBA in the typical operator locations (e.g., behind the drill rig). However, impact noise, such as the tripping of a pneumatic or hydraulic hammer on a direct-push rig or driving casing on a dual-tube drill rig, can be considerably higher. When a noise meter is not available, the following rule of thumb should be used, if it seems loud or you cannot carry on a normal conversation, hearing protection should be worn.

8. Protective Equipment

PPE requirements for each task are described in Table S-3. At a minimum, the following PPE shall be used by personnel while working at the site:

- Steel-toed/steel-shanked work boots
- Long pants
- Protective eyewear
- Hard hat (when needed)
- Chemical-resistant gloves (when needed)
- Hearing protection (when needed)

Level C PPE will include Level D equipment plus a full- or half-facepiece air-purifying respirator with appropriate cartridges and prefilters. Workers using respiratory protection should be familiar with guidelines to determine that the equipment being used for respiratory protection is providing adequate protection, as discussed in Section 7.1. Chemical-resistant coveralls and/or gloves will be worn whenever conditions require DBS&A field personnel to come in direct contact with potentially contaminated materials.

DBS&A will supply employees with PPE that meets requirements established by NIOSH or the American National Standards Institute (ANSI), and which meet current OSHA criteria.

Employees will be trained in the selection, care, and use of PPE, as described in the H&S Manual (DBS&A, 2013).

8.1 Disposal of Contaminated Clothing or Equipment

All potentially contaminated clothing, Tyvek coveralls, gloves, paper towels, and other expendable items will be placed in garbage bags for disposal. Fresh Tyvek coveralls and work gloves should be donned at the start of each workday or when otherwise required.

8.2 Decontamination Procedures

Specific personnel decontamination procedures are based on the personal level of protection. When using Level D protection, a personnel decontamination system (PDS) is not required. However, because project personnel wearing Level D protection may need to upgrade to Level C if site conditions change, a PDS may be established based on specific site characteristics.

The decontamination stations for Level C decontamination may include: (1) a segregated equipment drop for hand tools and monitoring equipment; (2) a wash and rinse for gloves and disposable booties (if worn); (3) a removal station for gloves and disposable booties (if worn); (4) a removal station for respiratory protection, hard hat, safety glasses, and Tyvek suits; and (5) a station to wash and rinse hands and face. Specific procedures and the sequence of events will be determined based on the potential hazards identified at the specific site. The stations listed are a guide to the selection of adequate decontamination procedures.

When a PDS is set up, the SSO or their designee has the responsibility for operating the decontamination station. This person will make sure that all personnel enter and leave active work areas through the PDS, that all personnel decontaminate properly, and that disposable items are bagged. The SSO will assist on-site workers in changing cartridges, masks, gloves, or other pieces of safety equipment, and monitor the length of work periods. Disposable items will be placed in plastic bags and properly disposed of. Non-disposable items will be properly cleaned and dried according to manufacturer's specifications and stored for future use.

Decontamination procedures, which are based on guidelines appropriate for low-level contamination, will be required for all reusable equipment used for drilling, sampling, personal protection, and field monitoring. Drilling equipment will be decontaminated between each borehole. Sampling equipment will be decontaminated between each sample. High-pressure steam cleaners, alconox detergent solution, and deionized water rinses may be used. If necessary, personnel will decontaminate equipment at a specified decontamination area between boreholes and before leaving the site. Field monitoring equipment will be cleaned daily; additional cleaning and recalibration will be performed if contamination affects operation.

9. Site Control

Barricades, caution tape, or other necessary means shall be used when necessary to prevent unauthorized access into the work area. The SSO will establish the physical limits of the work areas at the site and instruct all personnel and visitors concerning the boundaries of the exclusion zones.

At a minimum, a 15-foot wide primary exclusion area will be established around the perimeter of the drill rig or other active machinery. DBS&A personnel will enter the primary exclusion zone only when absolutely necessary for the performance of the task at hand. A secondary exclusion zone will be established around the general work area. If necessary, the work area will be marked off with temporary barriers and caution tape. Only authorized personnel will be allowed in active work areas.

Traffic control plans may be required for all sites where work activities may impact traffic flow on adjacent roadways. These plans must be submitted to and approved by the local traffic control authority. The PM or their designee will be responsible for ensuring that the necessary site control measures and plans are prepared and implemented.

10. Confined Space Entry

No confined spaces have been identified at the site and no confined space entries are anticipated during the field activities. However, any confined spaces identified as the work progresses shall be properly marked and managed accordingly. DBS&A has developed and implemented a Confined Space Entry Program Plan that provides policies and procedures to be followed for confined space entries, including air monitoring, participant training and duties, and authorizing and permitting confined space entries.

If confined space entries become necessary, the SSO will contact the PM and this site-specific HASP will be amended accordingly. The SSO will ensure that entries are performed in accordance with the DBS&A Confined Space Entry Program Plan. If necessary, the SSO will contact the local fire department to coordinate the entry and rescue requirements.

11. Spill Prevention

Minor spills of potentially contaminated soil, residual free product, or groundwater may occur during site work. The area beneath the drill rig may be lined with plastic sheeting to control fluid leaks from the equipment. If a spill occurs, site personnel will use best judgement and available materials to contain and prevent it from spreading. All contained soil and liquids will be disposed of in compliance with federal, state, and local requirements.

12. Safety Meetings

A site safety or "tailgate" safety meeting will be held before the start of work for the project and before the start of each new activity. All personnel directly involved in the work are required to attend. This HASP and all pertinent health and safety issues will be discussed during the initial briefing or meetings. The tailgate meeting will also address specific issues regarding on-site health and safety, such as the proposed work and associated hazards, recent problems, and any accidents or incidents. All personnel will acknowledge their attendance by signing the safety meeting form (Appendix A).

13. Training Requirements

Before entering the site, workers will have received the necessary training required by OSHA for workers at potentially hazardous waste sites [29 CFR 1910.120(e)], including 40 hours of formal instruction, and a minimum of 3 days of field experience under the supervision of a trained and experienced worker. Additionally, site supervisors will have completed an 8-hour health and safety supervisor training course. Before starting work, each worker will receive site-specific hazard recognition and emergency response training.

In the event that organic vapor concentrations in the work zone require an upgrade to Level C PPE, only workers who are trained and medically cleared to wear a respirator will be allowed in the work zone.

DBS&A's contractors will certify, by name, that each of their employees who will perform field work at a hazardous waste project site has received the applicable health and safety training listed above.

14. Medical Monitoring Requirements

All medical monitoring will be performed in accordance with 29 CFR 1910.120(f), 29 CFR 1910.134 (Respiratory Protection), and 29 CFR 1910.95 (Occupational Noise Exposure). The PM must identify any chemicals of concern that might require monitoring (e.g., lead or PCBs) before and after the site activities.

The DBS&A medical monitoring program is directed by WorkCare in Anaheim, California. In the event of a chemical exposure resulting in symptoms or illness, the SSO may contact Dr. Peter Greaney at WorkCare (800-455-6155) to obtain guidance for recommended testing protocols.

15. Hospital and Evacuation Route

If a medical emergency occurs during work at the site, the Alta Vista Regional Hospital in Las Vegas, New Mexico is the closest medical facility. Figure S-1 in the site HASP summary is a computer-generated route map from the site to the hospital, with driving directions. All workers should be familiar with the location of this facility. The SSO will perform a pre-activity physical route check to determine any planning modifications required. If the evacuation route needs to be modified, this HASP will be corrected, and all workers will be notified of the changes. All workers should be familiar with the location of this facility.

Appendix A

Health and Safety Forms

The Project Manager and their designated site supervisors and safety officers are responsible for the implementation of the company health and safety program. This form has been designed to help the Project Manager meet the health and safety guidelines established by the company in accordance with OSHA regulations and accepted protocols. If you have any questions, contact Bill Casadevall.

Project Planning

__ Do all of the workers at the site have the required or appropriate level of safety training for the site and the assigned tasks (e.g., current 40-hour training, 8-hour Supervisor training, 3-day supervised training)?
__ Has an OSHA-trained Supervisor been designated for the site?
__ Has a Safety Officer been designated for the site?
__ Has a Competent Person been designated for the site (required at construction/excavation sites)?
__ Do field personnel have current first aid/CPR training?
__ Are there any health hazards at the site that require workers to be medically monitored (e.g., excessive noise, possible respirator use, or potential for exposure to hazardous contaminants)?
__ Are there any special health hazards at the site that require baseline testing before and follow-up testing after field activities (e.g., cadmium or PCBs)

Site H&S Plans

__ Has a site-specific H&S Plan been prepared? *[Required for all Hazwoper sites; Company policy requires completion of the H&S Plan Summary at a minimum.]*
__ Has the site H&S Plan been reviewed and approved by the PM
__ Have all site workers been briefed on the contents of the site H&S Plan and signed-off on the Plan?
__ Have Tailgate Safety Meetings been held as necessary (e.g., prior to the start of activities, when activities or conditions change, or when new workers come on site) and have those present signed the attendance sheet?
__ Do site workers understand the site hazards and know the route to the hospital?
__ Have clearances been obtained for underground utilities?

Documentation

The following documentation should be available at the field site or in the office for inspection:

__ Site-specific H&S Plan signed by site workers **(must be available at the field site)**
__ Utility Clearance Form **(must be available at the field site)**
__ MSDSs for hazardous chemicals used on-site **(must be available at the field site)**
__ Tailgate Safety Meeting forms signed by site workers (current one in the field and completed forms in the project file)
__ Records of excavation inspections by Competent Person (current one in the field and completed forms in the project file)
__ Copies of Accident/Incident or Chemical Exposure reports (submitted to H&S in Albuquerque)
__ Results of any safety inspections (project and/or program files)

Health and Safety Plan Acceptance Form

Instructions: This form is to be completed by each person prior to beginning work at the subject hazardous waste site. THIS FORM IS TO BE MAINTAINED IN THE PROJECT FILES.

Project **Las Vegas Triple Site**
Job No. **DB18.1277**
Location **Las Vegas, NM**

By my signature below, I acknowledge that I have read and understand the contents of the Health & Safety Plan for this project. I agree to perform my work in accordance with the plan.

Signature	Print Name	Company	Date

Tailgate Safety Meeting

Daniel B. Stephens & Associates, Inc.

Project ID: DB18.1277 ______ Day: ______

Location: Las Vegas, NM ______ Date: ______

Project Manager: Tom Golden ______ Team Leader: ______

Health & Safety Officer: ______ No. of Personnel Present: ______

Check Topics Discussed

Scheduled Activities:______

Chemical/Physical Hazards
- Contaminants of Concern
- Safety Data Sheets
- Overhead & Underground Utilities
- Extraordinary Site Conditions
- Lifting/Slips/Trips/Falls
- Heat/Cold Stress (Inc. Sunburn)
- Other:______

First Aid
- Facilities/Kits/Eyewashes

Personal Protective Equipment - Level D
- Hard Hats/Hearing Protection
- Steel-Toed Boots
- Glasses/Goggles/Shields
- Gloves
- Contingency: Level C ______
- Respirators & Tyvek/Saranex

Emergency Procedures/Site Safety
- “Buddy System”
- Communication
- Facility-Specific Regulations
- Rally Point

Vehicle/Heavy Equipment
- Drill Rig “KILL” Switches
- Operation & Inspection
- Preventive Maintenance
- Rotating Augers/Moving Parts

Sanitation & Hygiene
- Drinking Water/Fluids
- Restrooms
- Personal Cleanliness

Housekeeping
- Waste Containers
- Waste Materials
- Waste Water/Decon. Water

Fire Prevention
- Locations of Extinguishers
- Smoking
- Hot Work
- Explosive & Flammable Liquids
- Other:______

Emergency Facilities (and Directions)
- Name: Dr. Alta Vista Regional Hospital ______
- Address: 104 Legion Dr, Las Vegas, NM 87701 ______
- Tel. No.: (505) 426-3500 ______

Safety Meeting Attendees:

Name	Signature	Name	Signature

S:\Projects\DB18.1277_Las_Vegas_Triple_Site\Docs\FRP\Appx E_HASP\HASP.8-19\App A_Forms\A2_Tailgate_SafetyMtg.doc

Daniel B. Stephens & Associates, Inc.

Injury and Illness Report

1. Employee Information

Full Name: ____Sex: M / F Date of Birth: ____/____/____

Home Address: ____

Job Title: ________________________ Date Hired: ____/____/____ Supervisor: ___________________________

2. Case Information OSHA Log Case Number: _____________ (assigned by Human Resources)

Date of Injury or Illness: ____/____/____ Time Employee Began Work: _________AM / PM

Time of Event: _________AM / PM Treatment Given: On-site First Aid ____ Emergency Room ____ Hospitalized ____

Physician Name: ________________________________ Treatment Facility Name: _______________________

Where did the incident occur?

____

____

What was employee doing just before the incident occurred? Describe the activity, as well as the tools, equipment, or material the employee was using. Be specific. Examples: “climbing a ladder while carrying roofing materials”; “spraying chlorine from hand sprayer”; “daily computer key entry.”

____

____

What happened? Describe how the injury occurred? Examples: “When ladder slipped on wet floor, worker fell 20 feet”; Worker was sprayed with chlorine when gasket broke during replacement”; “Worker developed soreness in wrist over time.”

____

____

What was the injury or illness? Identify the part of the body that was affected and how it was affected; be more specific than “hurt,” “pain,” or “sore.” Example: “strained back”; “chemical burn to hand”; carpal tunnel syndrome.”

____

____

What object or substance directly harmed the employee? Examples: “concrete floor”, “chlorine”; radial arm saw.”

____

____

If employee died, when did death occur? ____/____/____

Form Completed By: __________________________________ Signature: ______________________________

Attention: This form contains information related to employee health and must be used in a manner that protects the confidentiality of the employee to the extent possible while the information is being used for occupational safety and health purposes. Original to Human Resources within 24 hours of injury. Copy to H&S Program Coordinator.

This form is equivalent to OSHA Form 301 and must be retained for 5 years following the year to which it pertains.

Accident/Incident Investigation Report

(Injury and Illness Report Must be Attached)

Full Name: ____ Date of Injury or Illness: ____/____/____

Incident Location: ____

3. Accident Cause(s)

Identify the Direct Cause: (e.g., mechanical energy, impact energy, stored energy, electrical energy, chemical energy, etc.)

____

____

Identify any Unsafe Acts:

____

____

____

Identify any Unsafe Conditions:

____

____

____

Identify the Root Cause(s):

____

____

____

4. Corrective Action(s)

Recommendations to prevent recurrence of a similar accident?

____

____

____

Has it been done? Yes No If Not, Why? Explain ____

____

_______________________________________ ___/___/___ ______________________________________

Investigator **Date** **Reviewed and Approved By**

Original to be retained in H&S Program Files; Copy to Project File

Daily Site Safety Checklist

Daniel B. Stephens & Associates, Inc.

Job Name and Number: ____

Person Completing Form: ____________________________ **Date(s):** ________________

Instructions: Use form for up to five consecutive days. Write in date, place checkmark to indicate item has been completed. Deficiencies must be corrected. Completed form to be maintained with the Project files with copy to H&S Program Coordinator.

Checklist Item	Date				
The HASP (including emergency phone numbers) has been reviewed and signed by DBS&A staff, subcontractors, & visitors and is available on site					
Hazardous chemicals have been discussed and SDSs are available for each hazardous chemical on site.					
Tailgate Safety Meeting has been conducted for all site workers and visitors (and updated as necessary)					
Copies of Hospital Route map and emergency phone numbers are available in all vehicles					
DBS&A personnel and subcontractors have discussed hazards associated with Site-specific work					
Potential slips, trips, or fall hazards have been identified and mitigated where possible					
Site control measures have been established for present conditions (e.g., safety cones or caution tape)					
Proper PPE has been identified and is being used for present conditions					
Personnel monitoring is being conducted for present conditions					
An operating, fully-charged cell phone is available on site					
A fully-stocked first aid kit and eye wash bottle are readily available					
Fully-charged fire extinguishers are available for use.					
All workers and visitors have training appropriate for assigned tasks					
Equipment on-site has been inspected and is in safe working order					
Electrical power operated tools are properly grounded and used with a GFCI					
Excavated soils are properly stored and labeled					
Excavations are properly shored/sloped and barricaded					
Used disposable PPE and garbage are bagged for proper disposal					
All Health and Safety concerns have been communicated to the Site H&S Officer and the Project Manager					

Appendix B

Emergency Response Plan

Appendix B. Emergency Response Plan

B.1 Purpose and Scope

The following Emergency Response Plan has been developed to include instruction and procedures for emergency vehicular access, evacuation procedures for personnel, methods of containing a fire, and medical emergencies. All extraordinary conditions that require concise and timely action must be dealt with in a manner that minimizes the health and safety risks to the immediate site personnel and the general public.

B.2 General Response Considerations

All on-site personnel shall be familiar with the Emergency Response Plan described herein. This section will be maintained in the field office.

Due to the nature of the "site", the emergencies or extraordinary conditions that may arise are more than likely limited to personnel accidents requiring first aid, exposure to contaminated sediments, and potential fire near mechanical equipment. The following procedures shall be implemented in the event of an emergency:

- First aid or other appropriate initial action will be administered by those closest to the accident/event. This assistance will be coordinated by the Site Safety Officer (SSO) and will be conducted in a manner so that those rendering assistance are not placed in a situation of unacceptable risk. The primary concern is to avoid placing a greater number of workers in jeopardy;

- Personnel shall report all accidents and unusual events to the SSO, the subcontractor Health and Safety representative, and the Project Manager (PM);

The SSO and other on-site personnel are responsible for conducting the emergency response in an efficient, rapid, and safe manner. The SSO will decide if off-site assistance and/or medical treatment is required and shall be responsible for alerting off-site authorities and arranging for their assistance. The SSO, in coordination with the contractor Health and Safety representative, will provide to the PM, an Accident/Incident Report that includes the following:

- A description of the emergency (including date, time and duration);
- Date, time and names of all persons/agencies notified and their response; and
- A description of corrective actions implemented or other resolution of the incident.

All workers on site are responsible for conducting themselves in a mature, calm manner in the event of an accident/unusual event. All personnel must conduct themselves in a manner to avoid spreading the danger to themselves and to surrounding workers.

B.3 Responsibilities

The SSO shall have responsibility for directing response activities in the event of an emergency. He or she will:

- Assess the situation;
- Determine required response measures;
- Notify appropriate response teams; and
- Determine and direct on-site personnel during the emergency.

The SSO shall coordinate the response activities of on-site personnel with those of public agencies.

B.4 Public Response Agencies

A list of public response agencies to be contacted and who may, depending on the nature of the situation, assume authority for emergency response is included in the site-specific HSP. The HSP presents local emergency numbers, including local hospitals (which includes the poison control center), ambulance service, fire and police departments, and others. In addition, nationwide hotline numbers for emergency assistance are listed. These phone lists should be retained by all field personnel and posted by the phone in all field trailers.

The hospital location is outlined in the HSP. The SSO will provide directions and/or maps to these facilities to all field personnel.

Prior to the initiation of all on-site work, the local police and fire department will be notified, if deemed necessary. This notification will take the form of a letter describing both on-site and off-site activities. If requested, a briefing will be held to further explain the type of activities and equipment that are associated with each project. Emergency procedures also will be discussed.

B.5 Accidents and Non-Routine Events

Several types of emergencies are outlined in the following subsections. These are not intended to cover all potential situations, and the corresponding response procedures should be followed using common sense. Every accident is a unique event that must be dealt with by trained personnel working in a calm, controlled manner. In the event of an accident/unusual event, the prime consideration is to provide the appropriate initial response to assist those in jeopardy without placing additional personnel at an unnecessary risk. Employees shall be instructed to report all injuries and illnesses to the SSO.

B.5.1 Worker Injury

If a person working on the site is physically injured, appropriate first aid procedures shall be followed. Depending on the severity of the injury, emergency medical response may be sought. If the employee can be moved, he/she will be taken to the edge of the work area where contaminated clothing (if any) will be removed, and emergency first aid administered. If necessary, transportation to local emergency medical facility will be provided as soon as possible.

If a worker can only be moved by emergency medical personnel, the SSO will decide what protective equipment, if any, is required to be worn by emergency personnel. Each work area will have extra equipment available for emergencies.

If the injury to the worker involves chemical exposure, the first aid procedures summarized in Table S-5 should generally be initiated as soon as possible, including the following:

B.5.1.1 Eye Exposure

If contaminated solid or liquid gets into the eyes, wash eyes immediately at the emergency eyewash station using water and lifting the lower and upper lids occasionally. Obtain medical attention immediately if symptoms warrant.

B.5.1.2 Skin Exposure

If contaminated solid or liquid gets on the skin, wash skin immediately at the decontamination station using soap and water. Obtain medical attention immediately if symptoms warrant.

B.5.1.3 Inhalation

If a person inhales large amounts of organic vapor, move him/her to fresh air at once. If breathing has stopped, perform cardiopulmonary resuscitation (CPR), as per American Red Cross standard first aid instruction. Keep the affected person warm and at rest. Obtain medical attention as soon as possible.

B.5.1.4 Ingestion

If contaminated solid or liquid is swallowed, medical attention shall be obtained immediately by consulting the Poison Control Center as outlined in the site-specific HSP.

B.5.2 Temperature-related Problems

Adverse weather conditions are important considerations in planning and conducting site operations. Hot or cold weather can cause physical discomfort, loss of efficiency, and personal injury. One or more of the following control measures shall be employed to help control heat stress:

- Provision for adequate non-alcoholic liquids to replace lost body fluids. Employees must replace water and salt lost through perspiration. Employees will be encouraged to drink more than the amount required to satisfy thirst, since thirst satisfaction is not an accurate indicator of adequate salt and fluid replacement;

- Replacement fluids can be a 0.1 percent salt solution, commercial mixes such as GatoradeTM or Quick KickTM, or a combination of these with fresh water;

- Establishment of a work regimen that will provide adequate rest periods for cooling down;

- Rest breaks are to be taken in a cool, shaded area during hot periods;

- Employees shall not be assigned other tasks during rest periods; and

- All employees shall be informed of the importance of adequate rest, acclimation, and proper diet in the prevention of heat stress.

B.5.3 Adverse Weather

In addition to the hazards of UV radiation from the sun and extreme ambient temperatures, general weather conditions may present a hazard to field workers. Rain may result in muddy, slippery conditions that make foot and vehicle travel hazardous. Lightning and tornadoes, common summertime phenomena, can be extremely hazardous. In the event of adverse weather (e.g., high wind and airborne dust, lightning, extreme cold or heat, or rain) that could compromise worker's health and safety during outdoor activities, the SSO will shut down operations. Safety precautions for lightning and tornadoes can be found in Sections 7.5.2.1 and 7.5.2.2, respectively, of the Safety Manual (DBS&A, 2013).

B.5.4 Fires

The potential for fires involving hazardous chemicals must be addressed during the preliminary site-specific evaluation of all hazards. Personnel in each work group will be knowledgeable in fire extinguishing techniques. They shall be instructed in proper use and maintenance of the appropriate fire extinguishers supplied at the work site.

B.5.5 Vehicle Accidents

Posted speed limits will be observed. All vehicles will be required to meet applicable state inspection standards. All drivers will be required to have a good driving record and must have all necessary licenses to operate their vehicle.

The phone numbers of the SSO, the field office, and subcontractor Health and Safety representative will be carried in each vehicle on site. These numbers may also be provided to all police, fire, rescue, and emergency agencies in the area.

Upon notification of an accident, the PM will make available any personnel and equipment at his or her disposal to aid in the cleanup. For example, the following equipment may be supplied:

- Sorbent materials to contain/control liquids;
- Front-end loaders to pick up solids;
- Dust-suppression materials to control dust;
- Trucks to haul collected material; and
- Appropriate protective gear for cleanup workers.

The supervision and operation of all emergency response personnel and equipment will be coordinated through the authorities at the scene of the accident.

Appendix F

Permits

City of Las Vegas
Permit Requirements

CITY OF LAS VEGAS
1700 N. GRAND AVE. • LAS VEGAS, NEW MEXICO 87701-4731 • 505-454-1401 • FAX: 505-425-7335

TONITA GURULÉ-GIRÓN
Mayor

October 28, 2019

Kelly Jayne
Daniel B. Stephens & Associates, Inc.
6020 Academy Road NE, Suite 100
Albuquerque, New Mexico 87109

City of Las Vegas (City) Utilities Department (UD) has reviewed your request and determined that discharging the potentially contaminated groundwater is acceptable with some stipulation on processes and procedures to ensure that the discharged water meets our treatment standards.

As stated in your email the discharge will include volatile organic carbons (VOCs) and some MTBE. Your anticipated pumping rate is to be 5 – 10 gallons per minute approximately 24 hours a day, 7 days a week and extent of the cleanup project is expected to be for three years

- Coordinate with city staff to determine where and how the discharge system will tie into the city's system.
    - City will perform an assessment on the manhole to ensure maximum capacity.
- A utility account will need to be established to bill the customer for the discharge.
    - Current rate is $6.40 per 1000gal. Rate may change.
- Discharge will need to be metered and the City staff will need access to the meter.
    - Meter reads will be provided to the city customer service division on the first of each month.
    - Contact is Jodi Marquez - Customer Service Manager. EMAIL: Jodi@lasvegasnm.gov
- Provide monthly flow readings on the first of the month to the WWTP.
- Lab testing will be required weekly for the first two months followed by once a month or quarter depending on the results from the initial two months and with approval of the WWTP.
    - Test the discharge for VOC's, MTBE, E-Coli, Total Suspended Solids, Ammonia, pH and Total Nitrogen.
    - Lab results are to be provided to the wastewater treatment plant lab within one week of sampling.
- Provide an emergency contact list of personnel including those that have the authority to make decisions and access to shut down the discharge if necessary.
- Required to notify the City WWTP immediately for any system faults or changes in the system.
- Develop and provide a standard operating procedure (SOP) for emergencies.

- Sampling requirements may change as WWTP lab results may indicate impacts by additional potential constituent or lack of impact by constituents for which is being tested
- Provide any additional information or sampling requested.

Should you require any further information please do not hesitate to contact me at 505-454-3832. Thank you.

Sincerely,

Maria Gilvarry
Utilities Director

XC: File

Air

Mail Application To:		For Department use only:
New Mexico Environment Department Air Quality Bureau Permits Section 525 Camino de los Marquez, Suite 1 Santa Fe, New Mexico, 87505 Phone: (505) 476-4300 Fax: (505) 476-4375 www.env.nm.gov/aqb		AIRS No.:

Universal Air Quality Permit Application

Use this application for NOI, NSR, or Title V sources.

Use this application for: the initial application, modifications, technical revisions, and renewals. For technical revisions, complete Sections, 1-A, 1-B, 2-E, 3, 9 and any other sections that are relevant to the requested action; coordination with the Air Quality Bureau permit staff prior to submittal is encouraged to clarify submittal requirements and to determine if more or less than these sections of the application are needed. Use this application for streamline permits as well. See Section 1-I for submittal instructions for other permits.

This application is submitted as (check all that apply): ☒ Request for a No Permit Required Determination (no fee)

☐ **Updating** an application currently under NMED review. Include this page and all pages that are being updated (no fee required).

Construction Status: ☒ Not Constructed ☐ Existing Permitted (or NOI) Facility ☐ Existing Non-permitted (or NOI) Facility

Minor Source: ☐ a NOI 20.2.73 NMAC ☐ 20.2.72 NMAC application or revision ☐ 20.2.72.300 NMAC Streamline application

Title V Source: ☐ Title V (new) ☐ Title V renewal ☐ TV minor mod. ☐ TV significant mod. TV Acid Rain: ☐ New ☐ Renewal

PSD Major Source: ☐ PSD major source (new) ☐ minor modification to a PSD source ☐ a PSD major modification

Acknowledgements:

☒ I acknowledge that a pre-application meeting is available to me upon request. ☒ Title V Operating, Title IV Acid Rain, and NPR applications have no fees.

☐ $500 NSR application Filing Fee enclosed OR ☐ The full permit fee associated with 10 fee points (required w/ streamline applications).

☐ Check No.: in the amount of

☐ I acknowledge the required submittal format for the hard copy application is printed double sided 'head-to-toe', 2-hole punched (except the Sect. 2 landscape tables is printed 'head-to-head'), numbered tab separators. Incl. a copy of the check on a separate page.

☐ This facility qualifies to receive assistance from the Small Business Environmental Assistance program (SBEAP) and qualifies for 50% of the normal application and permit fees. Enclosed is a check for 50% of the normal application fee which will be verified with the Small Business Certification Form for your company.

☐ This facility qualifies to receive assistance from the Small Business Environmental Assistance Program (SBEAP) but does not qualify for 50% of the normal application and permit fees. To see if you qualify for SBEAP assistance and for the small business certification form go to https://www.env.nm.gov/aqb/sbap/small_business_criteria.html).

Citation: Please provide the **low level citation** under which this application is being submitted: **20.2.XX.XXX.X.X NMAC** (e.g. application for a new minor source would be 20.2.72.200.A NMAC, one example for a Technical Permit Revision is 20.2.72.219.B.1.b NMAC, a Title V acid rain application would be: 20.2.70.200.C NMAC)

Section 1 – Facility Information

Section 1-A: Company Information

		AI # if known (see 1st 3 to 5 #s of permit IDEA ID No.):	Updating Permit/NOI #:
1	Facility Name: Las Vegas Triple Site Remediation System	Plant primary SIC Code (4 digits):	
		Plant NAIC code (6 digits):	
a	Facility Street Address (If no facility street address, provide directions from a prominent landmark): Intersection of Grand and University Ave., Las Vegas, NM 87701		
2	Plant Operator Company Name: Daniel B. Stephens & Associates, Inc.	Phone/Fax: 505-822-9400/505-822-8877	
a	Plant Operator Address: 6020 Academy NE, Suite 100, Albuquerque, NM 87109		

b	Plant Operator's New Mexico Corporate ID or Tax ID: 85-0341157	
3	Plant Owner(s) name(s): New Mexico Environment Department Petroleum Storage Tank Bureau	Phone/Fax: 505-476-4397
a	Plant Owner(s) Mailing Address(s): 2905 Rodeo Park Drive East, Building 1, Santa Fe, NM 87505	
4	Bill To (Company): Daniel B. Stephens & Associates, Inc.	Phone/Fax: 505-822-9400/505-822-8877
a	Mailing Address: 6020 Academy NE, Suite 100, Albuquerque, NM 87109	E-mail: tgolden@geo-logic.com
5	☐ Preparer: ☒ Consultant: Daniel B. Stephens & Associates, Inc.	Phone/Fax: 505-822-9400/505-822-8877
a	Mailing Address: 6020 Academy NE, Suite 100, Albuquerque, NM 87109	E-mail: tgolden@geo-logic.com
6	Plant Operator Contact: Thomas Golden	Phone/Fax: 505-822-9400/505-822-8877
a	Address: 6020 Academy NE, Suite 100, Albuquerque, NM 87109	E-mail: tgolden@geo-logic.com
7	Air Permit Contact: Thomas Golden	Title: Project Engineer
a	E-mail: tgolden@geo-logic.com	Phone/Fax:
b	Mailing Address: 6020 Academy NE, Suite 100, Albuquerque, NM 87109	
c	The designated Air permit Contact will receive all official correspondence (i.e. letters, permits) from the Air Quality Bureau.	

