SUPPLEMENTAL INTERIM REMEDIAL MEASURES WORK PLAN TO ADDRESS SUBSURFACE OIL

AMERICAN AXLE PLANT
NYSDEC SITE NO. 915196

Prepared For:
General Motors Corporation
Worldwide Facilities Group
Environmental Services Group - Remediation

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TABLE OF CONTENTS

LIST OF FIGURES
(Following Text)

LIST OF TABLES
(Following Text)

LIST OF APPENDICES

LIST OF ACRONYMS

acfm	Actual cubic feet per minute
bgs	below ground surface
BSA	Buffalo Sewer Authority
cfm	cubic feet per minute
CRA	Conestoga-Rovers & Associates
DPT	Direct Push Technology
FID	Flame ionization detector
GEESI	Ground Effects Environmental Services Inc
GM	General Motors Corporation
gpm	gallons per minute
Hp	Horsepower
IRM	Interim Remedial Measure
ITS	Internal treatment system
LEL	Lower explosive limit
LNAPL	Light non-aqueous phase liquid
MPE	Multi-phase extraction
PAL	Pneumatic air lift
PCB	Polychlorinated biphenyl
PFS	Pneumatic fracturing system
ppm	Parts per million
psi	Pounds per square inch
PVC	Polyvinyl chloride
SVE	Soil vapor extraction
VER	Vacuum enhanced recovery
VOC	Volatile organic compounds
WP	Work Plan

1.0 INTRODUCTION

This Supplemental Work Plan has been prepared on behalf of General Motors Corporation (GM) to present changes to the approach presented in the "Interim Remedial Measures Work Plan to Address Oil Infiltration to the BSA Sewer" (IRM Work Plan) for the American Axle Plant Site (the Site). The Site is listed in the Registry of Inactive Hazardous Waste Disposal Sites in New York State as Site Number 915196. A remediation program is being performed in accordance with an Order on Consent (Order) between GM, American Axle & Manufacturing, Inc. (AAM) and the New York State Department of Environmental Conservation (NYSDEC) signed on August 31, 2006.

The IRM Work Plan outlining proposed remedial activities to address the presence of PCB-containing oil in the subsurface and combined sewer was submitted to the NYSDEC in November 2006. This Work Plan called for manual extraction of subsurface oil and operation of the B-26 Coolant Pit Recovery System to reduce the volume of PCB-containing oil in the subsurface. Since that time, AAM has idled manufacturing operations and subsequently closed the Buffalo facility allowing the opportunity to institute a more aggressive recovery method for subsurface oil within the Site. This Work Plan presents the approach to implement high vacuum multi-phase extraction (MPE) technology to achieve this goal.

1.1 WORK PLAN ORGANIZATION

The Supplemental IRM Work Plan is organized as follows:

- Section 1.0 – Introduction;
- Section 2.0 – Site Background;
- Section 3.0 – Multi-Phase Vacuum Extraction Technology;
- Section 4.0 – Methodology for Implementation of MPE/PAL and PFS;
- Section 5.0 – Reporting;
- Section 6.0 – Schedule; and
- Section 7.0 – References.

1.2 DEFINITIONS

The following terms are used in this Supplemental IRM WP to describe and define the Site:

i) "Property" refers to the parcels of land formerly owned by GM and now owned by AAM that are located at and in proximity to 1001 East Delavan Avenue in the City of Buffalo, Erie County, New York. The location of the property is shown on Figure 1.1;

ii) "Facility" means the portion of the property bounded by Delavan Avenue on the north, Cornwall Street on the west, Scajaquada Street on the south, and the CSX Corporation railroad right-of-way on the east. The boundary of the Facility is shown on Figure 1.2; and

iii) "Site" means the boundaries as defined in the Order dated August 31, 2006, which were established based on the source areas of PCB-impacted oil beneath the manufacturing floor slab of the Facility that had been identified at that time. The boundaries of the Site are shown on Figure 1.3.

2.0 SITE BACKGROUND

Multiple field investigations were conducted at the Facility between 2001 and 2005. Oil was encountered in the subsurface throughout the Site. The nature and extent of PCB-containing oil in the subsurface, as presented in the 2006 RI Report and IRM WP, is summarized as follows:

i) Oil presence in the fill unit is within the Site east of the Buffalo Sewer Authority (BSA) 5x9 Sewer;

ii) Oil presence in the clay unit is within the Site on both the east and west sides of the BSA 5x9 Sewer;

iii) Oil is present in the shallow bedrock within the Site on both the east and west sides of the BSA 5x9 Sewer and within the area of oil presence in the clay unit;

iv) PCBs are present in the subsurface oil in all three units;

v) the highest concentration of PCBs in subsurface oil was detected in the clay unit west of the BSA 5x9 Sewer;

vi) the highest concentration of PCBs in oil in the fill unit is two orders of magnitude lower than the highest concentration detected in the clay unit; and

vii) the highest concentration of PCBs in oil in the shallow bedrock is two orders of magnitude lower than the highest concentration detected in the clay unit.

2.1 MANUAL OIL RECOVERY PROGRAM

A program of manual recovery of oil from existing monitoring wells has occurred since December 2005. Oil recovery is concentrated in monitoring wells installed at the bases of the fill and clay units, primarily on the east side of the BSA 5x9 Sewer. Oil is removed from the monitoring wells on a bi-weekly basis using a peristaltic pump. The following wells are included in the program:

i) Fill wells: CP-13, CP-14, CP-28, M-1, M-3, MW-309, T-1;

ii) Clay wells: CP-14AR, CP-19A, MW-400;

iii) Bedrock wells: CP-11B; and

iv) B-26 Sump.

In addition, if sufficient oil (greater than 0.5 foot) is observed in monitoring wells during the quarterly phase checks, this oil is removed during the subsequent bi-weekly recovery rounds until the in-well volume is less than 0.5 foot.

The B-26 Sump is characterized a separate feature due to the fact that during construction of the recovery system, it is believed that the weep holes drilled through the coolant pit walls straddle the clay/bedrock interface. Furthermore, oil from the fill unit could migrate vertically along the side walls of the pit. As a result, the recovery observed in the B-26 Sump is not indicative of one unit.

Through June 6, 2008, a total volume of 3,387.85 gallons of oil were recovered through this program as follows:

Unit	*Volume (gallons)*
Fill	1,849.46
Clay	209.02
Bedrock	200.11
B-26 Sump	1,129.36

The majority of oil has been recovered through wells screened at the fill/clay interface; however, passive recovery from these wells has begun to show diminishing returns. Recovery from the monitoring wells averaged approximately 50 gallons per event in 2006, then dropped to approximately 40 gallons per event in 2007 and 20 to 25 gallons per event in 2008. It is anticipated that the rate of manual recovery of oil will continue to diminish.

2.2 ESTIMATED OIL VOLUMES

The American Petroleum Institute (API) "API Interactive LNAPL Guide" provides an understanding of the behavior of light non-aqueous liquid (LNAPL) or oil in the subsurface and provides assessment tools to evaluate the mobility and recoverability of oil. API has developed the LNAPL Distribution and Recovery Model (LDRM) to characterize the subsurface distribution and mobility of oil. This model represents the most current and accurate method for estimating oil volume in the subsurface.

The model incorporates both soil and petroleum product properties in its calculations. Site-specific data were utilized where available, including average specific gravity obtained from oil samples collected from representative monitoring wells (RI, Table 5.1,

November 2006); however, default values were utilized for some parameters, most notably for soil properties for the fill interval. The fill materials at the Site are heterogeneous in composition. Because published values for fill materials are unavailable, several native soil types that best matched the makeup of the fill material were selected as representative materials. This approach resulted in a range of likely volume estimates for the fill. Furthermore, because the phased oil observed beneath the Site is present on the water surface as an LNAPL, the groundwater surface level must be measurable (within the screened interval of the well) in order to accurately quantify the thickness of the oil. Consequently, the volumes obtained are reasonable approximations of oil presence beneath the Site.

The calculations of oil volume in each of the overburdened units are presented in Appendix A. Summaries of the calculated volumes are included in the discussions presented in the following subsections. Discussions of oil presence in the fill, clay, and bedrock units are based on the phase measurement data collected in February 2008.

It should be noted that any estimation of oil volume in the subsurface, based on observed in-well LNAPL thicknesses, should only be viewed as qualitative approximations. These types of analytical models are based upon assumptions of homogeneous granular porous media (sands, gravels, etc.), unconfined conditions, and vertical hydraulic equilibrium. Consequently, these types of estimations are subject to significant potential error where the following conditions exist:

- confined conditions;
- fine-grained soil (clays) or bedrock where LNAPL preferentially exists in secondary porosity (i.e., fractures, etc.); or
- a fluctuating water table.

2.2.1 FILL UNIT

Of the 35 fill monitoring wells which were accessible for phase monitoring in February 2008, non-aqueous phase oil was present in 14, with thicknesses ranging from 0.01 foot to 3.20 feet. The thicknesses of phased oil measured in the fill monitoring wells in February 2008, oil thickness contours, and estimated limits of the presence of phased oil within the fill unit are presented on Figure 2.1. The data presented on Figure 2.1 show that the presence of phased oil in the fill is centered on the east side of the BSA 5x9 Sewer, south of the former B-26 Coolant Pit; around wells CP-13, CP-14, and MW-309 where the thickness of oil is greater than 2 feet. Oil thickness diminishes in a radial

pattern moving outward from this area. Phased oil has only been observed in two fill wells located on the west side of the BSA 5x9 Sewer, with 1.70 feet in well T-1 and 0.4 foot in MW-103. The absence of phased oil in the fill west of the BSA 5x9 Sewer indicates that no significant sources of oil in the fill unit are present on the west side of the BSA 5x9 Sewer. The measurable oil in monitoring wells T-1 and MW-103 is most likely residual oil contained within the excavation around a former underground storage tank, Tank No. 11.

The fill unit beneath the Facility is not fully saturated and the water levels are often not within the installed interval of the well screen. In these cases, only the minimum thickness of the oil can be estimated. Furthermore, because published values for fill materials are unavailable, several native soil types that best matched the makeup of the fill material were selected as representative materials. This approach resulted in a range of very conservative volume estimates for the fill that represent reasonable approximations of oil presence beneath the Site. Based on these assumptions, the theoretically recoverable volume of oil within the fill unit beneath the Site is estimated to be in the range of 30,000 to 80,000 gallons.

2.2.2 CLAY UNIT

Thirty-six (36) clay monitoring wells were accessible for phase monitoring in February 2008. Of these 36 wells, 25 exhibited the presence of oil with thicknesses ranging from 0.01 to 2.39 feet. The thicknesses of oil measured in the clay monitoring wells in February 2005, oil thickness contours, and an estimated limit of the presence of oil within the clay unit are presented on Figure 2.2. The data presented on Figure 2.2 show that oil is present in the clay unit between Bays 13 and 38, and between Aisles AAA and G. Unlike the fill unit, oil is present on both sides of the BSA 5x9 Sewer between approximately Bays 22 and 35. An apparently isolated area of measurable oil is also present south of Plant No. 81 in well MW-404.

As in the fill, oil presence in the clay unit is primarily within Plant No. 81, south of the former B-26 Coolant Pit. The wells exhibiting the greatest thicknesses of oil within this area are CP-14AR (2.39 feet), MW-305R (approximately 3.9 feet), and CP-19A (1.85 feet). The thicknesses of oil generally diminish in a radial pattern moving outward from these wells. While significant oil thickness was also observed in monitoring wells MW-400 and GP-12 (3.06 feet and 1.83 feet, respectively), these wells are not included in the evaluation of the clay unit due to concerns that the well construction may be compromised allowing oil from the fill unit to seep into the wells.

Comparison of the oil thicknesses in the fill and clay units shows that:

i) the observed thicknesses of oil in the clay monitoring wells is less than in the fill; and

ii) the areal extent of oil in the clay unit south of the former B-26 Coolant Pit is greater than in the fill.

The theoretically recoverable volume of oil within the clay unit beneath the Site is estimated to be less than 1,000 gallons.

2.2.3 BEDROCK UNIT

Seventeen bedrock monitoring wells were accessible for phase monitoring in February 2008. Oil was observed in nine (9) of the 17 wells monitored, with thickness ranging from 0.01 to 1.40 feet. The thicknesses of oil measured in the bedrock monitoring wells in February 2008, oil thickness contours, and an estimated limit of the presence of phased oil within the bedrock unit are presented on Figure 2.3. The data presented on Figure 2.3 show that the area of observed oil presence in the bedrock is significantly smaller than the area of oil presence in the fill and clay units. The main area of oil presence in the bedrock unit, between Bays 26 and 32, and between Aisles B and G, is essentially contained within the area of oil presence in the clay. However, unlike the clay unit where the thickest presence of oil is located east of the BSA 5x9 Sewer, the thickest presence of oil in the bedrock is centered west of the BSA 5x9 Sewer around monitoring well CP-11B (approximately 0.75 feet).

Comparison of the observed thicknesses of oil in the bedrock monitoring wells to those in the fill and clay units shows that less oil is observed in the bedrock monitoring wells. The presence and behavior of oil within the fractured bedrock is a function of the fluid, geometry of the fracture network, rock matrix properties, and the groundwater regime (Hardisty, Roher, and Dottridge, 2004). The groundwater regime and fluid properties are well defined across the Site. The rock matrix properties can be inferred from data collected from studies conducted at other sites within the region. In general, the dolostone/limestone bedrock matrix is of extremely low porosity and permeability and water contained within the rock matrix is older than the water contained in the fractures. However, the geometry of the fracture network within the bedrock can only be estimated at well locations and at best can only be represented as uniform planar fractures across the Site. Because of the variable geometry of the fracture network,

estimates of oil volume in the bedrock cannot be made with any reasonable degree of confidence.

2.3 MODIFICATIONS TO CURRENT IRM WORK PLAN

The current IRM Work Plan calls for the Site calls for:

i) manual extraction of oil from select Site monitoring wells on a bi-weekly basis;

ii) construction of a water treatment system and continued operation of the former B-26 coolant pit recovery system;

iii) completion of spot repairs within the BSA 5x9 Sewer; and

iv) application of coatings to the sewer interior as a pilot study to evaluate the effectiveness of such an approach.

The sewer-related activities (items iii and iv above) have yet to be implemented due to a number of reasons, including limited access to the sewer and safety concerns for entry personnel. Furthermore, although observations made during sewer entries conducted in 2004 indicated seepage and pooling of oil along the east wall of the BSA 5x9 Sewer within the Site, the presence of pooled oil/seeps had visibly diminished as noted during the most recent sewer entries completed in October 2007 and April 2008.

Due to changes in the status of the AAM Facility (currently idled/closed), other interim measures previously deemed impractical are now feasible and will address Site contamination more expeditiously. Specifically, high vacuum multi-phase extraction can now be implemented within the Site. This remedial method will address the recovery of subsurface oil in a more aggressive manner, as well as create a barrier along the BSA 5x9 Sewer within the Site to further minimize the potential for infiltration to the Sewer.

3.0 MULTI-PHASE VACUUM EXTRACTION TECHNOLOGY

This section generally describes the multi-phase vacuum technology. Specific application of the technology is discussed in Section 4.0.

High vacuum multi-phase extraction (MPE) has been demonstrated to be an aggressive and effective technology for the remediation of large petroleum-related LNAPL plumes in dense glacial soils (silts and clays). MPE coupled with pneumatic air-lift (PAL) technology is capable of removing LNAPL/liquid from depths in excess of 25 feet and across greater horizontal distances. Further, the addition of pneumatic fracturing via a separate pneumatic fracturing system (PFS) is considered to be an effective enhancement to MPE/PAL that has been shown in other unrelated field applications to increase mass recovery rates of hydrocarbons (LNAPL, dissolved phase, vapor phase) from the subsurface (Schuring, 2002).

3.1 MPE TECHNOLOGY DESCRIPTION

MPE (also referred to as bioslurping or vacuum enhanced recovery (VER)) is an aggressive technology that uses a high vacuum pump to extract a mixture of LNAPL, vapor and groundwater from a network of extraction wells. The technology combines the aspects of soil vapor extraction (SVE) and groundwater pump and treat technologies by applying a constant high vacuum to the formation. The application of a high vacuum has been demonstrated as a superior technology for recovering mass quantities of hydrocarbons (free phase, vapor phase, dissolved phase) from medium to fine textured soils (silts and clays) as compared to traditional SVE with pump and treat (Blake et al., 1990; Kittel et al., 1994). MPE may also draw uncontaminated soil gas and groundwater containing relatively high levels of oxygen into oxygen-depleted areas of the saturated and unsaturated zones. This will enable aerobic biodegradation by adding oxygen (gas-phase and/or dissolved) to zones that were previously oxygen-depleted or anaerobic.

Based on the theoretical capabilities of vacuum lift technology, the application of MPE can be problematic at depths in excess of 25 feet. Although the vacuum effect is continuous throughout the column of an extraction well, an applied vacuum cannot lift a column of liquid beyond a specific point under specified conditions. However, the use of PAL with MPE is capable of extracting liquids at greater depths. The PAL technology operates by pulsing compressed air into the bottom of the well. The injected air increases the pressure differential that drives the column of liquid upward, and reduces the effective density that also promotes flow under the pressure differential. This

enables the effective evacuation of liquid (LNAPL and/or groundwater) from the well. The use of PAL at depths greater than 25 feet overcomes the vacuum loss and operational issues that can be associated with the use of drop tubes or stingers.

The use of PAL will be conducted in extraction wells greater than 25 feet in depth. Extraction wells less than 25 feet in depth will utilize small diameter drop tubes to perform extraction. Some extraction wells that are shallower than 25 feet may also employ PAL to overcome potential pressure drop issues associated with friction losses due to long extraction pipe runs.

3.2 FRACTURE TECHNOLOGY DESCRIPTION

Injection of air or any other gas into the subsurface at a pressure that exceeds the natural strength and in situ stresses present in the formation causes fracturing. Pneumatic fracturing is predominantly horizontal over consolidated formations. The most important system parameter for efficient pneumatic fracturing is the injection flow rate, as it largely determines the dimensions of the fracture. Once a pneumatic fracture has been initiated, it is the high volume of airflow that propagates the fracture and supports the formation. Other fracturing technologies, such as hydraulic fracturing, use the high-pressure injection of carrier fluids to create the fractures. Without the carrier fluids used in hydraulic fracturing, there are no concerns associated with fluid breakdown for pneumatic fracturing. Further, there is a potential for higher permeability within the fractures formed pneumatically, in comparison to hydraulic fractures, as the pneumatic fracture is essentially air space devoid of any propping agents. Open, self-propped fractures resulting from pneumatic fracturing are capable of transmitting relatively significant amounts of fluid flow in low permeability soils.

The clay unit soil at the Site is primarily made up of dense clays and silts, allowing fracturing to be performed in both the saturated and unsaturated zones. In silts and clays, the use of fracturing can be beneficial in the creation of secondary porosity providing extraction pathways that would not exist otherwise, and also in increased pressure gradient between the injection and extraction points. The creation of a fracture, even in the saturated zone, will not likely be flooded due to the time required for the silt/clay to release water or LNAPL into the fracture. Consequently, injected air will be allowed to propagate radially away from the air injection well. Once the network of fractures is created, and the water and/or LNAPL have time to release into the fracture, the push/pull movement of liquid through the fractures should be observed. However, in sands and gravels, water is released almost instantaneously. Consequently, fracturing as described above could not take place in sand or gravel formations, although the PFS

system may still be applied in more permeable formations in order to increase the pressure gradient toward the extraction points.

4.0 METHODOLOGY FOR IMPLEMENTATION OF MPE/PAL AND PFS

This section presents the methodology, schedule, materials and equipment to be used in the implementation of MPE/PAL and PFS at the Site.

4.1 SHORT-TERM VACUUM TEST EVENT

A short-term MPE test will be conducted utilizing a vacuum truck (Vac-Truck) to simulate MPE. The proposed testing is designed to determine the liquid and vapor-phase free hydrocarbon recovery rates, as well as the hydraulic and vacuum influence due to the application of vacuum at the extraction well. These are key data to confirm the configuration of a full-scale system. In addition, the testing of total and speciated hydrocarbons in the vapor phase will provide data that will be used to determine the need for any air emission control equipment on the full-scale system. Although operation of the extraction system is an exempt activity under 6 NYCRR Part 201-3.3(c) and an air permit will not be required, emission control equipment may still be necessary.

The Vac-Truck test will be conducted at CP-14, CP-14-AR, and CP-11B for two consecutive 8-hour periods at each well. Monitoring will be conducted at well locations within a radius of approximately 100 feet of the extraction wells. Specifically, the following locations will be monitored:

- CP-14 Test: CP-8, CP-13, CP-26, CP-27, and MW-309.
- CP-14-AR Test: CP-8A, CP-13A, CP-14A, CP-26A, CP-27A, and MW-309A.
- CP-11B-Test: CP-9B, CP-16B, CP-18B, CP-20B, CP-21B, and CP-22B.

The extraction wellhead will be outfitted with the following:

- A ¼-inch female quick-connect fitting to allow the use of a corresponding ¼-inch male quick-connect fitting for the attachment of various gauges/meters; and
- A ½-inch ball valve for the addition of bleed air to aid the lift of the vacuum.

Each monitoring well will be outfitted with a well cap having a gas-tight quick connect fitting (or equivalent) to allow the measurement of well headspace pressure without breaking the seal of the well cap.

The specific methodology for the tests is as follows:

1. Lower a drop tube to just above the top of the liquid in the well;
2. Start the vacuum;
3. Slowly lower the drop tube to the desired elevation (bottom of the LNAPL-impacted soil zone); and
4. Add bleed air at the top of the well as necessary to achieve multi-phase flow (i.e., extract liquids and air/soil gas).

The monitoring and measurement to be conducted before and/or during each test is summarized in Table 4.1.

Vapor samples will be collected from the vacuum truck in accordance with Table 4.1. The purpose for the vapor sampling is to: (1) provide a quantitative means of evaluating the mass of hydrocarbons removed in the vapor phase; (2) provide an additional source of mass removal estimation that may be compared to the measurements recorded by the MPVE System automated sensor; and (3) provide an actual measurement and estimation of air toxics that may be released during operation of the system to determine the need for control equipment.

Vapor samples will be collected from the vacuum truck's vacuum blower exhaust. The vapor will be extracted using a vacuum chamber (lung), Tedlar sample bag, ¼ horsepower (Hp) pump and associated Teflon tubing. Specifically, the Tedlar sample bag will be placed in the lung and sealed from atmosphere. The first Teflon tube will be connected from the Tedlar bag (inside the lung) to a vapor sampling port on the vacuum truck. The second Teflon tube will run from the inside of the lung to the outside of the lung. The ¼ Hp pump will be connected to the second Teflon tube and used to draw a vacuum in the lung (within the annulus of the outer Tedlar bag and inner lung wall). As the vacuum in the lung increases, vapor will be withdrawn from the truck sample port through the first Teflon tube and into the Tedlar bag. Once the Tedlar bag is sufficiently filled, the valve on the bag will be shut and the sampling system will be disconnected. The Tedlar bag will be conditioned prior to obtaining a final sample for laboratory analysis. Vapor samples will be submitted for laboratory analysis of total and speciated hydrocarbons.

4.2 RECOVERY WELL INSTALLATION

A network of 4-inch diameter recovery wells will be installed for use in LNAPL recovery efforts at the Site. The proposed extraction well and air injection well network consists

of approximately 65 extraction wells and 4 injection wells. Extraction wells at the fill/clay interface will be installed at spacings of approximately 50 feet (i.e., radius of influence of 25 feet), while extraction wells straddling the clay/bedrock will be installed at spacings of approximately 25 feet (i.e., radius of influence of 13 feet). The exact configuration of the extraction well network is dependent upon the presence of subsurface features and the locations of existing monitoring wells, resulting in an irregular grid.

Soil samples will be collected from the soil borings using a split-spoon sampler. The soil samples will be collected continuously (2-foot intervals) for inspection and characterization of soil types, stratigraphy, and presence of LNAPL.

Air injection wells will be installed into the clay at various locations in the middle portion of the LNAPL plume such that each fraction well is surrounded by extraction wells. All extraction and air injection wells will be individually piped with shut-off valves to/from the system to allow maximum operational flexibility throughout the operation of the system.

The approximate layout of the extraction/air injection well network is provided in Figure 4.1 (fill/clay interface wells) and Figure 4.2 (clay/bedrock interface wells). The number and locations of extraction/air injection wells may be modified after completion of the short-term vacuum test event described in Section 4.1. Furthermore, the layout of the extraction/air injection well network is subject to change based on the observed system performance.

4.3 MPE AND PFS OPERATION

The MPE will be accomplished using a Ground Effects Environmental Services, Inc. (GEESI) MPVE 27100 system (System) capable of delivering a maximum vacuum of 27 inches of mercury ("Hg, or 30 feet of water) with a maximum air flowrate of 1,734 actual cubic feet per minute (acfm) at 20"Hg. The System will be used to apply a constant vacuum to as many as 24 extraction wells at any given time. The extraction well network will be comprised of approximately 65 4-inch diameter PVC extraction wells. The fill/clay interface extraction wells will be screened over the entire depth of LNAPL in the fill and extend approximately 3 feet into the top of the clay formation. It is expected that the fill/clay interface extraction wells will be screened from approximately 5 to 10 feet below ground surface (bgs). The clay/bedrock interface extraction wells will penetrate the LNAPL zone at the base of the clay unit and extend 5 feet into the top of the bedrock. It is expected that each clay/bedrock interface

extraction well will be screened from approximately 12 to 22 feet bgs, dependent on field observations. The approximate layout of the extraction well network is provided in Figures 4.1 and 4.2.

Extraction wellheads using drop tubes for extraction will apply vacuum to the bottom of the well through a smaller diameter pipe or hose.

PAL will be conducted in select wells by injecting air into smaller diameter pipe or hose that run to the bottom of the extraction wells. Vacuum will be applied at the top of the extraction wells using PAL. The injected air will be pulsed into the extraction wells on a cycled basis with the pulse duration lasting approximately 30-90 seconds, and the time between pulses lasting approximately 2-3 minutes. The PAL will be conducted such that air is pulsed into each operational extraction well on a cycled basis.

The purpose of the PAL is to increase the pressure differential that drives the column of liquid upward, and to reduce the effective density to promote flow under the pressure differential. This enables the effective evacuation of liquid (LNAPL and/or groundwater) from the well. The combination of MPE/PAL allows the evacuation of all liquids from the extraction wells while applying a constant high vacuum to the subsurface.

Pneumatic fracturing (PF) will be accomplished using an air compressor to inject air into 1-inch diameter stainless steel injection wells that will penetrate the clay unit, into the saturated zone. The injection wells will be situated central to the extraction well network. The approximate locations of the air injection wells are provided in Figure 4.2.

PF will be conducted by pulsing air into the stainless steel injection well on a cycled basis. The pulse duration will last approximately 30-90 seconds, with the time between pulses lasting approximately 2-3 minutes.

The purpose of PF is to enhance the potential for mass hydrocarbon recovery from the subsurface. The continual injection of air (on a pulsed basis) causes fractures to propagate radially outward from the air injection (fracturing) well. The air injection also creates a substantial increase in the pressure differential between the fracturing well and surrounding MPE/PAL extraction wells. This creates a "push-pull" type of system that enhances the potential for mass hydrocarbon recovery.

The automated System will operate on a generally continuous basis, except for times when the system is shut down for maintenance and repair. All associated monitoring,

sampling, and data collection to be completed during the operation of the System is described in the following subsections.

4.4 MONITORING AND MEASUREMENT

Monitoring and measurement of various System parameters, extraction/injection well parameters, and monitoring well observations will be recorded to optimize the operation of the system and collect necessary data regarding hydrocarbon recovery rates and the System's effluent liquid and vapor-phase streams. The details of this monitoring and measurement are discussed in the following subsections and are summarized in Table 4.2.

4.4.1 MPVE 27100 SYSTEM

Operation of the MPVE System will be monitored on a regular basis. Specifically, the following parameters will be monitored:

- Applied vacuum ("Hg);
- Air flow rate (cfm);
- Total hydrocarbon concentration in vapor phase (% LEL or ppm, on a continuous basis via infrared sensor);
- Total hydrocarbon concentration in vapor phase (ppm, via handheld analyzer as necessary);
- Total liquid (LNAPL and groundwater) extracted (gallons);
- Total LNAPL removed (gallons);
- Separated groundwater discharge flowrate (gpm); and
- Applied air injection pressure for PAL and PFS (psi).

Table 4.2 provides more detail regarding the frequency of measurement. These data will be used to calculate mass hydrocarbon recovery rates, optimize the System operating parameters, and calculate the liquid and vapor-phase emission rates of all relevant chemical constituents. Monitoring equipment used to record and/or collect the necessary data is discussed in Section 4.6.6.

4.4.2 MPE WELLHEADS

The MPE wellheads will be monitored periodically during System operation for the optimization of operating conditions. Specifically, the following parameters will be monitored as required:

- Applied vacuum ("Hg);
- Air flow rate (cfm);
- Total liquid (LNAPL and groundwater) removed (gallons); and
- Depth to LNAPL/groundwater.

Monitoring equipment used to record and/or collect the necessary data is discussed in Section 4.6.6.

4.4.3 SURROUNDING MONITORING WELLS

Existing Site monitoring wells and any extraction wells not being utilized for LNAPL recovery will be monitored periodically during System operation for the optimization of operating conditions. Specifically, the following parameters will be monitored on an as-needed basis:

- Induced vacuum ("H_2O); and
- Depth to LNAPL and groundwater.

Table 4.2 details the monitoring schedule.

4.5 RECOVERED LNAPL/GROUNDWATER

The MPVE system is equipped with an oil/water separator with an internal storage tank for temporary storage of separated LNAPL. Recovered LNAPL will be subsequently transferred via transfer pump to a 1,000-gallon double-walled aboveground storage tank.

Recovered groundwater that exits the oil water separator will be transferred to the existing groundwater treatment system used to manage collected groundwater from the B-26 sump. The treatment system is designed to handle up to 14,400 gallons per day (gpd) of water, although current flows range from 500 to 1,000 gpd. The system can be

expanded as necessary with the addition of carbon vessels in parallel and/or series to handle increased flow and provide sufficient retention times. Effluent from the treatment system is discharged to the BSA under existing Buffalo Pollutant Discharge Elimination System (BPDES) Permit #07-04-BU039. Monitoring will continue to be conducted in accordance with the BSA permit.

4.6 EQUIPMENT AND MATERIALS

4.6.1 MPE EXTRACTION WELLS

Approximately 65 new MPE extraction wells will be installed throughout the Site. The approximate locations of the wells are identified in Figures 4.1 and 4.2. Additional extraction and/or monitoring wells may be installed, if required, based on the observed performance of the System.

The boreholes for the new MPE wells will be advanced using traditional hollow-stem auger drilling techniques as well as concrete coring. All drill cuttings will be placed in drums for characterization and disposal.

The new MPE wells will consist of 4-inch diameter, Schedule 40 PVC piping materials. The well screen will consist of Number 10-slot PVC well screen. The riser pipe will extend from the top of the screen to ground surface, with the wells finished as flush-mount installations.

The MPE wells will be constructed with a sand filter pack to prevent the introduction of native soil into the well screens. Each well will be equipped with a filter sand pack from the bottom of the well up to 2 feet above the top of the well screen. A 2-foot bentonite seal will be placed above the sand pack and sufficiently hydrated to allow swelling. A cement-bentonite grout (Neat cement with 3-5% bentonite powder) will be placed above the bentonite seal up to 2.5 feet bgs. The remaining borehole annulus will be filled with concrete to properly secure the well.

MPE wells with drop tubes for extraction will utilize 1-inch diameter Schedule 40 PVC pipe or vacuum-rated reinforced hose (open at the bottom). The inlet of the drop tubes will be placed such that the LNAPL-impacted soil zones will be completely dewatered at each respective location.

PAL will be accomplished through a 1-inch diameter drop tube placed within each extraction well. The PAL head will be situated such that the LNAPL-impacted soil zones will be completely dewatered at each respective location.

Typical well completion details are provided as Figures 4.3 and 4.4.

4.6.2 AIR INJECTION WELLS

Approximately four air injection wells (fracture wells) will be installed throughout the Site. The approximate locations of the wells are identified in Figure 4.2.

The air injection wells will be driven directly into the ground using Geoprobe direct push technology (DPT) techniques. GEESI will be on-Site to oversee the installation of the air injection wells.

The air injection wells will consist of 1-inch diameter, stainless steel piping materials. The bottom portion of the well piping (from approximately 12 to 17 feet bgs) will be specifically perforated by GEESI to enable fracturing at the desired depth range within the formation. The riser pipe (above the perforated portion) will extend from approximately 12 feet bgs up to ground surface. All PFS well piping materials will be provided by GEESI.

4.6.3 PIPING AND FITTINGS

All piping materials used to convey extracted vapors and fluids from the MPE/PAL wells to the MPVE System will consist of 2-inch to 4-inch diameter, vacuum-rated, reinforced flexible plastic hosing and Schedule 40 PVC pipe. The hosing will be secured at the top of each MPE/PAL wellhead using adjustable metal clamps or connectors. Multiple hoses will be routed into common PVC headers that will be connected via 3-inch PVC piping to the System. All piping materials will be completed above ground.

A PVC gate valve will be installed at each MPE wellhead to allow for flow control and wellhead monitoring.

Compressed air will be delivered to the PALs and the frac wells via a mixture of 2-inch diameter Schedule 80 PVC pipe and pressure-rated reinforced flexible hose. Each PAL line and air injection well can be isolated via a 2-inch brass gate valve.

4.6.4 MPVE 27100 SYSTEM

The GEESI MPVE 27100 system consists of a 100 Hp electric rotary lobe vacuum pump capable of delivering a maximum vacuum of 27"Hg and a maximum air flow rate of 1,734 acfm at 20"Hg. The System is also equipped with an Internal Treatment System (ITS) that includes an 840-gallon air/water separator (knockout) tank and an oil/water separator. If needed, a high efficiency, low maintenance vacuum air stripper can be incorporated into the system.

The System is equipped with a silt removal system upstream of the MPVE 27100 unit. A 350-gallon high-efficiency mud separator tank will be utilized as a silt knockout to reduce the solids loading to the System. The silt collected in the knockout tank will be periodically removed, characterized, and appropriately disposed of off-Site.

The System oil/water separator is equipped with an internal storage tank that is capable of storing 28-gallons of separated LNAPL. Recovered LNAPL will temporarily be stored in the 28-gallon storage tank and subsequently transferred via transfer pump to a 1,000-gallon double-walled aboveground storage tank. The oil/water separator is also equipped with a sludge hopper and progressive cavity mud pump to remove solids within the extracted liquid stream.

The System is equipped with three conductivity level switches for the transfer pump and low-level, high-level, and high high-level shut down controls. The System also contains two 32-inch by 42-inch clean-out ports and two drain ports. A liquid level sight glass is mounted on the unit for easy viewing of internal processes.

Influent and effluent liquid sampling ports are installed at the inlet and liquid outlet of the MPVE unit. Intermediate liquid sampling ports are also located within the knockout tank and after the oil/water separator within the System. A vapor sampling port is located at the System's gas stream exhaust point.

The System and associated equipment will utilize available Site power. GM will work with AAM to provide the necessary power connections and metering, should it be required.

The System and compressors are housed within a 12-foot by 42-foot skid-mounted, sound-attenuated steel building. The building will be located within the Site footprint to minimize the distance from the extraction well network. Figure 4.5 presents a schematic of the System. Complete System specifications are provided in Appendix B.

4.6.5 AIR COMPRESSORS

One air compressor will be used for both PAL and PFS purposes. The compressor is a 50 Hp Ingersoll-Rand electric unit capable of providing a maximum airflow rate of 200 acfm at a pressure of 100 pounds per square inch (psi). The compressor will be used with a surge tank to pulse air into the extraction and fracturing wells on a cycled basis as needed.

4.6.6 MONITORING AND OTHER RELATED EQUIPMENT

The System will be equipped with the following instrumentation to allow process monitoring and optimization:

- Water Flowmeter: An ABB 10DX4311 magnetic flowmeter will be utilized to measure the discharge of separated groundwater from the System. The flow meter will be capable of measuring flow in the range of 3-50 gpm;
- Air Flowmeter: A Rosemount 3051SFA annubar flowmeter will be utilized to measure the System gas stream exhaust volumetric flowrate;
- LEL Sensor: A Draeger Polytron IREXIL infrared sensor will be utilized to continuously monitor the total hydrocarbon concentration in the exhaust gas stream. The sensor will operate in the 0-10,000 parts per million volume (ppmv) range;
- Web Server Telemetry (WST) System: The WST system will allow wireless remote operation and monitoring of the system from any location through a secure website. The WST system will operate in conjunction with the vacuum transmitter and vapor temperature transmitter described below:
  - Vacuum Transmitter: A Wika 892.13.500 vacuum transmitter will be utilized to transmit the System applied vacuum to the web server telemetry (WST) system; and
  - Vapor Temperature Transmitter: A Rosemount 644H SMART system will be utilized complete with a Rosemount Series 644 Temperature Transmitter, direct mount with Rosemount Instruments Model 0183 Thermocouple Sensor.

The complete specifications of the System are available in Appendix B.

The following monitoring equipment will be utilized as needed for the purposes of System optimization, effluent monitoring (both liquid and gas/vapor streams), and data collection from the extraction/monitoring well network:

- Oil/Water Interface Probe: A Solinst Model 122 oil/water interface probe will be used as needed to record the depths to LNAPL/groundwater in the MPE/PAL wells and surrounding monitoring wells. The probe is equipped with an infrared sensor and conductivity sensor and is capable of measuring LNAPL thicknesses of 0.005 feet or greater. The presence of LNAPL is indicated via an audible steady tone with a visual steady red light. The presence of groundwater is indicated via an audible pulsed tone with a visual blinking red light.
- Vacuum Gauges: Various vacuum gauges (Magnehelic or equivalent) will be used to record applied and/or induced vacuum or pressure on MPE/PAL wells and surrounding monitoring wells. Gauges for MPE/PAL wellheads will be capable of reading applied vacuums ranging from 0-30 "Hg. Gauges for monitoring wells will be capable of reading induced vacuums ranging from 0-10 "H_2O, and 0-1" H_2O. All vacuum readings from monitoring wells will be obtained under sealed conditions using air-tight fittings; and
- Handheld Total Hydrocarbon Analyzer: If necessary, a Gastech Model 1238 handheld hydrocarbon analyzer, or equivalent, will be utilized to confirm the exhaust gas stream total/non-methane hydrocarbon content.

5.0 REPORTING

The performance of the System will be assessed and reported through the monthly progress reports. A report will be issued after operation of the System for one year. The report will offer recommendations for continued operation of the system, modifications to the system/mode of operation, or cessation of operation based on the System performance during the first year. Modifications to System operation and configuration may be proposed sooner than one year as warranted by changing conditions. A final report will be issued following the conclusion of the IRM.

6.0 SCHEDULE

Pending approval of this Work Plan, it is expected that equipment installation and System commissioning will take place in August and September 2008. The primary tasks to be completed for implementation of the System include:

- Completion of the short-term vacuum test;
- Mobilization of the MPVE System from its current location in Pontiac, Michigan to the Site;
- Installation of the extraction well network;
- Installation of the PFS wells;
- Commissioning of the System;
- System operation;
- On-site treatment of recovered groundwater;
- Off-site removal of LNAPL;
- Decommissioning of the System; and
- Reporting.

A detailed schedule with timelines for each of these activities is provided in Figure 6.1.

The exact length of operation of the System is unknown at this point. Duration of operation will be based on the ability of the System to continue to recover sufficient product. In general, most remedial technologies, at best, can recover approximately 40 to 60% of the total LNAPL present in the subsurface (API, 2004). As an LNAPL recovery program proceeds, the concentration of LNAPL in the subsurface approaches residual concentrations and hence, the LNAPL recovery rate diminishes with time. In no case can hydraulic recovery (total fluids pumping, groundwater pumping, etc.) reduce the subsurface LNAPL volume to below the residual LNAPL saturation of the formation (Huntley and Beckett, 2001).

Operation of the system will be deemed complete when the recovery rate exhibits a sustained asymptotic trend. Following this point, further recovery with MPE technology will be impracticable. Remaining residual LNAPL will be assumed to be effectively unrecoverable. Any risks associated with residual (unrecoverable) LNAPL will be evaluated at that time.

7.0 REFERENCES

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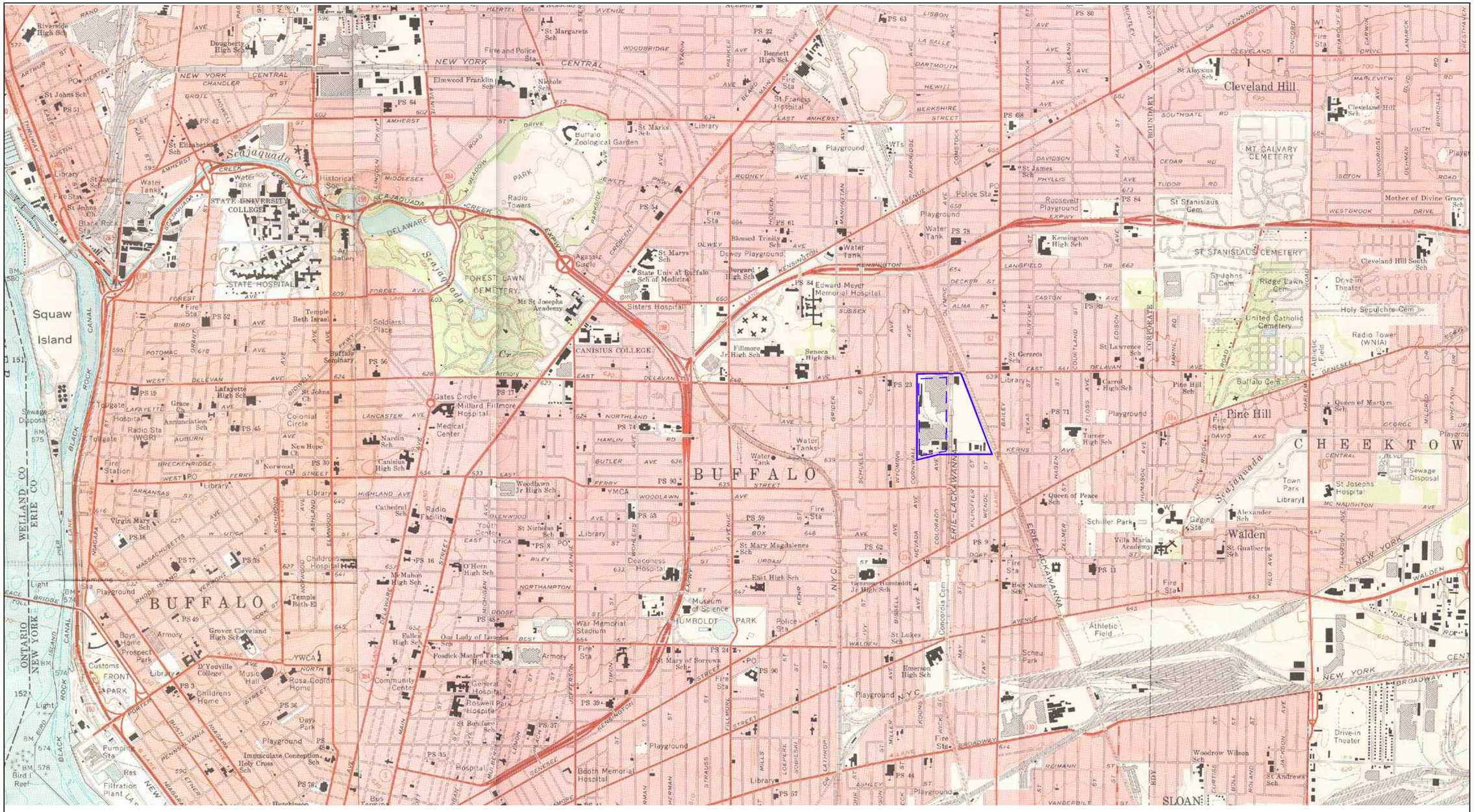
Kittel, J.A., R.E. Hinchee, R. Hoeppel, and R. Miller. 1994. "Bioslurping – Vacuum-Enhanced Free-Product Recovery Coupled with Bioventing: A Case Study." *Proceedings of Petroleum Hydrocarbons and Organic Chemicals in Groundwater – Prevention, Detection, and Restoration.* Ground Water Publishing Company, Dublin, Ohio. pp. 255-270.

