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Construction Documentation Report

Permeable Reactive Barrier Downgradient of the Southern
Source Area
Former Tecumseh Products Company Site
Tecumseh, Michigan

February 2012



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*Prepared For
Tecumseh Products Company*



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Section 1

Introduction

1.1 Background

Tecumseh Products Company (TPC) has retained TRC Environmental Corporation (TRC), formerly RMT, Inc. (RMT) to assist with environmental investigation and remediation activities at the former TPC site. The site is located at 100 East Patterson Street in Tecumseh, Michigan. Investigation activities indicate that shallow groundwater affected by chlorinated volatile organic compounds (CVOCs) has migrated off-site at concentrations above residential and non-residential groundwater screening levels for vapor intrusion (GWSLs).

In March 2011, RMT proposed a permeable reactive barrier (PRB) to eliminate the potential vapor intrusion pathway downgradient of the southern source area by treating shallow CVOC-affected groundwater along the eastern (downgradient) property line before it migrates off site. RMT submitted The Workplan to Install a Permeable Reactive Barrier (PRB) Downgradient of the Southern Source Area at the Former Tecumseh Products Company (TPC) site located at 100 East Patterson Street, Tecumseh, Michigan to the United States Environmental Protection Agency (USEPA) for review and comment on March 30, 2011. Following preliminary comments made by USEPA during a conference call on April 7, 2011 the Revised Workplan to Install a Permeable Reactive Barrier (PRB) Downgradient of the Southern Source Area (Workplan) was submitted to USEPA on May 2, 2011. The Workplan describes the PRB treatment objectives, the PRB technology and design, and the proposed monitoring plan.

During a conference call with USEPA on May 24, 2011, USEPA provided additional comments on the proposed PRB monitoring plan. A Workplan Addendum to Install Additional PRB Performance Monitoring Wells at the Former Tecumseh Products Site in Tecumseh, Michigan (Workplan Addendum) was submitted to USEPA on July 8, 2011. The Workplan Addendum describes the performance monitoring network including the purpose of each well in evaluating PRB performance, hydraulic conductivity testing, and the groundwater sampling program.

1.2 Scope and Objectives

The PRB was installed in May 2011 and the performance monitoring network was installed in August 2011. This Construction Documentation Report for the Permeable Reactive Barrier Downgradient of the Southern Source Area was prepared to document PRB construction activities conducted in 2011, including the following:

- PRB installation activities, including deviations from the proposed design;

- PRB monitoring well construction; and
- PRB vent construction to manage methane produced by the PRB.

1.3 Summary of PRB Design

In February and March 2011, RMT conducted perimeter groundwater investigation activities downgradient of the southern source area to supplement existing site data in support of the PRB feasibility assessment and design. These investigation activities are described in the Technical Memorandum titled “Summary of Design Basis Investigation to Support Permeable Reactive Barrier Evaluation and Design,” dated March 22, 2011. This March 22, 2011 Technical Memorandum is included as Attachment 1 of the Workplan.

The site perimeter, downgradient (east) of the southern source area is divided into two sections. PRB Section 1 is located adjacent to Maumee Street, and PRB Section 2 is located along the eastern site perimeter adjacent to the parcel located at 805 South Maumee Street (325-0261-00). PRB Section 1 was designed to extend from boring location B-4 in the north to the southern property line for a total length of 730 feet (ft), and PRB Section 2 was designed to extend from 100 ft north of monitoring well MW-01s to the midway point between soil borings B-53 and B-54 for a total length of 380 ft (Figure 1). Given the physical site constraints, two different installation techniques were proposed. Where the target treatment zone is relatively shallow, the PRB design included *in situ* soil blending to deliver the Adventus product DARAMEND® to the subsurface. The design included the use of injections to deliver the Redox Tech product ABC®+ to portions of the reactive barrier further below ground surface. The design also included shallow injections around an existing sewer pipe.

Section 2

Blended PRB Construction

2.1 Treatment Technology – DARAMEND®

The PRB was designed to treat CVOC-affected groundwater at the downgradient property line through enhanced reductive dechlorination. The Adventus product DARAMEND® is a pelletized form of controlled-release carbon and zero valent iron (ZVI) used for stimulating reductive dechlorination and enhanced bioremediation in a subsurface environment. The organic component of DARAMEND® (fibrous organic material) is nutrient rich, hydrophilic and has high surface area; thus, it is able to support the growth of bacteria in a groundwater environment. As they grow on DARAMEND® particle surfaces, indigenous heterotrophic bacteria consume dissolved oxygen thereby reducing the redox potential (Eh). In addition, as the bacteria grow on the organic particles, they ferment carbon and release a variety of volatile fatty acids (acetic, propionic, butyric) which diffuse from the site of fermentation into the downgradient affected groundwater and serve as electron donors for other microbes, including dehalogenators and halo-respiring species. Finally, the small ZVI particles provide a substantial reactive surface area that stimulates direct chemical dechlorination and an additional decrease in the redox potential of the groundwater via corrosion of the iron and chemical oxygen scavenging. For CVOCs, these physical, chemical and biological processes combine to create a reduced environment that stimulates chemical and microbiological dechlorination of otherwise persistent compounds.

The project specific blend of DARAMEND® was composed of 40-percent by mass ZVI and 60-percent by mass organic material. The PRB design included two DARAMEND® application rates. In PRB Section 1a, where the relative concentrations of CVOCs were lower, the proposed application rate was 7.5-percent mass, and in PRB Section 1b, where CVOCs concentrations were comparably higher the proposed DARAMEND® application rate was 10-percent by mass.

2.2 Summary of Field Activities

The blended portion of the PRB was installed between May 16 and May 27, 2011. Excavation and blending were performed by Redox Tech, LLC (Redox Tech) with construction oversight and documentation conducted by TRC. Appendix A includes a photographic log which documents the soil blending process.

2.2.1 Site Preparation

Prior to excavation activities, a silt fence was installed and secured to the eastern and southern perimeter fence. Based on the PRB design, the locations of blended PRB

Section 1a and blended PRB Section 1b were measured and staked. Flags were placed to specify the location of injection points for the injected portions of the PRB. The eastern perimeter fence was used as a guide for flag placement such that the PRB would be parallel to the fence. Flags were also placed around the sewer line that intercepted the PRB trench to prevent accidental damage to underground utilities.

The trenched portion of the PRB was subdivided into cells. Cell size was determined based on the physical reach of the excavation equipment and the dosing requirements of the PRB. The location of each cell was marked on the silt fence so that the marked location could be easily observed by the excavator operator and would not be disturbed by excavation activities.

See photographs 1 and 2 of Appendix A for documentation of site preparation activities.

2.2.2 Removal of Unsaturated Overburden

The target treatment zone for the blended PRB was the shallow saturated zone from approximately 7 to 18 ft below ground surface (bgs). A dozer and an excavator were used to remove the unsaturated overburden prior to soil blending. The unsaturated overburden was composed primarily of topsoil and less permeable silty/sandy clay. Typically the topsoil extended to 6 to 18 inches bgs, and the silty/sandy clay extended from the bottom of the topsoil to the water table. The excavation area for the removal of the unsaturated overburden was approximately 20 feet wide along the length of the blended PRB to prevent the collapse of less permeable unsaturated soils into the blended portion of the PRB. In the northernmost 200 feet of the PRB, up to 4 ft of unsaturated sandy soil was present below the silty/sandy clay, these sandy soils made the sidewalls of the excavation less competent. In this area (Cells 1 through 6) the overburden excavation area was widened and the PRB was installed further west (up to 5 feet) to protect the integrity of the perimeter fence and to help prevent the collapse of less permeable unsaturated soils into the blended portion of the PRB. The as-built layout of the blended PRB is illustrated on Figures 2 through 4.

Overburden soils were segregated into two stockpiles as they were removed: topsoil and subgrade soils. When encountered, asphalt was stockpiled separately for proper disposal at the Liberty Environmentalists Landfill in Clark Lake, Michigan.

The removal of unsaturated overburden is documented in photographs 3 through 5 of Appendix A.

2.2.3 DARAMEND® Addition and Soil Blending

After unsaturated overburden had been removed, a narrower excavator bucket was used to loosen, but not excavate, soil from 7 ft bgs to 18 ft bgs in a 4 foot-wide trench.

DARAMEND® has the capacity to absorb large amounts of water, creating a drying affect in the saturated zone and making soil blending activities more challenging. With permission from the City of Tecumseh, water from a nearby fire hydrant was added to the excavation as needed to facilitate blending. During the later portion of field activities heavy rain resulted in the accumulation of surface water run-off in the excavation. When available this water was used in lieu of or in addition to municipal water to facilitate mixing.

The blended PRB was divided into 15- to 16-foot-long sections for blending. DARAMEND® was added to each cell at the approximate dosing specified in the Workplan; however the DARAMEND® was packaged in large (1-ton) super sacs, which limited the precision of PRB dosing. Two to four super sacs of DARAMEND® were added to each 15 to 16 foot section of the PRB. The as-built DARAMEND™ dosing for each cell is listed in Table 1. The DARAMEND® application rate ranged from 7.3-percent by mass to 12.1-percent by mass.

The blended PRB was constructed by blending DARAMEND® into the native saturated soils from 7 ft to 18 ft bgs. A specialized 4-foot wide rotating head, designed specifically for soil blending by Redox Tech was used to install the blended portion of the PRB (See Photograph 12 of Appendix A). Following the application of DARAMEND® the rotating head was used to mix the DARAMEND® and native soils for a minimum of 10 to 15 minutes per section (15-16 feet in length). After the blending within each section was complete, the PRB was blended with the previously constructed section to help ensure that no windows are present in the PRB between PRB sections and to help ensure uniform distribution of DARAMEND® throughout each cell.

PRB installation proceeded parallel to the eastern fence, from north end of the PRB to the sanitary sewer located between Cells 17 and 18 (Figure 3) approximately 200 feet north of the southern fence. PRB Cell 17.6 was constructed at an angle parallel to the sanitary sewer to limit the length of PRB Section 1c (a section of shallow injections around the sanitary sewer). Calculated dosing in Cell 17.6 was based on the length of the cell perpendicular to groundwater flow (15 feet) rather than the total length of the excavation (20 feet). See Photograph 18 of Appendix A

South of the sewer, excavation continued parallel with the site perimeter to 15 feet north of the south site perimeter and fence. A large tree is located in line with the PRB on the adjacent property (parcel number 325-0261-00) immediately south of site perimeter. The PRB design was modified in the field to avoid damaging the tree. Rather than excavating to the southern fence line, the blended portion of the PRB was terminated 15 feet north of the fence, and shallow injections were conducted in the area adjacent to the southern fence line. These injections are described in Section 3 below.

DARAMEND® addition and soil blending are documented in photographs 6 through 18 in Appendix A.

2.2.4 Trench Closure, Grading and Site Restoration

Each section of trench was filled in within 48 hours of soil blending by first allowing the blended material in the trench to settle and dewater. This prevented the creation of an unstable surface due to supersaturated soil. Once soil saturation conditions were satisfactory, the segregated unsaturated subsurface soils were placed back into the upper trench and graded. After the unsaturated subsurface soil had been replaced in the excavation, a dozer was used to level the subsurface soils and allow even replacement of the segregated topsoil. Topsoil was placed on top of the trench and graded to the best of the operator's abilities.

Significant rainfall events in the days prior to the final grading resulted in wet and sloppy conditions which hampered efforts to conduct final grading. In particular, the site received several inches of rain overnight May 25, 2011. On May 26, 2011, TPC received permission from the City of Tecumseh to discharge surface water which had accumulated in the open excavation into the storm sewer. A sample of the surface water was collected for analysis. No volatile organic compounds (VOCs) were detected in the sample. The laboratory analytical report is included as Appendix B. Trench closure and rough grading was completed by Redox Tech on May 27, 2011.

In early June 2011, Stratton's Landscaping (Stratton's) was subcontracted to conduct site restoration. Stratton's brought in topsoil to fill areas where the use of heavy equipment on wet soil had caused rutting. Once surface conditions were drier, Stratton's re-graded and seeded the surface. The silt fence remained in place for an additional month to allow time for the re-establishment of vegetative cover. By late-June, grass had been re-established over the grassy portion of the excavation area.

Trench closure, grading and site restoration are documented in photographs 19 through 22 in Appendix A.

Section 3

Injected PRB Construction

3.1 Treatment Technology – ABC®+

The PRB was designed to treat CVOC-affected groundwater at the downgradient property line through enhanced reductive dechlorination. The Redox Tech product ABC® is a patented mixture of ethyl lactate and glycerin, which typically includes lesser amounts of fatty acids and dipotassium phosphate (to serve as a buffer and a source of micronutrients). However, the addition of dipotassium phosphate would have resulted in a total phosphorus concentration in the slurry above residential Part 201 groundwater criteria. Therefore the dipotassium phosphate was substituted with a similarly effective food grade yeast extract (micronutrient) and a carbonate buffer in the project specific blend of ABC®. The ethyl lactate and glycerin in the ABC®+ provides an essential carbon source for the anaerobic bacteria to facilitate the reductive dechlorination of CVOCs. The “Plus” component in the injectate is zero valent iron (ZVI). ZVI provides a strong and effective reducing environment to facilitate biotic, reductive dechlorination of CVOCs, and can also facilitate direct abiotic reductive dechlorination, directly.

The site specific blend of ABC®+ contained various fatty acids, a carbonate buffer, yeast extract, soluble lactic acid, as well as slow- and long-term releasing components. The yeast extract provides the microbes with essential micronutrients for bioremediation to occur. In addition, the carbonate buffer helps to maintain the pH in a range (pH 6 to pH 8) that is best suited for microbial growth. The mass of ZVI relative to the volume of ABC® varied depending on the injection area.

3.2 Summary of Field Activities

The injected portion of the PRB was installed between May 16 and May 25, 2011. Injections were performed by Redox Tech with construction oversight and documentation conducted by TRC. Appendix C includes a photographic log which documents the injection process.

3.2.1 Site Preparation

Prior to injection activities, a silt fence was installed and secured to the eastern and southern perimeter fence. Based on the PRB design, the locations of injection points for PRB Sections 1c, 1d, 2a and 2b were measured and staked. Flags were placed to specify the location of injection points for the injected portions of the PRB. The eastern perimeter fence was used as a guide for flag placement such that the PRB would be parallel to the fence. Flags were also placed around the sewer line that intercepted the PRB trench to prevent accidental damage to the underground utilities.

3.2.2 ABC®+ Injections – General

The injected portions of the PRB were installed by Redox Tech using the same injection method, regardless of the PRB Section. Injection methods are summarized below:

- Injections were conducted by Redox Tech using two two-man crews. Each crew was equipped with a Geoprobe® and a ChemGrout® mixer. One crew member operated the Geoprobe® while the other prepared the injection slurry with the ChemGrout® mixer.
- ABC®+ was prepared on-site. From an ABC® concentrate and powdered ZVI (Aggregate Size 50D, <0.25 millimeters).
- The ABC® was prepared by diluting the ABC® concentrate with water from the municipal water supply in a 500 gallon tank. The ratio of ABC® concentrate-to-water depended on the design specifications for the target PRB section. The ratio was verified and recorded by TRC staff in the field. The mixing ratio for each batch of ABC® is tabulated in Table 2.
- The ABC®+ was prepared in the ChemGrout® mixer immediately prior to injection. Each ChemGrout® mixer was equipped with two approximately 50-gallon mixing tanks. Prepared ABC® was pumped from the 500-gallon tank to the ChemGrout® mixing tanks. ZVI and guar, a food-grade thickening agent used to help stabilize the ZVI in solution, were added to the mixing tank. Typically the volume of ABC®+ mixed in a single tank was the same as the specified volume to be injected in a single injection layer. The volume of ABC® and the mass of ZVI added to each tank depended on the design specifications for the target PRB section. The volume of ABC® and the mass of ZVI were verified and recorded by TRC staff in the field. The volume of ABC® and the mass of ZVI as well as the injection location and depth are tabulated in Table 3.
- While ABC®+ was being prepared, the Geoprobe® operator installed hollow Geoprobe® rods at the specified injection location to the maximum injection depth. Granular bentonite was applied as needed during rod installation to help seal the annular space around the rods, limiting migration of ABC®+ to the surface via the injection borehole.
- Once the ABC®+ was prepared, it was injected at the specified location through a pressurized hose connected to the top of the installed Geoprobe® rods. At each location the injections proceeded from the bottom up, such that following injection of ABC®+ to the deepest layer, the Geoprobe® rods were pulled up to the next deepest layer, and so on, until the shallowest injection layer was complete. During injections the injection pressure was monitored and recorded. Injection pressure was used to limit the rate of injection and minimize the potential for daylighting, i.e. migration of treatment chemical to the surface.

- Once all of the injection layers at a given injection point were complete, Geoprobe® rods were removed, and the injection point was plugged with bentonite chips and/or granular bentonite.

3.2.3 ABC®+ Injections – PRB Section 1d

PRB Section 1d is located along South Maumee and extends from 510 feet north of the southern perimeter fence south to the southern perimeter fence. The maximum depth to which Redox Tech can install a PRB via *in situ* soil blending is approximately 18 ft bgs. However investigation data indicated that concentrations that warrant treatment (e.g., trichloroethene at 440 ug/L to 1600 ug/L) are present in groundwater to depths up to 24 ft bgs below PRB Section 1b. In order to address CVOC-affected groundwater from 18 to 24 ft bgs, ABC®+ was injected to increase the effective depth of the PRB in this area.

PRB Section 1d was installed between May 16, 2011 and May 20, 2011 prior to the installation of blended PRB Section 1b to allow the Geoprobe® access over undisturbed soils. Typical installation parameters for PRB Section 1d are listed below:

- Injection point spacing: 10 ft (5-ft radius of influence)
- Number of points: 102 points in two offset rows
- Dosing rate: 0.36-percent by mass ABC®+ with the ABC®+ comprised of approximately 15-percent ZVI by mass (60 pounds per layer) and 85-percent ABC® by mass (40 gallons per layer)
- Volume injected: 120 gallons per point in three layers
- Injection depths: 18, 21, and 24 ft bgs

Injection points were located in two rows one approximately 5 feet west of the eastern perimeter fence and a second approximately 15 feet west of the eastern perimeter fence. Injection points were typically spaced 10 feet apart in the north-south direction. Injection point layout is illustrated on Figures 2 through 4. The grid pattern of the injections was varied slightly in two locations:

- Injection point 1d-38 near monitoring well MW-09s was relocated to the west to help prevent ABC®+ from migrating into and up the well casing rather than into the target treatment zone; and
- The locations of injection points 1d-55 and 1d-58 were shifted to avoid the existing sanitary sewer.

Minor variations in injection location and dosing, if any, for each injection layer are specified in Table 3 along with injection depth, ABC® batch number (from Table 2), injection pressure, injection date, and injection time.

3.2.4 ABC®+ Injections – PRB Section 1c

A sewer line intersects PRB Section 1 at the location shown on Figures 1 and 3. In order to avoid damaging this sewer line, Redox Tech remained at least 5 ft from either side of the sewer line during soil blending activities. PRB Section 1c is a short segment of shallow injections located adjacent to this sanitary sewer line where DARAMEND® could not be blended without damaging the sewer line. As shown on Figure 3, PRB Section 1c extends from approximately 210 to 235 ft north of the southern perimeter fence.

PRB Section 1c was installed on May 19, 2011 and May 25, 2011. Installation parameters for PRB Section 1c are listed below:

- Injection point spacing: 6.6 ft (3.3-ft radius of influence)
- Number of points: 10 points
- Target dosing rate: 0.55-percent by mass ABC®+ with the ABC®+ comprised of approximately 20-percent ZVI by mass (68 pounds per layer) and 80-percent ABC® by mass (30 gallons per layer)
- Target volume injected: 120 gallons per point in four layers
- Target injection depths: 7, 10, 13, and 16 ft bgs

Injection points were located on either side of the sanitary sewer as illustrated on Figure 3. Field modifications to the design injection locations, target dose and injections depths were made to minimize daylighting in this area. As-built dosing and injection depths are provided for each injection location in Table 3 along with ABC® batch number (from Table 2), injection pressure, injection date, and injection time.

3.2.5 ABC®+ Injections – PRB Section 2a

PRB Section 2 is located along the eastern site perimeter adjacent to the parcel located at 805 South Maumee Street (325-0261-00). The depth to groundwater in the vicinity of PRB Section 2 is approximately 16 ft bgs. Consequently installation of a PRB via *in situ* soil blending was not feasible with the blending equipment used for PRB Section 1.

PRB Section 2a, the northernmost subsection of Section 2, is 280 ft long and extends from 100 ft north of monitoring well MW-01s to the southern fence (along the boundary

between parcels 325-0241-00 and 325-0250-00). CVOC concentrations in this area are higher than those detected further south (maximum TCE concentration of 3,400 ug/L). ABC®+ injections were completed from the water table (16 ft bgs) to 28 ft bgs in this area to help limit off-site migration of CVOC-affected groundwater.

PRB Section 2a was installed between May 21, 2011 and May 24, 2011. Typical installation parameters for PRB Section 2a are listed below:

- Injection point spacing: 10 ft (5-ft radius of influence)
- Number of points: 56 points in two offset rows
- Dosing rate: 0.36-percent by mass ABC®+ with the ABC®+ comprised of approximately 15-percent ZVI by mass (72 pounds per layer) and 85-percent ABC® by mass (50 gallons per layer)
- Volume injected: 250 gallons per point in five layers
- Injection depths: 16, 19, 22, 25 and 28 ft bgs

Injection points were located in two rows one approximately 5 feet west of the eastern perimeter fence and a second approximately 15 feet west of the eastern perimeter fence. Injection points were typically spaced 10 feet apart in the north-south direction. Injection point layout is illustrated on Figure 5. The grid pattern of the injections was varied slightly in one location:

- Injection points 2a-19 and 2a-20, near monitoring well MW-01s, were relocated to the east and west respectively to help prevent ABC®+ from migrating into and up the well casing rather than into the target treatment zone.

Minor variations in injection location and dosing, if any, for each injection layer are specified in Table 3 along with injection depth, ABC® batch number (from Table 2), injection pressure, injection date, and injection time.

3.2.6 ABC®+ Injections – PRB Section 2b

PRB Section 2 is located along the eastern site perimeter adjacent to the parcel located at 805 South Maumee Street (325-0261-00). The depth to groundwater in the vicinity of PRB Section 2 is approximately 16 ft bgs. Consequently installation of a PRB via *in situ* soil blending was not feasible.

PRB Section 2b, the southernmost subsection of Section 2, is 100 ft long and extends from the southern fence (along the boundary between parcels 325-0241-00 and 325-0250-00) south approximately 100 feet to the midway point between borings B-53 and B-54.

CVOCs concentrations in this area are more than an order of magnitude lower than those detected further north. ABC®+ injections were completed from the water table (16 ft bgs) to 22 ft bgs in this area to help limit off-site migration of CVOC-affected groundwater.

PRB Section 2b was installed between May 20, 2011 and May 21, 2011. Typical installation parameters for PRB Section 2b are listed below:

- Injection point spacing: 10 ft (5-ft radius of influence)
- Number of points: 20 points in two offset rows
- Dosing rate: 0.18-percent by mass ABC®+ with the ABC®+ comprised of approximately 8-percent ZVI by mass (30 pounds per layer) and 92-percent ABC® by mass (40 gallons per layer)
- Volume injected: 120 gallons per point in three layers
- Injection depths: 16, 19, and 22 ft bgs

Injection points were located in two rows one approximately 5 feet west of the eastern perimeter and a second approximately 15 feet west of the eastern perimeter. Injection points were typically spaced 10 feet apart in the north-south direction. Injection point layout is illustrated on Figure 6. The grid pattern of the injections was varied slightly in one location:

- Injection point 2b-3 was relocated due to daylighting. Daylighting also occurred immediately at two replacement locations (2b-3R and 2b-3RR) before the ABC®+ was successfully injected at replacement location 2b-3RRR.

Minor variations in injection location and dosing, if any, for each injection layer are specified in Table 3 along with injection depth, ABC® batch number (from Table 2), injection pressure, injection date, and injection time.

Section 4

Monitoring Network Installation

4.1 Introduction

A Workplan Addendum to Install Additional PRB Performance Monitoring Wells at the Former Tecumseh Products Site in Tecumseh, Michigan (Workplan Addendum) was submitted to USEPA on July 8, 2011. This Workplan Addendum describes the performance monitoring network including the purpose of each well in evaluating PRB performance, hydraulic conductivity testing, and the groundwater sampling program. The PRB performance monitoring activities documented in this section were conducted in accordance with the Workplan Addendum.

4.2 Summary of Field Activities

After completion of the Workplan Addendum, TRC initiated installation of the PRB performance monitoring network. Between August 1, 2011 and August 3, 2011, TRC installed the PRB performance monitoring network. Field activities included:

- Continuous soil sampling at each well/well nest location prior to well installation to evaluate depth to water and geology. Soil boring logs are included in Appendix D; and
- Installation of sixteen PRB monitoring wells (PRB-03s, PRB-04s, PRB-04d, PRB-05s, PRB-06s, PRB-07s, PRB-08s, PRB-08d, PRB-09s, PRB-10s, PRB-11s, PRB-12s, PRB-13s, PRB-14s, PRB-15s, and PRB-15d). In accordance with Workplan Addendum, wells were installed using direct push technology, without a gravel pack, using the natural collapse of the formation so that hydraulic conductivity could be measured without the confounding effects of the gravel pack. Well construction forms are included in Appendix D.

PRB performance monitoring locations are shown on Figure 1. Initial performance monitoring, including *in situ* hydraulic conductivity testing and groundwater sampling, was conducted in August 2011 following well installation activities. The results of PRB performance monitoring, including subsequent quarterly monitoring events conducted in October 2011 and January 2012, will be documented in a separate report.

Section 5

Methane Management

5.1 Purpose and Scope

Field data collected during fourth quarter PRB monitoring activities conducted in October 2011 suggest that the portion of the PRB composed of DARAMEND® (trenched PRB) is producing highly reducing conditions resulting in methanogenesis. These reducing conditions are favorable to the degradation of chlorinated VOCs, including the complete degradation of TCE to ethane without the accumulation of vinyl chloride. However, the generation of methane in the subsurface must be managed to prevent health and safety issues.

5.2 Summary of Field Activities

In order to help ensure that methane does not accumulate in the subsurface during the winter when the ground is frozen, TRC installed passive vents adjacent to the trenched portion of the PRB between October 27, 2011 and October 28, 2011. Vents were installed at approximate 50-foot spacing as shown on the attached Figure 7. Figure 8 is a detail sheet depicting vent construction. Typical vents features are listed below:

- Vents are screened in the vadose zone from approximately 4 feet below ground surface to approximately 1 foot below the water table;
- Above-grade vent components are composed of galvanized steel to increase durability;
- Each vent is equipped with a wind-driven turbine ventilator rated to pull 126 cubic feet of air per minute at a wind velocity of 4 miles per hour; and
- Each vent is equipped with a sample port so that methane concentrations may be monitored.

As built vent construction forms are included in Appendix E.