Section 1-B: Current Facility Status

1.a	Has this facility already been constructed? ☐ Yes ☒ No	1.b If yes to question 1.a, is it currently operating in New Mexico? ☐ Yes ☐ No
2	If yes to question 1.a, was the existing facility subject to a Notice of Intent (NOI) (20.2.73 NMAC) before submittal of this application? ☐ Yes ☐ No	If yes to question 1.a, was the existing facility subject to a construction permit (20.2.72 NMAC) before submittal of this application? ☐ Yes ☐ No
3	Is the facility currently shut down? ☐ Yes ☐ No	If yes, give month and year of shut down (MM/YY):
4	Was this facility constructed before 8/31/1972 and continuously operated since 1972? ☐ Yes ☒ No	
5	If Yes to question 3, has this facility been modified (see 20.2.72.7.P NMAC) or the capacity increased since 8/31/1972? ☐Yes ☐No ☐N/A	
6	Does this facility have a Title V operating permit (20.2.70 NMAC)? ☐ Yes ☒ No	If yes, the permit No. is: P-
7	Has this facility been issued a No Permit Required (NPR)? ☐ Yes ☒ No	If yes, the NPR No. is:
8	Has this facility been issued a Notice of Intent (NOI)? ☐ Yes ☒ No	If yes, the NOI No. is:
9	Does this facility have a construction permit (20.2.72/20.2.74 NMAC)? ☐ Yes ☒ No	If yes, the permit No. is:
10	Is this facility registered under a General permit (GCP-1, GCP-2, etc.)? ☐ Yes ☒ No	If yes, the register No. is:

Section 1-C: Facility Input Capacity & Production Rate

1	What is the facility's maximum input capacity, specify units (reference here and list capacities in Section 20, if more room is required)			
a	Current	Hourly: N/A	Daily: N/A	Annually: N/A
b	Proposed	Hourly: N/A	Daily: N/A	Annually: N/A
2	What is the facility's maximum production rate, specify units (reference here and list capacities in Section 20, if more room is required)			
a	Current	Hourly: N/A	Daily: N/A	Annually: N/A

b	Proposed	Hourly: N/A	Daily: N/A	Annually: N/A

Section 1-D: Facility Location Information

1	Section: N/A	Range: N/A	Township: N/A	County: San Miguel	Elevation (ft): 6420
2	UTM Zone: ☐ 12 or ☒ 13			Datum: ☐ NAD 27 ☐ NAD 83 ☒ WGS 84	
a	UTM E (in meters, to nearest 10 meters): 480,700			UTM N (in meters, to nearest 10 meters): 3,939,240	
b	**AND** Latitude (deg., min., sec.): 35° 35' 48.25" N			Longitude (deg., min., sec.): 105° 12' 46.94"	
3	Name and zip code of nearest New Mexico town: Las Vegas, NM 87701				
4	Detailed Driving Instructions from nearest NM town (attach a road map if necessary): Near corner of Grand and University Ave. Within the Las Vegas, NM city limits				
5	The facility is 0 (distance) miles (direction) of (nearest town).				
6	Status of land at facility (check one): ☒ Private ☐ Indian/Pueblo ☐ Federal BLM ☐ Federal Forest Service ☐ Other (specify)				
7	List all municipalities, Indian tribes, and counties within a ten (10) mile radius (20.2.72.203.B.2 NMAC) of the property on which the facility is proposed to be constructed or operated: Las Vegas, San Miguel County				
8	**20.2.72** NMAC applications **only**: Will the property on which the facility is proposed to be constructed or operated be closer than 50 km (31 miles) to other states, Bernalillo County, or a Class I area (see www.env.nm.gov/aqb/modeling/class1areas.html)? ☒ Yes ☐No (20.2.72.206.A.7 NMAC) If yes, list all with corresponding distances in kilometers: Pecos Wilderness, 25 km				
9	Name nearest Class I area: Pecos Wilderness				
10	Shortest distance (in km) from facility boundary to the boundary of the nearest Class I area (to the nearest 10 meters): 25				
11	Distance (meters) from the perimeter of the Area of Operations (AO is defined as the plant site inclusive of all disturbed lands, including mining overburden removal areas) to nearest residence, school or occupied structure: 50m				
12	Method(s) used to delineate the Restricted Area: Fencing "**Restricted Area**" is an area to which public entry is effectively precluded. Effective barriers include continuous fencing, continuous walls, or other continuous barriers approved by the Department, such as rugged physical terrain with steep grade that would require special equipment to traverse. If a large property is completely enclosed by fencing, a restricted area within the property may be identified with signage only. Public roads cannot be part of a Restricted Area.				
13	Does the owner/operator intend to operate this source as a portable stationary source as defined in 20.2.72.7.X NMAC? ☒ Yes ☐ No A portable stationary source is not a mobile source, such as an automobile, but a source that can be installed permanently at one location or that can be re-installed at various locations, such as a hot mix asphalt plant that is moved to different job sites.				
14	Will this facility operate in conjunction with other air regulated parties on the same property? ☒ No ☐ Yes If yes, what is the name and permit number (if known) of the other facility?				

Section 1-E: Proposed Operating Schedule (The 1-E.1 & 1-E.2 operating schedules may become conditions in the permit.)

1	Facility **maximum** operating ($\frac{\text{hours}}{\text{day}}$): 24	($\frac{\text{days}}{\text{week}}$): 7	($\frac{\text{weeks}}{\text{year}}$): 52		($\frac{\text{hours}}{\text{year}}$): 8,736	
2	Facility's maximum daily operating schedule (if less than 24 $\frac{\text{hours}}{\text{day}}$)?	Start:		☐AM ☐PM	End:	☐AM ☐PM
3	Month and year of anticipated start of construction: May 2020					
4	Month and year of anticipated construction completion: June 2020					
5	Month and year of anticipated startup of new or modified facility: June 2020					
6	Will this facility operate at this site for more than one year? ☒ Yes ☐ No					

Section 1-F: Other Facility Information

1	Are there any current Notice of Violations (NOV), compliance orders, or any other compliance or enforcement issues related to this facility? ☐ Yes ☒ No If yes, specify:		
a	If yes, NOV date or description of issue:		NOV Tracking No:
b	Is this application in response to any issue listed in 1-F, 1 or 1a above? ☐ Yes ☒No If Yes, provide the 1c & 1d info below:		
c	Document Title:	Date:	Requirement # (or page # and paragraph #):
d	Provide the required text to be inserted in this permit:		
2	Is air quality dispersion modeling or modeling waiver being submitted with this application? ☐ Yes ☒ No		
3	Does this facility require an "Air Toxics" permit under 20.2.72.400 NMAC & 20.2.72.502, Tables A and/or B? ☐ Yes ☒No		
4	Will this facility be a source of federal Hazardous Air Pollutants (HAP)? ☒Yes ☐ No		
a	If Yes, what type of source? ☐ **Major** (☐ $\geq$10 tpy of any single HAP **OR** ☐ $\geq$25 tpy of any combination of HAPS) **OR** ☒ **Minor** (☐ <10 tpy of any single HAP **AND** ☒<25 tpy of any combination of HAPS)		
5	Is any unit exempt under 20.2.72.202.B.3 NMAC? ☐ Yes ☒ No		
a	If yes, include the name of company providing commercial electric power to the facility: ___________________________ Commercial power is purchased from a commercial utility company, which specifically does not include power generated on site for the sole purpose of the user.		

Section 1-G: Streamline Application **(This section applies to 20.2.72.300 NMAC Streamline applications only)**

1	☐ I have filled out Section 18, "Addendum for Streamline Applications." ☒ N/A (This is not a Streamline application.)

Section 1-H: Current Title V Information - Required for all applications from TV Sources

(Title V-source required information for all applications submitted pursuant to 20.2.72 NMAC (Minor Construction Permits), or 20.2.74/20.2.79 NMAC (Major PSD/NNSR applications), and/or 20.2.70 NMAC (Title V))

1	Responsible Official (R.O.) (20.2.70.300.D.2 NMAC):	Phone:
a	R.O. Title:	R.O. e-mail:
b	R. O. Address:	
2	Alternate Responsible Official (20.2.70.300.D.2 NMAC):	Phone:
a	A. R.O. Title:	A. R.O. e-mail:
b	A. R. O. Address:	
3	Company's Corporate or Partnership Relationship to any other Air Quality Permittee (List the names of any companies that have operating (20.2.70 NMAC) permits and with whom the applicant for this permit has a corporate or partnership relationship):	
4	Name of Parent Company ("Parent Company" means the primary name of the organization that owns the company to be permitted wholly or in part.):	
a	Address of Parent Company:	
5	Names of Subsidiary Companies ("Subsidiary Companies" means organizations, branches, divisions or subsidiaries, which are owned, wholly or in part, by the company to be permitted.):	
6	Telephone numbers & names of the owners' agents and site contacts familiar with plant operations:	

7	Affected Programs to include Other States, local air pollution control programs (i.e. Bernalillo) and Indian tribes: Will the property on which the facility is proposed to be constructed or operated be closer than 80 km (50 miles) from other states, local pollution control programs, and Indian tribes and pueblos (20.2.70.402.A.2 and 20.2.70.7.B)? If yes, state which ones and provide the distances in kilometers:

Section 1-I – Submittal Requirements

Each 20.2.73 NMAC (**NOI**), a 20.2.70 NMAC (**Title V**), a 20.2.72 NMAC (**NSR** minor source), or 20.2.74 NMAC (**PSD**) application package shall consist of the following:

Hard Copy Submittal Requirements:

1) One hard copy **original signed and notarized application package printed double sided 'head-to-toe' 2-hole punched** as we bind the document on top, not on the side; except Section 2 (landscape tables), which should be head-to-head. Please use **numbered tab separators** in the hard copy submittal(s) as this facilitates the review process. For NOI submittals only, hard copies of UA1, Tables 2A, 2D & 2F, Section 3 and the signed Certification Page are required. Please include a copy of the check on a separate page.

2) If the application is for a minor NSR, PSD, NNSR, or Title V application, include one working hard **copy** for Department use. This copy should be printed in book form, 3-hole punched, and **must be double sided**. Note that this is in addition to the head-to-to 2-hole punched copy required in 1) above. Minor NSR Technical Permit revisions (20.2.72.219.B NMAC) only need to fill out Sections 1-A, 1-B, 3, and should fill out those portions of other Section(s) relevant to the technical permit revision. TV Minor Modifications need only fill out Sections 1-A, 1-B, 1-H, 3, and those portions of other Section(s) relevant to the minor modification. NMED may require additional portions of the application to be submitted, as needed.

3) The entire NOI or Permit application package, including the full modeling study, should be submitted electronically. Electronic files for applications for NOIs, any type of General Construction Permit (GCP), or technical revisions to NSRs must be submitted with compact disk (CD) or digital versatile disc (DVD). For these permit application submittals, **two** CD copies are required (in sleeves, not crystal cases, please), with additional CD copies as specified below. NOI applications require only a single CD submittal. Electronic files for other New Source Review (construction) permits/permit modifications or Title V permits/permit modifications can be submitted on CD/DVD or sent through AQB's secure file transfer service.

Electronic files sent by (check one):

☐ CD/DVD attached to paper application

☐ secure electronic transfer. Air Permit Contact Name____________________________

Email______________________________

Phone number _______________________

a. If the file transfer service is chosen by the applicant, after receipt of the application, the Bureau will email the applicant with instructions for submitting the electronic files through a secure file transfer service. Submission of the electronic files through the file transfer service needs to be completed within 3 business days after the invitation is received, so the applicant should ensure that the files are ready when sending the hard copy of the application. The applicant will not need a password to complete the transfer. **Do not use the file transfer service for NOIs, any type of GCP, or technical revisions to NSR permits.**

4) Optionally, the applicant may submit the files with the application on compact disk (CD) or digital versatile disc (DVD) following the instructions above and the instructions in 5 for applications subject to PSD review.

5) If **air dispersion modeling** is required by the application type, include the **NMED Modeling Waiver** and/or electronic air dispersion modeling report, input, and output files. The dispersion modeling ***summary report only*** should be submitted as hard copy(ies) unless otherwise indicated by the Bureau.

6) If the applicant submits the electronic files on CD and the application is subject to PSD review under 20.2.74 NMAC (PSD) or NNSR under 20.2.79 NMC include,
   a. one additional CD copy for US EPA,
   b. one additional CD copy for each federal land manager affected (NPS, USFS, FWS, USDI) and,
   c. one additional CD copy for each affected regulatory agency other than the Air Quality Bureau.

   If the application is submitted electronically through the secure file transfer service, these extra CDs do not need to be submitted.

Electronic Submittal Requirements [in addition to the required hard copy(ies)]:

1) All required electronic documents shall be submitted as 2 separate CDs or submitted through the AQB secure file transfer service. Submit a single PDF document of the entire application as submitted and the individual documents comprising the application.

2) The documents should also be submitted in Microsoft Office compatible file format (Word, Excel, etc.) allowing us to access the text and formulas in the documents (copy & paste). Any documents that cannot be submitted in a Microsoft Office compatible

format shall be saved as a PDF file from within the electronic document that created the file. If you are unable to provide Microsoft office compatible electronic files or internally generated PDF files of files (items that were not created electronically: i.e. brochures, maps, graphics, etc,), submit these items in hard copy format. We must be able to review the formulas and inputs that calculated the emissions.

3) It is preferred that this application form be submitted as 4 electronic files (3 MSWord docs: Universal Application section 1 [UA1], Universal Application section 3-19 [UA3], and Universal Application 4, the modeling report [UA4]) and 1 Excel file of the tables (Universal Application section 2 [UA2]). Please include as many of the 3-19 Sections as practical in a single MS Word electronic document. Create separate electronic file(s) if a single file becomes too large or if portions must be saved in a file format other than MS Word.

4) The electronic file names shall be a maximum of 25 characters long (including spaces, if any). The format of the electronic Universal Application shall be in the format: "A-3423-FacilityName". The "A" distinguishes the file as an application submittal, as opposed to other documents the Department itself puts into the database. Thus, all electronic application submittals should begin with "A-". Modifications to existing facilities should use the core permit number (i.e. '3423') the Department assigned to the facility as the next 4 digits. Use 'XXXX' for new facility applications. The format of any separate electronic submittals (additional submittals such as non-Word attachments, re-submittals, application updates) and Section document shall be in the format: "A-3423-9-description", where "9" stands for the section # (in this case Section 9-Public Notice). Please refrain, as much as possible, from submitting any scanned documents as this file format is extremely large, which uses up too much storage capacity in our database. Please take the time to fill out the header information throughout all submittals as this will identify any loose pages, including the Application Date (date submitted) & Revision number (0 for original, 1, 2, etc.; which will help keep track of subsequent partial update(s) to the original submittal. Do not use special symbols (#, @, etc.) in file names. The footer information should not be modified by the applicant.

Table of Contents

Table 2-A: Regulated Emission Sources

Unit and stack numbering must correspond throughout the application package. If applying for a NOI under 20.2.73 NMAC, equipment exemptions under 2.72.202 NMAC do not apply.

Unit Number[1]	Source Description	Make	Model #	Serial #	Manufact-urer's Rated Capacity[3] (Specify Units)	Requested Permitted Capacity[3] (Specify Units)	Date of Manufacture[2] Date of Construction/ Reconstruction[2]	Controlled by Unit # Emissions vented to Stack #	Source Classi-fication Code (SCC)	For Each Piece of Equipment, Check One	RICE Ignition Type (CI, SI, 4SLB, 4SRB, 2SLB)[4]	Replacing Unit No.
1	Air Stripper	QED	EZ2.4P		280 CFM	280 CFM	Dec-20			☐ Existing (unchanged) ☐ To be Removed X New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	No ignition	
										☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
										☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
										☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
										☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
										☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
										☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
										☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
										☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
										☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
										☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
										☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
										☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		
										☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced		

[1] Unit numbers must correspond to unit numbers in the previous permit unless a complete cross reference table of all units in both permits is provided.
[2] Specify dates required to determine regulatory applicability.
[3] To properly account for power conversion efficiencies, generator set rated capacity shall be reported as the rated capacity of the engine in horsepower, not the kilowatt capacity of the generator set.
[4] "4SLB" means four stroke lean burn engine, "4SRB" means four stroke rich burn engine, "2SLB" means two stroke lean burn engine, "CI" means compression ignition, and "SI" means spark ignition

Table 2-B: Insignificant Activities[1] (20.2.70 NMAC) OR Exempted Equipment (20.2.72 NMAC)

All 20.2.70 NMAC (Title V) applications must list all Insignificant Activities in this table. All 20.2.72 NMAC applications must list Exempted Equipment in this table. If equipment listed on this table is exempt under 20.2.72.202.B.5, include emissions calculations and emissions totals for 202.B.5 "similar functions" units, operations, and activities in Section 6, Calculations. Equipment and activities exempted under 20.2.72.202 NMAC may not necessarily be Insignificant under 20.2.70 NMAC (and vice versa). Unit & stack numbering must be consistent throughout the application package. Per Exemptions Policy 02-012.00 (see http://www.env.nm.gov/aqb/permit/aqb_pol.html), 20.2.72.202.B NMAC Exemptions do not apply, but 20.2.72.202.A NMAC exemptions do apply to NOI facilities under 20.2.73 NMAC. List 20.2.72.301.D.4 NMAC Auxiliary Equipment for Streamline applications in Table 2-A. The List of Insignificant Activities (for TV) can be found online at http://www.env.nm.gov/aqb/forms/InsignificantListTitleV.pdf . TV sources may elect to enter both TV Insignificant Activities and Part 72 Exemptions on this form.

Unit Number	Source Description	Manufacturer	Model No. / Serial No.	Max Capacity / Capacity Units	List Specific 20.2.72.202 NMAC Exemption (e.g. 20.2.72.202.B.5) / Insignificant Activity citation (e.g. IA List Item #1.a)	Date of Manufacture /Reconstruction[2] / Date of Installation /Construction[2]	For Each Piece of Equipment, Check Onc
							☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
							☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
							☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
							☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
							☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
							☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
							☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
							☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
							☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
							☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
							☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
							☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
							☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced

[1] Insignificant activities exempted due to size or production rate are defined in 20.2.70.300.D.6, 20.2.70.7.Q NMAC, and the NMED/AQB List of Insignificant Activities, dated September 15, 2008. Emissions from these insignificant activities do not need to be reported, unless specifically requested.

[2] Specify date(s) required to determine regulatory applicability.

Table 2-C: Emissions Control Equipment

Unit and stack numbering must correspond throughout the application package. Only list control equipment for TAPs if the TAP's maximum uncontrolled emissions rate is over its respective threshold as listed in 20.2.72 NMAC, Subpart V, Tables A and B. In accordance with 20.2.72.203.A(3) and (8) NMAC, 20.2.70.300.D(5)(b) and (e) NMAC, and 20.2.73.200.B(7) NMAC, the permittee shall report all control devices and list each pollutant controlled by the control device regardless if the applicant takes credit for the reduction in emissions.

Control Equipment Unit No.	Control Equipment Description	Date Installed	Controlled Pollutant(s)	Controlling Emissions for Unit Number(s)[1]	Efficiency (% Control by Weight)	Method used to Estimate Efficiency
	None					

[1] List each control device on a separate line. For each control device, list all emission units controlled by the control device.

Table 2-D: Maximum Emissions (under normal operating conditions)

☐ **This Table was intentionally left blank because it would be identical to Table 2-E.**

Maximum Emissions are the emissions at maximum capacity and prior to (in the absence of) pollution control, emission-reducing process equipment, or any other emission reduction. Calculate the hourly emissions using the worst case hourly emissions for each pollutant. For each pollutant, calculate the annual emissions as if the facility were operating at maximum plant capacity without pollution controls for 8760 hours per year, unless otherwise approved by the Department. List Hazardous Air Pollutants (HAP) & Toxic Air Pollutants (TAPs) in Table 2-I. Unit & stack numbering must be consistent throughout the application package. Fill all cells in this table with the emission numbers or a "-" symbol. A "-" symbol indicates that emissions of this pollutant are not expected. Numbers shall be expressed to at least 2 decimal points (e.g. 0.41, 1.41, or 1.41E-4).

Unit No.	NOx		CO		VOC		SOx		PM[1]		PM10[1]		PM2.5[1]		H_2S		Lead	
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
1	0	0	0	0	0.02	0.0876	0	0	0	0	0	0	0	0	0	0	0	0
Totals																		

[1] **Condensable Particulate Matter:** Include condensable particulate matter emissions for PM10 and PM2.5 if the source is a combustion source. Do not include condensable particulate matter for PM unless PM is set equal to PM10 and PM2.5. Particulate matter (PM) is not subject to an ambient air quality standard, but PM is a regulated air pollutant under PSD (20.2.74 NMAC) and Title V (20.2.70 NMAC).

Table 2-E: Requested Allowable Emissions

Unit & stack numbering must be consistent throughout the application package. Fill all cells in this table with the emission numbers or a "-" symbol. A “-“ symbol indicates that emissions of this pollutant are not expected. Numbers shall be expressed to at least 2 decimal points (e.g. 0.41, 1.41, or $1.41E^{-4}$).

Unit No.	NOx		CO		VOC		SOx		PM[1]		PM10[1]		PM2.5[1]		H_2S		Lead	
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
1	0	0	0	0	0.5	1	0	0	0	0	0	0	0	0	0	0	0	0
Totals																		

[1] **Condensable Particulate Matter:** Include condensable particulate matter emissions for PM10 and PM2.5 if the source is a combustion source. Do not include condensable particulate matter for PM unless PM is set equal to PM10 and PM2.5. Particulate matter (PM) is not subject to an ambient air quality standard, but it is a regulated air pollutant under PSD (20.2.74 NMAC) and Title V (20.2.70 NMAC).

Table 2-F: Additional Emissions during Startup, Shutdown, and Routine Maintenance (SSM)

☐ This table is intentionally left blank since all emissions at this facility due to routine or predictable startup, shutdown, or scehduled maintenance are no higher than those listed in Table 2-E and a malfunction emission limit is not already permitted or requested. If you are required to report GHG emissions as described in Section 6a, include any GHG emissions during Startup, Shutdown, and/or Scheduled Maintenance (SSM) in Table 2-P. Provide an explanations of SSM emissions in Section 6 and 6a.

All applications for facilities that have emissions during routine our predictable startup, shutdown or scheduled maintenance (SSM)[1], including NOI applications, must include in this table the Maximum Emissions during routine or predictable startup, shutdown and scheduled maintenance (20.2.7 NMAC, 20.2.72.203.A.3 NMAC, 20.2.73.200.D.2 NMAC). In Section 6 and 6a, provide emissions calculations for all SSM emissions reported in this table. Refer to "Guidance for Submittal of Startup, Shutdown, Maintenance Emissions in Permit Applications (https://www.env.nm.gov/aqb/permit/aqb_pol.html) for more detailed instructions. Numbers shall be expressed to at least 2 decimal points (e.g. 0.41, 1.41, or 1.41E-4).

Unit No.	NOx		CO		VOC		SOx		PM[2]		PM10[2]		PM2.5[2]		H_2S		Lead	
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
Totals																		

[1] **For instance**, if the short term steady-state Table 2-E emissions are 5 lb/hr and the SSM rate is 12 lb/hr, enter 7 lb/hr in this table. If the annual steady-state Table 2-E emissions are 21.9 TPY, and the number of scheduled SSM events result in annual emissions of 31.9 TPY, enter 10.0 TPY in the table below.

[2] **Condensable Particulate Matter:** Include condensable particulate matter emissions for PM10 and PM2.5 if the source is a combustion source. Do not include condensable particulate matter for PM unless PM is set equal to PM10 and PM2.5. Particulate matter (PM) is not subject to an ambient air quality standard, but it is a regulated air pollutant under PSD (20.2.74 NMAC) and Title V (20.2.70 NMAC).

Table 2-G: Stack Exit and Fugitive Emission Rates for Special Stacks

☐ I have elected to leave this table blank because this facility does not have any stacks/vents that split emissions from a single source or combine emissions from more than one source listed in table 2-A. Additionally, the emission rates of all stacks match the Requested allowable emission rates stated in Table 2-E.

Use this table to list stack emissions (requested allowable) from split and combined stacks. List Toxic Air Pollutants (TAPs) and Hazardous Air Pollutants (HAPs) in Table 2-I. List all fugitives that are associated with the normal, routine, and non-emergency operation of the facility. Unit and stack numbering must correspond throughout the application package. Refer to Table 2-E for instructions on use of the "-" symbol and on significant figures.

Stack No.	Serving Unit Number(s) from Table 2-A	NOx		CO		VOC		SOx		PM		PM10		PM2.5		☐ H_2S or ☐ Lead	
		lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
Totals:																	

Table 2-H: Stack Exit Conditions

Unit and stack numbering must correspond throughout the application package. Include the stack exit conditions for each unit that emits from a stack, including blowdown venting parameters and tank emissions. If the facility has multiple operating scenarios, complete a separate Table 2-H for each scenario and, for each, type scenario name here:

Stack Number	Serving Unit Number(s) from Table 2-A	Orientation (H-Horizontal V=Vertical)	Rain Caps (Yes or No)	Height Above Ground (ft)	Temp. (F)	Flow Rate		Moisture by Volume (%)	Velocity (ft/sec)	Inside Diameter (ft)
						(acfs)	(dscfs)			
1	1	V	yes	13	80	5	4	0	20.3	0.50

Table 2-I: Stack Exit and Fugitive Emission Rates for HAPs and TAPs

In the table below, report the Potential to Emit for each HAP from each regulated emission unit listed in Table 2-A, only if the entire facility emits the HAP at a rate greater than or equal to one (1) ton per year For each such emission unit, HAPs shall be reported to the nearest 0.1 tpy. Each facility-wide Individual HAP total and the facility-wide Total HAPs shall be the sum of all HAP sources calculated to the nearest 0.1 ton per year. Per 20.2.72.403.A.1 NMAC, facilities not exempt [see 20.2.72.402.C NMAC] from TAP permitting shall report each TAP that has an uncontrolled emission rate in excess of its pounds per hour screening level specified in 20.2.72.502 NMAC. TAPs shall be reported using one more significant figure than the number of significant figures shown in the pound per hour threshold corresponding to the substance. Use the HAP nomenclature as it appears in Section 112 (b) of the 1990 CAAA and the TAP nomenclature as it listed in 20.2.72.502 NMAC. Include tank-flashing emissions estimates of HAPs in this table. For each HAP or TAP listed, fill all cells in this table with the emission numbers or a "-" symbol. A “-” symbol indicates that emissions of this pollutant are not expected or the pollutant is emitted in a quantity less than the threshold amounts described above.

Stack No.	Unit No.(s)	Total HAPs		Benzene X HAP or ☐ TAP		ethylbenzene x HAP or ☐ TAP		methyl-t-Butyl ether X HAP or TAP		naphthalene x HAP or ☐ TAP		Xylenes X HAP or ☐ TAP		Toluene X HAP or ☐ TAP		Provide Pollutant Name Here ☐ HAP or ☐ TAP		Provide Pollutant Name Here ☐ HAP or ☐ TAP	
		lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
1	1	0.02	0.0876	<.01	<0.04	0.01	0.04	<.01	<0.04	<.01	<0.04	0.01	0.04	<.01	<0.04				
Totals:																			

Table 2-J: Fuel

Specify fuel characteristics and usage. Unit and stack numbering must correspond throughout the application package.

Unit No.	Fuel Type (low sulfur Diesel, ultra low sulfur diesel, Natural Gas, Coal, …)	Fuel Source: purchased commercial, pipeline quality natural gas, residue gas, raw/field natural gas, process gas (e.g. SRU tail gas) or other	Specify Units				
			Lower Heating Value	Hourly Usage	Annual Usage	% Sulfur	% Ash
1	electric						

Table 2-K: Liquid Data for Tanks Listed in Table 2-L

For each tank, list the liquid(s) to be stored in each tank. If it is expected that a tank may store a variety of hydrocarbon liquids, enter "mixed hydrocarbons" in the Composition column for that tank and enter the corresponding data of the most volatile liquid to be stored in the tank. If tank is to be used for storage of different materials, list all the materials in the "All Calculations" attachment, run the newest version of TANKS on each, and use the material with the highest emission rate to determine maximum uncontrolled and requested allowable emissions rate. The permit will specify the most volatile category of liquids that may be stored in each tank. Include appropriate tank-flashing modeling input data. Use additional sheets if necessary. Unit and stack numbering must correspond throughout the application package.

Tank No.	SCC Code	Material Name	Composition	Liquid Density (lb/gal)	Vapor Molecular Weight (lb/lb*mol)	Average Storage Conditions		Max Storage Conditions	
						Temperature (°F)	True Vapor Pressure (psia)	Temperature (°F)	True Vapor Pressure (psia)

Table 2-L: Tank Data

Include appropriate tank-flashing modeling input data. Use an addendum to this table for unlisted data categories. Unit and stack numbering must correspond throughout the application package. Use additional sheets if necessary. See reference Table 2-L2. Note: 1.00 bbl = 10.159 M3 = 42.0 gal

Tank No.	Date Installed	Materials Stored	Seal Type (refer to Table 2-LR below)	Roof Type (refer to Table 2-LR below)	Capacity		Diameter (M)	Vapor Space (M)	Color (from Table VI-C)		Paint Condition (from Table VI-C)	Annual Throughput (gal/yr)	Turn-overs (per year)
					(bbl)	(M^3)			Roof	Shell			

Table 2-L2: Liquid Storage Tank Data Codes Reference Table

Roof Type	Seal Type, Welded Tank Seal Type		Seal Type, Riveted Tank Seal Type		Roof, Shell Color	Paint Condition
FX: Fixed Roof	**Mechanical Shoe Seal**	**Liquid-mounted resilient seal**	**Vapor-mounted resilient seal**	**Seal Type**	**WH**: White	Good
IF: Internal Floating Roof	**A**: Primary only	**A**: Primary only	**A**: Primary only	**A**: Mechanical shoe, primary only	**AS**: Aluminum (specular)	Poor
EF: External Floating Roof	**B**: Shoe-mounted secondary	**B**: Weather shield	**B**: Weather shield	**B**: Shoe-mounted secondary	**AD**: Aluminum (diffuse)	
P: Pressure	**C**: Rim-mounted secondary	**C**: Rim-mounted secondary	**C**: Rim-mounted secondary	**C**: Rim-mounted secondary	**LG**: Light Gray	
					MG: Medium Gray	
					BL: Black	
					OT: Other (specify)	

Note: 1.00 bbl = 0.159 M^3 = 42.0 gal

Table 2-M: Materials Processed and Produced (Use additional sheets as necessary.)

Material Processed				Material Produced			
Description	**Chemical Composition**	**Phase (Gas, Liquid, or Solid)**	**Quantity (specify units)**	**Description**	**Chemical Composition**	**Phase**	**Quantity (specify units)**

Table 2-N: CEM Equipment

Enter Continuous Emissions Measurement (CEM) Data in this table. If CEM data will be used as part of a federally enforceable permit condition, or used to satisfy the requirements of a state or federal regulation, include a copy of the CEM's manufacturer specification sheet in the Information Used to Determine Emissions attachment. Unit and stack numbering must correspond throughout the application package. Use additional sheets if necessary.

Stack No.	Pollutant(s)	Manufacturer	Model No.	Serial No.	Sample Frequency	Averaging Time	Range	Sensitivity	Accuracy

Table 2-O: Parametric Emissions Measurement Equipment

Unit and stack numbering must correspond throughout the application package. Use additional sheets if necessary.