Ground Effects Environmental Services Inc., various personal correspondence.

Schuring, J.R. April, 2002. Fracturing Technologies to Enhance Remediation. Ground-Water Remediation Technology Analysis Center, Pittsburgh, Pennsylvania.

FIGURES



REFERENCE:

UNITED STATES GEOLOGIC SURVEY
BUFFALO NE QUADRANGLE, NY
TOPOGRAPHIC, 7.5 MINUTES SERIES 1965

0 1250 2500ft

LEGEND:

PROPERTY BOUNDARY

figure 1.1

LOCATION MAP
AMERICAN AXLE PLANT SITE
Buffalo, New York

12635-03(022)GN-NF001 JUL 02/2008

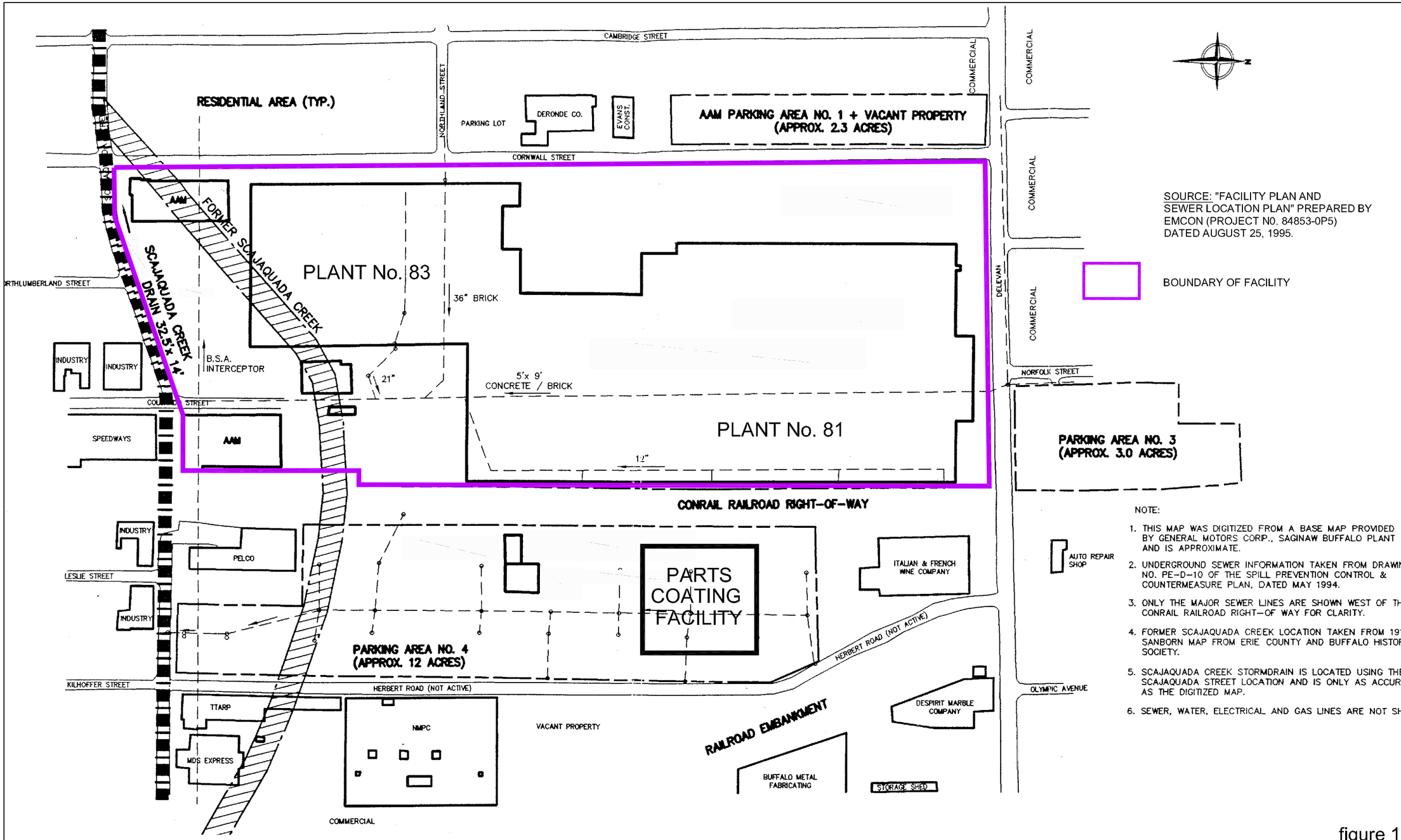


figure 1.2

FACILITY PLAN
AMERICAN AXLE PLANT SITE
BUFFALO FACILITY
Buffalo, New York

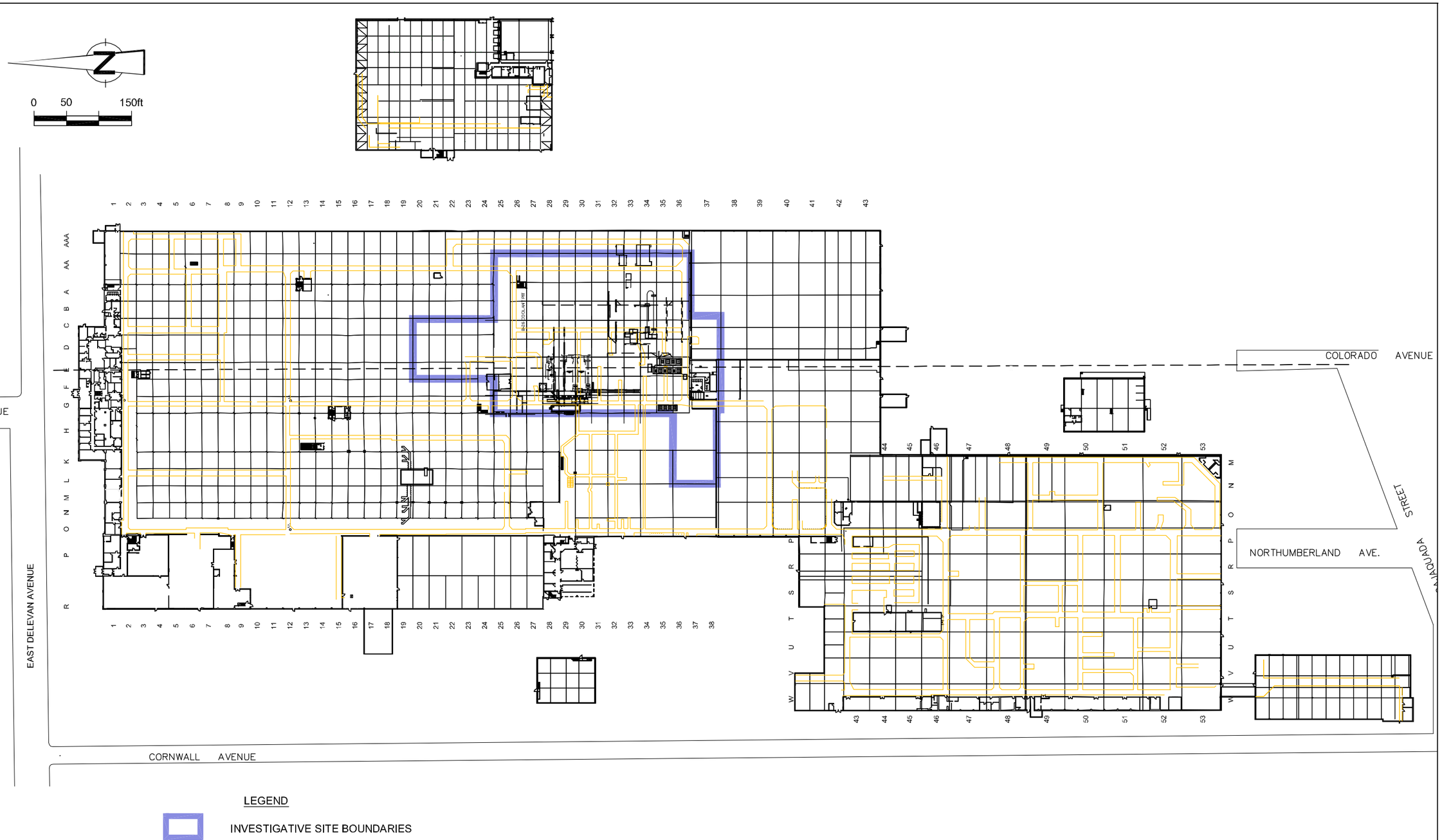


figure 1.3

SITE BOUNDARY
AMERICAN AXLE PLANT SITE
Buffalo, New York

12635-03(022)GN-NF003 JUL 02/2008

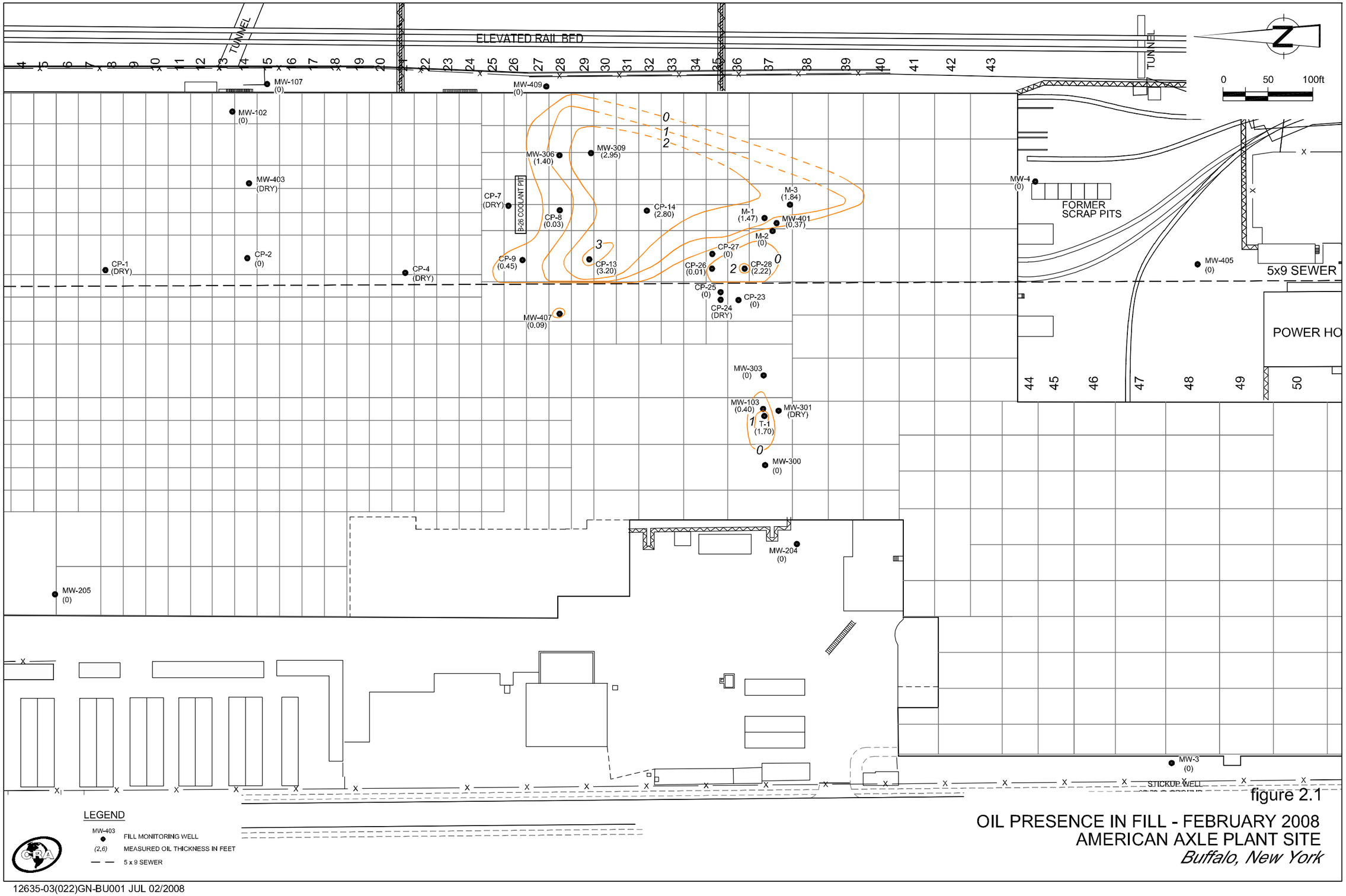
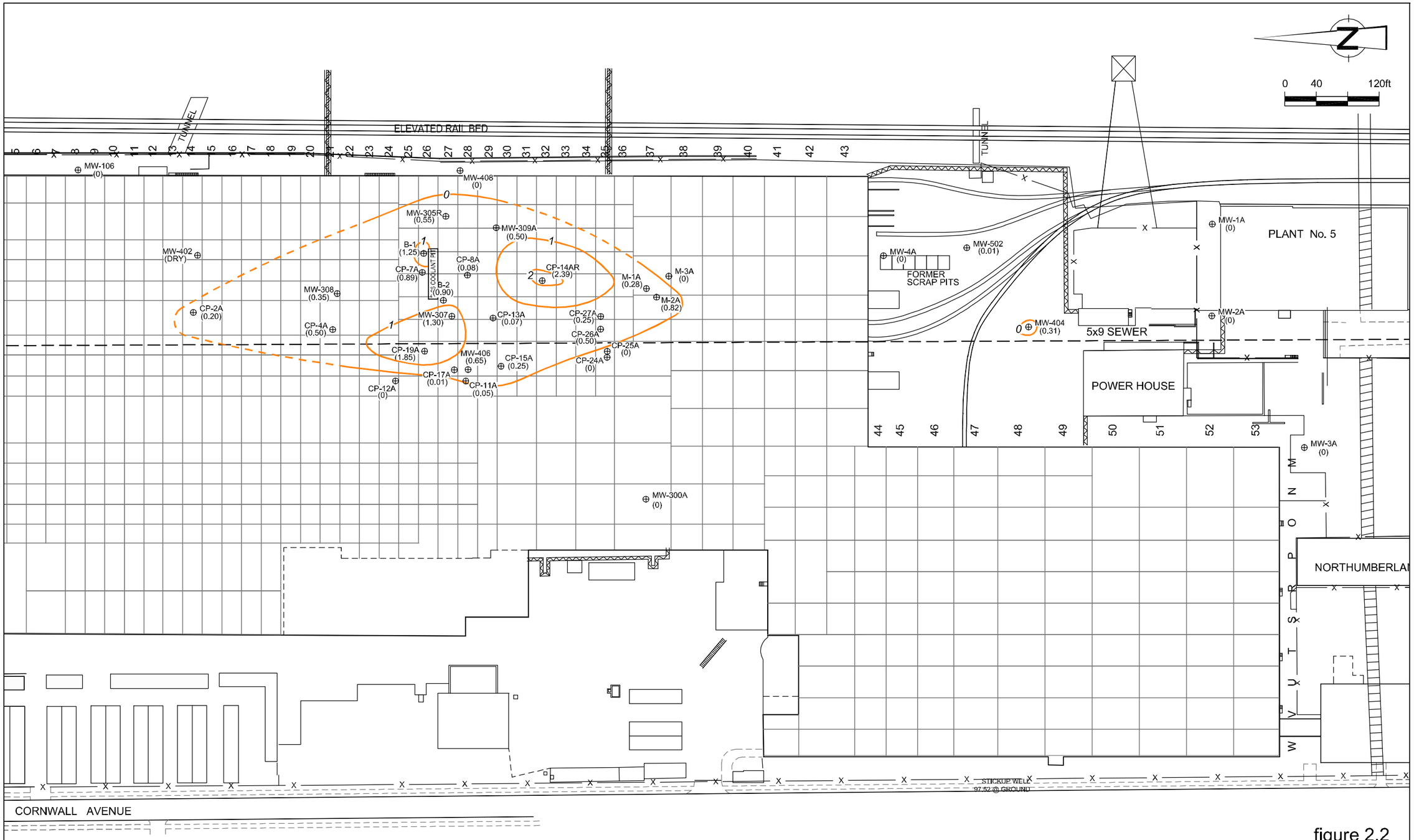


figure 2.1

OIL PRESENCE IN FILL - FEBRUARY 2008
AMERICAN AXLE PLANT SITE
Buffalo, New York

12635-03(022)GN-BU001 JUL 02/2008



LEGEND

MW-205 ⊕ CLAY MONITORING WELL

(2,1) MEASURED OIL THICKNESS IN FEET

— — 5 x 9 SEWER

figure 2.2

OIL PRESENCE IN CLAY - FEBRUARY 2008
AMERICAN AXLE PLANT SITE
Buffalo, New York

12635-03(022)GN-BU002 JUL 02/2008

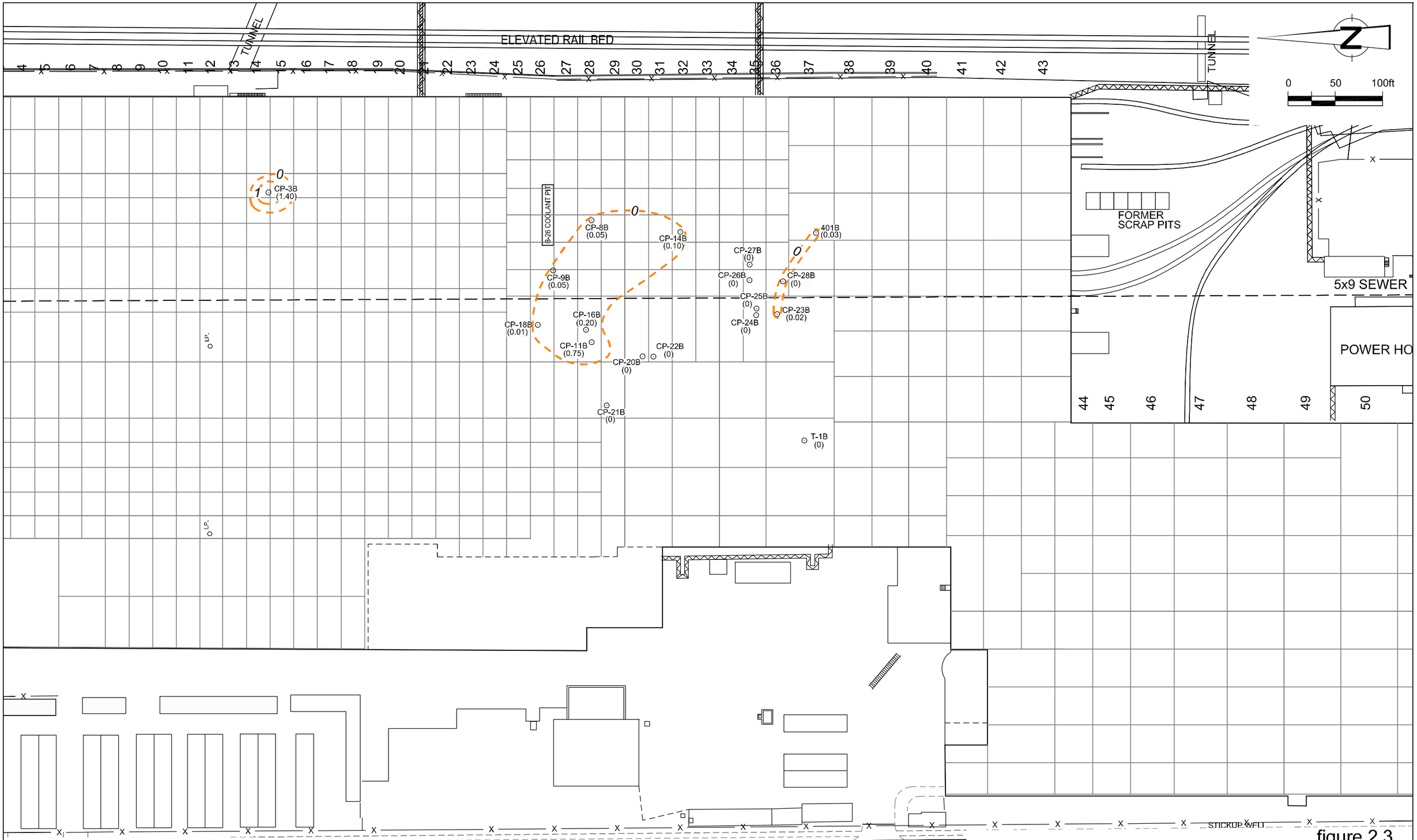


figure 2.3

OIL PRESENCE IN BEDROCK - FEBRUARY 2008
AMERICAN AXEL PLANT SITE
Buffalo, New York

12635-03(022)GN-BU003 JUL 02/2008

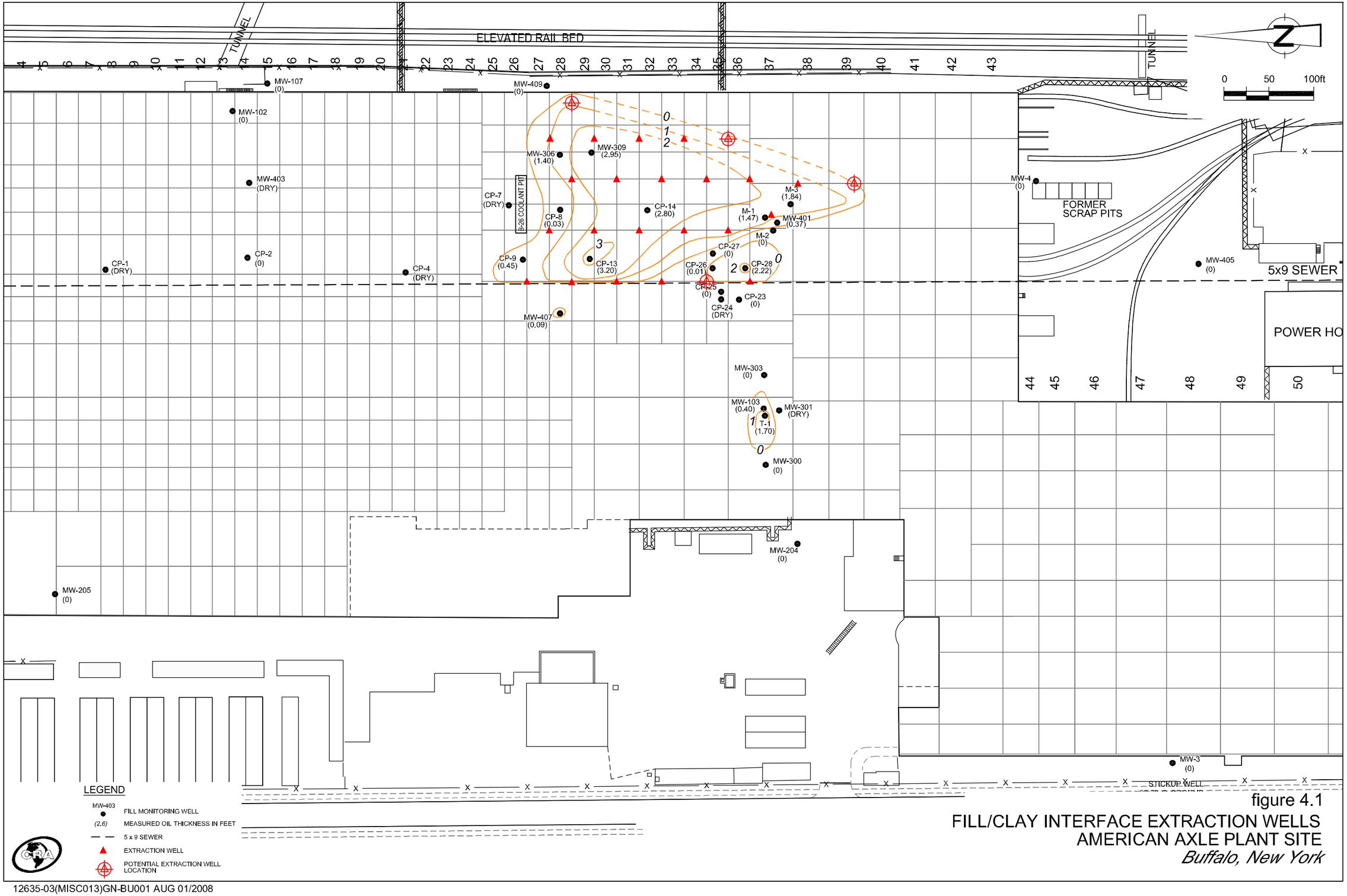


figure 4.1

FILL/CLAY INTERFACE EXTRACTION WELLS
AMERICAN AXLE PLANT SITE
Buffalo, New York

12635-03(MISC013)GN-BU001 AUG 01/2008

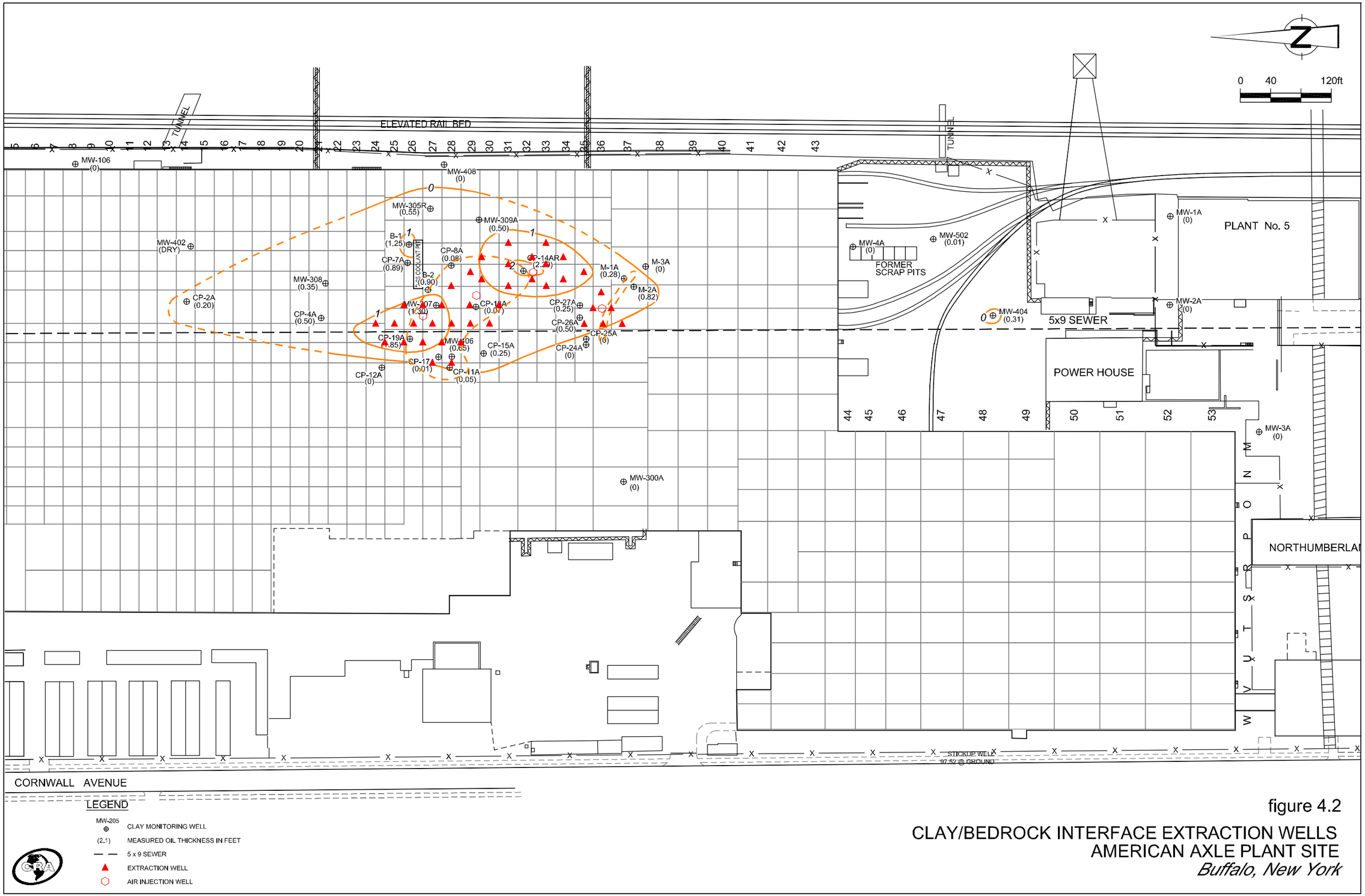
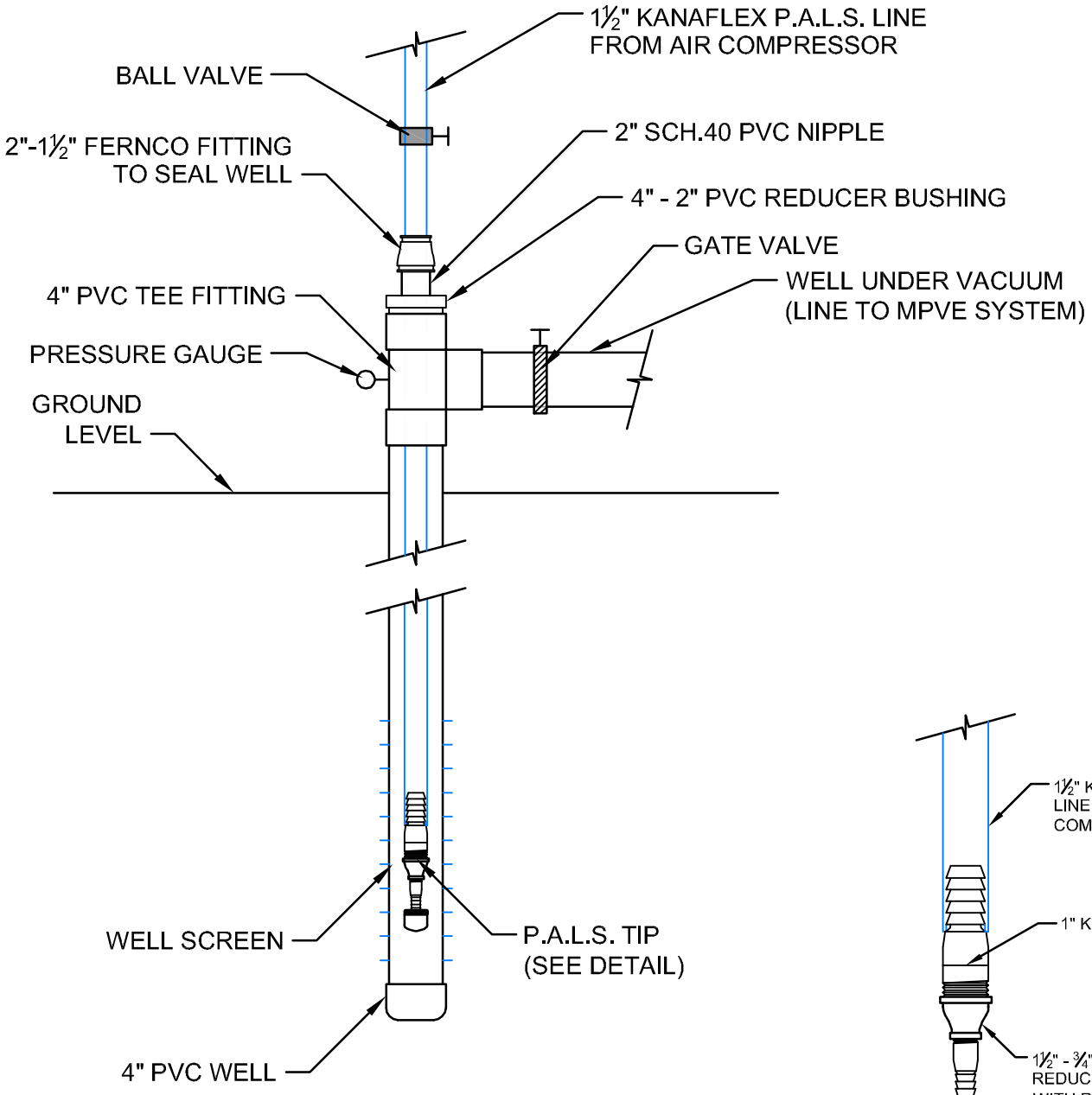
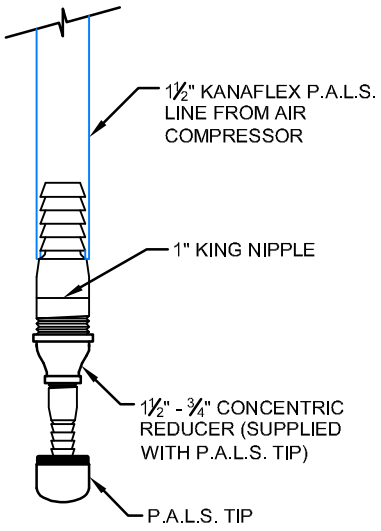


figure 4.2

CLAY/BEDROCK INTERFACE EXTRACTION WELLS
AMERICAN AXLE PLANT SITE
Buffalo, New York

12635-03(MISC022)GN-BU001 AUG 01/2008





P.A.L.S. TIP DETAIL

figure 4.3

TYPICAL EXTRACTION WELL COMPLETION SCHEMATIC
AMERICAN AXLE PLANT SITE
Buffalo, New York

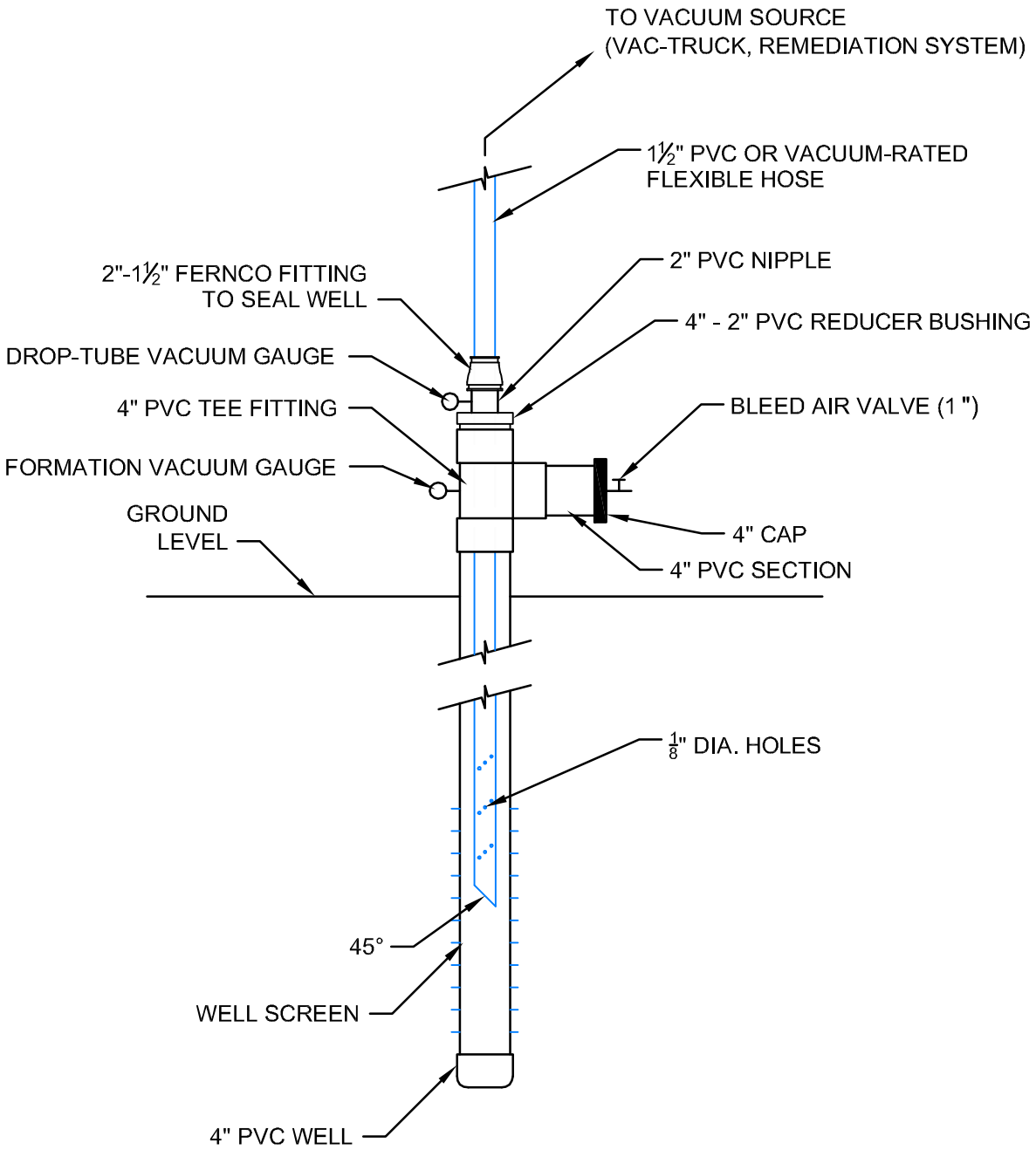


figure 4.4

TYPICAL EXTRACTION WELL
WITH DROP TUBE COMPLETION SCHEMATIC
AMERICAN AXLE PLANT SITE
Buffalo, New York

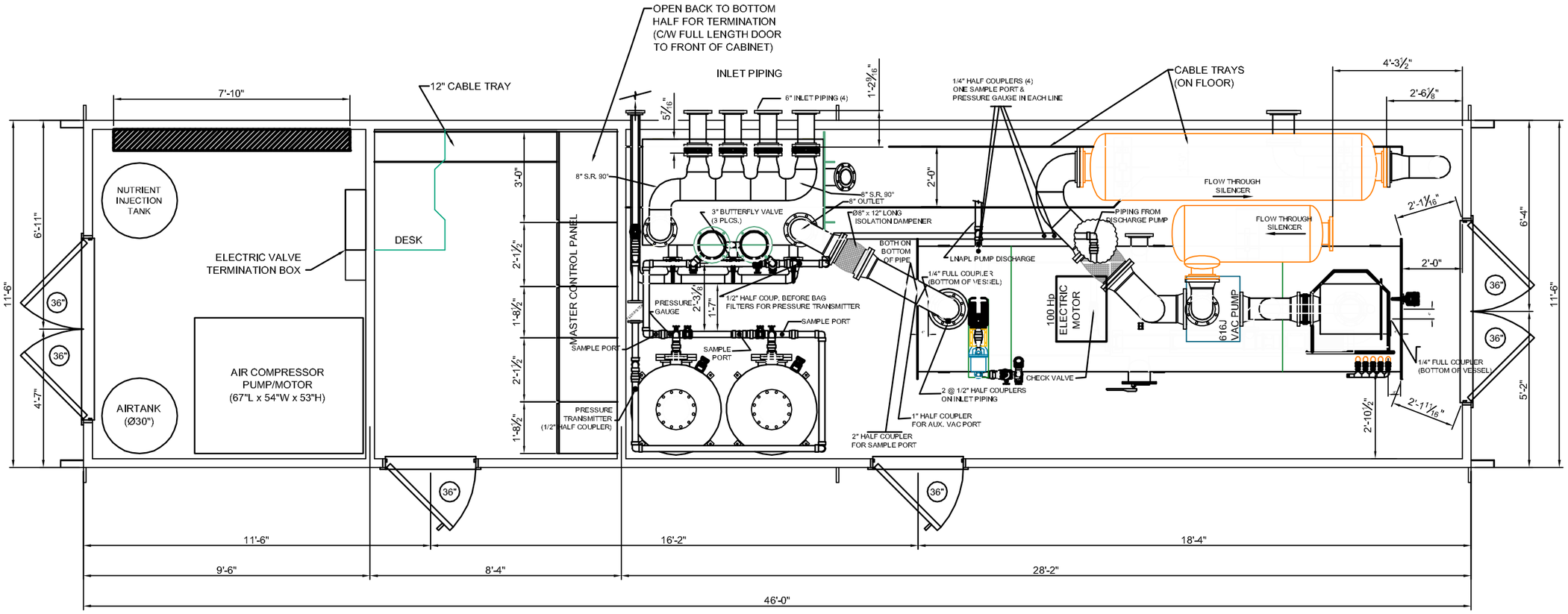
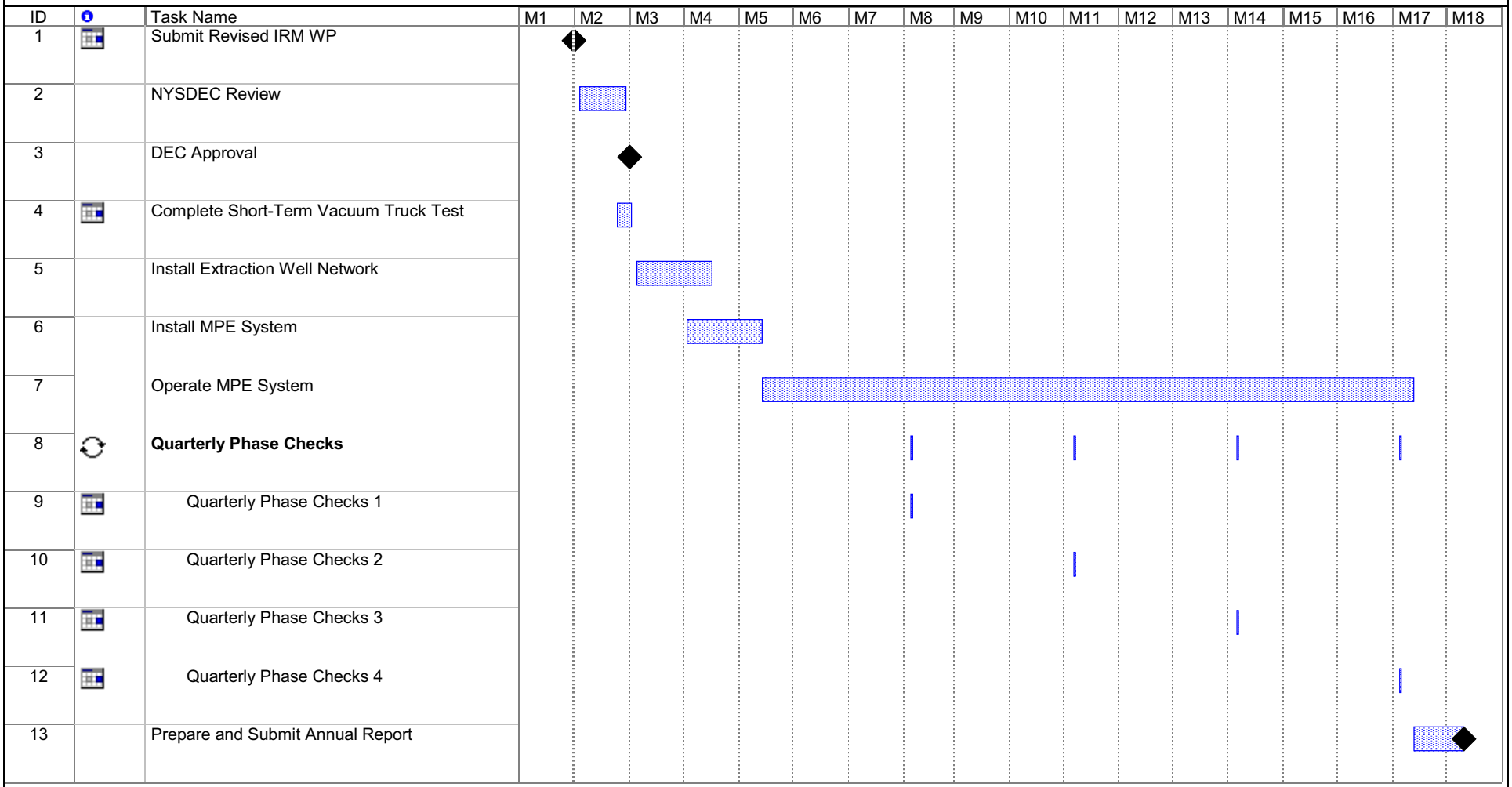


figure 4.5

MPVE 27100 SYSTEM SCHEMATIC
AMERICAN AXLE PLANT SITE
Buffalo, New York

SOURCE: GROUND EFFECTS ENVIRONMENTAL SERVICES, INC.