TRC measured methane concentrations approximately 1 week after system installation, approximately 3 weeks after vent installation, and again approximately one month later. Evaluation of methane concentration data from these monitoring events prompted the installation of active ventilation at the three northernmost vent locations (V-01, V-02, and V-03). Field activities associated with the installation of active ventilation units included the following:

- A pilot study was conducted on December 22, 2011 to determine system design parameters.
- Between December 28, 2011 and February 9, 2012 while awaiting permanent electrical service, a single blower was operated during business hours using a portable generator.

- Electrical service was provided on February 9, 2012.
- On February 15, 2012, after an electrician hard-wired the final unit into the electrical supply, the system was fully functional. System design is described below:
 - Because of the relatively large (50 feet) distance between each vent, a separate blower was installed at each location.
 - After removing the wind-driven turbine ventilator, Schedule 80 PVC pipe and Fernco flexible fittings were used to connect an in-line explosion-proof blower to each galvanized steel riser; and
 - Each blower is protected from the elements by rigid plastic housing mounted on a wooden pallet.

Appendix F includes a photographic log which documents passive and active vent construction.

At a minimum, monthly monitoring of methane concentrations will be conducted during the winter months, and quarterly the remainder of 2012. Methane production is expected to decrease over time; therefore the frequency of methane monitoring activities in 2013 and beyond may be reduced. PRB performance monitoring, including methane concentration data, will be documented in a separate report.

Tables

Table 1
Summary of Blended PRB Construction
Former Tecumseh Products Company Site
Tecumseh, Michigan

Cell Number	Cell Location		Cell Width (ft)	Cell Length (ft)	Top of Cell (ft bgs)	Bottom of Cell (ft bgs)	Installation Date	Installation Time	Chemical Loading		
	Distance West of Eastern Fence (ft)	Distance North of Southern Fence (ft)							Target Dose (% by Mass)	DARAMEND™ Added (lbs)	Actual Dose (% by Mass)
1.1	15 to 19	720 to 735	4	15	7	18	5/16/2011	17:05 to 18:45	7.5	4,000	7.6
1.5	15 to 19	705 to 720	4	15	4	18	5/16/2011	17:05 to 18:45	7.5	6,000	7.6
2.1	16 to 20	690 to 705	4	15	7	18	5/17/2011	8:00 to 10:15	7.5	4,000	7.6
2.5	17 to 21	675 to 690	4	15	7	18	5/17/2011	10:35 to 12:00	7.5	6,000	7.6
3.1	17 to 21	660 to 675	4	15	7	18	5/17/2011	14:03 to 14:52	7.5	4,000	7.6
3.5	17 to 21	645 to 660	4	15	7	18	5/17/2011	15:01 to 17:05	7.5	6,000	7.6
4.1	17 to 21	630 to 645	4	15	7	18	5/18/2011	7:50 to 8:45	7.5	4,000	7.6
4.5	17 to 21	615 to 630	4	15	7	18	5/18/2011	9:05 to 10:32	7.5	6,000	7.6
5.1	17 to 21	600 to 615	4	15	7	18	5/18/2011	11:10 to 12:10	7.5	4,000	7.6
5.5	16 to 20	585 to 600	4	15	7	18	5/18/2011	14:10 to 15:20	7.5	6,000	7.6
6.1	15 to 19	570 to 585	4	15	7	18	5/18/2011	15:25 to 16:14	7.5	4,000	7.6
6.5	14 to 18	555 to 570	4	15	7	18	5/19/2011	8:00 to 9:30	7.5	6,000	7.6
7.1	12 to 16	540 to 555	4	15	7	18	5/19/2011	11:00 to 12:00	7.5	4,000	7.3
7.5	12 to 16	524 to 540	4	16	7	18	5/19/2011	16:43 to 17:30	7.5	6,000	7.3
8.1	12 to 16	509 to 524	4	15	7	18	5/19/2011	17:30 to 18:45	7.5	4,000	7.3
8.5	12 to 16	493 to 509	4	16	7	18	5/20/2011	7:30 to 12:00	7.5	6,000	7.3
9.1	12 to 16	477 to 493	4	16	7	18	5/20/2011	12:00 to 13:00	10	6,000	8.5
10.1	12 to 16	462 to 477	4	15	7	18	5/20/2011	14:30 to 15:50	10	6,000	8.8
10.5	12 to 16	446 to 462	4	16	7	18	5/21/2011	9:10 to 10:00	10	6,000	8.8
11.1	12 to 16	431 to 446	4	15	7	18	5/21/2011	10:00 to 11:00	10	6,000	8.8
11.5	12 to 16	415 to 431	4	16	7	18	5/21/2011	11:00 to 12:10	10	6,000	8.8
12.1	12 to 16	400 to 415	4	15	7	18	5/21/2011	14:25 to 15:25	10	6,000	9.1
12.5	12 to 16	385 to 400	4	15	7	18	5/21/2011	15:25 to 16:15	10	6,000	9.1
13.1	12 to 16	370 to 385	4	15	7	18	5/22/2011	9:00 to 10:10	10	6,000	9.1
13.5	12 to 16	355 to 370	4	15	7	18	5/22/2011	10:10 to 11:10	10	6,000	9.1
14.1	12 to 16	340 to 355	4	15	7	18	5/22/2011	11:10 to 12:20	10	6,000	9.1
14.5	12 to 16	325 to 340	4	15	7	18	5/23/2011	7:45 to 10:17	10	6,000	9.1
15.1	12 to 16	309 to 325	4	16	7	18	5/23/2011	10:17 to 11:15	10	6,000	8.5
15.5	12 to 16	293 to 309	4	16	7	18	5/23/2011	11:15 to 12:00	10	6,000	8.5
16.1	11 to 15	277 to 293	4	16	7	18	5/23/2011	12:00 to 13:00	10	8,000	12.1
16.5	11 to 15	261 to 277	4	16	7	18	5/23/2011	14:00 to 15:00	10	8,000	12.1
17.1	10 to 14	245 to 261	4	16	7	18	5/23/2011	15:00 to 16:00	10	8,000	10.9
17.5	10 to 14	230 to 245	4	15	7	18	5/26/2011	8:30 to 9:30	10	8,000	10.9
17.6	10 to 24 ⁽¹⁾	215 to 230	4	20	7	18	5/26/2011	9:30 to 10:15	10	6,000	10.9 ⁽²⁾
18.1	11 to 15	195 to 210	4	15	7	18	5/25/2011	10:30 to 12:00	10	8,000	12.1
18.5	11 to 15	180 to 195	4	15	7	18	5/25/2011	10:30 to 12:00	10	8,000	12.1
19.1	12 to 16	165 to 180	4	15	7	18	5/25/2011	9:45 to 10:30	10	6,000	9.1
19.5	12 to 16	150 to 165	4	15	7	18	5/25/2011	9:00 to 9:45	10	6,000	9.1
20.1	12 to 16	135 to 150	4	15	7	18	5/25/2011	8:00 to 9:00	10	6,000	9.1
20.5	12 to 16	120 to 135	4	15	7	18	5/24/2011	16:40 to 17:40	10	6,000	9.1
21.1	12 to 16	105 to 120	4	15	7	18	5/24/2011	16:00 to 16:40	10	6,000	9.1
21.5	12 to 16	90 to 105	4	15	7	18	5/24/2011	15:20 to 16:00	10	6,000	9.1
22.1	12 to 16	75 to 90	4	15	7	18	5/24/2011	14:10 to 15:20	10	8,000	12.1
22.5	12 to 16	60 to 75	4	15	7	18	5/24/2011	13:05 to 14:10	10	8,000	12.1
23.1	12 to 16	45 to 60	4	15	7	18	5/24/2011	11:45 to 13:05	10	8,000	12.1
23.5	10 to 14	30 to 45	4	15	7	18	5/24/2011	11:00 to 11:45	10	8,000	12.1
24.1	10 to 14	15 to 30	4	15	7	18	5/24/2011	10:20 to 11:00	10	8,000	12.1

Notes:

1. Cell 17.6 was installed parallel to the existing sanitary sewer, rather than parallel to the fenceline. See Figure 3 of the Construction Documentation Report for an As-Built Drawing of PRB Section 1 Cells 11.5 through 20.5.
2. Cell 17.6 dosing calculated based on the length of the cell in the north-south direction (perpendicular to groundwater flow).

Table 2
Summary of ABC® Batches
Former Tecumseh Products Company Site
Tecumseh, Michigan

Batch Number ⁽¹⁾	Start Date	Installation Time	Injection Section	Total Volume (gallons)	Volume ABC® Concentrate (gallons)	Volume Water (gallons)	Concentration ABC® Concentrate (%)
A1	5/16/2011	16:32 to 17:45	1D	480	25	455	5.2
B1	5/16/2011	16:37 to 8:18	1D	480	25	455	5.2
A2	5/17/2011	8:15 to 9:41	1D	480	25	455	5.2
B2	5/17/2011	9:03 to 10:29	1D	480	25	455	5.2
A3	5/17/2011	10:16 to 11:57	1D	480	25	455	5.2
B3	5/17/2011	11:13 to 14:03	1D	480	25	455	5.2
A4	5/17/2011	13:52 to 15:45	1D	480	25	455	5.2
A4* ⁽²⁾	5/17/2011	15:47 to 15:51	1D	40	10	30	25
B4	5/17/2011	15:10 to 17:12	1D	480	25	455	5.2
A5 ⁽²⁾	5/18/2011	8:14 to 8:24	1D	120	15	105	5.0
B5	5/18/2011	8:13 to 9:50	1D	480	25	455	5.2
A6 ⁽²⁾	5/18/2011	9:00 to 10:09	1D	480	60	420	5.0
B6	5/18/2011	10:31 to 12:00	1D	480	25	455	5.2
A7 ⁽²⁾	5/18/2011	10:51 to 11:49	1D	480	60	420	5.0
A8 ⁽²⁾	5/18/2011	12:29 to 13:35	1D	480	60	420	5.0
B7	5/18/2011	12:37 to 14:03	1D	480	25	455	5.2
A9 ⁽²⁾	5/18/2011	15:38 to 16:36	1D	480	60	420	5.0
B8	5/18/2011	15:50 to 17:30	1D	480	25	455	5.2
A10	5/19/2011	17:16 to 8:18	1D	480	25	455	5.2
B9	5/19/2011	7:37 to 17:00	1C	480	37	443	7.7
A11	5/19/2011	9:00 to 10:08	1D	480	25	455	5.2
A12	5/19/2011	10:50 to 11:43	1D	480	25	455	5.2
A13	5/19/2011	14:28 to 15:51	1D	480	25	455	5.2
A14	5/19/2011	16:42 to 17:44	1D	480	25	455	5.2
A15	5/20/2011	8:40 to 9:33	1D	480	25	455	5.2
B10	5/20/2011	10:12 to 13:24	2B	480	12.5	467.5	2.6
A16	5/20/2011	10:17 to 11:04	1D	480	25	455	5.2
A17	5/20/2011	11:43 to 12:32	1D	480	25	455	5.2
B11	5/20/2011	15:19 to 19:05	2B	480	12.5	125	2.6
A18	5/20/2011	14:44 to 16:41	1D	480	25	455	5.2
A19	5/20/2011	15:09 to 15:33	1D	240	12.5	227.5	5.2
A20	5/21/2011	9:00 to 10:25	2A	500	25	475	5.0
B12	5/21/2011	9:00 to 10:40	2B	480	12.5	467.5	2.6

Notes:

- Batch numbers are designated chronologically by injection crew: Redox Tech injection Crew A - Ivan Blackman and Gray Meyers, and Crew B - Matt Ciociola and Mike Miles.
- An incorrect valve was opened on the Crew A mixing tank, resulting in additional ABC® concentrate in the mixing tank (approximately 25% ABC® concentrate). The problem was noted after one injection layer. The solution of 25% ABC® concentrate was pumped into the ABC® concentrate tote creating a 40% ABC® concentrate solution which was used for the next 5 batches (A5, A6, A7, A8 and A9) of ABC®.
- Batch A37 prepared by mixing the remainder of Batches B9 (~120 gallons) and A36 (~180 gallons).

Table 2
Summary of ABC® Batches
Former Tecumseh Products Company Site
Tecumseh, Michigan

Batch Number ⁽¹⁾	Start Date	Installation Time	Injection Section	Total Volume (gallons)	Volume ABC® Concentrate (gallons)	Volume Water (gallons)	Concentration ABC® Concentrate (%)
A21	5/21/2011	10:50 to 12:00	2A	500	25	475	5.0
B13	5/21/2011	11:10 to 13:10	2B	480	12.5	467.5	2.6
A22	5/21/2011	12:15 to 15:30	2A	500	25	475	5.0
B14	5/21/2011	14:30 to 16:33	2B	480	12.5	467.5	2.6
B15	5/21/2011	17:00 to 9:30	2A	500	25	475	5.0
A23	5/21/2011	15:50 to 16:42	2A	500	25	475	5.0
A24	5/21/2011	17:00 to 18:06	2A	500	25	475	5.0
B16	5/22/2011	9:55 to 11:24	2A	500	25	475	5.0
A25	5/22/2011	8:30 to 9:40	2A	500	25	475	5.0
B26	5/22/2011	9:55 to 10:53	2A	500	25	475	5.0
A27	5/22/2011	11:05 to 12:01	2A	500	25	475	5.0
B17	5/22/2011	11:50 to 13:23	2A	500	25	475	5.0
A28	5/22/2011	12:45 to 13:28	2A	500	25	475	5.0
B18	5/23/2011	8:19 to 9:09	2A	500	25	475	5.0
A29	5/23/2011	8:09 to 8:54	2A	500	25	475	5.0
A30	5/23/2011	9:24 to 10:08	2A	501	25	475	5.0
B19	5/23/2011	9:35 to 10:31	2A	500	25	475	5.0
A31	5/23/2011	10:50 to 8:48	2A	500	25	475	5.0
B20	5/23/2011	11:03 to 11:55	2A	500	25	475	5.0
B21	5/23/2011	12:17 to 12:20	2A	500	25	475	5.0
B22	5/23/2011	14:39 to 8:16	2A	500	25	475	5.0
B23	5/24/2011	8:57 to 9:50	2A	500	29	471	5.8
A32	5/24/2011	10:08 to 11:03	2A	500	29	471	5.8
B24	5/24/2011	11:21 to 12:23	2A	500	32	468	6.4
A33	5/24/2011	14:06 to 15:13	2A	500	32	468	6.4
B25	5/24/2011	15:26 to 16:34	2A	500	32	468	6.4
A34	5/24/2011	16:50 to 17:44	2A	500	32	468	6.4
B26	5/24/2011	17:58 to 19:08	2A	500	32	468	6.4
A35	5/24/2011	19:23 to 20:21	2A	500	32	468	6.4
A36	5/25/2011	10:12 to 11:14	1C	550	55	495	10
A37 ⁽³⁾	5/25/2011	12:30 to 14:18	1E	300	27	273	9.0

Notes:

1. Batch numbers are designated chronologically by injection crew: Redox Tech injection Crew A - Ivan Blackman and Gray Meyers, and Crew B - Matt Ciociola and Mike Miles.
2. An incorrect valve was opened on the Crew A mixing tank, resulting in additional ABC® concentrate in the mixing tank (approximately 25% ABC® concentrate). The problem was noted after one injection layer. The solution of 25% ABC® concentrate was pumped into the ABC® concentrate tote creating a 40% ABC® concentrate solution which was used for the next 5 batches (A5, A6, A7, A8 and A9) of ABC®.
3. Batch A37 prepared by mixing the remainder of Batches B9 (~120 gallons) and A36 (~180 gallons).

Table 3
Summary of Injected PRB Construction
Former Tecumseh Products Company Site
Tecumseh, Michigan

Injection Point	Injection Location	Injection Depth (ft bgs)	ABC® Batch Number	Injection Pressure (psi)	Solution Injected (gal)	Injection Date	Start Time	End Time	Mass ZVI (lbs)
SECTION 1C									
1C-1	232.5' N of S Fence, 7' W of E Fence	16	B9	100	25	5/19/2011	7:58	8:09	57
		13		100	30		8:11	8:23	68
		10		100	30		8:27	8:38	68
		7		75	30		8:42	8:54	68
1C-2	225' N of S Fence, 8' W of E Fence	16	B9	125	30	5/19/2011	7:37	7:43	68
		13 ⁽²⁾		100	5		7:51	7:53	11
1C-2R	221' N of S Fence, 2' W of E Fence	20	B9	150	25	5/19/2011	11:58	12:07	57
		17 ⁽²⁾		150	20		12:18	12:22	45
1C-3	215' N of S Fence, 35' W of E Fence	20	B9	150	40	5/19/2011	15:43	15:53	91
		17 ⁽²⁾		150	20		16:04	16:09	45
1C-4	228' N of S Fence, 12' W of E Fence	17 ⁽²⁾	B9	100	20	5/19/2011	11:37	11:42	45
1C-5	206' N of S Fence, 35' W of E Fence	20 ⁽¹⁾	B9	150	10	5/19/2011	16:27	16:31	23
		17 ⁽²⁾		150	10		16:50	16:55	23
1C-6	232.5' N of S Fence, 14' W of E Fence	16 ⁽²⁾	NA	400	0	5/19/2011	9:00	9:01	0
1C-6R	233.5' N of S Fence, 20' W of E Fence	16	B9	100	30	5/19/2011	11:03	11:10	68
		13 ⁽²⁾		100	15		11:15	11:19	34
1C-7	206' N of S Fence, 27' W of E Fence	20 ⁽²⁾	B9	150	20	5/19/2011	16:57	17:00	45
		--		--	--		--	--	--
1C-8	217' N of S Fence, 11' W of E Fence	20	A36	360	36	5/25/2011	10:12	10:18	68
		17		160	36		10:19	10:23	68
		14 ⁽²⁾		110	10		10:25	10:27	19
1C-9	213' N of S Fence, 21' W of E Fence	20	A36	120	26	5/25/2011	10:30	10:34	49
		17		120	36		10:36	10:39	68
		14		120	40		10:39	10:44	100
		11		120	40		10:45	10:50	100
		8		120	120		10:50	11:14	300

Notes:

1. Refusal, no additional ABC®+ could be injected at this interval.
2. Daylighting occurred. Injection at designated location terminated and re-located.

Table 3
Summary of Injected PRB Construction
Former Tecumseh Products Company Site
Tecumseh, Michigan

Injection Point	Injection Location	Injection Depth (ft bgs)	ABC® Batch Number	Injection Pressure (psi)	Solution Injected (gal)	Injection Date	Start Time	End Time	Mass ZVI (lbs)
SECTION 1D									
1D-1	505' N of S Fence, 5' W of E Fence	24	A1	110	40	5/16/2011	17:28	17:32	60
		21		110	40		17:32	17:36	60
		18		120	40		17:42	17:45	60
1D-2	500' N of S Fence, 15' W of E Fence	24	A1	110	40	5/16/2011	17:09	17:12	60
		21		110	40		17:13	17:17	60
		18		120	40		17:22	17:25	60
1D-3	495' N of S Fence, 5' W of E Fence	24	A1	120	40	5/16/2011	16:52	16:55	60
		21		120	40		16:58	17:02	60
		18		110	40		17:03	17:07	60
1D-4	490' N of S Fence, 15' W of E Fence	24	A1	150	40	5/16/2011	16:32	16:35	60
		21		140	40		16:38	16:41	60
		18		130	40		16:42	16:46	60
1D-5	485' N of S Fence, 5' W of E Fence	24	A2	140	40	5/17/2011	8:32	8:36	60
		21		140	40		8:36	8:40	60
		18		120	40		8:42	8:45	60
1D-6	480' N of S Fence, 15' W of E Fence	24	A2	130	40	5/17/2011	8:15	8:18	60
		21		130	40		8:19	8:22	60
		18		135	40		8:23	8:26	60
1D-7	475' N of S Fence, 5' W of E Fence	24	A3	150	40	5/17/2011	10:16	10:22	60
		21		115	40		10:25	10:31	60
		18		110	40		10:31	10:37	60
1D-8	470' N of S Fence, 15' W of E Fence	24	A2	140	40	5/17/2011	9:01	9:07	60
		21		130	40		9:08	9:14	60
		18		120	40		9:14	9:18	60
1D-9	465' N of S Fence, 5' W of E Fence	24	A2	110	40	5/17/2011	9:23	9:29	60
		21		110	40		9:30	9:37	60
		18		110	40		9:37	9:41	60
1D-10	460' N of S Fence, 15' W of E Fence	24	A3	120	40	5/17/2011	11:10	11:16	60
		21		120	40		11:16	11:22	60
		18		120	40		11:22	11:27	60

Notes:

1. Refusal, no additional ABC®+ could be injected at this interval.
2. Daylighting occurred. Injection at designated location terminated and re-located.

Table 3
Summary of Injected PRB Construction
Former Tecumseh Products Company Site
Tecumseh, Michigan

Injection Point	Injection Location	Injection Depth (ft bgs)	ABC® Batch Number	Injection Pressure (psi)	Solution Injected (gal)	Injection Date	Start Time	End Time	Mass ZVI (lbs)
SECTION 1D (Continued)									
1D-11	455' N of S Fence, 5' W of E Fence	24	A3	140	40	5/17/2011	10:44	10:48	60
		21		130	40		10:48	10:54	60
		18		110	40		10:56	11:00	60
1D-12	450' N of S Fence, 15' W of E Fence	24	A4	150	40	5/17/2011	13:52	13:57	60
		21		130	40		13:57	14:05	60
		18		120	40		14:05	14:09	60
1D-13	445' N of S Fence, 5' W of E Fence	24	A3	120	40	5/17/2011	11:38	11:43	60
		21		150	40		11:43	11:49	60
		18		140	40		11:51	11:57	60
1D-14	440' N of S Fence, 15' W of E Fence	24	A4	130	40	5/17/2011	14:33	14:38	60
		21		140	40		15:42	15:45	60
		18	A4*	140	40		15:47	15:51	60
1D-15	435' N of S Fence, 5' W of E Fence	24	A4	140	40	5/17/2011	14:17	14:20	60
		21		130	40		14:20	14:24	60
		18		110	40		14:24	14:28	60
1D-16	430' N of S Fence, 15' W of E Fence	24	B1	150	40	5/16/2011	16:37	16:42	60
		21		150	40		16:43	16:47	60
		18		150	40		16:51	16:54	60
1D-17	425' N of S Fence, 5' W of E Fence	24	B1	150	40	5/16/2011	17:37	17:40	60
		21		150	40		17:41	17:45	60
		18		150	40		17:46	17:50	60
1D-18	420' N of S Fence, 15' W of E Fence	24	B1	150	40	5/17/2011	8:02	8:05	60
		21		150	40		8:10	8:13	60
		18		150	40		8:15	8:18	60
1D-19	415' N of S Fence, 5' W of E Fence	24	B1	150	40	5/16/2011	18:25	18:28	60
		21		150	40		18:29	18:32	60
		18		150	40		18:34	18:37	60
1D-20	410' N of S Fence, 15' W of E Fence	24	B2	150	40	5/17/2011	9:03	9:07	60
		21		150	40		9:10	9:14	60
		18		150	40		9:20	9:24	60

Notes:

1. Refusal, no additional ABC®+ could be injected at this interval.
2. Daylighting occurred. Injection at designated location terminated and re-located.

Table 3
Summary of Injected PRB Construction
Former Tecumseh Products Company Site
Tecumseh, Michigan

Injection Point	Injection Location	Injection Depth (ft bgs)	ABC® Batch Number	Injection Pressure (psi)	Solution Injected (gal)	Injection Date	Start Time	End Time	Mass ZVI (lbs)
SECTION 1D (Continued)									
1D-21	405' N of S Fence, 5' W of E Fence	24	B2	150	40	5/17/2011	9:50	9:55	60
		21		150	40		9:56	10:00	60
		18		150	40		10:01	10:05	60
1D-22	400' N of S Fence, 15' W of E Fence	24	B2	150	40	5/17/2011	9:28	9:31	60
		21		150	40		9:33	9:37	60
		18		150	40		9:39	9:42	60
1D-23	395' N of S Fence, 5' W of E Fence	24	B2	150	40	5/17/2011	10:18	10:21	60
		21		150	40		10:22	10:25	60
		18		150	40		10:26	10:29	60
1D-24	390' N of S Fence, 15' W of E Fence	24	B3	150	40	5/17/2011	11:13	11:18	60
		21		150	40		11:19	11:23	60
		18		150	40		11:24	11:28	60
1D-25	385' N of S Fence, 5' W of E Fence	24	B3	150	40	5/17/2011	11:30	11:34	60
		21		150	40		11:35	11:39	60
		18		150	40		11:40	11:43	60
1D-26	380' N of S Fence, 15' W of E Fence	24	B3	150	40	5/17/2011	12:00	12:04	60
		21		150	40		12:05	12:08	60
		18		150	40		12:11	12:15	60
1D-27	375' N of S Fence, 5' W of E Fence	24	B3	150	40	5/17/2011	13:49	13:53	60
		21		150	40		13:56	13:59	60
		18		150	40		14:00	14:03	60
1D-28	370' N of S Fence, 15' W of E Fence	24	B4	150	40	5/17/2011	15:32	15:34	60
		21		150	40		15:35	15:39	60
		18		150	40		15:41	15:53	60
1D-29	365' N of S Fence, 5' W of E Fence	24	B4	150	40	5/17/2011	15:10	15:13	60
		21		150	40		15:14	15:19	60
		18		150	40		15:20	15:26	60
1D-30	360' N of S Fence, 15' W of E Fence	24	B4	150	40	5/17/2011	16:11	16:15	60
		21		150	40		16:16	16:19	60
		18		150	40		16:20	16:23	60

Notes:

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Table 3
Summary of Injected PRB Construction
Former Tecumseh Products Company Site
Tecumseh, Michigan

Injection Point	Injection Location	Injection Depth (ft bgs)	ABC® Batch Number	Injection Pressure (psi)	Solution Injected (gal)	Injection Date	Start Time	End Time	Mass ZVI (lbs)
SECTION 1D (Continued)									
1D-31	355' N of S Fence, 5' W of E Fence	24	B4	150	40	5/17/2011	16:58	17:03	60
		21		150	40		17:04	17:07	60
		18		150	40		17:08	17:12	60
1D-32	350' N of S Fence, 15' W of E Fence	24	B5	150	40	5/18/2011	8:29	8:33	60
		21		150	40		8:34	8:37	60
		18		150	40		8:39	8:42	60
1D-33	345' N of S Fence, 5' W of E Fence	24	B5	175	40	5/18/2011	8:13	8:18	60
		21		200	40		8:19	8:23	60
		18		180	40		8:25	8:28	60
1D-34	340' N of S Fence, 15' W of E Fence	24	B5	100	40	5/18/2011	9:34	9:39	60
		21		100	40		9:40	9:44	60
		18		100	40		9:44	9:50	60
1D-35	335' N of S Fence, 5' W of E Fence	24	B5	150	40	5/18/2011	9:13	9:18	60
		21		100	40		9:19	9:26	60
		18		100	40		9:27	9:34	60
1D-36	330' N of S Fence, 15' W of E Fence	24	B6	100	40	5/18/2011	10:48	10:53	60
		21		100	40		10:54	10:58	60
		18		100	40		10:59	11:04	60
1D-37	325' N of S Fence, 5' W of E Fence	24	B6	100	40	5/18/2011	10:31	10:36	60
		21		100	40		10:37	10:41	60
		18		100	40		10:42	10:47	60
1D-38	320' N of S Fence, 25' W of E Fence	24	B6	100	40	5/18/2011	11:32	11:36	60
		21		100	40		11:37	11:40	60
		18		100	40		11:41	11:44	60
1D-39	315' N of S Fence, 5' W of E Fence	24	B6	100	40	5/18/2011	11:47	11:50	60
		21		100	40		11:51	11:55	60
		18		100	40		11:55	12:00	60
1D-40	310' N of S Fence, 15' W of E Fence	24	B7	100	40	5/18/2011	12:37	12:42	60
		21		100	40		12:43	12:46	60
		18		100	40		12:47	12:51	60