Unit No.	Parameter/Pollutant Measured	Location of Measurement	Unit of Measure	Acceptable Range	Frequency of Maintenance	Nature of Maintenance	Method of Recording	Averaging Time

Table 2-P: Greenhouse Gas Emissions

Applications submitted under 20.2.70, 20.2.72, & 20.2.74 NMAC are required to complete this Table. Power plants, Title V major sources, and PSD major sources must report and calculate all GHG emissions for each unit. Applicants must report potential emission rates in short tons per year (see Section 6.a for assistance). Include GHG emissions during Startup, Shutdown, and Scheduled Maintenance in this table. For minor source facilities that are not power plants, are not Title V, or are not PSD, there are three options for reporting GHGs 1) report GHGs for each individual piece of equipment; 2) report all GHGs from a group of unit types, for example report all combustion source GHGs as a single unit and all venting GHG as a second separate unit; OR 3) check the following box ☐ By checking this box, the applicant acknowledges the total CO2e emissions are less than 75,000 tons per year.

		CO_2 ton/yr	N_2O ton/yr	CH_4 ton/yr	SF_6 ton/yr	PFC/HFC ton/yr[2]									Total GHG Mass Basis ton/yr[4]	Total CO_2e ton/yr[5]
Unit No.	**GWPs [1]**	**1**	**298**	**25**	**22,800**	**footnote 3**										
1	**mass GHG**	0	0	0	0	0									0	0
	CO_2e	0	0	0	0	0									0	0
	mass GHG															
	CO_2e															
	mass GHG															
	CO_2e															
	mass GHG															
	CO_2e															
	mass GHG															
	CO_2e															
	mass GHG															
	CO_2e															
	mass GHG															
	CO_2e															
	mass GHG															
	CO_2e															
	mass GHG															
	CO_2e															
	mass GHG															
	CO_2e															
	mass GHG															
	CO_2e															
	mass GHG															
	CO_2e															
	mass GHG															
	CO_2e															
	mass GHG															
	CO_2e															
	mass GHG															
	CO2e															
Total	**mass GHG**															
	CO_2e															

[1] **GWP** (Global Warming Potential): Applicants must use the most current GWPs codified in Table A-1 of 40 CFR part 98. GWPs are subject to change, therefore, applicants need to check 40 CFR 98 to confirm GWP values.

[2] For **HFCs** or **PFCs** describe the specific HFC or PFC compound and use a separate column for each individual compound.

[3] For each new compound, enter the appropriate GWP for each HFC or PFC compound from Table A-1 in 40 CFR 98.

[4] Green house gas emissions on a **mass basis** is the ton per year green house gas emission before adjustment with its GWP.

[5] **CO_2e** means Carbon Dioxide Equivalent and is calculated by multiplying the TPY mass emissions of the green house gas by its GWP.

Section 3

Application Summary

The **Application Summary** shall include a brief description of the facility and its process, the type of permit application, the applicable regulation (i.e. 20.2.72.200.A.X, or 20.2.73 NMAC) under which the application is being submitted, and any air quality permit numbers associated with this site. If this facility is to be collocated with another facility, provide details of the other facility including permit number(s). In case of a revision or modification to a facility, provide the lowest level regulatory citation (i.e. 20.2.72.219.B.1.d NMAC) under which the revision or modification is being requested. Also describe the proposed changes from the original permit, how the proposed modification will affect the facility's operations and emissions, de-bottlenecking impacts, and changes to the facility's major/minor status (both PSD & Title V).

The **Process Summary** shall include a brief description of the facility and its processes.

Startup, Shutdown, and Maintenance (SSM) routine or predictable emissions: Provide an overview of how SSM emissions are accounted for in this application. Refer to "Guidance for Submittal of Startup, Shutdown, Maintenance Emissions in Permit Applications (http://www.env.nm.gov/aqb/permit/app_form.html) for more detailed instructions on SSM emissions.

This is an application for a No Permit Required (NPR) determination. The application is for a new, minor source (NMAC 20.272.200.A), which will discharge a maximum of 1 tons per year of volatile organic compounds (VOCs) (Realistic emissions will be a couple orders of magnitude below a 1 ton/yr threshold).

This facility is part of a water treatment system for contaminated groundwater at a former leaking petroleum storage tank site. A QED 280 CFM EZ Stacker 4.XP air stripper will remove VOC's from ground water prior to discharge to a sanitary sewer. Air effluent will not be combusted or treated. QED modeling indicates VOC emissions of a maximum of 0.02 lb/hr.

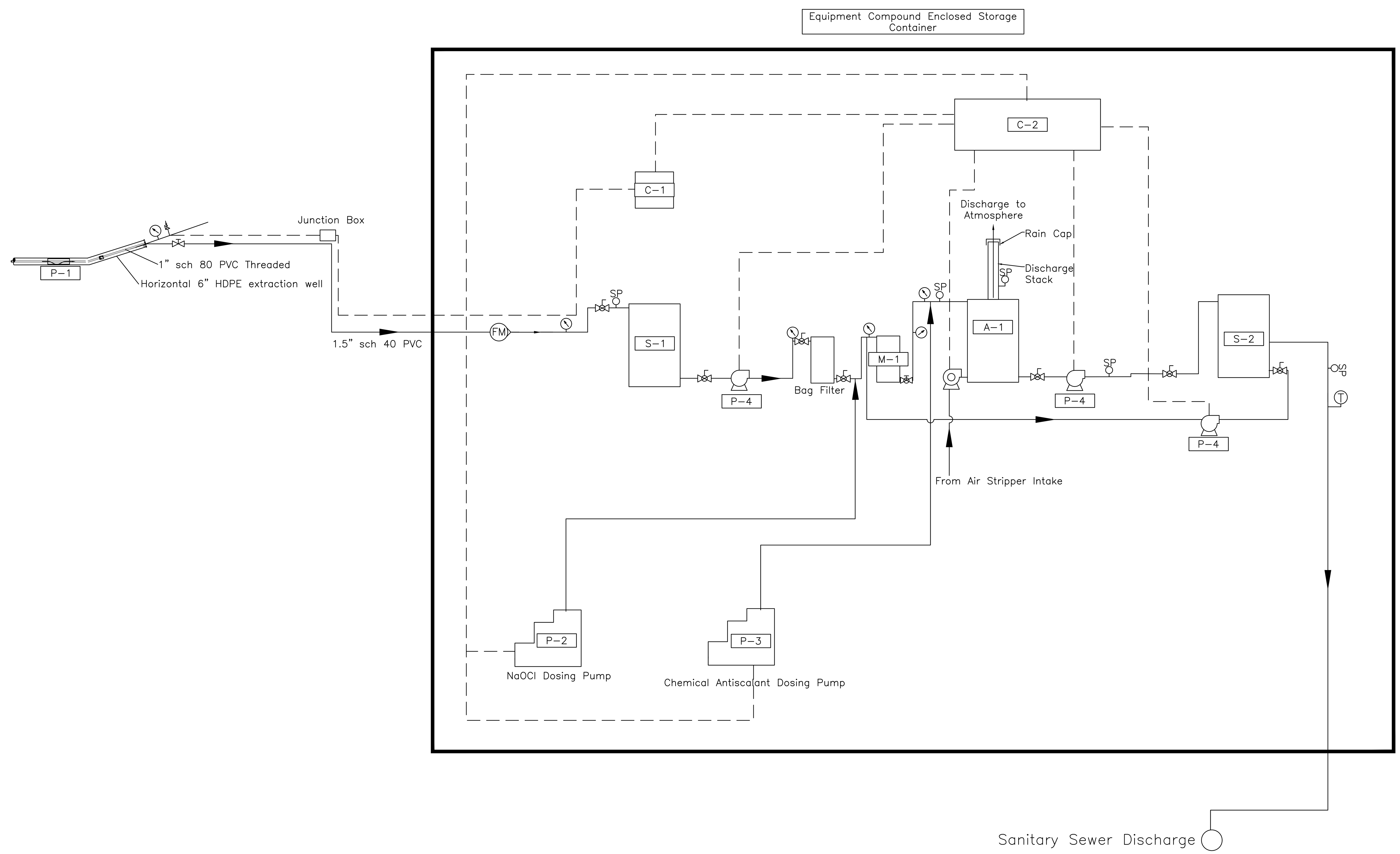
Section 4

Process Flow Sheet

A **process flow sheet** and/or block diagram indicating the individual equipment, all emission points and types of control applied to those points. The unit numbering system should be consistent throughout this application.

Please see attached DBS&A drawing titled Process and Instrumentation Diagram and Mechanical Elevation and Details.

P-1	C-1	S-1	M-1	A-1	S-2	C-2	P-2	P-3	P-4
Submersible Pump Provided by Grundfos Model 5 SQE05-140 5 GPM, 50' TDH, VF Drive 1/2 HP, 230VAC/1 PH/60 HZ	Pump Controller Provided by Grundfos Model CU 300 230VAC/1 PH/60 HZ	Raw Water Storage Tank 500 Gal HDPE	Metals Treatment Iron and Manganese Filter	Air Stripper Provided by QED Model EX 4.4P Stacker 10 GPM, 280 CFM Air 5 HP blower	Treated Water Storage Tank 710 Gal HDPE	Control Panel Automatic System Operation HMI Touch Screen	NaOCl Dosing Pump	Antiscalant Dosing Pump	Transfer pump to be specified by equipment vendor



ABBREVIATION KEY

CU	CONTROL UNIT
CFM	CUBIC FEET PER MINUTE
FM	FLOW METER
GAL	GALLONS
GPM	GALLONS PER MINUTE
HP	HORSE POWER
HMI	HUMAN MACHINE INTERFACE
HZ	HERTZ
PG	PRESSURE GAUGE
PH	PHASE
PVC	POLYVINYL CHLORIDE,
SP	SAMPLE PORT
TDH	TOTAL DYNAMIC HEAD
TP	TRANSFER PUMP
VAC	VOLTS ALTERNATING CURRENT
VF	VARIABLE FREQUENCY

SYMBOL LEGEND

- BALL VALVE
- BUTTERFLY VALVE
- CHECK VALVE
- ELECTRICAL
- FM FLOW METER
- GATE VALVE
- LEL SENSOR
- M MOTOR
- PRESSURE RELIEF VALVE
- PRESSURE/VACUUM GAUGE
- REDUCING FITTING
- SAMPLE TAP
- SYSTEM FLOW DIRECTION
- T TEMPERATURE GAUGE
- THERMOMETER

REV. NO.	DATE	DESCRIPTION	APPROVED BY

DATE OF ISSUE: 12/31/19
DESIGNED BY: TH
DRAWN BY: JA/RT
CHECKED BY: KJ
APPROVED BY: TG

DBS&A
Daniel B. Stephens & Associates, Inc.
6020 Academy Rd. NE, Suite 100
Albuquerque, NM 87109-3315

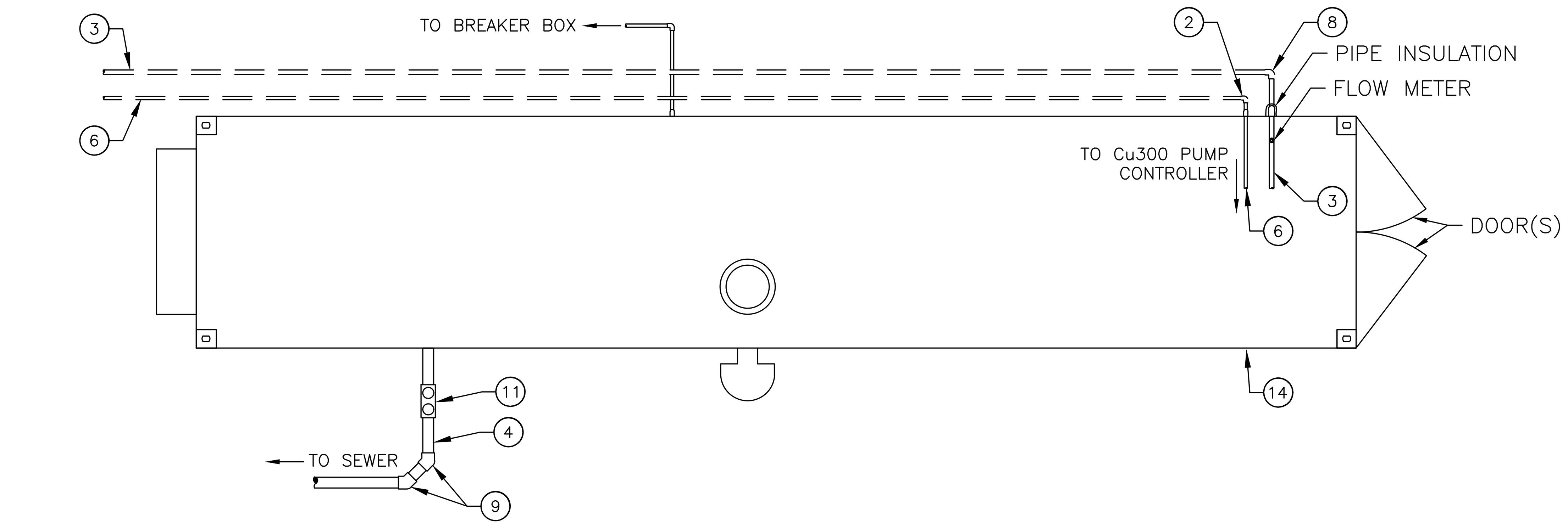
NEW MEXICO ENVIRONMENT DEPARTMENT
PETROLEUM STORAGE TANK BUREAU
2905 RODEO PARK DRIVE EAST
SANTA FE, NEW MEXICO 57505

ROSS TEXACO, PINO FINA, AND ATEX 394
GROUNDWATER REMEDIATION SYSTEM INSTALLATION
LAS VEGAS, NEW MEXICO

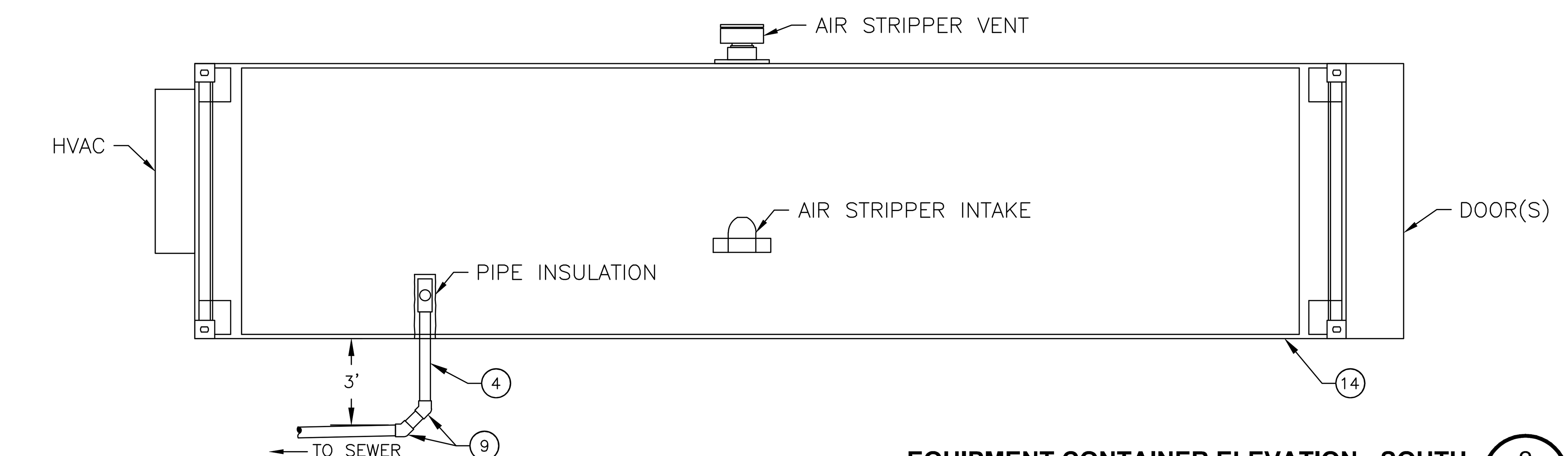
PROCESS AND INSTRUMENTATION DIAGRAM

SHT. 1 OF 11
DWG NO. M-1

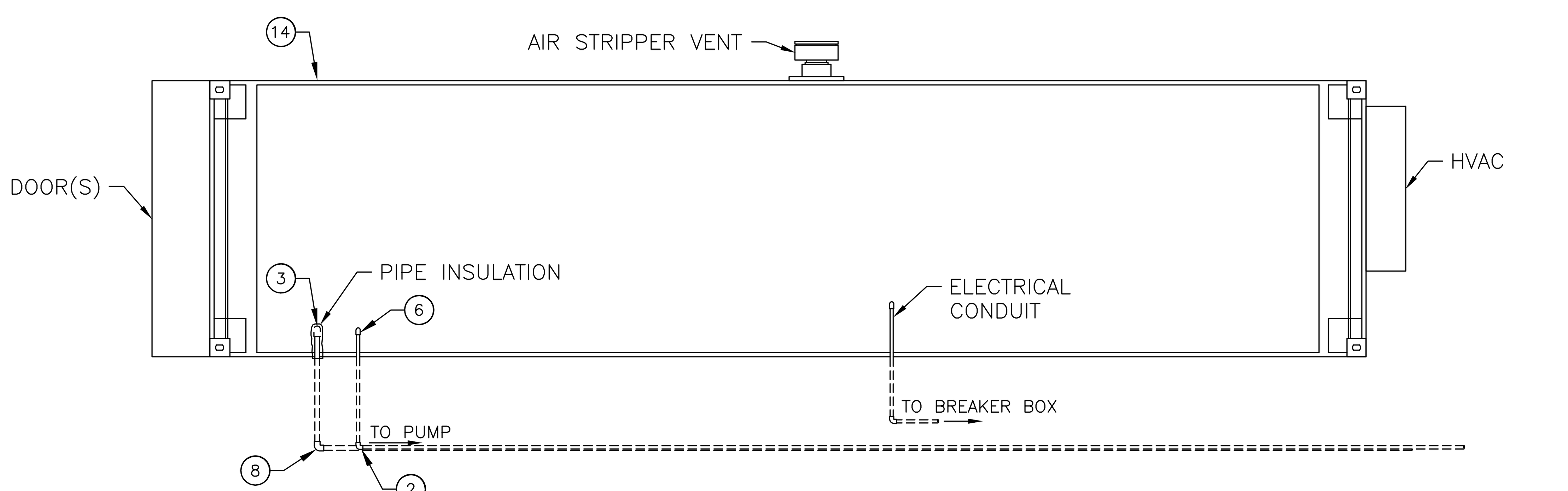
JOB NO.
DB18.1277



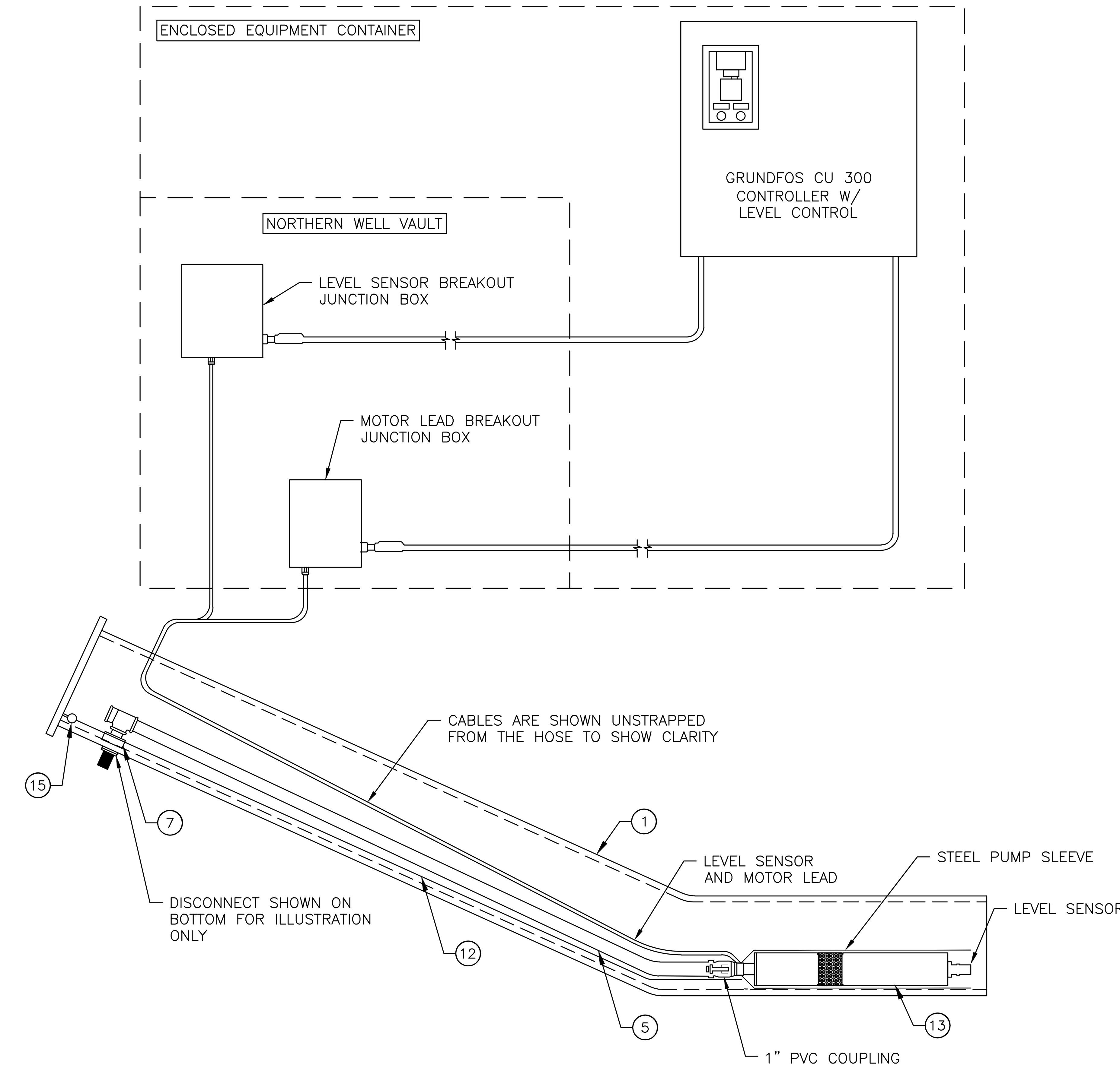
EQUIPMENT CONTAINER - PLAN VIEW 1/-
NTS



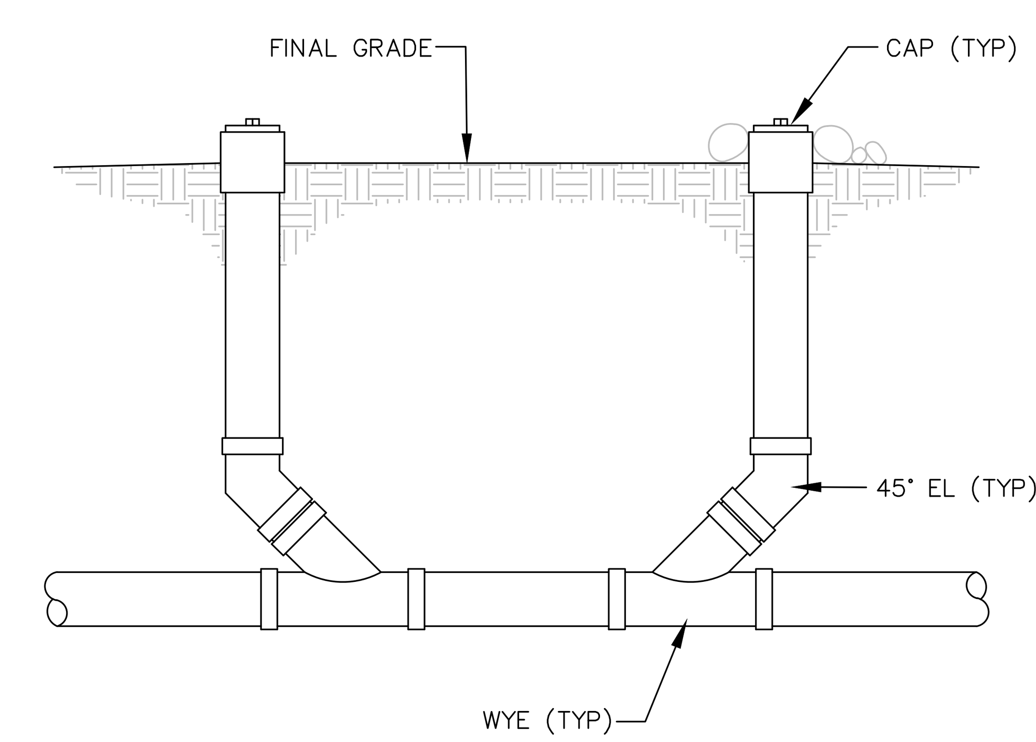
EQUIPMENT CONTAINER ELEVATION - SOUTH 2/-
NTS



EQUIPMENT CONTAINER ELEVATION VIEW - NORTH 3/-
NTS



SUBMERSIBLE PUMP INSTALLATION 4/-
NTS



TYPICAL 2 - WAY CLEANOUT 5/-
NTS

KEY NOTES:

1. 6" SOLID WALL HDPE SDR 11
2. 2" SCH 40 PVC 90° ELBOW, ELECTRICAL CONDUIT (TYP)
3. 1-1/2" SCH 40 PVC
4. 4" SCH 40 PVC
5. 1" SCH 80 PVC THREADED
6. 2" SCH 40 PVC, ELECTRIC CONDUIT
7. MONITOR SNAPPY PITLESS ADAPTER GALVANIZED CAST IRON MODEL 8PL6IU OR APPROVED EQUAL
8. 1-1/2" SCH 40 PVC ELBOW (TYP)
9. 4" SCH 40 PVC 45° ELBOW (TYP OF 2)
10. 4" SCH 40 PVC TEE
11. CLEAN-OUT
12. STEEL SAFETY CABLE
13. SUBMERSIBLE PUMP (P-1) CONTRACTOR TO FABRICATE AND WELD SKIDS TO PUMP SLEEVE
14. 8'x40' ENCLOSED EQUIPMENT CONTAINER ADEDGE WATERPOD OR APPROVED EQUAL
15. THREAD EYE BOLT INTO VENT PORT ON SPLIT WELL CAP

REV. NO.	DATE	DESCRIPTION	APPROVED BY

DATE OF ISSUE: 12/31/19
DESIGNED BY: TH
DRAWN BY: JA/RT
CHECKED BY: KJ
APPROVED BY: TG

DBS&A
Daniel B. Stephens & Associates, Inc.
6020 Academy Rd. NE, Suite 100
Albuquerque, NM 87109-3315

NEW MEXICO ENVIRONMENT DEPARTMENT
PETROLEUM STORAGE TANK BUREAU
2905 RODEO PARK DRIVE EAST
SANTA FE, NEW MEXICO 57505

ROSS TEXACO, PINO FINA, AND ATEX 394
GROUNDWATER REMEDIATION SYSTEM INSTALLATION
LAS VEGAS, NEW MEXICO

MEC□ANICAL ELEVATION AND DETAILS

SHT. 11 OF 11
DWG NO. M-2
JOB NO. DB18.1277

Section 5

Plot Plan Drawn To Scale

A **plot plan drawn to scale** showing emissions points, roads, structures, tanks, and fences of property owned, leased, or under direct control of the applicant. This plot plan must clearly designate the restricted area as defined in UA1, Section 1-D.12. The unit numbering system should be consistent throughout this application.

Please see attached DBS&A drawing titled General Site Plan.

GENERAL NOTES:

1. UTILITY LOCATIONS ARE BASED ON DETAILED SITE SURVEY COMPLETED BY COBB FENDLEY IN SEPTEMBER 2019. ANY DEVIATIONS FROM THE LOCATIONS SHOWN SHALL BE BROUGHT TO THE ENGINEER'S ATTENTION IMMEDIATELY.

KEY NOTES:

1. HORIZONTAL EXTRACTION WELL TO BE INSTALLED BY DIRECTIONAL DRILLING CONTRACTOR SELECTED BY THE ENGINEER. WELL ALIGNMENT SHOWN ON DWG C-3.
2. INSTALL CONVEYANCE LINE PER DWG C-4
3. INSTALL SEWER DISCHARGE LINE PER DWG C-5
4. INSTALL REMEDIATION SYSTEM PER DWG'S C-2, M-1, M-2
5. DEMOLISH AND DISPOSE OF EXISTING CONCRETE WALLS, SLAB AND OVERGROWN VEGETATION.

KEY NOTES SANITARY/STORM DRAIN MANHOLES:

1. SSMH 200 3896
RIM ELEV. = 6421.36
12" PVC INV.(N) = 6410.48
12" PVC INV.(S) = 6410.57
12" PVC INV.(W) = 6410.64
2. SDMH 100 3895
RIM ELEV. = 6420.68
UNABLE TO OPEN
3. SDMH 101 3928
RIM ELEV. = 6419.74
UNABLE TO OPEN
4. SSMH 201 3849
RIM ELEV. = 6420.02
12" PVC INV.(N) = 6409.15
12" PVC INV.(E) = 6409.08
5. SSMH 202 1286
RIM ELEV. = 6419.48
PIPE SIZE AND MATERIAL NOT ACCESSIBLE
(N) = 6409.03
12" PVC INV.(E) = 6408.43
12" PVC INV.(NW) = 6408.97
6. SDMH 102 1000
RIM ELEV. = 6419.61
UNABLE TO OPEN
7. SDMH 105 4154
RIM ELEV. = 6418.12
24" RCP INV.(N) = 6411.68
60" RCP INV.(E) = 6403.53
UNABLE TO GET INV.(S)
48" CMP INV.(W) 6402.92
8. SSMH 203 1448
RIM ELEV. = 6416.59
4" STEEL INV.(NE) = 6410.27
12" STEEL INV.(S) = 6407.19
12" STEEL INV.(W) = 6407.44

REV. NO.	DATE	DESCRIPTION	APPROVED BY

DATE OF ISSUE: 12/31/19
DESIGNED BY: TH
DRAWN BY: JA/RT
CHECKED BY: KJ
APPROVED BY: TG

DBS&A
Daniel B. Stephens & Associates, Inc.
6020 Academy Rd. NE, Suite 100
Albuquerque, NM 87109-3315

NEW MEXICO ENVIRONMENT DEPARTMENT
PETROLEUM STORAGE TANK BUREAU
2905 RODEO PARK DRIVE EAST
SANTA FE, NEW MEXICO 57505

ROSS TEXACO, PINO FINA, AND ATEX 394
GROUNDWATER REMEDIATION SYSTEM INSTALLATION
LAS VEGAS, NEW MEXICO

GENERAL SITE PLAN

SHT. OF 11
DWG NO. C-1
JOB NO. DB18.1277

S:\PROJECTS\DB18.1277_LAS_VEGAS_TRIPLE_SITE\CAD\C-1 GENERAL SITE PLAN.DWG December 30, 2019 - 2:14 PM BY: THOMAS, RYAN

Section 6

All Calculations

<u>Show all calculations</u> used to determine both the hourly and annual controlled and uncontrolled emission rates. All calculations shall be performed keeping a minimum of three significant figures. Document the source of each emission factor used (if an emission rate is carried forward and not revised, then a statement to that effect is required). If identical units are being permitted and will be subject to the same operating conditions, submit calculations for only one unit and a note specifying what other units to which the calculations apply. All formulas and calculations used to calculate emissions must be submitted. The "Calculations" tab in the UA2 has been provided to allow calculations to be linked to the emissions tables. Add additional "Calc" tabs as needed. If the UA2 or other spread sheets are used, all calculation spread sheet(s) shall be submitted electronically in Microsoft Excel compatible format so that formulas and input values can be checked. Format all spread sheets and calculations such that the reviewer can follow the logic and verify the input values. Define all variables. If calculation spread sheets are not used, provide the original formulas with defined variables. Additionally, provide subsequent formulas showing the input values for each variable in the formula. All calculations, including those calculations are imbedded in the Calc tab of the UA2 portion of the application, the printed Calc tab(s), should be submitted under this section.