FIGURE 6.1
PROPOSED SCHEDULE
SUPPLEMENTAL INTERIM REMEDIAL MEASURES WORK PLAN
AMERICAN AXLE PLANT SITE, NYSDEC SITE NO. 915196
BUFFALO, NEW YORK



Project: 012635-Fig6-1_final
Date: Thu 7/31/08

Task
Split
Progress
Milestone
Summary
Project Summary
External Tasks
External Milestone
Deadline

TABLES

TABLE 4.1
MONITORING AND MEASUREMENT PLAN
VACUUM TRUCK LNAPL RECOVERY TEST
AMERICAN AXLE PLANT SITE, NYSDEC SITE #915196
BUFFALO, NEW YORK

Location	Parameter	Method/ Instrumentation	Schedule
Vacuum Truck	Applied vacuum ("Hg)	Truck Gauge	Every 0.5 hours
	Air flow rate (cfm)	Truck Gauge	Every 0.5 hours
	Total hydrocarbon concentration in vacuum truck off-gas (ppm, via handheld analyzer as necessary)	Handheld FID or equivalent	Every 0.5 hours
	Total hydrocarbon concentration in vapor phase (tedlar bag samples)	Sample obtained using sample lung/vacuum box	Once per day (coinciding with a FID reading)
	Total liquid (LNAPL and groundwater) extracted (gallons)	Truck Gauge and/or dipstick/interface probe	At conclusion of each test
Extraction Wellheads	Applied vacuum ("Hg)	Vacuum gauge with male quick-connect fitting (or tapped into wellhead)	Prior to startup and hourly thereafter
	Depth to LNAPL/groundwater	Interface probe	Prior to startup and at the 8 hour mark
Monitoring Wells	Induced vacuum ("H_2O)	Magnehelic gauge, slack-tube manometer or digital manometer	Prior to startup and hourly thereafter
	Depth to LNAPL and groundwater	Interface probe	Prior to startup and at the 4 and 8 hour marks

TABLE 4.2
MONITORING AND MEASUREMENT PLAN
MPVE SYSTEM
AMERICAN AXLE PLANT SITE, NYSDEC SITE #915196
BUFFALO, NEW YORK

Location	Parameter	Method	Frequency
MPVE 27100 System	Applied vacuum ("Hg)	A	Continuous
	Air flow rate (cfm)	A	Continuous
	Total hydrocarbon concentration in vapor phase (% LEL or ppm, on a continuous basis via infrared sensor)	A	Continuous
	Total hydrocarbon concentration in vapor phase (ppm, via handheld analyzer)	M	Weekly - Month 1 Monthly - thereafter
	Total liquid (LNAPL and groundwater) extracted (gallons)	A	Continuous
	Total LNAPL removed (gallons)	M	Daily - Week 1 Weekly - thereafter (or more frequently as needed)
	Separated groundwater discharge flowrate (gpm)	A	Continuous
	Applied air injection pressure for PAL and PFS (psi)	A	Continuous
MPE/PAL Wellheads	Applied vacuum ("Hg)	M	Daily - Week 1 Weekly - Month 1 Monthly - thereafter
	Air flow rate (cfm)	M	As needed
	Depth to LNAPL/groundwater	M	As needed
Monitoring Wells	Induced vacuum ("H2O)	M	Daily - Week 1 Weekly - Month 1 Monthly - thereafter
	Depth to LNAPL and groundwater	M	Daily - Week 1 Weekly - Month 1 Monthly - thereafter

Notes:
M - manual measurement
A - automated measurement via system instrumentation

APPENDIX A

LNAPL VOLUME CALCULATIONS

TABLE 1A

FEBRUARY 2008 OIL VOLUME CALCULATIONS
AMERICAN AXLE PLANT SITE, NYSDEC SITE NO. 915196
BUFFALO, NEW YORK

FILL - OIL VOLUME ESTIMATES
ASSUMED SOIL TYPE: SILTY CLAY (SC)

Area	*Square Footage (ft^2)*	*LNAPL Thickness [bn] (ft)*	*Specific Volume [D_n] (ft^3/ft^2)*	*Theoretical Recoverable Volume [R_n] (ft^3/ft^2)*	*Total Volume*		*Theoretical Recoverable Volume*	
					(ft^3)	*(gal)*	*(ft^3)*	*(gal)*
A	502	3.2	0.293	0.187	147	1,100	94	702
B	19,695	2.875	0.246	0.158	4,845	36,240	3,112	23,276
C	15,631	1.57	0.089	0.057	1,391	10,406	891	6,664
D	14,975	0.283	0.003	0.002	45	336	30	224
E	100	2.22	0.162	0.104	16	121	10	78
F	2,633	0.01	0.000	0.000	0	0	0	0
G	332	1.7	0.103	0.066	34	256	22	164
H	1,211	0.4	0.006	0.004	7	54	5	36
						48,514		31,145

TABLE 1B

FEBRUARY 2008 OIL VOLUME CALCULATIONS
AMERICAN AXLE PLANT SITE, NYSDEC SITE NO. 915196
BUFFALO, NEW YORK

FILL - OIL VOLUME ESTIMATES
ASSUMED SOIL TYPE: SILTY CLAY LOAM (SCL)

Area	*Square Footage (ft^2)*	*LNAPL Thickness [bn] (ft)*	*Specific Volume [D_n] (ft^3/ft^2)*	*Theoretical Recoverable Volume [R_n] (ft^3/ft^2)*	*Total Volume*		*Theoretical Recoverable Volume*	
					(ft^3)	*(gal)*	*(ft^3)*	*(gal)*
A	502	3.2	0.702	0.436	352	2,636	219	1,637
B	19,695	2.875	0.607	0.379	11,955	89,422	7,464	55,834
C	15,631	1.57	0.255	0.159	3,986	29,815	2,485	18,590
D	14,975	0.283	0.011	0.007	165	1,232	105	784
E	100	2.22	0.425	0.264	43	318	26	197
F	2,633	0.01	0.000	0.000	0	0	0	0
G	332	1.7	0.287	0.179	95	713	59	445
H	1,211	0.4	0.022	0.014	27	199	17	127
						124,335		77,614

TABLE 1C

FEBRUARY 2008 OIL VOLUME CALCULATIONS
AMERICAN AXLE PLANT SITE, NYSDEC SITE NO. 915196
BUFFALO, NEW YORK

FILL - OIL VOLUME ESTIMATES
ASSUMED SOIL TYPE: LOAM (L)

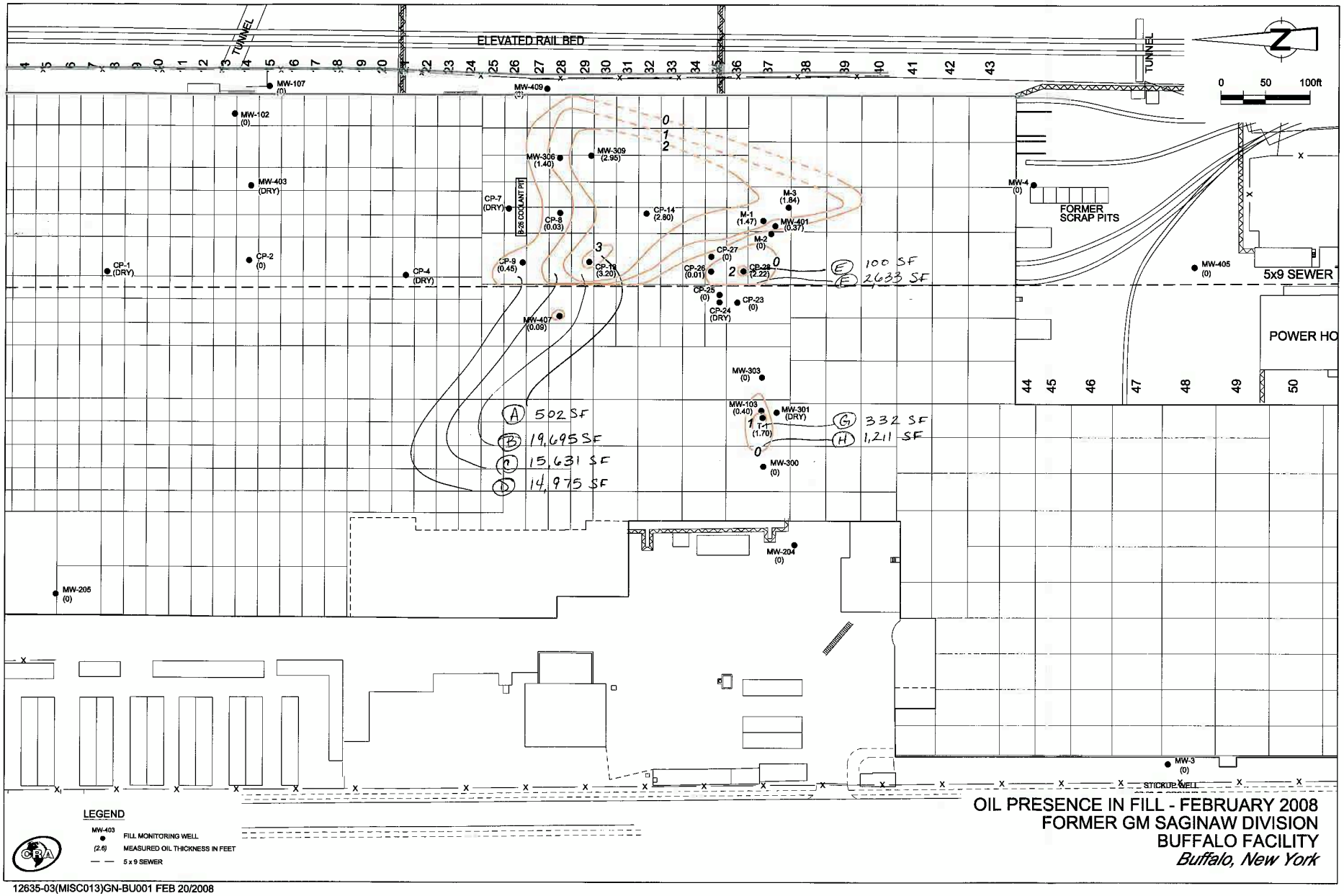
Area	*Square Footage (ft^2)*	*LNAPL Thickness [bn] (ft)*	*Specific Volume [D_n] (ft^3/ft^2)*	*Theoretical Recoverable Volume [R_n] (ft^3/ft^2)*	*Total Volume*		*Theoretical Recoverable Volume*	
					(ft^3)	*(gal)*	*(ft^3)*	*(gal)*
A	502	3.2	0.714	0.441	358	2,681	221	1,656
B	19,695	2.875	0.610	0.378	12,014	89,864	7,445	55,686
C	15,631	1.57	0.233	0.146	3,642	27,242	2,282	17,070
D	14,975	0.283	0.007	0.004	105	784	60	448
E	100	2.22	0.412	0.255	41	308	26	191
F	2,633	0.01	0.000	0.000	0	0	0	0
G	332	1.7	0.267	0.167	89	663	55	415
H	1,211	0.4	0.015	0.010	18	136	12	91
						121,679		75,557

TABLE 2

FEBRUARY 2008 OIL VOLUME CALCULATIONS
AMERICAN AXLE PLANT SITE, NYSDEC SITE NO. 915196
BUFFALO, NEW YORK

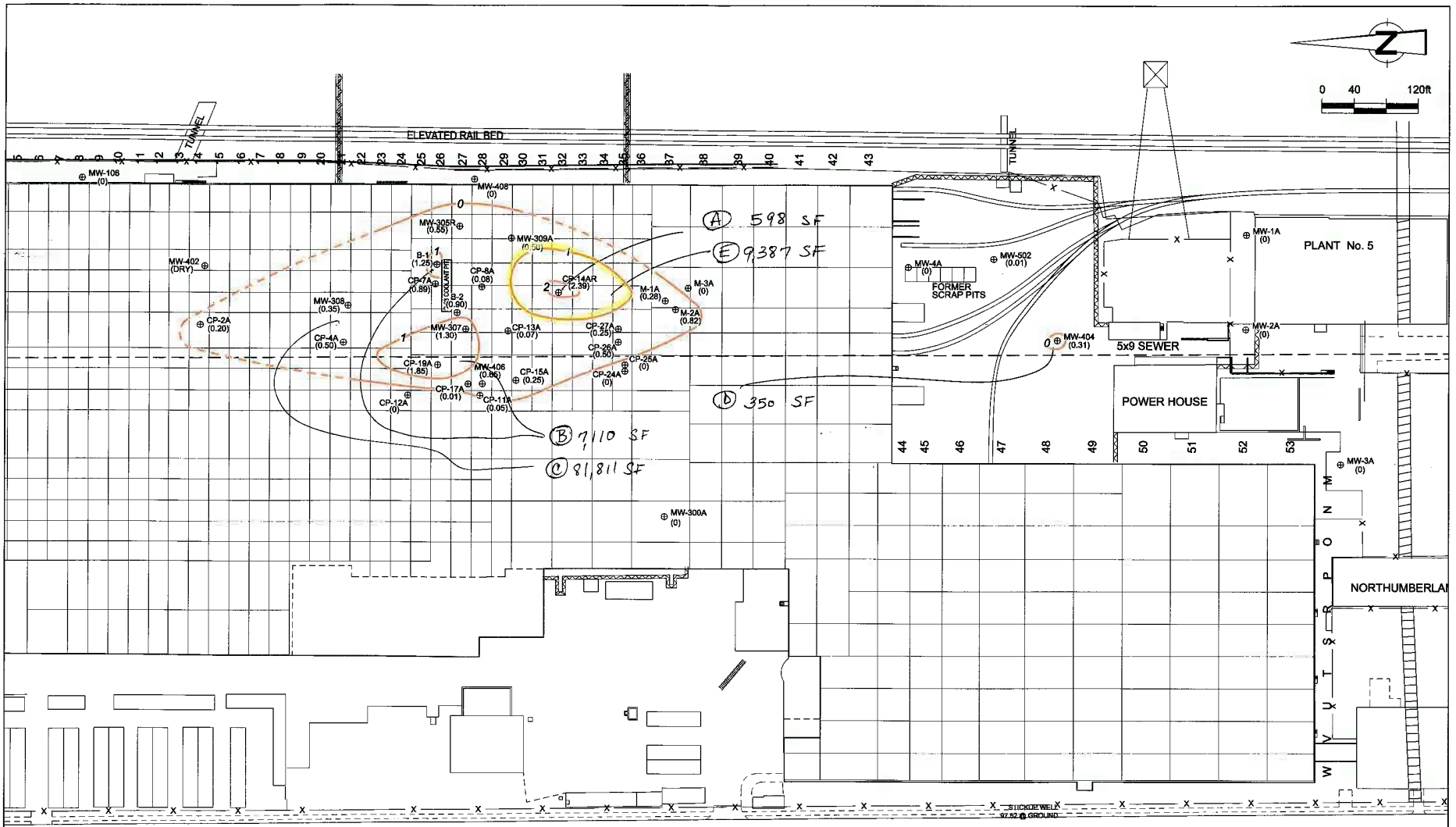
CLAY - OIL VOLUME ESTIMATES
ASSUMED SOIL TYPE: SILTY CLAY

Area	*Square Footage (ft^2)*	*LNAPL Thickness [b_n] (ft)*	*Specific Volume [D_n] (ft^3/ft^2)*	*Theoretical Recoverable Volume [R_n] (ft^3/ft^2)*	*Total Volume*		*Theoretical Recoverable Volume*	
					(ft^3)	*(gal)*	*(ft^3)*	*(gal)*
A	598	2.39	0.020	0.013	12	89	8	58
B	7,110	1.467	0.008	0.005	57	425	36	266
C	81,811	0.403	0.001	0.000	46	343	30	226
D	350	0.31	0.000	0.000	0	1	0	1
E	9,387	1	0.004	0.002	34	253	23	169
						1,111		720



OIL PRESENCE IN FILL - FEBRUARY 2008
FORMER GM SAGINAW DIVISION
BUFFALO FACILITY
Buffalo, New York

12635-03(MISC013)GN-BU001 FEB 20/2008



LEGEND

MW-205 ⊕ CLAY MONITORING WELL

(7.1) MEASURED OIL THICKNESS IN FEET

— — 5 x 9 SEWER

OIL PRESENCE IN CLAY - FEBRUARY 2008
FORMER GM SAGINAW DIVISION
BUFFALO FACILITY
Buffalo, New York

12635-03(MISC013)GN-BU002 FEB 19/2008

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 * Saved time =  16 : 32,   2008 . 2 . 26
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 1. OPTIONS.

 * Units              =   1              (1: English Units, 2: SI Units)

 * Soil Heterogeneity =   1              ( Number of Layers: 1, 2 or 3)

 * Elevation          =   2              (1: Elevation above datum, 2: depth BGS)

 * FPR System Used    =   0              (1: well,  2: trench,  0: Not used)

 * Smear Correction   =   1              (0: no adjustment, 1: smear correction)

 * LNAPL Residual     =   2              (1: Variable in Layer, 2: Constant for
Layer)


 2. INPUT PARAMETERS.

 2.1 BASIC INPUT PARAMETERS.
 Monitor. Well LNAPL thickness[ft]=          3.200
 Ground Surface Depth [ft]        =          0.000
 Groundwater Table Depth [ft]     =          8.000
 Water Vertical Gradient(+up)     =          0.000
 LNAPL Density [g/cm3]            =          0.870
 LNAPL Viscosity [cp]             =        102.000
 Water Surface Tension [dyne/cm]  =         65.000
 LNAPL Surface Tension [dyne/cm]  =         21.400
 LNAPL/Water Interfacial Tension  =          8.800
 Residual-f (vadose)              =          0.200
 Residual-f (saturated)           =          0.300

 2.1.1 SOIL PROPERTIES OF LAYER 1
 Relative permeability model      =              1     (Mualem)
 Soil porosity                    =          0.380
 Hydraulic conductivity [ft/d]    =          0.095
 van Genuchten "N"                =          1.230
 van Genuchten "Alpha" [ft-1]     =          0.820
 Swr1                             =          0.100
 Snrv1                            =          0.042
 Snrs1                            =          0.063


 4. Calculated Parameters

-------------------------------------------------
 Air-LNAPL interface [ft]         =          7.584
 LNAPL-Water interface [ft]       =         10.784
 Max. Free-Product elevation [ft] =          5.757
-------------------------------------------------

-------------------------------------------------
 Parameter                        :         Soil 1
-------------------------------------------------
 van Genuchten "M"                :          0.187
```

```
 Air/LNAPL "alpha"  [ft-1]       :          2.167
 LNAPL/water "alpha" [ft-1]      :          0.787
--------------------------------------------------


 5. LNAPL and Water saturation data.

--------------------------------------------------------------------------------
      BGS Depth [ft]              Sn              Snr               Sw              krn
--------------------------------------------------------------------------------
              5.757           0.042            0.042            0.706            0.000
              5.849           0.046            0.042            0.708            0.000
              5.940           0.050            0.042            0.710            0.000
              6.031           0.054            0.042            0.713            0.000
              6.123           0.059            0.042            0.715            0.000
              6.214           0.064            0.042            0.717            0.000
              6.305           0.070            0.042            0.720            0.000
              6.397           0.076            0.042            0.722            0.000
              6.488           0.083            0.042            0.724            0.000
              6.579           0.090            0.042            0.727            0.000
              6.671           0.098            0.042            0.730            0.000
              6.762           0.107            0.042            0.732            0.001
              6.853           0.117            0.042            0.735            0.001
              6.945           0.128            0.042            0.738            0.001
              7.036           0.140            0.042            0.740            0.002
              7.127           0.153            0.042            0.743            0.003
              7.219           0.169            0.042            0.746            0.005
              7.310           0.186            0.042            0.749            0.009
              7.401           0.204            0.042            0.752            0.017
              7.493           0.224            0.042            0.755            0.040
              7.584           0.257            0.063            0.743            0.474
              7.744           0.252            0.063            0.748            0.467
              7.904           0.246            0.063            0.754            0.460
              8.064           0.239            0.063            0.761            0.452
              8.224           0.233            0.063            0.767            0.444
              8.384           0.226            0.063            0.774            0.435
              8.544           0.219            0.063            0.781            0.425
              8.704           0.211            0.063            0.789            0.415
              8.864           0.203            0.063            0.797            0.403
              9.024           0.194            0.063            0.806            0.391
              9.184           0.185            0.063            0.815            0.378
              9.344           0.175            0.063            0.825            0.364
              9.504           0.165            0.063            0.835            0.348
              9.664           0.154            0.063            0.846            0.331
              9.824           0.143            0.063            0.857            0.312
              9.984           0.130            0.063            0.870            0.292
             10.144           0.117            0.063            0.883            0.269
             10.304           0.103            0.063            0.897            0.244
             10.464           0.089            0.063            0.911            0.216
             10.624           0.074            0.063            0.926            0.188
             10.784           0.063            0.063            0.937            0.164
             10.784           0.063            0.063            0.937            0.164
             10.784           0.063            0.063            0.937            0.164
             10.784           0.063            0.063            0.937            0.164
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             10.784           0.063            0.063            0.937            0.164
             10.784           0.063            0.063            0.937            0.164
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              10.784          0.063          0.063          0.937          0.164
              10.784          0.063          0.063          0.937          0.164
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              10.784          0.063          0.063          0.937          0.164
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              10.784          0.063          0.063          0.937          0.164
              10.784          0.063          0.063          0.937          0.164
              10.784          0.063          0.063          0.937          0.164
-----------------------------------------------------------------


 6. LNAPL specific volume and hydraulic conductivity
-----------------------------------------------------------------
             bn [ft]        Dn [ft]        Rn [ft]     Tn [ft2/d]
-----------------------------------------------------------------
               0.000          0.000          0.000          0.000
               0.128          0.005          0.000          0.000
               0.256          0.010          0.002          0.000
               0.384          0.016          0.004          0.000
               0.512          0.023          0.007          0.000
               0.640          0.031          0.010          0.000
               0.768          0.040          0.015          0.000
               0.896          0.049          0.020          0.000
               1.024          0.059          0.026          0.000
               1.152          0.070          0.032          0.000
               1.280          0.081          0.039          0.000
               1.408          0.092          0.046          0.000
               1.536          0.105          0.054          0.000
               1.664          0.117          0.062          0.000
               1.792          0.130          0.071          0.000
               1.920          0.143          0.080          0.000
               2.048          0.156          0.089          0.001
               2.176          0.171          0.099          0.001
               2.304          0.184          0.109          0.001
               2.432          0.199          0.119          0.001
               2.560          0.214          0.130          0.001
               2.688          0.229          0.141          0.001
               2.816          0.245          0.152          0.001
               2.944          0.260          0.164          0.001
               3.072          0.276          0.175          0.001
               3.200          0.293          0.187          0.001
-----------------------------------------------------------------
```

7. Data for curve-fitting segments

bn[ft]	Rn[ft]	Tn[ft2/d]	chi[ft]	beta	xi[ft]	eta
0.00000	0.00000	0.00000				
2.04800	0.08914	0.00052	0.00000	0.04352	0.00000	0.00026
2.68800	0.14087	0.00075	0.94523	0.08083	0.57916	0.00036
3.20000	0.18691	0.00095	1.12141	0.08992	0.73550	0.00039

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 1. OPTIONS.

 * Units              =   1              (1: English Units, 2: SI Units)

 * Soil Heterogeneity =   1              ( Number of Layers: 1, 2 or 3)

 * Elevation          =   2              (1: Elevation above datum, 2: depth BGS)

 * FPR System Used    =   0              (1: well,  2: trench,  0: Not used)

 * Smear Correction   =   1              (0: no adjustment, 1: smear correction)

 * LNAPL Residual     =   2              (1: Variable in Layer, 2: Constant for
Layer)


 2. INPUT PARAMETERS.

 2.1 BASIC INPUT PARAMETERS.
 Monitor. Well LNAPL thickness[ft]=          2.875
 Ground Surface Depth [ft]        =          0.000
 Groundwater Table Depth [ft]     =          8.000
 Water Vertical Gradient(+up)     =          0.000
 LNAPL Density [g/cm3]            =          0.870
 LNAPL Viscosity [cp]             =        102.000
 Water Surface Tension [dyne/cm]  =         65.000
 LNAPL Surface Tension [dyne/cm]  =         21.400
 LNAPL/Water Interfacial Tension  =          8.800
 Residual-f (vadose)              =          0.200
 Residual-f (saturated)           =          0.300

 2.1.1 SOIL PROPERTIES OF LAYER 1
 Relative permeability model      =              1     (Mualem)
 Soil porosity                    =          0.380
 Hydraulic conductivity [ft/d]    =          0.095
 van Genuchten "N"                =          1.230
 van Genuchten "Alpha" [ft-1]     =          0.820
 Swr1                             =          0.100
 Snrv1                            =          0.039
 Snrs1                            =          0.059


 4. Calculated Parameters

-------------------------------------------------
 Air-LNAPL interface [ft]         =          7.626
 LNAPL-Water interface [ft]       =         10.501
 Max. Free-Product elevation [ft] =          5.985
-------------------------------------------------

-------------------------------------------------
 Parameter                        :         Soil 1
-------------------------------------------------
 van Genuchten "M"                :          0.187
```

```
 Air/LNAPL "alpha"  [ft-1]        :          2.167
 LNAPL/water "alpha" [ft-1]       :          0.787
--------------------------------------------------


 5. LNAPL and Water saturation data.

--------------------------------------------------------------------------------
      BGS Depth [ft]             Sn            Snr             Sw            krn
--------------------------------------------------------------------------------
               5.985          0.039          0.039          0.720          0.000
               6.067          0.043          0.039          0.723          0.000
               6.149          0.047          0.039          0.725          0.000
               6.231          0.052          0.039          0.727          0.000
               6.313          0.057          0.039          0.729          0.000
               6.395          0.062          0.039          0.732          0.000
               6.478          0.067          0.039          0.734          0.000
               6.560          0.073          0.039          0.736          0.000
               6.642          0.080          0.039          0.739          0.000
               6.724          0.087          0.039          0.741          0.000
               6.806          0.095          0.039          0.744          0.000
               6.888          0.104          0.039          0.747          0.001
               6.970          0.113          0.039          0.749          0.001
               7.052          0.123          0.039          0.752          0.001
               7.134          0.135          0.039          0.755          0.002
               7.216          0.148          0.039          0.758          0.004
               7.298          0.162          0.039          0.761          0.006
               7.380          0.178          0.039          0.763          0.010
               7.462          0.195          0.039          0.767          0.019
               7.544          0.212          0.039          0.770          0.041
               7.626          0.227          0.039          0.773          0.436
               7.770          0.237          0.059          0.763          0.449
               7.914          0.231          0.059          0.769          0.441
               8.057          0.225          0.059          0.775          0.433
               8.201          0.218          0.059          0.782          0.424
               8.345          0.212          0.059          0.788          0.415
               8.489          0.204          0.059          0.796          0.406
               8.632          0.197          0.059          0.803          0.395
               8.776          0.189          0.059          0.811          0.384
               8.920          0.181          0.059          0.819          0.372
               9.064          0.172          0.059          0.828          0.359
               9.208          0.163          0.059          0.837          0.345
               9.351          0.153          0.059          0.847          0.329
               9.495          0.143          0.059          0.857          0.312
               9.639          0.132          0.059          0.868          0.294
               9.783          0.120          0.059          0.880          0.274
               9.926          0.108          0.059          0.892          0.252
              10.070          0.095          0.059          0.905          0.229
              10.214          0.082          0.059          0.918          0.203
              10.358          0.069          0.059          0.931          0.177
              10.501          0.059          0.059          0.941          0.155
              10.501          0.059          0.059          0.941          0.155
              10.501          0.059          0.059          0.941          0.155
              10.501          0.059          0.059          0.941          0.155
              10.501          0.059          0.059          0.941          0.155
              10.501          0.059          0.059          0.941          0.155
              10.501          0.059          0.059          0.941          0.155
              10.501          0.059          0.059          0.941          0.155
              10.501          0.059          0.059          0.941          0.155
              10.501          0.059          0.059          0.941          0.155
              10.501          0.059          0.059          0.941          0.155
              10.501          0.059          0.059          0.941          0.155
              10.501          0.059          0.059          0.941          0.155
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           10.501          0.059          0.059          0.941          0.155
           10.501          0.059          0.059          0.941          0.155
           10.501          0.059          0.059          0.941          0.155
           10.501          0.059          0.059          0.941          0.155
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           10.501          0.059          0.059          0.941          0.155
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           10.501          0.059          0.059          0.941          0.155
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           10.501          0.059          0.059          0.941          0.155
           10.501          0.059          0.059          0.941          0.155
           10.501          0.059          0.059          0.941          0.155
           10.501          0.059          0.059          0.941          0.155
           10.501          0.059          0.059          0.941          0.155
           10.501          0.059          0.059          0.941          0.155
           10.501          0.059          0.059          0.941          0.155
           10.501          0.059          0.059          0.941          0.155
           10.501          0.059          0.059          0.941          0.155
           10.501          0.059          0.059          0.941          0.155
           10.501          0.059          0.059          0.941          0.155
           10.501          0.059          0.059          0.941          0.155
           10.501          0.059          0.059          0.941          0.155
           10.501          0.059          0.059          0.941          0.155
           10.501          0.059          0.059          0.941          0.155
           10.501          0.059          0.059          0.941          0.155
-----------------------------------------------------------------


 6. LNAPL specific volume and hydraulic conductivity
-----------------------------------------------------------------
          bn [ft]        Dn [ft]        Rn [ft]     Tn [ft2/d]
-----------------------------------------------------------------
            0.000          0.000          0.000          0.000
            0.115          0.004          0.000          0.000
            0.230          0.008          0.001          0.000
            0.345          0.014          0.003          0.000
            0.460          0.019          0.005          0.000
            0.575          0.026          0.008          0.000
            0.690          0.033          0.012          0.000
            0.805          0.041          0.016          0.000
            0.920          0.049          0.021          0.000
            1.035          0.058          0.026          0.000
            1.150          0.068          0.032          0.000
            1.265          0.077          0.038          0.000
            1.380          0.087          0.045          0.000
            1.495          0.098          0.051          0.000
            1.610          0.108          0.059          0.000
            1.725          0.120          0.066          0.000
            1.840          0.131          0.074          0.000
            1.955          0.143          0.083          0.000
            2.070          0.155          0.091          0.001
            2.185          0.167          0.100          0.001
            2.300          0.180          0.109          0.001
            2.415          0.193          0.118          0.001
            2.530          0.206          0.128          0.001
            2.645          0.219          0.138          0.001
            2.760          0.233          0.148          0.001
            2.875          0.246          0.158          0.001
-----------------------------------------------------------------
```

7. Data for curve-fitting segments

bn[ft]	Rn[ft]	Tn[ft2/d]	chi[ft]	beta	xi[ft]	eta
0.00000	0.00000	0.00000				
1.84000	0.07436	0.00045	0.00000	0.04041	0.00000	0.00024
2.41500	0.11837	0.00064	0.86844	0.07654	0.53482	0.00034
2.87500	0.15796	0.00081	1.03957	0.08606	0.66350	0.00037

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 * Saved time =  16 : 38,   2008 . 2 . 26
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 1. OPTIONS.

 * Units              =   1              (1: English Units, 2: SI Units)

 * Soil Heterogeneity =   1              ( Number of Layers: 1, 2 or 3)

 * Elevation          =   2              (1: Elevation above datum, 2: depth BGS)

 * FPR System Used    =   0              (1: well,  2: trench,  0: Not used)

 * Smear Correction   =   1              (0: no adjustment, 1: smear correction)

 * LNAPL Residual     =   2              (1: Variable in Layer, 2: Constant for
Layer)


 2. INPUT PARAMETERS.

 2.1 BASIC INPUT PARAMETERS.
 Monitor. Well LNAPL thickness[ft]=          1.570
 Ground Surface Depth [ft]        =          0.000
 Groundwater Table Depth [ft]     =          8.000
 Water Vertical Gradient(+up)     =          0.000
 LNAPL Density [g/cm3]            =          0.870
 LNAPL Viscosity [cp]             =        102.000
 Water Surface Tension [dyne/cm]  =         65.000
 LNAPL Surface Tension [dyne/cm]  =         21.400
 LNAPL/Water Interfacial Tension  =          8.800
 Residual-f (vadose)              =          0.200
 Residual-f (saturated)           =          0.300

 2.1.1 SOIL PROPERTIES OF LAYER 1
 Relative permeability model      =              1     (Mualem)
 Soil porosity                    =          0.380
 Hydraulic conductivity [ft/d]    =          0.095
 van Genuchten "N"                =          1.230
 van Genuchten "Alpha" [ft-1]     =          0.820
 Swr1                             =          0.100
 Snrv1                            =          0.026
 Snrs1                            =          0.039


 4. Calculated Parameters

-------------------------------------------------
 Air-LNAPL interface [ft]         =          7.796
 LNAPL-Water interface [ft]       =          9.366
 Max. Free-Product elevation [ft] =          6.900
-------------------------------------------------

-------------------------------------------------
 Parameter                        :         Soil 1
-------------------------------------------------
 van Genuchten "M"                :          0.187
```

```
 Air/LNAPL "alpha"  [ft-1]       :          2.167
 LNAPL/water "alpha" [ft-1]      :          0.787
---------------------------------------------------


 5. LNAPL and Water saturation data.

---------------------------------------------------------------------------------
      BGS Depth [ft]              Sn             Snr              Sw             krn
---------------------------------------------------------------------------------
               6.900           0.026           0.026           0.801           0.000
               6.945           0.030           0.026           0.803           0.000
               6.989           0.033           0.026           0.805           0.000
               7.034           0.038           0.026           0.807           0.000
               7.079           0.042           0.026           0.809           0.000
               7.124           0.046           0.026           0.811           0.000
               7.169           0.051           0.026           0.813           0.000
               7.213           0.056           0.026           0.816           0.000
               7.258           0.062           0.026           0.818           0.000
               7.303           0.068           0.026           0.820           0.001
               7.348           0.074           0.026           0.823           0.001
               7.393           0.080           0.026           0.825           0.001
               7.437           0.087           0.026           0.827           0.002
               7.482           0.095           0.026           0.830           0.003
               7.527           0.102           0.026           0.832           0.004
               7.572           0.111           0.026           0.835           0.006
               7.617           0.119           0.026           0.837           0.009
               7.661           0.128           0.026           0.840           0.014
               7.706           0.137           0.026           0.843           0.023
               7.751           0.146           0.026           0.845           0.044
               7.796           0.152           0.026           0.848           0.327
               7.874           0.158           0.039           0.842           0.337
               7.953           0.153           0.039           0.847           0.329
               8.031           0.148           0.039           0.852           0.321
               8.110           0.143           0.039           0.857           0.312
               8.188           0.137           0.039           0.863           0.303
               8.267           0.131           0.039           0.869           0.294
               8.345           0.126           0.039           0.874           0.284
               8.424           0.120           0.039           0.880           0.273
               8.502           0.113           0.039           0.887           0.262
               8.581           0.107           0.039           0.893           0.251
               8.659           0.100           0.039           0.900           0.239
               8.738           0.094           0.039           0.906           0.226
               8.816           0.087           0.039           0.913           0.212
               8.895           0.080           0.039           0.920           0.198
               8.973           0.072           0.039           0.928           0.184
               9.052           0.065           0.039           0.935           0.169
               9.130           0.058           0.039           0.942           0.153
               9.209           0.051           0.039           0.949           0.137
               9.287           0.044           0.039           0.956           0.122
               9.366           0.039           0.039           0.961           0.110
               9.366           0.039           0.039           0.961           0.110
               9.366           0.039           0.039           0.961           0.110
               9.366           0.039           0.039           0.961           0.110
               9.366           0.039           0.039           0.961           0.110
               9.366           0.039           0.039           0.961           0.110
               9.366           0.039           0.039           0.961           0.110
               9.366           0.039           0.039           0.961           0.110
               9.366           0.039           0.039           0.961           0.110
               9.366           0.039           0.039           0.961           0.110
               9.366           0.039           0.039           0.961           0.110
               9.366           0.039           0.039           0.961           0.110
               9.366           0.039           0.039           0.961           0.110
```

```
               9.366          0.039          0.039          0.961          0.110
               9.366          0.039          0.039          0.961          0.110
               9.366          0.039          0.039          0.961          0.110
               9.366          0.039          0.039          0.961          0.110
               9.366          0.039          0.039          0.961          0.110
               9.366          0.039          0.039          0.961          0.110
               9.366          0.039          0.039          0.961          0.110
               9.366          0.039          0.039          0.961          0.110
               9.366          0.039          0.039          0.961          0.110
               9.366          0.039          0.039          0.961          0.110
               9.366          0.039          0.039          0.961          0.110
               9.366          0.039          0.039          0.961          0.110
               9.366          0.039          0.039          0.961          0.110
               9.366          0.039          0.039          0.961          0.110
               9.366          0.039          0.039          0.961          0.110
               9.366          0.039          0.039          0.961          0.110
               9.366          0.039          0.039          0.961          0.110
               9.366          0.039          0.039          0.961          0.110
               9.366          0.039          0.039          0.961          0.110
               9.366          0.039          0.039          0.961          0.110
               9.366          0.039          0.039          0.961          0.110
               9.366          0.039          0.039          0.961          0.110
               9.366          0.039          0.039          0.961          0.110
               9.366          0.039          0.039          0.961          0.110
               9.366          0.039          0.039          0.961          0.110
               9.366          0.039          0.039          0.961          0.110
               9.366          0.039          0.039          0.961          0.110
               9.366          0.039          0.039          0.961          0.110
-----------------------------------------------------------------