Notes:

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Table 3
Summary of Injected PRB Construction
Former Tecumseh Products Company Site
Tecumseh, Michigan

Injection Point	Injection Location	Injection Depth (ft bgs)	ABC® Batch Number	Injection Pressure (psi)	Solution Injected (gal)	Injection Date	Start Time	End Time	Mass ZVI (lbs)
SECTION 1D (Continued)									
1D-41	305' N of S Fence, 5' W of E Fence	24	B7	100	40	5/18/2011	12:52	12:56	60
		21		100	40		12:57	13:01	60
		18		100	40		13:02	13:06	60
1D-42	300' N of S Fence, 15' W of E Fence	24	B7	100	40	5/18/2011	13:33	13:37	60
		21		100	40		13:38	13:42	60
		18		100	40		13:43	13:47	60
1D-43	295' N of S Fence, 5' W of E Fence	24	B7	100	40	5/18/2011	13:48	13:52	60
		21		100	40		13:53	13:56	60
		18		100	40		13:57	14:03	60
1D-44	290' N of S Fence, 15' W of E Fence	24	B8	150	40	5/18/2011	16:07	16:10	60
		21		150	40		16:10	16:14	60
		18		150	40		16:15	16:20	60
1D-45	285' N of S Fence, 5' W of E Fence	24	B8	150	40	5/18/2011	15:50	15:55	60
		21		150	40		15:55	16:00	60
		18		150	40		16:01	16:06	60
1D-46	280' N of S Fence, 15' W of E Fence	24	B8	100	40	5/18/2011	16:44	16:49	60
		21		100	40		16:49	16:54	60
		18		100	40		16:54	17:00	60
1D-47	275' N of S Fence, 5' W of E Fence	24	B8	100	40	5/18/2011	17:06	17:10	60
		21		100	40		17:16	17:19	60
		18		100	40		17:21	17:30	60
1D-48	270' N of S Fence, 15' W of E Fence	24	5A	120	40	5/18/2011	8:14	8:16	60
		21		120	40		8:16	8:20	60
		18		120	40		8:21	8:24	60
1D-49	265' N of S Fence, 5' W of E Fence	24	A6	110	40	5/18/2011	9:18	9:22	60
		21		110	40		9:22	9:25	60
		18		110	40		9:26	9:30	60
1D-50	260' N of S Fence, 15' W of E Fence	24	A6	120	40	5/18/2011	9:36	9:40	60
		21		110	40		9:40	9:44	60
		18		110	40		9:44	9:49	60

Notes:

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Table 3
Summary of Injected PRB Construction
Former Tecumseh Products Company Site
Tecumseh, Michigan

Injection Point	Injection Location	Injection Depth (ft bgs)	ABC® Batch Number	Injection Pressure (psi)	Solution Injected (gal)	Injection Date	Start Time	End Time	Mass ZVI (lbs)
SECTION 1D (Continued)									
1D-51	255' N of S Fence, 5' W of E Fence	24	A6	110	40	5/18/2011	9:00	9:04	60
		21		120	40		9:05	9:09	60
		18		120	40		9:11	9:14	60
1D-52	250' N of S Fence, 15' W of E Fence	24	A7	110	40	5/18/2011	11:04	11:08	60
		21		110	40		11:08	11:11	60
		18		110	40		11:12	11:15	60
1D-53	245' N of S Fence, 5' W of E Fence	24	A6	110	40	5/18/2011	9:53	9:55	60
		21		120	40		10:01	10:04	60
		18		120	40		10:05	10:09	60
1D-54	240' N of S Fence, 15' W of E Fence	24	A7	110	40	5/18/2011	11:23	11:26	60
		21		110	40		11:27	11:30	60
		18		110	40		11:31	11:34	60
1D-55	237.5' N of S Fence, 5' W of E Fence	24	A7	145	40	5/18/2011	10:51	10:54	60
		21		140	40		10:55	10:57	60
		18		150	40		10:59	11:03	60
1D-56	230' N of S Fence, 15' W of E Fence	24	A7	120	40	5/18/2011	11:37	11:40	60
		21		110	40		11:41	11:44	60
		18		110	40		11:45	11:49	60
1D-57	225' N of S Fence, 5' W of E Fence	24	A8	120	40	5/18/2011	12:44	12:47	60
		21		110	40		12:48	12:51	60
		18		110	40		12:54	12:57	60
1D-58	221' N of S Fence, 17' W of E Fence	24	A8	110	40	5/18/2011	12:29	12:31	60
		21		110	40		12:31	12:35	60
		18		110	40		12:36	12:39	60
1D-59	215' N of S Fence, 5' W of E Fence	24	A8	130	40	5/18/2011	13:21	13:26	60
		21		140	40		13:26	13:32	60
		18		120	40		13:32	13:35	60
1D-60	210' N of S Fence, 15' W of E Fence	24	A8	110	40	5/18/2011	13:03	13:06	60
		21		110	40		13:08	13:11	60
		18		110	40		13:12	13:15	60

Notes:

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Table 3
Summary of Injected PRB Construction
Former Tecumseh Products Company Site
Tecumseh, Michigan

Injection Point	Injection Location	Injection Depth (ft bgs)	ABC® Batch Number	Injection Pressure (psi)	Solution Injected (gal)	Injection Date	Start Time	End Time	Mass ZVI (lbs)
SECTION 1D (Continued)									
1D-61	205' N of S Fence, 5' W of E Fence	24	A9	140	40	5/18/2011	15:54	15:57	60
		21		120	40		15:58	16:01	60
		18		120	40		16:01	16:05	60
1D-62	200' N of S Fence, 15' W of E Fence	24	A9	120	40	5/18/2011	15:38	15:41	60
		21		110	40		15:41	15:44	60
		18		120	40		15:46	15:49	60
1D-63	195' N of S Fence, 5' W of E Fence	24	A9	130	40	5/18/2011	16:10	16:13	60
		21		120	40		16:14	16:17	60
		18		120	40		16:17	16:20	60
1D-64	190' N of S Fence, 15' W of E Fence	24	A9	130	40	5/18/2011	16:25	16:28	60
		21		120	40		16:28	16:32	60
		18		130	40		16:32	16:36	60
1D-65	185' N of S Fence, 5' W of E Fence	24	A10	130	40	5/18/2011	17:29	17:33	60
		21		130	40		17:33	17:36	60
		18		150	40		17:37	17:39	60
1D-66	180' N of S Fence, 15' W of E Fence	24	A10	150	40	5/18/2011	17:16	17:19	60
		21		130	40		17:19	17:22	60
		18		120	40		17:22	17:25	60
1D-67	175' N of S Fence, 5' W of E Fence	24	A10	110	40	5/19/2011	8:03	8:06	60
		21		115	40		8:08	8:11	60
		18		115	40		8:11	8:15	60
1D-68	170' N of S Fence, 15' W of E Fence	24	A10	130	40	5/19/2011	7:49	7:52	60
		21		130	40		7:53	7:56	60
		18		110	40		7:59	8:02	60
1D-69	165' N of S Fence, 5' W of E Fence	24	A11	130	40	5/19/2011	9:00	9:03	60
		21		130	40		9:04	9:06	60
		18		140	40		9:12	9:15	60
1D-70	160' N of S Fence, 15' W of E Fence	24	A11	130	40	5/19/2011	9:18	9:21	60
		21		150	40		9:22	9:28	60
		18		130	40		9:28	9:31	60

Notes:

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Table 3
Summary of Injected PRB Construction
Former Tecumseh Products Company Site
Tecumseh, Michigan

Injection Point	Injection Location	Injection Depth (ft bgs)	ABC® Batch Number	Injection Pressure (psi)	Solution Injected (gal)	Injection Date	Start Time	End Time	Mass ZVI (lbs)
SECTION 1D (Continued)									
1D-71	155' N of S Fence, 5' W of E Fence	24	A11	120	40	5/19/2011	9:35	9:38	60
		21		120	40		9:38	9:41	60
		18		110	40		9:47	9:50	60
1D-72	150' N of S Fence, 15' W of E Fence	24	A12	130	40	5/19/2011	11:03	11:07	60
		21		130	40		11:07	11:10	60
		18		130	40		11:11	11:14	60
1D-73	145' N of S Fence, 5' W of E Fence	24	A11	130	40	5/19/2011	9:51	10:00	60
		21		130	40		10:01	10:04	60
		18		120	40		10:05	10:08	60
1D-74	140' N of S Fence, 15' W of E Fence	24	A12	130	40	5/19/2011	11:20	11:23	60
		21		130	40		11:23	11:27	60
		18		130	40		11:30	11:33	60
1D-75	135' N of S Fence, 5' W of E Fence	24	A12	130	40	5/19/2011	10:50	10:53	60
		21		130	40		10:53	10:57	60
		18		120	40		10:58	11:01	60
1D-76	130' N of S Fence, 15' W of E Fence	24	A13	130	40	5/19/2011	14:28	14:31	60
		21		120	40		14:31	14:35	60
		18		120	40		14:36	14:38	60
1D-77	125' N of S Fence, 5' W of E Fence	24	A12	130	40	5/19/2011	11:33	11:36	60
		21		130	40		11:38	11:41	60
		18		130	40		11:41	11:43	60
1D-78	120' N of S Fence, 15' W of E Fence	24	A13	120	40	5/19/2011	14:53	14:56	60
		21		110	40		14:56	15:00	60
		18		110	40		15:01	15:04	60
1D-79	115' N of S Fence, 5' W of E Fence	24	A13	110	40	5/19/2011	14:40	14:43	60
		21		110	40		14:43	14:46	60
		18		110	40		14:47	14:50	60
1D-80	110' N of S Fence, 15' W of E Fence	24	A14	130	40	5/19/2011	16:57	17:01	60
		21		140	40		17:04	17:07	60
		18		130	40		17:09	17:10	60

Notes:

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Table 3
Summary of Injected PRB Construction
Former Tecumseh Products Company Site
Tecumseh, Michigan

Injection Point	Injection Location	Injection Depth (ft bgs)	ABC® Batch Number	Injection Pressure (psi)	Solution Injected (gal)	Injection Date	Start Time	End Time	Mass ZVI (lbs)
SECTION 1D (Continued)									
1D-81	105' N of S Fence, 5' W of E Fence	24	A13	150	40	5/19/2011	15:08	15:10	60
		21 ⁽¹⁾		900	0		NA	NA	0
		18		120	80		15:31	15:51	120
1D-82	100' N of S Fence, 15' W of E Fence	24	A14	130	40	5/19/2011	17:16	17:18	60
		21		130	40		17:18	17:20	60
		18		120	40		17:24	17:27	60
1D-83	95' N of S Fence, 5' W of E Fence	24	A14	130	40	5/19/2011	16:42	16:45	60
		21		130	40		16:45	16:48	60
		18		120	40		16:50	16:53	60
1D-84	90' N of S Fence, 15' W of E Fence	24	A14	115	40	5/19/2011	17:33	17:36	60
		21		130	40		17:36	17:39	60
		18		130	40		17:40	17:44	60
1D-85	85' N of S Fence, 5' W of E Fence	24	A15	115	40	5/20/2011	8:56	8:59	60
		21		150	40		9:00	9:04	60
		18		150	40		9:05	9:08	60
1D-86	80' N of S Fence, 15' W of E Fence	24	A15	120	40	5/20/2011	8:40	8:44	60
		21		120	40		8:44	8:50	60
		18		110	40		8:50	8:55	60
1D-87	75' N of S Fence, 5' W of E Fence	24	A15	150	40	5/20/2011	9:10	9:12	60
		21		120	40		9:14	9:16	60
		18		120	40		9:17	9:20	60
1D-88	70' N of S Fence, 15' W of E Fence	24	A15	150	40	5/20/2011	9:22	9:24	60
		21		120	40		9:26	9:29	60
		18		120	40		9:29	9:33	60
1D-89	65' N of S Fence, 5' W of E Fence	24	A16	140	40	5/20/2011	10:29	10:32	60
		21		140	40		10:33	10:36	60
		18		140	40		10:36	10:39	60
1D-90	60' N of S Fence, 15' W of E Fence	24	A16	180	40	5/20/2011	10:17	10:20	60
		21		130	40		10:20	10:23	60
		18		130	40		10:24	10:28	60

Notes:

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Table 3
Summary of Injected PRB Construction
Former Tecumseh Products Company Site
Tecumseh, Michigan

Injection Point	Injection Location	Injection Depth (ft bgs)	ABC® Batch Number	Injection Pressure (psi)	Solution Injected (gal)	Injection Date	Start Time	End Time	Mass ZVI (lbs)
SECTION 1D (Continued)									
1D-91	55' N of S Fence, 5' W of E Fence	24	A16	130	40	5/20/2011	10:41	10:44	60
		21		130	40		10:44	10:47	60
		18		130	40		10:48	10:51	60
1D-92	50' N of S Fence, 15' W of E Fence	24	A17	150	40	5/20/2011	11:54	11:57	60
		21		150	40		11:58	12:01	60
		18		150	40		12:01	12:05	60
1D-93	45' N of S Fence, 5' W of E Fence	24	A16	150	40	5/20/2011	10:53	10:56	60
		21		140	40		10:57	11:00	60
		18		150	40		11:00	11:04	60
1D-94	40' N of S Fence, 15' W of E Fence	24	A17	150	40	5/20/2011	11:43	11:46	60
		21		150	40		11:46	11:49	60
		18		140	40		11:49	11:52	60
1D-95	35' N of S Fence, 5' W of E Fence	24	A17	145	40	5/20/2011	12:09	12:11	60
		21		140	40		12:11	12:14	60
		18		140	40		12:14	12:18	60
1D-96	30' N of S Fence, 15' W of E Fence	24	A18	150	40	5/20/2011	14:56	14:58	60
		21		150	40		14:59	15:02	60
		18		150	40		15:02	15:05	60
1D-97	25' N of S Fence, 5' W of E Fence	24	A17	120	40	5/20/2011	12:20	12:23	60
		21		120	40		12:23	12:28	60
		18		120	40		12:28	12:32	60
1D-98	20' N of S Fence, 15' W of E Fence	24	A18	150	40	5/20/2011	16:17	16:20	60
		21		150	40		16:20	16:23	60
		18		150	40		16:24	16:27	60
1D-99	15' N of S Fence, 5' W of E Fence	24	A18	150	40	5/20/2011	14:44	14:47	60
		21		150	40		14:47	14:50	60
		18		150	40		14:52	14:58	60
1D-100	10' N of S Fence, 15' W of E Fence	24	A18	150	40	5/20/2011	16:29	16:32	60
		21		150	40		16:33	16:37	60
		18		150	40		16:37	16:41	60

Notes:

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Table 3
Summary of Injected PRB Construction
Former Tecumseh Products Company Site
Tecumseh, Michigan

Injection Point	Injection Location	Injection Depth (ft bgs)	ABC® Batch Number	Injection Pressure (psi)	Solution Injected (gal)	Injection Date	Start Time	End Time	Mass ZVI (lbs)
SECTION 1D (Continued)									
1D-101	5' N of S Fence, 5' W of E Fence	24	A19	150	40	5/20/2011	15:09	15:09	60
		21		150	40		15:14	15:17	60
		18		150	40		15:17	15:20	60
1D-102	3' N of S Fence, 15' W of E Fence	24	A19	150	40	5/20/2011	15:26	15:29	60
		21		150	40		15:29	15:33	60
		18		150	40		15:33	15:36	60
SECTION 1E									
1E-1	10' N of S Fence, 6' W of E Fence	20	A37	200	30	5/25/2011	12:30	12:33	45
		17		200	30		12:33	12:36	45
		14		180	30		12:36	12:39	45
		11		160	30		12:40	12:42	45
		8		140	30		12:43	12:45	45
1E-2	5' N of S Fence, 15' W of E Fence	20	A37	200	30	5/25/2011	12:47	12:50	45
		17		160	30		14:05	14:08	45
		14		140	30		14:09	14:11	45
		11		140	30		14:13	14:16	45
		8		140	30		14:16	14:18	45
SECTION 2A									
2A-1	5'W and 100' N of Fence Corner, 275' N of S Fence	28	B15	150	50	5/21/2011	17:59	18:05	72
		25		150	50		18:09	18:12	72
		22		150	50		18:14	18:20	72
		19		100	50		18:21	18:25	72
		16		100	50		18:31	18:35	72
2A-2	15'W and 95' N of Fence Corner, 270' N of S Fence	28	B16	150	50	5/22/2011	10:39	10:44	72
		25		100	50		10:45	10:54	72
		22		100	50		10:57	11:05	72
		19		100	50		11:07	11:15	72
		16		100	50		11:18	11:24	72

Notes:

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Table 3
Summary of Injected PRB Construction
Former Tecumseh Products Company Site
Tecumseh, Michigan

Injection Point	Injection Location	Injection Depth (ft bgs)	ABC® Batch Number	Injection Pressure (psi)	Solution Injected (gal)	Injection Date	Start Time	End Time	Mass ZVI (lbs)
SECTION 2A (Continued)									
2A-3	5'W and 90' N of Fence Corner, 265' N of S Fence	28	B16	150	50	5/22/2011	10:01	10:06	72
		25		100	50		10:11	10:15	72
		22		100	50		10:16	10:22	72
		19		100	50		10:25	10:30	72
		16		100	50		10:31	10:36	72
2A-4	15'W and 85' N of Fence Corner, 260' N of S Fence	28	B15	150	50	5/22/2011	8:56	9:02	72
		25		150	50		9:03	9:08	72
		22		100	50		9:11	9:16	72
		19		100	50		9:19	9:25	72
		16		100	50		9:25	9:30	72
2A-5	5'W and 80' N of Fence Corner, 255' N of S Fence	28	B17	150	50	5/22/2011	11:58	12:05	72
		25		100	50		12:06	12:13	72
		22		100	50		12:18	12:24	72
		19		100	50		12:26	12:33	72
		16		100	50		12:38	12:44	72
2A-6	15'W and 75' N of Fence Corner, 250' N of S Fence	28	B17	175	50	5/22/2011	12:55	13:00	72
		25		150	50		13:00	13:06	72
		22		100	50		13:07	13:13	72
		19		100	50		13:14	13:18	72
		16		100	50		13:19	13:23	72
2A-7	5'W and 70' N of Fence Corner, 245' N of S Fence	28	B19	150	50	5/23/2011	10:07	10:11	72
		25		150	50		10:15	10:19	72
		22		150	50		10:19	10:23	72
		19		125	50		10:23	10:27	72
		16		150	50		10:29	10:31	72
2A-8	15'W and 65' N of Fence Corner, 240' N of S Fence	28	B18	250	50	5/23/2011	8:42	8:45	72
		25		200	50		8:46	8:51	72
		22		200	50		8:51	8:55	72
		19		200	50		8:56	8:59	72
		16		200	50		9:01	9:09	72

Notes:

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Table 3
Summary of Injected PRB Construction
Former Tecumseh Products Company Site
Tecumseh, Michigan

Injection Point	Injection Location	Injection Depth (ft bgs)	ABC® Batch Number	Injection Pressure (psi)	Solution Injected (gal)	Injection Date	Start Time	End Time	Mass ZVI (lbs)
SECTION 2A (Continued)									
2A-9	5'W and 60' N of Fence Corner, 235' N of S Fence	28	B18	200	50	5/23/2011	8:19	8:21	72
		25		200	50		8:24	8:27	72
		22		200	50		8:28	8:31	72
		19		200	50		8:33	8:36	72
		16		200	50		8:37	8:40	72
2A-10	15'W and 55' N of Fence Corner, 230' N of S Fence	28	B19	250	50	5/23/2011	9:35	9:42	72
		25		200	50		9:45	9:48	72
		22		150	50		9:48	9:52	72
		19		175	50		9:54	9:57	72
		16		175	50		9:58	10:02	72
2A-11	5'W and 50' N of Fence Corner, 225' N of S Fence	28	B20	200	50	5/23/2011	11:03	11:07	72
		25		200	50		11:09	11:12	72
		22		200	50		11:12	11:17	72
		19		200	50		11:19	11:22	72
		16		175	50		11:25	11:28	72
2A-12	15'W and 45' N of Fence Corner, 220' N of S Fence	28	B20	175	50	5/23/2011	11:32	11:36	72
		25		175	50		11:37	11:41	72
		22		175	50		11:41	11:45	72
		19		175	50		11:46	11:50	72
		16		175	50		11:52	11:55	72
2A-13	5'W and 40' N of Fence Corner, 215' N of S Fence	28	B22	200	50	5/23/2011	14:39	14:42	72
		25		200	50		14:44	14:48	72
		22		175	50		14:48	14:53	72
		19		175	50		14:55	14:59	72
		16		175	50		14:59	15:23	72
2A-14	15'W and 35' N of Fence Corner, 210' N of S Fence	28	B21	200	50	5/23/2011	12:17	12:21	72
		25		175	50		12:22	12:26	72
		22		175	50		12:26	12:30	72
		19		175	50		12:33	12:36	72
		16		175	50		12:38	12:43	72

Notes:

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Table 3
Summary of Injected PRB Construction
Former Tecumseh Products Company Site
Tecumseh, Michigan

Injection Point	Injection Location	Injection Depth (ft bgs)	ABC® Batch Number	Injection Pressure (psi)	Solution Injected (gal)	Injection Date	Start Time	End Time	Mass ZVI (lbs)
SECTION 2A (Continued)									
2A-15	5'W and 30' N of Fence Corner, 205' N of S Fence	28	B21	200	50	5/23/2011	12:53	12:57	72
		25		200	50		12:59	13:04	72
		22		200	50		13:04	13:08	72
		19		175	50		13:09	13:14	72
		16		175	50		13:14	13:17	72
2A-16	15'W and 25' N of Fence Corner, 200' N of S Fence	28	B22	275	50	5/24/2011	7:50	7:55	72
		25		200	50		7:57	8:01	72
		22		175	50		8:01	8:06	72
		19		175	50		8:09	8:12	72
		16		175	50		8:13	8:16	72
2A-17	5'W and 20' N of Fence Corner, 195' N of S Fence	28	A31	225	50	5/24/2011	8:20	8:24	72
		25		200	50		8:28	8:32	72
		22		175	50		8:32	8:36	72
		19		175	50		8:38	8:42	72
		16		175	50		8:44	8:48	72
2A-18	15'W and 15' N of Fence Corner, 190' N of S Fence	28	B24	200	50	5/24/2011	11:51	11:56	72
		25		175	50		11:56	12:01	72
		22		175	50		12:02	12:06	72
		19		175	50		12:11	12:17	72
		16		175	50		12:18	12:23	72
2A-19	10'S of Fence Corner, 185' N of S Fence	28	B24	200	50	5/24/2011	11:21	11:25	72
		25		175	50		11:29	11:33	72
		22		175	50		11:35	11:38	72
		19		175	50		11:40	11:43	72
		16		175	50		11:45	11:49	72
2A-20	18'W and 5' N of Fence Corner, 180' N of S Fence	28	A32	175	50	5/24/2011	10:36	10:40	72
		25		175	50		10:41	10:48	72
		22		175	50		10:49	10:53	72
		19		175	50		10:53	10:56	72
		16		175	50		10:59	11:03	72

Notes:

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Table 3
Summary of Injected PRB Construction
Former Tecumseh Products Company Site
Tecumseh, Michigan

Injection Point	Injection Location	Injection Depth (ft bgs)	ABC [®] Batch Number	Injection Pressure (psi)	Solution Injected (gal)	Injection Date	Start Time	End Time	Mass ZVI (lbs)
SECTION 2A (Continued)									
2A-21	5.5' W of E Fence, 173' N of S Fence, 2' S of Fence Corner	28	B25	225	50	5/24/2011	15:55	15:59	72
		25		225	50		16:01	16:05	72
		22		200	50		16:09	16:13	72
		19		200	50		16:14	16:18	72
		16		200	50		16:21	16:26	72
2A-22	15' W of E Fence, 170' N of S Fence	28	B25	200	50	5/24/2011	16:30	16:34	72
		25	A34	200	100		16:50	16:58	144
		22		175	50		16:59	17:02	72
		19		175	50		17:03	17:06	72
		16		175	50		17:07	17:11	72
2A-23	5' W of E Fence, 165' N of S Fence	28	A34	175	50	5/24/2011	17:17	17:20	72
		25		175	50		17:22	17:25	72
		22		175	50		17:27	17:31	72
		19		175	50		17:33	17:37	72
		16		175	50		17:40	17:44	72
2A-24	15' W of E Fence, 160' N of S Fence	28	B26	175	50	5/24/2011	17:58	18:03	72
		25		175	50		18:04	18:07	72
		22		175	50		18:08	18:12	72
		19		175	50		18:16	18:21	72
		16		175	50		18:21	18:30	72
2A-25	5' W of E Fence, 155' N of S Fence	28	B26	175	50	5/24/2011	18:31	18:34	72
		25		175	50		18:37	18:49	72
		22		175	50		18:49	18:55	72
		19 ⁽²⁾		--	--		--	--	--
2A-26	15' W of E Fence, 150' N of S Fence	28	B26	175	100	5/24/2011	19:00	19:08	72
		25	A35	175	50		19:23	19:26	72
		22		175	50		19:26	19:29	72
		19		175	50		19:32	19:36	72
		16		175	50		19:36	19:40	72

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Table 3
Summary of Injected PRB Construction
Former Tecumseh Products Company Site
Tecumseh, Michigan

Injection Point	Injection Location	Injection Depth (ft bgs)	ABC® Batch Number	Injection Pressure (psi)	Solution Injected (gal)	Injection Date	Start Time	End Time	Mass ZVI (lbs)
SECTION 2A (Continued)									
2A-27	5' W of E Fence, 145' N of S Fence	28	A35	175	100	5/24/2011	19:42	19:48	72
		25		175	50		19:51	19:58	72
		22		175	50		19:59	20:03	72
		19		175	50		20:11	20:16	72
		16		175	50		20:16	20:21	72
2A-28	15' W of E Fence, 140' N of S Fence	28	A33	175	50	5/24/2011	14:06	14:10	72
		25		175	50		14:15	14:23	72
		22		175	50		14:23	14:27	72
		19		200	50		14:32	14:36	72
		16		175	50		14:36	14:40	72
2A-29	5' W of E Fence, 135' N of S Fence	28	A33	175	50	5/24/2011	14:42	14:45	72
		25		175	50		14:46	14:50	72
		22		175	50		14:50	14:54	72
		19		175	50		14:56	15:00	72
		16 ⁽²⁾		--	--		--	--	--
2A-30	15' W of E Fence, 130' N of S Fence	28	A33/B25	175	100	5/24/2011	15:06	15:31	72
		25	B25	175	50		15:34	15:37	72
		22		175	50		15:38	15:41	72
		19		175	50		15:46	15:50	72
		16 ⁽²⁾		--	--		--	--	--
2A-31	5' W of E Fence, 125' N of S Fence	28	A32	150	50	5/24/2011	10:08	10:12	72
		25		200	50		10:14	10:18	72
		22		200	50		10:18	10:23	72
		19		175	50		10:25	10:29	72
		16		175	50		10:30	10:33	72
2A-32	15' W of E Fence, 120' N of S Fence	28	B23	175	50	5/24/2011	9:25	9:28	72
		25		175	50		9:31	9:35	72
		22		175	50		9:35	9:38	72
		19		175	50		9:41	9:44	72
		16		175	50		9:44	9:50	72