Tank Flashing Calculations: The information provided to the AQB shall include a discussion of the method used to estimate tank-flashing emissions, relative thresholds (i.e., NOI, permit, or major source (NSPS, PSD or Title V)), accuracy of the model, the input and output from simulation models and software, all calculations, documentation of any assumptions used, descriptions of sampling methods and conditions, copies of any lab sample analysis. If Hysis is used, all relevant input parameters shall be reported, including separator pressure, gas throughput, and all other relevant parameters necessary for flashing calculation.

SSM Calculations: It is the applicant's responsibility to provide an estimate of SSM emissions or to provide justification for not doing so. In this Section, provide emissions calculations for Startup, Shutdown, and Routine Maintenance (SSM) emissions listed in the Section 2 SSM and/or Section 22 GHG Tables and the rational for why the others are reported as zero (or left blank in the SSM/GHG Tables). Refer to "Guidance for Submittal of Startup, Shutdown, Maintenance Emissions in Permit Applications (http://www.env.nm.gov/aqb/permit/app_form.html) for more detailed instructions on calculating SSM emissions. If SSM emissions are greater than those reported in the Section 2, Requested Allowables Table, modeling may be required to ensure compliance with the standards whether the application is NSR or Title V. Refer to the Modeling Section of this application for more guidance on modeling requirements.

Glycol Dehydrator Calculations: The information provided to the AQB shall include the manufacturer's maximum design recirculation rate for the glycol pump. If GRI-Glycalc is used, the full input summary report shall be included as well as a copy of the gas analysis that was used.

Road Calculations: Calculate fugitive particulate emissions and enter haul road fugitives in Tables 2-A, 2-D and 2-E for:

1. If you transport raw material, process material and/or product into or out of or within the facility and have PER emissions greater than 0.5 tpy.
2. If you transport raw material, process material and/or product into or out of the facility more frequently than one round trip per day.

Significant Figures:
A. All emissions standards are deemed to have at least two significant figures, but not more than three significant figures.
B. At least 5 significant figures shall be retained in all intermediate calculations.
C. In calculating emissions to determine compliance with an emission standard, the following rounding off procedures shall be used:

- **(1)** If the first digit to be discarded is less than the number 5, the last digit retained shall not be changed;
- **(2)** If the first digit discarded is greater than the number 5, or if it is the number 5 followed by at least one digit other than the number zero, the last figure retained shall be increased by one unit; **and**
- **(3)** If the first digit discarded is exactly the number 5, followed only by zeros, the last digit retained shall be rounded upward if it is an odd number, but no adjustment shall be made if it is an even number.
- **(4)** The final result of the calculation shall be expressed in the units of the standard.

Control Devices: In accordance with 20.2.72.203.A(3) and (8) NMAC, 20.2.70.300.D(5)(b) and (e) NMAC, and 20.2.73.200.B(7) NMAC, the permittee shall report all control devices and list each pollutant controlled by the control device regardless if the applicant takes credit for the reduction in emissions. The applicant can indicate in this section of the application if they chose to not take credit for the reduction in emission rates. For notices of intent submitted under 20.2.73 NMAC, only uncontrolled emission rates can be considered to determine applicability unless the state or federal Acts require the control. This information is necessary to determine if federally enforceable conditions are necessary for the control device, and/or if the control device produces its own regulated pollutants or increases emission rates of other pollutants.

Please see attached emissions calculation based on QED Environmental Systems modeling software.

Tank flashing and SSM calculations are not required for this project.

QED Air Stripper Model ver. 3.0
SITE DATA

9/13/2019

Name: Thomas Hopkins
Project: BTEX System NM
Units: English
Air Temp: 80 F
Water Temp: 65 F

e-mail: thopkins@geo-logic.com
Save ID: N/A
Altitude: 6400 ft
Flow: 10 gpm

Ease: MN LW MD HI MX

Water Results (EZ-Stacker 4.xp / Air Flow - 280 cfm)

Contaminant	Influent (ppb)	Target (ppb)	4-Tray Results (ppb)	4-Tray %Removal	6-Tray Results (ppb)	6-Tray %Removal
benzene	690	5	0.0	100.0	0.0	100.0
ethylbenzene	2100	700	0.0	100.0	0.0	100.0
methyl-t-Butyl ether (MTBE)	13	100	0.0	100.0	0.0	100.0
naphthalene	480	30	23.2	95.2	6.6	98.6
p-xylene	1300	620	0.0	100.0	0.0	100.0
toluene	11	1000	0.0	100.0	0.0	100.0

Save ID: N/A

Air Results (EZ-Stacker 4.xp / Air Flow - 280 cfm)

Contaminant	4-Tray (ppmV)	4-Tray (lb/hr)	6-Tray (ppmV)	6-Tray (lb/hr)
benzene	1.04	0.00	1.04	0.00
ethylbenzene	2.32	0.01	2.32	0.01
methyl-t-Butyl ether (MTBE)	0.02	0.00	0.02	0.00
naphthalene	0.42	0.00	0.43	0.00
p-xylene	1.44	0.01	1.44	0.01
toluene	0.01	0.00	0.01	0.00

Disclaimers

PH-> 1-800-624-2026 or 1-734-995-2547, FX-> 1-734-995-1170.
E-mail->info@qedenv.com WEB->www.qedenv.com

The QED modeler estimates unit performance for the listed contaminants. Results assume -

1. Contaminants are in the dissolved-phase, within a water matrix
2. Stripper Influent air is contaminant-free
3. Influent liquid does not have surfactants, oil, grease, other immiscible phase(s) or other Henry's constant altering additions present, such as dissolved phase polar organic contaminants
4. The air stripper is operated within the given parameters listed above and as instructed in the E-Z Tray O&M manual

Stripper performance shall meet or exceed either the required effluent concentration(s) or effluent estimates, whichever is greater, for the conditions supplied and assumes the influent concentrations of each contaminant are less than 25% solubility in water.

QED makes no claim of the model's accuracy beyond the 25% solubility in water limit.

Standard E-Z Tray material is 304SS - contact QED for other material options, 304SS is not recommended for chloride levels greater than 80-100ppm. Induced draft blower and piping is recommeneded for systems with off-gas treatment, such as VGAC. Check all downstream pipe and systems losses to ensure that blower and discharge transfer pump(s) are sized correctly. Gravity drain discharge systems must include a water trap.

Remodel Link:

http://64.9.197.49/cgi-bin/remodel.pl?u=e&tw=65&ta=80&f=10&a=6400&s=4.xp&n=Thoma&e=thopkins@geo-logic.com&p=BTEX+&c=63,690;120,2100;149,13;154,480;162,1300;186,11;

URL

Section 6.a

Green House Gas Emissions

(Submitting under 20.2.70, 20.2.72 20.2.74 NMAC)

Title V (20.2.70 NMAC), Minor NSR (20.2.72 NMAC), and PSD (20.2.74 NMAC) applicants must estimate and report greenhouse gas (GHG) emissions to verify the emission rates reported in the public notice, determine applicability to 40 CFR 60 Subparts, and to evaluate Prevention of Significant Deterioration (PSD) applicability. GHG emissions that are subject to air permit regulations consist of the sum of an aggregate group of these six greenhouse gases: carbon dioxide (CO_2), nitrous oxide (N_2O), methane (CH_4), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6).

Calculating GHG Emissions:

1. Calculate the ton per year (tpy) GHG mass emissions and GHG CO_2e emissions from your facility.
2. GHG mass emissions are the sum of the total annual tons of greenhouse gases without adjusting with the global warming potentials (GWPs). GHG CO_2e emissions are the sum of the mass emissions of each individual GHG multiplied by its GWP found in Table A-1 in 40 CFR 98 Mandatory Greenhouse Gas Reporting.
3. Emissions from routine or predictable start up, shut down, and maintenance must be included.
4. Report GHG mass and GHG CO_2e emissions in Table 2-P of this application. Emissions are reported in **short** tons per year and represent each emission unit's Potential to Emit (PTE).
5. All Title V major sources, PSD major sources, and all power plants, whether major or not, must calculate and report GHG mass and CO2e emissions for each unit in Table 2-P.
6. For minor source facilities that are not power plants, are not Title V, and are not PSD there are three options for reporting GHGs in Table 2-P: 1) report GHGs for each individual piece of equipment; 2) report all GHGs from a group of unit types, for example report all combustion source GHGs as a single unit and all venting GHGs as a second separate unit; 3) or check the following ☐ By checking this box, the applicant acknowledges the total CO2e emissions are less than 75,000 tons per year.

Sources for Calculating GHG Emissions:

- Manufacturer's Data
- AP-42 Compilation of Air Pollutant Emission Factors at http://www.epa.gov/ttn/chief/ap42/index.html
- EPA's Internet emission factor database WebFIRE at http://cfpub.epa.gov/webfire/
- 40 CFR 98 Mandatory Green House Gas Reporting except that tons should be reported in short tons rather than in metric tons for the purpose of PSD applicability.
- API Compendium of Greenhouse Gas Emissions Methodologies for the Oil and Natural Gas Industry. August 2009 or most recent version.
- Sources listed on EPA's NSR Resources for Estimating GHG Emissions at http://www.epa.gov/nsr/clean-air-act-permitting-greenhouse-gases:

Global Warming Potentials (GWP):
Applicants must use the Global Warming Potentials codified in Table A-1 of the most recent version of 40 CFR 98 Mandatory Greenhouse Gas Reporting. The GWP for a particular GHG is the ratio of heat trapped by one unit mass of the GHG to that of one unit mass of CO_2 over a specified time period.

"Greenhouse gas" for the purpose of air permit regulations is defined as the aggregate group of the following six gases: carbon dioxide, nitrous oxide, methane, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. **(20.2.70.7 NMAC, 20.2.74.7 NMAC).** You may also find GHGs defined in 40 CFR 86.1818-12(a).

Metric to Short Ton Conversion:
Short tons for GHGs and other regulated pollutants are the standard unit of measure for PSD and title V permitting programs. 40 CFR 98 Mandatory Greenhouse Reporting requires metric tons.
1 metric ton = 1.10231 short tons (per Table A-2 to Subpart A of Part 98 – Units of Measure Conversions)

Section 7

Information Used To Determine Emissions

Information Used to Determine Emissions shall include the following:

- ☒ If manufacturer data are used, include specifications for emissions units and control equipment, including control efficiencies specifications and sufficient engineering data for verification of control equipment operation, including design drawings, test reports, and design parameters that affect normal operation.
- ☐ If test data are used, include a copy of the complete test report. If the test data are for an emissions unit other than the one being permitted, the emission units must be identical. Test data may not be used if any difference in operating conditions of the unit being permitted and the unit represented in the test report significantly effect emission rates.
- ☐ If the most current copy of AP-42 is used, reference the section and date located at the bottom of the page. Include a copy of the page containing the emissions factors, and clearly mark the factors used in the calculations.
- ☐ If an older version of AP-42 is used, include a complete copy of the section.
- ☐ If an EPA document or other material is referenced, include a complete copy.
- ☐ Fuel specifications sheet.
- ☐ If computer models are used to estimate emissions, include an input summary (if available) and a detailed report, and a disk containing the input file(s) used to run the model. For tank-flashing emissions, include a discussion of the method used to estimate tank-flashing emissions, relative thresholds (i.e., permit or major source (NSPS, PSD or Title V)), accuracy of the model, the input and output from simulation models and software, all calculations, documentation of any assumptions used, descriptions of sampling methods and conditions, copies of any lab sample analysis.

Please see QED modeling to determine emissions.

Example calculation:
Assumptions:
1. Maximum possible groundwater influent concentration 4594 µg/L (Determined from groundwater monitoring).
2. 10 gallons per minute flow (maximum flow)

4594 µg/L X 3.78 L/Gal. X 10 Gal./min X 1 lbs./ 4.54e8 µg X 60 min./hr = 0.02 lb/hr

Groundwater influent concentrations will very likely be lower than the maximum measured VOC concentration, which can be considered worst case.

Section 8

Map(s)

A map such as a 7.5 minute topographic quadrangle showing the exact location of the source. The map shall also include the following:

The UTM or Longitudinal coordinate system on both axes	An indicator showing which direction is north
A minimum radius around the plant of 0.8km (0.5 miles)	Access and haul roads
Topographic features of the area	Facility property boundaries
The name of the map	The area which will be restricted to public access
A graphical scale	

See attached (a) site map and (b) 7.5' quad.

Source: ESRI imagery tiles

N

ATEX 394 (ALLSUP'S), PINO FINA, AND ROSS TEXACO
LAS VEGAS, NEW MEXICO

Area Map

Daniel B. Stephens & Associates, Inc.
12/31/2019
DB18.1131.PR

Figure 1

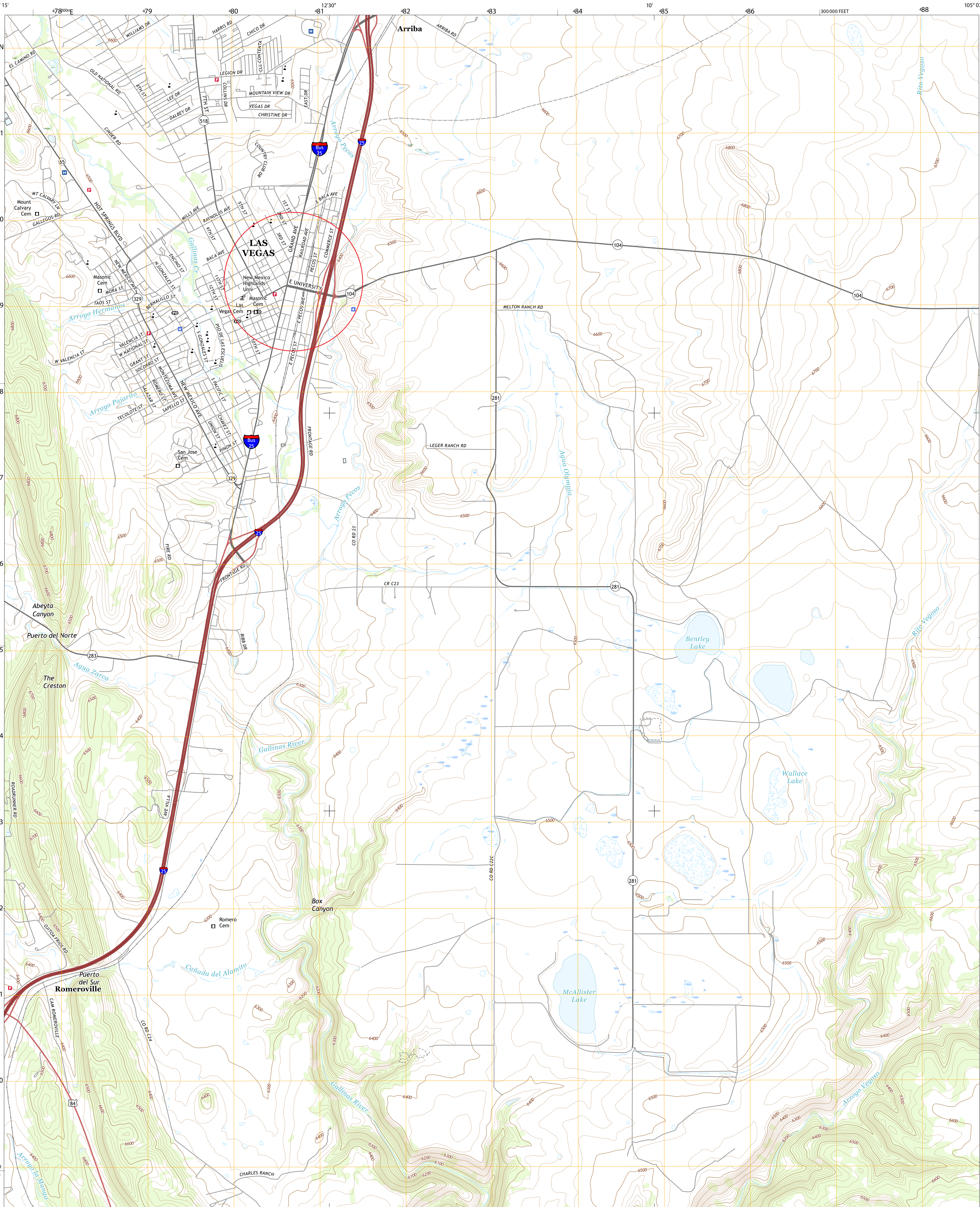
S:\Projects\DB18.1277_Las_Vegas_Triple_Site\GIS\MXDs\Fig01_Area_map.mxd

USGS
science for a changing world

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

The National Map
US Topo

LAS VEGAS QUADRANGLE
NEW MEXICO-SAN MIGUEL CO.
7.5-MINUTE SERIES



Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and 1 000-meter grid: Universal Transverse Mercator, Zone 13S
10 000-foot ticks: New Mexico Coordinate System of 1983 (east zone)

This map is not a legal document. Boundaries may be generalized for this map scale. Private lands within government reservations may not be shown. Obtain permission before entering private lands.

Imagery..NAIP, October 2014
Roads.............................. U.S. Census Bureau, 2015 - 2016
Names...GNIS, 2016
Hydrography....................National Hydrography Dataset, 2014
Contours..........................National Elevation Dataset, 2000
Boundaries...........Multiple sources; see metadata file 1972 - 2016
Public Land Survey System................................BLM, 2016
Wetlands.........FWS National Wetlands Inventory 1977 - 2014

MN
GN
0° 7´
2 MILS
8° 3´
143 MILS

UTM GRID AND 2017 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

U.S. National Grid
100,000-m Square ID
DV
Grid Zone Designation
13S

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with the National Geospatial Program US Topo Product Standard, 2011.
A metadata file associated with this product is draft version 0.6.19

NEW MEXICO
QUADRANGLE LOCATION

1	2	3
4		5
6	7	8

ADJOINING QUADRANGLES

1 Montezuma
2 Las Vegas NW
3 Onava
4 Ojitos Frios
5 Las Vegas SE
6 Tecolote
7 Los Montoyas
8 La Liendre

ROAD CLASSIFICATION

Expressway
Secondary Hwy
Ramp
Local Connector
Local Road
4WD
Interstate Route
US Route
State Route

LAS VEGAS, NM
2017

NSN. 7643016383484
NGA REF NO. USGSX24K25015

Section 9

Proof of Public Notice

(for NSR applications submitting under 20.2.72 or 20.2.74 NMAC)
(This proof is required by: 20.2.72.203.A.14 NMAC "Documentary Proof of applicant's public notice")

☒ **I have read the AQB "Guidelines for Public Notification for Air Quality Permit Applications"**
This document provides detailed instructions about public notice requirements for various permitting actions. It also provides public notice examples and certification forms. Material mistakes in the public notice will require a re-notice before issuance of the permit.

Unless otherwise allowed elsewhere in this document, the following items document proof of the applicant's Public Notification. Please include this page in your proof of public notice submittal with checkmarks indicating which documents are being submitted with the application.

New Permit and **Significant Permit Revision** public notices must include all items in this list.

Technical Revision public notices require only items 1, 5, 9, and 10.

Per the Guidelines for Public Notification document mentioned above, include:

1. ☐ A copy of the certified letter receipts with post marks (20.2.72.203.B NMAC)
2. ☐ A list of the places where the public notice has been posted in at least four publicly accessible and conspicuous places, including the proposed or existing facility entrance. (e.g: post office, library, grocery, etc.)
3. ☐ A copy of the property tax record (20.2.72.203.B NMAC).
4. ☐ A sample of the letters sent to the owners of record.
5. ☐ A sample of the letters sent to counties, municipalities, and Indian tribes.
6. ☐ A sample of the public notice posted and a verification of the local postings.
7. ☐ A table of the noticed citizens, counties, municipalities and tribes and to whom the notices were sent in each group.
8. ☐ A copy of the public service announcement (PSA) sent to a local radio station and documentary proof of submittal.
9. ☐ A copy of the classified or legal ad including the page header (date and newspaper title) or its affidavit of publication stating the ad date, and a copy of the ad. When appropriate, this ad shall be printed in both English and Spanish.
10. ☐ A copy of the display ad including the page header (date and newspaper title) or its affidavit of publication stating the ad date, and a copy of the ad. When appropriate, this ad shall be printed in both English and Spanish.
11. ☐ A map with a graphic scale showing the facility boundary and the surrounding area in which owners of record were notified by mail. This is necessary for verification that the correct facility boundary was used in determining distance for notifying land owners of record.

Section 10

Written Description of the Routine Operations of the Facility

A written description of the routine operations of the facility. Include a description of how each piece of equipment will be operated, how controls will be used, and the fate of both the products and waste generated. For modifications and/or revisions, explain how the changes will affect the existing process. In a separate paragraph describe the major process bottlenecks that limit production. The purpose of this description is to provide sufficient information about plant operations for the permit writer to determine appropriate emission sources.

A single 300-foot long horizontal extraction well will be installed through a hydrocarbon plume under the intersection of Grand and University Ave. Contaminated groundwater will be pumped to an equipment compound onsite containing a storage tank, air stripper unit (emission source), and other non-emitting equipment. The air stripper will remove hydrocarbons from a maximum flow of 10 gpm. The air stripper will vent a flow of 280 cfm through a vertical stack to the atmosphere. Treated groundwater will be discharged into the sanitary sewer.

Air emissions from the air stripper have been modeled using lab analyses from the most contaminated monitoring wells onsite. During actual operation, hydrocarbon concentrations in air stripper influent should be lower as a result of less contaminated water also being extracted along the well screen.

Failure of any component in the system will lead to system shutdown. There would be no air emissions during system shutdown.

The remediation system, including the air stripper, will be routinely monitored to ensure proper function.

Section 11

Source Determination

Source submitting under 20.2.70, 20.2.72, 20.2.73, and 20.2.74 NMAC

Sources applying for a construction permit, PSD permit, or operating permit shall evaluate surrounding and/or associated sources (including those sources directly connected to this source for business reasons) and complete this section. Responses to the following questions shall be consistent with the Air Quality Bureau's permitting guidance, Single Source Determination Guidance, which may be found on the Applications Page in the Permitting Section of the Air Quality Bureau website.

Typically, buildings, structures, installations, or facilities that have the same SIC code, that are under common ownership or control, and that are contiguous or adjacent constitute a single stationary source for 20.2.70, 20.2.72, 20.2.73, and 20.2.74 NMAC applicability purposes. Submission of your analysis of these factors in support of the responses below is optional, unless requested by NMED.

A. Identify the emission sources evaluated in this section (list and describe)**:**

B. Apply the 3 criteria for determining a single source:

SIC Code: Surrounding or associated sources belong to the same 2-digit industrial grouping (2-digit SIC code) as this facility, OR surrounding or associated sources that belong to different 2-digit SIC codes are support facilities for this source.

☒ **Yes** ☐ **No**

Common Ownership or Control: Surrounding or associated sources are under common ownership or control as this source.

☒**Yes** ☐ **No**

Contiguous or Adjacent: Surrounding or associated sources are contiguous or adjacent with this source.

☒**Yes** ☐ **No**

C. Make a determination:

☒ The source, as described in this application, constitutes the entire source for 20.2.70, 20.2.72, 20.2.73, or 20.2.74 NMAC applicability purposes. If in "A" above you evaluated only the source that is the subject of this application, all "**YES**" boxes should be checked. If in "A" above you evaluated other sources as well, you must check **AT LEAST ONE** of the boxes "**NO**" to conclude that the source, as described in the application, is the entire source for 20.2.70, 20.2.72, 20.2.73, and 20.2.74 NMAC applicability purposes.

☐ The source, as described in this application, **does not** constitute the entire source for 20.2.70, 20.2.72, 20.2.73, or 20.2.74 NMAC applicability purposes (A permit may be issued for a portion of a source). The entire source consists of the following facilities or emissions sources (list and describe):

Section 12

Section 12.A
PSD Applicability Determination for All Sources

(Submitting under 20.2.72, 20.2.74 NMAC)

A PSD applicability determination for all sources. For sources applying for a significant permit revision, apply the applicable requirements of 20.2.74.AG and 20.2.74.200 NMAC and to determine whether this facility is a major or minor PSD source, and whether this modification is a major or a minor PSD modification. It may be helpful to refer to the procedures for Determining the Net Emissions Change at a Source as specified by Table A-5 (Page A.45) of the EPA New Source Review Workshop Manual to determine if the revision is subject to PSD review.

A. This facility is:

☒ **a minor PSD source before and after this modification (if so, delete C and D below).**

☐ **a major PSD source before this modification. This modification will make this a PSD minor source.**

☐ **an existing PSD Major Source that has never had a major modification requiring a BACT analysis.**

☐ **an existing PSD Major Source that has had a major modification requiring a BACT analysis**

☐ **a new PSD Major Source after this modification.**

B. **This facility is not one of the listed 20.2.74.501 Table I – PSD Source Categories. The "project" emissions** for this modification are **not significant, since they will be far less than 1 ton/yr. The "project" emissions listed below do only result from changes described in this permit application, and since the facility is not yet built no past emissions exist. There are no plans to modify the system at a future date. This project will not result in "de-bottlenecking", or other associated emissions resulting in higher emissions. The project emissions (before netting) for this project are as follows [see Table 2 in 20.2.74.502 NMAC for a complete list of significance levels]:**

a. **NOx: 0 TPY**
b. **CO: 0TPY**
c. **VOC: <0.01 TPY**
d. **SOx: 0 TPY**
e. **PM: 0 TPY**
f. **PM10: 0 TPY**
g. **PM2.5: 0 TPY**
h. **Fluorides: 0 TPY**
i. **Lead: 0 TPY**
j. **Sulfur compounds (listed in Table 2): 0 TPY**
k. **GHG: <0.01 TPY**

C. **Netting is not required (project is not significant)]**

D. **BACT** is **not required for this modification, as this application is a minor modification.**

E. If this is an existing PSD major source, or any facility with emissions greater than 250 TPY (or 100 TPY for 20.2.74.501 Table 1 – PSD Source Categories), determine whether any permit modifications are related, or could be considered a single project with this action, and provide an explanation for your determination whether a PSD modification is triggered.

Section 13

Determination of State & Federal Air Quality Regulations

This section lists each state and federal air quality regulation that may apply to your facility and/or equipment that are stationary sources of regulated air pollutants.

Not all state and federal air quality regulations are included in this list. Go to the Code of Federal Regulations (CFR) or to the Air Quality Bureau's regulation page to see the full set of air quality regulations.

Required Information for Specific Equipment:
For regulations that apply to specific source types, in the 'Justification' column **provide any information needed to determine if the regulation does or does not apply**. **For example**, to determine if emissions standards at 40 CFR 60, Subpart IIII apply to your three identical stationary engines, we need to know the construction date as defined in that regulation; the manufacturer date; the date of reconstruction or modification, if any; if they are or are not fire pump engines; if they are or are not emergency engines as defined in that regulation; their site ratings; and the cylinder displacement.

Required Information for Regulations that Apply to the Entire Facility:
See instructions in the 'Justification' column for the information that is needed to determine if an 'Entire Facility' type of regulation applies (e.g. 20.2.70 or 20.2.73 NMAC).

Regulatory Citations for Regulations That Do Not, but Could Apply:
If there is a state or federal air quality regulation that does not apply, but you have a piece of equipment in a source category for which a regulation has been promulgated, you must **provide the low level regulatory citation showing why your piece of equipment is not subject to or exempt from the regulation. For example** if you have a stationary internal combustion engine that is not subject to 40 CFR 63, Subpart ZZZZ because it is an existing 2 stroke lean burn stationary RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions, your citation would be 40 CFR 63.6590(b)(3)(i). **We don't want a discussion of every non-applicable regulation, but if it is possible a regulation could apply, explain why it does not. For example,** if your facility is a power plant, you do not need to include a citation to show that 40 CFR 60, Subpart OOO does not apply to your non-existent rock crusher.

Regulatory Citations for Emission Standards:
For each unit that is subject to an emission standard in a source specific regulation, such as 40 CFR 60, Subpart OOO or 40 CFR 63, Subpart HH, include the low level regulatory citation of that emission standard. Emission standards can be numerical emission limits, work practice standards, or other requirements such as maintenance. **Here are examples:** a glycol dehydrator is subject to the general standards at 63.764C(1)(i) through (iii); an engine is subject to 63.6601, Tables 2a and 2b; a crusher is subject to 60.672(b), Table 3 and all transfer points are subject to 60.672(e)(1)

Federally Enforceable Conditions:
All federal regulations are federally enforceable. All Air Quality Bureau State regulations are federally enforceable except for the following: affirmative defense portions at 20.2.7.6.B, 20.2.7.110(B)(15), 20.2.7.11 through 20.2.7.113, 20.2.7.115, and 20.2.7.116; 20.2.37; 20.2.42; 20.2.43; 20.2.62; 20.2.63; 20.2.86; 20.2.89; and 20.2.90 NMAC. Federally enforceable means that EPA can enforce the regulation as well as the Air Quality Bureau and federally enforceable regulations can count toward determining a facility's potential to emit (PTE) for the Title V, PSD, and nonattainment permit regulations.

INCLUDE ANY OTHER INFORMATION NEEDED TO COMPLETE AN APPLICABILITY DETERMINATION OR THAT IS RELEVENT TO YOUR FACILITY'S NOTICE OF INTENT OR PERMIT.

EPA Applicability Determination Index for 40 CFR 60, 61, 63, etc: http://cfpub.epa.gov/adi/

To save paper and to standardize the application format, delete this sentence, and begin your submittal for this attachment on this page.