 6. LNAPL specific volume and hydraulic conductivity
-----------------------------------------------------------------
             bn [ft]        Dn [ft]        Rn [ft]     Tn [ft2/d]
-----------------------------------------------------------------
               0.000          0.000          0.000          0.000
               0.063          0.001          0.000          0.000
               0.126          0.003          0.000          0.000
               0.188          0.005          0.001          0.000
               0.251          0.007          0.002          0.000
               0.314          0.009          0.002          0.000
               0.377          0.011          0.004          0.000
               0.440          0.014          0.005          0.000
               0.502          0.017          0.006          0.000
               0.565          0.020          0.008          0.000
               0.628          0.023          0.010          0.000
               0.691          0.026          0.012          0.000
               0.754          0.030          0.015          0.000
               0.816          0.034          0.017          0.000
               0.879          0.038          0.020          0.000
               0.942          0.042          0.022          0.000
               1.005          0.046          0.025          0.000
               1.068          0.050          0.028          0.000
               1.130          0.054          0.032          0.000
               1.193          0.059          0.035          0.000
               1.256          0.064          0.038          0.000
               1.319          0.069          0.042          0.000
               1.382          0.074          0.046          0.000
               1.444          0.079          0.049          0.000
               1.507          0.084          0.053          0.000
               1.570          0.089          0.057          0.000
-----------------------------------------------------------------
```

7. Data for curve-fitting segments

bn[ft]	Rn[ft]	Tn[ft2/d]	chi[ft]	beta	xi[ft]	eta
0.00000	0.00000	0.00000				
0.81640	0.01696	0.00013	0.00000	0.02077	0.00000	0.00015
1.25600	0.03830	0.00023	0.46715	0.04855	0.28479	0.00024
1.57000	0.05738	0.00032	0.62585	0.06078	0.41190	0.00027

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 1. OPTIONS.

 * Units              =   1              (1: English Units, 2: SI Units)

 * Soil Heterogeneity =   1              ( Number of Layers: 1, 2 or 3)

 * Elevation          =   2              (1: Elevation above datum, 2: depth BGS)

 * FPR System Used    =   0              (1: well,  2: trench,  0: Not used)

 * Smear Correction   =   1              (0: no adjustment, 1: smear correction)

 * LNAPL Residual     =   2              (1: Variable in Layer, 2: Constant for
Layer)


 2. INPUT PARAMETERS.

 2.1 BASIC INPUT PARAMETERS.
 Monitor. Well LNAPL thickness[ft]=          0.283
 Ground Surface Depth [ft]        =          0.000
 Groundwater Table Depth [ft]     =          8.000
 Water Vertical Gradient(+up)     =          0.000
 LNAPL Density [g/cm3]            =          0.870
 LNAPL Viscosity [cp]             =        102.000
 Water Surface Tension [dyne/cm]  =         65.000
 LNAPL Surface Tension [dyne/cm]  =         21.400
 LNAPL/Water Interfacial Tension  =          8.800
 Residual-f (vadose)              =          0.200
 Residual-f (saturated)           =          0.300

 2.1.1 SOIL PROPERTIES OF LAYER 1
 Relative permeability model      =              1     (Mualem)
 Soil porosity                    =          0.380
 Hydraulic conductivity [ft/d]    =          0.095
 van Genuchten "N"                =          1.230
 van Genuchten "Alpha" [ft-1]     =          0.820
 Swr1                             =          0.100
 Snrv1                            =          0.005
 Snrs1                            =          0.007


 4. Calculated Parameters

-------------------------------------------------
 Air-LNAPL interface [ft]         =          7.963
 LNAPL-Water interface [ft]       =          8.246
 Max. Free-Product elevation [ft] =          7.802
-------------------------------------------------

-------------------------------------------------
 Parameter                        :         Soil 1
-------------------------------------------------
 van Genuchten "M"                :          0.187
```

```
 Air/LNAPL "alpha"  [ft-1]       :          2.167
 LNAPL/water "alpha" [ft-1]      :          0.787
---------------------------------------------------


 5. LNAPL and Water saturation data.

--------------------------------------------------------------------------------
      BGS Depth [ft]              Sn             Snr              Sw             krn
--------------------------------------------------------------------------------
               7.802           0.005           0.005           0.955           0.000
               7.810           0.006           0.005           0.956           0.000
               7.818           0.008           0.005           0.957           0.000
               7.826           0.009           0.005           0.958           0.000
               7.834           0.010           0.005           0.958           0.000
               7.842           0.012           0.005           0.959           0.000
               7.850           0.013           0.005           0.960           0.000
               7.858           0.014           0.005           0.961           0.000
               7.866           0.016           0.005           0.962           0.001
               7.874           0.017           0.005           0.962           0.001
               7.882           0.018           0.005           0.963           0.001
               7.891           0.020           0.005           0.964           0.001
               7.899           0.021           0.005           0.965           0.002
               7.907           0.022           0.005           0.965           0.002
               7.915           0.024           0.005           0.966           0.003
               7.923           0.025           0.005           0.967           0.004
               7.931           0.026           0.005           0.968           0.005
               7.939           0.027           0.005           0.969           0.008
               7.947           0.028           0.005           0.969           0.011
               7.955           0.029           0.005           0.970           0.017
               7.963           0.031           0.007           0.969           0.092
               7.977           0.030           0.007           0.970           0.089
               7.992           0.029           0.007           0.971           0.085
               8.006           0.027           0.007           0.973           0.082
               8.020           0.026           0.007           0.974           0.078
               8.034           0.025           0.007           0.975           0.075
               8.048           0.023           0.007           0.977           0.071
               8.062           0.022           0.007           0.978           0.068
               8.076           0.021           0.007           0.979           0.064
               8.091           0.019           0.007           0.981           0.061
               8.105           0.018           0.007           0.982           0.057
               8.119           0.017           0.007           0.983           0.054
               8.133           0.016           0.007           0.984           0.051
               8.147           0.014           0.007           0.986           0.047
               8.161           0.013           0.007           0.987           0.044
               8.175           0.012           0.007           0.988           0.040
               8.190           0.011           0.007           0.989           0.037
               8.204           0.010           0.007           0.990           0.034
               8.218           0.009           0.007           0.991           0.031
               8.232           0.008           0.007           0.992           0.028
               8.246           0.007           0.007           0.993           0.026
               8.246           0.007           0.007           0.993           0.026
               8.246           0.007           0.007           0.993           0.026
               8.246           0.007           0.007           0.993           0.026
               8.246           0.007           0.007           0.993           0.026
               8.246           0.007           0.007           0.993           0.026
               8.246           0.007           0.007           0.993           0.026
               8.246           0.007           0.007           0.993           0.026
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               8.246           0.007           0.007           0.993           0.026
               8.246           0.007           0.007           0.993           0.026
               8.246           0.007           0.007           0.993           0.026
               8.246           0.007           0.007           0.993           0.026
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               8.246          0.007          0.007          0.993          0.026
               8.246          0.007          0.007          0.993          0.026
               8.246          0.007          0.007          0.993          0.026
               8.246          0.007          0.007          0.993          0.026
               8.246          0.007          0.007          0.993          0.026
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               8.246          0.007          0.007          0.993          0.026
               8.246          0.007          0.007          0.993          0.026
               8.246          0.007          0.007          0.993          0.026
               8.246          0.007          0.007          0.993          0.026
               8.246          0.007          0.007          0.993          0.026
               8.246          0.007          0.007          0.993          0.026
               8.246          0.007          0.007          0.993          0.026
               8.246          0.007          0.007          0.993          0.026
               8.246          0.007          0.007          0.993          0.026
               8.246          0.007          0.007          0.993          0.026
               8.246          0.007          0.007          0.993          0.026
               8.246          0.007          0.007          0.993          0.026
               8.246          0.007          0.007          0.993          0.026
               8.246          0.007          0.007          0.993          0.026
               8.246          0.007          0.007          0.993          0.026
               8.246          0.007          0.007          0.993          0.026
               8.246          0.007          0.007          0.993          0.026
               8.246          0.007          0.007          0.993          0.026
               8.246          0.007          0.007          0.993          0.026
               8.246          0.007          0.007          0.993          0.026
               8.246          0.007          0.007          0.993          0.026
               8.246          0.007          0.007          0.993          0.026
-----------------------------------------------------------------
```

6. LNAPL specific volume and hydraulic conductivity

```
-----------------------------------------------------------------
             bn [ft]        Dn [ft]        Rn [ft]     Tn [ft2/d]
-----------------------------------------------------------------
               0.000          0.000          0.000          0.000
               0.011          0.000          0.000          0.000
               0.023          0.000          0.000          0.000
               0.034          0.000          0.000          0.000
               0.045          0.000          0.000          0.000
               0.057          0.000          0.000          0.000
               0.068          0.000          0.000          0.000
               0.079          0.000          0.000          0.000
               0.091          0.001          0.000          0.000
               0.102          0.001          0.000          0.000
               0.113          0.001          0.000          0.000
               0.125          0.001          0.000          0.000
               0.136          0.001          0.000          0.000
               0.147          0.001          0.000          0.000
               0.158          0.001          0.001          0.000
               0.170          0.001          0.001          0.000
               0.181          0.001          0.001          0.000
               0.192          0.002          0.001          0.000
               0.204          0.002          0.001          0.000
               0.215          0.002          0.001          0.000
               0.226          0.002          0.001          0.000
               0.238          0.002          0.001          0.000
               0.249          0.002          0.002          0.000
               0.260          0.003          0.002          0.000
               0.272          0.003          0.002          0.000
               0.283          0.003          0.002          0.000
-----------------------------------------------------------------
```

7. Data for curve-fitting segments

bn[ft]	Rn[ft]	Tn[ft2/d]	chi[ft]	beta	xi[ft]	eta
0.00000	0.00000	0.00000				
0.19244	0.00088	0.00001	0.00000	0.00458	0.00000	0.00004
0.23772	0.00139	0.00001	0.11365	0.01119	0.07348	0.00006
0.28300	0.00201	0.00001	0.13701	0.01378	0.09657	0.00007

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1. OPTIONS.

* Units	=	1	(1: English Units, 2: SI Units)
* Soil Heterogeneity	=	1	(Number of Layers: 1, 2 or 3)
* Elevation	=	2	(1: Elevation above datum, 2: depth BGS)
* FPR System Used	=	0	(1: well, 2: trench, 0: Not used)
* Smear Correction	=	1	(0: no adjustment, 1: smear correction)
* LNAPL Residual	=	2	(1: Variable in Layer, 2: Constant for Layer)

2. INPUT PARAMETERS.

2.1 BASIC INPUT PARAMETERS.

Monitor. Well LNAPL thickness[ft]	=	2.220
Ground Surface Depth [ft]	=	0.000
Groundwater Table Depth [ft]	=	8.000
Water Vertical Gradient(+up)	=	0.000
LNAPL Density [g/cm3]	=	0.870
LNAPL Viscosity [cp]	=	102.000
Water Surface Tension [dyne/cm]	=	65.000
LNAPL Surface Tension [dyne/cm]	=	21.400
LNAPL/Water Interfacial Tension	=	8.800
Residual-f (vadose)	=	0.200
Residual-f (saturated)	=	0.300

2.1.1 SOIL PROPERTIES OF LAYER 1

Relative permeability model	=	1	(Mualem)
Soil porosity	=	0.380	
Hydraulic conductivity [ft/d]	=	0.095	
van Genuchten "N"	=	1.230	
van Genuchten "Alpha" [ft-1]	=	0.820	
Swr1	=	0.100	
Snrv1	=	0.033	
Snrs1	=	0.050	

4. Calculated Parameters

Air-LNAPL interface [ft]	=	7.711
LNAPL-Water interface [ft]	=	9.931
Max. Free-Product elevation [ft]	=	6.444

Parameter	:	Soil 1
van Genuchten "M"	:	0.187

```
 Air/LNAPL "alpha"  [ft-1]       :          2.167
 LNAPL/water "alpha" [ft-1]      :          0.787
--------------------------------------------------


 5. LNAPL and Water saturation data.

--------------------------------------------------------------------------------
      BGS Depth [ft]              Sn             Snr              Sw             krn
--------------------------------------------------------------------------------
               6.444           0.033           0.033           0.755           0.000
               6.508           0.037           0.033           0.757           0.000
               6.571           0.041           0.033           0.760           0.000
               6.634           0.046           0.033           0.762           0.000
               6.698           0.050           0.033           0.764           0.000
               6.761           0.055           0.033           0.766           0.000
               6.824           0.061           0.033           0.769           0.000
               6.888           0.066           0.033           0.771           0.000
               6.951           0.073           0.033           0.773           0.000
               7.014           0.079           0.033           0.776           0.000
               7.078           0.086           0.033           0.778           0.001
               7.141           0.094           0.033           0.781           0.001
               7.205           0.103           0.033           0.784           0.001
               7.268           0.112           0.033           0.786           0.002
               7.331           0.122           0.033           0.789           0.003
               7.395           0.133           0.033           0.792           0.005
               7.458           0.144           0.033           0.794           0.007
               7.521           0.157           0.033           0.797           0.012
               7.585           0.170           0.033           0.800           0.021
               7.648           0.183           0.033           0.803           0.044
               7.711           0.207           0.050           0.793           0.410
               7.822           0.202           0.050           0.798           0.402
               7.933           0.196           0.050           0.804           0.394
               8.044           0.190           0.050           0.810           0.386
               8.155           0.184           0.050           0.816           0.377
               8.266           0.178           0.050           0.822           0.368
               8.377           0.171           0.050           0.829           0.358
               8.488           0.165           0.050           0.835           0.347
               8.599           0.157           0.050           0.843           0.336
               8.710           0.150           0.050           0.850           0.324
               8.821           0.142           0.050           0.858           0.312
               8.932           0.134           0.050           0.866           0.298
               9.043           0.125           0.050           0.875           0.284
               9.154           0.117           0.050           0.883           0.268
               9.265           0.107           0.050           0.893           0.251
               9.376           0.098           0.050           0.902           0.233
               9.487           0.088           0.050           0.912           0.214
               9.598           0.078           0.050           0.922           0.194
               9.709           0.067           0.050           0.933           0.173
               9.820           0.058           0.050           0.942           0.153
               9.931           0.050           0.050           0.950           0.136
               9.931           0.050           0.050           0.950           0.136
               9.931           0.050           0.050           0.950           0.136
               9.931           0.050           0.050           0.950           0.136
               9.931           0.050           0.050           0.950           0.136
               9.931           0.050           0.050           0.950           0.136
               9.931           0.050           0.050           0.950           0.136
               9.931           0.050           0.050           0.950           0.136
               9.931           0.050           0.050           0.950           0.136
               9.931           0.050           0.050           0.950           0.136
               9.931           0.050           0.050           0.950           0.136
               9.931           0.050           0.050           0.950           0.136
               9.931           0.050           0.050           0.950           0.136
```

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               9.931          0.050          0.050          0.950          0.136
               9.931          0.050          0.050          0.950          0.136
               9.931          0.050          0.050          0.950          0.136
               9.931          0.050          0.050          0.950          0.136
               9.931          0.050          0.050          0.950          0.136
               9.931          0.050          0.050          0.950          0.136
               9.931          0.050          0.050          0.950          0.136
               9.931          0.050          0.050          0.950          0.136
               9.931          0.050          0.050          0.950          0.136
               9.931          0.050          0.050          0.950          0.136
               9.931          0.050          0.050          0.950          0.136
               9.931          0.050          0.050          0.950          0.136
               9.931          0.050          0.050          0.950          0.136
               9.931          0.050          0.050          0.950          0.136
               9.931          0.050          0.050          0.950          0.136
               9.931          0.050          0.050          0.950          0.136
               9.931          0.050          0.050          0.950          0.136
               9.931          0.050          0.050          0.950          0.136
               9.931          0.050          0.050          0.950          0.136
               9.931          0.050          0.050          0.950          0.136
               9.931          0.050          0.050          0.950          0.136
               9.931          0.050          0.050          0.950          0.136
               9.931          0.050          0.050          0.950          0.136
               9.931          0.050          0.050          0.950          0.136
               9.931          0.050          0.050          0.950          0.136
               9.931          0.050          0.050          0.950          0.136
               9.931          0.050          0.050          0.950          0.136
               9.931          0.050          0.050          0.950          0.136
-----------------------------------------------------------------


 6. LNAPL specific volume and hydraulic conductivity
-----------------------------------------------------------------
             bn [ft]        Dn [ft]        Rn [ft]    Tn [ft2/d]
-----------------------------------------------------------------
               0.000          0.000          0.000          0.000
               0.089          0.002          0.000          0.000
               0.178          0.005          0.001          0.000
               0.266          0.009          0.002          0.000
               0.355          0.012          0.003          0.000
               0.444          0.017          0.005          0.000
               0.533          0.021          0.007          0.000
               0.622          0.026          0.010          0.000
               0.710          0.031          0.013          0.000
               0.799          0.037          0.016          0.000
               0.888          0.043          0.020          0.000
               0.977          0.049          0.024          0.000
               1.066          0.056          0.028          0.000
               1.154          0.062          0.032          0.000
               1.243          0.070          0.037          0.000
               1.332          0.077          0.042          0.000
               1.421          0.085          0.047          0.000
               1.510          0.092          0.053          0.000
               1.598          0.101          0.059          0.000
               1.687          0.108          0.064          0.000
               1.776          0.117          0.070          0.000
               1.865          0.125          0.077          0.000
               1.954          0.135          0.083          0.000
               2.042          0.143          0.090          0.000
               2.131          0.152          0.097          0.001
               2.220          0.162          0.104          0.001
-----------------------------------------------------------------
```

7. Data for curve-fitting segments

bn[ft]	Rn[ft]	Tn[ft2/d]	chi[ft]	beta	xi[ft]	eta
0.00000	0.00000	0.00000				
1.50960	0.05289	0.00032	0.00000	0.03504	0.00000	0.00021
1.86480	0.07683	0.00043	0.72487	0.06740	0.45381	0.00031
2.22000	0.10357	0.00055	0.84427	0.07529	0.56537	0.00033

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 * Saved time =  16 : 42,   2008 . 2 . 26
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 1. OPTIONS.

 * Units              =   1              (1: English Units, 2: SI Units)

 * Soil Heterogeneity =   1              ( Number of Layers: 1, 2 or 3)

 * Elevation          =   2              (1: Elevation above datum, 2: depth BGS)

 * FPR System Used    =   0              (1: well,  2: trench,  0: Not used)

 * Smear Correction   =   1              (0: no adjustment, 1: smear correction)

 * LNAPL Residual     =   2              (1: Variable in Layer, 2: Constant for
Layer)


 2. INPUT PARAMETERS.

 2.1 BASIC INPUT PARAMETERS.
 Monitor. Well LNAPL thickness[ft]=          0.010
 Ground Surface Depth [ft]        =          0.000
 Groundwater Table Depth [ft]     =          8.000
 Water Vertical Gradient(+up)     =          0.000
 LNAPL Density [g/cm3]            =          0.870
 LNAPL Viscosity [cp]             =        102.000
 Water Surface Tension [dyne/cm]  =         65.000
 LNAPL Surface Tension [dyne/cm]  =         21.400
 LNAPL/Water Interfacial Tension  =          8.800
 Residual-f (vadose)              =          0.200
 Residual-f (saturated)           =          0.300

 2.1.1 SOIL PROPERTIES OF LAYER 1
 Relative permeability model      =              1     (Mualem)
 Soil porosity                    =          0.380
 Hydraulic conductivity [ft/d]    =          0.095
 van Genuchten "N"                =          1.230
 van Genuchten "Alpha" [ft-1]     =          0.820
 Swr1                             =          0.100
 Snrv1                            =          0.000
 Snrs1                            =          0.000


 4. Calculated Parameters

-------------------------------------------------
 Air-LNAPL interface [ft]         =          7.999
 LNAPL-Water interface [ft]       =          8.009
 Max. Free-Product elevation [ft] =          7.993
-------------------------------------------------

-------------------------------------------------
 Parameter                        :         Soil 1
-------------------------------------------------
 van Genuchten "M"                :          0.187
```

```
 Air/LNAPL "alpha"  [ft-1]        :          2.167
 LNAPL/water "alpha" [ft-1]       :          0.787
--------------------------------------------------


 5. LNAPL and Water saturation data.

--------------------------------------------------------------------------------
      BGS Depth [ft]             Sn            Snr             Sw            krn
--------------------------------------------------------------------------------
               7.993          0.000          0.000          0.999          0.000
               7.993          0.000          0.000          0.999          0.000
               7.994          0.000          0.000          0.999          0.000
               7.994          0.000          0.000          0.999          0.000
               7.994          0.000          0.000          0.999          0.000
               7.994          0.000          0.000          0.999          0.000
               7.995          0.000          0.000          0.999          0.000
               7.995          0.000          0.000          0.999          0.000
               7.995          0.000          0.000          0.999          0.000
               7.996          0.000          0.000          0.999          0.000
               7.996          0.000          0.000          0.999          0.000
               7.996          0.000          0.000          0.999          0.000
               7.996          0.000          0.000          0.999          0.000
               7.997          0.000          0.000          0.999          0.000
               7.997          0.000          0.000          0.999          0.000
               7.997          0.000          0.000          0.999          0.000
               7.998          0.000          0.000          0.999          0.000
               7.998          0.000          0.000          0.999          0.000
               7.998          0.001          0.000          0.999          0.000
               7.998          0.001          0.000          0.999          0.001
               7.999          0.001          0.000          0.999          0.003
               7.999          0.001          0.000          0.999          0.003
               8.000          0.001          0.000          0.999          0.003
               8.000          0.000          0.000          1.000          0.002
               8.001          0.000          0.000          1.000          0.002
               8.001          0.000          0.000          1.000          0.002
               8.002          0.000          0.000          1.000          0.002
               8.002          0.000          0.000          1.000          0.002
               8.003          0.000          0.000          1.000          0.002
               8.003          0.000          0.000          1.000          0.002
               8.004          0.000          0.000          1.000          0.002
               8.004          0.000          0.000          1.000          0.002
               8.005          0.000          0.000          1.000          0.001
               8.005          0.000          0.000          1.000          0.001
               8.006          0.000          0.000          1.000          0.001
               8.006          0.000          0.000          1.000          0.001
               8.007          0.000          0.000          1.000          0.001
               8.007          0.000          0.000          1.000          0.001
               8.008          0.000          0.000          1.000          0.001
               8.008          0.000          0.000          1.000          0.001
               8.009          0.000          0.000          1.000          0.001
               8.009          0.000          0.000          1.000          0.001
               8.009          0.000          0.000          1.000          0.001
               8.009          0.000          0.000          1.000          0.001
               8.009          0.000          0.000          1.000          0.001
               8.009          0.000          0.000          1.000          0.001
               8.009          0.000          0.000          1.000          0.001
               8.009          0.000          0.000          1.000          0.001
               8.009          0.000          0.000          1.000          0.001
               8.009          0.000          0.000          1.000          0.001
               8.009          0.000          0.000          1.000          0.001
               8.009          0.000          0.000          1.000          0.001
               8.009          0.000          0.000          1.000          0.001
```

```
               8.009          0.000          0.000          1.000          0.001
               8.009          0.000          0.000          1.000          0.001
               8.009          0.000          0.000          1.000          0.001
               8.009          0.000          0.000          1.000          0.001
               8.009          0.000          0.000          1.000          0.001
               8.009          0.000          0.000          1.000          0.001
               8.009          0.000          0.000          1.000          0.001
               8.009          0.000          0.000          1.000          0.001
               8.009          0.000          0.000          1.000          0.001
               8.009          0.000          0.000          1.000          0.001
               8.009          0.000          0.000          1.000          0.001
               8.009          0.000          0.000          1.000          0.001
               8.009          0.000          0.000          1.000          0.001
               8.009          0.000          0.000          1.000          0.001
               8.009          0.000          0.000          1.000          0.001
               8.009          0.000          0.000          1.000          0.001
               8.009          0.000          0.000          1.000          0.001
               8.009          0.000          0.000          1.000          0.001
               8.009          0.000          0.000          1.000          0.001
               8.009          0.000          0.000          1.000          0.001
               8.009          0.000          0.000          1.000          0.001
               8.009          0.000          0.000          1.000          0.001
               8.009          0.000          0.000          1.000          0.001
               8.009          0.000          0.000          1.000          0.001
               8.009          0.000          0.000          1.000          0.001
               8.009          0.000          0.000          1.000          0.001
               8.009          0.000          0.000          1.000          0.001
               8.009          0.000          0.000          1.000          0.001
-----------------------------------------------------------------


 6. LNAPL specific volume and hydraulic conductivity
-----------------------------------------------------------------
             bn [ft]        Dn [ft]        Rn [ft]     Tn [ft2/d]
-----------------------------------------------------------------
               0.000          0.000          0.000          0.000
               0.000          0.000          0.000          0.000
               0.001          0.000          0.000          0.000
               0.001          0.000          0.000          0.000
               0.002          0.000          0.000          0.000
               0.002          0.000          0.000          0.000
               0.002          0.000          0.000          0.000
               0.003          0.000          0.000          0.000
               0.003          0.000          0.000          0.000
               0.004          0.000          0.000          0.000
               0.004          0.000          0.000          0.000
               0.004          0.000          0.000          0.000
               0.005          0.000          0.000          0.000
               0.005          0.000          0.000          0.000
               0.006          0.000          0.000          0.000
               0.006          0.000          0.000          0.000
               0.006          0.000          0.000          0.000
               0.007          0.000          0.000          0.000
               0.007          0.000          0.000          0.000
               0.008          0.000          0.000          0.000
               0.008          0.000          0.000          0.000
               0.008          0.000          0.000          0.000
               0.009          0.000          0.000          0.000
               0.009          0.000          0.000          0.000
               0.010          0.000          0.000          0.000
               0.010          0.000          0.000          0.000
-----------------------------------------------------------------
```

7. Data for curve-fitting segments

bn[ft]	Rn[ft]	Tn[ft2/d]	chi[ft]	beta	xi[ft]	eta
0.00000	0.00000	0.00000				
0.00400	0.00000	0.00000	0.00000	0.00004	0.00000	0.00000
0.00760	0.00000	0.00000	0.00287	0.00015	0.00166	0.00000
0.01000	0.00000	0.00000	0.00475	0.00025	0.00330	0.00000

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 1. OPTIONS.

 * Units              =   1              (1: English Units, 2: SI Units)

 * Soil Heterogeneity =   1              ( Number of Layers: 1, 2 or 3)

 * Elevation          =   2              (1: Elevation above datum, 2: depth BGS)

 * FPR System Used    =   0              (1: well,  2: trench,  0: Not used)

 * Smear Correction   =   1              (0: no adjustment, 1: smear correction)

 * LNAPL Residual     =   2              (1: Variable in Layer, 2: Constant for
Layer)


 2. INPUT PARAMETERS.

 2.1 BASIC INPUT PARAMETERS.
 Monitor. Well LNAPL thickness[ft]=          1.700
 Ground Surface Depth [ft]        =          0.000
 Groundwater Table Depth [ft]     =          8.000
 Water Vertical Gradient(+up)     =          0.000
 LNAPL Density [g/cm3]            =          0.870
 LNAPL Viscosity [cp]             =        102.000
 Water Surface Tension [dyne/cm]  =         65.000
 LNAPL Surface Tension [dyne/cm]  =         21.400
 LNAPL/Water Interfacial Tension  =          8.800
 Residual-f (vadose)              =          0.200
 Residual-f (saturated)           =          0.300

 2.1.1 SOIL PROPERTIES OF LAYER 1
 Relative permeability model      =              1     (Mualem)
 Soil porosity                    =          0.380
 Hydraulic conductivity [ft/d]    =          0.095
 van Genuchten "N"                =          1.230
 van Genuchten "Alpha" [ft-1]     =          0.820
 Swr1                             =          0.100
 Snrv1                            =          0.028
 Snrs1                            =          0.041


 4. Calculated Parameters

-------------------------------------------------
 Air-LNAPL interface [ft]         =          7.779
 LNAPL-Water interface [ft]       =          9.479
 Max. Free-Product elevation [ft] =          6.809
-------------------------------------------------

-------------------------------------------------
 Parameter                        :         Soil 1
-------------------------------------------------
 van Genuchten "M"                :          0.187
```

```
 Air/LNAPL "alpha"  [ft-1]        :          2.167
 LNAPL/water "alpha" [ft-1]       :          0.787
--------------------------------------------------


 5. LNAPL and Water saturation data.

--------------------------------------------------------------------------------
      BGS Depth [ft]             Sn            Snr             Sw            krn
--------------------------------------------------------------------------------
               6.809          0.028          0.028          0.790          0.000
               6.857          0.031          0.028          0.793          0.000
               6.906          0.035          0.028          0.795          0.000
               6.954          0.039          0.028          0.797          0.000
               7.003          0.044          0.028          0.799          0.000
               7.051          0.048          0.028          0.801          0.000
               7.100          0.053          0.028          0.803          0.000
               7.148          0.059          0.028          0.806          0.000
               7.197          0.064          0.028          0.808          0.000
               7.245          0.070          0.028          0.810          0.001
               7.294          0.077          0.028          0.813          0.001
               7.342          0.084          0.028          0.815          0.001
               7.391          0.091          0.028          0.818          0.002
               7.439          0.099          0.028          0.820          0.003
               7.488          0.107          0.028          0.823          0.004
               7.536          0.116          0.028          0.825          0.006
               7.585          0.125          0.028          0.828          0.008
               7.633          0.135          0.028          0.831          0.014
               7.682          0.145          0.028          0.833          0.023
               7.730          0.154          0.028          0.836          0.044
               7.779          0.161          0.028          0.839          0.342
               7.864          0.168          0.041          0.832          0.352
               7.949          0.163          0.041          0.837          0.344
               8.034          0.157          0.041          0.843          0.336
               8.119          0.152          0.041          0.848          0.327
               8.204          0.146          0.041          0.854          0.318
               8.289          0.140          0.041          0.860          0.308
               8.374          0.134          0.041          0.866          0.298
               8.459          0.128          0.041          0.872          0.288
               8.544          0.121          0.041          0.879          0.276
               8.629          0.115          0.041          0.885          0.264
               8.714          0.108          0.041          0.892          0.252
               8.799          0.100          0.041          0.900          0.239
               8.884          0.093          0.041          0.907          0.225
               8.969          0.085          0.041          0.915          0.210
               9.054          0.078          0.041          0.922          0.195
               9.139          0.070          0.041          0.930          0.179
               9.224          0.062          0.041          0.938          0.162
               9.309          0.054          0.041          0.946          0.145
               9.394          0.047          0.041          0.953          0.129
               9.479          0.041          0.041          0.959          0.116
               9.479          0.041          0.041          0.959          0.116
               9.479          0.041          0.041          0.959          0.116
               9.479          0.041          0.041          0.959          0.116
               9.479          0.041          0.041          0.959          0.116
               9.479          0.041          0.041          0.959          0.116
               9.479          0.041          0.041          0.959          0.116
               9.479          0.041          0.041          0.959          0.116
               9.479          0.041          0.041          0.959          0.116
               9.479          0.041          0.041          0.959          0.116
               9.479          0.041          0.041          0.959          0.116
               9.479          0.041          0.041          0.959          0.116
               9.479          0.041          0.041          0.959          0.116
```

```
               9.479          0.041          0.041          0.959          0.116
               9.479          0.041          0.041          0.959          0.116
               9.479          0.041          0.041          0.959          0.116
               9.479          0.041          0.041          0.959          0.116
               9.479          0.041          0.041          0.959          0.116
               9.479          0.041          0.041          0.959          0.116
               9.479          0.041          0.041          0.959          0.116
               9.479          0.041          0.041          0.959          0.116
               9.479          0.041          0.041          0.959          0.116
               9.479          0.041          0.041          0.959          0.116
               9.479          0.041          0.041          0.959          0.116
               9.479          0.041          0.041          0.959          0.116
               9.479          0.041          0.041          0.959          0.116
               9.479          0.041          0.041          0.959          0.116
               9.479          0.041          0.041          0.959          0.116
               9.479          0.041          0.041          0.959          0.116
               9.479          0.041          0.041          0.959          0.116
               9.479          0.041          0.041          0.959          0.116
               9.479          0.041          0.041          0.959          0.116
               9.479          0.041          0.041          0.959          0.116
               9.479          0.041          0.041          0.959          0.116
               9.479          0.041          0.041          0.959          0.116
               9.479          0.041          0.041          0.959          0.116
               9.479          0.041          0.041          0.959          0.116
               9.479          0.041          0.041          0.959          0.116
               9.479          0.041          0.041          0.959          0.116
               9.479          0.041          0.041          0.959          0.116
               9.479          0.041          0.041          0.959          0.116
-----------------------------------------------------------------


 6. LNAPL specific volume and hydraulic conductivity
-----------------------------------------------------------------
             bn [ft]        Dn [ft]        Rn [ft]     Tn [ft2/d]
-----------------------------------------------------------------
               0.000          0.000          0.000          0.000
               0.068          0.002          0.000          0.000
               0.136          0.003          0.000          0.000
               0.204          0.005          0.001          0.000
               0.272          0.008          0.002          0.000
               0.340          0.010          0.003          0.000
               0.408          0.013          0.004          0.000
               0.476          0.016          0.006          0.000
               0.544          0.019          0.008          0.000
               0.612          0.023          0.010          0.000
               0.680          0.027          0.012          0.000
               0.748          0.031          0.014          0.000
               0.816          0.034          0.017          0.000
               0.884          0.039          0.020          0.000
               0.952          0.043          0.023          0.000
               1.020          0.048          0.026          0.000
               1.088          0.053          0.029          0.000
               1.156          0.058          0.033          0.000
               1.224          0.063          0.036          0.000
               1.292          0.068          0.040          0.000
               1.360          0.074          0.044          0.000
               1.428          0.079          0.048          0.000
               1.496          0.085          0.052          0.000
               1.564          0.091          0.057          0.000
               1.632          0.096          0.061          0.000
               1.700          0.103          0.066          0.000
-----------------------------------------------------------------
```

7. Data for curve-fitting segments

bn[ft]	Rn[ft]	Tn[ft2/d]	chi[ft]	beta	xi[ft]	eta
0.00000	0.00000	0.00000				
0.95200	0.02273	0.00016	0.00000	0.02388	0.00000	0.00017
1.29200	0.04024	0.00025	0.51049	0.05149	0.31106	0.00025
1.70000	0.06592	0.00036	0.65262	0.06294	0.42593	0.00028

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 * Saved time =  16 : 43,   2008 . 2 . 26
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 1. OPTIONS.

 * Units              =   1              (1: English Units, 2: SI Units)

 * Soil Heterogeneity =   1              ( Number of Layers: 1, 2 or 3)

 * Elevation          =   2              (1: Elevation above datum, 2: depth BGS)

 * FPR System Used    =   0              (1: well,  2: trench,  0: Not used)

 * Smear Correction   =   1              (0: no adjustment, 1: smear correction)

 * LNAPL Residual     =   2              (1: Variable in Layer, 2: Constant for
Layer)


 2. INPUT PARAMETERS.

 2.1 BASIC INPUT PARAMETERS.
 Monitor. Well LNAPL thickness[ft]=          0.400
 Ground Surface Depth [ft]        =          0.000
 Groundwater Table Depth [ft]     =          8.000
 Water Vertical Gradient(+up)     =          0.000
 LNAPL Density [g/cm3]            =          0.870
 LNAPL Viscosity [cp]             =        102.000
 Water Surface Tension [dyne/cm]  =         65.000
 LNAPL Surface Tension [dyne/cm]  =         21.400
 LNAPL/Water Interfacial Tension  =          8.800
 Residual-f (vadose)              =          0.200
 Residual-f (saturated)           =          0.300

 2.1.1 SOIL PROPERTIES OF LAYER 1
 Relative permeability model      =              1     (Mualem)
 Soil porosity                    =          0.380
 Hydraulic conductivity [ft/d]    =          0.095
 van Genuchten "N"                =          1.230
 van Genuchten "Alpha" [ft-1]     =          0.820
 Swr1                             =          0.100
 Snrv1                            =          0.007
 Snrs1                            =          0.011


 4. Calculated Parameters

-------------------------------------------------
 Air-LNAPL interface [ft]         =          7.948
 LNAPL-Water interface [ft]       =          8.348
 Max. Free-Product elevation [ft] =          7.720
-------------------------------------------------

-------------------------------------------------
 Parameter                        :         Soil 1
-------------------------------------------------
 van Genuchten "M"                :          0.187
```

```
 Air/LNAPL "alpha"  [ft-1]       :          2.167
 LNAPL/water "alpha" [ft-1]      :          0.787
--------------------------------------------------


 5. LNAPL and Water saturation data.

--------------------------------------------------------------------------------
      BGS Depth [ft]              Sn              Snr               Sw              krn
--------------------------------------------------------------------------------
               7.720           0.007            0.007            0.936            0.000
               7.731           0.009            0.007            0.937            0.000
               7.743           0.011            0.007            0.938            0.000
               7.754           0.013            0.007            0.939            0.000
               7.765           0.015            0.007            0.940            0.000
               7.777           0.016            0.007            0.941            0.000
               7.788           0.018            0.007            0.942            0.000
               7.800           0.020            0.007            0.943            0.000
               7.811           0.022            0.007            0.945            0.001
               7.822           0.024            0.007            0.946            0.001
               7.834           0.026            0.007            0.947            0.001
               7.845           0.028            0.007            0.948            0.002
               7.857           0.030            0.007            0.949            0.002
               7.868           0.032            0.007            0.950            0.003
               7.880           0.034            0.007            0.951            0.004
               7.891           0.036            0.007            0.952            0.005
               7.902           0.038            0.007            0.953            0.007
               7.914           0.039            0.007            0.954            0.010
               7.925           0.041            0.007            0.955            0.014
               7.937           0.042            0.007            0.956            0.023
               7.948           0.043            0.007            0.957            0.119
               7.968           0.044            0.011            0.956            0.122
               7.988           0.042            0.011            0.958            0.118
               8.008           0.040            0.011            0.960            0.113
               8.028           0.038            0.011            0.962            0.109
               8.048           0.036            0.011            0.964            0.104
               8.068           0.034            0.011            0.966            0.099
               8.088           0.033            0.011            0.967            0.095
               8.108           0.031            0.011            0.969            0.090
               8.128           0.029            0.011            0.971            0.085
               8.148           0.027            0.011            0.973            0.080
               8.168           0.025            0.011            0.975            0.076
               8.188           0.023            0.011            0.977            0.071
               8.208           0.021            0.011            0.979            0.066
               8.228           0.020            0.011            0.980            0.061
               8.248           0.018            0.011            0.982            0.057
               8.268           0.016            0.011            0.984            0.052
               8.288           0.015            0.011            0.985            0.048
               8.308           0.013            0.011            0.987            0.043
               8.328           0.012            0.011            0.988            0.040
               8.348           0.011            0.011            0.989            0.037
               8.348           0.011            0.011            0.989            0.037
               8.348           0.011            0.011            0.989            0.037
               8.348           0.011            0.011            0.989            0.037
               8.348           0.011            0.011            0.989            0.037
               8.348           0.011            0.011            0.989            0.037
               8.348           0.011            0.011            0.989            0.037
               8.348           0.011            0.011            0.989            0.037
               8.348           0.011            0.011            0.989            0.037
               8.348           0.011            0.011            0.989            0.037
               8.348           0.011            0.011            0.989            0.037
               8.348           0.011            0.011            0.989            0.037
               8.348           0.011            0.011            0.989            0.037
```

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               8.348          0.011          0.011          0.989          0.037
               8.348          0.011          0.011          0.989          0.037
               8.348          0.011          0.011          0.989          0.037
               8.348          0.011          0.011          0.989          0.037
               8.348          0.011          0.011          0.989          0.037
               8.348          0.011          0.011          0.989          0.037
               8.348          0.011          0.011          0.989          0.037
               8.348          0.011          0.011          0.989          0.037
               8.348          0.011          0.011          0.989          0.037
               8.348          0.011          0.011          0.989          0.037
               8.348          0.011          0.011          0.989          0.037
               8.348          0.011          0.011          0.989          0.037
               8.348          0.011          0.011          0.989          0.037
               8.348          0.011          0.011          0.989          0.037
               8.348          0.011          0.011          0.989          0.037
               8.348          0.011          0.011          0.989          0.037
               8.348          0.011          0.011          0.989          0.037
               8.348          0.011          0.011          0.989          0.037
               8.348          0.011          0.011          0.989          0.037
               8.348          0.011          0.011          0.989          0.037
               8.348          0.011          0.011          0.989          0.037
               8.348          0.011          0.011          0.989          0.037
               8.348          0.011          0.011          0.989          0.037
               8.348          0.011          0.011          0.989          0.037
               8.348          0.011          0.011          0.989          0.037
               8.348          0.011          0.011          0.989          0.037
               8.348          0.011          0.011          0.989          0.037
               8.348          0.011          0.011          0.989          0.037
-----------------------------------------------------------------


 6. LNAPL specific volume and hydraulic conductivity
-----------------------------------------------------------------
             bn [ft]        Dn [ft]        Rn [ft]     Tn [ft2/d]
-----------------------------------------------------------------
               0.000          0.000          0.000          0.000
               0.016          0.000          0.000          0.000
               0.032          0.000          0.000          0.000
               0.048          0.000          0.000          0.000
               0.064          0.000          0.000          0.000
               0.080          0.001          0.000          0.000
               0.096          0.001          0.000          0.000
               0.112          0.001          0.000          0.000
               0.128          0.001          0.000          0.000
               0.144          0.001          0.000          0.000
               0.160          0.001          0.001          0.000
               0.176          0.002          0.001          0.000
               0.192          0.002          0.001          0.000
               0.208          0.002          0.001          0.000
               0.224          0.002          0.001          0.000
               0.240          0.003          0.001          0.000
               0.256          0.003          0.002          0.000
               0.272          0.003          0.002          0.000
               0.288          0.004          0.002          0.000
               0.304          0.004          0.002          0.000
               0.320          0.004          0.003          0.000
               0.336          0.005          0.003          0.000
               0.352          0.005          0.003          0.000
               0.368          0.006          0.003          0.000
               0.384          0.006          0.004          0.000
               0.400          0.006          0.004          0.000
-----------------------------------------------------------------
```

7. Data for curve-fitting segments

bn[ft]	Rn[ft]	Tn[ft2/d]	chi[ft]	beta	xi[ft]	eta
0.00000	0.00000	0.00000				
0.20800	0.00104	0.00001	0.00000	0.00499	0.00000	0.00005
0.32000	0.00260	0.00002	0.13350	0.01394	0.08186	0.00008
0.40000	0.00415	0.00003	0.18546	0.01933	0.12639	0.00010

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 1. OPTIONS.

 * Units              =   1              (1: English Units, 2: SI Units)

 * Soil Heterogeneity =   1              ( Number of Layers: 1, 2 or 3)

 * Elevation          =   2              (1: Elevation above datum, 2: depth BGS)

 * FPR System Used    =   0              (1: well,  2: trench,  0: Not used)

 * Smear Correction   =   1              (0: no adjustment, 1: smear correction)

 * LNAPL Residual     =   2              (1: Variable in Layer, 2: Constant for
Layer)


 2. INPUT PARAMETERS.

 2.1 BASIC INPUT PARAMETERS.
 Monitor. Well LNAPL thickness[ft]=          3.200
 Ground Surface Depth [ft]        =          0.000
 Groundwater Table Depth [ft]     =          8.000
 Water Vertical Gradient(+up)     =          0.000
 LNAPL Density [g/cm3]            =          0.870
 LNAPL Viscosity [cp]             =        102.000
 Water Surface Tension [dyne/cm]  =         65.000
 LNAPL Surface Tension [dyne/cm]  =         21.400
 LNAPL/Water Interfacial Tension  =          8.800
 Residual-f (vadose)              =          0.200
 Residual-f (saturated)           =          0.300

 2.1.1 SOIL PROPERTIES OF LAYER 1
 Relative permeability model      =              1     (Mualem)
 Soil porosity                    =          0.390
 Hydraulic conductivity [ft/d]    =          1.000
 van Genuchten "N"                =          1.480
 van Genuchten "Alpha" [ft-1]     =          1.800
 Swr1                             =          0.100
 Snrv1                            =          0.103
 Snrs1                            =          0.154


 4. Calculated Parameters

-------------------------------------------------
 Air-LNAPL interface [ft]         =          7.584
 LNAPL-Water interface [ft]       =         10.784
 Max. Free-Product elevation [ft] =          5.757
-------------------------------------------------

-------------------------------------------------
 Parameter                        :         Soil 1
-------------------------------------------------
 van Genuchten "M"                :          0.324
```

```
 Air/LNAPL "alpha"  [ft-1]       :          4.757
 LNAPL/water "alpha" [ft-1]      :          1.728
--------------------------------------------------


 5. LNAPL and Water saturation data.

------------------------------------------------------------------------------
      BGS Depth [ft]              Sn             Snr              Sw             krn
------------------------------------------------------------------------------
               5.757           0.103           0.103           0.379           0.000
               5.849           0.107           0.103           0.381           0.000
               5.940           0.112           0.103           0.384           0.000
               6.031           0.117           0.103           0.386           0.000
               6.123           0.123           0.103           0.389           0.000
               6.214           0.129           0.103           0.391           0.000
               6.305           0.137           0.103           0.394           0.000
               6.397           0.145           0.103           0.397           0.000
               6.488           0.154           0.103           0.400           0.000
               6.579           0.165           0.103           0.403           0.000
               6.671           0.178           0.103           0.406           0.000
               6.762           0.192           0.103           0.409           0.000
               6.853           0.209           0.103           0.412           0.001
               6.945           0.229           0.103           0.415           0.001
               7.036           0.253           0.103           0.419           0.001
               7.127           0.283           0.103           0.422           0.003
               7.219           0.320           0.103           0.426           0.005
               7.310           0.367           0.103           0.430           0.012
               7.401           0.426           0.103           0.434           0.030
               7.493           0.499           0.103           0.438           0.095
               7.584           0.580           0.154           0.420           0.741
               7.744           0.572           0.154           0.428           0.735
               7.904           0.565           0.154           0.435           0.728
               8.064           0.556           0.154           0.444           0.721
               8.224           0.547           0.154           0.453           0.712
               8.384           0.537           0.154           0.463           0.704
               8.544           0.526           0.154           0.474           0.685
               8.704           0.514           0.154           0.486           0.683
               8.864           0.501           0.154           0.499           0.670
               9.024           0.487           0.154           0.513           0.656
               9.184           0.471           0.154           0.529           0.640
               9.344           0.453           0.154           0.547           0.622
               9.504           0.433           0.154           0.567           0.600
               9.664           0.410           0.154           0.590           0.575
               9.824           0.384           0.154           0.616           0.545
               9.984           0.354           0.154           0.646           0.509
              10.144           0.319           0.154           0.681           0.465
              10.304           0.279           0.154           0.721           0.412
              10.464           0.234           0.154           0.766           0.349
              10.624           0.187           0.154           0.813           0.280
              10.784           0.154           0.154           0.846           0.230
              10.784           0.154           0.154           0.846           0.230
              10.784           0.154           0.154           0.846           0.230
              10.784           0.154           0.154           0.846           0.230
              10.784           0.154           0.154           0.846           0.230
              10.784           0.154           0.154           0.846           0.230
              10.784           0.154           0.154           0.846           0.230
              10.784           0.154           0.154           0.846           0.230
              10.784           0.154           0.154           0.846           0.230
              10.784           0.154           0.154           0.846           0.230
              10.784           0.154           0.154           0.846           0.230
              10.784           0.154           0.154           0.846           0.230
              10.784           0.154           0.154           0.846           0.230
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              10.784          0.154          0.154          0.846          0.230
              10.784          0.154          0.154          0.846          0.230
              10.784          0.154          0.154          0.846          0.230
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              10.784          0.154          0.154          0.846          0.230
              10.784          0.154          0.154          0.846          0.230
              10.784          0.154          0.154          0.846          0.230
              10.784          0.154          0.154          0.846          0.230
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              10.784          0.154          0.154          0.846          0.230
              10.784          0.154          0.154          0.846          0.230
              10.784          0.154          0.154          0.846          0.230
              10.784          0.154          0.154          0.846          0.230
              10.784          0.154          0.154          0.846          0.230
              10.784          0.154          0.154          0.846          0.230
              10.784          0.154          0.154          0.846          0.230
              10.784          0.154          0.154          0.846          0.230
              10.784          0.154          0.154          0.846          0.230
              10.784          0.154          0.154          0.846          0.230
              10.784          0.154          0.154          0.846          0.230
              10.784          0.154          0.154          0.846          0.230
              10.784          0.154          0.154          0.846          0.230
              10.784          0.154          0.154          0.846          0.230
              10.784          0.154          0.154          0.846          0.230
              10.784          0.154          0.154          0.846          0.230
              10.784          0.154          0.154          0.846          0.230
              10.784          0.154          0.154          0.846          0.230
-----------------------------------------------------------------


 6. LNAPL specific volume and hydraulic conductivity
-----------------------------------------------------------------
             bn [ft]        Dn [ft]        Rn [ft]     Tn [ft2/d]
-----------------------------------------------------------------
               0.000          0.000          0.000          0.000
               0.128          0.012          0.001          0.000
               0.256          0.026          0.005          0.001
               0.384          0.043          0.011          0.001
               0.512          0.063          0.021          0.002
               0.640          0.085          0.032          0.002
               0.768          0.108          0.045          0.003
               0.896          0.134          0.059          0.003
               1.024          0.159          0.075          0.004
               1.152          0.187          0.091          0.004
               1.280          0.215          0.109          0.005
               1.408          0.244          0.128          0.006
               1.536          0.274          0.146          0.006
               1.664          0.304          0.166          0.007
               1.792          0.335          0.186          0.008
               1.920          0.367          0.207          0.009
               2.048          0.398          0.229          0.009
               2.176          0.431          0.250          0.010
               2.304          0.463          0.273          0.011
               2.432          0.496          0.295          0.012
               2.560          0.530          0.317          0.012
               2.688          0.563          0.342          0.013
               2.816          0.598          0.364          0.014
               2.944          0.632          0.389          0.015
               3.072          0.666          0.413          0.016
               3.200          0.702          0.436          0.016
-----------------------------------------------------------------
```

7. Data for curve-fitting segments

bn[ft]	Rn[ft]	Tn[ft2/d]	chi[ft]	beta	xi[ft]	eta
0.00000	0.00000	0.00000				
0.38400	0.01149	0.00104	0.00000	0.02993	0.00000	0.00271
2.04800	0.22895	0.00934	0.29607	0.13068	0.17548	0.00499
3.20000	0.43603	0.01647	0.77435	0.17976	0.54054	0.00619

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 1. OPTIONS.