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Former Tecumseh Products Company Site
Tecumseh, Michigan

Injection Point	Injection Location	Injection Depth (ft bgs)	ABC® Batch Number	Injection Pressure (psi)	Solution Injected (gal)	Injection Date	Start Time	End Time	Mass ZVI (lbs)
SECTION 2A (Continued)									
2A-33	5' W of E Fence, 115' N of S Fence	28	B23	175	50	5/24/2011	8:57	9:01	72
		25		175	50		9:02	9:06	72
		22		175	50		9:06	9:11	72
		19		175	50		9:13	9:16	72
		16		175	50		9:18	9:22	72
2A-34	15' W of E Fence, 110' N of S Fence	28	A31	320	50	5/23/2011	10:50	10:54	72
		25		200	50		10:55	11:00	72
		22		200	50		11:05	11:10	72
		19		150	50		15:25	15:30	72
		16		150	50		15:33	15:37	72
2A-35	5' W of E Fence, 105' N of S Fence	28	A-30	140	50	5/23/2011	9:46	9:49	72
		25		140	50		9:50	9:54	72
		22		130	50		9:55	9:59	72
		19		130	50		9:59	10:03	72
		16		130	50		10:04	10:08	72
2A-36	15' W of E Fence, 100' N of S Fence	28	A30	150	50	5/23/2011	9:24	9:28	72
		25		150	50		9:28	9:32	72
		22		140	50		9:33	9:36	72
		19		140	50		9:38	9:41	72
		16		140	50		9:42	9:45	72
2A-37	5' W of E Fence, 95' N of S Fence	28	A29	150	50	5/23/2011	8:32	8:36	72
		25		140	50		8:36	8:40	72
		22		140	50		8:41	8:45	72
		19		180	50		8:46	8:49	72
		16		140	50		8:50	8:54	72
2A-38	15' W of E Fence, 90' N of S Fence	28	A29	140	50	5/23/2011	8:09	8:13	72
		25		140	50		8:13	8:17	72
		22		140	50		8:18	8:21	72
		19		140	50		8:21	8:25	72
		16		130	50		8:26	8:30	72

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Tecumseh, Michigan

Injection Point	Injection Location	Injection Depth (ft bgs)	ABC® Batch Number	Injection Pressure (psi)	Solution Injected (gal)	Injection Date	Start Time	End Time	Mass ZVI (lbs)
SECTION 2A (Continued)									
2A-39	5' W of E Fence, 85' N of S Fence	28	A28	190	50	5/22/2011	13:05	13:09	72
		25		195	50		13:09	13:14	72
		22		195	50		13:15	13:18	72
		19		190	50		13:19	13:22	72
		16		190	50		13:24	13:28	72
2A-40	15' W of E Fence, 80' N of S Fence	28	A28	180	50	5/22/2011	12:44	12:47	72
		25		180	50		12:49	12:52	72
		22		180	50		12:53	12:56	72
		19		180	50		12:57	13:00	72
		16		180	50		13:01	13:04	72
2A-41	5' W of E Fence, 75' N of S Fence	28	A27	180	50	5/22/2011	11:41	11:45	72
		25		180	50		11:45	11:48	72
		22		180	50		11:50	11:54	72
		19		180	50		11:54	11:57	72
		16		180	50		11:58	12:01	72
2A-42	15' W of E Fence, 70' N of S Fence	28	A27	170	50	5/22/2011	11:17	11:20	72
		25		170	50		11:22	11:26	72
		22		170	50		11:26	11:30	72
		19		170	50		11:30	11:33	72
		16		170	50		11:34	11:39	72
2A-43	5' W of E Fence, 65' N of S Fence	28	A26	170	50	5/22/2011	10:33	10:35	72
		25		170	50		10:36	10:40	72
		22		170	50		10:41	10:44	72
		19		170	50		10:45	10:48	72
		16		170	50		10:49	10:53	72
2A-44	15' W of E Fence, 60' N of S Fence	28	A25	150	50	5/22/2011	9:03	9:07	72
		25		150	50		9:07	9:10	72
		22		150	50		9:12	9:15	72
		19		150	50		9:16	9:18	72
		16		150	50		9:19	9:23	72

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Former Tecumseh Products Company Site
Tecumseh, Michigan

Injection Point	Injection Location	Injection Depth (ft bgs)	ABC® Batch Number	Injection Pressure (psi)	Solution Injected (gal)	Injection Date	Start Time	End Time	Mass ZVI (lbs)
SECTION 2A (Continued)									
2A-45	5' W of E Fence, 55' N of S Fence	28	A26	170	50	5/22/2011	10:07	10:11	72
		25		170	50		10:11	10:14	72
		22		160	50		10:16	10:20	72
		19		180	50		10:20	10:23	72
		16		140	50		10:26	10:30	72
2A-46	15' W of E Fence, 50' N of S Fence	28	A25	150	50	5/22/2011	9:25	9:29	72
		25		150	50		9:30	9:33	72
		22		150	50		9:34	9:37	72
		19		150	50		9:37	9:41	72
		16		150	50		9:42	9:45	72
2A-47	5' W of E Fence, 45' N of S Fence	28	A24	140	50	5/21/2011	17:47	17:49	72
		25		130	50		17:49	17:52	72
		22		130	50		17:35	17:58	72
		19		130	50		17:58	18:02	72
		16		130	50		18:02	18:06	72
2A-48	15' W of E Fence, 40' N of S Fence	28	A24	150	50	5/21/2011	17:23	17:26	72
		25		140	50		17:26	17:30	72
		22		130	50		17:33	17:36	72
		19		130	50		17:36	17:40	72
		16		130	50		17:44	17:48	72
2A-49	5' W of E Fence, 35' N of S Fence	28	A23	130	50	5/21/2011	16:21	16:24	72
		25		130	50		16:24	16:27	72
		22		130	50		16:29	16:33	72
		19		130	50		16:33	16:37	72
		16		130	50		16:38	16:42	72
2A-50	15' W of E Fence, 30' N of S Fence	28	A23	140	50	5/21/2011	15:58	16:01	72
		25		140	50		16:01	16:05	72
		22		140	50		16:06	16:09	72
		19		140	50		16:10	16:13	72
		16		140	50		16:14	16:18	72

Notes:

1. Refusal, no additional ABC®+ could be injected at this interval.
2. Daylighting occurred. Injection at designated location terminated and re-located.

Table 3
Summary of Injected PRB Construction
Former Tecumseh Products Company Site
Tecumseh, Michigan

Injection Point	Injection Location	Injection Depth (ft bgs)	ABC® Batch Number	Injection Pressure (psi)	Solution Injected (gal)	Injection Date	Start Time	End Time	Mass ZVI (lbs)
SECTION 2A (Continued)									
2A-51	5' W of E Fence, 25' N of S Fence	28	A22	140	50	5/21/2011	14:57	15:01	72
		25		140	50		15:02	15:05	72
		22		140	50		15:06	15:09	72
		19		130	50		15:12	15:15	72
		16		130	50		15:17	15:20	72
2A-52	15' W of E Fence, 20' N of S Fence	28	A22	150	50	5/21/2011	14:34	14:37	72
		25		140	50		14:37	14:40	72
		22		140	50		14:41	14:44	72
		19		140	50		14:45	14:48	72
		16		140	50		14:51	14:55	72
2A-53	5' W of E Fence, 15' N of S Fence	28	A21	140	50	5/21/2011	11:37	11:40	72
		25		140	50		11:41	11:44	72
		22		140	50		11:45	11:49	72
		19		140	50		11:50	11:54	72
		16		140	50		11:55	12:00	72
2A-54	15' W of E Fence, 10' N of S Fence	28	A20	180	50	5/21/2011	9:39	9:43	72
		25		180	50		9:43	9:46	72
		22		150	50		9:48	9:52	72
		19		150	50		9:52	9:55	72
		16		150	50		9:57	10:00	72
2A-55	5' W of E Fence, 5' N of S Fence	28	A20	150	50	5/21/2011	10:05	10:08	72
		25		150	50		10:08	10:11	72
		22		140	50		10:13	10:17	72
		19		140	50		10:17	10:21	72
		16		140	50		10:22	10:25	72
2A-56	15' W of E Fence, 1' N of S Fence	28	A21	150	50	5/21/2011	11:12	11:15	72
		25		140	50		11:16	11:19	72
		22		140	50		11:21	11:24	72
		19		140	50		11:25	11:29	72
		16		140	50		11:31	11:34	72

Notes:

1. Refusal, no additional ABC®+ could be injected at this interval.
2. Daylighting occurred. Injection at designated location terminated and re-located.

Table 3
Summary of Injected PRB Construction
Former Tecumseh Products Company Site
Tecumseh, Michigan

Injection Point	Injection Location	Injection Depth (ft bgs)	ABC® Batch Number	Injection Pressure (psi)	Solution Injected (gal)	Injection Date	Start Time	End Time	Mass ZVI (lbs)
SECTION 2B									
2B-1	4' W of Property Line, 5' S of S Fence	22	B10	125	40	5/20/2011	10:25	10:30	30
		19		150	40		10:33	10:38	30
		16		125	40		10:39	10:46	30
2B-2	14' W of Property Line, 9' S of S Fence	22	B10	125	40	5/20/2011	10:04	10:10	30
		19		125	40		10:12	10:17	30
		16		125	40		10:17	10:21	30
2B-3	4' W of Property Line, 15' S of S Fence	22	B10	150	20	5/20/2011	11:07	11:10	15
		19 ⁽²⁾		150	5		11:16	11:17	3.75
2B-3R	24' W of Property Line, 15' S of S Fence	19 ⁽²⁾	--	--	--	5/20/2011	--	--	--
		--	--	--	--		--	--	--
2B-3RR	24' W of Property Line, 20' S of S Fence	19 ⁽¹⁾	--	--	--	5/20/2011	--	--	--
		--	--	--	--		--	--	--
2B-3RRR	24' W of Property Line, 8' S of S Fence	19 ⁽¹⁾	B10	500	--	5/20/2011	--	--	--
		17		250	40		13:10	13:18	30
		16		250	40		13:19	13:24	30
2B-4	14' W of Property Line, 20' S of S Fence	22	B10	175	55	5/20/2011	11:28	11:39	41.25
		19		150	40		11:43	11:48	30
		16		100	40		11:49	11:56	30
2B-5	4' W of Property Line, 25' S of S Fence	22	B13	150	40	5/21/2011	12:53	12:57	30
		19		100	40		13:01	13:07	30
		16		100	40		13:07	13:10	30
2B-6	14' W of Property Line, 30' S of S Fence	22	B14	150	40	5/21/2011	16:11	16:17	30
		19		125	40		16:22	16:21	30
		16		100	40		16:28	16:33	30
2B-7	4' W of Property Line, 35' S of S Fence	22	B12	125	40	5/21/2011	9:36	9:42	30
		19		125	40		9:45	9:49	30
		16		100	40		9:50	10:00	30
2B-8	14' W of Property Line, 40' S of S Fence	22	B11	200	40	5/20/2011	16:19	16:26	30
		19		150	40		16:30	16:35	30
		16		150	40		16:36	16:43	30

Notes:

1. Refusal, no additional ABC®+ could be injected at this interval.
2. Daylighting occurred. Injection at designated location terminated and re-located.

Table 3
Summary of Injected PRB Construction
Former Tecumseh Products Company Site
Tecumseh, Michigan

Injection Point	Injection Location	Injection Depth (ft bgs)	ABC® Batch Number	Injection Pressure (psi)	Solution Injected (gal)	Injection Date	Start Time	End Time	Mass ZVI (lbs)
SECTION 2B (Continued)									
2B-9	4' W of Property Line, 45' S of S Fence	22	B13	125	40	5/21/2011	11:36	11:41	30
		19		100	40		11:44	11:48	30
		16		100	40		11:50	11:53	30
2B-10	14' W of Property Line, 50' S of S Fence	22	B14	150	40	5/21/2011	15:00	15:04	30
		19		125	40		15:07	15:10	30
		16		100	40		15:10	15:14	30
2B-11	4' W of Property Line, 55' S of S Fence	22	B12	125	40	5/21/2011	10:04	10:10	30
		19		100	40		10:12	10:17	30
		16		100	40		10:17	10:21	30
2B-12	14' W of Property Line, 60' S of S Fence	22	B11	350	40	5/20/2011	15:19	15:31	30
		19		200	40		15:52	16:02	30
		16		150	40		16:07	16:14	30
2B-13	4' W of Property Line, 65' S of S Fence	22	B13	150	40	5/21/2011	12:03	12:09	30
		19		150	40		12:12	12:17	30
		16		100	40		12:19	12:24	30
2B-14	14' W of Property Line, 70' S of S Fence	22	B14	150	40	5/21/2011	15:19	15:25	30
		19		100	40		15:27	15:31	30
		16		100	40		15:37	15:42	30
2B-15	4' W of Property Line, 75' S of S Fence	22	B12	150	40	5/20/2011	18:51	18:55	30
		19		150	40		18:57	17:01	30
		16		100	40		19:01	19:05	30
2B-16	14' W of Property Line, 80' S of S Fence	22	B11	150	40	5/20/2011	17:11	17:20	30
		19		100	40		17:25	17:32	30
		16		100	40		17:33	17:38	30
2B-17	4' W of Property Line, 85' S of S Fence	22	B13	150	40	5/21/2011	12:29	12:33	30
		19		150	40		12:36	12:41	30
		16		100	40		12:44	12:49	30
2B-18	14' W of Property Line, 90' S of S Fence	22	B14	150	40	5/21/2011	15:45	15:49	30
		19		100	40		15:51	15:55	30
		16		100	40		15:55	16:00	30

Notes:

1. Refusal, no additional ABC®+ could be injected at this interval.
2. Daylighting occurred. Injection at designated location terminated and re-located.

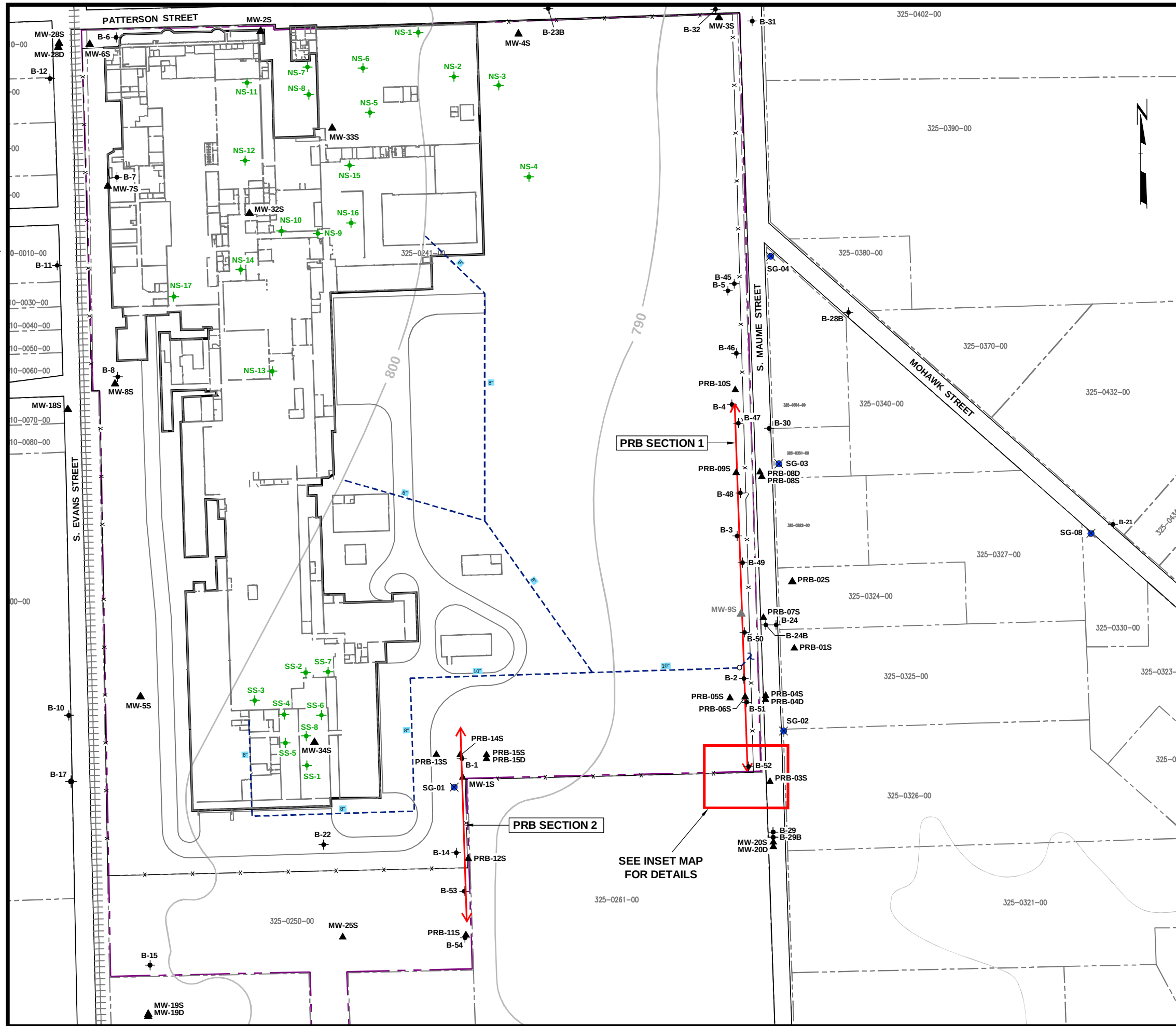
Table 3
Summary of Injected PRB Construction
Former Tecumseh Products Company Site
Tecumseh, Michigan

Injection Point	Injection Location	Injection Depth (ft bgs)	ABC® Batch Number	Injection Pressure (psi)	Solution Injected (gal)	Injection Date	Start Time	End Time	Mass ZVI (lbs)
SECTION 2B (Continued)									
2B-19	4' W of Property Line, 95' S of S Fence	22	B12	125	40	5/21/2011	10:24	10:28	30
		19		100	40		10:32	10:36	30
		16		100	40		10:36	10:40	30
2B-20	14' W of Property Line, 100' S of S Fence	22	B11	150	40	5/20/2011	17:41	17:46	30
		19		100	40		17:50	17:56	30
		16		100	40		17:56	18:01	30

Notes:

1. Refusal, no additional ABC®+ could be injected at this interval.
2. Daylighting occurred. Injection at designated location terminated and re-located.

Figures

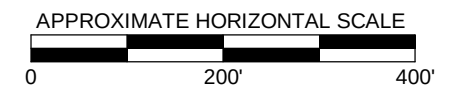
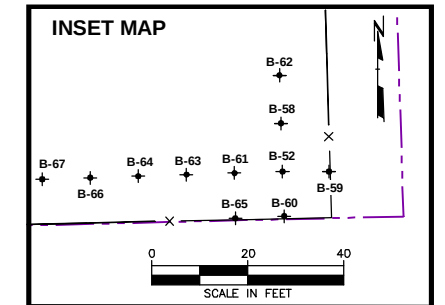


LEGEND

- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- PARCEL BOUNDARY
- RAILROAD TRACKS (APPROXIMATE LOCATION)
- 800 APPROXIMATE GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S. TOPOGRAPHIC QUADRANGLE MAP
- B-2 PERIMETER / OFF-SITE INVESTIGATION SOIL BORING LOCATION AND NUMBER
- MW-4S MONITORING WELL LOCATION AND NUMBER
- MW-9S DECOMMISSIONED MONITORING WELL LOCATION AND NUMBER
- SS-2 SOURCE AREA INVESTIGATION BORING LOCATION AND NUMBER
- SG-02 SOIL GAS SAMPLE LOCATION AND NUMBER
- 8" PIPE DIAMETER AND APPROXIMATE LOCATION OF ON-SITE STORM SEWER
- PRB LOCATION
- FENCE LINE

NOTES

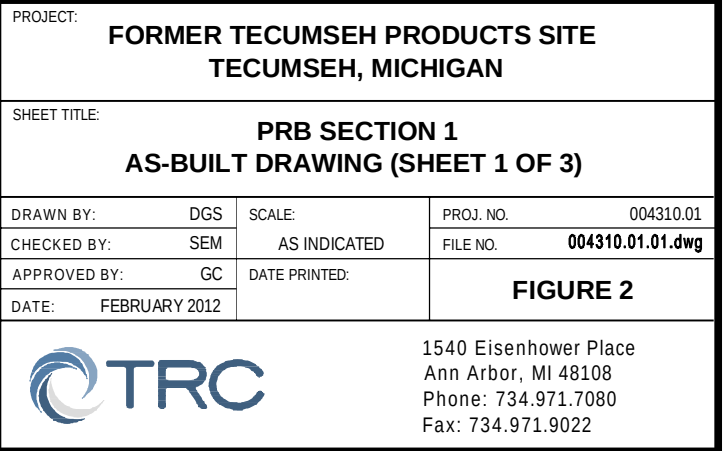
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- GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S TOPOGRAPHIC QUADRANGLE MAP AND GROUND SURVEY DATA.

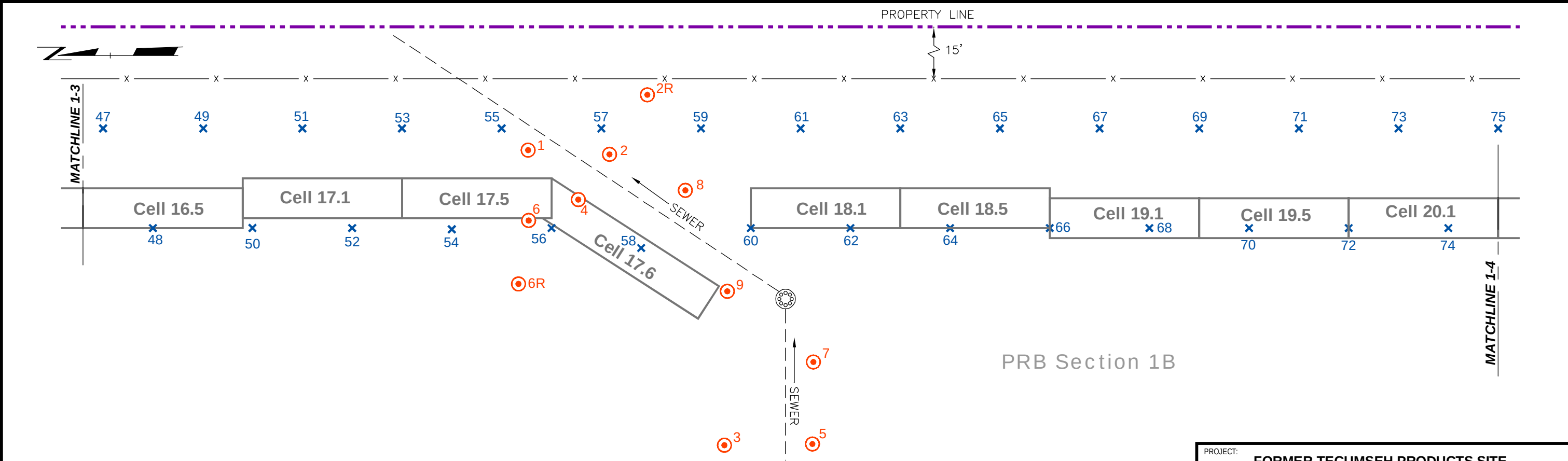
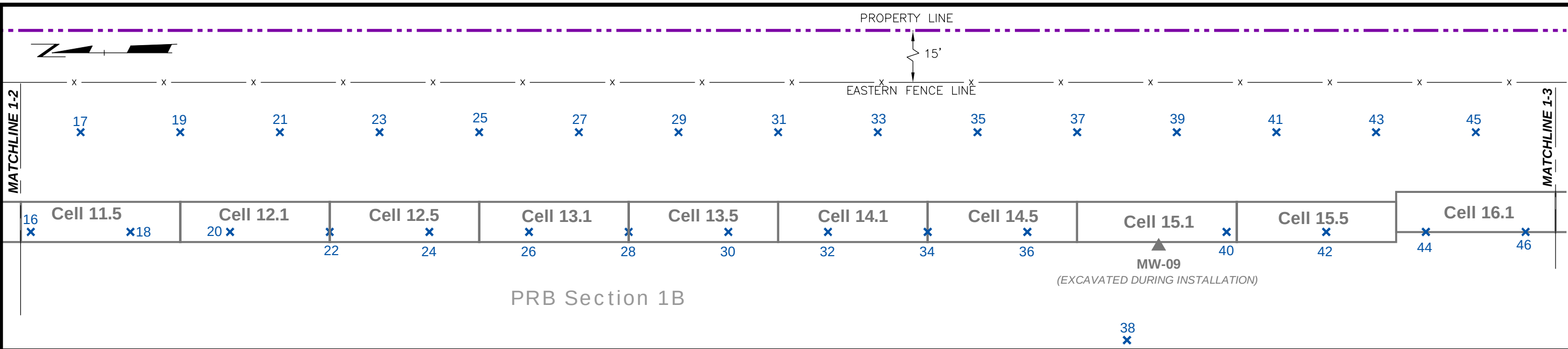


PROJECT: FORMER TECUMSEH PRODUCTS SITE TECUMSEH, MICHIGAN			
SHEET TITLE: SITE PLAN AND PRB MONITORING LOCATIONS			
DRAWN BY: DGS	SCALE: AS INDICATED	PROJ. NO. 004310.01	FIGURE 1
CHECKED BY: SEM	DATE PRINTED:	FILE NO. 004310.01.02.dwg	
APPROVED BY: GC			
DATE: FEBRUARY 2012			



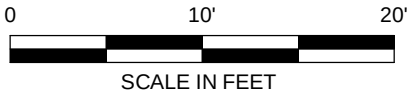
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022