Example of a Table for STATE REGULATIONS:

STATE REGU-LATIONS CITATION	Title	Applies? Enter Yes or No	Unit(s) or Facility	JUSTIFICATION: (You may delete instructions or statements that do not apply in the justification column to shorten the document.)
20.2.1 NMAC	General Provisions	Yes	Facility	General Provisions apply to Notice of Intent, Construction, and Title V permit applications.
20.2.3 NMAC	Ambient Air Quality Standards NMAAQS	Yes	Facility	This facility emits small volumes of low concentration VOCs with little potential to impact overall site ambient air quality..
20.2.7 NMAC	Excess Emissions	No	Facility	This facility is a minor source, not a Title V source.
20.2.23 NMAC	Fugitive Dust Control	No	Facility	This facility will not emit fugitive dust and is not in an area subject to this requirement.
20.2.33 NMAC	Gas Burning Equipment - Nitrogen Dioxide	No	Facility	This facility does not burn gas.
20.2.34 NMAC	Oil Burning Equipment: NO_2	No	Facility	This facility does not burn oil.
20.2.35 NMAC	Natural Gas Processing Plant – Sulfur	No	Facility	This facility does not process natural gas or emit sulfur.
20.2.37 and 20.2.36 NMAC	Petroleum Processing Facilities and Petroleum Refineries	No	Facility	This facility does not process petroleum or refine it.
20.2.38 NMAC	Hydrocarbon Storage Facility	No	Facility	This facility does not store hydrocarbons.
20.2.39 NMAC	Sulfur Recovery Plant - Sulfur	No	Facility	This facility does not recover or emit sulfur.
20.2.61.109 NMAC	Smoke & Visible Emissions	No	Facility	This facility is not subject because it qualifies for exemption D under 20.2.61.111 NMAC.
20.2.70 NMAC	Operating Permits	No	Facility	This facility is not subject because it qualifies for exemption B under 20.2.70.202 NMAC (non-major source).
20.2.71 NMAC	Operating Permit Fees	No	Facility	This facility is not subject because it qualifies for exemption B under 20.2.70.202 NMAC (non-major source).
20.2.72 NMAC	Construction Permits	No	Facility	This facility is not subject to 20.2.72 NMAC because it does not meet any of the permit requirements.
20.2.73 NMAC	NOI & Emissions Inventory Requirements	No	Facility	The emissions from this facility are low enough that an NOI is not required.
20.2.74 NMAC	Permits – Prevention of Significant Deterioration (PSD)	No	Facility	This facility is not a PSD major as defined by any of the following: **(1)** Any stationary source listed in Table 1 of this Part (20.2.74.501 NMAC) which emits, or has the potential to emit, emissions equal to or greater than one hundred (100) tons per year of any regulated pollutant; or **(2)** Any stationary source not listed in Table 1 of this Part (20.2.74.501 NMAC) and which emits or has the potential to emit two hundred fifty (250) tons per year or more of any regulated pollutant; or **(3)** Any physical change that would occur at a stationary source not otherwise qualifying under paragraphs (1) or (2) of subsection Z of 20.2.74.7 NMAC if the change would constitute a major stationary source by itself; **(4)** A major source that is major for volatile organic compounds shall be considered major for ozone; **(5)** The fugitive emissions of a stationary source shall not be included in determining for any of the purposes of this section whether it is a major stationary

STATE REGU-LATIONS CITATION	**Title**	**Applies? Enter Yes or No**	**Unit(s) or Facility**	**JUSTIFICATION: (You may delete instructions or statements that do not apply in the justification column to shorten the document.)**
				source, unless the source belongs to one of the stationary source categories found in Table 1 of this Part (20.2.74.501 NMAC) or any other stationary source category which, as of August 7, 1980, is being regulated under section 111 or 112 of the Act.
20.2.75 NMAC	Construction Permit Fees	No	Facility	This facility is not subject to 20.2.72 NMAC because it does not meet any of the permit requirements.
20.2.77 NMAC	New Source Performance	No	Units subject to 40 CFR 60	This facility is a Clean Air Act designated area source which is not regulated by the EPA under 40 CFR 60.
20.2.78 NMAC	Emission Standards for HAPS	No	Units Subject to 40 CFR 61	This facility is a Clean Air Act designated area source which is not regulated by the EPA under 40 CFR 61 or by the Urban Air Toxics Strategy.
20.2.79 NMAC	Permits – Nonattainment Areas	No	Facility	This facility is a minor stationary source
20.2.80 NMAC	Stack Heights	No		This facility has one stack approximately 13’.
20.2.82 NMAC	MACT Standards for source categories of HAPS	No	Units Subject to 40 CFR 63	This facility is a Clean Air Act designated area source which is not regulated by the EPA under 40 CFR 61 or by the Urban Air Toxics Strategy.

Example of a Table for Applicable FEDERAL REGULATIONS (Note: This is not an exhaustive list):

FEDERAL REGU-LATIONS CITATION	**Title**	**Applies? Enter Yes or No**	**Unit(s) or Facility**	**JUSTIFICATION:**
40 CFR 50	NAAQS	No	Facility	This facility emits small volumes of low concentration VOCs with little potential to impact overall site ambient air quality.
NSPS 40 CFR 60, Subpart A	General Provisions	No	Units subject to 40 CFR 60	This facility is a Clean Air Act designated area source which is not regulated by the EPA under 40 CFR 63 or by the Urban Air Toxics Strategy.
NSPS 40 CFR60.40a, Subpart Da	Subpart Da, Performance Standards for **Electric Utility Steam Generating Units**	No	Facility	This facility will not possess utility steam generating units.

FEDERAL REGU-LATIONS CITATION	Title	Applies? Enter Yes or No	Unit(s) or Facility	JUSTIFICATION:
NSPS 40 CFR60.40b Subpart Db	**Electric Utility Steam Generating Units**	No	Facility	This facility will not possess utility steam generating units.
40 CFR 60.40c, Subpart Dc	Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units	No	Facility	This facility will not possess utility steam generating units.
NSPS 40 CFR 60, Subpart Ka	Standards of Performance for **Storage Vessels for Petroleum Liquids** for which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and **Prior** to July 23, 1984	No	Facility	This facility will not possess storage vessels for petroleum liquids.
NSPS 40 CFR 60, Subpart Kb	Standards of Performance for **Volatile Organic Liquid Storage Vessels** (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced **After** July 23, 1984	No	Facility	This facility will not possess storage vessels for volatile organic liquids.
NSPS 40 CFR 60.330 Subpart GG	**Stationary Gas Turbines**	No	Facility	This facility will not possess stationary gas turbines.
NSPS 40 CFR 60, Subpart KKK	Leaks of VOC from **Onshore Gas Plants**	No	Facility	This facility will not utilize natural gas.
NSPS 40 CFR Part 60 Subpart LLL	Standards of Performance for **Onshore Natural Gas Processing**:	No	Facility	This facility will not utilize natural gas.

FEDERAL REGU-LATIONS CITATION	Title	Applies? Enter Yes or No	Unit(s) or Facility	JUSTIFICATION:
	SO_2 Emissions			
NSPS 40 CFR Part 60 Subpart OOOO	Standards of Performance for Crude Oil and Natural Gas Production, Transmission, and Distribution for which construction, modification or reconstruction commenced after August 23, 2011 and before September 18, 2015	No	Facility	This facility will not utilize natural gas or crude oil.
NSPS 40 CFR Part 60 Subpart OOOOa	Standards of Performance for Crude Oil and Natural Gas Facilities for which Construction, Modification or Reconstruction Commenced After September 18, 2015	No	Facility	This facility will not utilize natural gas or crude oil.
NSPS 40 CFR 60 Subpart IIII	Standards of performance for Stationary Compression Ignition Internal Combustion Engines	No	Facility	This facility will not utilize any combustion engines.
NSPS 40 CFR Part 60 Subpart JJJJ	Standards of Performance for Stationary Spark Ignition Internal Combustion Engines	No	Facility	This facility will not utilize any combustion engines.
NSPS 40 CFR 60 Subpart TTTT	Standards of Performance for Greenhouse Gas Emissions for Electric Generating Units	No	Facility	This facility will not generate electricity.
NSPS 40 CFR 60 Subpart UUUU	Emissions Guidelines for Greenhouse Gas Emissions and Compliance Times for Electric Utility Generating Units	No	Facility	This facility will not generate electricity.
NSPS 40 CFR 60, Subparts WWW, XXX, Cc,	Standards of performance for Municipal Solid Waste (MSW)	No	Facility	This facility is not a solid waste landfill.

FEDERAL REGU-LATIONS CITATION	Title	Applies? Enter Yes or No	Unit(s) or Facility	JUSTIFICATION:
and Cf	Landfills			
NESHAP 40 CFR 61 Subpart A	General Provisions	No	Facility	This facility is not regulated under 40 CFR 61
NESHAP 40 CFR 61 Subpart E	National Emission Standards for **Mercury**	No	Facility	This facility will not emit mercury.
NESHAP 40 CFR 61 Subpart V	National Emission Standards for **Equipment Leaks** (Fugitive Emission Sources)	No	Facility	This facility does not have any sources that are intended to operate in volatile hazardous air pollutant (VHAP) service: pumps, compressors, pressure relief devices, sampling connection systems, open-ended valves or lines, valves, connectors, surge control vessels, bottoms receivers, and control devices or systems required by this subpart
MACT 40 CFR 63, Subpart A	General Provisions	No	Facility	This facility is a Clean Air Act designated area source which is not regulated by the EPA under 40 CFR 63 or by the Urban Air Toxics Strategy.
MACT 40 CFR 63.760 Subpart HH	**Oil and Natural Gas Production Facilities**	No	Facility	This facility is not an Oil and Gas Production Facility and is not subject to the requirements of 40 CFR 63 Subpart HH
MACT 40 CFR 63 Subpart HHH		No	Facility	This facility is not subject to 40 CFR 63 Subpart HHH
MACT 40 CFR 63 Subpart DDDDD	National Emission Standards for Hazardous Air Pollutants for Major Industrial, Commercial, and Institutional Boilers & Process Heaters	No	Facility	This facility will not possess boilers or process heaters.
MACT 40 CFR 63 Subpart UUUUU	National Emission Standards for Hazardous Air Pollutants Coal & Oil Fire Electric Utility Steam Generating Unit	No	Facility	This facility will not utilize coal or oil.
MACT 40 CFR 63 Subpart ZZZZ	National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines (**RICE MACT**)	No	Facility	This facility will possess any internal combustion engines.

FEDERAL REGU-LATIONS CITATION	Title	Applies? Enter Yes or No	Unit(s) or Facility	JUSTIFICATION:
40 CFR 64	**Compliance Assurance Monitoring**	No	Facility	This facility is not a major source; therefore Compliance Assurance Monitoring does not apply.
40 CFR 68	**Chemical Accident Prevention**	No	Facility	This facility is not a stationary source that has more than a threshold quantity of a regulated substance in a process, as determined under §68.115, 40 CFR 68.
Title IV – Acid Rain 40 CFR 72	**Acid Rain**	No	Facility	This facility is not an electricity generation facility, therefore 40 CFR 72 does not apply.
Title IV – Acid Rain 40 CFR 73	**Sulfur Dioxide** Allowance Emissions	No	Facility	This facility is not an electricity generation facility, therefore 40 CFR 73 does not apply.
Title IV-Acid Rain 40 CFR 75	**Continuous Emissions Monitoring**	No	Facility	This facility is not an electricity generation facility, therefore Title IV 40 CFR 75 does not apply.
Title IV – Acid Rain 40 CFR 76	**Acid Rain** Nitrogen Oxides **Emission Reduction Program**	No	Facility	This facility is not an electricity generation facility, therefore 40 CFR 76 does not apply.
Title VI – 40 CFR 82	Protection of **Stratospheric Ozone**	No	Facility	This facility will not utilize or store any equipment containing chemicals that destroy atmospheric ozone.

Section 14

Operational Plan to Mitigate Emissions

(Submitting under 20.2.70, 20.2.72, 20.2.74 NMAC)

☐ **Title V Sources** (20.2.70 NMAC)**:** By checking this box and certifying this application the permittee certifies that it has developed an **Operational Plan to Mitigate Emissions During Startups, Shutdowns, and Emergencies** defining the measures to be taken to mitigate source emissions during startups, shutdowns, and emergencies as required by 20.2.70.300.D.5(f) and (g) NMAC. This plan shall be kept on site to be made available to the Department upon request. This plan should not be submitted with this application.

☐ **NSR** (20.2.72 NMAC)**, PSD** (20.2.74 NMAC) **& Nonattainment** (20.2.79 NMAC) **Sources:** By checking this box and certifying this application the permittee certifies that it has developed an **Operational Plan to Mitigate Source Emissions During Malfunction, Startup, or Shutdown** defining the measures to be taken to mitigate source emissions during malfunction, startup, or shutdown as required by 20.2.72.203.A.5 NMAC. This plan shall be kept on site to be made available to the Department upon request. This plan should not be submitted with this application.

☐ **Title V** (20.2.70 NMAC)**, NSR** (20.2.72 NMAC)**, PSD** (20.2.74 NMAC) **& Nonattainment** (20.2.79 NMAC) **Sources:** By checking this box and certifying this application the permittee certifies that it has established and implemented a Plan to Minimize Emissions During Routine or Predictable Startup, Shutdown, and Scheduled Maintenance through work practice standards and good air pollution control practices as required by 20.2.7.14.A and B NMAC. This plan shall be kept on site or at the nearest field office to be made available to the Department upon request. This plan should not be submitted with this application.

The emissions from this facility are below permitting standards. If sampling determines the potential for emissions above any standard, the system will be shut down and operations will only continue on a schedule that will prevent exceedance of any permitting standard.

Section 15

Alternative Operating Scenarios

(Submitting under 20.2.70, 20.2.72, 20.2.74 NMAC)

Alternative Operating Scenarios: Provide all information required by the department to define alternative operating scenarios. This includes process, material and product changes; facility emissions information; air pollution control equipment requirements; any applicable requirements; monitoring, recordkeeping, and reporting requirements; and compliance certification requirements. Please ensure applicable Tables in this application are clearly marked to show alternative operating scenario.

Construction Scenarios: When a permit is modified authorizing new construction to an existing facility, NMED includes a condition to clearly address which permit condition(s) (from the previous permit and the new permit) govern during the interval between the date of issuance of the modification permit and the completion of construction of the modification(s). There are many possible variables that need to be addressed such as: Is simultaneous operation of the old and new units permitted and, if so for example, for how long and under what restraints? In general, these types of requirements will be addressed in Section A100 of the permit, but additional requirements may be added elsewhere. Look in A100 of our NSR and/or TV permit template for sample language dealing with these requirements. Find these permit templates at: https://www.env.nm.gov/aqb/permit/aqb_pol.html. Compliance with standards must be maintained during construction, which should not usually be a problem unless simultaneous operation of old and new equipment is requested.

In this section, under the bolded title "Construction Scenarios", specify any information necessary to write these conditions, such as: conservative-realistic estimated time for completion of construction of the various units, whether simultaneous operation of old and new units is being requested (and, if so, modeled), whether the old units will be removed or decommissioned, any PSD ramifications, any temporary limits requested during phased construction, whether any increase in emissions is being requested as SSM emissions or will instead be handled as a separate Construction Scenario (with corresponding emission limits and conditions, etc.

There are no alternative operating scenarios for this facility.

Section 16

Air Dispersion Modeling

1) Minor Source Construction (20.2.72 NMAC) and Prevention of Significant Deterioration (PSD) (20.2.74 NMAC) ambient impact analysis (modeling): Provide an ambient impact analysis as required at 20.2.72.203.A(4) and/or 20.2.74.303 NMAC and as outlined in the Air Quality Bureau's Dispersion Modeling Guidelines found on the Planning Section's modeling website. If air dispersion modeling has been waived for one or more pollutants, attach the AQB Modeling Section modeling waiver approval documentation.
2) SSM Modeling: Applicants must conduct dispersion modeling for the total short term emissions during routine or predictable startup, shutdown, or maintenance (SSM) using realistic worst case scenarios following guidance from the Air Quality Bureau's dispersion modeling section. Refer to "Guidance for Submittal of Startup, Shutdown, Maintenance Emissions in Permit Applications (http://www.env.nm.gov/aqb/permit/app_form.html) for more detailed instructions on SSM emissions modeling requirements.
3) Title V (20.2.70 NMAC) ambient impact analysis: Title V applications must specify the construction permit and/or Title V Permit number(s) for which air quality dispersion modeling was last approved. Facilities that have only a Title V permit, such as landfills and air curtain incinerators, are subject to the same modeling required for preconstruction permits required by 20.2.72 and 20.2.74 NMAC.

What is the purpose of this application?	Enter an X for each purpose that applies
New PSD major source or PSD major modification (20.2.74 NMAC). See #1 above.	
New Minor Source or significant permit revision under 20.2.72 NMAC (20.2.72.219.D NMAC). See #1 above. **Note:** Neither modeling nor a modeling waiver is required for VOC emissions.	
Reporting existing pollutants that were not previously reported.	
Reporting existing pollutants where the ambient impact is being addressed for the first time.	
Title V application (new, renewal, significant, or minor modification. 20.2.70 NMAC). See #3 above.	
Relocation (20.2.72.202.B.4 or 72.202.D.3.c NMAC)	
Minor Source Technical Permit Revision 20.2.72.219.B.1.d.vi NMAC for like-kind unit replacements.	
Other: i.e. SSM modeling. See #2 above.	
This application does not require modeling since this is a No Permit Required (NPR) application.	
This application does not require modeling since this is a Notice of Intent (NOI) application (20.2.73 NMAC).	
This application does not require modeling according to 20.2.70.7.E(11), 20.2.72.203.A(4), 20.2.74.303, 20.2.79.109.D NMAC and in accordance with the Air Quality Bureau's Modeling Guidelines.	

Check each box that applies:

☐ See attached, approved modeling **waiver for all** pollutants from the facility.
☐ See attached, approved modeling **waiver for some** pollutants from the facility.
☐ Attached in Universal Application Form 4 (UA4) is a **modeling report for all** pollutants from the facility.
☐ Attached in UA4 is a **modeling report for some** pollutants from the facility.
☒ No modeling is required.

Section 17

Compliance Test History

(Submitting under 20.2.70, 20.2.72, 20.2.74 NMAC)

To show compliance with existing NSR permits conditions, you must submit a compliance test history. The table below provides an example.

This facility does not have any existing NSR permits.

Section 20

Other Relevant Information

Other relevant information. Use this attachment to clarify any part in the application that you think needs explaining. Reference the section, table, column, and/or field. Include any additional text, tables, calculations or clarifying information.

Additionally, the applicant may propose specific permit language for AQB consideration. In the case of a revision to an existing permit, the applicant should provide the old language and the new language in track changes format to highlight the proposed changes. If proposing language for a new facility or language for a new unit, submit the proposed operating condition(s), along with the associated monitoring, recordkeeping, and reporting conditions. In either case, please limit the proposed language to the affected portion of the permit.

There is no additional information that needs to be included for this application.

Section 22: Certification

Company Name: ____

I, ____________________________________, hereby certify that the information and data submitted in this application are true and as accurate as possible, to the best of my knowledge and professional expertise and experience.

Signed this ____ day of ________________, ________, upon my oath or affirmation, before a notary of the State of

___________________________________.

_______________________________________ _______________________

*Signature Date

_______________________________________ _______________________

Printed Name Title

Scribed and sworn before me on this ____ day of _________________________, _________.

My authorization as a notary of the State of _______________________________ expires on the

_________________ day of _______________________, ______________.

_______________________________________ _______________________

Notary's Signature Date

____

Notary's Printed Name

*For Title V applications, the signature must be of the Responsible Official as defined in 20.2.70.7.AE NMAC.

Utility

December 31, 2019

New Mexico Department of Transportation
District 4
P.O. Box 10
Las Vegas, NM 87701

Re: Public Right of Way Permit - Las Vegas, NM

To Whom It May Concern:

Please find enclosed four copies of a fully executed Utility Permit Application. We have been contracted by the New Mexico Environment Department (NMED) Petroleum Storage Tank Bureau (PSTB) to install a horizontal groundwater extraction well in the vicinity of University and Grand Avenues (associated with the Atex 394, Pino Fina, and Ross Texaco PSTB sites) in Las Vegas, New Mexico. The proposed extraction well will be located under the sidewalk along the east side of Grand Ave as shown on the attached figures. The borehole entrance and exit will be on private property.

Please contact me at (505) 822-9400 or tgolden@geo-logic.com if you have any questions concerning this application.

Sincerely,

DANIEL B. STEPHENS & ASSOCIATES, INC.

Thomas Golden, P.E.
Project Engineer

TG/ed
Enclosures

Form No. A-63
Rev. 11/12

APPLICATION FOR PERMIT TO INSTALL UTILITY FACILITIES WITHIN PUBLIC RIGHT OF WAY

Permit No.____________

________Renewal Permit
________ Relocation
________ Remain in place
XXX New Installation

T0: NEW MEXICO DEPARTMENT of TRANSPORTATION
P.O. BOX 1149
SANTA FE, NEW MEXICO 87504 – 1149

1. Pursuant to New Mexico Statutes Annotated, 1978 Compilation, Sections 67-8-13 and 55-2-7, and 17.4.2 NMAC the undersigned Daniel B. Stephens & Associates, Inc.

   Address: 6020 Academy Rd. NE, Suite 100, Albuquerque, NM 87109
   herein makes application to use highway rights of way to install:

   Size and Type of Facility Horizontal groundwater extraction well underneath right of way. Approximately 500 feet in length.

   in the following location: N.M. Project No. See attached Map (Figure 1), S.R. No. ____________,

   Highway Station / and or GPS/MP 35 deg. 35' 46.31"N 105 deg 12' 49.74"W" to Highway Station and/or GPS/MP 35 deg 35' 49.80"N 105 deg 12' 48.77"W,

   San Miguel County, Section Las Vegas Land Grar, Township ____________, Range ____________

2. For the purpose of this application "within" shall be construed as meaning "on, upon, over, under, across or along."
   a. "Engineer" shall be construed as meaning the District Engineer of the New Mexico Department of Transportation or the District Engineer's representative.
   b. "Applicant" shall be construed as meaning the individual, firm, corporation, association, governmental subdivision, or other organization making application, or the successors of any of the above.
   c. "Facility" shall be construed as meaning, but not limited to any publicly, privately, cooperatively, municipally or governmentally owned facility used for carriage, distribution or transmission of water, gas or electricity, oil and products derived therefrom, sewage, stream or other projects carried by means of pipelines, conduits, wires, culverts, ditches, conveyors or other methods.
   d. If application is for a parallel installation, justification as to why private right may not be utilized must be furnished.

3. Applicant proposes to relocate, install or leave facility (varies, see map) feet within the Grand and University Avenu right of way line. The proposed installation shall be:

Both	subsurface	Boring
(Crossing or Parallel)	(Subsurface or Overhead)	(Boring, Jacking or Pavement Cut)

   a. If Applicant requests installation by pavement cut, complete justification therefore shall be submitted by attachment.
   b. Where application for pavement cut is justified, the application may be held in abeyance pending receipt of cash bond in an amount to be fixed by the Engineer.

4. There is attached hereto a diagrammatic dimensioned drawing showing the location of existing and/or proposed installation referenced to roadway and right of way, right of way lines, any access control lines, distance of proposed installation above, or below grade, highway stationing, identification of materials to be used and any other pertinent data, If application is for parallel installation, nature of adjacent land use must be shown. Proposed installations on or in bridges or other structures, or for the installation of any structures, shall require detailed structural drawings.

5. Applicant desires this permit to be in affect for 25 years. Permit shall not be issued for a period longer than 25 years, and must be renewed upon expiration. The burden of timely renewal is on the Applicant. The Applicant shall formally notify the engineer of actual commencement and completion of construction of the installation. The Applicant shall also formally notify the Engineer of removal or abandonment of the facility, or relinquishment of the permit.

6. This application shall be validated as a permit upon the signing of the application by the Engineer and returning it to the applicant. The granting of this permit shall not be construed as granting any easement or property right.

7. Servicing of facilities shall not be permitted within the access control lines on any controlled access project. Should an emergency occur, the Applicant shall notify the Engineer and shall provide such flagmen, flashers, warning or other safety devices as required by the Engineer. All routine maintenance shall be performed from outside any access control lines.

8. The relocation or installation of facilities within public right of way shall be in strict conformance with all **applicable provisions of**

regulations of the New Mexico Department of Transportation, 17.4.2 NMAC, all provisions of this application, drawing and the Instructions for Utility Permits, as they may be modified by the Engineer, and no departure therefrom may be made without the written consent of the Engineer. All facilities shall be so placed that they will not interfere with or endanger any roadway features or other existing facilities. All construction of facilities shall be subject to the inspection and approval of the Engineer. All such work shall be performed so that danger, inconvenience and delay to the traveling public will be held to a minimum. Protection and handling of traffic during the installation are the responsibility of the Applicant and must be approved by the Engineer.

9. The Applicant shall, except as otherwise ordered by the Engineer, restore the public right of way, and all bridges or other structures thereon or adjacent thereto which have been altered or affected by facility installation performed hereunder, in accordance with sound construction practices and the Engineer's specifications, and shall cause the work to be done in a workmanlike manner, If any damage is caused to the highway right of way or to any bridge, structure or improvement thereon or adjacent thereto by reason of the design installation, maintenance, alteration or removal of such facilities or other appurtenances, the Applicant shall reimburse the Engineer the full amount thereof promptly upon demand by the Engineer provided, however, that the obligation imposed under this paragraph shall not apply in the event the damage resulted from causes beyond the control of the Applicant or its contractors or its consultants. All such facilities located within the right of way shall at all times be kept in such repair so as not to damage the highway, inconvenience or endanger the traveling public and shall be kept free from advertisement, posters and the like.

10. Should the Applicant at any time fail to promptly and fully perform any of the obligations imposed hereby and after thirty (30) days written notice thereof, the Engineer may, at his option (a) cause the obligations to be fully carried out and performed, and the Applicant shall promptly reimburse the Engineer for all costs and expenses incident thereto, or (b) summarily order the removal of such facility and if the Applicant fails to comply with that removal order within a reasonable time, the Engineer may direct the removal of the facility with all costs and expenses thereto to be borne by Applicant.

11. If by reason of any change In the location, construction, grade or by any other matter affecting the highway upon which any facility is located or because of changing traffic conditions or otherwise, it shall become advisable In the opinion of the Engineer that said facility be removed, relocated or otherwise modified, the Applicant, upon written notice from the Engineer, shall remove, relocate or modify such facility without undue delay in such manner as the Engineer may direct or approve, at the Applicant's expense and at no cost to the Engineer, the New Mexico Department of Transportation or the New Mexico State Transportation Commission. All facilities located on public right of way under the dual jurisdiction of the State and a subordinate governmental entity shall comply with all applicable rules and regulations of such entity properly and lawfully In force and Including but not limited to provisions of local franchises not in conflict with the rules and regulations of the New Mexico Department of Transportation. The Engineer makes no express or implied as to the continued existence of any highway in any particular location and expressly assumes no obligation with regard to the facility upon change, vacation or abandonment of any highway or portions thereof.

12. Neither the making of this application nor anything herein contained shall constitute a waiver on the part of the Applicant of any rights or claims had or made by some with respect to the occupancy of the streets and highways under the Constitution and Laws of the State of New Mexico, nor shall anything herein contained in any prejudice or impair any rights or claims existing Independent of this application with respect to the construction, operation and maintenance of the Applicant's facilities In the State of New Mexico.

13. The utility owner must indemnify and hold harmless the New Mexico Department of Transportation from loss due to any negligent act of the utility, the utility's
employees, any agent acting on the utility's behalf, and anyone else engaged by the utility to work on
the utility installations, maintenance or relocations of their facilities. Any contractor or subcontractor engaged by the utility to perform utility installations or relocations in conjunction with or prior to highway construction must also indemnify and hold harmless the New Mexico Department of Transportation from loss due to any negligent act of the utility's contractor or subcontractor.

14. Each copy of the application shall be signed by the Applicant as an individual owner or by any official designated to execute such documents.

15. Utility owners shall carry insurance in amounts not less than those below specified and as outlined in 17 NMAC 4.2 and the Standard Specifications for Highway and Bridge Construction, 1994 Edition, (hereinafter, "Specifications"), as may be updated from time to time. In the event of conflict between the specification, and the regulations, owner shall carry the larger amount of insurance. If a utility is self-insured, the utility shall provide an Owner's Protective Liability Insurance Policy, in favor of the Department, in the amounts below specified. **Department as additional named insured**: The utility, its contractor or subcontractor shall have the New Mexico State Highway and Transportation Department added as an additional named insured on the Comprehensive General Liability Form or Commercial General Liability Form furnished by the Utility.

This application is hereby granted subject to all provisions herein and including the following special provisions, changes or amendments:

The utility shall provide "as-built" horizontal and vertical location information in hard copy and electronic file (AutoCAD DWG (3D) or Microstation DGN (3D) format. The standard horizontal datum shall be North American Datum 1983 (NAD83) and the standard projections shall be the New Mexico State Plane

Coordinate System 1983 (NMSPCS83). The standard vertical datum shall be North American Vertical Datum 1988 (NAVD 1988). The preferred media in which this data must be submitted is CD ROM. The utility location information shall be tied to Department monuments and referenced to highway mileposts and/or to highway project construction stationing and certified by a New Mexico Registered Land Surveyor. Metadata or "data about the data" shall be submitted with each utility's as-built electronic file, preferably as a separate text file on the electronic submittal media, and shall include: **1.** District Utility Permit Number. **2.** Name, address and phone number of the responsible land surveyor. **3.** Date of completion of survey. **4.** Equipment used to conduct the Survey. **5.** Horizontal and vertical control marks used to tie the survey to the NMSPC83 and NAVD88. **6.** Ground to Grid combined scale factor used. **7.** Elevations shall be provided every 500 feet and at all survey break points, including all high and low points.

Note: Highway projects are time sensitive therefore, permit information requested from Authorization to Engineer Letters must be returned by the date indicated within the Authorization to Engineer letter.

16. Pursuant to: MAP-21; http://www.fhwa.dot.gov/construction/contracts/buyam-qa.cfm and (23U.S.C313) Applicant/Utility Owner certifies we are in compliance with Buy America for said facility described in Section 1. of this permit document. Applicant agrees and understands nonadherence will void said permit.

Applicant Daniel B. Stephens & Associates, Inc.

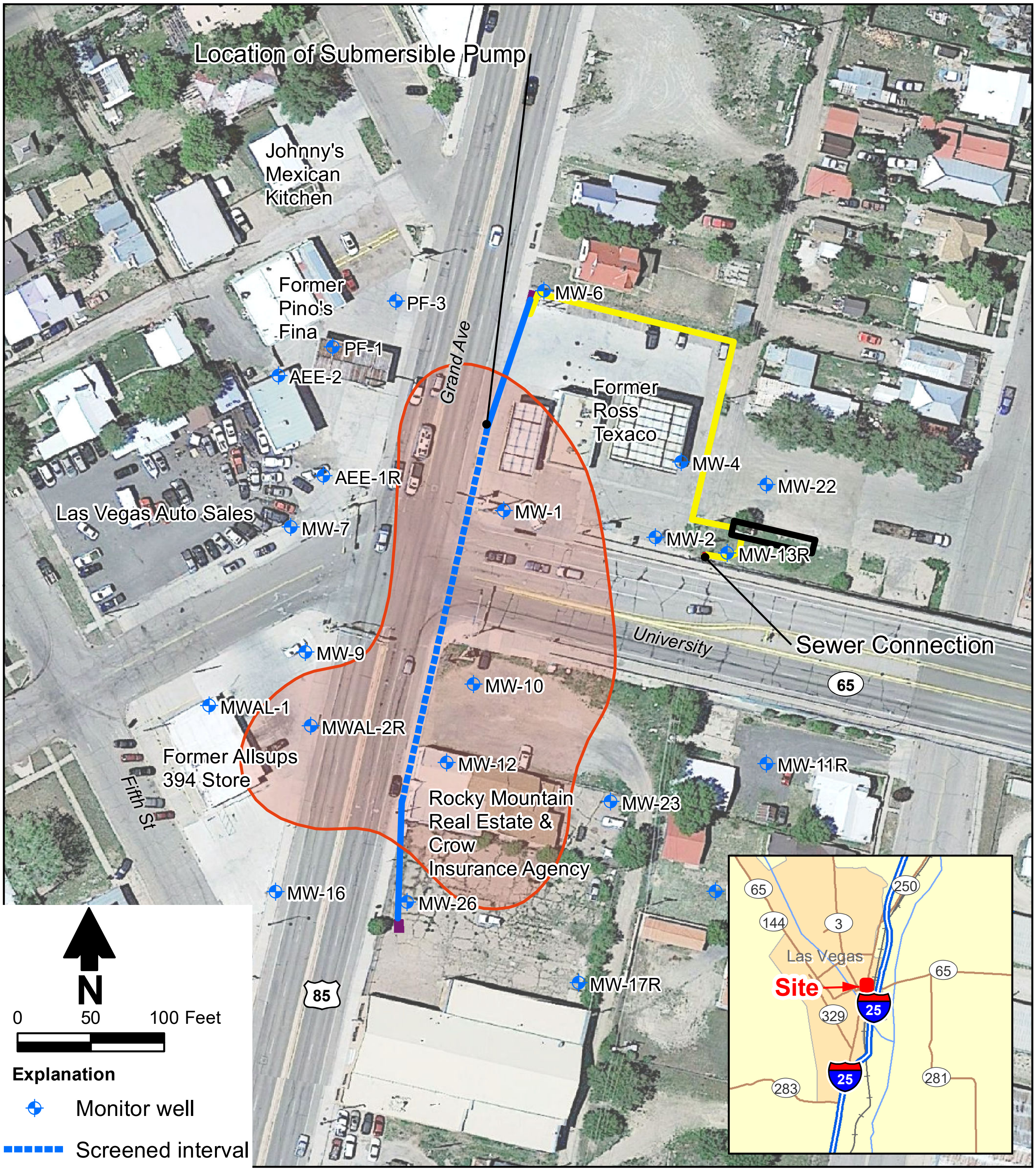
By Thomas Golden, P.E.