 * Units              =   1              (1: English Units, 2: SI Units)

 * Soil Heterogeneity =   1              ( Number of Layers: 1, 2 or 3)

 * Elevation          =   2              (1: Elevation above datum, 2: depth BGS)

 * FPR System Used    =   0              (1: well,  2: trench,  0: Not used)

 * Smear Correction   =   1              (0: no adjustment, 1: smear correction)

 * LNAPL Residual     =   2              (1: Variable in Layer, 2: Constant for
Layer)


 2. INPUT PARAMETERS.

 2.1 BASIC INPUT PARAMETERS.
 Monitor. Well LNAPL thickness[ft]=          2.875
 Ground Surface Depth [ft]        =          0.000
 Groundwater Table Depth [ft]     =          8.000
 Water Vertical Gradient(+up)     =          0.000
 LNAPL Density [g/cm3]            =          0.870
 LNAPL Viscosity [cp]             =        102.000
 Water Surface Tension [dyne/cm]  =         65.000
 LNAPL Surface Tension [dyne/cm]  =         21.400
 LNAPL/Water Interfacial Tension  =          8.800
 Residual-f (vadose)              =          0.200
 Residual-f (saturated)           =          0.300

 2.1.1 SOIL PROPERTIES OF LAYER 1
 Relative permeability model      =              1     (Mualem)
 Soil porosity                    =          0.390
 Hydraulic conductivity [ft/d]    =          1.000
 van Genuchten "N"                =          1.480
 van Genuchten "Alpha" [ft-1]     =          1.800
 Swr1                             =          0.100
 Snrv1                            =          0.099
 Snrs1                            =          0.148


 4. Calculated Parameters

-------------------------------------------------
 Air-LNAPL interface [ft]         =          7.626
 LNAPL-Water interface [ft]       =         10.501
 Max. Free-Product elevation [ft] =          5.985
-------------------------------------------------

-------------------------------------------------
 Parameter                        :         Soil 1
-------------------------------------------------
 van Genuchten "M"                :          0.324
```

```
 Air/LNAPL "alpha"  [ft-1]       :          4.757
 LNAPL/water "alpha" [ft-1]      :          1.728
---------------------------------------------------


 5. LNAPL and Water saturation data.

---------------------------------------------------------------------------------
      BGS Depth [ft]             Sn             Snr              Sw             krn
---------------------------------------------------------------------------------
               5.985          0.099           0.099           0.394           0.000
               6.067          0.103           0.099           0.397           0.000
               6.149          0.108           0.099           0.399           0.000
               6.231          0.114           0.099           0.402           0.000
               6.313          0.120           0.099           0.405           0.000
               6.395          0.127           0.099           0.407           0.000
               6.478          0.135           0.099           0.410           0.000
               6.560          0.143           0.099           0.413           0.000
               6.642          0.153           0.099           0.416           0.000
               6.724          0.164           0.099           0.419           0.000
               6.806          0.177           0.099           0.422           0.000
               6.888          0.192           0.099           0.426           0.000
               6.970          0.209           0.099           0.429           0.001
               7.052          0.229           0.099           0.432           0.001
               7.134          0.254           0.099           0.436           0.002
               7.216          0.284           0.099           0.440           0.004
               7.298          0.320           0.099           0.444           0.007
               7.380          0.366           0.099           0.448           0.014
               7.462          0.423           0.099           0.452           0.035
               7.544          0.488           0.099           0.456           0.106
               7.626          0.540           0.099           0.460           0.706
               7.770          0.554           0.148           0.446           0.719
               7.914          0.546           0.148           0.454           0.712
               8.057          0.537           0.148           0.463           0.704
               8.201          0.528           0.148           0.472           0.695
               8.345          0.517           0.148           0.483           0.685
               8.489          0.506           0.148           0.494           0.675
               8.632          0.494           0.148           0.506           0.663
               8.776          0.481           0.148           0.519           0.650
               8.920          0.466           0.148           0.534           0.635
               9.064          0.450           0.148           0.550           0.618
               9.208          0.431           0.148           0.569           0.598
               9.351          0.411           0.148           0.589           0.576
               9.495          0.388           0.148           0.612           0.550
               9.639          0.362           0.148           0.638           0.519
               9.783          0.333           0.148           0.667           0.482
               9.926          0.299           0.148           0.701           0.439
              10.070          0.261           0.148           0.739           0.387
              10.214          0.219           0.148           0.781           0.328
              10.358          0.177           0.148           0.823           0.265
              10.501          0.148           0.148           0.852           0.222
              10.501          0.148           0.148           0.852           0.222
              10.501          0.148           0.148           0.852           0.222
              10.501          0.148           0.148           0.852           0.222
              10.501          0.148           0.148           0.852           0.222
              10.501          0.148           0.148           0.852           0.222
              10.501          0.148           0.148           0.852           0.222
              10.501          0.148           0.148           0.852           0.222
              10.501          0.148           0.148           0.852           0.222
              10.501          0.148           0.148           0.852           0.222
              10.501          0.148           0.148           0.852           0.222
              10.501          0.148           0.148           0.852           0.222
              10.501          0.148           0.148           0.852           0.222
```

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              10.501          0.148          0.148          0.852          0.222
              10.501          0.148          0.148          0.852          0.222
              10.501          0.148          0.148          0.852          0.222
              10.501          0.148          0.148          0.852          0.222
              10.501          0.148          0.148          0.852          0.222
              10.501          0.148          0.148          0.852          0.222
              10.501          0.148          0.148          0.852          0.222
              10.501          0.148          0.148          0.852          0.222
              10.501          0.148          0.148          0.852          0.222
              10.501          0.148          0.148          0.852          0.222
              10.501          0.148          0.148          0.852          0.222
              10.501          0.148          0.148          0.852          0.222
              10.501          0.148          0.148          0.852          0.222
              10.501          0.148          0.148          0.852          0.222
              10.501          0.148          0.148          0.852          0.222
              10.501          0.148          0.148          0.852          0.222
              10.501          0.148          0.148          0.852          0.222
              10.501          0.148          0.148          0.852          0.222
              10.501          0.148          0.148          0.852          0.222
              10.501          0.148          0.148          0.852          0.222
              10.501          0.148          0.148          0.852          0.222
              10.501          0.148          0.148          0.852          0.222
              10.501          0.148          0.148          0.852          0.222
              10.501          0.148          0.148          0.852          0.222
              10.501          0.148          0.148          0.852          0.222
              10.501          0.148          0.148          0.852          0.222
              10.501          0.148          0.148          0.852          0.222
              10.501          0.148          0.148          0.852          0.222
-----------------------------------------------------------------


 6. LNAPL specific volume and hydraulic conductivity
-----------------------------------------------------------------
             bn [ft]        Dn [ft]        Rn [ft]     Tn [ft2/d]
-----------------------------------------------------------------
               0.000          0.000          0.000          0.000
               0.115          0.010          0.001          0.000
               0.230          0.022          0.004          0.001
               0.345          0.037          0.009          0.001
               0.460          0.053          0.017          0.001
               0.575          0.072          0.026          0.002
               0.690          0.092          0.037          0.002
               0.805          0.113          0.049          0.003
               0.920          0.136          0.062          0.003
               1.035          0.159          0.077          0.004
               1.150          0.184          0.092          0.004
               1.265          0.208          0.108          0.005
               1.380          0.235          0.124          0.006
               1.495          0.261          0.141          0.006
               1.610          0.287          0.159          0.007
               1.725          0.315          0.177          0.007
               1.840          0.342          0.196          0.008
               1.955          0.371          0.214          0.009
               2.070          0.399          0.234          0.009
               2.185          0.428          0.254          0.010
               2.300          0.458          0.273          0.011
               2.415          0.486          0.294          0.011
               2.530          0.517          0.314          0.012
               2.645          0.546          0.336          0.013
               2.760          0.578          0.356          0.014
               2.875          0.607          0.379          0.014
-----------------------------------------------------------------
```

7. Data for curve-fitting segments

bn[ft]	Rn[ft]	Tn[ft2/d]	chi[ft]	beta	xi[ft]	eta
0.00000	0.00000	0.00000				
0.46000	0.01678	0.00127	0.00000	0.03647	0.00000	0.00277
2.41500	0.29447	0.01144	0.34190	0.14204	0.21513	0.00520
2.87500	0.37872	0.01430	0.80734	0.18316	0.56988	0.00620

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 1. OPTIONS.

 * Units              =   1              (1: English Units, 2: SI Units)

 * Soil Heterogeneity =   1              ( Number of Layers: 1, 2 or 3)

 * Elevation          =   2              (1: Elevation above datum, 2: depth BGS)

 * FPR System Used    =   0              (1: well,  2: trench,  0: Not used)

 * Smear Correction   =   1              (0: no adjustment, 1: smear correction)

 * LNAPL Residual     =   2              (1: Variable in Layer, 2: Constant for
Layer)


 2. INPUT PARAMETERS.

 2.1 BASIC INPUT PARAMETERS.
 Monitor. Well LNAPL thickness[ft]=          1.570
 Ground Surface Depth [ft]        =          0.000
 Groundwater Table Depth [ft]     =          8.000
 Water Vertical Gradient(+up)     =          0.000
 LNAPL Density [g/cm3]            =          0.870
 LNAPL Viscosity [cp]             =        102.000
 Water Surface Tension [dyne/cm]  =         65.000
 LNAPL Surface Tension [dyne/cm]  =         21.400
 LNAPL/Water Interfacial Tension  =          8.800
 Residual-f (vadose)              =          0.200
 Residual-f (saturated)           =          0.300

 2.1.1 SOIL PROPERTIES OF LAYER 1
 Relative permeability model      =              1     (Mualem)
 Soil porosity                    =          0.390
 Hydraulic conductivity [ft/d]    =          1.000
 van Genuchten "N"                =          1.480
 van Genuchten "Alpha" [ft-1]     =          1.800
 Swr1                             =          0.100
 Snrv1                            =          0.076
 Snrs1                            =          0.114


 4. Calculated Parameters

-------------------------------------------------
 Air-LNAPL interface [ft]         =          7.796
 LNAPL-Water interface [ft]       =          9.366
 Max. Free-Product elevation [ft] =          6.900
-------------------------------------------------

-------------------------------------------------
 Parameter                        :         Soil 1
-------------------------------------------------
 van Genuchten "M"                :          0.324
```

```
 Air/LNAPL "alpha"  [ft-1]       :          4.757
 LNAPL/water "alpha" [ft-1]      :          1.728
---------------------------------------------------


 5. LNAPL and Water saturation data.

---------------------------------------------------------------------------------
      BGS Depth [ft]               Sn              Snr               Sw              krn
---------------------------------------------------------------------------------
               6.900            0.076            0.076            0.497            0.000
               6.945            0.081            0.076            0.500            0.000
               6.989            0.088            0.076            0.503            0.000
               7.034            0.094            0.076            0.506            0.000
               7.079            0.102            0.076            0.509            0.000
               7.124            0.110            0.076            0.513            0.000
               7.169            0.119            0.076            0.516            0.000
               7.213            0.129            0.076            0.520            0.000
               7.258            0.141            0.076            0.524            0.001
               7.303            0.153            0.076            0.528            0.001
               7.348            0.167            0.076            0.532            0.001
               7.393            0.183            0.076            0.536            0.002
               7.437            0.201            0.076            0.540            0.003
               7.482            0.221            0.076            0.544            0.004
               7.527            0.245            0.076            0.548            0.007
               7.572            0.271            0.076            0.553            0.011
               7.617            0.301            0.076            0.558            0.020
               7.661            0.334            0.076            0.562            0.037
               7.706            0.369            0.076            0.567            0.071
               7.751            0.402            0.076            0.572            0.153
               7.796            0.422            0.076            0.578            0.589
               7.874            0.435            0.114            0.565            0.603
               7.953            0.426            0.114            0.574            0.592
               8.031            0.415            0.114            0.585            0.581
               8.110            0.404            0.114            0.596            0.568
               8.188            0.393            0.114            0.607            0.555
               8.267            0.380            0.114            0.620            0.540
               8.345            0.367            0.114            0.633            0.525
               8.424            0.353            0.114            0.647            0.507
               8.502            0.337            0.114            0.663            0.488
               8.581            0.321            0.114            0.679            0.467
               8.659            0.303            0.114            0.697            0.445
               8.738            0.285            0.114            0.715            0.419
               8.816            0.264            0.114            0.736            0.392
               8.895            0.243            0.114            0.757            0.361
               8.973            0.220            0.114            0.780            0.328
               9.052            0.196            0.114            0.804            0.293
               9.130            0.171            0.114            0.829            0.256
               9.209            0.147            0.114            0.853            0.220
               9.287            0.126            0.114            0.874            0.187
               9.366            0.114            0.114            0.886            0.167
               9.366            0.114            0.114            0.886            0.167
               9.366            0.114            0.114            0.886            0.167
               9.366            0.114            0.114            0.886            0.167
               9.366            0.114            0.114            0.886            0.167
               9.366            0.114            0.114            0.886            0.167
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               9.366            0.114            0.114            0.886            0.167
               9.366            0.114            0.114            0.886            0.167
               9.366            0.114            0.114            0.886            0.167
               9.366            0.114            0.114            0.886            0.167
```

```
               9.366          0.114          0.114          0.886          0.167
               9.366          0.114          0.114          0.886          0.167
               9.366          0.114          0.114          0.886          0.167
               9.366          0.114          0.114          0.886          0.167
               9.366          0.114          0.114          0.886          0.167
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               9.366          0.114          0.114          0.886          0.167
               9.366          0.114          0.114          0.886          0.167
               9.366          0.114          0.114          0.886          0.167
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               9.366          0.114          0.114          0.886          0.167
               9.366          0.114          0.114          0.886          0.167
               9.366          0.114          0.114          0.886          0.167
               9.366          0.114          0.114          0.886          0.167
               9.366          0.114          0.114          0.886          0.167
               9.366          0.114          0.114          0.886          0.167
               9.366          0.114          0.114          0.886          0.167
               9.366          0.114          0.114          0.886          0.167
               9.366          0.114          0.114          0.886          0.167
               9.366          0.114          0.114          0.886          0.167
               9.366          0.114          0.114          0.886          0.167
               9.366          0.114          0.114          0.886          0.167
               9.366          0.114          0.114          0.886          0.167
               9.366          0.114          0.114          0.886          0.167
-----------------------------------------------------------------


 6. LNAPL specific volume and hydraulic conductivity
-----------------------------------------------------------------
             bn [ft]        Dn [ft]        Rn [ft]     Tn [ft2/d]
-----------------------------------------------------------------
               0.000          0.000          0.000          0.000
               0.063          0.004          0.000          0.000
               0.126          0.009          0.001          0.000
               0.188          0.014          0.002          0.000
               0.251          0.020          0.005          0.000
               0.314          0.027          0.008          0.001
               0.377          0.034          0.012          0.001
               0.440          0.043          0.016          0.001
               0.502          0.052          0.021          0.001
               0.565          0.061          0.026          0.001
               0.628          0.071          0.032          0.002
               0.691          0.081          0.039          0.002
               0.754          0.091          0.045          0.002
               0.816          0.102          0.052          0.002
               0.879          0.114          0.060          0.003
               0.942          0.125          0.068          0.003
               1.005          0.137          0.076          0.003
               1.068          0.149          0.084          0.004
               1.130          0.162          0.093          0.004
               1.193          0.174          0.102          0.004
               1.256          0.187          0.111          0.004
               1.319          0.201          0.120          0.005
               1.382          0.214          0.129          0.005
               1.444          0.228          0.139          0.005
               1.507          0.241          0.149          0.006
               1.570          0.255          0.159          0.006
-----------------------------------------------------------------
```

7. Data for curve-fitting segments

bn[ft]	Rn[ft]	Tn[ft2/d]	chi[ft]	beta	xi[ft]	eta
0.00000	0.00000	0.00000				
0.37680	0.01154	0.00082	0.00000	0.03063	0.00000	0.00218
0.81640	0.05248	0.00241	0.25286	0.09312	0.15028	0.00362
1.57000	0.15913	0.00606	0.44561	0.14152	0.31881	0.00484

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 1. OPTIONS.

 * Units              =   1              (1: English Units, 2: SI Units)

 * Soil Heterogeneity =   1              ( Number of Layers: 1, 2 or 3)

 * Elevation          =   2              (1: Elevation above datum, 2: depth BGS)

 * FPR System Used    =   0              (1: well,  2: trench,  0: Not used)

 * Smear Correction   =   1              (0: no adjustment, 1: smear correction)

 * LNAPL Residual     =   2              (1: Variable in Layer, 2: Constant for
Layer)


 2. INPUT PARAMETERS.

 2.1 BASIC INPUT PARAMETERS.
 Monitor. Well LNAPL thickness[ft]=          0.283
 Ground Surface Depth [ft]        =          0.000
 Groundwater Table Depth [ft]     =          8.000
 Water Vertical Gradient(+up)     =          0.000
 LNAPL Density [g/cm3]            =          0.870
 LNAPL Viscosity [cp]             =        102.000
 Water Surface Tension [dyne/cm]  =         65.000
 LNAPL Surface Tension [dyne/cm]  =         21.400
 LNAPL/Water Interfacial Tension  =          8.800
 Residual-f (vadose)              =          0.200
 Residual-f (saturated)           =          0.300

 2.1.1 SOIL PROPERTIES OF LAYER 1
 Relative permeability model      =              1     (Mualem)
 Soil porosity                    =          0.390
 Hydraulic conductivity [ft/d]    =          1.000
 van Genuchten "N"                =          1.480
 van Genuchten "Alpha" [ft-1]     =          1.800
 Swr1                             =          0.100
 Snrv1                            =          0.017
 Snrs1                            =          0.025


 4. Calculated Parameters

-------------------------------------------------
 Air-LNAPL interface [ft]         =          7.963
 LNAPL-Water interface [ft]       =          8.246
 Max. Free-Product elevation [ft] =          7.802
-------------------------------------------------

-------------------------------------------------
 Parameter                        :         Soil 1
-------------------------------------------------
 van Genuchten "M"                :          0.324
```

```
 Air/LNAPL "alpha"  [ft-1]        :          4.757
 LNAPL/water "alpha" [ft-1]       :          1.728
--------------------------------------------------


 5. LNAPL and Water saturation data.

--------------------------------------------------------------------------------
      BGS Depth [ft]             Sn            Snr             Sw            krn
--------------------------------------------------------------------------------
               7.802          0.017          0.017          0.847          0.000
               7.810          0.021          0.017          0.850          0.000
               7.818          0.026          0.017          0.852          0.000
               7.826          0.031          0.017          0.855          0.000
               7.834          0.036          0.017          0.858          0.001
               7.842          0.041          0.017          0.860          0.001
               7.850          0.046          0.017          0.863          0.001
               7.858          0.051          0.017          0.866          0.002
               7.866          0.056          0.017          0.868          0.003
               7.874          0.061          0.017          0.871          0.004
               7.882          0.066          0.017          0.874          0.005
               7.891          0.071          0.017          0.877          0.007
               7.899          0.076          0.017          0.879          0.009
               7.907          0.080          0.017          0.882          0.012
               7.915          0.085          0.017          0.885          0.015
               7.923          0.089          0.017          0.888          0.020
               7.931          0.092          0.017          0.891          0.027
               7.939          0.095          0.017          0.893          0.036
               7.947          0.097          0.017          0.896          0.049
               7.955          0.099          0.017          0.899          0.070
               7.963          0.106          0.025          0.894          0.155
               7.977          0.101          0.025          0.899          0.147
               7.992          0.096          0.025          0.904          0.140
               8.006          0.091          0.025          0.909          0.132
               8.020          0.086          0.025          0.914          0.124
               8.034          0.081          0.025          0.919          0.117
               8.048          0.076          0.025          0.924          0.109
               8.062          0.072          0.025          0.928          0.102
               8.076          0.067          0.025          0.933          0.094
               8.091          0.062          0.025          0.938          0.087
               8.105          0.058          0.025          0.942          0.080
               8.119          0.053          0.025          0.947          0.074
               8.133          0.049          0.025          0.951          0.067
               8.147          0.045          0.025          0.955          0.061
               8.161          0.041          0.025          0.959          0.055
               8.175          0.037          0.025          0.963          0.049
               8.190          0.034          0.025          0.966          0.044
               8.204          0.031          0.025          0.969          0.040
               8.218          0.028          0.025          0.972          0.036
               8.232          0.026          0.025          0.974          0.033
               8.246          0.025          0.025          0.975          0.032
               8.246          0.025          0.025          0.975          0.032
               8.246          0.025          0.025          0.975          0.032
               8.246          0.025          0.025          0.975          0.032
               8.246          0.025          0.025          0.975          0.032
               8.246          0.025          0.025          0.975          0.032
               8.246          0.025          0.025          0.975          0.032
               8.246          0.025          0.025          0.975          0.032
               8.246          0.025          0.025          0.975          0.032
               8.246          0.025          0.025          0.975          0.032
               8.246          0.025          0.025          0.975          0.032
               8.246          0.025          0.025          0.975          0.032
               8.246          0.025          0.025          0.975          0.032
```

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               8.246          0.025          0.025          0.975          0.032
               8.246          0.025          0.025          0.975          0.032
               8.246          0.025          0.025          0.975          0.032
               8.246          0.025          0.025          0.975          0.032
               8.246          0.025          0.025          0.975          0.032
               8.246          0.025          0.025          0.975          0.032
               8.246          0.025          0.025          0.975          0.032
               8.246          0.025          0.025          0.975          0.032
               8.246          0.025          0.025          0.975          0.032
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               8.246          0.025          0.025          0.975          0.032
               8.246          0.025          0.025          0.975          0.032
               8.246          0.025          0.025          0.975          0.032
               8.246          0.025          0.025          0.975          0.032
               8.246          0.025          0.025          0.975          0.032
               8.246          0.025          0.025          0.975          0.032
               8.246          0.025          0.025          0.975          0.032
               8.246          0.025          0.025          0.975          0.032
               8.246          0.025          0.025          0.975          0.032
               8.246          0.025          0.025          0.975          0.032
               8.246          0.025          0.025          0.975          0.032
               8.246          0.025          0.025          0.975          0.032
               8.246          0.025          0.025          0.975          0.032
               8.246          0.025          0.025          0.975          0.032
               8.246          0.025          0.025          0.975          0.032
               8.246          0.025          0.025          0.975          0.032
               8.246          0.025          0.025          0.975          0.032
               8.246          0.025          0.025          0.975          0.032
------------------------------------------------------------------


 6. LNAPL specific volume and hydraulic conductivity
------------------------------------------------------------------
             bn [ft]        Dn [ft]        Rn [ft]     Tn [ft2/d]
------------------------------------------------------------------
               0.000          0.000          0.000          0.000
               0.011          0.000          0.000          0.000
               0.023          0.000          0.000          0.000
               0.034          0.000          0.000          0.000
               0.045          0.001          0.000          0.000
               0.057          0.001          0.000          0.000
               0.068          0.001          0.000          0.000
               0.079          0.001          0.000          0.000
               0.091          0.002          0.000          0.000
               0.102          0.002          0.001          0.000
               0.113          0.002          0.001          0.000
               0.125          0.003          0.001          0.000
               0.136          0.003          0.001          0.000
               0.147          0.004          0.002          0.000
               0.158          0.004          0.002          0.000
               0.170          0.004          0.002          0.000
               0.181          0.005          0.002          0.000
               0.192          0.005          0.003          0.000
               0.204          0.006          0.003          0.000
               0.215          0.007          0.004          0.000
               0.226          0.007          0.004          0.000
               0.238          0.008          0.005          0.000
               0.249          0.008          0.005          0.000
               0.260          0.009          0.006          0.000
               0.272          0.010          0.006          0.000
               0.283          0.011          0.007          0.000
------------------------------------------------------------------
```

7. Data for curve-fitting segments

bn[ft]	Rn[ft]	Tn[ft2/d]	chi[ft]	beta	xi[ft]	eta
0.00000	0.00000	0.00000				
0.19244	0.00287	0.00011	0.00000	0.01490	0.00000	0.00059
0.23772	0.00463	0.00016	0.11885	0.03897	0.09083	0.00112
0.28300	0.00682	0.00023	0.14175	0.04827	0.11762	0.00137

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 1. OPTIONS.

 * Units              =   1              (1: English Units, 2: SI Units)

 * Soil Heterogeneity =   1              ( Number of Layers: 1, 2 or 3)

 * Elevation          =   2              (1: Elevation above datum, 2: depth BGS)

 * FPR System Used    =   0              (1: well,  2: trench,  0: Not used)

 * Smear Correction   =   1              (0: no adjustment, 1: smear correction)

 * LNAPL Residual     =   2              (1: Variable in Layer, 2: Constant for
Layer)


 2. INPUT PARAMETERS.

 2.1 BASIC INPUT PARAMETERS.
 Monitor. Well LNAPL thickness[ft]=          2.220
 Ground Surface Depth [ft]        =          0.000
 Groundwater Table Depth [ft]     =          8.000
 Water Vertical Gradient(+up)     =          0.000
 LNAPL Density [g/cm3]            =          0.870
 LNAPL Viscosity [cp]             =        102.000
 Water Surface Tension [dyne/cm]  =         65.000
 LNAPL Surface Tension [dyne/cm]  =         21.400
 LNAPL/Water Interfacial Tension  =          8.800
 Residual-f (vadose)              =          0.200
 Residual-f (saturated)           =          0.300

 2.1.1 SOIL PROPERTIES OF LAYER 1
 Relative permeability model      =              1     (Mualem)
 Soil porosity                    =          0.390
 Hydraulic conductivity [ft/d]    =          1.000
 van Genuchten "N"                =          1.480
 van Genuchten "Alpha" [ft-1]     =          1.800
 Swr1                             =          0.100
 Snrv1                            =          0.089
 Snrs1                            =          0.134


 4. Calculated Parameters

-------------------------------------------------
 Air-LNAPL interface [ft]         =          7.711
 LNAPL-Water interface [ft]       =          9.931
 Max. Free-Product elevation [ft] =          6.444
-------------------------------------------------

-------------------------------------------------
 Parameter                        :         Soil 1
-------------------------------------------------
 van Genuchten "M"                :          0.324
```

```
 Air/LNAPL "alpha"  [ft-1]       :          4.757
 LNAPL/water "alpha" [ft-1]      :          1.728
--------------------------------------------------


 5. LNAPL and Water saturation data.

--------------------------------------------------------------------------------
      BGS Depth [ft]              Sn              Snr               Sw              krn
--------------------------------------------------------------------------------
               6.444           0.089           0.089           0.435           0.000
               6.508           0.094           0.089           0.438           0.000
               6.571           0.100           0.089           0.440           0.000
               6.634           0.106           0.089           0.443           0.000
               6.698           0.113           0.089           0.446           0.000
               6.761           0.120           0.089           0.449           0.000
               6.824           0.129           0.089           0.452           0.000
               6.888           0.138           0.089           0.456           0.000
               6.951           0.148           0.089           0.459           0.000
               7.014           0.160           0.089           0.462           0.000
               7.078           0.174           0.089           0.466           0.001
               7.141           0.190           0.089           0.470           0.001
               7.205           0.208           0.089           0.473           0.001
               7.268           0.229           0.089           0.477           0.002
               7.331           0.253           0.089           0.481           0.003
               7.395           0.282           0.089           0.485           0.006
               7.458           0.317           0.089           0.489           0.011
               7.521           0.358           0.089           0.494           0.023
               7.585           0.406           0.089           0.498           0.050
               7.648           0.457           0.089           0.503           0.129
               7.711           0.515           0.134           0.485           0.683
               7.822           0.506           0.134           0.494           0.666
               7.933           0.497           0.134           0.503           0.666
               8.044           0.488           0.134           0.512           0.657
               8.155           0.478           0.134           0.522           0.647
               8.266           0.466           0.134           0.534           0.635
               8.377           0.455           0.134           0.545           0.623
               8.488           0.442           0.134           0.558           0.609
               8.599           0.428           0.134           0.572           0.594
               8.710           0.412           0.134           0.588           0.577
               8.821           0.396           0.134           0.604           0.558
               8.932           0.377           0.134           0.623           0.537
               9.043           0.357           0.134           0.643           0.512
               9.154           0.334           0.134           0.666           0.485
               9.265           0.310           0.134           0.690           0.453
               9.376           0.282           0.134           0.718           0.416
               9.487           0.252           0.134           0.748           0.375
               9.598           0.220           0.134           0.780           0.329
               9.709           0.186           0.134           0.814           0.279
               9.820           0.155           0.134           0.845           0.231
               9.931           0.134           0.134           0.866           0.200
               9.931           0.134           0.134           0.866           0.200
               9.931           0.134           0.134           0.866           0.200
               9.931           0.134           0.134           0.866           0.200
               9.931           0.134           0.134           0.866           0.200
               9.931           0.134           0.134           0.866           0.200
               9.931           0.134           0.134           0.866           0.200
               9.931           0.134           0.134           0.866           0.200
               9.931           0.134           0.134           0.866           0.200
               9.931           0.134           0.134           0.866           0.200
               9.931           0.134           0.134           0.866           0.200
               9.931           0.134           0.134           0.866           0.200
               9.931           0.134           0.134           0.866           0.200
```

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               9.931          0.134          0.134          0.866          0.200
               9.931          0.134          0.134          0.866          0.200
               9.931          0.134          0.134          0.866          0.200
               9.931          0.134          0.134          0.866          0.200
               9.931          0.134          0.134          0.866          0.200
               9.931          0.134          0.134          0.866          0.200
               9.931          0.134          0.134          0.866          0.200
               9.931          0.134          0.134          0.866          0.200
               9.931          0.134          0.134          0.866          0.200
               9.931          0.134          0.134          0.866          0.200
               9.931          0.134          0.134          0.866          0.200
               9.931          0.134          0.134          0.866          0.200
               9.931          0.134          0.134          0.866          0.200
               9.931          0.134          0.134          0.866          0.200
               9.931          0.134          0.134          0.866          0.200
               9.931          0.134          0.134          0.866          0.200
               9.931          0.134          0.134          0.866          0.200
               9.931          0.134          0.134          0.866          0.200
               9.931          0.134          0.134          0.866          0.200
               9.931          0.134          0.134          0.866          0.200
               9.931          0.134          0.134          0.866          0.200
               9.931          0.134          0.134          0.866          0.200
               9.931          0.134          0.134          0.866          0.200
               9.931          0.134          0.134          0.866          0.200
               9.931          0.134          0.134          0.866          0.200
               9.931          0.134          0.134          0.866          0.200
               9.931          0.134          0.134          0.866          0.200
               9.931          0.134          0.134          0.866          0.200
-----------------------------------------------------------------


 6. LNAPL specific volume and hydraulic conductivity
-----------------------------------------------------------------
             bn [ft]        Dn [ft]        Rn [ft]     Tn [ft2/d]
-----------------------------------------------------------------
               0.000          0.000          0.000          0.000
               0.089          0.007          0.000          0.000
               0.178          0.015          0.002          0.000
               0.266          0.024          0.005          0.001
               0.355          0.036          0.010          0.001
               0.444          0.048          0.016          0.001
               0.533          0.061          0.023          0.001
               0.622          0.075          0.031          0.002
               0.710          0.091          0.040          0.002
               0.799          0.107          0.049          0.003
               0.888          0.124          0.059          0.003
               0.977          0.141          0.071          0.003
               1.066          0.159          0.082          0.004
               1.154          0.177          0.094          0.004
               1.243          0.196          0.106          0.005
               1.332          0.215          0.119          0.005
               1.421          0.235          0.132          0.006
               1.510          0.254          0.146          0.006
               1.598          0.275          0.159          0.007
               1.687          0.295          0.174          0.007
               1.776          0.317          0.188          0.007
               1.865          0.337          0.203          0.008
               1.954          0.359          0.218          0.009
               2.042          0.380          0.233          0.009
               2.131          0.402          0.249          0.010
               2.220          0.425          0.264          0.010
-----------------------------------------------------------------
```

7. Data for curve-fitting segments

bn[ft]	Rn[ft]	Tn[ft2/d]	chi[ft]	beta	xi[ft]	eta
0.00000	0.00000	0.00000				
0.44400	0.01586	0.00114	0.00000	0.03572	0.00000	0.00256
0.79920	0.04935	0.00252	0.27580	0.09428	0.15102	0.00389
2.22000	0.26378	0.01005	0.47224	0.15092	0.32425	0.00530

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 1. OPTIONS.

 * Units              =   1              (1: English Units, 2: SI Units)

 * Soil Heterogeneity =   1              ( Number of Layers: 1, 2 or 3)

 * Elevation          =   2              (1: Elevation above datum, 2: depth BGS)

 * FPR System Used    =   0              (1: well,  2: trench,  0: Not used)

 * Smear Correction   =   1              (0: no adjustment, 1: smear correction)

 * LNAPL Residual     =   2              (1: Variable in Layer, 2: Constant for
Layer)


 2. INPUT PARAMETERS.

 2.1 BASIC INPUT PARAMETERS.
 Monitor. Well LNAPL thickness[ft]=          0.001
 Ground Surface Depth [ft]        =          0.000
 Groundwater Table Depth [ft]     =          8.000
 Water Vertical Gradient(+up)     =          0.000
 LNAPL Density [g/cm3]            =          0.870
 LNAPL Viscosity [cp]             =        102.000
 Water Surface Tension [dyne/cm]  =         65.000
 LNAPL Surface Tension [dyne/cm]  =         21.400
 LNAPL/Water Interfacial Tension  =          8.800
 Residual-f (vadose)              =          0.200
 Residual-f (saturated)           =          0.300

 2.1.1 SOIL PROPERTIES OF LAYER 1
 Relative permeability model      =              1     (Mualem)
 Soil porosity                    =          0.390
 Hydraulic conductivity [ft/d]    =          1.000
 van Genuchten "N"                =          1.480
 van Genuchten "Alpha" [ft-1]     =          1.800
 Swr1                             =          0.100
 Snrv1                            =          0.000
 Snrs1                            =          0.000


 4. Calculated Parameters

-------------------------------------------------
 Air-LNAPL interface [ft]         =          8.000
 LNAPL-Water interface [ft]       =          8.001
 Max. Free-Product elevation [ft] =          7.999
-------------------------------------------------

-------------------------------------------------
 Parameter                        :         Soil 1
-------------------------------------------------
 van Genuchten "M"                :          0.324
```

Air/LNAPL "alpha" [ft-1]   :   4.757
LNAPL/water "alpha" [ft-1]   :   1.728

5. LNAPL and Water saturation data.

BGS Depth [ft]	Sn	Snr	Sw	krn
7.999	0.000	0.000	1.000	0.000
7.999	0.000	0.000	1.000	0.000
7.999	0.000	0.000	1.000	0.000
7.999	0.000	0.000	1.000	0.000
7.999	0.000	0.000	1.000	0.000
7.999	0.000	0.000	1.000	0.000
7.999	0.000	0.000	1.000	0.000
7.999	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.001	0.000	0.000	1.000	0.000
8.001	0.000	0.000	1.000	0.000
8.001	0.000	0.000	1.000	0.000
8.001	0.000	0.000	1.000	0.000
8.001	0.000	0.000	1.000	0.000
8.001	0.000	0.000	1.000	0.000
8.001	0.000	0.000	1.000	0.000
8.001	0.000	0.000	1.000	0.000
8.001	0.000	0.000	1.000	0.000
8.001	0.000	0.000	1.000	0.000
8.001	0.000	0.000	1.000	0.000
8.001	0.000	0.000	1.000	0.000
8.001	0.000	0.000	1.000	0.000
8.001	0.000	0.000	1.000	0.000
8.001	0.000	0.000	1.000	0.000
8.001	0.000	0.000	1.000	0.000
8.001	0.000	0.000	1.000	0.000
8.001	0.000	0.000	1.000	0.000
8.001	0.000	0.000	1.000	0.000
8.001	0.000	0.000	1.000	0.000

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               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
-----------------------------------------------------------------