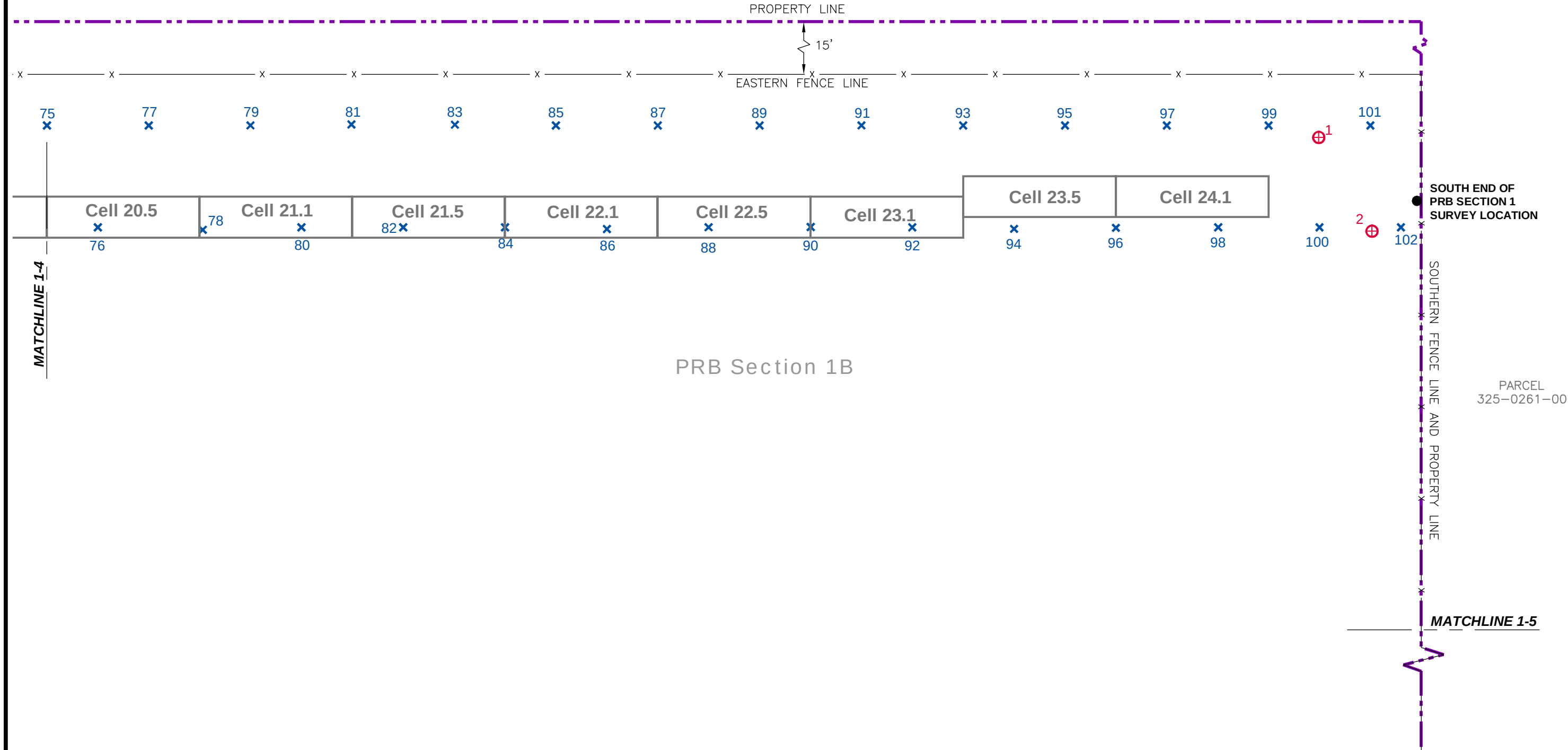
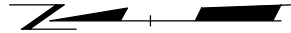
LEGEND

- 69 x PRB SECTION 1D INJECTION LOCATION AND NUMBER
- 9 o PRB SECTION 1C INJECTION LOCATION AND NUMBER
- MW-09 ▲ DECOMMISSIONED MONITORING WELL LOCATION AND NUMBER
- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- x — FENCE LINE



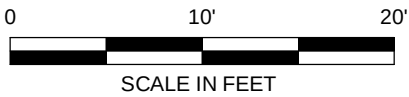
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SHEET TITLE: PRB SECTION 1 AS-BUILT DRAWING (SHEET 2 OF 3)		
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CHECKED BY: SEM	DATE PRINTED:	FILE NO. 004310.01.01.dwg
APPROVED BY: GC		FIGURE 3
DATE: FEBRUARY 2012		

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Fax: 734.971.9022

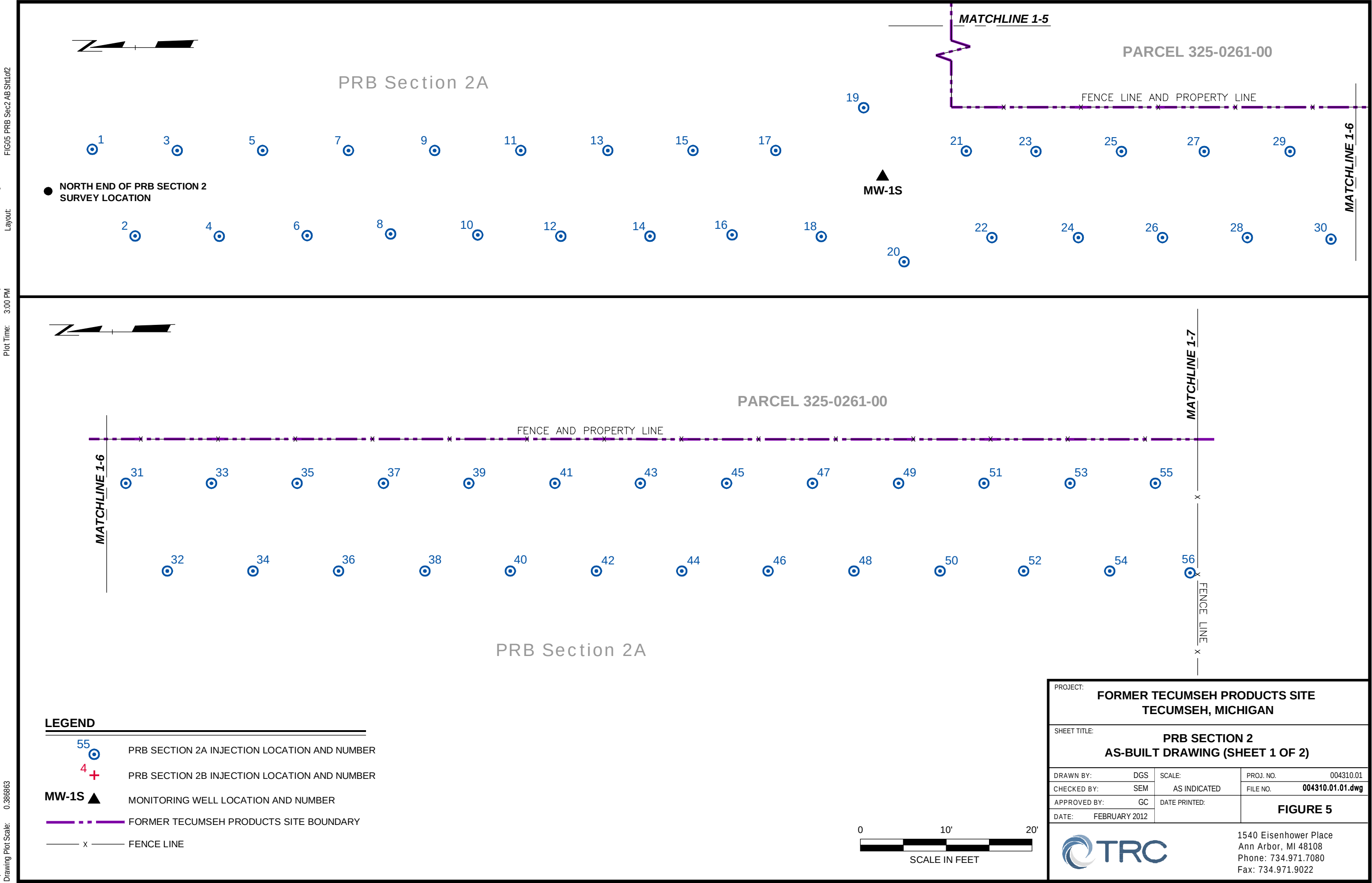


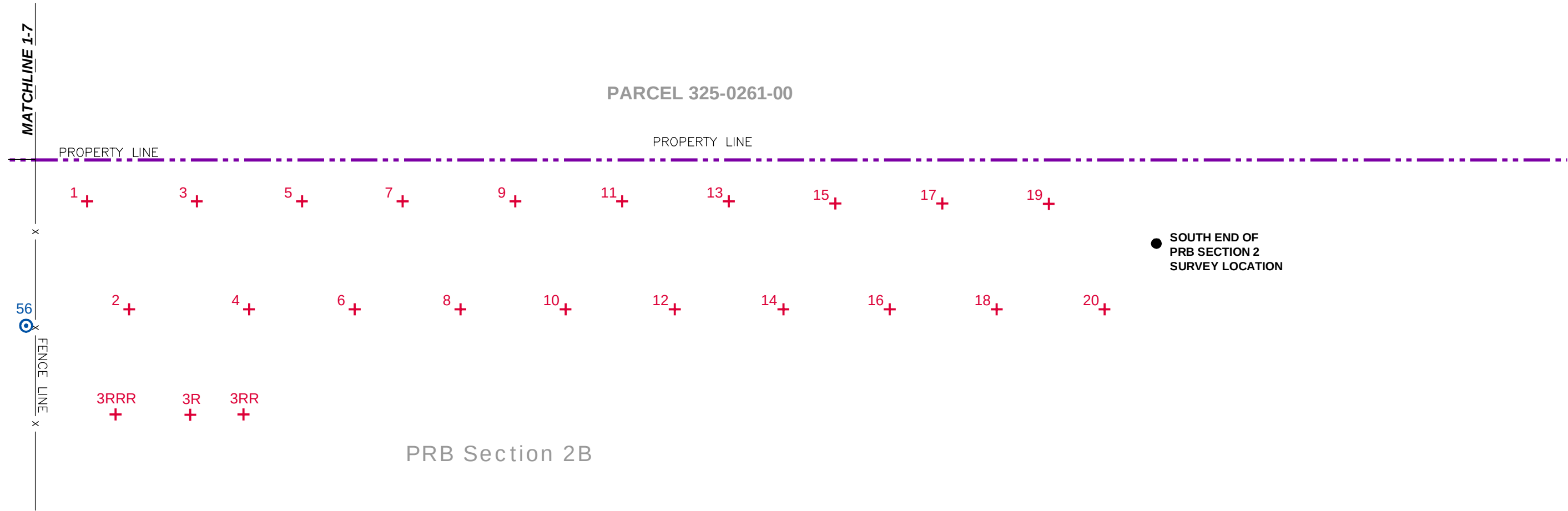
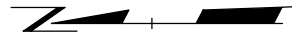
LEGEND

- 89 x PRB SECTION 1D INJECTION LOCATION AND NUMBER
- 2 ⊕ PRB SECTION 1E INJECTION LOCATION AND NUMBER
- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- x — FENCE LINE



PROJECT: FORMER TECUMSEH PRODUCTS SITE TECUMSEH, MICHIGAN			
SHEET TITLE: PRB SECTION 1 AS-BUILT DRAWING (SHEET 3 OF 3)			
DRAWN BY: DGS	SCALE: AS INDICATED	PROJ. NO. 004310.01	FIGURE 4
CHECKED BY: SEM	DATE PRINTED:	FILE NO. 004310.01.01.dwg	
APPROVED BY: GC			
DATE: FEBRUARY 2012			
		1540 Eisenhower Place Ann Arbor, MI 48108 Phone: 734.971.7080 Fax: 734.971.9022	



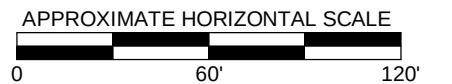


LEGEND

-  PRB SECTION 2A INJECTION LOCATION AND NUMBER
-  PRB SECTION 2B INJECTION LOCATION AND NUMBER
-  FORMER TECUMSEH PRODUCTS SITE BOUNDARY
-  FENCE LINE

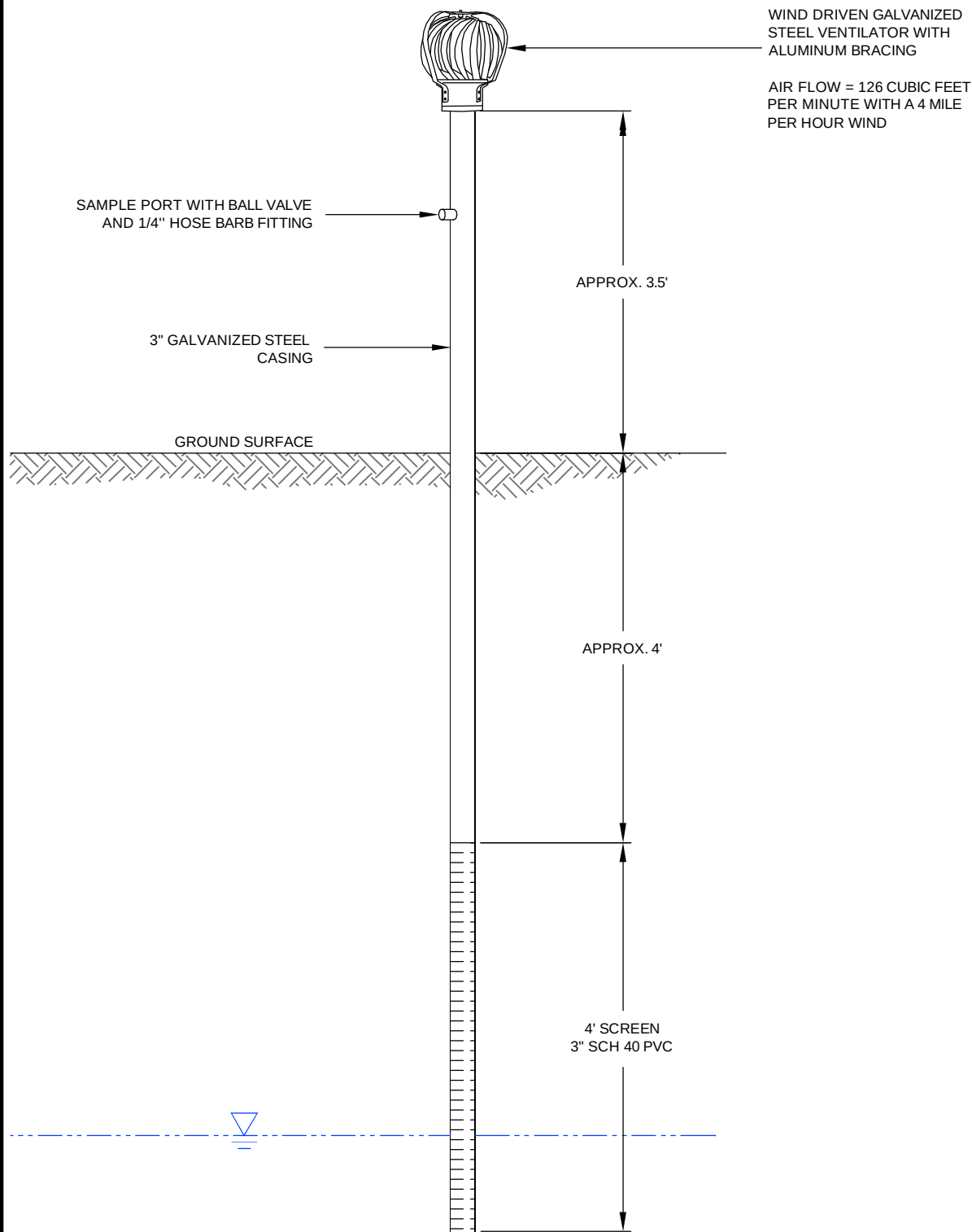


PROJECT: FORMER TECUMSEH PRODUCTS SITE TECUMSEH, MICHIGAN		
SHEET TITLE: PRB SECTION 2 AS-BUILT DRAWING (SHEET 2 OF 2)		
DRAWN BY: DGS	SCALE: AS INDICATED	PROJ. NO. 004310.01
CHECKED BY: SEM	DATE PRINTED:	FILE NO. 004310.01.01.dwg
APPROVED BY: GC		FIGURE 6
DATE: FEBRUARY 2012		
		1540 Eisenhower Place Ann Arbor, MI 48108 Phone: 734.971.7080 Fax: 734.971.9022



1. BASE MAP DEVELOPED FROM SITE PLAN PROVIDED BY THE CITY OF TECUMSEH, DRAWING NO. CITY.DWG, MARCH 2009.
2. GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S TOPOGRAPHIC QUADRANGLE MAP AND GROUND SURVEY DATA.

1540 Eisenhower Place
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Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

PROJECT: **FORMER TECUMSEH PRODUCTS SITE
TECUMSEH, MICHIGAN**

SHEET TITLE: **AS-BUILT PASSIVE VENT DETAIL**

DRAWN BY:	DGS
APPROVED BY:	SEM
PROJ. NO.	004310.01
FILE NO.	004310.01.08.dwg
DATE:	FEBRUARY 2012

FIGURE 8

Appendix A

Photographic Log – Soil Blending



Photographic Log

Client Name:		Site Location:	Project No.:
Tecumseh Products Company		Tecumseh, MI	02751.16
Photo No.	Date		
1	5/16/2011		
Description PRB excavation and injection points for PRB Section 1 were measured, flagged, and labeled prior to construction activity to ensure proper placement. A silt fence was installed along the property line to help prevent off-site migration of soil during construction activity			
Photo No.	Date		
2	5/17/2011		
Description PRB materials, 1-ton super sacs of DARAMEND® and pallets of zero valent iron (each pallet contained 40 bags each weighing 50-pounds) were delivered to the site between May 16 and May 18, 2011. Materials were stockpiled on-site adjacent to PRB Section 1.			

Photographic Log

Client Name: Tecumseh Products Company	Site Location: Tecumseh, MI	Project No.: 02751.16
--	---------------------------------------	---------------------------------

Photo No.	Date	
3	5/16/2011	
Description Excavation and soil blending activities begin at the north end of PRB Section 1. This allowed the injection crew to complete injections for Section 1d, below Section 1b prior to excavation activities so that the injection crew could operate over undisturbed terrain and to reduce the likelihood that injected materials would move up into the excavated/disturbed soils during injection, rather than remaining at the design/injection depth (18-24 feet for Section 1d).		

Photo No.	Date	
4	5/16/2011	
Description An excavator was used to remove surface and unsaturated subsurface soils to a depth of approximately 7 feet below ground surface prior to the addition of the reactive material, DARAMEND®. The width of this shallow excavation was approximately 20 feet in order to prevent the less permeable shallow soils from collapsing into the blended portion of the excavation.		

Photographic Log

Client Name: Tecumseh Products Company	Site Location: Tecumseh, MI	Project No.: 02751.16
--	---------------------------------------	---------------------------------

Photo No. 5	Date 5/20/2011
-----------------------	--------------------------

Description

In grassy areas, pre-excavation of the unsaturated soils consisted of segregating topsoil, from the underlying clay and sand. In the paved portion of the site, asphalt was segregated from the underlying soils, and subsequently properly disposed at an off-site location.



Photo No. 6	Date 5/16/2011
-----------------------	--------------------------

Description

The PRB was blended in cells. The length of the cells was controlled by the reach of the excavation and blending equipment. Each cell was approximately 15 feet long and extended from the saturated zone at 7 feet below ground surface to a total depth of 18 feet below ground surface.



Photographic Log

Client Name: Tecumseh Products Company		Site Location: Tecumseh, MI	Project No.: 02751.16
Photo No. 7	Date 5/16/2011		
Description The excavator was used to loosen soils in the PRB trench prior to the addition of DARAMEND®.			
Photo No. 8	Date 5/16/2011		
Description One-ton super sacs of DARAMEND® were added to each cell in prescribed amounts. Super sacs were attached to the excavator bucket/blender head then cut open at end of the perimeter of the cell.			

Photographic Log

Client Name: Tecumseh Products Company	Site Location: Tecumseh, MI	Project No.: 02751.16
--	---------------------------------------	---------------------------------

Photo No.	Date	
9	5/16/2011	
Description Open super sacs of DARAMEND® were held and emptied over the excavated cell with the excavator bucket/blender head.		

Photo No.	Date	
10	5/16/2011	
Description The excavator, equipped with a standard bucket, was used to distribute DARAMEND® along the length of the cell.		

Photographic Log

Client Name: Tecumseh Products Company		Site Location: Tecumseh, MI	Project No.: 02751.16
--	--	---------------------------------------	---------------------------------

Photo No.	Date	
11	5/16/2011	

Description
DARAMEND® absorbed water in the saturated zone creating a drying-effect. Water was added at the engineer's discretion to improve the consistency of the soils for mixing and to improve the stability of the excavation walls.

Photo No. 12	Date 5/16/2011	
Description An excavator equipped with a specialized blending head was utilized by Redox Tech to blend DARAMEND® into the existing soil matrix.		

Photographic Log

Client Name: Tecumseh Products Company	Site Location: Tecumseh, MI	Project No.: 02751.16
--	---------------------------------------	---------------------------------

Photo No. 13	Date 5/16/2011
------------------------	--------------------------

Description

The known length of the excavator arm was used to confirm that the target blending depth was reached along the entire length of each cell. A spray-painted line was drawn 18 feet. up the boom from the edge of the bucket to gauge the depth of the the excavation.



Photo No. 14	Date 5/16/2011
------------------------	--------------------------

Description

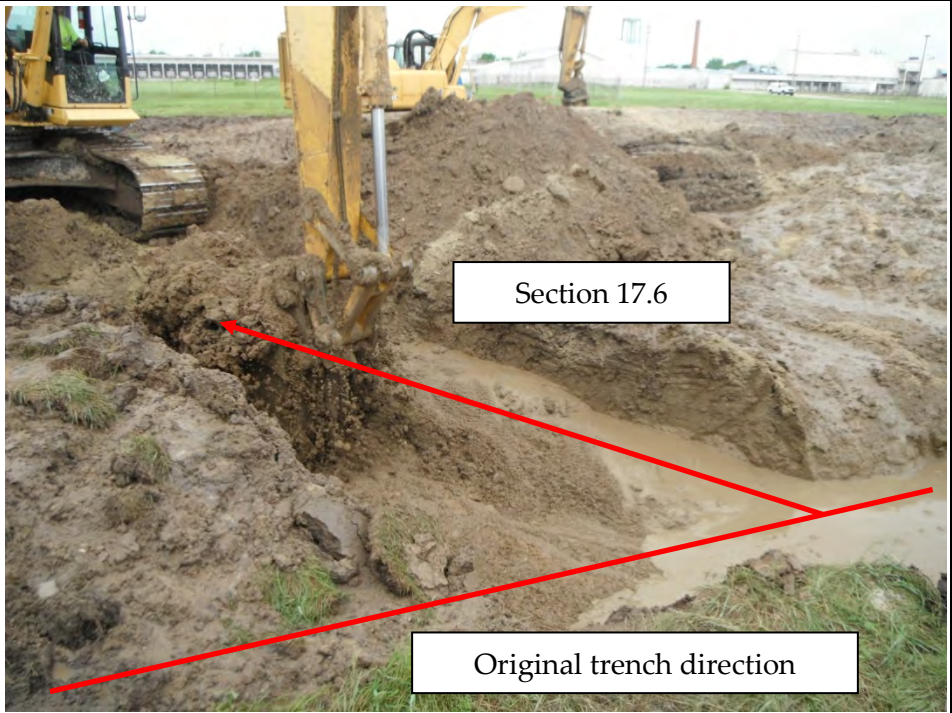
Here the excavator equipped with the blending head was used to mix DARAMEND® into the existing soil matrix in Cell 9.1. The previously blended cell (Cell 8.5 here) was left open during blending activities so that the interface between adjacent cells could be properly mixed, preventing "windows" in the trenched portion of the PRB.



Photographic Log

Client Name:		Site Location:	Project No.:
Tecumseh Products Company		Tecumseh, MI	02751.16
Photo No.	Date		
15	5/16/2011		
Description The excavator equipped with a bucket was used in conjunction with the blender to thoroughly mix DARAMEND® into the soils. In particular, the excavator with a bucket had a longer reach that the excavator with a blender head. As such the larger excavator was used to help ensure target depth was reached along the entire length of cell and to help mix areas between cells.			
Photo No.	Date		
16	5/20/2011		
Description Gas evolution was observed in treated groundwater within several hours of mixing indicating active fermentation taking place. This picture was taken the morning after this spot had been treated with Daramend®.			

Photographic Log

Client Name:		Site Location:	Project No.:
Tecumseh Products Company		Tecumseh, MI	02751.16
Photo No.	Date		
17	5/24/2011		
Description Heavy rains delayed construction several times. Collected storm water was moved between dammed cells or removed from the trench altogether to allow mixing to continue.			
Photo No.	Date		
18	5/25/2011		
Description The area around sewer was excavated parallel to sewer pipe (at an angle relative to the remainder of PRB Section 1) to improve coverage of the trenched PRB without damaging the sewer line. Injections in this area included the shallow saturated zone (7 to 18 feet below ground surface) to help ensure complete coverage of the reactive materials around the existing sewer.			



Photographic Log

Client Name: Tecumseh Products Company		Site Location: Tecumseh, MI	Project No.: 02751.16
Photo No. 19	Date 5/25/2011		
Description As cells were completed, the excavator was used to replace the unsaturated sub-surface soils. Typically cells were covered within a day of blending activities. Water was applied as needed to help control dust during excavation and soil replacement activities.			
Photo No. 20	Date 5/25/2011		
Description A bulldozer was used in conjunction with the excavator to fill the trench, replace the topsoil, and grade the site following trenching activities.			

Photographic Log

Client Name: Tecumseh Products Company	Site Location: Tecumseh, MI	Project No.: 02751.16
--	---------------------------------------	---------------------------------

Photo No.	Date	
21	5/25/2011	
Description Upon completion of excavation, topsoil was graded by Redox Tech in preparation for seeding. The silt fence was left in place until restoration work could be completed.		

Photo No.	Date	
22	6/27/2011	
Description Approximately one month after the completion of blending activities, grass which was planted in early June, was becoming established.		

Appendix B

Laboratory Data – May 2011 Storm Water

June 06, 2011

RMT, Inc. - Ann Arbor Office
Attn: Ms. Stacy Metz
3754 Ranchero Drive
Ann Arbor, MI 48108-2771

Project: Tecumseh Products

Dear Ms. Stacy Metz,

Enclosed is a copy of the laboratory report, comprised of the following work order(s), for test samples received by TriMatrix Laboratories:

Work Order	Received	Description
1105477	05/27/2011	Laboratory Services

This report relates only to the sample(s), as received. Test results are in compliance with the requirements of the National Environmental Laboratory Accreditation Conference (NELAC). Any qualifications of results, including sample acceptance requirements, are explained in the Statement of Data Qualifications.

Estimates of analytical uncertainties for the test results contained within this report are available upon request.

If you have any questions or require further information, please do not hesitate to contact me.