Title Project Engineer

Approval of this permit is hereby given this ___________ day of ____________________________, 20 ________

NEW MEXICO DEPARTMENT of TRANSPORTATION

By ____



Source: Google Earth May 2019

Explanation

- Monitor well
- Screened interval
- 6" HDPE casing
- Equipment compound
- Proposed conveyance lines
- Extent of actionable benzene in groundwater
- Well vaults

ATEX 394 (ALLSUP'S), PINO FINA, AND ROSS TEXACO

Proposed Technical Approach

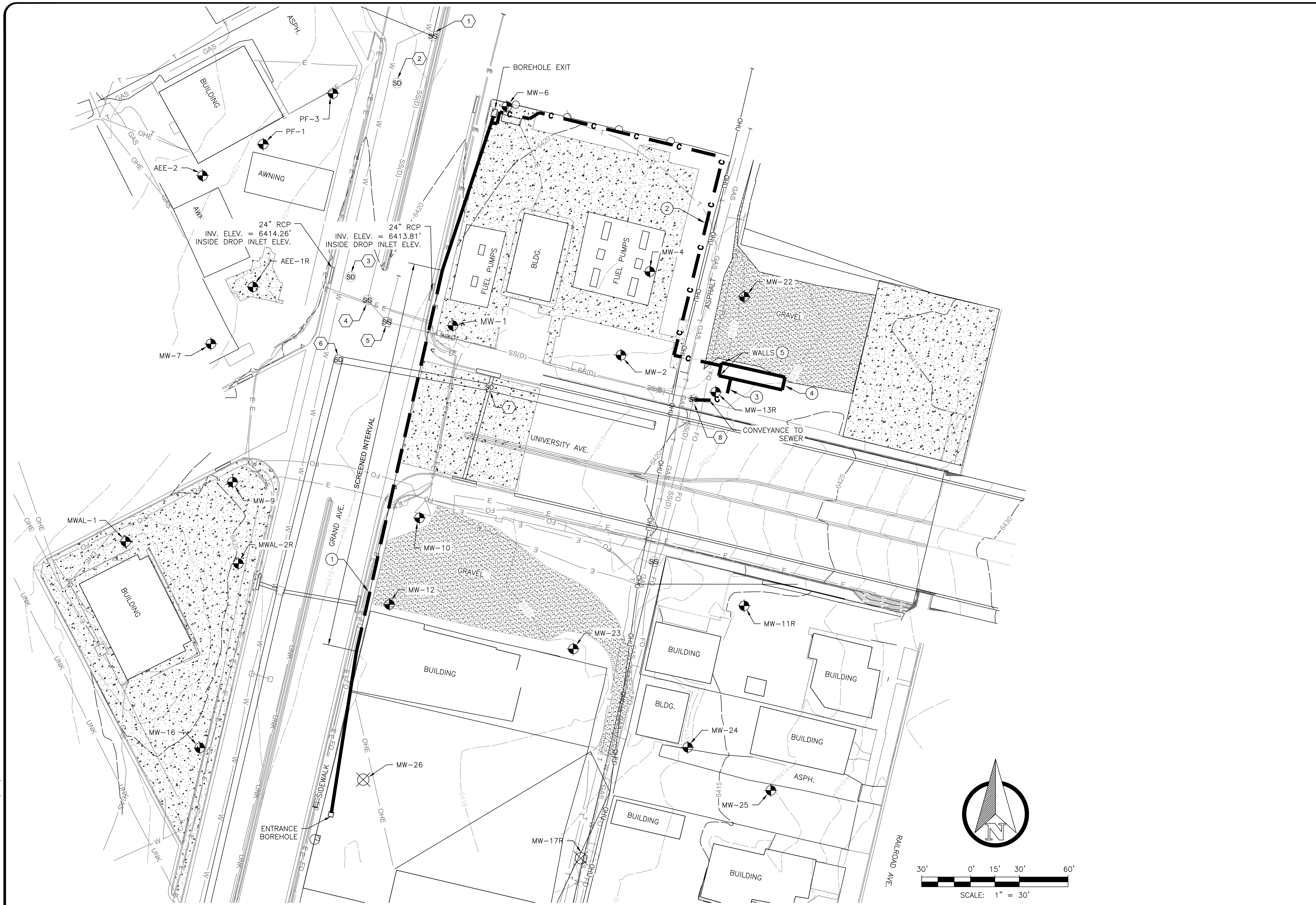
Daniel B. Stephens & Associates, Inc.

12/20/2019

JN DB18.1277

Figure 1

Path: S:\Projects\DB18.1277_Las_Vegas_Triple_Site\GIS\MXDs\Working\Technical_approach.mxd



GENERAL NOTES:

1. UTILITY LOCATIONS ARE APPROXIMATE AND HAVE NOT BEEN FIELD VERIFIED.

KEY NOTES:

1. INSTALL HORIZONTAL EXTRACTION WELL PER DWG C-3
2. INSTALL CONVEYANCE LINE PER DWG C-4
3. INSTALL SEWER DISCHARGE LINE PER DWG C-5
4. INSTALL REMEDIATION SYSTEM PER DWG'S C-2, M-1, M-2
5. DEMOLISH AND DISPOSE OF EXISTING WALLS AND SLAB

KEY NOTES SANITARY/STORM DRAIN MANHOLES:

1. SSMH 200 3896
   RIM ELEV. = 6421.36
   12" PVC INV.(N) = 6410.48
   12" PVC INV.(S) = 6410.57
   12" PVC INV.(W) = 6410.64
2. SDMH 100 3895
   RIM ELEV. = 6420.68
   UNABLE TO OPEN
3. SDMH 101 3928
   RIM ELEV. = 6419.74
   UNABLE TO OPEN
4. SSMH 201 3849
   RIM ELEV. = 6420.02
   12" PVC INV.(N) = 6409.15
   12" PVC INV.(E) = 6409.08
5. SSMH 202 1286
   RIM ELEV. = 6419.48
   PIPE SIZE AND MATERIAL NOT ACCESSIBLE
   (N) = 6409.03
   12" PVC INV.(E) = 6408.43
   12" PVC INV.(NW) = 6408.97
6. SDMH 102 1000
   RIM ELEV. = 6419.61
   UNABLE TO OPEN
7. SDMH 105 4154
   RIM ELEV. = 6418.12
   24" RCP INV.(N) = 6411.68
   60" RCP INV.(E) = 6403.53
   UNABLE TO GET INV.(S)
   48" CMP INV.(W) 6402.92
8. SSMH 203 1448
   RIM ELEV. = 6416.59
   4" STEEL INV.(NE) = 6410.27
   12" STEEL INV.(S) = 6407.19
   12" STEEL INV.(W) = 6407.44

\\SS6ABQ\DATAS\PROJECTS\DB18.1277_LAS_VEGAS_TRIPLE_SITE\CAD\C-1 GENERAL SITE PLAN.DWG December 18, 2019 - 2:14 PM BY: THOMAS, RYAN

REV. NO.	DATE	DESCRIPTION	APPROVED BY

DATE OF ISSUE: 12/31/19
DESIGNED BY: TH
DRAWN BY: RT
CHECKED BY: KJ
APPROVED BY: TG

DBS&A
Daniel B. Stephens & Associates, Inc.
6020 Academy Rd. NE, Suite 100
Albuquerque, NM 87109-3315

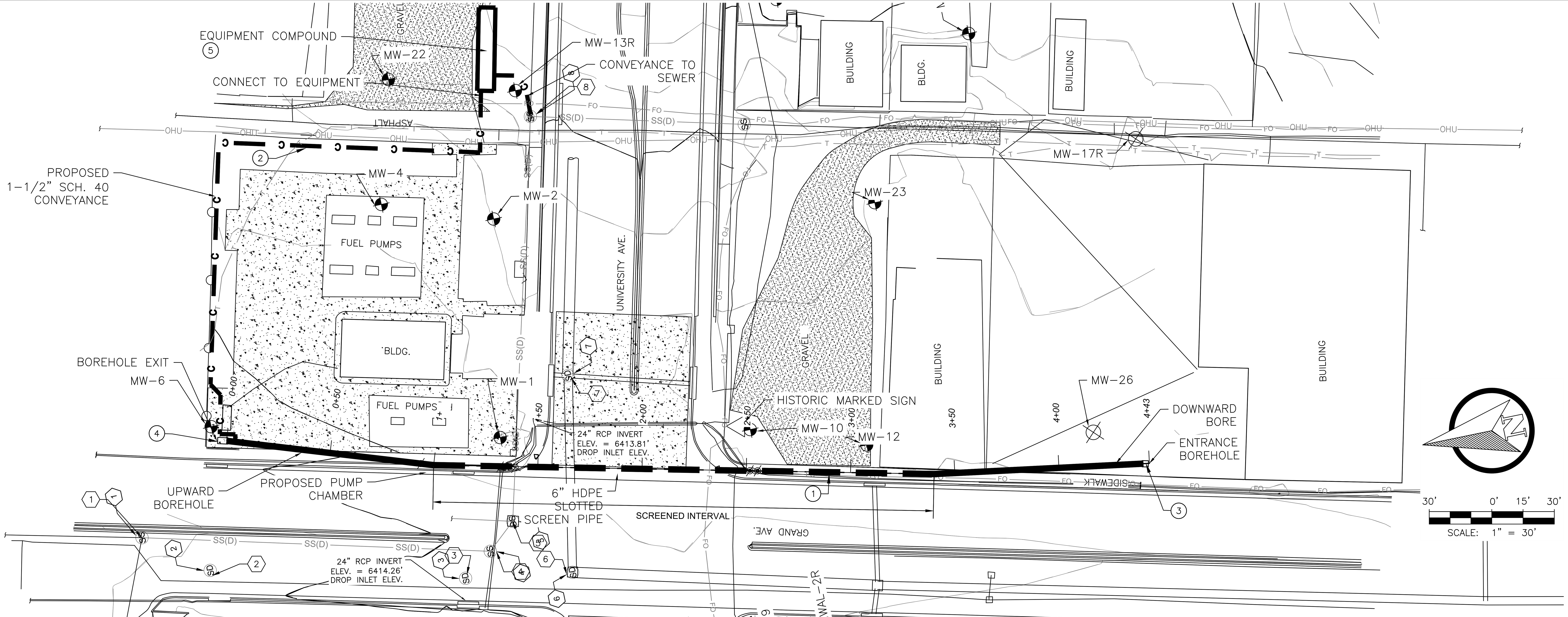
NEW MEXICO ENVIRONMENT DEPARTMENT
PETROLEUM STORAGE TANK BUREAU
2905 RODEO PARK DRIVE EAST
SANTA FE, NEW MEXICO 57505

ROSS TEXACO, PINO'S FINA, AND ALLSUPS
GROUNDWATER REMEDIATION SYSTEM INSTALLATION
LAS VEGAS, NEW MEXICO

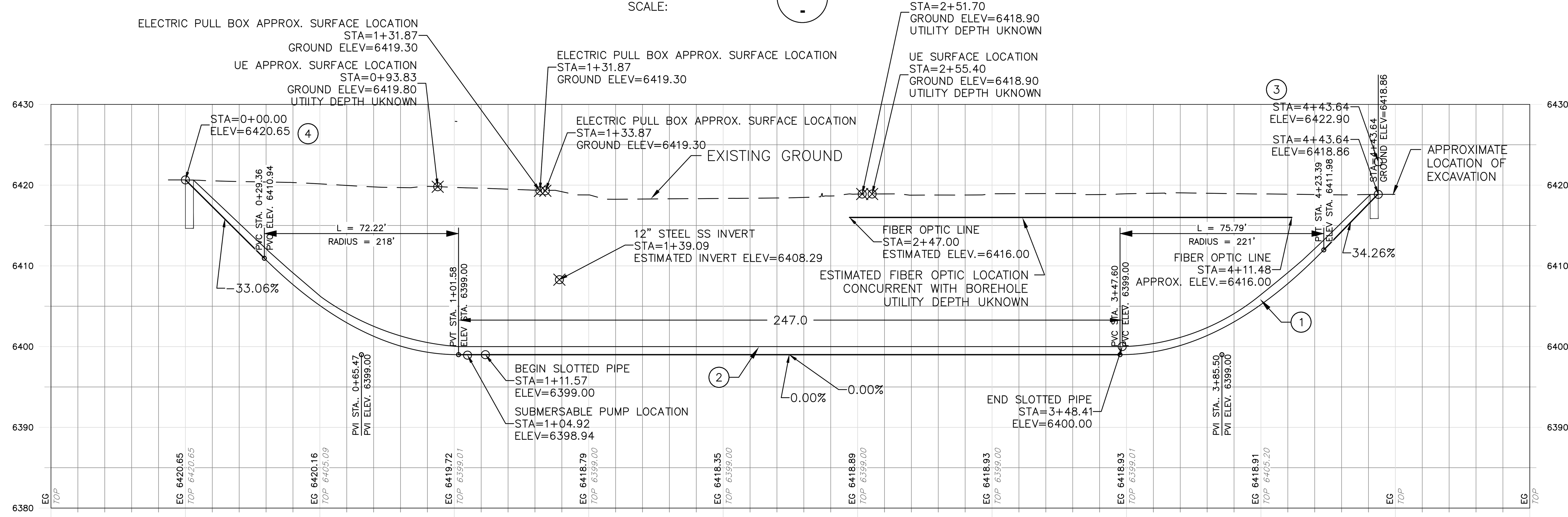
GENERAL SITE PLAN

SHT. OF 11
DWG NO. C-1

JOB NO.
DB18.1277



PLAN 1
SCALE:



PROFILE 1
SCALE: 1" = 30'
VERTICAL SCALE: 1"=10'

GENERAL NOTES:

1. UTILITY LOCATIONS ARE APPROXIMATE AND HAVE NOT BEEN FIELD VERIFIED.
2. THE GROUND SURFACE SHALL BE RESTORED TO PREVIOUS CONDITIONS OR BETTER AFTER DISTURBANCE.
3. RECEIVE, STORE, AND INSTALL ALL PIPING MATERIAL IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
4. PRESSURE TEST PVC WITH WATER AT 100 PSI FOR ONE HOUR. PRESSURE DEVIATION OF MORE THAN 5 PSI OVER THE HOUR WILL REQUIRE CORRECTIVE ACTION.

KEY NOTES:

1. 6" HDPE SDR 11
2. SCREEN SHALL BE FACTORY SLOTTED 0.02" SLOT, SLOT DENSITY OF 4 PER FOOT. 6" HDPE SDR11.
3. INSTALL ENTRANCE VAULT PER DETAIL 1, DWG C-6.
4. INSTALL EXIT VAULT PER DETAIL 2, DWG C-6.

KEY NOTES SANITARY/STORM DRAIN MANHOLES:

1. SSMH 200 3896
RIM ELEV. = 6421.36
12" PVC INV.(N) = 6410.48
12" PVC INV.(S) = 6410.57
12" PVC INV.(W) = 6410.64
2. SDMH 100 3895
RIM ELEV. = 6420.68
UNABLE TO OPEN
3. SDMH 101 3928
RIM ELEV. = 6419.74
UNABLE TO OPEN
4. SSMH 201 3849
RIM ELEV. = 6420.02
12" PVC INV.(N) = 6409.15
12" PVC INV.(E) = 6409.08
5. SSMH 202 1286
RIM ELEV. = 6419.48
PIPE SIZE AND MATERIAL NOT ACCESSIBLE (N) = 6409.03
12" PVC INV.(E) = 6408.43
12" PVC INV.(NW) = 6408.97
6. SDMH 102 1000
RIM ELEV. = 6419.61
UNABLE TO OPEN
7. SDMH 105 4154
RIM ELEV. = 6418.12
24" RCP INV.(N) = 6411.68
60" RCP INV.(E) = 6403.53
UNABLE TO GET INV.(S)
48" CMP INV.(W) 6402.92
8. SSMH 203 1448
RIM ELEV. = 6416.59
4" STEEL INV.(NE) = 6410.27
12" STEEL INV.(S) = 6407.19
12" STEEL INV.(W) = 6407.44

REV. NO.	DATE	DESCRIPTION	APPROVED BY

DATE OF ISSUE: 12/31/19
DESIGNED BY: TH
DRAWN BY: RT
CHECKED BY: KJ
APPROVED BY: TG

DBS&A
Daniel B. Stephens & Associates, Inc.
6020 Academy Rd. NE, Suite 100
Albuquerque, NM 87109-3315

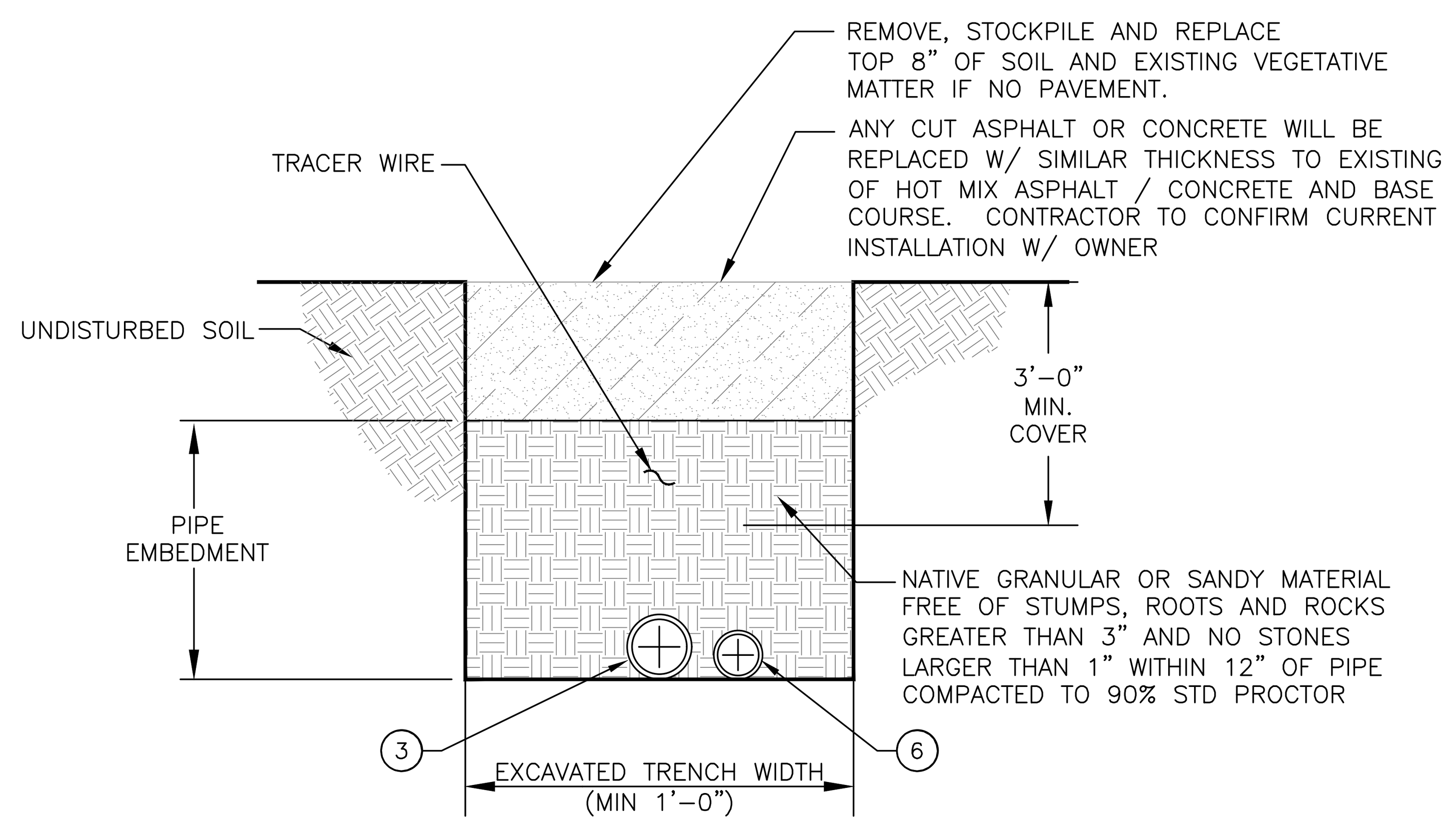
NEW MEXICO ENVIRONMENT DEPARTMENT
PETROLEUM STORAGE TANK BUREAU
2905 RODEO PARK DRIVE EAST
SANTA FE, NEW MEXICO 57505

ROSS TEXACO, PINO'S FINA, AND ATEX 394
GROUNDWATER REMEDIATION SYSTEM INSTALLATION
LAS VEGAS, NEW MEXICO

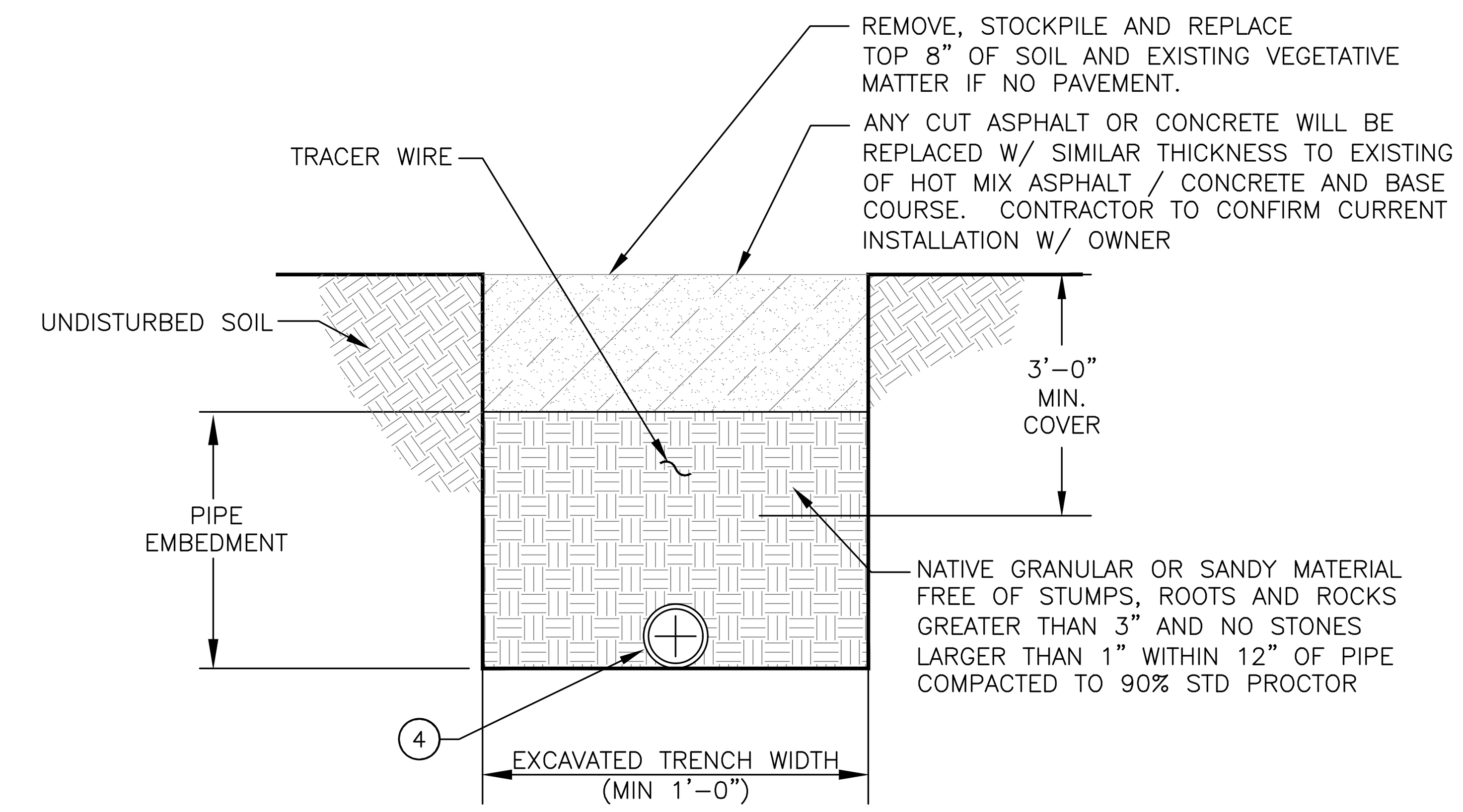
□ORI□ONTAL WELL PLAN AND PROFILE

SHT. 6 OF 11
DWG NO. C-□

JOB NO. DB18.1277



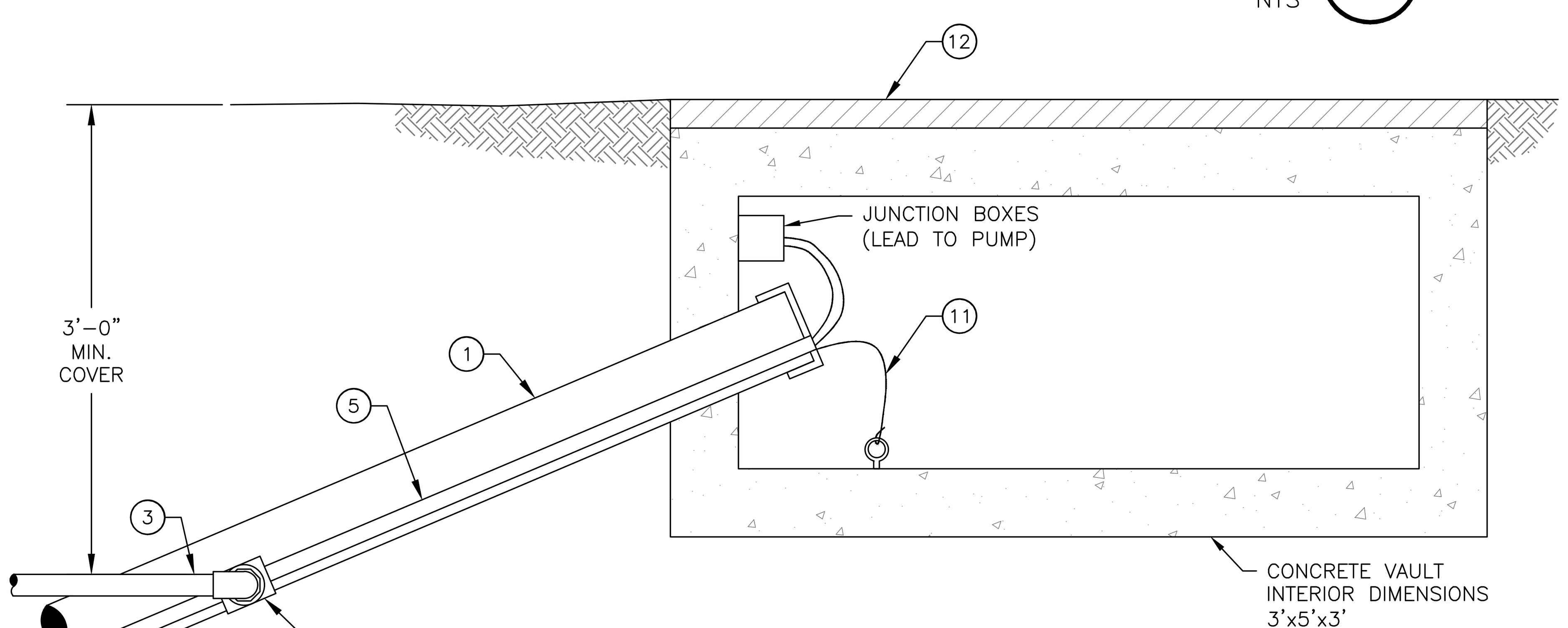
TYPICAL CONVEYANCE PIPING TRENCH SECTION 1 / -
NTS



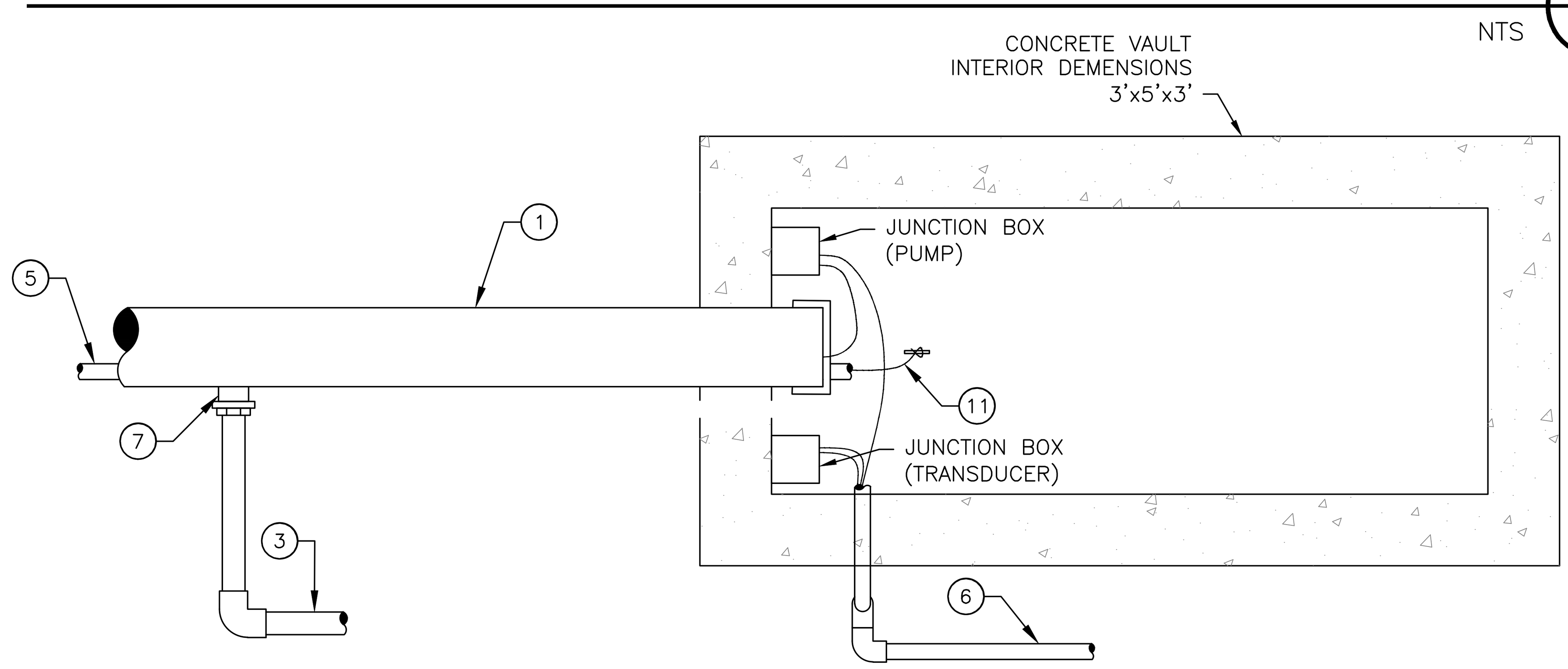
SEWER DISCHARGE CONVEYANCE PIPING TRENCH SECTION 4 / -
NTS

KEY NOTES:

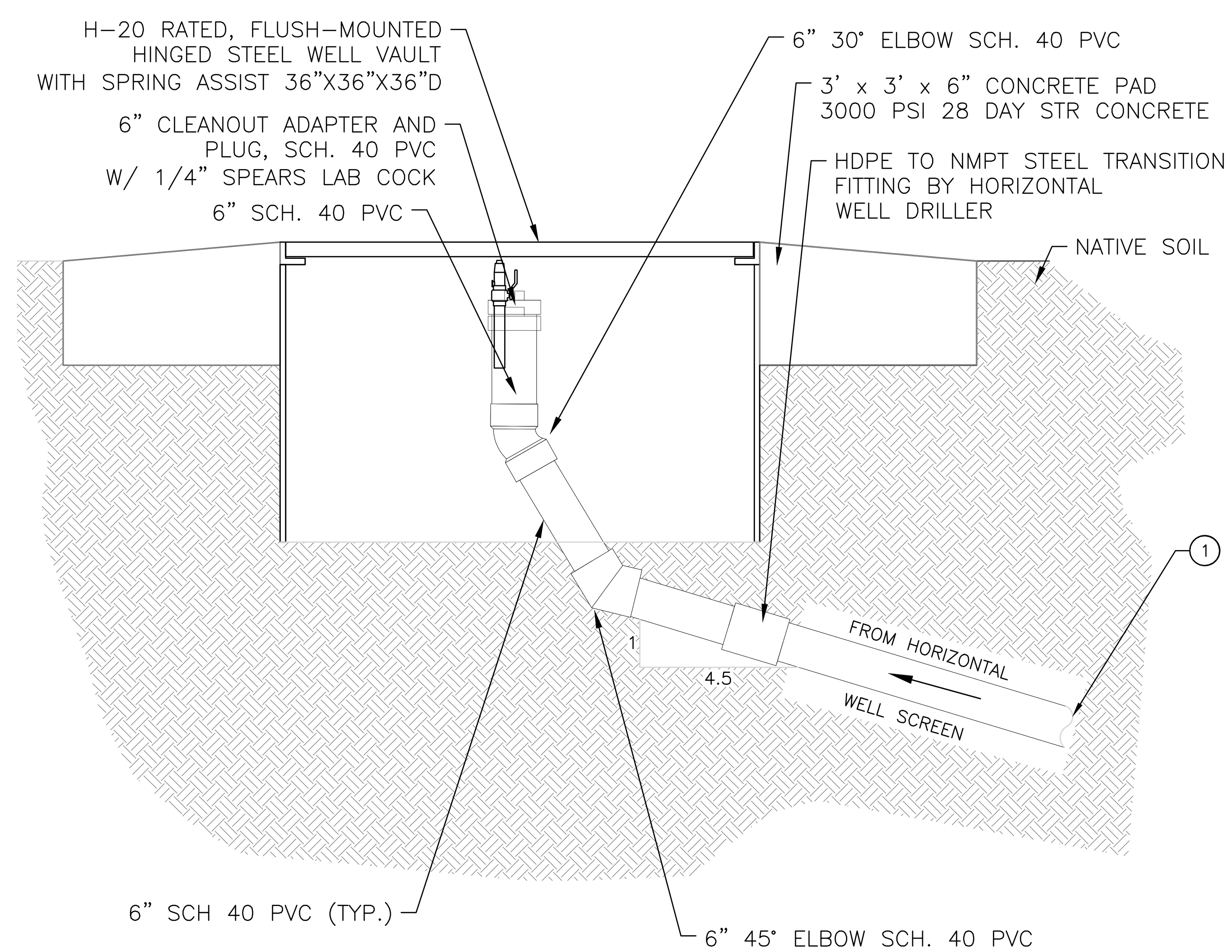
1. 6" SOLID WALL HDPE SDR 11
2. 6" SLOTTED 0.02" HDPE. FACTORY SLOTTED.
3. 1.5" SCH 40 PVC.
4. 4" SCH 40 PVC.
5. 1" SCH 80 PVC THREADED.
6. 1" SCH 40 PVC, ELECTRIC CONDUIT
7. 1" SS PITLESS ADAPTOR
8. 1.5" SCH 80 ELBOW
9. 4" SCH 80 ELBOW
10. 4" SCH 80 TEE
11. STEEL SAFETY CABLE
12. INCIDENTAL H-20 TRAFFIC COVER WITH TORSION SPRING ASSISTED HATCH ASSEMBLY, STEEL.



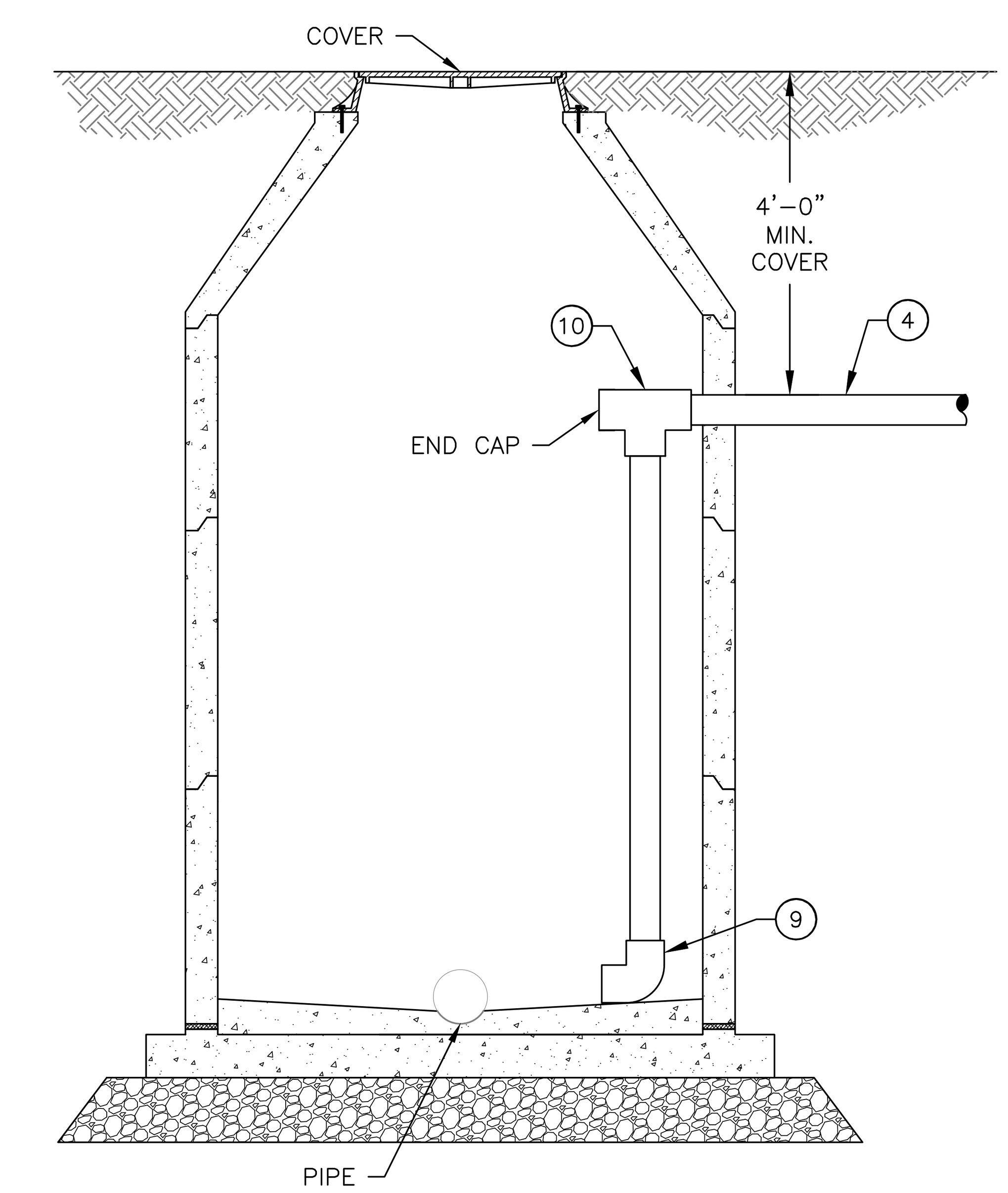
NORTHERN WELL VAULT DETAIL, PROFILE VIEW 2 / -
NTS



NORTHERN WELL VAULT DETAIL, PLAN VIEW 3 / -
NTS



SOUTHERN WELL VAULT DETAIL, PROFILE VIEW 5 / -
NTS



ELEVATION

SANITARY SEWER MANHOLE DROP CONNECTION 6 / -
NTS

REV. NO.	DATE	DESCRIPTION	APPROVED BY

DATE OF ISSUE: 12/31/19
DESIGNED BY: TH
DRAWN BY: JA/RT
CHECKED BY: KJ
APPROVED BY: TG

DBS&A
Daniel B. Stephens & Associates, Inc.
6020 Academy Rd. NE, Suite 100
Albuquerque, NM 87109-3315

NEW MEXICO ENVIRONMENT DEPARTMENT
PETROLEUM STORAGE TANK BUREAU
2905 RODEO PARK DRIVE EAST
SANTA FE, NEW MEXICO 57505

ROSS TEXACO, PINO'S FINA, AND ATEX 394
GROUNDWATER REMEDIATION SYSTEM INSTALLATION
LAS VEGAS, NEW MEXICO

CIVIL DETAILS

SHT. 9 OF 11
DWG NO. C-6

JOB NO.
DB18.1277

ACORD®

CERTIFICATE OF LIABILITY INSURANCE

DATE(MM/DD/YYYY) 07/25/2019

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

Holder Identifier : A

PRODUCER
Aon Risk Insurance Services West, Inc.
Los Angeles CA Office
707 Wilshire Boulevard
Suite 2600
Los Angeles CA 90017-0460 USA

CONTACT NAME:
PHONE (A/C. No. Ext): (866) 283-7122
FAX (A/C. No.): (800) 363-0105
E-MAIL ADDRESS:

INSURED
Daniel B. Stephens & Assoc., Inc., LSE
3921-A East La Palma Avenue
Anaheim CA 92807 USA

INSURER(S) AFFORDING COVERAGE		NAIC #
INSURER A:	Steadfast Insurance Company	26387
INSURER B:	Zurich American Ins Co	16535
INSURER C:		
INSURER D:		
INSURER E:		
INSURER F:		

COVERAGES **CERTIFICATE NUMBER:** 570077606250 **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

Limits shown are as requested

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	X COMMERCIAL GENERAL LIABILITY			GPL016606902	12/31/2018	12/31/2019	EACH OCCURRENCE	$1,000,000
	CLAIMS-MADE [X] OCCUR						DAMAGE TO RENTED PREMISES (Ea occurrence)	$1,000,000
							MED EXP (Any one person)	$25,000
							PERSONAL & ADV INJURY	$1,000,000
	GEN'L AGGREGATE LIMIT APPLIES PER:						GENERAL AGGREGATE	$2,000,000
	X POLICY PRO-JECT LOC						PRODUCTS - COMP/OP AGG	$2,000,000
	OTHER:							
B	AUTOMOBILE LIABILITY			BAP 0166068-02	12/31/2018	12/31/2019	COMBINED SINGLE LIMIT (Ea accident)	$1,000,000
	X ANY AUTO						BODILY INJURY (Per person)	
	OWNED AUTOS ONLY; SCHEDULED AUTOS						BODILY INJURY (Per accident)	
	HIRED AUTOS ONLY; NON-OWNED AUTOS ONLY						PROPERTY DAMAGE (Per accident)	
A	UMBRELLA LIAB X OCCUR			SXS016607602	12/31/2018	12/31/2019	EACH OCCURRENCE	$10,000,000
	X EXCESS LIAB CLAIMS-MADE						AGGREGATE	$10,000,000
	DED RETENTION							
B	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY Y/N; ANY PROPRIETOR / PARTNER / EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) N; If yes, describe under DESCRIPTION OF OPERATIONS below	N / A		WC016606602	12/31/2018	12/31/2019	X PER STATUTE OTH-ER	
							E.L. EACH ACCIDENT	$1,000,000
							E.L. DISEASE-EA EMPLOYEE	$1,000,000
							E.L. DISEASE-POLICY LIMIT	$1,000,000
A	E&O-PL-Primary			GPL016606902 Prof Liab - Claims Made	12/31/2018	12/31/2019	Each Claim Aggregate	$1,000,000 $2,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)
RE: Project No. DB17.1363.00. New Mexico Department of Transportation (NMDOT), District 5 is included as Additional Insured in accordance with the policy provisions of the General Liability policy.

Certificate No : 570077606250

CERTIFICATE HOLDER

New Mexico Department of
Transportation (NMDOT)
District 5
PO Box 4127
7315 Cerrillos Road
Santa Fe, NM 87502

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

Aon Risk Insurance Services West, Inc.

Additional Insured-Automatic-Owners, Lessees Or Contractors

Coverage Part One-Commercial General Liability
Coverage Part Two-Contractor's Pollution Liability

ZURICH

Policy No.	Eff. Date of Pol.	Exp. Date of Pol.	Eff. Date of End.	Producer	Add'l Prem.	Return Prem.
GPL 0166069-02	12/31/2018	12/31/2019	12/31/2018	75272000		

Named Insured and Mailing Address:

Geologic Associates, Inc.
2777 E Guasti Rd., Ste. 1
Ontario, CA 91761-1256

Producer: Aon Risk Insurance Services West, Inc.
707 Wilshire Blvd Ste. 2600
Los Angeles, CA 90017-3533

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

This endorsement modifies insurance provided under the following:

Environmental Services Package Policy

[X] COVERAGE PART ONE-COMMERCIAL GENERAL LIABILITY

[X] COVERAGE PART TWO-CONTRACTOR'S POLLUTION LIABILITY

1. Who is an Insured (Section I.) in the COMMON COVERAGE PROVISIONS is amended to include as an additional insured any person(s) or organization(s) whom you are required to add as an additional insured on this policy under a written contract or written agreement.

2. The insurance provided to the additional insured person(s) or organization(s) applies only to:

   a. "Bodily injury", "property damage" or "personal and advertising injury" under COVERAGE PART ONE-COMMERCIAL GENERAL LIABILITY, COVERAGE A - BODILY INJURY AND PROPERTY DAMAGE LIABILITY and COVERAGE B - PERSONAL AND ADVERTISING INJURY LIABILITY caused, in whole or in part, by:

      (1) Your acts or omissions; or

      (2) The acts or omissions of those acting on your behalf;

      and resulting directly from:

         (a) Your ongoing operations performed for the additional insured, which is the subject of the written contract or written agreement; or

         (b) "Your work" completed as included in the "products-completed operations hazard", performed for the additional insured, which is the subject of the written contract or written agreement; and/or

   b. "Claims" arising out of a "pollution event" under COVERAGE PART TWO - CONTRACTOR'S POLLUTION LIABILITY, caused, in whole or in part, by:

      (1) Your acts or omissions; or

      (2) The acts or omissions of those acting on your behalf**,**

      and resulting directly from:

         (a) "Covered operations" performed for the additional insured, which is the subject of the written contract or written agreement; or

(b) "Completed operations" of the "covered operations" performed for the additional insured, which is the subject of the written contract or written agreement.

3. However, regardless of the provisions of paragraphs 1. and 2. above, the insurance afforded to such additional insured:

   a. Only applies to the extent permitted by law; and

   b. Will not be broader than that which you are required by the written contract or written agreement to provide to such additional insured.

4. With respect to the insurance afforded to the additional insured under this endorsement, the following is added to **Section III – Limits Of Insurance and Deductible**:

   The most we will pay on behalf of the additional insured is the amount of insurance:

   a. Required by the written contract or written agreement you have entered into with the additional insured; or

   b. Available under the applicable Limits of Insurance shown in the Declarations,

   whichever is less.

   This endorsement shall not increase the applicable Limits of Insurance shown in the Declarations

5. The insurance provided to the additional insured person or organization does not apply to:

   "Bodily injury", "property damage" or "personal and advertising injury" arising out of the rendering or failure to render any professional architectural, engineering or surveying services including:

   (1) The preparing, approving or failing to prepare or approve maps, shop drawings, opinions, reports, surveys, field orders, change orders or drawings and specifications; and

   (2) Supervisory, inspection, architectural or engineering activities.

   This exclusion applies even if the claims against any insured allege negligence or other wrongdoing in the supervision, hiring, employment, training or monitoring of others by that insured, if the "occurrence" which caused the "bodily injury" or "property damage", or the offense which caused the "personal and advertising injury", involved the rendering of or the failure to render any architectural, engineering or surveying services.

6. The additional insured must see to it that:

   a. We are notified as soon as practicable of an "occurrence", offense or “pollution event”, as applicable, that may result in a claim;

   b. We receive written notice of a claim or "suit" as soon as practicable; and

   c. A request for defense and indemnity of the claim or "suit" will promptly be brought against any policy issued by another insurer under which the additional insured may be an insured in any capacity. This provision does not apply to insurance on which the additional insured is a Named Insured, if the written contract or written agreement requires that this coverage be primary and non-contributory.

7. For the coverage provided by this endorsement:

   a. The following paragraph is added to Paragraph 8.a. Other Insurance, Conditions (Section V.) in the COMMON COVERAGE PROVISIONS:

      Primary and Noncontributory Insurance

      This Insurance is primary to and will not seek contribution from any other insurance available to an additional insured under this endorsement provided that:

      (1) The additional insured is a Named Insured under such other insurance; and

      (2) You have agreed in a written contract or written agreement that this insurance would be primary and would not seek contribution from any other insurance available to the additional insured.

   b. The following paragraph is added to Paragraph 8.b. Other Insurance, Conditions (Section V.) in the COMMON COVERAGE PROVISIONS:

      This insurance is excess over:

Any of the other insurance, whether primary, excess, contingent or on any other basis, available to an additional insured, in which the additional insured on our policy is also covered as an additional insured on another policy providing coverage for the same "occurrence", offense, claim or "suit". This provision does not apply to any policy in which the additional insured is a Named Insured on such other policy and where our policy is required by written contract or written agreement to provide coverage to the additional insured on a primary and non-contributory basis.

8. This endorsement does not apply to an additional insured which has been added to this policy by an endorsement showing the additional insured in a Schedule of additional insureds, and which endorsement applies specifically to that identified additional insured.

ALL OTHER TERMS AND CONDITIONS OF THE POLICY SHALL APPLY AND REMAIN UNCHANGED.

New Mexico DEPARTMENT OF TRANSPORTATION
MOBILITY FOR EVERYONE

Environmental Clearance for Undertakings within NMDOT Right-of-Way

In order to receive environmental clearance for permitted projects in highway rights-of-way, the following information will need to be submitted to the NMDOT Environmental Design Division. Submittals (usually) are reviewed Tuesday of each week. Submittals received on Tuesday will not be reviewed until the following Tuesday. Emergency requests are handled on a case-by-case basis.

1. **Purpose** and **Nature** of undertaking. Describe the undertaking along with width, length and depth of ground disturbance. Include the methods and machinery to be used.
   An approximately 500' horizontal groundwater extraction well along the east side of Grand
   The depth of the well will be approximately 20 feet below ground surface.
2. **Is your project resulting from a NMDOT project?** If so, provide the control and/or project number.
   It is not.
3. **Funding Source**. Is the funding private, state or federal? If state and/or federal, list agency(s).
   New Mexico Environment Department Petroleum Storage Tank Bureau
4. **Land status.** Is the project on the right-of-way owned by BLM, Forest Service, Tribal land or State Trust land? (NMDOT does not own all highway rights-of-way!)
   No
5. **Permitting agencies.** List other permitting agencies involved besides NMDOT.
   New Mexico Office of the State Engineer
6. **County.** List the county or counties in which the project is located.
   San Miguel
7. **Highway number.** Indicate the highway, the project will cross or parallel.
   I-25 business (Grand Ave.) in Las Vegas and State route 104 (University Ave.)
8. **BOP and EOP.** Provide the milepost locations for the beginning of the project area (BOP) and the end of the project area (EOP). If highway crossing only, list the milepost location, indicate BOP and EOP on quadrangle maps as well.
   35 deg. 35' 46.31"N 105 deg 12' 49.74"W" to 35 deg 35' 49.80"N 105 deg 12' 48.77"W

9. **Side(s)** of the road. Indicate of which side of the road the project will be located using cardinal directions (north, south, east, west). List all project crossings of the highway by milepost.

East side of Grand Ave. (I-25 Business)

10. **Length** of the project. Indicate the length of the project within NMDOT right-of-way in terms of feet and/or miles.

About 500 feet

11. **Provide the legal description** of the project area: Township, Range, and Section(s).

Las Vegas Land Grant

12. **USGS 1:24,000(7.5') Quadrangle map.** List the name(s) of the USGS quadrangle map(s) on which the project is located.

Las Vegas, NM

13. Include the appropriate portion of the **USGS 1:24,000 (7.5') Quadrangle map(s)** with the project area indicated by an **X** if a crossing, or **BOP** and **EOP** if linear. **Do not reduce or enlarge.** Quad map images can be printed at no charge from the website http://terraserver.usa.com/.

See attached map

14. **Do not** send photos (including aerial photos or photo maps) unless they are scanned or sent via US Mail. Faxed photos come out entirely black.

15. Include your name, company (if applicable), phone #, fax # and email address (if you use one).

Thomas Golden, Daniel B. Stephens & Associates, Inc., 505-822-9400, tgolden@geo-logic.com

16. Submit your requests by email, by fax **OR** by mail. Send in one format only- **DO NOT** send in multiple formats.

Send clearance requests to:

Genevieve Head, NMDOT-Environmental Design Division
1129 Cerrillos Road/P.O. Box 1149
Santa Fe, NM 87504
(for FedEx or UPS the ZIP code I 87501)
Phone: (505) 827-5356; **Fax**:(505) 827-0417; **Email:** genevieve.head@state.nm.us

Horizontal Well

December 31, 2019

New Mexico Office of the State Engineer
District VI
P.O. Box 25102
Santa Fe, NM 87504-5102

Re: Application for Permit to Drill a Well with No Consumptive Use of Water

To Whom It May Concern:

Please find enclosed three (3) copies of Application for Permit to Drill a Well with No Consumptive Use of Water and a check for the appropriate permit fees. Daniel B. Stephens & Associates, Inc. (DBS&A) has been contracted by the New Mexico Environment Department (NMED) to drill one (1) horizontal extraction well to treat contaminated groundwater for a Underground Storage Tank (UST) site in Las Vegas, New Mexico.

Please call me at (505) 822-9400 should you have any questions or need additional paperwork.

Sincerely,

DANIEL B. STEPHENS & ASSOCIATES, INC.

Tom Golden
Project Engineer

Enclosures

Daniel B. Stephens & Associates, Inc.

6020 Academy Rd. NE, Suite 100 505-822-9400
Albuquerque, NM 87109 FAX 505-822-8877

File No.

NEW MEXICO OFFICE OF THE STATE ENGINEER

APPLICATION FOR PERMIT TO DRILL A WELL WITH NO CONSUMPTIVE USE OF WATER

(check applicable box):

For fees, see State Engineer website: http://www.ose.state.nm.us/

Purpose:	☒ Pollution Control And / Or Recovery	☐ Geo-Thermal
☐ Exploratory	☐ Construction Site De-Watering	☐ Other (Describe):
☐ Monitoring	☐ Mineral De-Watering	

A separate permit will be required to apply water to beneficial use.

☒ Temporary Request - Requested Start Date: **3/1/2020** Requested End Date: **Unknown**

Plugging Plan of Operations Submitted? ☐ Yes ☒ No

---

1. APPLICANT(S)

Name: **New Mexico Environment Department (NMED), Petroleum Storage Tank Bureau**	Name:
Contact or Agent: check here if Agent ☐	Contact or Agent: check here if Agent ☒ **Thomas Golden for Daniel B. Stephens & Assoc., Inc.**
Mailing Address: **2905 Rodeo Park Drive East, Building 1**	Mailing Address: **6020 Academy NE, Suite 100**
City: **Santa Fe**	City: **Albuquerque**
State: **NM** Zip Code: **87505**	State: **NM** Zip Code: **87109**
Phone: ☐ Home ☐ Cell Phone (Work): **505-476-4397**	Phone: ☐ Home ☐ Cell Phone (Work): **505-822-9400**
E-mail (optional):	E-mail (optional): **tgolden@dbstephens.com**

FOR OSE INTERNAL USE

Application for Permit, Form wr-07, Rev 8/25/11

File Number:	Trn Number:
Trans Description (optional):	
Sub-Basin:	
PCW/LOG Due Date:	

2. WELL(S) Describe the well(s) applicable to this application.

Location Required: Coordinate location must be reported in NM State Plane (NAD 83), UTM (NAD 83), or Latitude/Longitude (Lat/Long - WGS84)

☒ NM State Plane (NAD83) (Feet)
☐ NM West Zone
☒ NM East Zone
☐ NM Central Zone

☐ UTM (NAD83) (Meters)
☐ Zone 12N
☐ Zone 13N

☐ Lat/Long (WGS84) (to the nearest 1/10th of second)

Well Number (if known):	X or Easting or Latitude:	Y or Northing or Longitude:	Optional: Complete boxes labeled "Other" below with PLSS (Public Land Survey System, i.e. Quarters, Section, Township, Range); Hydrographic Survey Map & Tract; Lot, Block & Subdivision; OR Land Grant Name if known.
1	**279723**	**1673363**	

NOTE: If more well locations need to be described, complete form WR-08 (Attachment 1 – POD Descriptions)
Additional well descriptions are attached: ☐ **Yes** ☒ **No** **If yes, how many______**

Other description relating well to common landmarks, streets, or other: **Intersection of University and Grand Ave. in Las Vegas, New Mexico**

Well is on land owned by: **Quality Motor Company, Inc.**

Well Information: NOTE: If more than one (1) well needs to be described, provide attachment. Attached? ☒ **Yes** ☐ **No**
If yes, how many______

Approximate depth of well (feet): **20.00**	Outside diameter of well casing (inches): **6.00**
Driller Name: **Directed Technologies Drillin**	Driller License Number: **WD-1186**

3. ADDITIONAL STATEMENTS OR EXPLANATIONS

Daniel B. Stephens & Associates, Inc. has been contracted by the New Mexico Environment Department Petroleum Storage Tank Bureau to extract and treat contaminated groundwater at this gasoline release site. The project is the combination of three sites: Atex 394 (Allsup's), Pino's Fina, and Ross Texaco and is referred to as the Las Vegas Triple site. One approximately 500 foot 6" horizontal well will be drilled from the vacant lot to the south under University Ave. to the Crossroads gas station.

The well will be drilled within 100 feet of the given coordinates, and DBS&A will provide the exact coordinates of the well entrance and exit after installation.

FOR OSE INTERNAL USE

File Number:	Trn Number:

4. SPECIFIC REQUIREMENTS: The applicant must include the following, as applicable to each well type. Please check the appropriate boxes, to indicate the information has been included and/or attached to this application:

Exploratory:	Pollution Control and/or Recovery:	Construction De-Watering:	Mine De-Watering:
☐ Include a description of any proposed pump test, if applicable. **Monitoring:** ☐ Include the reason for the monitoring well, and, ☐ The duration of the planned monitoring.	☒ Include a plan for pollution control/recovery, that includes the following: ☒ A description of the need for the pollution control or recovery operation. ☒ The estimated maximum period of time for completion of the operation. ☐ The annual diversion amount. ☒ The annual consumptive use amount. ☒ The maximum amount of water to be diverted and injected for the duration of the operation. ☒ The method and place of discharge. ☒ The method of measurement of water produced and discharged. ☐ The source of water to be injected. ☐ The method of measurement of water injected. ☒ The characteristics of the aquifer. ☐ The method of determining the resulting annual consumptive use of water and depletion from any related stream system. ☒ Proof of any permit required from the New Mexico Environment Department. ☒ An access agreement if the applicant is not the owner of the land on which the pollution plume control or recovery well is to be located.	☐ Include a description of the proposed dewatering operation, ☐ The estimated duration of the operation, ☐ The maximum amount of water to be diverted, ☐ A description of the need for the dewatering operation, and, ☐ A description of how the diverted water will be disposed of. **Geo-Thermal:** ☐ Include a description of the geothermal heat exchange project, ☐ The amount of water to be diverted and re-injected for the project, ☐ The time frame for constructing the geothermal heat exchange project, and, ☐ The duration of the project. ☐ Preliminary surveys, design data, and additional information shall be included to provide all essential facts relating to the request.	☐ Include a plan for pollution control/recovery, that includes the following: ☐ A description of the need for mine dewatering. ☐ The estimated maximum period of time for completion of the operation. ☐ The source(s) of the water to be diverted. ☐ The geohydrologic characteristics of the aquifer(s). ☐ The maximum amount of water to be diverted per annum. ☐ The maximum amount of water to be diverted for the duration of the operation. ☐ The quality of the water. ☐ The method of measurement of water diverted. ☐ The recharge of water to the aquifer. ☐ Description of the estimated area of hydrologic effect of the project. ☐ The method and place of discharge. ☐ An estimation of the effects on surface water rights and underground water rights from the mine dewatering project. ☐ A description of the methods employed to estimate effects on surface water rights and underground water rights. ☐ Information on existing wells, rivers, springs, and wetlands within the area of hydrologic effect.

ACKNOWLEDGEMENT

I, We (name of applicant(s)), **Thomas Golden, P.E. on behalf of NMED**
Print Name(s)

affirm that the foregoing statements are true to the best of (my, our) knowledge and belief.

____________________ Applicant Signature

____________________ Applicant Signature

ACTION OF THE STATE ENGINEER

This application is:

☐ approved ☐ partially approved ☐ denied

provided it is not exercised to the detriment of any others having existing rights, and is not contrary to the conservation of water in New Mexico nor detrimental to the public welfare and further subject to the attached conditions of approval.

Witness my hand and seal this ______ day of ____________ 20 _____ , for the State Engineer,

____________________________, State Engineer

By: ____________________ ____________________
Signature Print

Title: ____________________
Print

FOR OSE INTERNAL USE

File Number:	Trn Number:

Specific Requirements for Office of the State Engineer Horizontal Extraction Well Permit

Groundwater remediation system summary: The horizontal extraction well will contain approximately 250 feet of 6 inch slotted HDPE screen at a depth of around 20 feet below ground surface (Figure 1 and 2). Groundwater will be extracted with a dedicated submersible pump at the north end of the screen section with a maximum pumping rate of 10 gpm with 5 gpm expected. Water will be treated with an air-stripper to remove hydrocarbons on the former Ross Texaco site before discharge to the Las Vegas Utility's sanitary sewer system.