 6. LNAPL specific volume and hydraulic conductivity
-----------------------------------------------------------------
             bn [ft]        Dn [ft]        Rn [ft]     Tn [ft2/d]
-----------------------------------------------------------------
               0.000          0.000          0.000          0.000
               0.000          0.000          0.000          0.000
               0.000          0.000          0.000          0.000
               0.000          0.000          0.000          0.000
               0.000          0.000          0.000          0.000
               0.000          0.000          0.000          0.000
               0.000          0.000          0.000          0.000
               0.000          0.000          0.000          0.000
               0.000          0.000          0.000          0.000
               0.000          0.000          0.000          0.000
               0.000          0.000          0.000          0.000
               0.000          0.000          0.000          0.000
               0.000          0.000          0.000          0.000
               0.001          0.000          0.000          0.000
               0.001          0.000          0.000          0.000
               0.001          0.000          0.000          0.000
               0.001          0.000          0.000          0.000
               0.001          0.000          0.000          0.000
               0.001          0.000          0.000          0.000
               0.001          0.000          0.000          0.000
               0.001          0.000          0.000          0.000
               0.001          0.000          0.000          0.000
               0.001          0.000          0.000          0.000
               0.001          0.000          0.000          0.000
               0.001          0.000          0.000          0.000
               0.001          0.000          0.000          0.000
-----------------------------------------------------------------
```

7. Data for curve-fitting segments

bn[ft]	Rn[ft]	Tn[ft2/d]	chi[ft]	beta	xi[ft]	eta
0.00000	0.00000	0.00000				
0.00044	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
0.00060	0.00000	0.00000	0.00030	0.00001	0.00019	0.00000
0.00100	0.00000	0.00000	0.00044	0.00001	0.00035	0.00000

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 1. OPTIONS.

 * Units              =   1              (1: English Units, 2: SI Units)

 * Soil Heterogeneity =   1              ( Number of Layers: 1, 2 or 3)

 * Elevation          =   2              (1: Elevation above datum, 2: depth BGS)

 * FPR System Used    =   0              (1: well,  2: trench,  0: Not used)

 * Smear Correction   =   1              (0: no adjustment, 1: smear correction)

 * LNAPL Residual     =   2              (1: Variable in Layer, 2: Constant for
Layer)


 2. INPUT PARAMETERS.

 2.1 BASIC INPUT PARAMETERS.
 Monitor. Well LNAPL thickness[ft]=          1.700
 Ground Surface Depth [ft]        =          0.000
 Groundwater Table Depth [ft]     =          8.000
 Water Vertical Gradient(+up)     =          0.000
 LNAPL Density [g/cm3]            =          0.870
 LNAPL Viscosity [cp]             =        102.000
 Water Surface Tension [dyne/cm]  =         65.000
 LNAPL Surface Tension [dyne/cm]  =         21.400
 LNAPL/Water Interfacial Tension  =          8.800
 Residual-f (vadose)              =          0.200
 Residual-f (saturated)           =          0.300

 2.1.1 SOIL PROPERTIES OF LAYER 1
 Relative permeability model      =              1     (Mualem)
 Soil porosity                    =          0.390
 Hydraulic conductivity [ft/d]    =          1.000
 van Genuchten "N"                =          1.480
 van Genuchten "Alpha" [ft-1]     =          1.800
 Swr1                             =          0.100
 Snrv1                            =          0.079
 Snrs1                            =          0.118


 4. Calculated Parameters

-------------------------------------------------
 Air-LNAPL interface [ft]         =          7.779
 LNAPL-Water interface [ft]       =          9.479
 Max. Free-Product elevation [ft] =          6.809
-------------------------------------------------

-------------------------------------------------
 Parameter                        :         Soil 1
-------------------------------------------------
 van Genuchten "M"                :          0.324
```

```
 Air/LNAPL "alpha"  [ft-1]       :          4.757
 LNAPL/water "alpha" [ft-1]      :          1.728
--------------------------------------------------


 5. LNAPL and Water saturation data.

--------------------------------------------------------------------------------
      BGS Depth [ft]              Sn             Snr              Sw             krn
--------------------------------------------------------------------------------
               6.809           0.079           0.079           0.482           0.000
               6.857           0.084           0.079           0.485           0.000
               6.906           0.091           0.079           0.488           0.000
               6.954           0.097           0.079           0.491           0.000
               7.003           0.104           0.079           0.494           0.000
               7.051           0.113           0.079           0.498           0.000
               7.100           0.122           0.079           0.501           0.000
               7.148           0.131           0.079           0.505           0.000
               7.197           0.143           0.079           0.508           0.000
               7.245           0.155           0.079           0.512           0.001
               7.294           0.169           0.079           0.516           0.001
               7.342           0.185           0.079           0.520           0.001
               7.391           0.203           0.079           0.524           0.002
               7.439           0.224           0.079           0.528           0.004
               7.488           0.248           0.079           0.532           0.006
               7.536           0.275           0.079           0.537           0.010
               7.585           0.306           0.079           0.541           0.018
               7.633           0.341           0.079           0.546           0.033
               7.682           0.379           0.079           0.551           0.067
               7.730           0.416           0.079           0.556           0.149
               7.779           0.439           0.079           0.561           0.607
               7.864           0.452           0.118           0.548           0.621
               7.949           0.443           0.118           0.557           0.611
               8.034           0.432           0.118           0.568           0.600
               8.119           0.422           0.118           0.578           0.588
               8.204           0.410           0.118           0.590           0.575
               8.289           0.398           0.118           0.602           0.561
               8.374           0.384           0.118           0.616           0.545
               8.459           0.370           0.118           0.630           0.528
               8.544           0.355           0.118           0.645           0.510
               8.629           0.338           0.118           0.662           0.489
               8.714           0.320           0.118           0.680           0.466
               8.799           0.301           0.118           0.699           0.441
               8.884           0.280           0.118           0.720           0.413
               8.969           0.257           0.118           0.743           0.382
               9.054           0.233           0.118           0.767           0.348
               9.139           0.208           0.118           0.792           0.311
               9.224           0.182           0.118           0.818           0.272
               9.309           0.156           0.118           0.844           0.233
               9.394           0.133           0.118           0.867           0.197
               9.479           0.118           0.118           0.882           0.175
               9.479           0.118           0.118           0.882           0.175
               9.479           0.118           0.118           0.882           0.175
               9.479           0.118           0.118           0.882           0.175
               9.479           0.118           0.118           0.882           0.175
               9.479           0.118           0.118           0.882           0.175
               9.479           0.118           0.118           0.882           0.175
               9.479           0.118           0.118           0.882           0.175
               9.479           0.118           0.118           0.882           0.175
               9.479           0.118           0.118           0.882           0.175
               9.479           0.118           0.118           0.882           0.175
               9.479           0.118           0.118           0.882           0.175
               9.479           0.118           0.118           0.882           0.175
```

```
               9.479          0.118          0.118          0.882          0.175
               9.479          0.118          0.118          0.882          0.175
               9.479          0.118          0.118          0.882          0.175
               9.479          0.118          0.118          0.882          0.175
               9.479          0.118          0.118          0.882          0.175
               9.479          0.118          0.118          0.882          0.175
               9.479          0.118          0.118          0.882          0.175
               9.479          0.118          0.118          0.882          0.175
               9.479          0.118          0.118          0.882          0.175
               9.479          0.118          0.118          0.882          0.175
               9.479          0.118          0.118          0.882          0.175
               9.479          0.118          0.118          0.882          0.175
               9.479          0.118          0.118          0.882          0.175
               9.479          0.118          0.118          0.882          0.175
               9.479          0.118          0.118          0.882          0.175
               9.479          0.118          0.118          0.882          0.175
               9.479          0.118          0.118          0.882          0.175
               9.479          0.118          0.118          0.882          0.175
               9.479          0.118          0.118          0.882          0.175
               9.479          0.118          0.118          0.882          0.175
               9.479          0.118          0.118          0.882          0.175
               9.479          0.118          0.118          0.882          0.175
               9.479          0.118          0.118          0.882          0.175
               9.479          0.118          0.118          0.882          0.175
               9.479          0.118          0.118          0.882          0.175
               9.479          0.118          0.118          0.882          0.175
               9.479          0.118          0.118          0.882          0.175
               9.479          0.118          0.118          0.882          0.175
-----------------------------------------------------------------


 6. LNAPL specific volume and hydraulic conductivity
-----------------------------------------------------------------
             bn [ft]        Dn [ft]        Rn [ft]     Tn [ft2/d]
-----------------------------------------------------------------
               0.000          0.000          0.000          0.000
               0.068          0.005          0.000          0.000
               0.136          0.010          0.001          0.000
               0.204          0.016          0.003          0.000
               0.272          0.023          0.006          0.001
               0.340          0.031          0.009          0.001
               0.408          0.039          0.014          0.001
               0.476          0.049          0.019          0.001
               0.544          0.059          0.024          0.001
               0.612          0.070          0.030          0.002
               0.680          0.081          0.037          0.002
               0.748          0.092          0.044          0.002
               0.816          0.104          0.052          0.002
               0.884          0.116          0.060          0.003
               0.952          0.129          0.069          0.003
               1.020          0.142          0.077          0.003
               1.088          0.156          0.086          0.004
               1.156          0.169          0.096          0.004
               1.224          0.183          0.106          0.004
               1.292          0.197          0.115          0.005
               1.360          0.212          0.125          0.005
               1.428          0.227          0.136          0.005
               1.496          0.242          0.146          0.006
               1.564          0.256          0.157          0.006
               1.632          0.272          0.168          0.006
               1.700          0.287          0.179          0.007
-----------------------------------------------------------------
```

7. Data for curve-fitting segments

bn[ft]	Rn[ft]	Tn[ft2/d]	chi[ft]	beta	xi[ft]	eta
0.00000	0.00000	0.00000				
0.54400	0.02424	0.00139	0.00000	0.04455	0.00000	0.00255
0.81600	0.05215	0.00245	0.30782	0.10262	0.18906	0.00391
1.70000	0.17938	0.00683	0.45364	0.14392	0.32109	0.00495

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 1. OPTIONS.

 * Units              =   1              (1: English Units, 2: SI Units)

 * Soil Heterogeneity =   1              ( Number of Layers: 1, 2 or 3)

 * Elevation          =   2              (1: Elevation above datum, 2: depth BGS)

 * FPR System Used    =   0              (1: well,  2: trench,  0: Not used)

 * Smear Correction   =   1              (0: no adjustment, 1: smear correction)

 * LNAPL Residual     =   2              (1: Variable in Layer, 2: Constant for
Layer)


 2. INPUT PARAMETERS.

 2.1 BASIC INPUT PARAMETERS.
 Monitor. Well LNAPL thickness[ft]=          0.400
 Ground Surface Depth [ft]        =          0.000
 Groundwater Table Depth [ft]     =          8.000
 Water Vertical Gradient(+up)     =          0.000
 LNAPL Density [g/cm3]            =          0.870
 LNAPL Viscosity [cp]             =        102.000
 Water Surface Tension [dyne/cm]  =         65.000
 LNAPL Surface Tension [dyne/cm]  =         21.400
 LNAPL/Water Interfacial Tension  =          8.800
 Residual-f (vadose)              =          0.200
 Residual-f (saturated)           =          0.300

 2.1.1 SOIL PROPERTIES OF LAYER 1
 Relative permeability model      =              1     (Mualem)
 Soil porosity                    =          0.390
 Hydraulic conductivity [ft/d]    =          1.000
 van Genuchten "N"                =          1.480
 van Genuchten "Alpha" [ft-1]     =          1.800
 Swr1                             =          0.100
 Snrv1                            =          0.025
 Snrs1                            =          0.037


 4. Calculated Parameters

-------------------------------------------------
 Air-LNAPL interface [ft]         =          7.948
 LNAPL-Water interface [ft]       =          8.348
 Max. Free-Product elevation [ft] =          7.720
-------------------------------------------------

-------------------------------------------------
 Parameter                        :         Soil 1
-------------------------------------------------
 van Genuchten "M"                :          0.324
```

```
 Air/LNAPL "alpha"  [ft-1]       :         4.757
 LNAPL/water "alpha" [ft-1]      :         1.728
--------------------------------------------------


 5. LNAPL and Water saturation data.

--------------------------------------------------------------------------------
      BGS Depth [ft]              Sn              Snr               Sw              krn
--------------------------------------------------------------------------------
               7.720           0.025           0.025            0.785            0.000
               7.731           0.030           0.025            0.788            0.000
               7.743           0.036           0.025            0.791            0.000
               7.754           0.042           0.025            0.795            0.000
               7.765           0.049           0.025            0.798            0.001
               7.777           0.055           0.025            0.801            0.001
               7.788           0.062           0.025            0.804            0.001
               7.800           0.069           0.025            0.808            0.002
               7.811           0.076           0.025            0.811            0.003
               7.822           0.083           0.025            0.815            0.004
               7.834           0.090           0.025            0.818            0.005
               7.845           0.098           0.025            0.822            0.007
               7.857           0.105           0.025            0.825            0.010
               7.868           0.112           0.025            0.829            0.014
               7.880           0.120           0.025            0.832            0.018
               7.891           0.126           0.025            0.836            0.025
               7.902           0.133           0.025            0.840            0.035
               7.914           0.138           0.025            0.843            0.048
               7.925           0.143           0.025            0.847            0.068
               7.937           0.145           0.025            0.851            0.101
               7.948           0.145           0.025            0.855            0.217
               7.968           0.149           0.037            0.851            0.223
               7.988           0.143           0.037            0.857            0.213
               8.008           0.136           0.037            0.864            0.203
               8.028           0.129           0.037            0.871            0.192
               8.048           0.122           0.037            0.878            0.181
               8.068           0.116           0.037            0.884            0.171
               8.088           0.109           0.037            0.891            0.160
               8.108           0.102           0.037            0.898            0.149
               8.128           0.095           0.037            0.905            0.139
               8.148           0.088           0.037            0.912            0.128
               8.168           0.082           0.037            0.918            0.118
               8.188           0.075           0.037            0.925            0.108
               8.208           0.069           0.037            0.931            0.098
               8.228           0.063           0.037            0.937            0.088
               8.248           0.057           0.037            0.943            0.079
               8.268           0.052           0.037            0.948            0.071
               8.288           0.047           0.037            0.953            0.064
               8.308           0.043           0.037            0.957            0.057
               8.328           0.039           0.037            0.961            0.052
               8.348           0.037           0.037            0.963            0.049
               8.348           0.037           0.037            0.963            0.049
               8.348           0.037           0.037            0.963            0.049
               8.348           0.037           0.037            0.963            0.049
               8.348           0.037           0.037            0.963            0.049
               8.348           0.037           0.037            0.963            0.049
               8.348           0.037           0.037            0.963            0.049
               8.348           0.037           0.037            0.963            0.049
               8.348           0.037           0.037            0.963            0.049
               8.348           0.037           0.037            0.963            0.049
               8.348           0.037           0.037            0.963            0.049
               8.348           0.037           0.037            0.963            0.049
               8.348           0.037           0.037            0.963            0.049
```

```
               8.348          0.037          0.037          0.963          0.049
               8.348          0.037          0.037          0.963          0.049
               8.348          0.037          0.037          0.963          0.049
               8.348          0.037          0.037          0.963          0.049
               8.348          0.037          0.037          0.963          0.049
               8.348          0.037          0.037          0.963          0.049
               8.348          0.037          0.037          0.963          0.049
               8.348          0.037          0.037          0.963          0.049
               8.348          0.037          0.037          0.963          0.049
               8.348          0.037          0.037          0.963          0.049
               8.348          0.037          0.037          0.963          0.049
               8.348          0.037          0.037          0.963          0.049
               8.348          0.037          0.037          0.963          0.049
               8.348          0.037          0.037          0.963          0.049
               8.348          0.037          0.037          0.963          0.049
               8.348          0.037          0.037          0.963          0.049
               8.348          0.037          0.037          0.963          0.049
               8.348          0.037          0.037          0.963          0.049
               8.348          0.037          0.037          0.963          0.049
               8.348          0.037          0.037          0.963          0.049
               8.348          0.037          0.037          0.963          0.049
               8.348          0.037          0.037          0.963          0.049
               8.348          0.037          0.037          0.963          0.049
               8.348          0.037          0.037          0.963          0.049
               8.348          0.037          0.037          0.963          0.049
               8.348          0.037          0.037          0.963          0.049
               8.348          0.037          0.037          0.963          0.049
               8.348          0.037          0.037          0.963          0.049
-----------------------------------------------------------------


 6. LNAPL specific volume and hydraulic conductivity
-----------------------------------------------------------------
             bn [ft]        Dn [ft]        Rn [ft]     Tn [ft2/d]
-----------------------------------------------------------------
               0.000          0.000          0.000          0.000
               0.016          0.000          0.000          0.000
               0.032          0.001          0.000          0.000
               0.048          0.001          0.000          0.000
               0.064          0.001          0.000          0.000
               0.080          0.002          0.000          0.000
               0.096          0.002          0.001          0.000
               0.112          0.003          0.001          0.000
               0.128          0.004          0.001          0.000
               0.144          0.004          0.001          0.000
               0.160          0.005          0.002          0.000
               0.176          0.006          0.002          0.000
               0.192          0.007          0.003          0.000
               0.208          0.008          0.003          0.000
               0.224          0.009          0.004          0.000
               0.240          0.009          0.005          0.000
               0.256          0.011          0.005          0.000
               0.272          0.012          0.006          0.000
               0.288          0.013          0.007          0.000
               0.304          0.014          0.008          0.000
               0.320          0.015          0.009          0.000
               0.336          0.016          0.010          0.000
               0.352          0.018          0.011          0.000
               0.368          0.019          0.012          0.000
               0.384          0.021          0.013          0.000
               0.400          0.022          0.014          0.000
-----------------------------------------------------------------
```

7. Data for curve-fitting segments

bn[ft]	Rn[ft]	Tn[ft2/d]	chi[ft]	beta	xi[ft]	eta
0.00000	0.00000	0.00000				
0.20800	0.00339	0.00016	0.00000	0.01628	0.00000	0.00079
0.32000	0.00881	0.00033	0.13807	0.04841	0.09967	0.00152
0.40000	0.01414	0.00049	0.18777	0.06661	0.15042	0.00197

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 1. OPTIONS.

 * Units              =   1              (1: English Units, 2: SI Units)

 * Soil Heterogeneity =   1              ( Number of Layers: 1, 2 or 3)

 * Elevation          =   2              (1: Elevation above datum, 2: depth BGS)

 * FPR System Used    =   0              (1: well,  2: trench,  0: Not used)

 * Smear Correction   =   1              (0: no adjustment, 1: smear correction)

 * LNAPL Residual     =   2              (1: Variable in Layer, 2: Constant for
Layer)


 2. INPUT PARAMETERS.

 2.1 BASIC INPUT PARAMETERS.
 Monitor. Well LNAPL thickness[ft]=          3.200
 Ground Surface Depth [ft]        =          0.000
 Groundwater Table Depth [ft]     =          8.000
 Water Vertical Gradient(+up)     =          0.000
 LNAPL Density [g/cm3]            =          0.870
 LNAPL Viscosity [cp]             =        102.000
 Water Surface Tension [dyne/cm]  =         65.000
 LNAPL Surface Tension [dyne/cm]  =         21.400
 LNAPL/Water Interfacial Tension  =          8.800
 Residual-f (vadose)              =          0.200
 Residual-f (saturated)           =          0.300

 2.1.1 SOIL PROPERTIES OF LAYER 1
 Relative permeability model      =              1     (Mualem)
 Soil porosity                    =          0.430
 Hydraulic conductivity [ft/d]    =          0.820
 van Genuchten "N"                =          1.560
 van Genuchten "Alpha" [ft-1]     =          1.100
 Swr1                             =          0.078
 Snrv1                            =          0.096
 Snrs1                            =          0.144


 4. Calculated Parameters

-------------------------------------------------
 Air-LNAPL interface [ft]         =          7.584
 LNAPL-Water interface [ft]       =         10.784
 Max. Free-Product elevation [ft] =          5.757
-------------------------------------------------

-------------------------------------------------
 Parameter                        :         Soil 1
-------------------------------------------------
 van Genuchten "M"                :          0.359
```

```
 Air/LNAPL "alpha"  [ft-1]       :          2.907
 LNAPL/water "alpha" [ft-1]      :          1.056
--------------------------------------------------


 5. LNAPL and Water saturation data.

--------------------------------------------------------------------------------
      BGS Depth [ft]              Sn              Snr               Sw              krn
--------------------------------------------------------------------------------
               5.757           0.096            0.096            0.394            0.000
               5.849           0.101            0.096            0.397            0.000
               5.940           0.107            0.096            0.400            0.000
               6.031           0.114            0.096            0.404            0.000
               6.123           0.122            0.096            0.407            0.000
               6.214           0.130            0.096            0.410            0.000
               6.305           0.139            0.096            0.414            0.000
               6.397           0.150            0.096            0.417            0.000
               6.488           0.162            0.096            0.421            0.000
               6.579           0.175            0.096            0.425            0.001
               6.671           0.191            0.096            0.429            0.001
               6.762           0.208            0.096            0.433            0.001
               6.853           0.229            0.096            0.437            0.002
               6.945           0.253            0.096            0.441            0.003
               7.036           0.281            0.096            0.446            0.006
               7.127           0.314            0.096            0.450            0.010
               7.219           0.352            0.096            0.455            0.019
               7.310           0.397            0.096            0.460            0.037
               7.401           0.447            0.096            0.465            0.078
               7.493           0.496            0.096            0.470            0.183
               7.584           0.548            0.144            0.452            0.691
               7.744           0.538            0.144            0.462            0.687
               7.904           0.528            0.144            0.472            0.677
               8.064           0.517            0.144            0.483            0.666
               8.224           0.506            0.144            0.494            0.655
               8.384           0.493            0.144            0.507            0.642
               8.544           0.480            0.144            0.520            0.627
               8.704           0.465            0.144            0.535            0.611
               8.864           0.449            0.144            0.551            0.594
               9.024           0.432            0.144            0.568            0.574
               9.184           0.413            0.144            0.587            0.552
               9.344           0.392            0.144            0.608            0.527
               9.504           0.370            0.144            0.630            0.499
               9.664           0.345            0.144            0.655            0.468
               9.824           0.317            0.144            0.683            0.432
               9.984           0.288            0.144            0.712            0.392
              10.144           0.256            0.144            0.744            0.349
              10.304           0.222            0.144            0.778            0.302
              10.464           0.189            0.144            0.811            0.254
              10.624           0.160            0.144            0.840            0.212
              10.784           0.144            0.144            0.856            0.188
              10.784           0.144            0.144            0.856            0.188
              10.784           0.144            0.144            0.856            0.188
              10.784           0.144            0.144            0.856            0.188
              10.784           0.144            0.144            0.856            0.188
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              10.784           0.144            0.144            0.856            0.188
              10.784           0.144            0.144            0.856            0.188
```

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              10.784          0.144          0.144          0.856          0.188
              10.784          0.144          0.144          0.856          0.188
              10.784          0.144          0.144          0.856          0.188
              10.784          0.144          0.144          0.856          0.188
              10.784          0.144          0.144          0.856          0.188
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              10.784          0.144          0.144          0.856          0.188
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              10.784          0.144          0.144          0.856          0.188
              10.784          0.144          0.144          0.856          0.188
              10.784          0.144          0.144          0.856          0.188
              10.784          0.144          0.144          0.856          0.188
              10.784          0.144          0.144          0.856          0.188
              10.784          0.144          0.144          0.856          0.188
              10.784          0.144          0.144          0.856          0.188
              10.784          0.144          0.144          0.856          0.188
              10.784          0.144          0.144          0.856          0.188
              10.784          0.144          0.144          0.856          0.188
              10.784          0.144          0.144          0.856          0.188
              10.784          0.144          0.144          0.856          0.188
-----------------------------------------------------------------


 6. LNAPL specific volume and hydraulic conductivity
-----------------------------------------------------------------
             bn [ft]        Dn [ft]        Rn [ft]     Tn [ft2/d]
-----------------------------------------------------------------
               0.000          0.000          0.000          0.000
               0.128          0.011          0.001          0.000
               0.256          0.025          0.003          0.000
               0.384          0.040          0.008          0.001
               0.512          0.059          0.015          0.001
               0.640          0.079          0.024          0.001
               0.768          0.100          0.035          0.002
               0.896          0.125          0.048          0.002
               1.024          0.149          0.063          0.002
               1.152          0.177          0.078          0.003
               1.280          0.205          0.095          0.003
               1.408          0.233          0.114          0.004
               1.536          0.264          0.133          0.004
               1.664          0.294          0.153          0.005
               1.792          0.327          0.173          0.005
               1.920          0.359          0.195          0.006
               2.048          0.391          0.218          0.006
               2.176          0.426          0.240          0.007
               2.304          0.460          0.264          0.008
               2.432          0.494          0.288          0.008
               2.560          0.531          0.312          0.009
               2.688          0.566          0.338          0.009
               2.816          0.603          0.362          0.010
               2.944          0.639          0.389          0.011
               3.072          0.676          0.415          0.011
               3.200          0.714          0.441          0.012
-----------------------------------------------------------------
```

7. Data for curve-fitting segments

bn[ft]	Rn[ft]	Tn[ft2/d]	chi[ft]	beta	xi[ft]	eta
0.00000	0.00000	0.00000				
0.76800	0.03521	0.00161	0.00000	0.04585	0.00000	0.00210
1.40800	0.11383	0.00376	0.48135	0.12284	0.28973	0.00337
3.20000	0.44071	0.01181	0.78395	0.18241	0.56971	0.00449

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 1. OPTIONS.

 * Units              =   1              (1: English Units, 2: SI Units)

 * Soil Heterogeneity =   1              ( Number of Layers: 1, 2 or 3)

 * Elevation          =   2              (1: Elevation above datum, 2: depth BGS)

 * FPR System Used    =   0              (1: well,  2: trench,  0: Not used)

 * Smear Correction   =   1              (0: no adjustment, 1: smear correction)

 * LNAPL Residual     =   2              (1: Variable in Layer, 2: Constant for
Layer)


 2. INPUT PARAMETERS.

 2.1 BASIC INPUT PARAMETERS.
 Monitor. Well LNAPL thickness[ft]=          2.875
 Ground Surface Depth [ft]        =          0.000
 Groundwater Table Depth [ft]     =          8.000
 Water Vertical Gradient(+up)     =          0.000
 LNAPL Density [g/cm3]            =          0.870
 LNAPL Viscosity [cp]             =        102.000
 Water Surface Tension [dyne/cm]  =         65.000
 LNAPL Surface Tension [dyne/cm]  =         21.400
 LNAPL/Water Interfacial Tension  =          8.800
 Residual-f (vadose)              =          0.200
 Residual-f (saturated)           =          0.300

 2.1.1 SOIL PROPERTIES OF LAYER 1
 Relative permeability model      =              1     (Mualem)
 Soil porosity                    =          0.430
 Hydraulic conductivity [ft/d]    =          0.820
 van Genuchten "N"                =          1.560
 van Genuchten "Alpha" [ft-1]     =          1.100
 Swr1                             =          0.078
 Snrv1                            =          0.091
 Snrs1                            =          0.137


 4. Calculated Parameters

-------------------------------------------------
 Air-LNAPL interface [ft]         =          7.626
 LNAPL-Water interface [ft]       =         10.501
 Max. Free-Product elevation [ft] =          5.985
-------------------------------------------------

-------------------------------------------------
 Parameter                        :         Soil 1
-------------------------------------------------
 van Genuchten "M"                :          0.359
```

```
 Air/LNAPL "alpha"  [ft-1]       :          2.907
 LNAPL/water "alpha" [ft-1]      :          1.056
--------------------------------------------------


 5. LNAPL and Water saturation data.

--------------------------------------------------------------------------------
      BGS Depth [ft]              Sn             Snr              Sw             krn
--------------------------------------------------------------------------------
               5.985           0.091           0.091           0.414           0.000
               6.067           0.097           0.091           0.417           0.000
               6.149           0.103           0.091           0.421           0.000
               6.231           0.110           0.091           0.424           0.000
               6.313           0.118           0.091           0.427           0.000
               6.395           0.127           0.091           0.431           0.000
               6.478           0.136           0.091           0.435           0.000
               6.560           0.147           0.091           0.438           0.000
               6.642           0.160           0.091           0.442           0.000
               6.724           0.173           0.091           0.446           0.001
               6.806           0.189           0.091           0.450           0.001
               6.888           0.207           0.091           0.454           0.002
               6.970           0.228           0.091           0.459           0.003
               7.052           0.252           0.091           0.463           0.004
               7.134           0.279           0.091           0.468           0.007
               7.216           0.311           0.091           0.473           0.012
               7.298           0.348           0.091           0.477           0.022
               7.380           0.390           0.091           0.483           0.043
               7.462           0.434           0.091           0.488           0.087
               7.544           0.477           0.091           0.493           0.192
               7.626           0.501           0.091           0.499           0.650
               7.770           0.514           0.137           0.486           0.664
               7.914           0.504           0.137           0.496           0.653
               8.057           0.493           0.137           0.507           0.641
               8.201           0.481           0.137           0.519           0.629
               8.345           0.468           0.137           0.532           0.615
               8.489           0.454           0.137           0.546           0.599
               8.632           0.440           0.137           0.560           0.583
               8.776           0.424           0.137           0.576           0.564
               8.920           0.406           0.137           0.594           0.544
               9.064           0.387           0.137           0.613           0.521
               9.208           0.367           0.137           0.633           0.496
               9.351           0.344           0.137           0.656           0.467
               9.495           0.320           0.137           0.680           0.436
               9.639           0.294           0.137           0.706           0.401
               9.783           0.266           0.137           0.734           0.363
               9.926           0.236           0.137           0.764           0.321
              10.070           0.206           0.137           0.794           0.278
              10.214           0.176           0.137           0.824           0.235
              10.358           0.151           0.137           0.849           0.198
              10.501           0.137           0.137           0.863           0.177
              10.501           0.137           0.137           0.863           0.177
              10.501           0.137           0.137           0.863           0.177
              10.501           0.137           0.137           0.863           0.177
              10.501           0.137           0.137           0.863           0.177
              10.501           0.137           0.137           0.863           0.177
              10.501           0.137           0.137           0.863           0.177
              10.501           0.137           0.137           0.863           0.177
              10.501           0.137           0.137           0.863           0.177
              10.501           0.137           0.137           0.863           0.177
              10.501           0.137           0.137           0.863           0.177
              10.501           0.137           0.137           0.863           0.177
              10.501           0.137           0.137           0.863           0.177
```

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              10.501          0.137          0.137          0.863          0.177
              10.501          0.137          0.137          0.863          0.177
              10.501          0.137          0.137          0.863          0.177
              10.501          0.137          0.137          0.863          0.177
              10.501          0.137          0.137          0.863          0.177
              10.501          0.137          0.137          0.863          0.177
              10.501          0.137          0.137          0.863          0.177
              10.501          0.137          0.137          0.863          0.177
              10.501          0.137          0.137          0.863          0.177
              10.501          0.137          0.137          0.863          0.177
              10.501          0.137          0.137          0.863          0.177
              10.501          0.137          0.137          0.863          0.177
              10.501          0.137          0.137          0.863          0.177
              10.501          0.137          0.137          0.863          0.177
              10.501          0.137          0.137          0.863          0.177
              10.501          0.137          0.137          0.863          0.177
              10.501          0.137          0.137          0.863          0.177
              10.501          0.137          0.137          0.863          0.177
              10.501          0.137          0.137          0.863          0.177
              10.501          0.137          0.137          0.863          0.177
              10.501          0.137          0.137          0.863          0.177
              10.501          0.137          0.137          0.863          0.177
              10.501          0.137          0.137          0.863          0.177
              10.501          0.137          0.137          0.863          0.177
              10.501          0.137          0.137          0.863          0.177
              10.501          0.137          0.137          0.863          0.177
              10.501          0.137          0.137          0.863          0.177
              10.501          0.137          0.137          0.863          0.177
-----------------------------------------------------------------


 6. LNAPL specific volume and hydraulic conductivity
-----------------------------------------------------------------
             bn [ft]        Dn [ft]        Rn [ft]     Tn [ft2/d]
-----------------------------------------------------------------
               0.000          0.000          0.000          0.000
               0.115          0.010          0.000          0.000
               0.230          0.021          0.002          0.000
               0.345          0.034          0.006          0.001
               0.460          0.049          0.012          0.001
               0.575          0.066          0.019          0.001
               0.690          0.084          0.028          0.001
               0.805          0.104          0.039          0.002
               0.920          0.126          0.051          0.002
               1.035          0.148          0.064          0.002
               1.150          0.172          0.079          0.003
               1.265          0.196          0.094          0.003
               1.380          0.223          0.110          0.004
               1.495          0.249          0.127          0.004
               1.610          0.275          0.146          0.004
               1.725          0.304          0.164          0.005
               1.840          0.332          0.183          0.005
               1.955          0.362          0.203          0.006
               2.070          0.390          0.224          0.006
               2.185          0.420          0.244          0.007
               2.300          0.452          0.265          0.007
               2.415          0.482          0.287          0.008
               2.530          0.514          0.309          0.008
               2.645          0.545          0.332          0.009
               2.760          0.579          0.354          0.010
               2.875          0.610          0.378          0.010
-----------------------------------------------------------------
```

7. Data for curve-fitting segments

bn[ft]	Rn[ft]	Tn[ft2/d]	chi[ft]	beta	xi[ft]	eta
0.00000	0.00000	0.00000				
1.03500	0.06446	0.00237	0.00000	0.06228	0.00000	0.00229
1.61000	0.14565	0.00446	0.57846	0.14120	0.38410	0.00364
2.87500	0.37829	0.01007	0.81801	0.18390	0.60494	0.00444

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 1. OPTIONS.

 * Units              =   1              (1: English Units, 2: SI Units)

 * Soil Heterogeneity =   1              ( Number of Layers: 1, 2 or 3)

 * Elevation          =   2              (1: Elevation above datum, 2: depth BGS)

 * FPR System Used    =   0              (1: well,  2: trench,  0: Not used)

 * Smear Correction   =   1              (0: no adjustment, 1: smear correction)

 * LNAPL Residual     =   2              (1: Variable in Layer, 2: Constant for
Layer)


 2. INPUT PARAMETERS.

 2.1 BASIC INPUT PARAMETERS.
 Monitor. Well LNAPL thickness[ft]=          1.570
 Ground Surface Depth [ft]        =          0.000
 Groundwater Table Depth [ft]     =          8.000
 Water Vertical Gradient(+up)     =          0.000
 LNAPL Density [g/cm3]            =          0.870
 LNAPL Viscosity [cp]             =        102.000
 Water Surface Tension [dyne/cm]  =         65.000
 LNAPL Surface Tension [dyne/cm]  =         21.400
 LNAPL/Water Interfacial Tension  =          8.800
 Residual-f (vadose)              =          0.200
 Residual-f (saturated)           =          0.300

 2.1.1 SOIL PROPERTIES OF LAYER 1
 Relative permeability model      =              1     (Mualem)
 Soil porosity                    =          0.430
 Hydraulic conductivity [ft/d]    =          0.820
 van Genuchten "N"                =          1.560
 van Genuchten "Alpha" [ft-1]     =          1.100
 Swr1                             =          0.078
 Snrv1                            =          0.063
 Snrs1                            =          0.094


 4. Calculated Parameters

-------------------------------------------------
 Air-LNAPL interface [ft]         =          7.796
 LNAPL-Water interface [ft]       =          9.366
 Max. Free-Product elevation [ft] =          6.900
-------------------------------------------------

-------------------------------------------------
 Parameter                        :         Soil 1
-------------------------------------------------
 van Genuchten "M"                :          0.359
```

```
 Air/LNAPL "alpha"  [ft-1]       :          2.907
 LNAPL/water "alpha" [ft-1]      :          1.056
--------------------------------------------------


 5. LNAPL and Water saturation data.

--------------------------------------------------------------------------------
      BGS Depth [ft]              Sn             Snr              Sw             krn
--------------------------------------------------------------------------------
               6.900           0.063           0.063           0.545           0.000
               6.945           0.070           0.063           0.549           0.000
               6.989           0.078           0.063           0.553           0.000
               7.034           0.086           0.063           0.557           0.000
               7.079           0.095           0.063           0.562           0.000
               7.124           0.105           0.063           0.566           0.000
               7.169           0.116           0.063           0.570           0.001
               7.213           0.128           0.063           0.575           0.001
               7.258           0.140           0.063           0.579           0.002
               7.303           0.154           0.063           0.584           0.002
               7.348           0.170           0.063           0.589           0.004
               7.393           0.186           0.063           0.594           0.005
               7.437           0.204           0.063           0.599           0.008
               7.482           0.224           0.063           0.604           0.012
               7.527           0.245           0.063           0.609           0.019
               7.572           0.267           0.063           0.615           0.029
               7.617           0.290           0.063           0.620           0.045
               7.661           0.313           0.063           0.626           0.073
               7.706           0.333           0.063           0.632           0.119
               7.751           0.350           0.063           0.638           0.204
               7.796           0.356           0.063           0.644           0.482
               7.874           0.366           0.094           0.634           0.495
               7.953           0.355           0.094           0.645           0.481
               8.031           0.343           0.094           0.657           0.466
               8.110           0.331           0.094           0.669           0.450
               8.188           0.318           0.094           0.682           0.433
               8.267           0.305           0.094           0.695           0.415
               8.345           0.291           0.094           0.709           0.396
               8.424           0.276           0.094           0.724           0.376
               8.502           0.261           0.094           0.739           0.355
               8.581           0.245           0.094           0.755           0.333
               8.659           0.228           0.094           0.772           0.310
               8.738           0.211           0.094           0.789           0.285
               8.816           0.194           0.094           0.806           0.261
               8.895           0.176           0.094           0.824           0.235
               8.973           0.159           0.094           0.841           0.210
               9.052           0.142           0.094           0.858           0.185
               9.130           0.126           0.094           0.874           0.162
               9.209           0.112           0.094           0.888           0.142
               9.287           0.100           0.094           0.900           0.125
               9.366           0.094           0.094           0.906           0.117
               9.366           0.094           0.094           0.906           0.117
               9.366           0.094           0.094           0.906           0.117
               9.366           0.094           0.094           0.906           0.117
               9.366           0.094           0.094           0.906           0.117
               9.366           0.094           0.094           0.906           0.117
               9.366           0.094           0.094           0.906           0.117
               9.366           0.094           0.094           0.906           0.117
               9.366           0.094           0.094           0.906           0.117
               9.366           0.094           0.094           0.906           0.117
               9.366           0.094           0.094           0.906           0.117
               9.366           0.094           0.094           0.906           0.117
               9.366           0.094           0.094           0.906           0.117
```

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               9.366          0.094          0.094          0.906          0.117
               9.366          0.094          0.094          0.906          0.117
               9.366          0.094          0.094          0.906          0.117
               9.366          0.094          0.094          0.906          0.117
               9.366          0.094          0.094          0.906          0.117
               9.366          0.094          0.094          0.906          0.117
               9.366          0.094          0.094          0.906          0.117
               9.366          0.094          0.094          0.906          0.117
               9.366          0.094          0.094          0.906          0.117
               9.366          0.094          0.094          0.906          0.117
               9.366          0.094          0.094          0.906          0.117
               9.366          0.094          0.094          0.906          0.117
               9.366          0.094          0.094          0.906          0.117
               9.366          0.094          0.094          0.906          0.117
               9.366          0.094          0.094          0.906          0.117
               9.366          0.094          0.094          0.906          0.117
               9.366          0.094          0.094          0.906          0.117
               9.366          0.094          0.094          0.906          0.117
               9.366          0.094          0.094          0.906          0.117
               9.366          0.094          0.094          0.906          0.117
               9.366          0.094          0.094          0.906          0.117
               9.366          0.094          0.094          0.906          0.117
               9.366          0.094          0.094          0.906          0.117
               9.366          0.094          0.094          0.906          0.117
               9.366          0.094          0.094          0.906          0.117
               9.366          0.094          0.094          0.906          0.117
               9.366          0.094          0.094          0.906          0.117
               9.366          0.094          0.094          0.906          0.117
-----------------------------------------------------------------


 6. LNAPL specific volume and hydraulic conductivity
-----------------------------------------------------------------
             bn [ft]        Dn [ft]        Rn [ft]     Tn [ft2/d]
-----------------------------------------------------------------
               0.000          0.000          0.000          0.000
               0.063          0.004          0.000          0.000
               0.126          0.008          0.001          0.000
               0.188          0.012          0.001          0.000
               0.251          0.017          0.003          0.000
               0.314          0.023          0.005          0.000
               0.377          0.029          0.008          0.000
               0.440          0.036          0.011          0.001
               0.502          0.043          0.015          0.001
               0.565          0.051          0.019          0.001
               0.628          0.060          0.024          0.001
               0.691          0.068          0.030          0.001
               0.754          0.078          0.036          0.001
               0.816          0.088          0.042          0.001
               0.879          0.098          0.049          0.002
               0.942          0.109          0.056          0.002
               1.005          0.120          0.063          0.002
               1.068          0.131          0.072          0.002
               1.130          0.143          0.080          0.002
               1.193          0.155          0.088          0.002
               1.256          0.167          0.097          0.003
               1.319          0.180          0.106          0.003
               1.382          0.193          0.116          0.003
               1.444          0.207          0.125          0.003
               1.507          0.220          0.136          0.004
               1.570          0.233          0.146          0.004
-----------------------------------------------------------------
```

7. Data for curve-fitting segments

bn[ft]	Rn[ft]	Tn[ft2/d]	chi[ft]	beta	xi[ft]	eta
0.00000	0.00000	0.00000				
0.81640	0.04202	0.00136	0.00000	0.05146	0.00000	0.00167
1.25600	0.09731	0.00266	0.48236	0.12578	0.35527	0.00295
1.57000	0.14579	0.00376	0.62586	0.15442	0.49697	0.00351

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 1. OPTIONS.

 * Units              =   1              (1: English Units, 2: SI Units)

 * Soil Heterogeneity =   1              ( Number of Layers: 1, 2 or 3)

 * Elevation          =   2              (1: Elevation above datum, 2: depth BGS)

 * FPR System Used    =   0              (1: well,  2: trench,  0: Not used)

 * Smear Correction   =   1              (0: no adjustment, 1: smear correction)

 * LNAPL Residual     =   2              (1: Variable in Layer, 2: Constant for
Layer)


 2. INPUT PARAMETERS.

 2.1 BASIC INPUT PARAMETERS.
 Monitor. Well LNAPL thickness[ft]=          0.283
 Ground Surface Depth [ft]        =          0.000
 Groundwater Table Depth [ft]     =          8.000
 Water Vertical Gradient(+up)     =          0.000
 LNAPL Density [g/cm3]            =          0.870
 LNAPL Viscosity [cp]             =        102.000
 Water Surface Tension [dyne/cm]  =         65.000
 LNAPL Surface Tension [dyne/cm]  =         21.400
 LNAPL/Water Interfacial Tension  =          8.800
 Residual-f (vadose)              =          0.200
 Residual-f (saturated)           =          0.300

 2.1.1 SOIL PROPERTIES OF LAYER 1
 Relative permeability model      =              1     (Mualem)
 Soil porosity                    =          0.430
 Hydraulic conductivity [ft/d]    =          0.820
 van Genuchten "N"                =          1.560
 van Genuchten "Alpha" [ft-1]     =          1.100
 Swr1                             =          0.078
 Snrv1                            =          0.009
 Snrs1                            =          0.014


 4. Calculated Parameters

-------------------------------------------------
 Air-LNAPL interface [ft]         =          7.963
 LNAPL-Water interface [ft]       =          8.246
 Max. Free-Product elevation [ft] =          7.802
-------------------------------------------------

-------------------------------------------------
 Parameter                        :         Soil 1
-------------------------------------------------
 van Genuchten "M"                :          0.359
```

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 Air/LNAPL "alpha"  [ft-1]       :          2.907
 LNAPL/water "alpha" [ft-1]      :          1.056
--------------------------------------------------


 5. LNAPL and Water saturation data.

--------------------------------------------------------------------------------
      BGS Depth [ft]             Sn             Snr              Sw             krn
--------------------------------------------------------------------------------
               7.802          0.009           0.009           0.907           0.000
               7.810          0.013           0.009           0.909           0.000
               7.818          0.016           0.009           0.911           0.000
               7.826          0.020           0.009           0.913           0.000
               7.834          0.023           0.009           0.915           0.001
               7.842          0.026           0.009           0.917           0.001
               7.850          0.030           0.009           0.919           0.001
               7.858          0.033           0.009           0.921           0.002
               7.866          0.036           0.009           0.923           0.002
               7.874          0.039           0.009           0.925           0.003
               7.882          0.041           0.009           0.927           0.004
               7.891          0.044           0.009           0.929           0.005
               7.899          0.047           0.009           0.930           0.007
               7.907          0.049           0.009           0.932           0.008
               7.915          0.051           0.009           0.934           0.011
               7.923          0.053           0.009           0.936           0.014
               7.931          0.054           0.009           0.938           0.017
               7.939          0.055           0.009           0.940           0.022
               7.947          0.055           0.009           0.942           0.028
               7.955          0.055           0.009           0.944           0.037
               7.963          0.059           0.014           0.941           0.068
               7.977          0.056           0.014           0.944           0.063
               7.992          0.053           0.014           0.947           0.059
               8.006          0.050           0.014           0.950           0.055
               8.020          0.047           0.014           0.953           0.051
               8.034          0.044           0.014           0.956           0.047
               8.048          0.041           0.014           0.959           0.044
               8.062          0.038           0.014           0.962           0.040
               8.076          0.035           0.014           0.965           0.037
               8.091          0.033           0.014           0.967           0.034
               8.105          0.030           0.014           0.970           0.031
               8.119          0.028           0.014           0.972           0.028
               8.133          0.026           0.014           0.974           0.025
               8.147          0.023           0.014           0.977           0.023
               8.161          0.021           0.014           0.979           0.020
               8.175          0.020           0.014           0.980           0.018
               8.190          0.018           0.014           0.982           0.016
               8.204          0.017           0.014           0.983           0.015
               8.218          0.015           0.014           0.985           0.014
               8.232          0.014           0.014           0.986           0.013
               8.246          0.014           0.014           0.986           0.012
               8.246          0.014           0.014           0.986           0.012
               8.246          0.014           0.014           0.986           0.012
               8.246          0.014           0.014           0.986           0.012
               8.246          0.014           0.014           0.986           0.012
               8.246          0.014           0.014           0.986           0.012
               8.246          0.014           0.014           0.986           0.012
               8.246          0.014           0.014           0.986           0.012
               8.246          0.014           0.014           0.986           0.012
               8.246          0.014           0.014           0.986           0.012
               8.246          0.014           0.014           0.986           0.012
               8.246          0.014           0.014           0.986           0.012
               8.246          0.014           0.014           0.986           0.012
```

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            8.246          0.014          0.014          0.986          0.012
            8.246          0.014          0.014          0.986          0.012
            8.246          0.014          0.014          0.986          0.012
            8.246          0.014          0.014          0.986          0.012
            8.246          0.014          0.014          0.986          0.012
            8.246          0.014          0.014          0.986          0.012
            8.246          0.014          0.014          0.986          0.012
            8.246          0.014          0.014          0.986          0.012
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            8.246          0.014          0.014          0.986          0.012
            8.246          0.014          0.014          0.986          0.012
            8.246          0.014          0.014          0.986          0.012
            8.246          0.014          0.014          0.986          0.012
            8.246          0.014          0.014          0.986          0.012
            8.246          0.014          0.014          0.986          0.012
            8.246          0.014          0.014          0.986          0.012
            8.246          0.014          0.014          0.986          0.012
            8.246          0.014          0.014          0.986          0.012
            8.246          0.014          0.014          0.986          0.012
            8.246          0.014          0.014          0.986          0.012
            8.246          0.014          0.014          0.986          0.012
            8.246          0.014          0.014          0.986          0.012
-----------------------------------------------------------------


 6. LNAPL specific volume and hydraulic conductivity
-----------------------------------------------------------------
          bn [ft]        Dn [ft]        Rn [ft]    Tn [ft2/d]
-----------------------------------------------------------------
            0.000          0.000          0.000          0.000
            0.011          0.000          0.000          0.000
            0.023          0.000          0.000          0.000
            0.034          0.000          0.000          0.000
            0.045          0.000          0.000          0.000
            0.057          0.001          0.000          0.000
            0.068          0.001          0.000          0.000
            0.079          0.001          0.000          0.000
            0.091          0.001          0.000          0.000
            0.102          0.001          0.000          0.000
            0.113          0.001          0.000          0.000
            0.125          0.002          0.001          0.000
            0.136          0.002          0.001          0.000
            0.147          0.002          0.001          0.000
            0.158          0.002          0.001          0.000
            0.170          0.003          0.001          0.000
            0.181          0.003          0.001          0.000
            0.192          0.003          0.002          0.000
            0.204          0.004          0.002          0.000
            0.215          0.004          0.002          0.000
            0.226          0.004          0.002          0.000
            0.238          0.005          0.003          0.000
            0.249          0.005          0.003          0.000
            0.260          0.006          0.003          0.000
            0.272          0.006          0.004          0.000
            0.283          0.007          0.004          0.000
-----------------------------------------------------------------
```

7. Data for curve-fitting segments

bn[ft]	Rn[ft]	Tn[ft2/d]	chi[ft]	beta	xi[ft]	eta
0.00000	0.00000	0.00000				
0.19244	0.00166	0.00004	0.00000	0.00865	0.00000	0.00019
0.23772	0.00279	0.00005	0.12549	0.02486	0.09957	0.00039
0.28300	0.00425	0.00008	0.15099	0.03217	0.13046	0.00051

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 1. OPTIONS.