Sincerely,



Jennifer L. Rice
Project Chemist

Enclosures(s)

ANALYTICAL REPORT

Client: **RMT, Inc. - Ann Arbor Office**
 Project: Tecumseh Products
 Client Sample ID: **Surface Water**
 Lab Sample ID: **1105477-01**
 Matrix: Water
 Unit: ug/L
 Dilution Factor: 1
 QC Batch: 1105233

Work Order: **1105477**
 Description: Laboratory Services
 Sampled: 05/26/11 14:30
 Sampled By: RMT
 Received: 05/27/11 16:25
 Prepared: 05/31/11 By: LEW
 Analyzed: 05/31/11 By: LEW
 Analytical Batch: 1E31025

*Volatile Organic Compounds by EPA Method 8260B

CAS Number	Analyte	Analytical Result	RL
67-64-1	Acetone	<20	20
107-13-1	Acrylonitrile	<2.0	2.0
71-43-2	Benzene	<1.0	1.0
108-86-1	Bromobenzene	<1.0	1.0
74-97-5	Bromochloromethane	<1.0	1.0
75-27-4	Bromodichloromethane	<1.0	1.0
75-25-2	Bromoform	<1.0	1.0
74-83-9	Bromomethane	<5.0	5.0
104-51-8	n-Butylbenzene	<1.0	1.0
135-98-8	sec-Butylbenzene	<1.0	1.0
98-06-6	tert-Butylbenzene	<1.0	1.0
75-15-0	Carbon Disulfide	<1.0	1.0
56-23-5	Carbon Tetrachloride	<1.0	1.0
108-90-7	Chlorobenzene	<1.0	1.0
75-00-3	Chloroethane	<5.0	5.0
67-66-3	Chloroform	<1.0	1.0
74-87-3	Chloromethane	<5.0	5.0
96-12-8	1,2-Dibromo-3-chloropropane	<5.0	5.0
124-48-1	Dibromochloromethane	<1.0	1.0
106-93-4	1,2-Dibromoethane	<1.0	1.0
74-95-3	Dibromomethane	<1.0	1.0
110-57-6	trans-1,4-Dichloro-2-butene	<1.0	1.0
95-50-1	1,2-Dichlorobenzene	<1.0	1.0
541-73-1	1,3-Dichlorobenzene	<1.0	1.0
106-46-7	1,4-Dichlorobenzene	<1.0	1.0
*75-71-8	Dichlorodifluoromethane	<5.0	5.0
75-34-3	1,1-Dichloroethane	<1.0	1.0
107-06-2	1,2-Dichloroethane	<1.0	1.0
75-35-4	1,1-Dichloroethene	<1.0	1.0
156-59-2	cis-1,2-Dichloroethene	<1.0	1.0
156-60-5	trans-1,2-Dichloroethene	<1.0	1.0

Continued on next page

*See Statement of Data Qualifications

ANALYTICAL REPORT

Client: **RMT, Inc. - Ann Arbor Office**
 Project: Tecumseh Products
 Client Sample ID: **Surface Water**
 Lab Sample ID: **1105477-01**
 Matrix: Water
 Unit: ug/L
 Dilution Factor: 1
 QC Batch: 1105233

Work Order: **1105477**
 Description: Laboratory Services
 Sampled: 05/26/11 14:30
 Sampled By: RMT
 Received: 05/27/11 16:25
 Prepared: 05/31/11 By: LEW
 Analyzed: 05/31/11 By: LEW
 Analytical Batch: 1E31025

*Volatile Organic Compounds by EPA Method 8260B (Continued)

CAS Number	Analyte	Analytical Result	RL
78-87-5	1,2-Dichloropropane	<1.0	1.0
10061-01-5	cis-1,3-Dichloropropene	<1.0	1.0
10061-02-6	trans-1,3-Dichloropropene	<1.0	1.0
100-41-4	Ethylbenzene	<1.0	1.0
60-29-7	Ethyl Ether	<5.0	5.0
591-78-6	2-Hexanone	<5.0	5.0
74-88-4	Iodomethane	<1.0	1.0
98-82-8	Isopropylbenzene	<1.0	1.0
99-87-6	4-Isopropyltoluene	<5.0	5.0
1634-04-4	Methyl tert-Butyl Ether	<5.0	5.0
75-09-2	Methylene Chloride	<5.0	5.0
78-93-3	2-Butanone (MEK)	<5.0	5.0
91-57-6	2-Methylnaphthalene	<5.0	5.0
108-10-1	4-Methyl-2-pentanone (MIBK)	<5.0	5.0
91-20-3	Naphthalene	<5.0	5.0
103-65-1	n-Propylbenzene	<1.0	1.0
100-42-5	Styrene	<1.0	1.0
630-20-6	1,1,1,2-Tetrachloroethane	<1.0	1.0
79-34-5	1,1,2,2-Tetrachloroethane	<1.0	1.0
127-18-4	Tetrachloroethene	<1.0	1.0
109-99-9	Tetrahydrofuran	<5.0	5.0
108-88-3	Toluene	<1.0	1.0
87-61-6	1,2,3-Trichlorobenzene	<5.0	5.0
120-82-1	1,2,4-Trichlorobenzene	<5.0	5.0
71-55-6	1,1,1-Trichloroethane	<1.0	1.0
79-00-5	1,1,2-Trichloroethane	<1.0	1.0
79-01-6	Trichloroethene	<1.0	1.0
75-69-4	Trichlorofluoromethane	<1.0	1.0
96-18-4	1,2,3-Trichloropropane	<1.0	1.0
95-63-6	1,2,4-Trimethylbenzene	<1.0	1.0
108-67-8	1,3,5-Trimethylbenzene	<1.0	1.0

Continued on next page

*See Statement of Data Qualifications

ANALYTICAL REPORT

Client: **RMT, Inc. - Ann Arbor Office**
 Project: Tecumseh Products
 Client Sample ID: **Surface Water**
 Lab Sample ID: **1105477-01**
 Matrix: Water
 Unit: ug/L
 Dilution Factor: 1
 QC Batch: 1105233

Work Order: **1105477**
 Description: Laboratory Services
 Sampled: 05/26/11 14:30
 Sampled By: RMT
 Received: 05/27/11 16:25
 Prepared: 05/31/11 By: LEW
 Analyzed: 05/31/11 By: LEW
 Analytical Batch: 1E31025

*Volatile Organic Compounds by EPA Method 8260B (Continued)

CAS Number	Analyte	Analytical Result	RL
75-01-4	Vinyl Chloride	<1.0	1.0
136777-61-2	Xylene, Meta + Para	<2.0	2.0
95-47-6	Xylene, Ortho	<1.0	1.0
Surrogates:			
		% Recovery	Control Limits
	<i>Dibromofluoromethane</i>	102	88-116
	<i>1,2-Dichloroethane-d4</i>	99	87-123
	<i>Toluene-d8</i>	98	91-107
	<i>4-Bromofluorobenzene</i>	99	84-106

*See Statement of Data Qualifications

QUALITY CONTROL REPORT

Volatile Organic Compounds by EPA Method 8260B

Analyte	Sample Conc.	Spike Qty.	Result	Spike % Rec.	Control Limits	RPD	RPD Limits	RL
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QC Batch: 1105233 5030B Aqueous Purge & Trap/USEPA-8260B

Method Blank				Analyzed:	05/31/2011	By: LEW
Unit: ug/L				Analytical Batch:	1E31025	
Acetone			<20	--	20	
Acrylonitrile			<2.0		2.0	
Benzene			<1.0		1.0	
Bromobenzene			<1.0		1.0	
Bromochloromethane			<1.0		1.0	
Bromodichloromethane			<1.0		1.0	
Bromoform			<1.0		1.0	
Bromomethane			<5.0		5.0	
n-Butylbenzene			<1.0		1.0	
sec-Butylbenzene			<1.0		1.0	
tert-Butylbenzene			<1.0		1.0	
Carbon Disulfide			<1.0		1.0	
Carbon Tetrachloride			<1.0		1.0	
Chlorobenzene			<1.0		1.0	
Chloroethane			<5.0		5.0	
Chloroform			<1.0		1.0	
Chloromethane			<5.0		5.0	
1,2-Dibromo-3-chloropropane			<5.0		5.0	
Dibromochloromethane			<1.0		1.0	
1,2-Dibromoethane			<1.0		1.0	
Dibromomethane			<1.0		1.0	
trans-1,4-Dichloro-2-butene			<1.0		1.0	
1,2-Dichlorobenzene			<1.0		1.0	
1,3-Dichlorobenzene			<1.0		1.0	
1,4-Dichlorobenzene			<1.0		1.0	
Dichlorodifluoromethane			<5.0		5.0	
1,1-Dichloroethane			<1.0		1.0	
1,2-Dichloroethane			<1.0		1.0	
1,1-Dichloroethene			<1.0		1.0	
cis-1,2-Dichloroethene			<1.0		1.0	
trans-1,2-Dichloroethene			<1.0		1.0	
1,2-Dichloropropane			<1.0		1.0	
cis-1,3-Dichloropropene			<1.0		1.0	
trans-1,3-Dichloropropene			<1.0		1.0	
Ethylbenzene			<1.0		1.0	
Ethyl Ether			<5.0		5.0	

Continued on next page

QUALITY CONTROL REPORT

Volatile Organic Compounds by EPA Method 8260B (Continued)

Analyte	Sample Conc.	Spike Qty.	Result	Spike % Rec.	Control Limits	RPD	RPD Limits	RL
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QC Batch: 1105233 (Continued) 5030B Aqueous Purge & Trap/USEPA-8260B

Method Blank (Continued)

Unit: ug/L

Analyzed: 05/31/2011 By: LEW

Analytical Batch: 1E31025

2-Hexanone		<5.0					5.0
Iodomethane		<1.0					1.0
Isopropylbenzene		<1.0					1.0
4-Isopropyltoluene		<5.0					5.0
Methyl tert-Butyl Ether		<5.0					5.0
Methylene Chloride		<5.0					5.0
2-Butanone (MEK)		<5.0					5.0
2-Methylnaphthalene		<5.0			--		5.0
4-Methyl-2-pentanone (MIBK)		<5.0					5.0
Naphthalene		<5.0			--		5.0
n-Propylbenzene		<1.0					1.0
Styrene		<1.0					1.0
1,1,1,2-Tetrachloroethane		<1.0					1.0
1,1,2,2-Tetrachloroethane		<1.0					1.0
Tetrachloroethene		<1.0					1.0
Tetrahydrofuran		<5.0					5.0
Toluene		<1.0					1.0
1,2,3-Trichlorobenzene		<5.0					5.0
1,2,4-Trichlorobenzene		<5.0					5.0
1,1,1-Trichloroethane		<1.0					1.0
1,1,2-Trichloroethane		<1.0					1.0
Trichloroethene		<1.0					1.0
Trichlorofluoromethane		<1.0					1.0
1,2,3-Trichloropropane		<1.0					1.0
1,2,4-Trimethylbenzene		<1.0					1.0
1,3,5-Trimethylbenzene		<1.0					1.0
Vinyl Chloride		<1.0					1.0
Xylene, Meta + Para		<2.0					2.0
Xylene, Ortho		<1.0					1.0

Surrogates:

Dibromofluoromethane	102	88-116
1,2-Dichloroethane-d4	97	87-123
Toluene-d8	97	91-107
4-Bromofluorobenzene	98	84-106

Laboratory Control Sample

Unit: ug/L

Analyzed: 05/31/2011 By: LEW

Analytical Batch: 1E31025

Benzene	40.0	39.7	99	84-119	--	20	1.0
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Continued on next page

QUALITY CONTROL REPORT

Volatile Organic Compounds by EPA Method 8260B (Continued)

Analyte	Sample Conc.	Spike Qty.	Result	Spike % Rec.	Control Limits	RPD	RPD Limits	RL
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QC Batch: 1105233 (Continued) 5030B Aqueous Purge & Trap/USEPA-8260B

Laboratory Control Sample (Continued)

Unit: ug/L

Analyzed: 05/31/2011 By: LEW

Analytical Batch: 1E31025

Chlorobenzene	40.0	38.5	96	84-118	--	20	1.0
1,1-Dichloroethene	40.0	37.8	95	77-123	--	20	1.0
Toluene	40.0	39.2	98	85-118	--	20	1.0
Trichloroethene	40.0	40.4	101	82-119	--	20	1.0

Surrogates:

<i>Dibromofluoromethane</i>			100	88-116
<i>1,2-Dichloroethane-d4</i>			99	87-123
<i>Toluene-d8</i>			101	91-107
<i>4-Bromofluorobenzene</i>			102	84-106

Laboratory Control Sample Duplicate

Unit: ug/L

Analyzed: 05/31/2011 By: LEW

Analytical Batch: 1E31025

Benzene	40.0	38.4	96	84-119	3	20	1.0
Chlorobenzene	40.0	36.9	92	84-118	4	20	1.0
1,1-Dichloroethene	40.0	37.3	93	77-123	1	20	1.0
Toluene	40.0	38.5	96	85-118	2	20	1.0
Trichloroethene	40.0	39.7	99	82-119	2	20	1.0

Surrogates:

<i>Dibromofluoromethane</i>			100	88-116
<i>1,2-Dichloroethane-d4</i>			96	87-123
<i>Toluene-d8</i>			101	91-107
<i>4-Bromofluorobenzene</i>			100	84-106

STATEMENT OF DATA QUALIFICATIONS**Volatile Organic Compounds by EPA Method 8260B**

Qualification: Sample integrity for the parameter was suspect upon receipt; container had headspace. All reported values, including non-detectable results, are considered estimated.

Analysis: USEPA-8260B

Sample/Analyte: 1105477-01 Surface Water

Qualification: The CCV for this analytical batch had a recovery above the upper control limit. Positive results for this analyte in the associated analytical batch are considered estimated; non-detectable results do not require qualification.

Analysis: USEPA-8260B

Sample/Analyte: 1105477-01 Surface Water

Dichlorodifluoromethane

US EPA ARCHIVE DOCUMENT

E-105A177

Chain of Custody Record # 08619

33-13

#249-B

TRIMATRIX
TestAmerica
THE LABORATORY EXPERT

TestAmerica Laboratory location:

Regulatory program:

☐ DW

☐ NPDES

☐ RCRA

☐ Other

Client Contact

Company Name:

Address:

City/State/Zip:

Phone:

Project Name:

Project Number:

P.O. #

Client Project Manager:

Telephone:

City/State/Zip:

Phone:

Method of Shipment/Carrier:

Shipping/Tracking No.:

Site Contact:

Telephone:

City/State/Zip:

Phone:

Lab Contact:

Telephone:

City/State/Zip:

Phone:

COC No.:

of COCs

Free lab use only

Wait-in client

Lab pickup

Lab sampling

Web/SMS No.:

Sample Specific Notes /
Special Instructions:

SURFACE H₂O

5/26/11 2:30

X

X

X

X

X

X

X

X

X

X

X

X

X

Sample Identification

Sample Date

Sample Time

Alr

Aqueous

Sediment

Solid

Other:

H2SO4

HNO3

HCl

NaOH

ZnAc/
NaOH

Unpres

Other:

Filtered Sample (Y / N)

Composite=C / Grab=G

TCE (8260)

X

X

X

X

X

X

X

X

X

X

X

X

X

X

X

Possible Hazard Identification

☐ Non-Hazard

☐ Flammable

☐ Skin Irritant

☐ Poison B

☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return to Client

☐ Dispose by Lab

☐ Archive For

Months

Special Instructions/OC Requirements & Comments:

Relinquished by:

Relinquished to:

Relinquished by:

Relinquished to:

Company:

Company:

Company:

Company:

Date/Time:

Date/Time:

Date/Time:

Date/Time:

Received by:

Received by:

Received by:

Received by:

Company:

Company:

Company:

Company:

Date/Time:

Date/Time:

Date/Time:

Date/Time:

SAMPLE RECEIVING / LOG-IN CHECKLIST



Client: <u>RMT</u>	Work Order #: <u>1105477</u>
Receipt Record Page/Line #: <u>33-13</u>	New / Add To: Project Chemist: Sample #:

Recorded by (Initials/date): <u>DN 5/27/11</u>	☒ Cooler ☐ Box ☐ Other:	Qty Received: <u>1</u>	☒ IR Gun (#202) ☐ Digital Thermometer (#54) ☐ Other (#):	Thermometer Used: ☐ See Additional Cooler Information Form
--	---	------------------------	--	--

Cooler #	Time	Cooler #	Time	Cooler #	Time	Cooler #	Time	
<u>RMT</u>	<u>1705</u>							
Custody Seals: ☒ None ☐ Present / Intact ☐ Present / Not Intact								
Coolant Location: Dispersed / Top / Middle / Bottom								
Coolant/Temperature Taken Via: ☒ Loose Ice / Avg 2-3 containers ☐ Bagged Ice / Avg 2-3 containers ☐ Blue Ice / Avg 2-3 containers ☒ None / Avg 2-3 containers								
Alternate Temperature Taken Via: ☐ Temperature Blank (TB) ☐ 1 Container								
Recorded °C	Correction Factor °C	Actual °C	Recorded °C	Correction Factor °C	Actual °C	Recorded °C	Correction Factor °C	
Temp Blank:			Temp Blank:			Temp Blank:		
TB location: Representative / Not Representative								
1	2	3	1	2	3	1	2	
<u>8.4</u>	<u>8</u>	<u>8.4</u>						
<u>5.4</u>	<u>8</u>	<u>5.4</u>						
<u>6.1</u>	<u>8</u>	<u>6.1</u>						
Average °C: <u>6.8</u>			Average °C:			Average °C:		
☐ Cooler ID on COC? ☒ VOC Trip Blank received?								

If any shaded areas checked, complete Sample Receiving Non-Conformance Form

Paperwork Received ☐ No COC Received

N/A	Yes	No
	☒	☐

Chain of Custody record(s)?
 If No, COC Initiated By:
 Red'd for Lab Signed Date/Time?
 Shipping document?
 Other:

COC ID #s:
☒ TriMatrix 08619
☐ Other (Name or ID#):

Check COC for Accuracy ☐ No analysis requested

Yes	No
☒	☐

☒ Sample ID matches COC?
☒ Sample Date and Time matches COC?
☒ Container type completed on COC?
☒ All container types indicated are received?

Sample Condition Summary ☐ Non-TriMatrix containers, see Notes

N/A	Yes	No
	☒	☐

☐ Broken containers/lids?
☒ Missing or incomplete labels?
☒ Illegible information on labels?
☒ Low volume received?
☒ Inappropriate containers received?
☒ VOC vials / TOX containers have headspace?
☒ Extra sample locations / containers not listed on COC?

Check Sample Preservation

N/A	Yes	No
	☐	☒

☒ Average sample temperature ≤ 6° C?
☒ Completed Sample Preservation Verification Form?
☒ Samples preserved correctly?
 If "No", added orange tag?
 Received pre-preserved VOC soils?
 ☐ MeOH ☐ Na₂SO₄

Check for Short Hold-Time Prep/Analyses

☐ Bacteriological
☐ Air Bags
☐ EnCores / Methanol Pre-Preserved
☐ Formaldehyde/Aldehyde
☐ Green-tagged containers
☐ Yellow/White-tagged 1L ambers (SV Prep-Lab)

AFTER HOURS ONLY:

COPIES OF COC TO LAB AREA(S)

☒ NONE RECEIVED

☐ RECEIVED, COCs TO LAB(S)

Notes

☐ Trip Blank received ☒ Trip Blank not listed on COC
☐ No COC received, Proj. Chemist reviewed (Init/Date):
☐ No analysis requested, Proj. Chemist completed (Init/Date):

Cooler Received (Date/Time): <u>DN 5/27/11</u>	Paperwork Delivered (Date/Time): <u>DN 5/27/11</u>	≤ 1 Hour Goal Met?
		Yes / No



List non-conformance issues associated with this work order in the chart below/left. Identify discrepancies between the COC and sample tags in the chart below/right. Add comments as needed.

Client	RMT	Work Order #	1105477
Receipt Log #	33-13	Project Chemist	JLR
		Completed By (initials/date)	JN 5/27/11

[illegible]

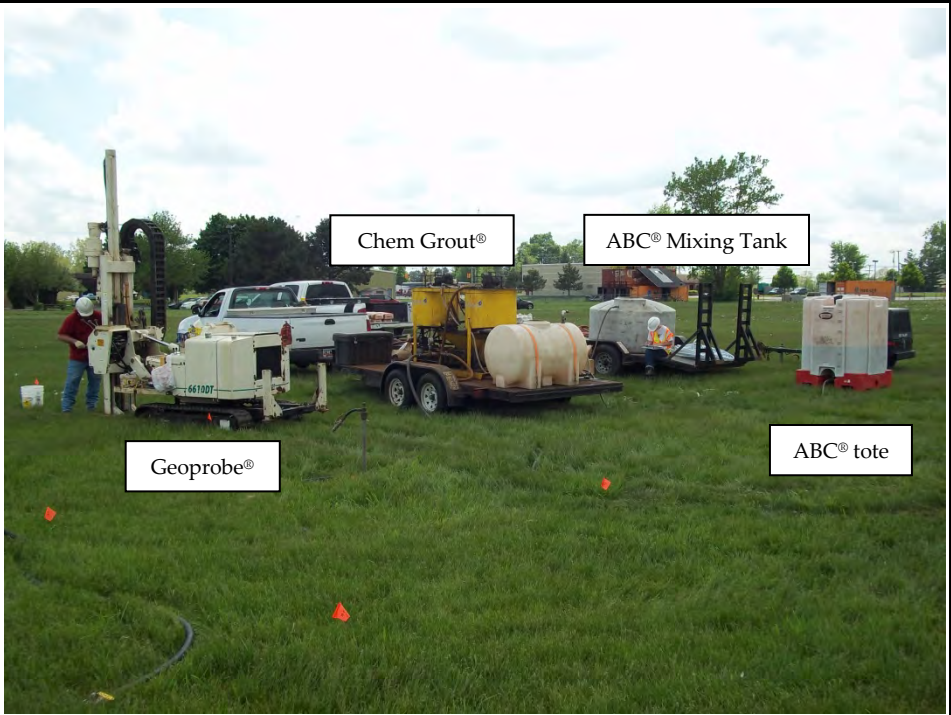
General Comments:

Project Chemist (initials/date)

Appendix C

Photographic Log – ABC®+ Injections

Photographic Log

Client Name:		Site Location:	Project No.:
Tecumseh Products Company		Former TPC Site Tecumseh, MI	02751.16
Photo No.	Date		
1	5/20/2011		
Description PRB injection points were measured, flagged and labeled prior to injection activities.			
Photo No.	Date		
2	5/18/2011		
Description Injection crews worked to complete injections in Section 1d (below trenched PRB Section 1b) prior to trenching activities so that the injection crews could be operated over undisturbed terrain and to reduce the likelihood that injected materials would move up into the excavated/disturbed soils during injection, rather than remaining at the design depth (18-24 feet for Section 1d).			

Photographic Log

Client Name: Tecumseh Products Company		Site Location: Former TPC Site Tecumseh, MI	Project No.: 02751.16
Photo No. 3	Date 5/25/2011		
Description Each injection crew had a Geoprobe® operator and a ChemGrout® operator. Here the Geoprobe® operator installs an injection point.			

Photo No.	Date	
4	5/25/2011	
Description While the Geoprobe® operator installed injection points, the ChemGrout® operator mixed ABC+® for injection.		

Photographic Log

Client Name: Tecumseh Products Company		Site Location: Former TPC Site Tecumseh, MI	Project No.: 02751.16
Photo No. 5	Date 5/25/2011		
Description Prior to injection ABC® was prepared from concentrate in a 500 gallon tank. Water and concentrated ABC® were added to the tank at pre-determined ratios and mixed by bubbling air through the tank.			

Photo No.	Date	
6	5/18/2011	
Description Each ChemGrout® mixer was equipped with two mixing hoppers. ABC® was pumped from the ABC® mixing tank to the hopper.		

Photographic Log

Client Name:		Site Location:	Project No.:
Tecumseh Products Company		Former TPC Site Tecumseh, MI	02751.16
Photo No.	Date		
7	5/18/2011		
Description Zero valent iron and guar (a food-grade thickening agent used to help keep the iron in solution) were added to the hopper and mixed.			
Photo No.	Date		
8	5/18/2011		
Description ABC+® was continuously mixed in the hopper until injection. Each hopper could hold approximately 50 gallons of ABC+®, sufficient volume for a single injection layer. ABC+® was injected in several layers having a vertical spacing of approximately 3 feet at each injection point.			

Photographic Log

Client Name: Tecumseh Products Company		Site Location: Former TPC Site Tecumseh, MI	Project No.: 02751.16
Photo No. 9	Date 5/18/2011		
Description From the hopper, ABC+® was discharged to the injection tank for immediate injection.			

Photo No.	Date	
10	5/25/2011	
Description After mixing, the ChemGrout® was used to inject the ABC+® through a pressurized injection hose which was connected to the Geoprobe® rods by to the Geoprobe® operator.		



Photographic Log

Client Name:		Site Location:	Project No.:
Tecumseh Products Company		Former TPC Site Tecumseh, MI	02751.16
Photo No.	Date		
11	5/18/2011		
Description Geoprobe® rods used for injection were equipped with a check valve. This valve was closed when the Geoprobe® operator adjusted the injection depth for the next layer and following the completion of injections at each point to allow pressure to dissipate and to help prevent the pressurized fluid from returning to the surface.			

Appendix D

Soil Boring Logs and Well Construction Forms



WELL CONSTRUCTION LOG

WELL NO. PRB-03s

Page 1 of 1

Facility/Project Name: Tecumseh Products PRB Monitoring Well Network		Date Drilling Started: 8/2/11	Date Drilling Completed: 8/2/11	Project Number: 186299	
Drilling Firm: Terra Probe, Inc.	Drilling Method: Direct Push	Surface Elev. (ft) 784.5	TOC Elevation (ft) 784.16	Total Depth (ft bgs) 12.0	Borehole Dia. (in) 3
Boring Location: In right-of-way, 30 feet south of PRB Section 1. N: 180566.77 E: 13239375.67		Personnel Logged By - Jamie Hoffman Driller - Ray Bashaw		Drilling Equipment: Geoprobe 6620DT	
Civil Town/City/or Village: Tecumseh	County: Lenawee	State: MI	Water Level Observations: While Drilling: Date/Time 8/2/11 00:00 ∇ Depth (ft bgs) 7.0 After Drilling: Date/Time 8/5/11 14:17 ∇ Depth (ft bgs) 5.51		

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
1 HA	100		0	TOPSOIL				
			2	SANDY CLAY mostly clay, some medium to coarse sand, trace fine to medium gravel, medium plasticity, very dark grayish brown (10YR 3/2), moist, medium stiff to stiff.	CL			
			4					
			6	LEAN CLAY mostly clay, some silt, trace fine sand, high plasticity, very dark grayish brown (10YR 3/2), moist to saturated, very stiff. Interbedded with POORLY GRADED SAND WITH GRAVEL mostly coarse sand, some fine to medium gravel, few medium to fine sand, very dark grayish brown (10YR 3/2), moist to saturated, very loose.	CL			
2 GP	80		7		SP			
			8		CL			
			9		SP			
			10	POORLY GRADED SAND WITH GRAVEL mostly coarse sand, some fine to medium gravel, few medium to fine sand, very dark brown (10YR 2/2), saturated, loose.	SP			
3 GP	80		11					
			12	End of boring at 12.0 feet below ground surface.				