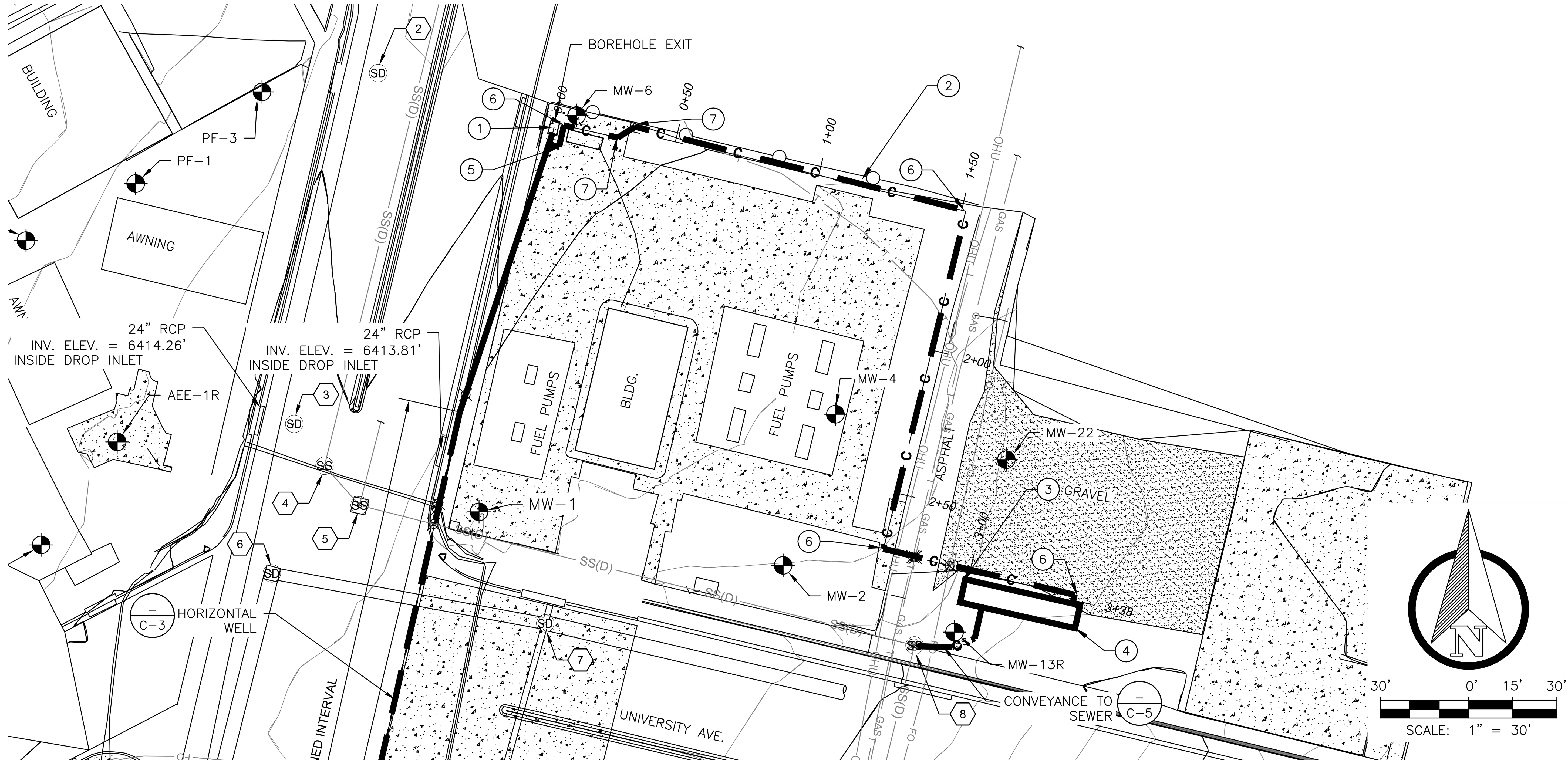
Description of need for contaminated groundwater recovery: A groundwater contamination plume exists under the site centered approximately under the intersection of Grand and East University Ave (Figure 3). Groundwater in this region exceeds New Mexico Water Quality Control Commission standards for Benzene, ethylbenzene, total xylenes, and total naphthalenes.

Maximum time for completion of operation: The duration of groundwater remediation is currently unknown. System operation for approximately three years is planned. More will be known once operation commences.

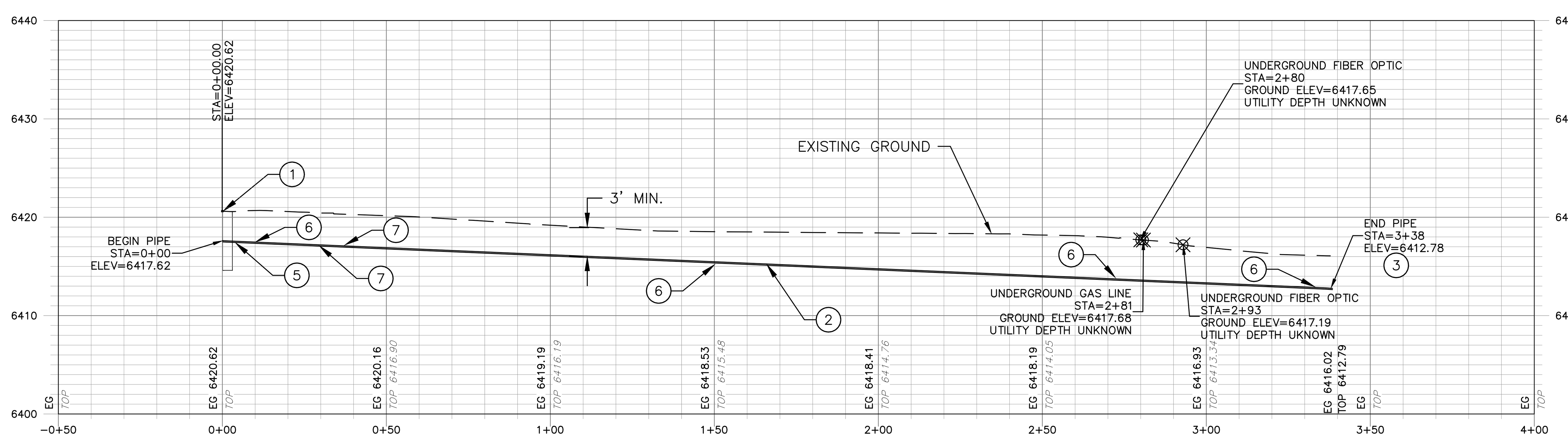
Method and place of discharge: Treated groundwater will be fed to a sanitary sewer connection on the northeast side of the site.

Method of water produced and discharged: Both influent to the air stripper system and discharge will be metered.

Characteristics of the aquifer: The contaminated water is to be extracted from a shallow alluvium aquifer under the site. The water table is approximately 15 feet below ground surface. The lithology consists mainly of weathered clays and shale with gravel and sand lenses. The aquifer is not used for drinking water locally.



PLAN 1
SCALE:



PROFILE 1
SCALE: 1" = 30'
VERTICAL SCALE: 1"=10'

GENERAL NOTES:

1. RECEIVE, STORE, AND INSTALL ALL PIPING MATERIAL IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
2. PRESSURE TEST PVC WITH WATER AT 100 PSI FOR ONE HOUR. PRESSURE DEVIATION OF MORE THAN 5 PSI OVER THE HOUR WILL REQUIRE CORRECTIVE ACTION.

KEY NOTES:

1. WELL VAULT & PITLESS ADAPTER PER DETAILS 2 AND 3, DWG C-6.
2. INSTALL 1.5" SCH. 40 PVC CONVEYANCE LINE PER DETAIL 1, DWG C-6.
3. CONNECT CONVEYANCE LINE TO EQUIPMENT CONTAINER AS SHOWN ON DWG. M-2.
4. EQUIPMENT STORAGE CONTAINER AS SHOWN ON DWG. M-2
5. 1.5" SS GATE VALVE AND VALVE VAULT
6. 1.5" SCH 40 PVC 90 DEG ELBOW
7. 1.5" SCH 40 PVC 45 DEG ELBOW

KEY NOTES SANITARY/STORM DRAIN MANHOLES:

1. SSMH 200 3896
RIM ELEV. = 6421.36
12" PVC INV.(N) = 6410.48
12" PVC INV.(S) = 6410.57
12" PVC INV.(W) = 6410.64
2. SDMH 100 3895
RIM ELEV. = 6420.68
UNABLE TO OPEN
3. SDMH 101 3928
RIM ELEV. = 6419.74
UNABLE TO OPEN
4. SSMH 201 3849
RIM ELEV. = 6420.02
12" PVC INV.(N) = 6409.15
12" PVC INV.(E) = 6409.08
5. SSMH 202 1286
RIM ELEV. = 6419.48
PIPE SIZE AND MATERIAL NOT ACCESSIBLE
(N) = 6409.03
12" PVC INV.(E) = 6408.43
12" PVC INV.(NW) = 6408.97
6. SDMH 102 1000
RIM ELEV. = 6419.61
UNABLE TO OPEN
7. SDMH 105 4154
RIM ELEV. = 6418.12
24" RCP INV.(N) = 6411.68
60" RCP INV.(E) = 6403.53
UNABLE TO GET INV.(S)
48" CMP INV.(W) 6402.92
8. SSMH 203 1448
RIM ELEV. = 6416.59
4" STEEL INV.(NE) = 6410.27
12" STEEL INV.(S) = 6407.19
12" STEEL INV.(W) = 6407.44

REV. NO.	DATE	DESCRIPTION	APPROVED BY

DATE OF ISSUE: 12/31/19
DESIGNED BY: TH
DRAWN BY: JA/RT
CHECKED BY: KJ
APPROVED BY: TG

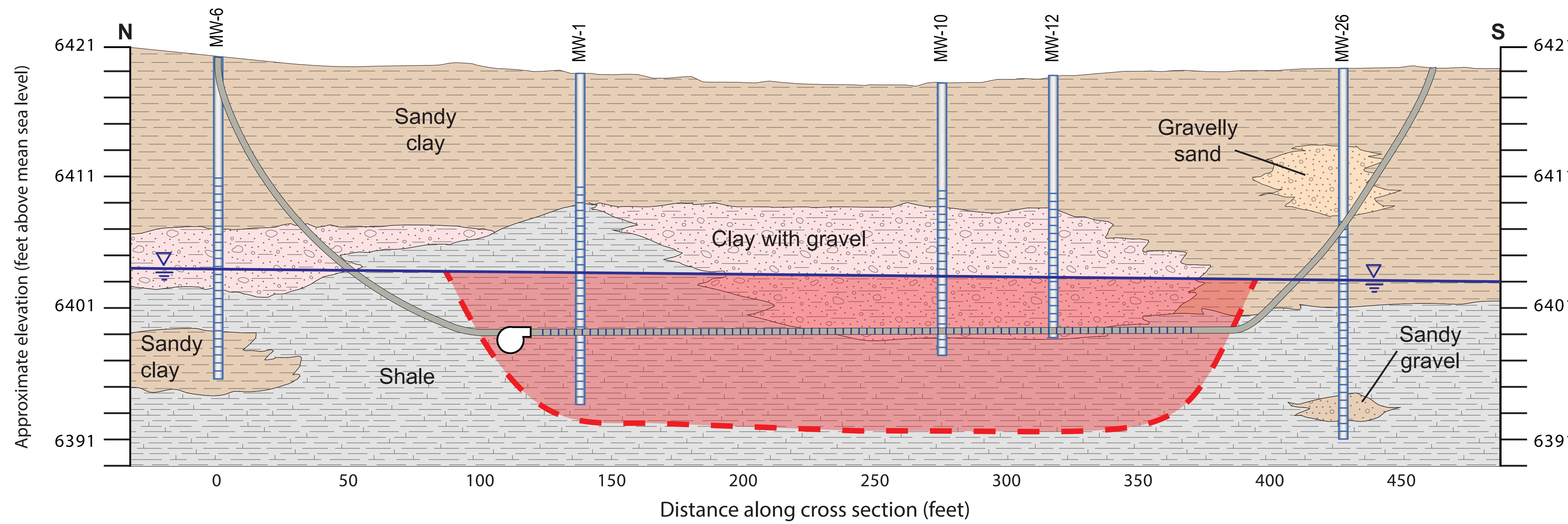
DBS&A
Daniel B. Stephens & Associates, Inc.
6020 Academy Rd. NE, Suite 100
Albuquerque, NM 87109-3315

NEW MEXICO ENVIRONMENT DEPARTMENT
PETROLEUM STORAGE TANK BUREAU
2905 RODEO PARK DRIVE EAST
SANTA FE, NEW MEXICO 57505

ROSS TEXACO, PINO FINA, AND ATEX 394
GROUNDWATER REMEDIATION SYSTEM INSTALLATION
LAS VEGAS, NEW MEXICO

CONVEYANCE LINE PLAN AND PROFILE

SHT. 7 OF 11
DWG NO. C-
JOB NO. DB18.1277



N

0 50 100 Feet

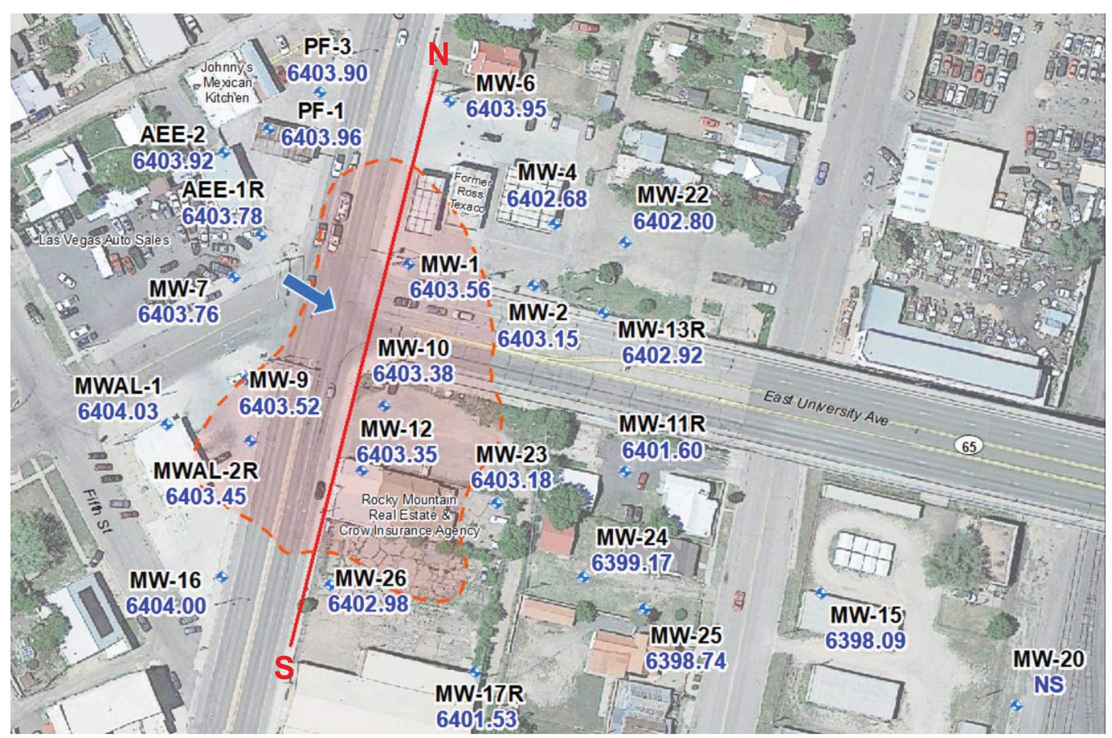
Monitor well

5 µg/L benzene contour (Extent of actionable Benzene in groundwater)

MW-1 Monitor well designation

6403.56 Potentiometric surface elevation (ft msl)

Groundwater flow direction



Explanation

Well

Well Screen

Bore path (6” casing)

Screen

Approximate July 2019 water table

Pump

Geology

Sandy clay

Gravely sand

Sandy gravel

Clay with gravel

Shale

Approximate extent of actionable benzene groundwater contamination

5x vertical exaggeration

horizontal: 1 inch = 50 feet   vertical: 1 inch = 10 feet

ATEX 394 (ALLSUP'S), PINO FINA, AND ROSS TEXACO
LAS VEGAS, NEW MEXICO

Conceptual Cross Section

Figure 12

S:\Projects\DB18.1277_Las_Vegas_Triple_Site\VR_Drawings\Adobe Illustrator\Cross_Section_20191104\Fig12_Las Vegas Tripple Site Cross Section_20191104.ai

Daniel B. Stephens & Associates, Inc.

12-17-19   JN DB18.1277

Path: S:\Projects\DB18.1277_Las_Vegas_Triple_Site\GIS\MXDs\Report_201907\Fig07_Benzene_GW_201907.mxd

Explanation

- Monitor well
- Extent of actionable benzene in groundwater
- **MW-1** Monitor well designation
- **47** Benzene concentration (µg/L)

Source: Google Earth May 2019

Notes:
1. NS = Well not sampled
2. Gray shading indicates concentration is below laboratory reporting limits.

ATEX 394 (ALLSUP'S), PINO FINA, AND ROSS TEXACO
LAS VEGAS, NEW MEXICO

Benzene in Groundwater
July 2019

Daniel B. Stephens & Associates, Inc.
9/24/2019
JN DB18.1277

Figure 7

Appendix G

O&M Data Collection

Site: Las Vegas Triple Site (Atex 394, Pino Fina, Ross Texaco) **Project No:** DB18.1277.00

Staff: ______________________

Date/Time on site: ______________________ **off site:** ______________

(use value of no reading (NR) or not active (NA) if applicable for each entry)

SERVICE ELECTRIC METER READING: ______________ kWh

Submersible Pump

Status Menu

Temp. (°C): ______	Operating hrs.: ______	Elec. usage (kwh): ______
Speed (min^{-1}): ______	# of Starts: ______	Water level: ______

Equipment Container

Influent flow rate (gpm): ______	Air Str. Flow (gpm): ______
Influent totalizer (gal): ______	Vol. Treated H2O Tank (gal): ______
Influent line pressure (psi): ______	Backwash cycles (#): ______
Vol. Raw H2O Tank (gal): ______	Effluent Totalizer (gal): ______
Press pre-AD26 (psi): ______	Container Temp. (°C): ______
Press post-AD26 (psi): ______	Vol. Antiscalant (gal): ______
Air Str. Press(psi): ______	Vol. NaOCl (gal): ______

Vapor and Water Samples

Sample	Matrix	Lab analysis	
Air Stripper Vent	Vapor	______	PID:
Raw Water Influent	Water	______	
Post AD26 Iron Treat.	Water	______	
Post air stripper	Water	______	

NOTES:

____

____

____

____

Appendix H

Legal Notice Publication

NOTICE OF SUBMISSION OF
FINAL REMEDIATION PLAN

Date of Notice: December 27, 2019 and January 3, 2020

Notice is hereby given by Daniel B. Stephens & Associates, Inc. of the submission of a Final Remediation Plan to the New Mexico Environment Department (NMED) Petroleum Storage Tank Bureau (PSTB), as follows:

1. The Final Remediation Plan proposes actions to remediate a release of petroleum or petroleum products into the environment.

2. Three petroleum release sites are located at the intersection Grand and University Avenues in Las Vegas, New Mexico. The sites are Atex 394, 615 Grand Avenue; Pino Fina, 701 Grand Avenue; and Ross Texaco, 700 Grand Avenue Sites. The remediation equipment will be located at 700 Grand Avenue, currently the site of the Ross One Stop convenience store and gas station.

3. The Final Remediation Plan proposes to remove gasoline contamination through groundwater extraction and treatment. The contaminated groundwater will be pumped out of the shallow water table, treated using air stripping, then discharged to the City of Las Vegas Utilities' sanitary sewer.

4. A copy of the Final Remediation Plan can be viewed by interested parties at the NMED PSTB office located at 2905 Rodeo Park Drive East, Building 1, Santa Fe, New Mexico, 87505. In addition, the Final Remediation Plan and all applicable data may be viewed at the following website: http://dbsa-client-access.com/PSTB/file_access.htm. Services may be arranged for translation of documents, for interpreters, and for obtaining services for persons with disabilities by contacting the PSTB Project Manager. TDD or TTY users, please access phone numbers using the New Mexico Relay Network, 1-800-659-1779 (voice) and 1-800-659-8331 (TTY users).

5. Comments on the plan may be sent to the PSTB Project Manager: by mail at New Mexico Environment Department Petroleum Storage Tank Bureau, Attn: Christopher Holmes, 2905 Rodeo Park Drive East, Building 1, Santa Fe, New Mexico, 87505; by telephone at 505-476-4397; or e-mailed to: chris.holmes@state.nm.us. Comments sent to the project manager must also be mailed to the NMED Secretary at New Mexico Environment Department, Attn: Secretary Kenney, PO Box 5469, Santa Fe, NM 87502-5469. Comments must be delivered by January 24, 2020. Please include the name of the sites "Atex 394, Pino Fina, and Ross Texaco sites, 700 Grand Avenue, Las Vegas, New Mexico" to ensure comments are correctly assigned to the site.

**AVISO DE PRESENTACIÓN DEL
PLAN DE REMEDIACIÓN FINAL**

Fecha del aviso: 27 de diciembre de 2019 y 3 de enero de 2020

Por el presente documento, Daniel B. Stephens & Associates, Inc. da aviso de la presentación de un Plan de Remediación Final a la Oficina de Tanques de Almacenamiento de Petróleo (PSTB, por sus siglas en inglés) del Departamento de Medio Ambiente de Nuevo México (NMED, por sus siglas en inglés), de la siguiente manera:

1. El Plan de Remediación Final propone acciones para remediar una liberación de petróleo o productos derivados del petróleo al medio ambiente.

2. Hay tres sitios de liberación de petróleo localizados en la intersección de Grand Avenue y University Avenue en Las Vegas, Nuevo México. Los sitios son Atex 394, 615 Grand Avenue; Pino Fina, 701 Grand Avenue; y Ross Texaco, 700 Grand Avenue. El equipo de remediación estará ubicado en 700 Grand Avenue, actualmente el sitio de la tienda Ross One Stop y la gasolinera.

3. El Plan de Remediación Final propone eliminar la contaminación de la gasolina mediante la extracción y el tratamiento de las aguas subterráneas. El agua subterránea contaminada será bombeada fuera de la capa freática superficial, tratada usando *air stripping*, y luego descargada al alcantarillado sanitario de servicios públicos de la ciudad de Las Vegas.

4. Las partes interesadas pueden ver una copia del Plan de Remediación Final en la oficina de PSTB de NMED ubicada en 2905 Rodeo Park Drive East, Edificio 1, Santa Fe, Nuevo México, 87505. Además, el Plan de Remediación Final y todos los datos aplicables se pueden ver en el siguiente sitio web: http://dbsa-client-access.com/PSTB/file_access.htm. Se pueden organizar servicios para obtener traducción de documentos, intérpretes, y ayuda para personas con discapacidades, poniéndose en contacto con el gerente de proyectos de PSTB. Los usuarios de TDD o TTY pueden acceder a los números de teléfono usando la Red de Retransmisión de Nuevo México, 1-800-659-1779 (voz) y 1-800-659-8331 (usuarios de TTY).

5. Los comentarios sobre el plan pueden enviarse al gerente de proyectos de PSTB: por correo postal a la Oficina de Tanques de Almacenamiento de Petróleo del Departamento de Medio Ambiente de Nuevo México, a la atención de: Christopher Holmes, 2905 Rodeo Park Drive East, Building 1, Santa Fe, NM, 87505; por teléfono al 505-476-4397; o por correo electrónico a: chris.holmes@state.nm.us Los comentarios enviados al gerente de proyectos también deben enviarse por correo postal al secretario de NMED del Departamento de Medio Ambiente de Nuevo México, a la atención de: Secretario Kenney, P.O. Box 5469, Santa Fe, NM 87502-5469. Los comentarios deben ser entregados a más tardar el 24 de enero de 2020. Incluya el nombre de los sitios "Atex 394, Pino Fina, y Ross Texaco, 700 Grand Avenue, Las Vegas, NM" para asegurar que los comentarios se asignen correctamente al sitio.

East of Grand Ave

1. House - 709 Railroad Ave, Las Vegas, NM 87701

Owner Address: 709 Railroad Ave, Las Vegas, NM 87701

2. House - 711 Railroad Ave, Las Vegas, NM 87701

Owner Address: 2050 Calle Lorca, Santa Fe, NM 87505

3. House - 713 Railroad Ave, Las Vegas, NM 87701

Owner Address: 31 Los Alamogordos Rd, Las Vegas, NM 87701

4. Quality Motor Company - 610 Grand Ave, Las Vegas, NM 87701

Owner Name: ROMERO NICK ADAM

Owner Address: PO BOX 273 Las Vegas, NM 87701

5. Crow Insurance Agency/Rocky Mountain Real Estate - 626 Grand Ave, Las Vegas, NM 87701

Owner Address: 626 Grand Ave, Las Vegas, NM 87701

6. Ross One Stop - 700 Grand Ave, Las Vegas, NM 87701

Owner Address: PO BOX 727 Springer, NM 87747

7. House - 712 Grand Ave, Las Vegas, NM 87701

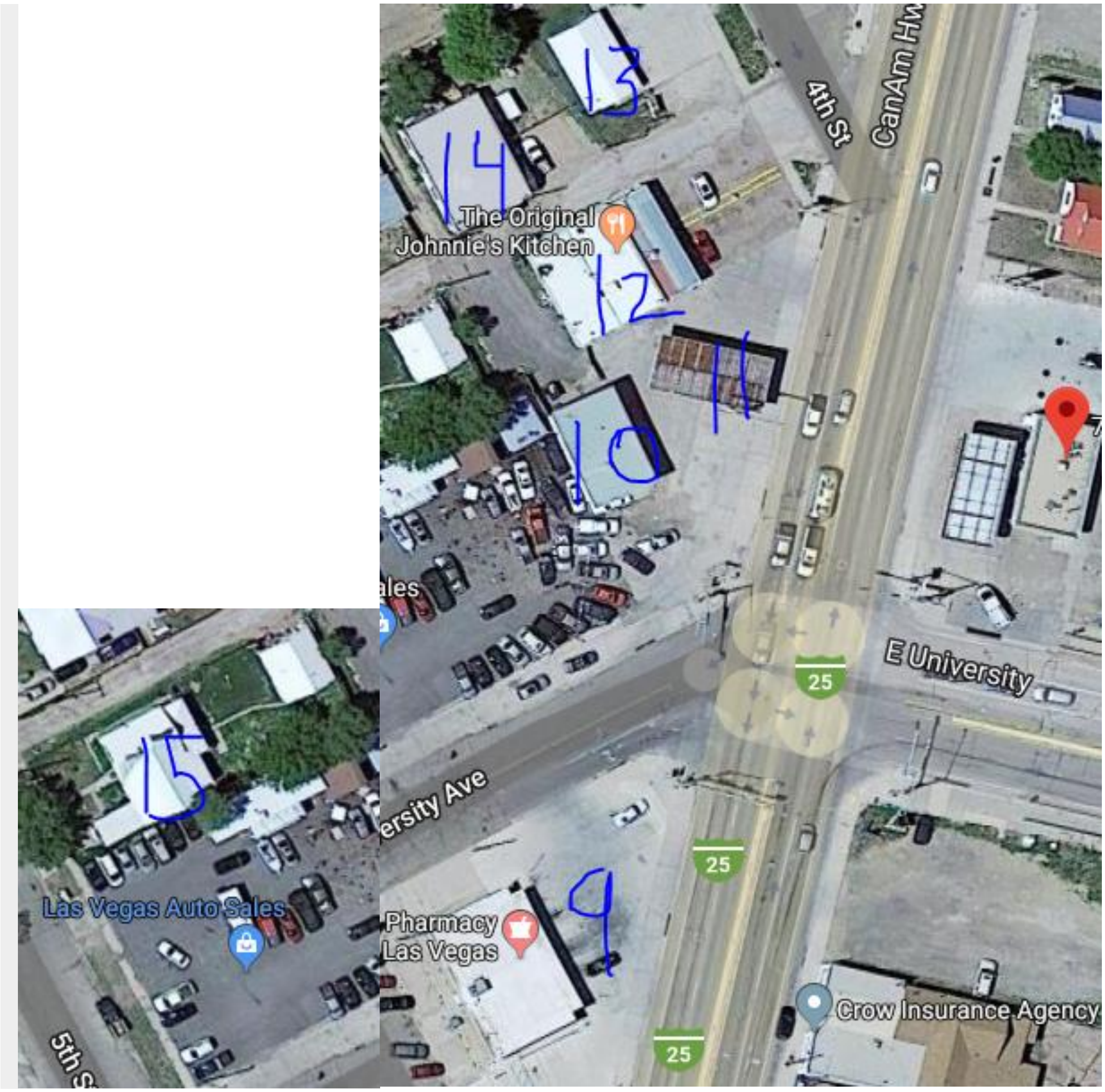
Owner Name: Estate of Bridgette Medina & Lena Apodaca

Owner Address: 1701 La Poblana Rd NW, Albuquerque, NM 87104

8. Samaritan Shelter - 716 Grand Ave, Las Vegas, NM 87701

Owner Address: PO Box 3116 Las Vegas, NM 87701

West of Grand Ave



9. Del Norte Pharmacy of Las Vegas- 615 N. Grand Ave, Las Vegas, NM 87701

OWNER ADDRESS: 615 N. Grand Ave, LAS VEGAS, NM 87701

10. Las Vegas Auto Sales - 406 University Ave, Las Vegas, NM 87701

Owner Name: VAISA, GARY & DELLA
Owner Address: 406 UNIVERSITY AVE, LAS VEGAS, NM 87701

11. 701 4th St, Las Vegas, NM 87701

OWNER ADDRESS: Romero, Patrick E. & Rosina, M. - 2117 Old National Rd, Las Vegas, NM 87701

12. The Original Johnnie's Kitchen - 717 Grand Ave, Las Vegas, NM 87701

OWNER ADDRESS: Romero, Patrick E. & Rosina, M. - 2117 Old National Rd, Las Vegas, NM 87701

13. Corky's Barber Shop - 717 4th St, Las Vegas, NM 87701

OWNER ADDRESS: Salazar, Frank & Pauline - 730 Diane Ave, Las Vegas NM 87701

14. Knutson Construction CO Inc. - 715 4th St, Las Vegas, NM 87701

OWNER ADDRESS: Knutson Construction CO Inc. - 8C 68 Box #11 Sapello, NM 87745

15. House - 712 5th St, Las Vegas, NM 87701

Owner name: GONZALES, THERESA

OWNER ADDRESS: 712 5th St, Las Vegas, NM 87701

Appendix I

Schedule for Implementation of Final Remediation Plan

Atex 394, Pino Fina, and Ross Texaco Remedial Action Schedule

Task	Calendar Days	Start Date	End Date
Final FRP Submittal			12/31/2019
Address PSTB and Public Comments	45	12/31/2019	2/14/2020
FRP Approval	14	2/14/2020	2/28/2020
Work Plan for FRP Implementation	14	2/28/2020	3/13/2020
Work Plan Approval	60	3/13/2020	5/12/2020
Equipment Procurement	84	5/12/2020	8/4/2020
Well Installation	14	8/4/2020	8/18/2020
Trenching/Piping	14	8/18/2020	9/1/2020
Equipment Installation	14	9/1/2020	9/15/2020
Startup	5	9/15/2020	9/20/2020
First Year System Operations	365	9/20/2020	9/20/2021