 * Units              =   1              (1: English Units, 2: SI Units)

 * Soil Heterogeneity =   1              ( Number of Layers: 1, 2 or 3)

 * Elevation          =   2              (1: Elevation above datum, 2: depth BGS)

 * FPR System Used    =   0              (1: well,  2: trench,  0: Not used)

 * Smear Correction   =   1              (0: no adjustment, 1: smear correction)

 * LNAPL Residual     =   2              (1: Variable in Layer, 2: Constant for
Layer)


 2. INPUT PARAMETERS.

 2.1 BASIC INPUT PARAMETERS.
 Monitor. Well LNAPL thickness[ft]=          2.220
 Ground Surface Depth [ft]        =          0.000
 Groundwater Table Depth [ft]     =          8.000
 Water Vertical Gradient(+up)     =          0.000
 LNAPL Density [g/cm3]            =          0.870
 LNAPL Viscosity [cp]             =        102.000
 Water Surface Tension [dyne/cm]  =         65.000
 LNAPL Surface Tension [dyne/cm]  =         21.400
 LNAPL/Water Interfacial Tension  =          8.800
 Residual-f (vadose)              =          0.200
 Residual-f (saturated)           =          0.300

 2.1.1 SOIL PROPERTIES OF LAYER 1
 Relative permeability model      =              1     (Mualem)
 Soil porosity                    =          0.430
 Hydraulic conductivity [ft/d]    =          0.820
 van Genuchten "N"                =          1.560
 van Genuchten "Alpha" [ft-1]     =          1.100
 Swr1                             =          0.078
 Snrv1                            =          0.079
 Snrs1                            =          0.119


 4. Calculated Parameters

-------------------------------------------------
 Air-LNAPL interface [ft]         =          7.711
 LNAPL-Water interface [ft]       =          9.931
 Max. Free-Product elevation [ft] =          6.444
-------------------------------------------------

-------------------------------------------------
 Parameter                        :         Soil 1
-------------------------------------------------
 van Genuchten "M"                :          0.359
```

```
 Air/LNAPL "alpha"  [ft-1]       :          2.907
 LNAPL/water "alpha" [ft-1]      :          1.056
--------------------------------------------------


 5. LNAPL and Water saturation data.

--------------------------------------------------------------------------------
      BGS Depth [ft]              Sn              Snr               Sw              krn
--------------------------------------------------------------------------------
               6.444           0.079           0.079            0.467            0.000
               6.508           0.086           0.079            0.470            0.000
               6.571           0.093           0.079            0.474            0.000
               6.634           0.100           0.079            0.477            0.000
               6.698           0.109           0.079            0.481            0.000
               6.761           0.118           0.079            0.485            0.000
               6.824           0.129           0.079            0.489            0.000
               6.888           0.140           0.079            0.493            0.001
               6.951           0.153           0.079            0.497            0.001
               7.014           0.167           0.079            0.502            0.001
               7.078           0.183           0.079            0.506            0.002
               7.141           0.201           0.079            0.511            0.003
               7.205           0.222           0.079            0.516            0.005
               7.268           0.245           0.079            0.520            0.007
               7.331           0.270           0.079            0.525            0.012
               7.395           0.299           0.079            0.531            0.019
               7.458           0.330           0.079            0.536            0.032
               7.521           0.364           0.079            0.541            0.057
               7.585           0.397           0.079            0.547            0.105
               7.648           0.427           0.079            0.553            0.206
               7.711           0.464           0.119            0.536            0.610
               7.822           0.453           0.119            0.547            0.598
               7.933           0.442           0.119            0.558            0.586
               8.044           0.431           0.119            0.569            0.573
               8.155           0.418           0.119            0.582            0.558
               8.266           0.405           0.119            0.595            0.542
               8.377           0.391           0.119            0.609            0.526
               8.488           0.376           0.119            0.624            0.507
               8.599           0.360           0.119            0.640            0.487
               8.710           0.343           0.119            0.657            0.465
               8.821           0.325           0.119            0.675            0.442
               8.932           0.305           0.119            0.695            0.416
               9.043           0.285           0.119            0.715            0.388
               9.154           0.263           0.119            0.737            0.359
               9.265           0.240           0.119            0.760            0.327
               9.376           0.216           0.119            0.784            0.293
               9.487           0.192           0.119            0.808            0.259
               9.598           0.169           0.119            0.831            0.224
               9.709           0.147           0.119            0.853            0.193
               9.820           0.129           0.119            0.871            0.166
               9.931           0.119           0.119            0.881            0.152
               9.931           0.119           0.119            0.881            0.152
               9.931           0.119           0.119            0.881            0.152
               9.931           0.119           0.119            0.881            0.152
               9.931           0.119           0.119            0.881            0.152
               9.931           0.119           0.119            0.881            0.152
               9.931           0.119           0.119            0.881            0.152
               9.931           0.119           0.119            0.881            0.152
               9.931           0.119           0.119            0.881            0.152
               9.931           0.119           0.119            0.881            0.152
               9.931           0.119           0.119            0.881            0.152
               9.931           0.119           0.119            0.881            0.152
               9.931           0.119           0.119            0.881            0.152
```

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               9.931          0.119          0.119          0.881          0.152
               9.931          0.119          0.119          0.881          0.152
               9.931          0.119          0.119          0.881          0.152
               9.931          0.119          0.119          0.881          0.152
               9.931          0.119          0.119          0.881          0.152
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               9.931          0.119          0.119          0.881          0.152
               9.931          0.119          0.119          0.881          0.152
               9.931          0.119          0.119          0.881          0.152
               9.931          0.119          0.119          0.881          0.152
               9.931          0.119          0.119          0.881          0.152
               9.931          0.119          0.119          0.881          0.152
               9.931          0.119          0.119          0.881          0.152
               9.931          0.119          0.119          0.881          0.152
               9.931          0.119          0.119          0.881          0.152
               9.931          0.119          0.119          0.881          0.152
               9.931          0.119          0.119          0.881          0.152
               9.931          0.119          0.119          0.881          0.152
               9.931          0.119          0.119          0.881          0.152
               9.931          0.119          0.119          0.881          0.152
-----------------------------------------------------------------


 6. LNAPL specific volume and hydraulic conductivity
-----------------------------------------------------------------
             bn [ft]        Dn [ft]        Rn [ft]     Tn [ft2/d]
-----------------------------------------------------------------
               0.000          0.000          0.000          0.000
               0.089          0.006          0.000          0.000
               0.178          0.014          0.001          0.000
               0.266          0.022          0.003          0.000
               0.355          0.032          0.007          0.001
               0.444          0.042          0.011          0.001
               0.533          0.054          0.016          0.001
               0.622          0.067          0.023          0.001
               0.710          0.081          0.031          0.001
               0.799          0.095          0.039          0.002
               0.888          0.111          0.048          0.002
               0.977          0.127          0.059          0.002
               1.066          0.145          0.069          0.002
               1.154          0.162          0.081          0.003
               1.243          0.181          0.093          0.003
               1.332          0.199          0.106          0.003
               1.421          0.219          0.119          0.004
               1.510          0.238          0.133          0.004
               1.598          0.259          0.146          0.004
               1.687          0.279          0.161          0.005
               1.776          0.301          0.176          0.005
               1.865          0.322          0.191          0.005
               1.954          0.345          0.206          0.006
               2.042          0.366          0.223          0.006
               2.131          0.389          0.239          0.006
               2.220          0.412          0.255          0.007
-----------------------------------------------------------------
```

7. Data for curve-fitting segments

bn[ft]	Rn[ft]	Tn[ft2/d]	chi[ft]	beta	xi[ft]	eta
0.00000	0.00000	0.00000				
1.50960	0.13251	0.00385	0.00000	0.08778	0.00000	0.00255
1.86480	0.19135	0.00525	0.70970	0.16566	0.53397	0.00394
2.22000	0.25519	0.00677	0.80013	0.17973	0.64138	0.00429

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 1. OPTIONS.

 * Units              =   1              (1: English Units, 2: SI Units)

 * Soil Heterogeneity =   1              ( Number of Layers: 1, 2 or 3)

 * Elevation          =   2              (1: Elevation above datum, 2: depth BGS)

 * FPR System Used    =   0              (1: well,  2: trench,  0: Not used)

 * Smear Correction   =   1              (0: no adjustment, 1: smear correction)

 * LNAPL Residual     =   2              (1: Variable in Layer, 2: Constant for
Layer)


 2. INPUT PARAMETERS.

 2.1 BASIC INPUT PARAMETERS.
 Monitor. Well LNAPL thickness[ft]=          0.001
 Ground Surface Depth [ft]        =          0.000
 Groundwater Table Depth [ft]     =          8.000
 Water Vertical Gradient(+up)     =          0.000
 LNAPL Density [g/cm3]            =          0.870
 LNAPL Viscosity [cp]             =        102.000
 Water Surface Tension [dyne/cm]  =         65.000
 LNAPL Surface Tension [dyne/cm]  =         21.400
 LNAPL/Water Interfacial Tension  =          8.800
 Residual-f (vadose)              =          0.200
 Residual-f (saturated)           =          0.300

 2.1.1 SOIL PROPERTIES OF LAYER 1
 Relative permeability model      =              1     (Mualem)
 Soil porosity                    =          0.430
 Hydraulic conductivity [ft/d]    =          0.820
 van Genuchten "N"                =          1.560
 van Genuchten "Alpha" [ft-1]     =          1.100
 Swr1                             =          0.078
 Snrv1                            =          0.000
 Snrs1                            =          0.000


 4. Calculated Parameters

-------------------------------------------------
 Air-LNAPL interface [ft]         =          8.000
 LNAPL-Water interface [ft]       =          8.001
 Max. Free-Product elevation [ft] =          7.999
-------------------------------------------------

-------------------------------------------------
 Parameter                        :         Soil 1
-------------------------------------------------
 van Genuchten "M"                :          0.359
```

Air/LNAPL "alpha" [ft-1]	:	2.907
LNAPL/water "alpha" [ft-1]	:	1.056

5. LNAPL and Water saturation data.

BGS Depth [ft]	Sn	Snr	Sw	krn
7.999	0.000	0.000	1.000	0.000
7.999	0.000	0.000	1.000	0.000
7.999	0.000	0.000	1.000	0.000
7.999	0.000	0.000	1.000	0.000
7.999	0.000	0.000	1.000	0.000
7.999	0.000	0.000	1.000	0.000
7.999	0.000	0.000	1.000	0.000
7.999	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.000	0.000	0.000	1.000	0.000
8.001	0.000	0.000	1.000	0.000
8.001	0.000	0.000	1.000	0.000
8.001	0.000	0.000	1.000	0.000
8.001	0.000	0.000	1.000	0.000
8.001	0.000	0.000	1.000	0.000
8.001	0.000	0.000	1.000	0.000
8.001	0.000	0.000	1.000	0.000
8.001	0.000	0.000	1.000	0.000
8.001	0.000	0.000	1.000	0.000
8.001	0.000	0.000	1.000	0.000
8.001	0.000	0.000	1.000	0.000
8.001	0.000	0.000	1.000	0.000
8.001	0.000	0.000	1.000	0.000
8.001	0.000	0.000	1.000	0.000
8.001	0.000	0.000	1.000	0.000
8.001	0.000	0.000	1.000	0.000
8.001	0.000	0.000	1.000	0.000
8.001	0.000	0.000	1.000	0.000
8.001	0.000	0.000	1.000	0.000
8.001	0.000	0.000	1.000	0.000

```
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
               8.001          0.000          0.000          1.000          0.000
-----------------------------------------------------------------


 6. LNAPL specific volume and hydraulic conductivity
-----------------------------------------------------------------
             bn [ft]        Dn [ft]        Rn [ft]     Tn [ft2/d]
-----------------------------------------------------------------
               0.000          0.000          0.000          0.000
               0.000          0.000          0.000          0.000
               0.000          0.000          0.000          0.000
               0.000          0.000          0.000          0.000
               0.000          0.000          0.000          0.000
               0.000          0.000          0.000          0.000
               0.000          0.000          0.000          0.000
               0.000          0.000          0.000          0.000
               0.000          0.000          0.000          0.000
               0.000          0.000          0.000          0.000
               0.000          0.000          0.000          0.000
               0.000          0.000          0.000          0.000
               0.000          0.000          0.000          0.000
               0.001          0.000          0.000          0.000
               0.001          0.000          0.000          0.000
               0.001          0.000          0.000          0.000
               0.001          0.000          0.000          0.000
               0.001          0.000          0.000          0.000
               0.001          0.000          0.000          0.000
               0.001          0.000          0.000          0.000
               0.001          0.000          0.000          0.000
               0.001          0.000          0.000          0.000
               0.001          0.000          0.000          0.000
               0.001          0.000          0.000          0.000
               0.001          0.000          0.000          0.000
               0.001          0.000          0.000          0.000
-----------------------------------------------------------------
```

7. Data for curve-fitting segments

bn[ft]	Rn[ft]	Tn[ft2/d]	chi[ft]	beta	xi[ft]	eta
0.00000	0.00000	0.00000				
0.00044	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
0.00060	0.00000	0.00000	0.00031	0.00000	0.00020	0.00000
0.00100	0.00000	0.00000	0.00045	0.00000	0.00037	0.00000

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 1. OPTIONS.

 * Units              =   1              (1: English Units, 2: SI Units)

 * Soil Heterogeneity =   1              ( Number of Layers: 1, 2 or 3)

 * Elevation          =   2              (1: Elevation above datum, 2: depth BGS)

 * FPR System Used    =   0              (1: well,  2: trench,  0: Not used)

 * Smear Correction   =   1              (0: no adjustment, 1: smear correction)

 * LNAPL Residual     =   2              (1: Variable in Layer, 2: Constant for
Layer)


 2. INPUT PARAMETERS.

 2.1 BASIC INPUT PARAMETERS.
 Monitor. Well LNAPL thickness[ft]=          1.700
 Ground Surface Depth [ft]        =          0.000
 Groundwater Table Depth [ft]     =          8.000
 Water Vertical Gradient(+up)     =          0.000
 LNAPL Density [g/cm3]            =          0.870
 LNAPL Viscosity [cp]             =        102.000
 Water Surface Tension [dyne/cm]  =         65.000
 LNAPL Surface Tension [dyne/cm]  =         21.400
 LNAPL/Water Interfacial Tension  =          8.800
 Residual-f (vadose)              =          0.200
 Residual-f (saturated)           =          0.300

 2.1.1 SOIL PROPERTIES OF LAYER 1
 Relative permeability model      =              1     (Mualem)
 Soil porosity                    =          0.430
 Hydraulic conductivity [ft/d]    =          0.820
 van Genuchten "N"                =          1.560
 van Genuchten "Alpha" [ft-1]     =          1.100
 Swr1                             =          0.078
 Snrv1                            =          0.067
 Snrs1                            =          0.100


 4. Calculated Parameters

-------------------------------------------------
 Air-LNAPL interface [ft]         =          7.779
 LNAPL-Water interface [ft]       =          9.479
 Max. Free-Product elevation [ft] =          6.809
-------------------------------------------------

-------------------------------------------------
 Parameter                        :         Soil 1
-------------------------------------------------
 van Genuchten "M"                :          0.359
```

```
 Air/LNAPL "alpha"  [ft-1]        :          2.907
 LNAPL/water "alpha" [ft-1]       :          1.056
--------------------------------------------------


 5. LNAPL and Water saturation data.

--------------------------------------------------------------------------------
      BGS Depth [ft]             Sn            Snr             Sw            krn
--------------------------------------------------------------------------------
               6.809          0.067          0.067          0.526          0.000
               6.857          0.074          0.067          0.530          0.000
               6.906          0.081          0.067          0.534          0.000
               6.954          0.089          0.067          0.538          0.000
               7.003          0.098          0.067          0.542          0.000
               7.051          0.108          0.067          0.547          0.000
               7.100          0.119          0.067          0.551          0.001
               7.148          0.131          0.067          0.555          0.001
               7.197          0.144          0.067          0.560          0.001
               7.245          0.158          0.067          0.564          0.002
               7.294          0.173          0.067          0.569          0.003
               7.342          0.191          0.067          0.574          0.005
               7.391          0.209          0.067          0.579          0.007
               7.439          0.230          0.067          0.584          0.011
               7.488          0.252          0.067          0.589          0.017
               7.536          0.276          0.067          0.595          0.027
               7.585          0.301          0.067          0.600          0.043
               7.633          0.326          0.067          0.606          0.070
               7.682          0.349          0.067          0.612          0.117
               7.730          0.368          0.067          0.618          0.207
               7.779          0.376          0.067          0.624          0.507
               7.864          0.387          0.100          0.613          0.520
               7.949          0.375          0.100          0.625          0.506
               8.034          0.363          0.100          0.637          0.492
               8.119          0.351          0.100          0.649          0.476
               8.204          0.338          0.100          0.662          0.459
               8.289          0.324          0.100          0.676          0.441
               8.374          0.310          0.100          0.690          0.422
               8.459          0.295          0.100          0.705          0.402
               8.544          0.279          0.100          0.721          0.380
               8.629          0.262          0.100          0.738          0.358
               8.714          0.245          0.100          0.755          0.334
               8.799          0.227          0.100          0.773          0.308
               8.884          0.209          0.100          0.791          0.282
               8.969          0.190          0.100          0.810          0.255
               9.054          0.171          0.100          0.829          0.228
               9.139          0.153          0.100          0.847          0.201
               9.224          0.135          0.100          0.865          0.175
               9.309          0.119          0.100          0.881          0.153
               9.394          0.107          0.100          0.893          0.134
               9.479          0.100          0.100          0.900          0.125
               9.479          0.100          0.100          0.900          0.125
               9.479          0.100          0.100          0.900          0.125
               9.479          0.100          0.100          0.900          0.125
               9.479          0.100          0.100          0.900          0.125
               9.479          0.100          0.100          0.900          0.125
               9.479          0.100          0.100          0.900          0.125
               9.479          0.100          0.100          0.900          0.125
               9.479          0.100          0.100          0.900          0.125
               9.479          0.100          0.100          0.900          0.125
               9.479          0.100          0.100          0.900          0.125
               9.479          0.100          0.100          0.900          0.125
               9.479          0.100          0.100          0.900          0.125
```

```
               9.479          0.100          0.100          0.900          0.125
               9.479          0.100          0.100          0.900          0.125
               9.479          0.100          0.100          0.900          0.125
               9.479          0.100          0.100          0.900          0.125
               9.479          0.100          0.100          0.900          0.125
               9.479          0.100          0.100          0.900          0.125
               9.479          0.100          0.100          0.900          0.125
               9.479          0.100          0.100          0.900          0.125
               9.479          0.100          0.100          0.900          0.125
               9.479          0.100          0.100          0.900          0.125
               9.479          0.100          0.100          0.900          0.125
               9.479          0.100          0.100          0.900          0.125
               9.479          0.100          0.100          0.900          0.125
               9.479          0.100          0.100          0.900          0.125
               9.479          0.100          0.100          0.900          0.125
               9.479          0.100          0.100          0.900          0.125
               9.479          0.100          0.100          0.900          0.125
               9.479          0.100          0.100          0.900          0.125
               9.479          0.100          0.100          0.900          0.125
               9.479          0.100          0.100          0.900          0.125
               9.479          0.100          0.100          0.900          0.125
               9.479          0.100          0.100          0.900          0.125
               9.479          0.100          0.100          0.900          0.125
               9.479          0.100          0.100          0.900          0.125
               9.479          0.100          0.100          0.900          0.125
               9.479          0.100          0.100          0.900          0.125
               9.479          0.100          0.100          0.900          0.125
               9.479          0.100          0.100          0.900          0.125
-----------------------------------------------------------------


 6. LNAPL specific volume and hydraulic conductivity
-----------------------------------------------------------------
             bn [ft]        Dn [ft]        Rn [ft]     Tn [ft2/d]
-----------------------------------------------------------------
               0.000          0.000          0.000          0.000
               0.068          0.004          0.000          0.000
               0.136          0.009          0.001          0.000
               0.204          0.014          0.002          0.000
               0.272          0.020          0.004          0.000
               0.340          0.026          0.006          0.000
               0.408          0.033          0.009          0.001
               0.476          0.041          0.013          0.001
               0.544          0.050          0.018          0.001
               0.612          0.059          0.023          0.001
               0.680          0.069          0.029          0.001
               0.748          0.079          0.035          0.001
               0.816          0.090          0.042          0.001
               0.884          0.101          0.049          0.002
               0.952          0.113          0.057          0.002
               1.020          0.126          0.065          0.002
               1.088          0.138          0.074          0.002
               1.156          0.151          0.083          0.002
               1.224          0.164          0.092          0.003
               1.292          0.178          0.102          0.003
               1.360          0.193          0.112          0.003
               1.428          0.207          0.122          0.003
               1.496          0.222          0.133          0.004
               1.564          0.236          0.144          0.004
               1.632          0.251          0.155          0.004
               1.700          0.267          0.167          0.004
-----------------------------------------------------------------
```

7. Data for curve-fitting segments

bn[ft]	Rn[ft]	Tn[ft2/d]	chi[ft]	beta	xi[ft]	eta
0.00000	0.00000	0.00000				
0.54400	0.01765	0.00077	0.00000	0.03244	0.00000	0.00142
0.95200	0.05688	0.00178	0.36047	0.09615	0.22970	0.00246
1.70000	0.16659	0.00433	0.56422	0.14668	0.43050	0.00341

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 1. OPTIONS.

 * Units              =   1              (1: English Units, 2: SI Units)

 * Soil Heterogeneity =   1              ( Number of Layers: 1, 2 or 3)

 * Elevation          =   2              (1: Elevation above datum, 2: depth BGS)

 * FPR System Used    =   0              (1: well,  2: trench,  0: Not used)

 * Smear Correction   =   1              (0: no adjustment, 1: smear correction)

 * LNAPL Residual     =   2              (1: Variable in Layer, 2: Constant for
Layer)


 2. INPUT PARAMETERS.

 2.1 BASIC INPUT PARAMETERS.
 Monitor. Well LNAPL thickness[ft]=          0.400
 Ground Surface Depth [ft]        =          0.000
 Groundwater Table Depth [ft]     =          8.000
 Water Vertical Gradient(+up)     =          0.000
 LNAPL Density [g/cm3]            =          0.870
 LNAPL Viscosity [cp]             =        102.000
 Water Surface Tension [dyne/cm]  =         65.000
 LNAPL Surface Tension [dyne/cm]  =         21.400
 LNAPL/Water Interfacial Tension  =          8.800
 Residual-f (vadose)              =          0.200
 Residual-f (saturated)           =          0.300

 2.1.1 SOIL PROPERTIES OF LAYER 1
 Relative permeability model      =              1     (Mualem)
 Soil porosity                    =          0.430
 Hydraulic conductivity [ft/d]    =          0.820
 van Genuchten "N"                =          1.560
 van Genuchten "Alpha" [ft-1]     =          1.100
 Swr1                             =          0.078
 Snrv1                            =          0.015
 Snrs1                            =          0.022


 4. Calculated Parameters

-------------------------------------------------
 Air-LNAPL interface [ft]         =          7.948
 LNAPL-Water interface [ft]       =          8.348
 Max. Free-Product elevation [ft] =          7.720
-------------------------------------------------

-------------------------------------------------
 Parameter                        :         Soil 1
-------------------------------------------------
 van Genuchten "M"                :          0.359
```

```
 Air/LNAPL "alpha"  [ft-1]       :          2.907
 LNAPL/water "alpha" [ft-1]      :          1.056
--------------------------------------------------


 5. LNAPL and Water saturation data.

--------------------------------------------------------------------------------
      BGS Depth [ft]            Sn            Snr             Sw            krn
--------------------------------------------------------------------------------
               7.720         0.015          0.015          0.857          0.000
               7.731         0.020          0.015          0.860          0.000
               7.743         0.025          0.015          0.863          0.000
               7.754         0.030          0.015          0.865          0.000
               7.765         0.034          0.015          0.868          0.001
               7.777         0.039          0.015          0.871          0.001
               7.788         0.044          0.015          0.874          0.002
               7.800         0.049          0.015          0.876          0.002
               7.811         0.054          0.015          0.879          0.003
               7.822         0.059          0.015          0.882          0.004
               7.834         0.063          0.015          0.885          0.006
               7.845         0.068          0.015          0.888          0.007
               7.857         0.072          0.015          0.890          0.010
               7.868         0.076          0.015          0.893          0.013
               7.880         0.079          0.015          0.896          0.017
               7.891         0.082          0.015          0.899          0.021
               7.902         0.085          0.015          0.902          0.027
               7.914         0.087          0.015          0.904          0.036
               7.925         0.088          0.015          0.907          0.046
               7.937         0.089          0.015          0.910          0.063
               7.948         0.087          0.015          0.913          0.107
               7.968         0.089          0.022          0.911          0.110
               7.988         0.085          0.022          0.915          0.103
               8.008         0.080          0.022          0.920          0.096
               8.028         0.075          0.022          0.925          0.090
               8.048         0.071          0.022          0.929          0.084
               8.068         0.066          0.022          0.934          0.078
               8.088         0.062          0.022          0.938          0.072
               8.108         0.058          0.022          0.942          0.066
               8.128         0.053          0.022          0.947          0.060
               8.148         0.049          0.022          0.951          0.055
               8.168         0.046          0.022          0.954          0.050
               8.188         0.042          0.022          0.958          0.045
               8.208         0.038          0.022          0.962          0.040
               8.228         0.035          0.022          0.965          0.036
               8.248         0.032          0.022          0.968          0.033
               8.268         0.029          0.022          0.971          0.029
               8.288         0.027          0.022          0.973          0.026
               8.308         0.025          0.022          0.975          0.024
               8.328         0.023          0.022          0.977          0.022
               8.348         0.022          0.022          0.978          0.021
               8.348         0.022          0.022          0.978          0.021
               8.348         0.022          0.022          0.978          0.021
               8.348         0.022          0.022          0.978          0.021
               8.348         0.022          0.022          0.978          0.021
               8.348         0.022          0.022          0.978          0.021
               8.348         0.022          0.022          0.978          0.021
               8.348         0.022          0.022          0.978          0.021
               8.348         0.022          0.022          0.978          0.021
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               8.348         0.022          0.022          0.978          0.021
               8.348         0.022          0.022          0.978          0.021
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               8.348          0.022          0.022          0.978          0.021
               8.348          0.022          0.022          0.978          0.021
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               8.348          0.022          0.022          0.978          0.021
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               8.348          0.022          0.022          0.978          0.021
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               8.348          0.022          0.022          0.978          0.021
               8.348          0.022          0.022          0.978          0.021
               8.348          0.022          0.022          0.978          0.021
               8.348          0.022          0.022          0.978          0.021
               8.348          0.022          0.022          0.978          0.021
               8.348          0.022          0.022          0.978          0.021
               8.348          0.022          0.022          0.978          0.021
-----------------------------------------------------------------


 6. LNAPL specific volume and hydraulic conductivity
-----------------------------------------------------------------
             bn [ft]        Dn [ft]        Rn [ft]    Tn [ft2/d]
-----------------------------------------------------------------
               0.000          0.000          0.000          0.000
               0.016          0.000          0.000          0.000
               0.032          0.000          0.000          0.000
               0.048          0.001          0.000          0.000
               0.064          0.001          0.000          0.000
               0.080          0.001          0.000          0.000
               0.096          0.002          0.000          0.000
               0.112          0.002          0.000          0.000
               0.128          0.002          0.001          0.000
               0.144          0.003          0.001          0.000
               0.160          0.003          0.001          0.000
               0.176          0.004          0.001          0.000
               0.192          0.004          0.002          0.000
               0.208          0.005          0.002          0.000
               0.224          0.005          0.002          0.000
               0.240          0.006          0.003          0.000
               0.256          0.007          0.003          0.000
               0.272          0.007          0.004          0.000
               0.288          0.008          0.004          0.000
               0.304          0.009          0.005          0.000
               0.320          0.010          0.006          0.000
               0.336          0.011          0.006          0.000
               0.352          0.012          0.007          0.000
               0.368          0.013          0.008          0.000
               0.384          0.014          0.009          0.000
               0.400          0.015          0.010          0.000
-----------------------------------------------------------------
```

7. Data for curve-fitting segments

bn[ft]	Rn[ft]	Tn[ft2/d]	chi[ft]	beta	xi[ft]	eta
0.00000	0.00000	0.00000				
0.20800	0.00200	0.00006	0.00000	0.00961	0.00000	0.00028
0.32000	0.00565	0.00012	0.14662	0.03256	0.10930	0.00059
0.40000	0.00951	0.00019	0.20306	0.04828	0.17035	0.00083

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 1. OPTIONS.

 * Units              =   1              (1: English Units, 2: SI Units)

 * Soil Heterogeneity =   1              ( Number of Layers: 1, 2 or 3)

 * Elevation          =   2              (1: Elevation above datum, 2: depth BGS)

 * FPR System Used    =   0              (1: well,  2: trench,  0: Not used)

 * Smear Correction   =   1              (0: no adjustment, 1: smear correction)

 * LNAPL Residual     =   2              (1: Variable in Layer, 2: Constant for
Layer)


 2. INPUT PARAMETERS.

 2.1 BASIC INPUT PARAMETERS.
 Monitor. Well LNAPL thickness[ft]=          2.390
 Ground Surface Depth [ft]        =          0.000
 Groundwater Table Depth [ft]     =         14.000
 Water Vertical Gradient(+up)     =          0.000
 LNAPL Density [g/cm3]            =          0.870
 LNAPL Viscosity [cp]             =        102.000
 Water Surface Tension [dyne/cm]  =         65.000
 LNAPL Surface Tension [dyne/cm]  =         21.400
 LNAPL/Water Interfacial Tension  =          8.800
 Residual-f (vadose)              =          0.200
 Residual-f (saturated)           =          0.300

 2.1.1 SOIL PROPERTIES OF LAYER 1
 Relative permeability model      =              1     (Mualem)
 Soil porosity                    =          0.350
 Hydraulic conductivity [ft/d]    =          0.016
 van Genuchten "N"                =          1.090
 van Genuchten "Alpha" [ft-1]     =          0.150
 Swr1                             =          0.070
 Snrv1                            =          0.004
 Snrs1                            =          0.006


 4. Calculated Parameters

-------------------------------------------------
 Air-LNAPL interface [ft]         =         13.689
 LNAPL-Water interface [ft]       =         16.079
 Max. Free-Product elevation [ft] =         12.325
-------------------------------------------------

-------------------------------------------------
 Parameter                        :         Soil 1
-------------------------------------------------
 van Genuchten "M"                :          0.083
```

```
 Air/LNAPL "alpha"  [ft-1]       :          0.396
 LNAPL/water "alpha" [ft-1]      :          0.144
--------------------------------------------------


 5. LNAPL and Water saturation data.

--------------------------------------------------------------------------------
      BGS Depth [ft]              Sn              Snr               Sw              krn
--------------------------------------------------------------------------------
              12.325           0.004           0.004           0.965           0.000
              12.393           0.005           0.004           0.965           0.000
              12.462           0.006           0.004           0.966           0.000
              12.530           0.007           0.004           0.966           0.000
              12.598           0.008           0.004           0.967           0.000
              12.666           0.009           0.004           0.967           0.000
              12.734           0.010           0.004           0.968           0.000
              12.803           0.011           0.004           0.968           0.000
              12.871           0.012           0.004           0.969           0.000
              12.939           0.013           0.004           0.969           0.000
              13.007           0.014           0.004           0.970           0.000
              13.075           0.015           0.004           0.970           0.000
              13.144           0.016           0.004           0.971           0.000
              13.212           0.017           0.004           0.971           0.000
              13.280           0.018           0.004           0.972           0.001
              13.348           0.019           0.004           0.973           0.001
              13.416           0.020           0.004           0.973           0.001
              13.485           0.022           0.004           0.974           0.002
              13.553           0.023           0.004           0.974           0.003
              13.621           0.024           0.004           0.975           0.005
              13.689           0.025           0.004           0.975           0.127
              13.809           0.026           0.006           0.974           0.131
              13.928           0.025           0.006           0.975           0.127
              14.048           0.024           0.006           0.976           0.124
              14.167           0.023           0.006           0.977           0.121
              14.287           0.022           0.006           0.978           0.117
              14.406           0.021           0.006           0.979           0.114
              14.526           0.020           0.006           0.980           0.110
              14.645           0.019           0.006           0.981           0.106
              14.765           0.018           0.006           0.982           0.102
              14.884           0.017           0.006           0.983           0.098
              15.004           0.016           0.006           0.984           0.094
              15.123           0.014           0.006           0.986           0.090
              15.243           0.013           0.006           0.987           0.086
              15.362           0.012           0.006           0.988           0.081
              15.482           0.011           0.006           0.989           0.077
              15.601           0.010           0.006           0.990           0.072
              15.721           0.009           0.006           0.991           0.067
              15.840           0.008           0.006           0.992           0.062
              15.960           0.007           0.006           0.993           0.056
              16.079           0.006           0.006           0.994           0.052
              16.079           0.006           0.006           0.994           0.052
              16.079           0.006           0.006           0.994           0.052
              16.079           0.006           0.006           0.994           0.052
              16.079           0.006           0.006           0.994           0.052
              16.079           0.006           0.006           0.994           0.052
              16.079           0.006           0.006           0.994           0.052
              16.079           0.006           0.006           0.994           0.052
              16.079           0.006           0.006           0.994           0.052
              16.079           0.006           0.006           0.994           0.052
              16.079           0.006           0.006           0.994           0.052
              16.079           0.006           0.006           0.994           0.052
              16.079           0.006           0.006           0.994           0.052
```

```
              16.079         0.006          0.006          0.994          0.052
              16.079         0.006          0.006          0.994          0.052
              16.079         0.006          0.006          0.994          0.052
              16.079         0.006          0.006          0.994          0.052
              16.079         0.006          0.006          0.994          0.052
              16.079         0.006          0.006          0.994          0.052
              16.079         0.006          0.006          0.994          0.052
              16.079         0.006          0.006          0.994          0.052
              16.079         0.006          0.006          0.994          0.052
              16.079         0.006          0.006          0.994          0.052
              16.079         0.006          0.006          0.994          0.052
              16.079         0.006          0.006          0.994          0.052
              16.079         0.006          0.006          0.994          0.052
              16.079         0.006          0.006          0.994          0.052
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              16.079         0.006          0.006          0.994          0.052
              16.079         0.006          0.006          0.994          0.052
              16.079         0.006          0.006          0.994          0.052
              16.079         0.006          0.006          0.994          0.052
              16.079         0.006          0.006          0.994          0.052
              16.079         0.006          0.006          0.994          0.052
              16.079         0.006          0.006          0.994          0.052
              16.079         0.006          0.006          0.994          0.052
              16.079         0.006          0.006          0.994          0.052
              16.079         0.006          0.006          0.994          0.052
              16.079         0.006          0.006          0.994          0.052
              16.079         0.006          0.006          0.994          0.052
              16.079         0.006          0.006          0.994          0.052
-----------------------------------------------------------------


 6. LNAPL specific volume and hydraulic conductivity
-----------------------------------------------------------------
             bn [ft]        Dn [ft]        Rn [ft]     Tn [ft2/d]
-----------------------------------------------------------------
               0.000          0.000          0.000          0.000
               0.096          0.000          0.000          0.000
               0.191          0.001          0.000          0.000
               0.287          0.001          0.000          0.000
               0.382          0.001          0.000          0.000
               0.478          0.002          0.001          0.000
               0.574          0.002          0.001          0.000
               0.669          0.003          0.001          0.000
               0.765          0.004          0.001          0.000
               0.860          0.004          0.002          0.000
               0.956          0.005          0.002          0.000
               1.052          0.006          0.003          0.000
               1.147          0.007          0.003          0.000
               1.243          0.007          0.004          0.000
               1.338          0.008          0.004          0.000
               1.434          0.009          0.005          0.000
               1.530          0.010          0.006          0.000
               1.625          0.011          0.006          0.000
               1.721          0.012          0.007          0.000
               1.816          0.013          0.008          0.000
               1.912          0.014          0.009          0.000
               2.008          0.015          0.010          0.000
               2.103          0.017          0.010          0.000
               2.199          0.018          0.011          0.000
               2.294          0.019          0.012          0.000
               2.390          0.020          0.013          0.000
-----------------------------------------------------------------
```