SOIL BORING WELL CONSTRUCTION LOG 8070.20 2011.GPJ TRC CORP.GDT 186299 11/16/11

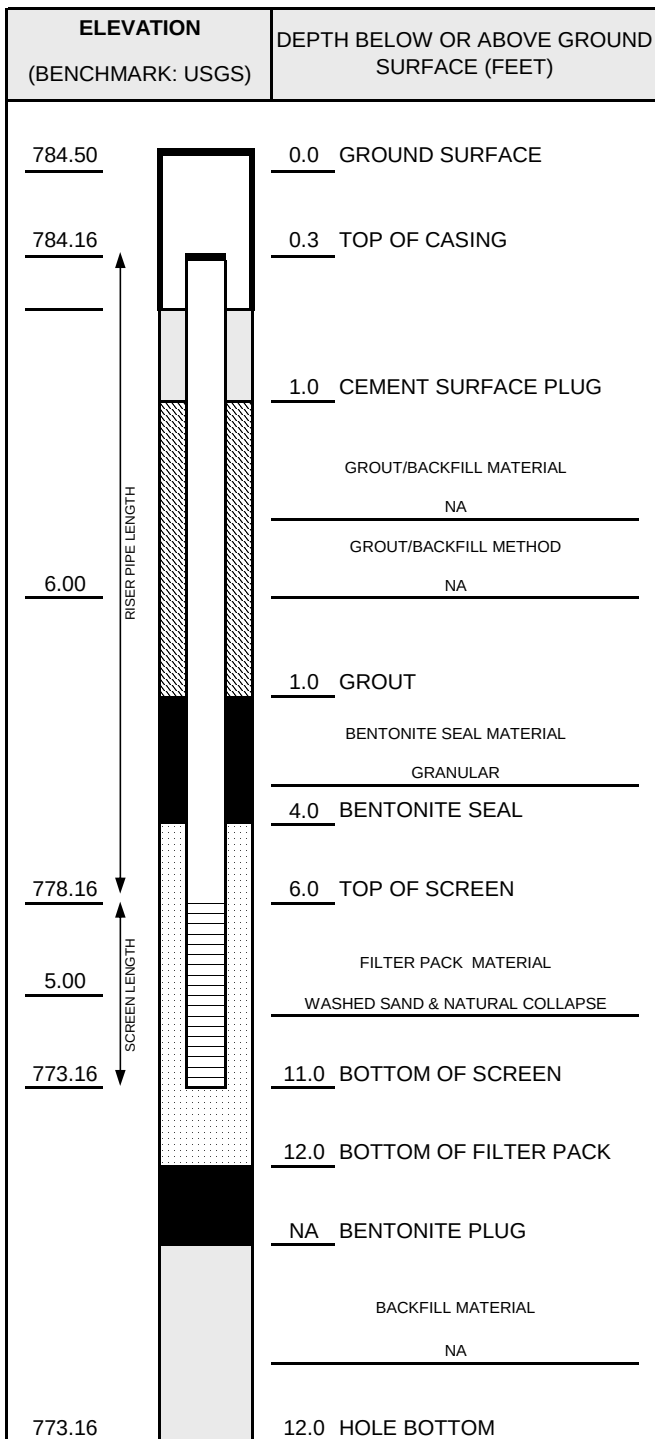
Signature:

Firm: TRC Environmental Corp.
1540 Eisenhower Place Ann Arbor, MI(734) 971-7080
Fax (734) 971-9022



WELL CONSTRUCTION DIAGRAM

PROJ. NAME: TPC - PRB Well Installation				WELL ID:	PRB-03s		
PROJ. NO:	186299	DATE INSTALLED:	8/2/2011	INSTALLED BY:	J. Hoffman	CHECKED BY:	S. Metz



NOTES:

CASING AND SCREEN DETAILS	
TYPE OF RISER:	2-INCH PVC
PIPE SCHEDULE:	40
PIPE JOINTS:	THREADED O-RINGS
SOLVENT USED?	NO
SCREEN TYPE:	2-INCH PVC
SCR. SLOT SIZE:	0.01-INCH
BOREHOLE DIAMETER:	3 IN. FROM 0 TO 12 FT.
SURF. CASING DIAMETER:	12 IN. FROM 0 TO 1 FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	SURGE AND PUMP
TIME DEVELOPING:	0.25 HOURS
WATER REMOVED:	6.5 GALLONS
WATER ADDED:	0 GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	Very Turbid
COLOR BEFORE:	Brown
CLARITY AFTER:	Clear
COLOR AFTER:	None
ODOR (IF PRESENT):	None

WATER LEVEL SUMMARY				
MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	10.65	T/PVC	8/3/2011	8:35
DTB AFTER DEVELOPING:	10.65	T/PVC	8/5/2011	14:17
SWE BEFORE DEVELOPING:	5.44	T/PVC	8/3/2011	8:35
SWE AFTER DEVELOPING:	5.51	T/PVC	8/5/2011	14:17
OTHER SWE:		T/PVC		
OTHER SWE:		T/PVC		

PROTECTIVE CASING DETAILS	
PERMANENT, LEGIBLE WELL LABEL ADDED?	☒ YES ☐ NO
PROTECTIVE COVER AND LOCK INSTALLED?	☒ YES ☐ NO
LOCK KEY NUMBER:	3120



WELL CONSTRUCTION LOG

WELL NO. PRB-04s

Page 1 of 1

Facility/Project Name: Tecumseh Products PRB Monitoring Well Network		Date Drilling Started: 8/2/11	Date Drilling Completed: 8/2/11	Project Number: 186299	
Drilling Firm: Terra Probe, Inc.	Drilling Method: Direct Push	Surface Elev. (ft) 785.4	TOC Elevation (ft) 784.70	Total Depth (ft bgs) 12.0	Borehole Dia. (in) 3
Boring Location: In right-of-way, 170 feet north of PRB-03s, 40 feet east of PRB-06s. N: 180739.64 E: 13239366.88		Personnel Logged By - Jamie Hoffman Driller - Ray Bashaw		Drilling Equipment: Geoprobe 6620DT	
Civil Town/City/or Village: Tecumseh	County: Lenawee	State: MI	Water Level Observations: While Drilling: Date/Time 8/2/11 00:00 Depth (ft bgs) 7.0 After Drilling: Date/Time 8/5/11 14:35 Depth (ft bgs) 5.97		

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
				TOPSOIL				
1 GP	50		2	SANDY LEAN CLAY mostly clay, some medium to coarse sand, trace fine to medium gravel, nonplastic, very dark grayish brown (10YR 3/2), moist, medium stiff to stiff.	CL			
			4	LEAN CLAY mostly clay, some silt, trace fine sand, high plasticity, very dark grayish brown (10YR 3/2), dry, very stiff.	CL			
				SILTY SAND mostly fine to medium sand, some silt, few coarse sand, brown (10YR 5/3), moist, loose.	SM			
2 GP	50		6	LEAN CLAY mostly clay, some silt, trace fine sand, high plasticity, very dark grayish brown (10YR 3/2), moist, very stiff.	CL			
				SILTY SAND mostly fine to medium sand, some silt, few coarse sand, brown (10YR 5/3), moist, loose.	SM			
			8	POORLY GRADED SAND WITH GRAVEL mostly medium to coarse sand, some fine to medium gravel, few silt, few coarse gravel, few cobbles, dark brown (10YR 3/3), saturated, very loose.	SP			
			10					
			12	End of boring at 12.0 feet below ground surface.				

Heaving sands prevented sample collection below 8 feet.

SOIL BORING WELL CONSTRUCTION LOG 8070.20 2011.GPJ TRC CORP.GDT 186299 11/16/11

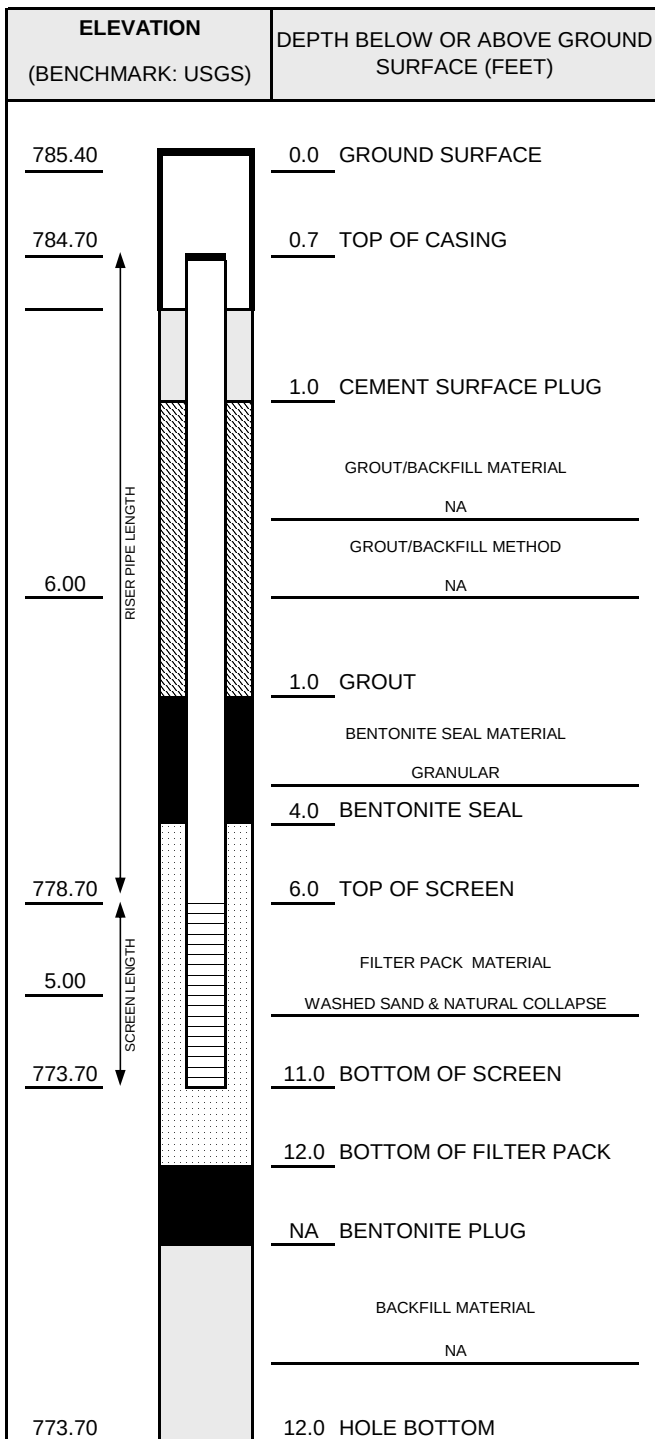
Signature:

Firm: TRC Environmental Corp.
1540 Eisenhower Place Ann Arbor, MI(734) 971-7080
Fax (734) 971-9022



WELL CONSTRUCTION DIAGRAM

PROJ. NAME: TPC - PRB Well Installation				WELL ID:	PRB-04s		
PROJ. NO:	186299	DATE INSTALLED:	8/2/2011	INSTALLED BY:	J. Hoffman	CHECKED BY:	S. Metz



NOTES:

CASING AND SCREEN DETAILS	
TYPE OF RISER:	2-INCH PVC
PIPE SCHEDULE:	40
PIPE JOINTS:	THREADED O-RINGS
SOLVENT USED?	NO
SCREEN TYPE:	2-INCH PVC
SCR. SLOT SIZE:	0.01-INCH
BOREHOLE DIAMETER:	3 IN. FROM 0 TO 12 FT.
SURF. CASING DIAMETER:	12 IN. FROM 0 TO 1 FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	SURGE AND PUMP
TIME DEVELOPING:	0.25 HOURS
WATER REMOVED:	10 GALLONS
WATER ADDED:	0 GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	Very Turbid
COLOR BEFORE:	Brown
CLARITY AFTER:	Clear
COLOR AFTER:	None
ODOR (IF PRESENT):	None

WATER LEVEL SUMMARY				
MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	10.64	T/PVC	8/3/2011	8:47
DTB AFTER DEVELOPING:	10.59	T/PVC	8/5/2011	14:35
SWE BEFORE DEVELOPING:	6.01	T/PVC	8/3/2011	8:47
SWE AFTER DEVELOPING:	5.97	T/PVC	8/5/2011	14:35
OTHER SWE:		T/PVC		
OTHER SWE:		T/PVC		

PROTECTIVE CASING DETAILS	
PERMANENT, LEGIBLE WELL LABEL ADDED?	☒ YES ☐ NO
PROTECTIVE COVER AND LOCK INSTALLED?	☒ YES ☐ NO
LOCK KEY NUMBER:	3120



WELL CONSTRUCTION LOG

WELL NO. PRB-04d

Page 1 of 2

Facility/Project Name: Tecumseh Products PRB Monitoring Well Network		Date Drilling Started: 8/2/11	Date Drilling Completed: 8/2/11	Project Number: 186299	
Drilling Firm: Terra Probe, Inc.	Drilling Method: Direct Push	Surface Elev. (ft) 785.4	TOC Elevation (ft) 784.70	Total Depth (ft bgs) 30.0	Borehole Dia. (in) 3
Boring Location: In right-of-way, 170 feet north of PRB-03s, 40 feet east of PRB-06s. N: 180738.67 E: 13239366.83		Personnel Logged By - Jamie Hoffman Driller - Ray Bashaw		Drilling Equipment: Geoprobe 6620DT	
Civil Town/City/or Village: Tecumseh	County: Lenawee	State: MI	Water Level Observations: While Drilling: Date/Time 8/2/11 00:00 ∇ Depth (ft bgs) 7.0 After Drilling: Date/Time 8/5/11 14:30 ∇ Depth (ft bgs) 6.11		

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
				TOPSOIL				
1 GP	50		2	SANDY LEAN CLAY mostly clay, some medium to coarse sand, trace fine to medium gravel, nonplastic, very dark grayish brown (10YR 3/2), moist, medium stiff to stiff.	CL			
			4	LEAN CLAY mostly clay, some silt, trace fine sand, high plasticity, very dark grayish brown (10YR 3/2), dry, very stiff.	CL			
				SILTY SAND mostly fine to medium sand, some silt, few coarse sand, brown (10YR 5/3), moist, loose.	SM			
2 GP	50		6	LEAN CLAY mostly clay, some silt, trace fine sand, high plasticity, very dark grayish brown (10YR 3/2), moist, very stiff.	CL			
				SILTY SAND mostly fine to medium sand, some silt, few coarse sand, brown (10YR 5/3), moist, loose.	SM			
			8	POORLY GRADED SAND WITH GRAVEL mostly medium to coarse sand, some fine to medium gravel, few silt, few coarse gravel, few cobbles, dark brown (10YR 3/3), saturated, very loose.	SP			Heaving sands prevented sample collection below 8 feet.
			10					
			12					

SOIL BORING WELL CONSTRUCTION LOG 8070.20, 2011.GPJ TRC CORP.GDT 186299 11/16/11

Signature:	Firm: TRC Environmental Corp. 1540 Eisenhower Place Ann Arbor, MI	(734) 971-7080 Fax (734) 971-9022
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WELL CONSTRUCTION LOG

WELL NO. PRB-04d

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SOIL BORING WELL CONSTRUCTION LOG 8070.20_2011.GPJ TRC_CORP.GDT 8070.20 12/19/11

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
			14					
			16					
			18					
			20					
			22					
			24					
			26					
			28					



WELL CONSTRUCTION LOG

WELL NO. PRB-04d

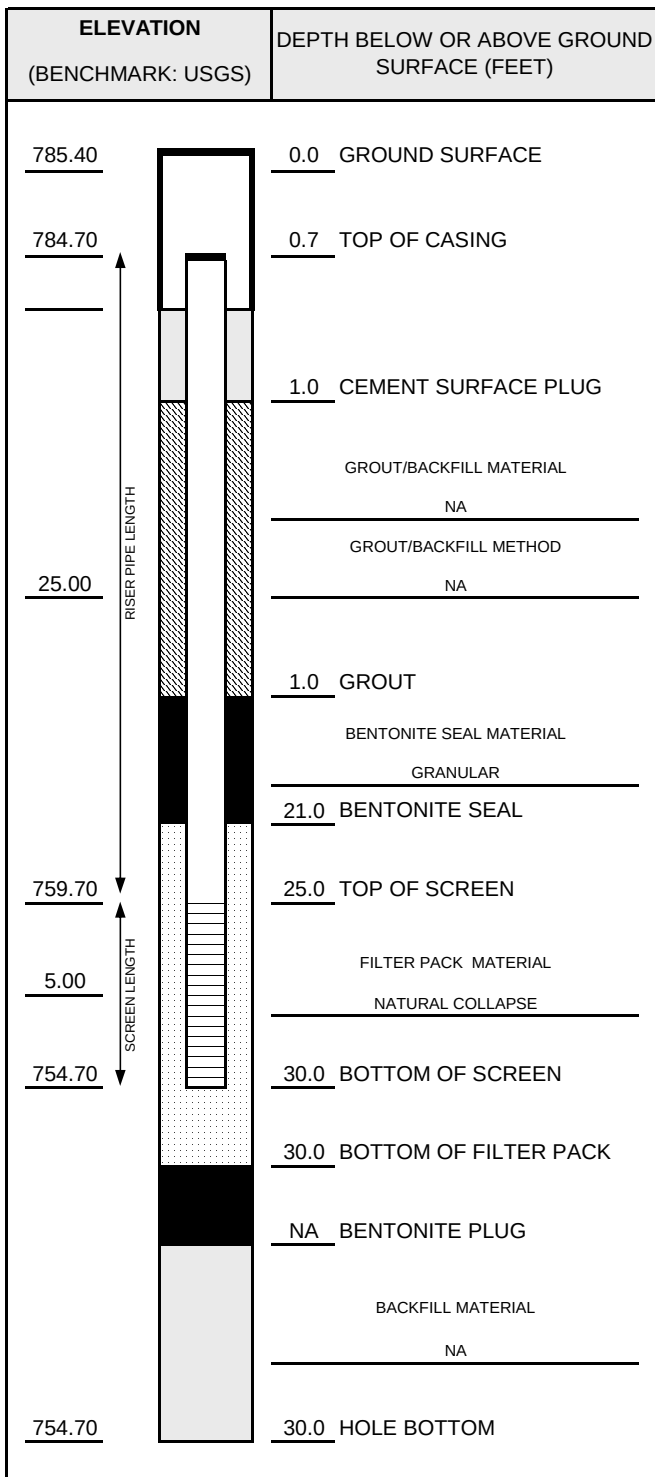
Page 3 of 3

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
			30	End of boring at 30.0 feet below ground surface.				
			32					
			34					
			36					
			38					
			40					
			42					
			44					



WELL CONSTRUCTION DIAGRAM

PROJ. NAME:	TPC - PRB Well Installation			WELL ID:	PRB-04d		
PROJ. NO:	186299	DATE INSTALLED:	8/2/2011	INSTALLED BY:	J. Hoffman	CHECKED BY:	S. Metz



CASING AND SCREEN DETAILS	
TYPE OF RISER:	2-INCH PVC
PIPE SCHEDULE:	40
PIPE JOINTS:	THREADED O-RINGS
SOLVENT USED?	NO
SCREEN TYPE:	2-INCH PVC
SCR. SLOT SIZE:	0.01-INCH
BOREHOLE DIAMETER:	3 IN. FROM 0 TO 30 FT.
SURF. CASING DIAMETER:	12 IN. FROM 0 TO 1 FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	SURGE AND PUMP
TIME DEVELOPING:	0.25 HOURS
WATER REMOVED:	14 GALLONS
WATER ADDED:	0 GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	Very Turbid
COLOR BEFORE:	Brown
CLARITY AFTER:	Clear
COLOR AFTER:	None
ODOR (IF PRESENT):	None

WATER LEVEL SUMMARY				
MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	29.55	T/PVC	8/3/2011	8:46
DTB AFTER DEVELOPING:	29.89	T/PVC	8/5/2011	14:30
SWE BEFORE DEVELOPING:	6.04	T/PVC	8/3/2011	8:46
SWE AFTER DEVELOPING:	6.11	T/PVC	8/5/2011	14:30
OTHER SWE:		T/PVC		
OTHER SWE:		T/PVC		

PROTECTIVE CASING DETAILS	
PERMANENT, LEGIBLE WELL LABEL ADDED?	☒ YES ☐ NO
PROTECTIVE COVER AND LOCK INSTALLED?	☒ YES ☐ NO
LOCK KEY NUMBER:	3120

NOTES:



WELL CONSTRUCTION LOG

WELL NO. PRB-05s

Page 1 of 1

Facility/Project Name: Tecumseh Products PRB Monitoring Well Network		Date Drilling Started: 8/1/11	Date Drilling Completed: 8/1/11	Project Number: 186299	
Drilling Firm: Terra Probe, Inc.	Drilling Method: Direct Push	Surface Elev. (ft) 785.1	TOC Elevation (ft) 784.66	Total Depth (ft bgs) 12.0	Borehole Dia. (in) 3
Boring Location: 30 feet west of in-barrier well PRB-06s, 150 feet north of southern fence. N: 180734.84 E: 13239295.51		Personnel Logged By - Jamie Hoffman Driller - Ray Bashaw		Drilling Equipment: Geoprobe 6620DT	
Civil Town/City/or Village: Tecumseh	County: Lenawee	State: MI	Water Level Observations: While Drilling: Date/Time 8/1/11 00:00 Depth (ft bgs) 7.0 After Drilling: Date/Time 8/5/11 12:41 Depth (ft bgs) 5.93		

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
				TOPSOIL				
1 GP	50		2	SANDY LEAN CLAY mostly clay, some medium to coarse sand, trace fine to medium gravel, medium plasticity, very dark grayish brown (10YR 3/2), moist, medium stiff to stiff.	CL			
			4	Same as above.				
2 GP	50		6	POORLY GRADED SAND WITH GRAVEL mostly coarse sand, some fine to medium gravel, few medium to fine sand, very dark grayish brown (10YR 3/2), moist, loose.	SP			
			8	SANDY LEAN CLAY mostly clay, some medium to coarse sand, trace fine to medium gravel, medium plasticity, very dark grayish brown (10YR 3/2), moist, stiff.	CL			
			10	POORLY GRADED SAND WITH GRAVEL mostly coarse sand, some fine to medium gravel, few medium to fine sand, trace cobbles, very dark grayish brown (10YR 3/2), saturated, very loose.	SP			
3 GP	70		12	End of boring at 12.0 feet below ground surface.				

SOIL BORING WELL CONSTRUCTION LOG 8070.20 2011.GPJ TRC CORP.GDT 186299 11/16/11

Signature:

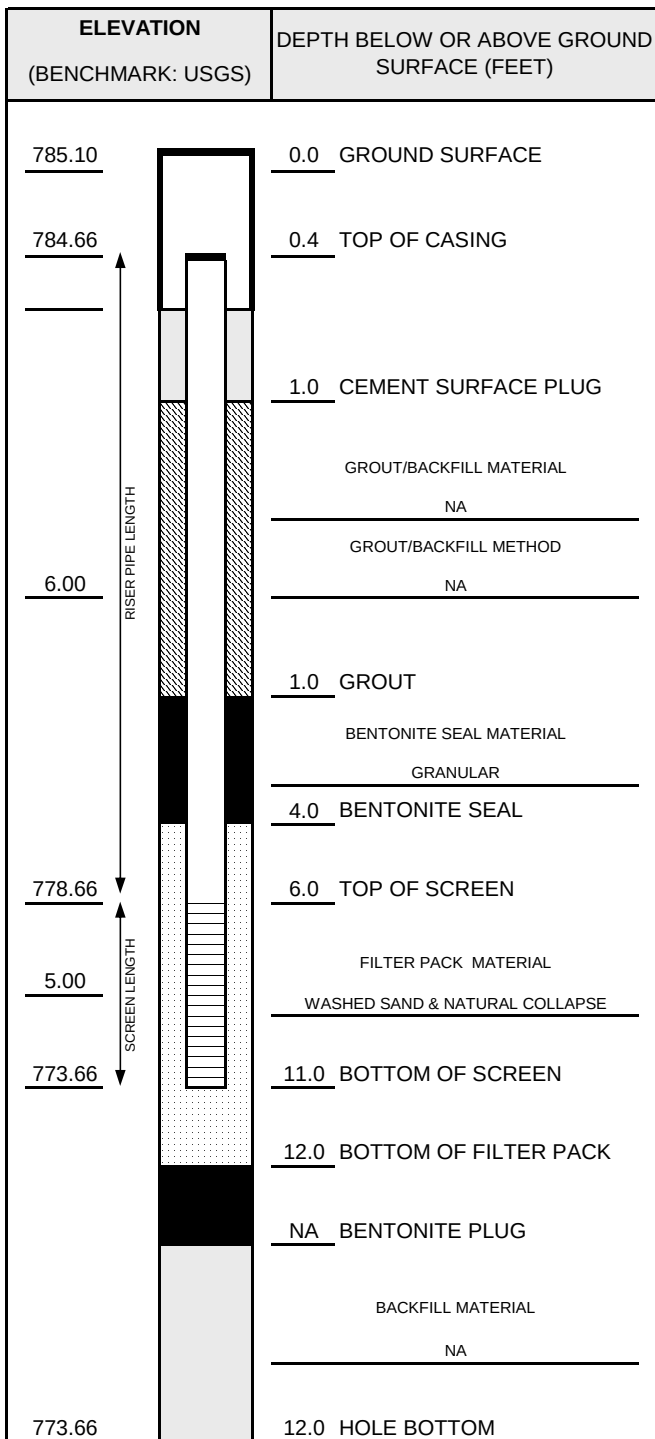
Firm: TRC Environmental Corp.
1540 Eisenhower Place Ann Arbor, MI

(734) 971-7080
Fax (734) 971-9022



WELL CONSTRUCTION DIAGRAM

PROJ. NAME: TPC - PRB Well Installation			WELL ID:	PRB-05s
PROJ. NO:	186299	DATE INSTALLED: 8/1/2011 INSTALLED BY: J. Hoffman		CHECKED BY: S. Metz



NOTES:

Natural collapse to 7 feet below ground surface.

CASING AND SCREEN DETAILS

TYPE OF RISER: 2-INCH PVC

PIPE SCHEDULE: 40

PIPE JOINTS: THREADED O-RINGS

SOLVENT USED? NO

SCREEN TYPE: 2-INCH PVC

SCR. SLOT SIZE: 0.01-INCH

BOREHOLE DIAMETER: 3 IN. FROM 0 TO 12 FT.

 IN. FROM TO FT.

SURF. CASING DIAMETER: 12 IN. FROM 0 TO 1 FT.

 IN. FROM TO FT.