7. Data for curve-fitting segments

bn[ft]	Rn[ft]	Tn[ft2/d]	chi[ft]	beta	xi[ft]	eta
0.00000	0.00000	0.00000				
1.05160	0.00262	0.00001	0.00000	0.00249	0.00000	0.00001
2.00760	0.00951	0.00003	0.68766	0.00720	0.34781	0.00002
2.39000	0.01336	0.00003	1.06408	0.01008	0.60210	0.00002

```
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 1. OPTIONS.

 * Units              =   1              (1: English Units, 2: SI Units)

 * Soil Heterogeneity =   1              ( Number of Layers: 1, 2 or 3)

 * Elevation          =   2              (1: Elevation above datum, 2: depth BGS)

 * FPR System Used    =   0              (1: well,  2: trench,  0: Not used)

 * Smear Correction   =   1              (0: no adjustment, 1: smear correction)

 * LNAPL Residual     =   2              (1: Variable in Layer, 2: Constant for
Layer)


 2. INPUT PARAMETERS.

 2.1 BASIC INPUT PARAMETERS.
 Monitor. Well LNAPL thickness[ft]=          1.467
 Ground Surface Depth [ft]        =          0.000
 Groundwater Table Depth [ft]     =         14.000
 Water Vertical Gradient(+up)     =          0.000
 LNAPL Density [g/cm3]            =          0.870
 LNAPL Viscosity [cp]             =        102.000
 Water Surface Tension [dyne/cm]  =         65.000
 LNAPL Surface Tension [dyne/cm]  =         21.400
 LNAPL/Water Interfacial Tension  =          8.800
 Residual-f (vadose)              =          0.200
 Residual-f (saturated)           =          0.300

 2.1.1 SOIL PROPERTIES OF LAYER 1
 Relative permeability model      =              1     (Mualem)
 Soil porosity                    =          0.350
 Hydraulic conductivity [ft/d]    =          0.016
 van Genuchten "N"                =          1.090
 van Genuchten "Alpha" [ft-1]     =          0.150
 Swr1                             =          0.070
 Snrv1                            =          0.003
 Snrs1                            =          0.004


 4. Calculated Parameters

-------------------------------------------------
 Air-LNAPL interface [ft]         =         13.809
 LNAPL-Water interface [ft]       =         15.276
 Max. Free-Product elevation [ft] =         12.972
-------------------------------------------------

-------------------------------------------------
 Parameter                        :         Soil 1
-------------------------------------------------
 van Genuchten "M"                :          0.083
```

```
 Air/LNAPL "alpha"  [ft-1]       :          0.396
 LNAPL/water "alpha" [ft-1]      :          0.144
--------------------------------------------------


 5. LNAPL and Water saturation data.

--------------------------------------------------------------------------------
      BGS Depth [ft]              Sn             Snr              Sw             krn
--------------------------------------------------------------------------------
              12.972           0.003           0.003           0.978           0.000
              13.014           0.003           0.003           0.978           0.000
              13.056           0.004           0.003           0.978           0.000
              13.098           0.004           0.003           0.979           0.000
              13.139           0.005           0.003           0.979           0.000
              13.181           0.006           0.003           0.979           0.000
              13.223           0.006           0.003           0.980           0.000
              13.265           0.007           0.003           0.980           0.000
              13.307           0.008           0.003           0.980           0.000
              13.349           0.008           0.003           0.981           0.000
              13.391           0.009           0.003           0.981           0.000
              13.432           0.010           0.003           0.981           0.000
              13.474           0.010           0.003           0.982           0.000
              13.516           0.011           0.003           0.982           0.000
              13.558           0.012           0.003           0.982           0.001
              13.600           0.012           0.003           0.983           0.001
              13.642           0.013           0.003           0.983           0.001
              13.684           0.014           0.003           0.984           0.001
              13.726           0.014           0.003           0.984           0.002
              13.767           0.015           0.003           0.984           0.004
              13.809           0.015           0.003           0.985           0.094
              13.883           0.016           0.004           0.984           0.096
              13.956           0.015           0.004           0.985           0.094
              14.029           0.015           0.004           0.985           0.091
              14.103           0.014           0.004           0.986           0.088
              14.176           0.013           0.004           0.987           0.086
              14.249           0.013           0.004           0.987           0.083
              14.323           0.012           0.004           0.988           0.080
              14.396           0.011           0.004           0.989           0.077
              14.469           0.011           0.004           0.989           0.074
              14.543           0.010           0.004           0.990           0.071
              14.616           0.010           0.004           0.990           0.068
              14.689           0.009           0.004           0.991           0.065
              14.763           0.008           0.004           0.992           0.062
              14.836           0.008           0.004           0.992           0.059
              14.910           0.007           0.004           0.993           0.055
              14.983           0.006           0.004           0.994           0.052
              15.056           0.006           0.004           0.994           0.048
              15.130           0.005           0.004           0.995           0.045
              15.203           0.004           0.004           0.996           0.041
              15.276           0.004           0.004           0.996           0.038
              15.276           0.004           0.004           0.996           0.038
              15.276           0.004           0.004           0.996           0.038
              15.276           0.004           0.004           0.996           0.038
              15.276           0.004           0.004           0.996           0.038
              15.276           0.004           0.004           0.996           0.038
              15.276           0.004           0.004           0.996           0.038
              15.276           0.004           0.004           0.996           0.038
              15.276           0.004           0.004           0.996           0.038
              15.276           0.004           0.004           0.996           0.038
              15.276           0.004           0.004           0.996           0.038
              15.276           0.004           0.004           0.996           0.038
              15.276           0.004           0.004           0.996           0.038
```

```
              15.276          0.004          0.004          0.996          0.038
              15.276          0.004          0.004          0.996          0.038
              15.276          0.004          0.004          0.996          0.038
              15.276          0.004          0.004          0.996          0.038
              15.276          0.004          0.004          0.996          0.038
              15.276          0.004          0.004          0.996          0.038
              15.276          0.004          0.004          0.996          0.038
              15.276          0.004          0.004          0.996          0.038
              15.276          0.004          0.004          0.996          0.038
              15.276          0.004          0.004          0.996          0.038
              15.276          0.004          0.004          0.996          0.038
              15.276          0.004          0.004          0.996          0.038
              15.276          0.004          0.004          0.996          0.038
              15.276          0.004          0.004          0.996          0.038
              15.276          0.004          0.004          0.996          0.038
              15.276          0.004          0.004          0.996          0.038
              15.276          0.004          0.004          0.996          0.038
              15.276          0.004          0.004          0.996          0.038
              15.276          0.004          0.004          0.996          0.038
              15.276          0.004          0.004          0.996          0.038
              15.276          0.004          0.004          0.996          0.038
              15.276          0.004          0.004          0.996          0.038
              15.276          0.004          0.004          0.996          0.038
              15.276          0.004          0.004          0.996          0.038
              15.276          0.004          0.004          0.996          0.038
              15.276          0.004          0.004          0.996          0.038
              15.276          0.004          0.004          0.996          0.038
              15.276          0.004          0.004          0.996          0.038
-----------------------------------------------------------------


 6. LNAPL specific volume and hydraulic conductivity
-----------------------------------------------------------------
             bn [ft]        Dn [ft]        Rn [ft]     Tn [ft2/d]
-----------------------------------------------------------------
               0.000          0.000          0.000          0.000
               0.059          0.000          0.000          0.000
               0.117          0.000          0.000          0.000
               0.176          0.000          0.000          0.000
               0.235          0.001          0.000          0.000
               0.293          0.001          0.000          0.000
               0.352          0.001          0.000          0.000
               0.411          0.001          0.000          0.000
               0.469          0.001          0.001          0.000
               0.528          0.002          0.001          0.000
               0.587          0.002          0.001          0.000
               0.645          0.002          0.001          0.000
               0.704          0.002          0.001          0.000
               0.763          0.003          0.001          0.000
               0.822          0.003          0.002          0.000
               0.880          0.003          0.002          0.000
               0.939          0.004          0.002          0.000
               0.998          0.004          0.002          0.000
               1.056          0.005          0.003          0.000
               1.115          0.005          0.003          0.000
               1.174          0.005          0.003          0.000
               1.232          0.006          0.004          0.000
               1.291          0.006          0.004          0.000
               1.350          0.007          0.004          0.000
               1.408          0.007          0.005          0.000
               1.467          0.008          0.005          0.000
-----------------------------------------------------------------
```

7. Data for curve-fitting segments

bn[ft]	Rn[ft]	Tn[ft2/d]	chi[ft]	beta	xi[ft]	eta
0.00000	0.00000	0.00000				
0.17604	0.00007	0.00000	0.00000	0.00038	0.00000	0.00001
0.64548	0.00097	0.00000	0.14163	0.00193	0.04758	0.00001
1.46700	0.00512	0.00001	0.45269	0.00505	0.23852	0.00001

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 1. OPTIONS.

 * Units              =   1              (1: English Units, 2: SI Units)

 * Soil Heterogeneity =   1              ( Number of Layers: 1, 2 or 3)

 * Elevation          =   2              (1: Elevation above datum, 2: depth BGS)

 * FPR System Used    =   0              (1: well,  2: trench,  0: Not used)

 * Smear Correction   =   1              (0: no adjustment, 1: smear correction)

 * LNAPL Residual     =   2              (1: Variable in Layer, 2: Constant for
Layer)


 2. INPUT PARAMETERS.

 2.1 BASIC INPUT PARAMETERS.
 Monitor. Well LNAPL thickness[ft]=          0.403
 Ground Surface Depth [ft]        =          0.000
 Groundwater Table Depth [ft]     =         14.000
 Water Vertical Gradient(+up)     =          0.000
 LNAPL Density [g/cm3]            =          0.870
 LNAPL Viscosity [cp]             =        102.000
 Water Surface Tension [dyne/cm]  =         65.000
 LNAPL Surface Tension [dyne/cm]  =         21.400
 LNAPL/Water Interfacial Tension  =          8.800
 Residual-f (vadose)              =          0.200
 Residual-f (saturated)           =          0.300

 2.1.1 SOIL PROPERTIES OF LAYER 1
 Relative permeability model      =              1     (Mualem)
 Soil porosity                    =          0.350
 Hydraulic conductivity [ft/d]    =          0.016
 van Genuchten "N"                =          1.090
 van Genuchten "Alpha" [ft-1]     =          0.150
 Swr1                             =          0.070
 Snrv1                            =          0.001
 Snrs1                            =          0.001


 4. Calculated Parameters

-------------------------------------------------
 Air-LNAPL interface [ft]         =         13.948
 LNAPL-Water interface [ft]       =         14.351
 Max. Free-Product elevation [ft] =         13.718
-------------------------------------------------

-------------------------------------------------
 Parameter                        :         Soil 1
-------------------------------------------------
 van Genuchten "M"                :          0.083
```

```
 Air/LNAPL "alpha"  [ft-1]       :          0.396
 LNAPL/water "alpha" [ft-1]      :          0.144
----------------------------------------------------


 5. LNAPL and Water saturation data.

--------------------------------------------------------------------------------
      BGS Depth [ft]              Sn              Snr              Sw             krn
--------------------------------------------------------------------------------
              13.718           0.001           0.001           0.994           0.000
              13.729           0.001           0.001           0.994           0.000
              13.741           0.001           0.001           0.994           0.000
              13.752           0.001           0.001           0.994           0.000
              13.764           0.001           0.001           0.994           0.000
              13.775           0.002           0.001           0.994           0.000
              13.787           0.002           0.001           0.995           0.000
              13.798           0.002           0.001           0.995           0.000
              13.810           0.002           0.001           0.995           0.000
              13.821           0.002           0.001           0.995           0.000
              13.833           0.002           0.001           0.995           0.000
              13.844           0.003           0.001           0.995           0.000
              13.856           0.003           0.001           0.995           0.000
              13.867           0.003           0.001           0.995           0.000
              13.879           0.003           0.001           0.995           0.000
              13.890           0.003           0.001           0.995           0.000
              13.902           0.003           0.001           0.996           0.000
              13.913           0.004           0.001           0.996           0.001
              13.925           0.004           0.001           0.996           0.001
              13.936           0.004           0.001           0.996           0.002
              13.948           0.004           0.001           0.996           0.039
              13.968           0.004           0.001           0.996           0.040
              13.988           0.004           0.001           0.996           0.039
              14.008           0.004           0.001           0.996           0.038
              14.028           0.004           0.001           0.996           0.036
              14.048           0.003           0.001           0.997           0.035
              14.069           0.003           0.001           0.997           0.034
              14.089           0.003           0.001           0.997           0.033
              14.109           0.003           0.001           0.997           0.032
              14.129           0.003           0.001           0.997           0.030
              14.149           0.003           0.001           0.997           0.029
              14.169           0.002           0.001           0.998           0.028
              14.189           0.002           0.001           0.998           0.027
              14.210           0.002           0.001           0.998           0.025
              14.230           0.002           0.001           0.998           0.024
              14.250           0.002           0.001           0.998           0.023
              14.270           0.002           0.001           0.998           0.021
              14.290           0.001           0.001           0.999           0.020
              14.310           0.001           0.001           0.999           0.018
              14.330           0.001           0.001           0.999           0.017
              14.351           0.001           0.001           0.999           0.016
              14.351           0.001           0.001           0.999           0.016
              14.351           0.001           0.001           0.999           0.016
              14.351           0.001           0.001           0.999           0.016
              14.351           0.001           0.001           0.999           0.016
              14.351           0.001           0.001           0.999           0.016
              14.351           0.001           0.001           0.999           0.016
              14.351           0.001           0.001           0.999           0.016
              14.351           0.001           0.001           0.999           0.016
              14.351           0.001           0.001           0.999           0.016
              14.351           0.001           0.001           0.999           0.016
              14.351           0.001           0.001           0.999           0.016
              14.351           0.001           0.001           0.999           0.016
```

```
              14.351          0.001          0.001          0.999          0.016
              14.351          0.001          0.001          0.999          0.016
              14.351          0.001          0.001          0.999          0.016
              14.351          0.001          0.001          0.999          0.016
              14.351          0.001          0.001          0.999          0.016
              14.351          0.001          0.001          0.999          0.016
              14.351          0.001          0.001          0.999          0.016
              14.351          0.001          0.001          0.999          0.016
              14.351          0.001          0.001          0.999          0.016
              14.351          0.001          0.001          0.999          0.016
              14.351          0.001          0.001          0.999          0.016
              14.351          0.001          0.001          0.999          0.016
              14.351          0.001          0.001          0.999          0.016
              14.351          0.001          0.001          0.999          0.016
              14.351          0.001          0.001          0.999          0.016
              14.351          0.001          0.001          0.999          0.016
              14.351          0.001          0.001          0.999          0.016
              14.351          0.001          0.001          0.999          0.016
              14.351          0.001          0.001          0.999          0.016
              14.351          0.001          0.001          0.999          0.016
              14.351          0.001          0.001          0.999          0.016
              14.351          0.001          0.001          0.999          0.016
              14.351          0.001          0.001          0.999          0.016
              14.351          0.001          0.001          0.999          0.016
              14.351          0.001          0.001          0.999          0.016
              14.351          0.001          0.001          0.999          0.016
              14.351          0.001          0.001          0.999          0.016
              14.351          0.001          0.001          0.999          0.016
-----------------------------------------------------------------


 6. LNAPL specific volume and hydraulic conductivity
-----------------------------------------------------------------
             bn [ft]        Dn [ft]        Rn [ft]     Tn [ft2/d]
-----------------------------------------------------------------
               0.000          0.000          0.000          0.000
               0.016          0.000          0.000          0.000
               0.032          0.000          0.000          0.000
               0.048          0.000          0.000          0.000
               0.064          0.000          0.000          0.000
               0.081          0.000          0.000          0.000
               0.097          0.000          0.000          0.000
               0.113          0.000          0.000          0.000
               0.129          0.000          0.000          0.000
               0.145          0.000          0.000          0.000
               0.161          0.000          0.000          0.000
               0.177          0.000          0.000          0.000
               0.193          0.000          0.000          0.000
               0.210          0.000          0.000          0.000
               0.226          0.000          0.000          0.000
               0.242          0.000          0.000          0.000
               0.258          0.000          0.000          0.000
               0.274          0.000          0.000          0.000
               0.290          0.000          0.000          0.000
               0.306          0.000          0.000          0.000
               0.322          0.000          0.000          0.000
               0.339          0.000          0.000          0.000
               0.355          0.000          0.000          0.000
               0.371          0.000          0.000          0.000
               0.387          0.001          0.000          0.000
               0.403          0.001          0.000          0.000
-----------------------------------------------------------------
```

7. Data for curve-fitting segments

bn[ft]	Rn[ft]	Tn[ft2/d]	chi[ft]	beta	xi[ft]	eta
0.00000	0.00000	0.00000				
0.19344	0.00008	0.00000	0.00000	0.00042	0.00000	0.00000
0.27404	0.00017	0.00000	0.11740	0.00107	0.05640	0.00000
0.40300	0.00037	0.00000	0.16832	0.00158	0.09285	0.00001

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 1. OPTIONS.

 * Units              =   1              (1: English Units, 2: SI Units)

 * Soil Heterogeneity =   1              ( Number of Layers: 1, 2 or 3)

 * Elevation          =   2              (1: Elevation above datum, 2: depth BGS)

 * FPR System Used    =   0              (1: well,  2: trench,  0: Not used)

 * Smear Correction   =   1              (0: no adjustment, 1: smear correction)

 * LNAPL Residual     =   2              (1: Variable in Layer, 2: Constant for
Layer)


 2. INPUT PARAMETERS.

 2.1 BASIC INPUT PARAMETERS.
 Monitor. Well LNAPL thickness[ft]=          0.310
 Ground Surface Depth [ft]        =          0.000
 Groundwater Table Depth [ft]     =         14.000
 Water Vertical Gradient(+up)     =          0.000
 LNAPL Density [g/cm3]            =          0.870
 LNAPL Viscosity [cp]             =        102.000
 Water Surface Tension [dyne/cm]  =         65.000
 LNAPL Surface Tension [dyne/cm]  =         21.400
 LNAPL/Water Interfacial Tension  =          8.800
 Residual-f (vadose)              =          0.200
 Residual-f (saturated)           =          0.300

 2.1.1 SOIL PROPERTIES OF LAYER 1
 Relative permeability model      =              1     (Mualem)
 Soil porosity                    =          0.350
 Hydraulic conductivity [ft/d]    =          0.016
 van Genuchten "N"                =          1.090
 van Genuchten "Alpha" [ft-1]     =          0.150
 Swr1                             =          0.070
 Snrv1                            =          0.001
 Snrs1                            =          0.001


 4. Calculated Parameters

-------------------------------------------------
 Air-LNAPL interface [ft]         =         13.960
 LNAPL-Water interface [ft]       =         14.270
 Max. Free-Product elevation [ft] =         13.783
-------------------------------------------------

-------------------------------------------------
 Parameter                        :         Soil 1
-------------------------------------------------
 van Genuchten "M"                :          0.083
```

```
 Air/LNAPL "alpha"  [ft-1]       :          0.396
 LNAPL/water "alpha" [ft-1]      :          0.144
--------------------------------------------------


 5. LNAPL and Water saturation data.

--------------------------------------------------------------------------------
      BGS Depth [ft]              Sn              Snr               Sw             krn
--------------------------------------------------------------------------------
              13.783           0.001            0.001            0.995           0.000
              13.792           0.001            0.001            0.995           0.000
              13.800           0.001            0.001            0.996           0.000
              13.809           0.001            0.001            0.996           0.000
              13.818           0.001            0.001            0.996           0.000
              13.827           0.001            0.001            0.996           0.000
              13.836           0.001            0.001            0.996           0.000
              13.845           0.001            0.001            0.996           0.000
              13.854           0.002            0.001            0.996           0.000
              13.862           0.002            0.001            0.996           0.000
              13.871           0.002            0.001            0.996           0.000
              13.880           0.002            0.001            0.996           0.000
              13.889           0.002            0.001            0.996           0.000
              13.898           0.002            0.001            0.996           0.000
              13.907           0.002            0.001            0.996           0.000
              13.915           0.003            0.001            0.997           0.000
              13.924           0.003            0.001            0.997           0.000
              13.933           0.003            0.001            0.997           0.001
              13.942           0.003            0.001            0.997           0.001
              13.951           0.003            0.001            0.997           0.001
              13.960           0.003            0.001            0.997           0.032
              13.975           0.003            0.001            0.997           0.033
              13.991           0.003            0.001            0.997           0.032
              14.006           0.003            0.001            0.997           0.031
              14.022           0.003            0.001            0.997           0.030
              14.037           0.003            0.001            0.997           0.029
              14.053           0.002            0.001            0.998           0.028
              14.068           0.002            0.001            0.998           0.027
              14.084           0.002            0.001            0.998           0.026
              14.099           0.002            0.001            0.998           0.025
              14.115           0.002            0.001            0.998           0.024
              14.130           0.002            0.001            0.998           0.023
              14.146           0.002            0.001            0.998           0.022
              14.161           0.002            0.001            0.998           0.021
              14.177           0.001            0.001            0.999           0.020
              14.192           0.001            0.001            0.999           0.019
              14.208           0.001            0.001            0.999           0.018
              14.223           0.001            0.001            0.999           0.016
              14.239           0.001            0.001            0.999           0.015
              14.254           0.001            0.001            0.999           0.014
              14.270           0.001            0.001            0.999           0.013
              14.270           0.001            0.001            0.999           0.013
              14.270           0.001            0.001            0.999           0.013
              14.270           0.001            0.001            0.999           0.013
              14.270           0.001            0.001            0.999           0.013
              14.270           0.001            0.001            0.999           0.013
              14.270           0.001            0.001            0.999           0.013
              14.270           0.001            0.001            0.999           0.013
              14.270           0.001            0.001            0.999           0.013
              14.270           0.001            0.001            0.999           0.013
              14.270           0.001            0.001            0.999           0.013
              14.270           0.001            0.001            0.999           0.013
              14.270           0.001            0.001            0.999           0.013
```

```
              14.270          0.001          0.001          0.999          0.013
              14.270          0.001          0.001          0.999          0.013
              14.270          0.001          0.001          0.999          0.013
              14.270          0.001          0.001          0.999          0.013
              14.270          0.001          0.001          0.999          0.013
              14.270          0.001          0.001          0.999          0.013
              14.270          0.001          0.001          0.999          0.013
              14.270          0.001          0.001          0.999          0.013
              14.270          0.001          0.001          0.999          0.013
              14.270          0.001          0.001          0.999          0.013
              14.270          0.001          0.001          0.999          0.013
              14.270          0.001          0.001          0.999          0.013
              14.270          0.001          0.001          0.999          0.013
              14.270          0.001          0.001          0.999          0.013
              14.270          0.001          0.001          0.999          0.013
              14.270          0.001          0.001          0.999          0.013
              14.270          0.001          0.001          0.999          0.013
              14.270          0.001          0.001          0.999          0.013
              14.270          0.001          0.001          0.999          0.013
              14.270          0.001          0.001          0.999          0.013
              14.270          0.001          0.001          0.999          0.013
              14.270          0.001          0.001          0.999          0.013
              14.270          0.001          0.001          0.999          0.013
              14.270          0.001          0.001          0.999          0.013
              14.270          0.001          0.001          0.999          0.013
              14.270          0.001          0.001          0.999          0.013
              14.270          0.001          0.001          0.999          0.013
              14.270          0.001          0.001          0.999          0.013
-----------------------------------------------------------------


 6. LNAPL specific volume and hydraulic conductivity
-----------------------------------------------------------------
             bn [ft]        Dn [ft]        Rn [ft]     Tn [ft2/d]
-----------------------------------------------------------------
               0.000          0.000          0.000          0.000
               0.012          0.000          0.000          0.000
               0.025          0.000          0.000          0.000
               0.037          0.000          0.000          0.000
               0.050          0.000          0.000          0.000
               0.062          0.000          0.000          0.000
               0.074          0.000          0.000          0.000
               0.087          0.000          0.000          0.000
               0.099          0.000          0.000          0.000
               0.112          0.000          0.000          0.000
               0.124          0.000          0.000          0.000
               0.136          0.000          0.000          0.000
               0.149          0.000          0.000          0.000
               0.161          0.000          0.000          0.000
               0.174          0.000          0.000          0.000
               0.186          0.000          0.000          0.000
               0.198          0.000          0.000          0.000
               0.211          0.000          0.000          0.000
               0.223          0.000          0.000          0.000
               0.236          0.000          0.000          0.000
               0.248          0.000          0.000          0.000
               0.260          0.000          0.000          0.000
               0.273          0.000          0.000          0.000
               0.285          0.000          0.000          0.000
               0.298          0.000          0.000          0.000
               0.310          0.000          0.000          0.000
-----------------------------------------------------------------
```

7. Data for curve-fitting segments

bn[ft]	Rn[ft]	Tn[ft2/d]	chi[ft]	beta	xi[ft]	eta
0.00000	0.00000	0.00000				
0.11160	0.00003	0.00000	0.00000	0.00023	0.00000	0.00000
0.23560	0.00012	0.00000	0.07835	0.00078	0.03719	0.00000
0.31000	0.00022	0.00000	0.13846	0.00126	0.07746	0.00000

```
*****************************************************************************
 *
 * File Name  = C:\Documents and Settings\kgalanti\My Documents\Projects\gm delavan\
 * Saved time =   9 :  0,   2008 . 2 . 27
 *
*****************************************************************************

 1. OPTIONS.

 * Units              =   1              (1: English Units, 2: SI Units)

 * Soil Heterogeneity =   1              ( Number of Layers: 1, 2 or 3)

 * Elevation          =   2              (1: Elevation above datum, 2: depth BGS)

 * FPR System Used    =   0              (1: well,  2: trench,  0: Not used)

 * Smear Correction   =   1              (0: no adjustment, 1: smear correction)

 * LNAPL Residual     =   2              (1: Variable in Layer, 2: Constant for
Layer)


 2. INPUT PARAMETERS.

 2.1 BASIC INPUT PARAMETERS.
 Monitor. Well LNAPL thickness[ft]=          1.000
 Ground Surface Depth [ft]        =          0.000
 Groundwater Table Depth [ft]     =         14.000
 Water Vertical Gradient(+up)     =          0.000
 LNAPL Density [g/cm3]            =          0.870
 LNAPL Viscosity [cp]             =        102.000
 Water Surface Tension [dyne/cm]  =         65.000
 LNAPL Surface Tension [dyne/cm]  =         21.400
 LNAPL/Water Interfacial Tension  =          8.800
 Residual-f (vadose)              =          0.200
 Residual-f (saturated)           =          0.300

 2.1.1 SOIL PROPERTIES OF LAYER 1
 Relative permeability model      =              1     (Mualem)
 Soil porosity                    =          0.350
 Hydraulic conductivity [ft/d]    =          0.016
 van Genuchten "N"                =          1.090
 van Genuchten "Alpha" [ft-1]     =          0.150
 Swr1                             =          0.070
 Snrv1                            =          0.002
 Snrs1                            =          0.003


 4. Calculated Parameters

-------------------------------------------------
 Air-LNAPL interface [ft]         =         13.870
 LNAPL-Water interface [ft]       =         14.870
 Max. Free-Product elevation [ft] =         13.299
-------------------------------------------------

-------------------------------------------------
 Parameter                        :         Soil 1
-------------------------------------------------
 van Genuchten "M"                :          0.083
```

```
 Air/LNAPL "alpha"  [ft-1]       :          0.396
 LNAPL/water "alpha" [ft-1]      :          0.144
---------------------------------------------------


 5. LNAPL and Water saturation data.

-------------------------------------------------------------------------------
      BGS Depth [ft]              Sn             Snr              Sw            krn
-------------------------------------------------------------------------------
              13.299           0.002           0.002           0.985           0.000
              13.328           0.002           0.002           0.985           0.000
              13.356           0.003           0.002           0.985           0.000
              13.385           0.003           0.002           0.985           0.000
              13.413           0.004           0.002           0.986           0.000
              13.442           0.004           0.002           0.986           0.000
              13.470           0.004           0.002           0.986           0.000
              13.499           0.005           0.002           0.986           0.000
              13.528           0.005           0.002           0.987           0.000
              13.556           0.006           0.002           0.987           0.000
              13.585           0.006           0.002           0.987           0.000
              13.613           0.007           0.002           0.987           0.000
              13.642           0.007           0.002           0.988           0.000
              13.670           0.008           0.002           0.988           0.000
              13.699           0.008           0.002           0.988           0.000
              13.727           0.008           0.002           0.988           0.001
              13.756           0.009           0.002           0.989           0.001
              13.784           0.009           0.002           0.989           0.001
              13.813           0.010           0.002           0.989           0.002
              13.841           0.010           0.002           0.989           0.003
              13.870           0.010           0.002           0.990           0.073
              13.920           0.011           0.003           0.989           0.075
              13.970           0.010           0.003           0.990           0.073
              14.020           0.010           0.003           0.990           0.071
              14.070           0.010           0.003           0.990           0.069
              14.120           0.009           0.003           0.991           0.066
              14.170           0.009           0.003           0.991           0.064
              14.220           0.008           0.003           0.992           0.062
              14.270           0.008           0.003           0.992           0.060
              14.320           0.007           0.003           0.993           0.057
              14.370           0.007           0.003           0.993           0.055
              14.420           0.006           0.003           0.994           0.053
              14.470           0.006           0.003           0.994           0.050
              14.520           0.006           0.003           0.994           0.048
              14.570           0.005           0.003           0.995           0.045
              14.620           0.005           0.003           0.995           0.043
              14.670           0.004           0.003           0.996           0.040
              14.720           0.004           0.003           0.996           0.037
              14.770           0.003           0.003           0.997           0.035
              14.820           0.003           0.003           0.997           0.032
              14.870           0.003           0.003           0.997           0.029
              14.870           0.003           0.003           0.997           0.029
              14.870           0.003           0.003           0.997           0.029
              14.870           0.003           0.003           0.997           0.029
              14.870           0.003           0.003           0.997           0.029
              14.870           0.003           0.003           0.997           0.029
              14.870           0.003           0.003           0.997           0.029
              14.870           0.003           0.003           0.997           0.029
              14.870           0.003           0.003           0.997           0.029
              14.870           0.003           0.003           0.997           0.029
              14.870           0.003           0.003           0.997           0.029
              14.870           0.003           0.003           0.997           0.029
              14.870           0.003           0.003           0.997           0.029
```

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              14.870          0.003          0.003          0.997          0.029
              14.870          0.003          0.003          0.997          0.029
              14.870          0.003          0.003          0.997          0.029
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              14.870          0.003          0.003          0.997          0.029
              14.870          0.003          0.003          0.997          0.029
              14.870          0.003          0.003          0.997          0.029
              14.870          0.003          0.003          0.997          0.029
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              14.870          0.003          0.003          0.997          0.029
              14.870          0.003          0.003          0.997          0.029
              14.870          0.003          0.003          0.997          0.029
              14.870          0.003          0.003          0.997          0.029
              14.870          0.003          0.003          0.997          0.029
              14.870          0.003          0.003          0.997          0.029
              14.870          0.003          0.003          0.997          0.029
              14.870          0.003          0.003          0.997          0.029
              14.870          0.003          0.003          0.997          0.029
              14.870          0.003          0.003          0.997          0.029
              14.870          0.003          0.003          0.997          0.029
              14.870          0.003          0.003          0.997          0.029
              14.870          0.003          0.003          0.997          0.029
-----------------------------------------------------------------


 6. LNAPL specific volume and hydraulic conductivity
-----------------------------------------------------------------
             bn [ft]        Dn [ft]        Rn [ft]     Tn [ft2/d]
-----------------------------------------------------------------
               0.000          0.000          0.000          0.000
               0.040          0.000          0.000          0.000
               0.080          0.000          0.000          0.000
               0.120          0.000          0.000          0.000
               0.160          0.000          0.000          0.000
               0.200          0.000          0.000          0.000
               0.240          0.000          0.000          0.000
               0.280          0.001          0.000          0.000
               0.320          0.001          0.000          0.000
               0.360          0.001          0.000          0.000
               0.400          0.001          0.000          0.000
               0.440          0.001          0.000          0.000
               0.480          0.001          0.001          0.000
               0.520          0.001          0.001          0.000
               0.560          0.001          0.001          0.000
               0.600          0.002          0.001          0.000
               0.640          0.002          0.001          0.000
               0.680          0.002          0.001          0.000
               0.720          0.002          0.001          0.000
               0.760          0.002          0.001          0.000
               0.800          0.003          0.002          0.000
               0.840          0.003          0.002          0.000
               0.880          0.003          0.002          0.000
               0.920          0.003          0.002          0.000
               0.960          0.003          0.002          0.000
               1.000          0.004          0.002          0.000
-----------------------------------------------------------------
```

7. Data for curve-fitting segments

bn[ft]	Rn[ft]	Tn[ft2/d]	chi[ft]	beta	xi[ft]	eta
0.00000	0.00000	0.00000				
0.52000	0.00063	0.00000	0.00000	0.00120	0.00000	0.00001
0.80000	0.00151	0.00001	0.32197	0.00316	0.16352	0.00001
1.00000	0.00238	0.00001	0.45075	0.00433	0.25385	0.00001

APPENDIX B

MPVE 27100 SYSTEM SPECIFICATIONS

Ground Effects
Environmental Services Inc.

2251 Industrial Dr. Regina, SK, Canada, S4P 3C4
TELEPHONE: (306) 352-1400 **FAX**: (306) 352-1412
EMAIL: sfrisky@groundeffects.org

MULTI PHASE VAPOR EXTRACTION WITH WATER TREATMENT MODEL 27100

PERFORMANCE CHARACTERISTICS:

- Nominal capacity: 2367 CFM
- Motor: 100 HP
- Speed: 3000 RPM
- Maximum vacuum: 27" Hg
- Weight (approximate): 1650 Lbs
- Maximum gas inlet temperature: 100^0c / 212^0F

Performance based on atmospheric pressure equal to 29.92" Hg

ADVANTAGES:

- Oil-less process eliminates oil carry-over concerns
- Extremely low maintenance
- Eliminates water-cooling, heat exchangers, etc.
- Continuous operation over the full vacuum range without overheating
- Air-cooled design is standard
- Heavy Duty construction

PUMP ASSEMBLY:

(1) *DVJ 412* series vacuum blowers

Pump Capacity:	1734 CFM @ 20" Hg
Ultimate vacuum:	27" Hg
Power consumption:	100 Hp

GEE DVJ 616, VACUUM PUMP PACKAGE

Each package should be complete with the following:

- ROOTS DVJ 616, rotary lobe, positive displacement vacuum pump
- 100 Hp, XP (Class 1, Group C & D / Class 2, Group E, F, G), 230/460/3/60, 1800 rpm, 326T frame, Design 'B' electric motor having class 'F' insulation & 1.15 service factor
- Drive group designed with a minimum service factor of 1.4 times motor nameplate rating and including a poly chain drive
- Fully enclosed belt guard with removable front cover for easy access to belt
- In-line type, inlet filter (air box type) with pleated paper filter element. Filter media efficiency – 99.9% on 10 micron
- Integral base on which all of the above equipment shall be mounted
- Discharge silencers, chamber/absorptive type

GEE MPVE CONTROL SYSTEM

(x1) Modicon Ethernet Bridge

Ground Effects
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(x1) Thermocouple Signal Converter

(x1) RS232 – RS485 converter

(x1) 460V 3PH 50HP 75A Variable Speed Drive

(x1) Main Lugs Distribution block

(x1) Cooling Fans

(x1) DC power supply

(x1) Industrial PC with PC anyware, HMI software

(x1) 1,500 VA UPS

(x1) Modicon PLC with the following I/O

- (x5) Analog inputs cards
- (x2) Analog outputs cards
- (x5) Digital outputs cards
- (x4) Digital inputs cards

(x1) 30KVA transformer

(x1) Power meter with CT's

(x1) 1/3HP 480V Motor Starter

(x1) 1HP 480V Motor Starter

(x1) 3HP 480V Motor Starter

(x1) 10HP 480V Motor Starter

(x1) 25HP 480V Motor Starter

(x1) 100A Breaker for VFD

(x2) 15A 480V Breakers

(x1) 25A Breaker

(x1) 200A Control Panel Main Breaker

(x1) SEMC-1622-02 Skid Main Breaker Panel

(x1) 240V/115V 100A Breaker Panel C/W assorted breakers

(x1) Firewall Router

(x1) Direct-way Dish

(x1) Electrical Enclosure for control panel

(x1) Sat components

Ground Effects
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MPVE AIR/WATER OIL/WATER SEPARATOR VESSEL WITH INTEGRAL AIR STRIPPER

- 840 gallon air/water separator tank with high efficiency low maintenance air stripper and Oil/water separator
- 28 gallon internal LNAPL recovery tank
- (x3) conductivity level switches for produced liquids transfer pump (low level, high level and high high level)
  - Siemens' CLS 200 (Capacitance)
- (x2) conductivity level switches for LNAPL transfer pump (low level, high high level)
  - Siemens' CLS 200 (Capacitance)
- (x1) conductivity level switch for secondary containment
  - Siemens' CLS 200 (Capacitance)
- (x2) - 32" x 42"" clean out ports
- (x2) - liquid level site glass
- ASME 36 carbon steel construction
- Internally Novalac epoxy coated
- External Endura industrial coating

MPVE MUD SEPARATOR VESSEL

- 350 gallon mud separator tank with high efficiency low maintenance design
- (x1) 32" x 42"" clean out port
- (x1) liquid level site glass
- (x1) 3" drain valve
- ASME 36 carbon steel construction
- Internally Novalac epoxy coated
- External Endura industrial coating

MPVE TRANSFER PUMP (MUD PUMP)

- Monoflo progressive cavity pump
  - Model E042

2251 Industrial Dr. Regina, SK, Canada, S4P 3C4
TELEPHONE: (306) 352-1400 **FAX**: (306) 352-1412
EMAIL: sfrisky@groundeffects.org

- 50 gpm @ 30 psi TDH
- 3 hp, XP, 420 rpm, 230/460 V, 3ph

MPVE LNAPL TRANSFER PUMP

- Moyno progressive cavity pump
  - Model 35601
  - 10 gpm @ 30 psi TDH

1 hp, XP, 1730 rpm, 230/460

MPVE BUILDING

- Mounting of the above items in a 12' x 42' all steel, sound attenuated, skid building
- Process Area to include
  - Double containment floor w/ HHL shutdown
  - MPVE vacuum pump (DVJ 616)
  - Electric motor (100 Hp)
  - Mud tank
  - ITS (Integral Treatment System) package
  - Produced liquids transfer pump
  - LNAPL transfer pump
  - Bag filter
  - (x2) carbon vessels
  - (x4) automated extraction header system
  - Heater (forced fan)
  - Heater (convection)
  - Exhaust fan
  - All necessary piping and instrumentation
  - All necessary XP wiring
- Controls Area to include
  - Pneumatic fracturing compressor
    - Pneumatic fracturing automated header system

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TELEPHONE: (306) 352-1400 **FAX**: (306) 352-1412
EMAIL: sfrisky@groundeffects.org

- Nutrient injection system complete with nutrient injection automated header system
- Pneumatic air lift compressor
  - Pneumatic air lift automated header system
- Control system complete with HMI
- All necessary wiring

NOTES:

1. Building interior:	Process Area: Class 1, Div 2
	Controls Area – Non-hazardous
2. Control panel	Nema 3R
3. Power supply	480 Volt, 200 amp, 3 phase
4. Process piping	Schedule 40, steel
5. Valves & Fittings	Steel, 150 lb
6. Lighting:	Process Area: (x2) XP 150 Watt
	Controls Area: (x1) 100 Watt

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EMAIL: sfrisky@groundeffects.org

GEE Pneumatic Air Lift System

GEE Pneumatic Air Lift Control System

1– Nema 4 System Controller
32- valve PLC operated control system.
GEE proposes a control panel to include controls for the following;

- Pneumatic air lift compressor circuit
- Automated valve circuit

Each motor circuit to include H/O/A switch, green run light, motor starter w/overload protection,

GEE Pneumatic Fracturing System

Performance Characteristics:

- Nominal capacity: 203 ACFM
- Motor: 50 HP
- Speed: 3600 RPM
- Maximum pressure: 100 psi
- Weight (approximate): 1065 Lbs
- Maximum noise level (@ 3 feet): 80dBa

Advantages:

- Extremely low maintenance
- Auto start and stop
- Continuous operation over the full pressure range
- Air-cooled design is standard
- Heavy Duty construction

Pump Assembly:

screw type compressor
Pump Capacity: 203 ACFM @ 100 psi FAD
Power consumption: 50 Hp

GEE Pneumatic Fracturing Control System

1– Nema 4 System Controller
15- valve PLC operated control system.
GEE proposes a control panel to include controls for the following;

- Fracturing compressor circuit
- Automated valve circuit

Each motor circuit to include H/O/A switch, green run light, motor starter w/overload protection,

Ground Effects
Environmental Services Inc.

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TELEPHONE: (306) 352-1400 **FAX**: (306) 352-1412
EMAIL: sfrisky@groundeffects.org

Automated nutrient injection system which includes

14- ¼" 316 Stainless Steel ball valves with pneumatic actuators
1- 150 gallon Polyethylene tank for nutrient solution with all hoses and fittings
1- Series 'M' metering pump with 316 Stainless steel head,
check balls and seat, valve cap. Also comes with TFE faced diaphragm,
Manual flow control, and a ½ hp 1725 rpm 115V motor and motor starter.
-316 Stainless steel tubing for nutrient injection

BUILDING EXHAUST FAN

2000 cfm,1/2 hp, 1750 rpm, 230/460 V, 3 ph fan and thermostat
complete with 18"x 30" gravity closing inlet louver

BUILDING HEATER

Ruffneck forced air XP heater
20 kW
Integral thermostat
230/460 V, 3 ph

INSTRUMENTS

7- Vacuum gauge; 0-30 "Hg, liquid filled 4"
7- Level switch; Siemens milltronics point level conductivity probes
1- Temperature indicator; 0-250 ^{0}F
1- Volt meter
1- Amp meter
2- Hour meters
48- Pressure gauge; 0-125 psi, liquid filled, 4"
1- Temperature indicators; 0-500 F
1- Helium injection port

MPVE INSTRUMENTATION

- Water Flow meter (Magnetic)
  - ABB 10DX4311
    - 2" line size, 1" meter size
    - 3 – 50 gpm flow range
    - Flanged connection for ease of maintenance
    - 304 SS body material
    - 120 V power supply

2251 Industrial Dr. Regina, SK, Canada, S4P 3C4
TELEPHONE: (306) 352-1400 **FAX**: (306) 352-1412
EMAIL: sfrisky@groundeffects.org

  - 4-20 mA analog output
  - Class I, Div. II
- Air flow meter
  - Rosemount 3051SFA
    - Annubar flowmeter
    - 4-20 mA output
    - Sized for 6" exhaust line
    - LCD dsiplay

- LEL Sensor
  - Draeger Polytron IREXIL
    - Infrared
    - 0 – 10,000 ppm range
    - Local Display
    - 4-20 mA analog output with relay output module
- (x3) Pressure Transmitter
  - ASCO 43A00100P4M100
    - ½" NPT connection
    - 0 – 250 psig

- Vacuum Transmitter
  - Wika 892.13.500
    - Class 1 Div 1 Groups A,B,C,D
    - 30"Hg – 30psig compound range
    - ½" MNPT process connection
    - SST wetted parts
    - 4-20 mA output, loop powered
    -
- Vapour Temperature Transmitter
  - Rosemount 644H SMART
    - Complete with
      - Series 644 Temperature Transmitter
      - CSA XP approved
      - Assembled to sensor
      - Aluminum junction box with 2" pipe stand mounting bracket

Ground Effects
Environmental Services Inc.

2251 Industrial Dr. Regina, SK, Canada, S4P 3C4
TELEPHONE: (306) 352-1400 **FAX**: (306) 352-1412
EMAIL: sfrisky@groundeffects.org

- 60 Hz line voltage filter
- LCD meter
- Direct mount with Rosemount Instruments Model 0183 Thermocouple Sensor

BAG FILTERS (X2)

- GEE 25 & 5 micron bag filter housings

  Carbon steel construction

  Tri-pod adjustable leg assembly

  S/S internal basket for bag filters

  Complete with (x5) 25 micron and (x5) 5 micron bag filters

LIQUID PHASE (GAC) GRANULAR ACTIVATED CARBON (X2)

- 48" dia. x 5' h carbon steel constructed liquid phase carbon vessel
  - Carbon steel construction
  - Schd. 80 PVC internals
  - Maximum pressure: 40 Psig
  - External Endura Industrial coated, Internal epoxy coating