WELL DEVELOPMENT

DEVELOPMENT METHOD: SURGE AND PUMP

TIME DEVELOPING: 0.25 HOURS

WATER REMOVED: 12 GALLONS

WATER ADDED: 0 GALLONS

WATER CLARITY BEFORE / AFTER DEVELOPMENT

CLARITY BEFORE: Very Turbid

COLOR BEFORE: Brown

CLARITY AFTER: Clear

COLOR AFTER: None

ODOR (IF PRESENT): None

WATER LEVEL SUMMARY

MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	10.84	T/PVC	8/3/2011	10:43
DTB AFTER DEVELOPING:	10.75	T/PVC	8/5/2011	12:41
SWE BEFORE DEVELOPING:	5.87	T/PVC	8/3/2011	10:43
SWE AFTER DEVELOPING:	5.93	T/PVC	8/5/2011	12:41
OTHER SWE:		T/PVC		
OTHER SWE:		T/PVC		

PROTECTIVE CASING DETAILS

PERMANENT, LEGIBLE WELL LABEL ADDED? ☒ YES ☐ NO

PROTECTIVE COVER AND LOCK INSTALLED? ☒ YES ☐ NO

LOCK KEY NUMBER: 3120



WELL CONSTRUCTION LOG

WELL NO. PRB-06s

Page 1 of 1

Facility/Project Name: Tecumseh Products PRB Monitoring Well Network		Date Drilling Started: 8/1/11	Date Drilling Completed: 8/1/11	Project Number: 186299	
Drilling Firm: Terra Probe, Inc.	Drilling Method: Direct Push	Surface Elev. (ft) 784.9	TOC Elevation (ft) 784.52	Total Depth (ft bgs) 12.0	Borehole Dia. (in) 3
Boring Location: 14 feet west of eastern fence, 150 feet north of southern fence within PRB Section 1. N: 180737.19 E: 13239325.71		Personnel Logged By - Jamie Hoffman Driller - Ray Bashaw		Drilling Equipment: Geoprobe 6620DT	
Civil Town/City/or Village: Tecumseh	County: Lenawee	State: MI	Water Level Observations: While Drilling: Date/Time 8/1/11 00:00 Depth (ft bgs) 7.0 After Drilling: Date/Time 8/5/11 13:15 Depth (ft bgs) 5.85		

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
				TOPSOIL				
				SANDY LEAN CLAY mostly clay, some medium to coarse sand, few fine gravel, medium plasticity, dark grayish brown (10YR 4/2), moist, soft.	CL			
1 GP	50		2					
				WELL GRADED SAND mostly medium to coarse sand, some fine sand, few clay, trace fine gravel, dark grayish brown (10YR 4/2), moist, dense.	SW			
			4	SANDY LEAN CLAY mostly clay, some medium to coarse sand, few fine gravel, medium plasticity, dark grayish brown (10YR 4/2), moist, soft.	CL			
				WELL GRADED SAND mostly medium to coarse sand, some fine sand, few clay, trace fine gravel, dark grayish brown (10YR 4/2), decomposition odor, moist, loose.				
2 GP	30		6					
				Change to trace coarse gravel, saturated at 7.0 feet.				
			8	Same as above.	SW			
3 GP	30		10					
			12	End of boring at 12.0 feet below ground surface.				

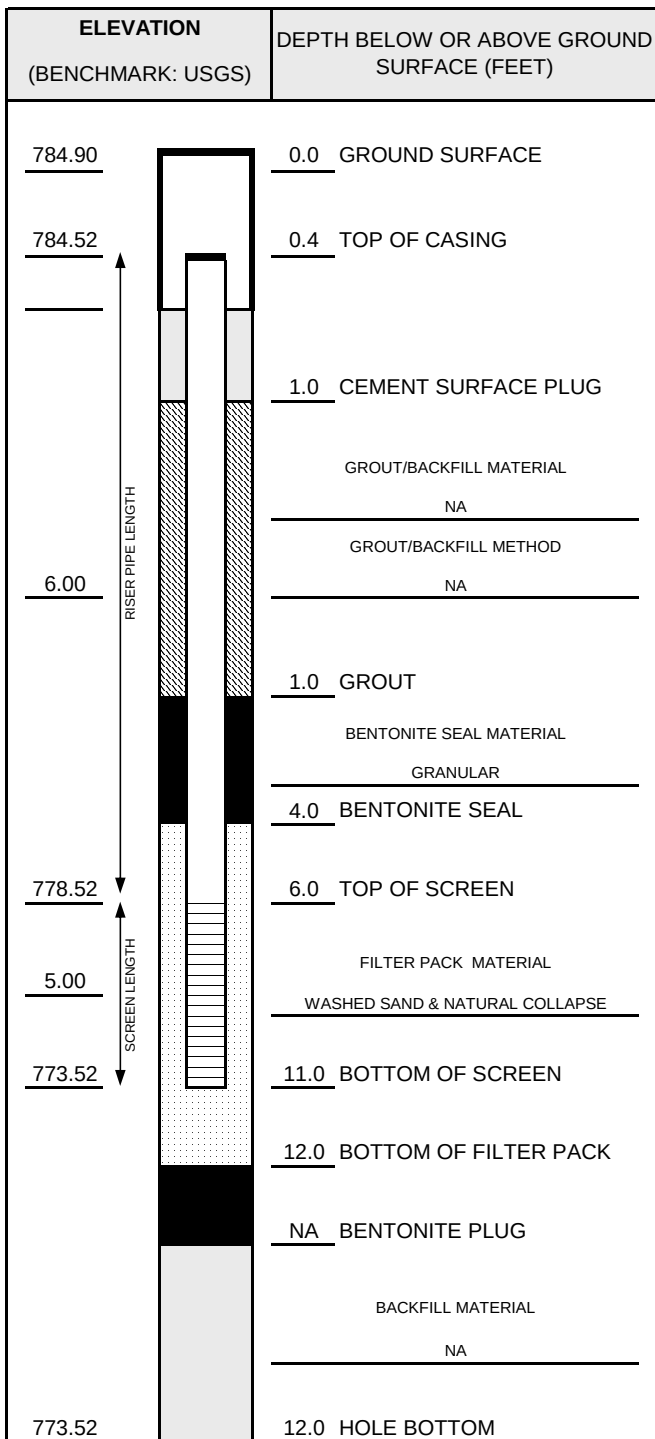
SOIL BORING WELL CONSTRUCTION LOG 8070.20 2011.GPJ TRC CORP.GDT 186299 11/16/11

Signature:	Firm: TRC Environmental Corp. 1540 Eisenhower Place Ann Arbor, MI	(734) 971-7080 Fax (734) 971-9022
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WELL CONSTRUCTION DIAGRAM

PROJ. NAME:	TPC - PRB Well Installation			WELL ID:	PRB-06s		
PROJ. NO:	186299	DATE INSTALLED:	8/1/2011	INSTALLED BY:	J. Hoffman	CHECKED BY:	S. Metz



CASING AND SCREEN DETAILS	
TYPE OF RISER:	2-INCH PVC
PIPE SCHEDULE:	40
PIPE JOINTS:	THREADED O-RINGS
SOLVENT USED?	NO
SCREEN TYPE:	2-INCH PVC
SCR. SLOT SIZE:	0.01-INCH
BOREHOLE DIAMETER:	3 IN. FROM 0 TO 12 FT.
SURF. CASING DIAMETER:	12 IN. FROM 0 TO 1 FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	SURGE AND PUMP
TIME DEVELOPING:	0.25 HOURS
WATER REMOVED:	0.5 (Dry) GALLONS
WATER ADDED:	0 GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	Very Turbid
COLOR BEFORE:	Milky Brown
CLARITY AFTER:	Turbid
COLOR AFTER:	White
ODOR (IF PRESENT):	Decomposition

WATER LEVEL SUMMARY				
MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	10.84	T/PVC	8/3/2011	10:45
DTB AFTER DEVELOPING:	10.74	T/PVC	8/5/2011	13:15
SWE BEFORE DEVELOPING:	5.81	T/PVC	8/3/2011	10:45
SWE AFTER DEVELOPING:	5.85	T/PVC	8/5/2011	13:15
OTHER SWE:		T/PVC		
OTHER SWE:		T/PVC		

PROTECTIVE CASING DETAILS	
PERMANENT, LEGIBLE WELL LABEL ADDED?	☒ YES ☐ NO
PROTECTIVE COVER AND LOCK INSTALLED?	☒ YES ☐ NO
LOCK KEY NUMBER:	3120

NOTES:



WELL CONSTRUCTION LOG

WELL NO. PRB-07s

Page 1 of 1

Facility/Project Name: Tecumseh Products PRB Monitoring Well Network		Date Drilling Started: 8/2/11	Date Drilling Completed: 8/2/11	Project Number: 186299	
Drilling Firm: Terra Probe, Inc.	Drilling Method: Direct Push	Surface Elev. (ft) 784.5	TOC Elevation (ft) 784.08	Total Depth (ft bgs) 12.0	Borehole Dia. (in) 3
Boring Location: In right-of-way, 170 feet north of PRB-04s/d, 30 feet east of eastern fence. N: 180895.66 E: 13239362.82		Personnel Logged By - Jamie Hoffman Driller - Ray Bashaw		Drilling Equipment: Geoprobe 6620DT	
Civil Town/City/or Village: Tecumseh	County: Lenawee	State: MI	Water Level Observations: While Drilling: Date/Time 8/2/11 00:00 Depth (ft bgs) 8.0 After Drilling: Date/Time 8/8/11 13:26 Depth (ft bgs) 5.59		

SAMPLE	NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
					TOPSOIL				
	1 GP	60		2	SANDY LEAN CLAY mostly clay, some medium to coarse sand, trace fine to medium gravel, medium plasticity, very dark grayish brown (10YR 3/2), moist, medium stiff to stiff.	CL			
				4	SANDY LEAN CLAY WITH GRAVEL mostly clay, some medium to coarse sand, little fine to coarse gravel, trace cobbles, medium plasticity, very dark grayish brown (10YR 3/2), moist, medium stiff to stiff.	CL			
	2 GP	60		6	SILTY SAND mostly fine to medium sand, some silt, few coarse sand, brown (10YR 5/3), moist, loose.	SM			
					SANDY LEAN CLAY mostly clay, some medium to coarse sand, trace fine to medium gravel, medium plasticity, very dark grayish brown (10YR 3/2), moist, medium stiff to stiff.	CL			
				8	POORLY GRADED SAND WITH GRAVEL mostly medium to coarse sand, some fine to medium gravel, few silt, few coarse gravel, few cobbles, dark brown (10YR 3/3), moist, very loose.				
					Change to saturated at 8 feet.				
	3 GP	80		10		SP			
				12	End of boring at 12.0 feet below ground surface.				

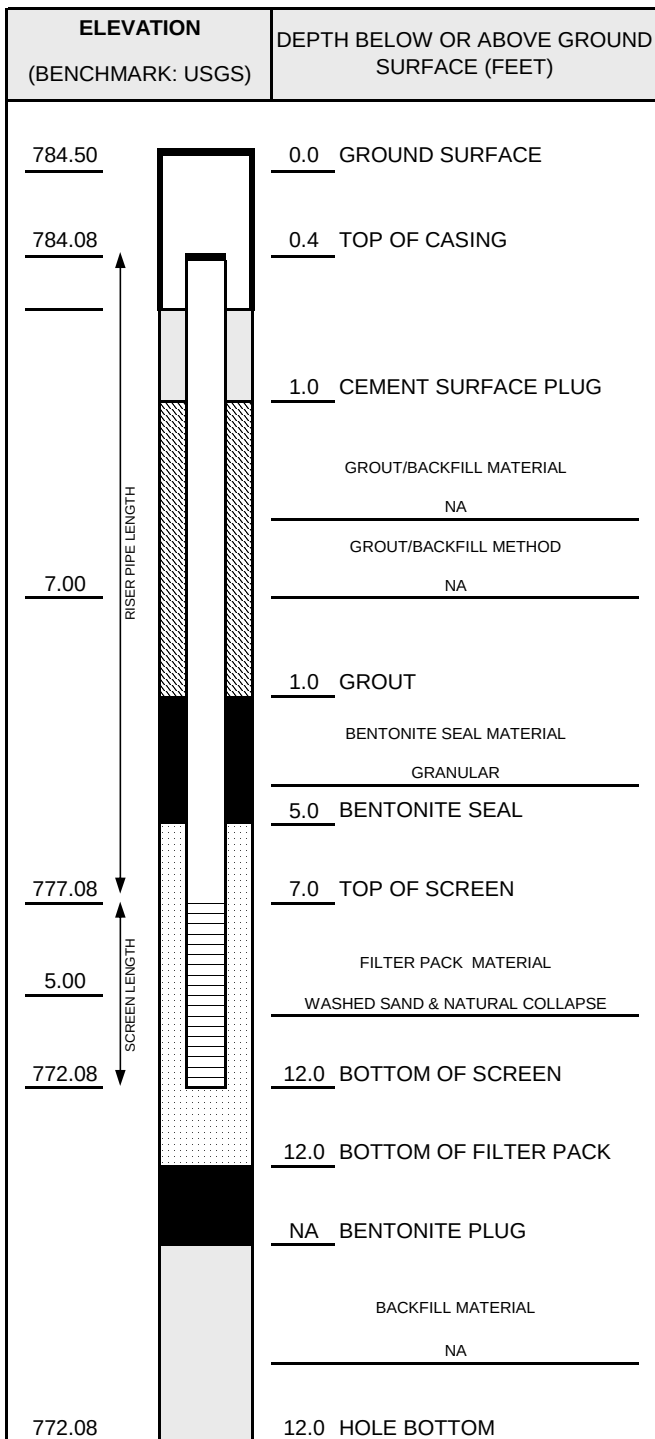
SOIL BORING WELL CONSTRUCTION LOG 8070.20 2011.GPJ TRC CORP.GDT 186299 11/16/11

Signature:	Firm: TRC Environmental Corp. 1540 Eisenhower Place Ann Arbor, MI	(734) 971-7080 Fax (734) 971-9022
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WELL CONSTRUCTION DIAGRAM

PROJ. NAME: TPC - PRB Well Installation				WELL ID:	PRB-07s		
PROJ. NO:	186299	DATE INSTALLED:	8/2/2011	INSTALLED BY:	J. Hoffman	CHECKED BY:	S. Metz



NOTES:

CASING AND SCREEN DETAILS	
TYPE OF RISER:	2-INCH PVC
PIPE SCHEDULE:	40
PIPE JOINTS:	THREADED O-RINGS
SOLVENT USED?	NO
SCREEN TYPE:	2-INCH PVC
SCR. SLOT SIZE:	0.01-INCH
BOREHOLE DIAMETER:	3 IN. FROM 0 TO 12 FT.
SURF. CASING DIAMETER:	12 IN. FROM 0 TO 1 FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	SURGE AND PUMP
TIME DEVELOPING:	0.25 HOURS
WATER REMOVED:	13 GALLONS
WATER ADDED:	0 GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	Very Turbid
COLOR BEFORE:	Brown
CLARITY AFTER:	Clear
COLOR AFTER:	None
ODOR (IF PRESENT):	None

WATER LEVEL SUMMARY				
MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	11.85	T/PVC	8/3/2011	9:05
DTB AFTER DEVELOPING:	11.85	T/PVC	8/8/2011	13:26
SWE BEFORE DEVELOPING:	5.46	T/PVC	8/3/2011	9:05
SWE AFTER DEVELOPING:	5.59	T/PVC	8/8/2011	13:26
OTHER SWE:		T/PVC		
OTHER SWE:		T/PVC		

PROTECTIVE CASING DETAILS	
PERMANENT, LEGIBLE WELL LABEL ADDED?	☒ YES ☐ NO
PROTECTIVE COVER AND LOCK INSTALLED?	☒ YES ☐ NO
LOCK KEY NUMBER:	3120



WELL CONSTRUCTION LOG

WELL NO. PRB-08s

Page 1 of 1

Facility/Project Name: Tecumseh Products PRB Monitoring Well Network		Date Drilling Started: 8/2/11	Date Drilling Completed: 8/2/11	Project Number: 186299	
Drilling Firm: Terra Probe, Inc.	Drilling Method: Direct Push	Surface Elev. (ft) 785.2	TOC Elevation (ft) 784.69	Total Depth (ft bgs) 12.0	Borehole Dia. (in) 3
Boring Location: In right-of-way, 290 feet north of PRB-07s, 30 feet east of eastern fence. N: 181186.61 E: 13239356.36		Personnel Logged By - Jamie Hoffman Driller - Ray Bashaw		Drilling Equipment: Geoprobe 6620DT	
Civil Town/City/or Village: Tecumseh	County: Lenawee	State: MI	Water Level Observations: While Drilling: Date/Time <u>8/2/11 00:00</u> Depth (ft bgs) <u>7.0</u> After Drilling: Date/Time <u>8/8/11 12:48</u> Depth (ft bgs) <u>6.18</u>		

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
				TOPSOIL				
1 GP	60		2	SANDY LEAN CLAY mostly clay, some medium to coarse sand, trace fine to medium gravel, medium plasticity, very dark grayish brown (10YR 3/2) with gray (10YR 5/1) mottling, moist, medium stiff to stiff.	CL			
2 GP	70		6	SILTY SAND mostly fine to medium sand, some silt, few coarse sand, brown (10YR 5/3), moist, loose.	SM			
			7	POORLY GRADED SAND WITH GRAVEL mostly medium to coarse sand, some fine to medium gravel, few silt, trace coarse gravel, dark brown (10YR 3/3), moist, very loose.				
			7.0	Change to saturated at 7.0 feet.				
3 GP	90		8	Same as above.	SP			
			12	End of boring at 12.0 feet below ground surface.				

SOIL BORING WELL CONSTRUCTION LOG 8070.20 2011 GPJ TRC CORP GDT 186299 11/16/11

Signature:

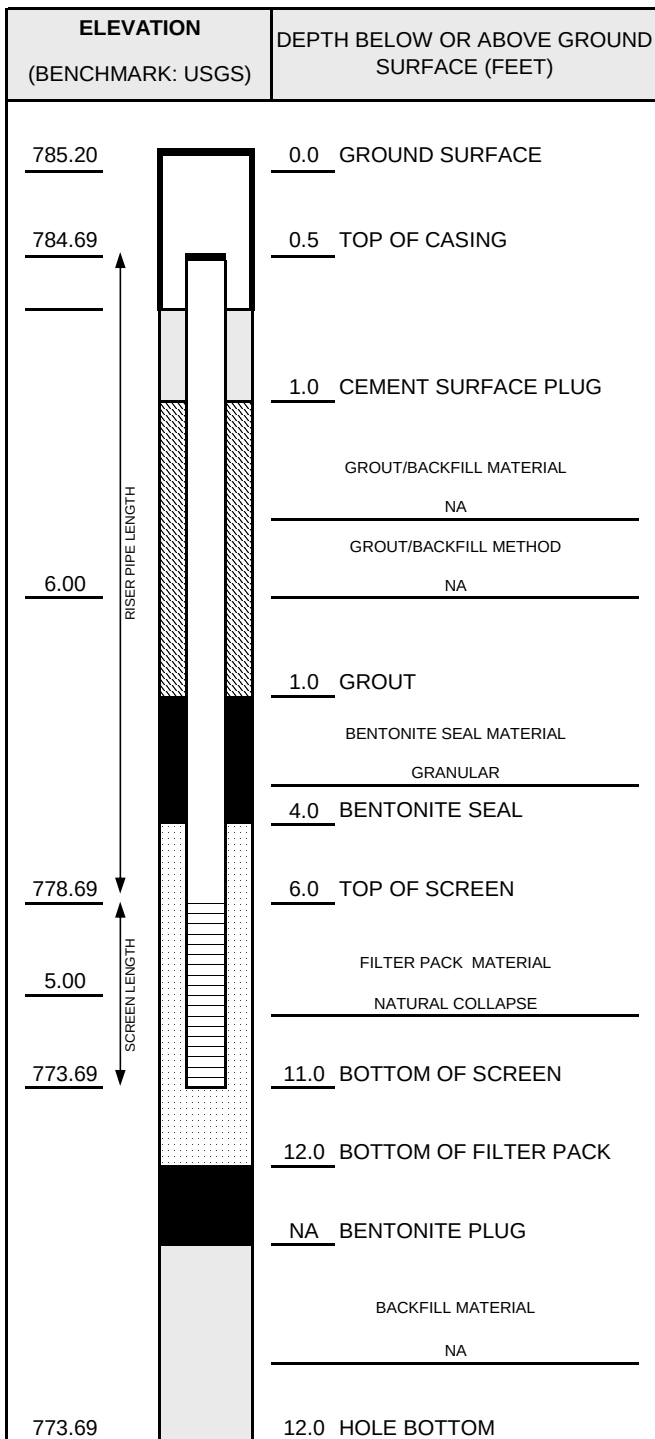
Firm: TRC Environmental Corp.
1540 Eisenhower Place Ann Arbor, MI

(734) 971-7080
Fax (734) 971-9022



WELL CONSTRUCTION DIAGRAM

PROJ. NAME:	TPC - PRB Well Installation			WELL ID:	PRB-08s		
PROJ. NO:	186299	DATE INSTALLED:	8/2/2011	INSTALLED BY:	J. Hoffman	CHECKED BY:	S. Metz



CASING AND SCREEN DETAILS	
TYPE OF RISER:	2-INCH PVC
PIPE SCHEDULE:	40
PIPE JOINTS:	THREADED O-RINGS
SOLVENT USED?	NO
SCREEN TYPE:	2-INCH PVC
SCR. SLOT SIZE:	0.01-INCH
BOREHOLE DIAMETER:	3 IN. FROM 0 TO 12 FT.
SURF. CASING DIAMETER:	12 IN. FROM 0 TO 1 FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	SURGE AND PUMP
TIME DEVELOPING:	0.25 HOURS
WATER REMOVED:	10 (Dry) GALLONS
WATER ADDED:	0 GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	Very Turbid
COLOR BEFORE:	Brown
CLARITY AFTER:	Slightly Turbid
COLOR AFTER:	Light Brown
ODOR (IF PRESENT):	None

WATER LEVEL SUMMARY				
MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	10.78	T/PVC	8/3/2011	9:32
DTB AFTER DEVELOPING:	10.76	T/PVC	8/8/2011	12:48
SWE BEFORE DEVELOPING:	6.08	T/PVC	8/3/2011	9:32
SWE AFTER DEVELOPING:	6.18	T/PVC	8/8/2011	12:48
OTHER SWE:		T/PVC		
OTHER SWE:		T/PVC		

PROTECTIVE CASING DETAILS	
PERMANENT, LEGIBLE WELL LABEL ADDED?	☒ YES ☐ NO
PROTECTIVE COVER AND LOCK INSTALLED?	☒ YES ☐ NO
LOCK KEY NUMBER:	3120

NOTES:



WELL CONSTRUCTION LOG

WELL NO. PRB-08d

Page 1 of 2

Facility/Project Name: Tecumseh Products PRB Monitoring Well Network		Date Drilling Started: 8/2/11	Date Drilling Completed: 8/2/11	Project Number: 186299	
Drilling Firm: Terra Probe, Inc.	Drilling Method: Direct Push	Surface Elev. (ft) 785.2	TOC Elevation (ft) 784.69	Total Depth (ft bgs) 24.0	Borehole Dia. (in) 3
Boring Location: In right-of-way, 290 feet north of PRB-07s, 30 feet east of eastern fence. N: 181187.49 E: 13239355.92		Personnel Logged By - Jamie Hoffman Driller - Ray Bashaw		Drilling Equipment: Geoprobe 6620DT	
Civil Town/City/or Village: Tecumseh	County: Lenawee	State: MI	Water Level Observations: While Drilling: Date/Time 8/2/11 00:00 Depth (ft bgs) 7.0 After Drilling: Date/Time 8/8/11 12:38 Depth (ft bgs) 6.18		

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
				TOPSOIL				
1 GP	60		2	SANDY LEAN CLAY mostly clay, some medium to coarse sand, trace fine to medium gravel, medium plasticity, very dark grayish brown (10YR 3/2) with gray (10YR 5/1) mottling, moist, medium stiff to stiff.	CL			
2 GP	70		6	SILTY SAND mostly fine to medium sand, some silt, few coarse sand, brown (10YR 5/3), moist, loose.	SM			
				▼ POORLY GRADED SAND WITH GRAVEL mostly medium to coarse sand, some fine to medium gravel, few silt, trace coarse gravel, dark brown (10YR 3/3), moist, very loose.				
				▽ Change to saturated at 7.0 feet.				
			8	Same as above	SP			
3 GP	90		10					
			12					

SOIL BORING WELL CONSTRUCTION LOG 8070.20 2011.GPJ TRC CORP.GDT 186299 11/16/11

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WELL CONSTRUCTION LOG

WELL NO. PRB-08d

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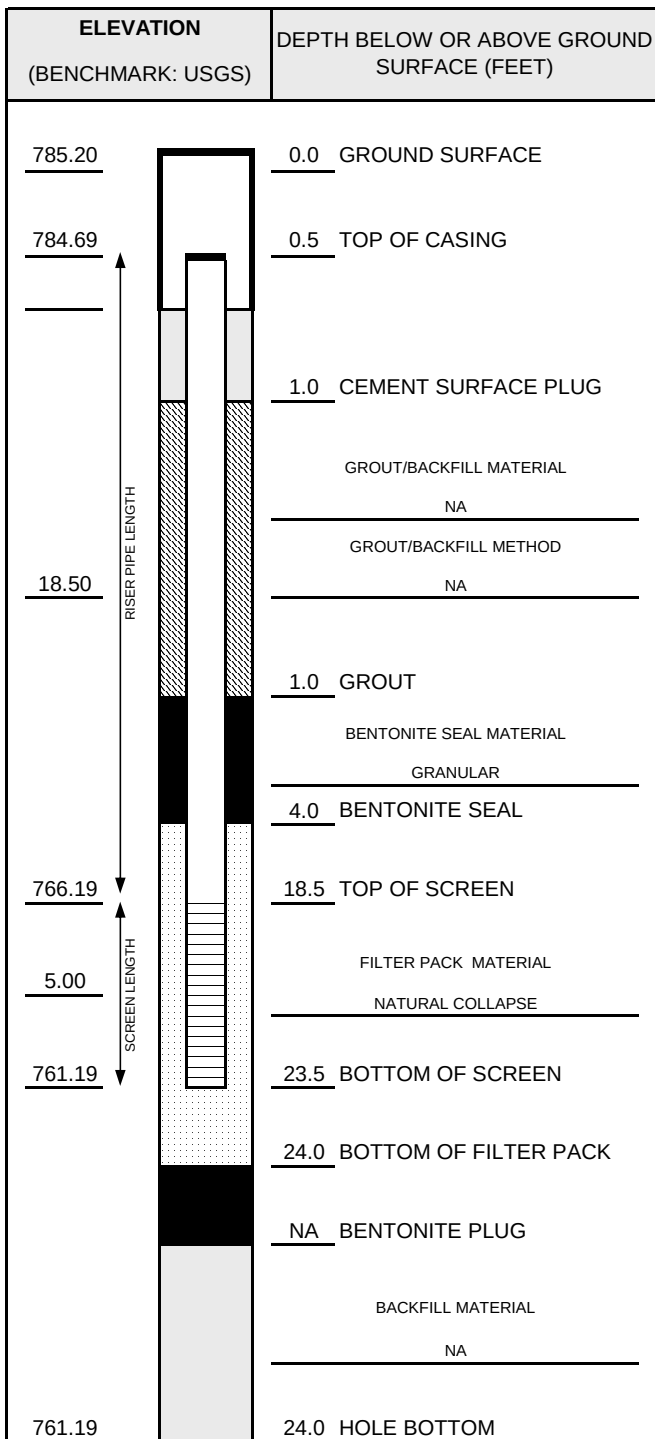
SOIL BORING WELL CONSTRUCTION LOG 8070.20_2011.GPJ TRC_CORP.GDT 8070.20 12/19/11

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
			14					
			16					
			18					
			20					
			22					
			24	End of boring at 24.0 feet below ground surface.				
			26					
			28					



WELL CONSTRUCTION DIAGRAM

PROJ. NAME:	TPC - PRB Well Installation			WELL ID:	PRB-08d		
PROJ. NO:	186299	DATE INSTALLED:	8/2/2011	INSTALLED BY:	J. Hoffman	CHECKED BY:	S. Metz



CASING AND SCREEN DETAILS	
TYPE OF RISER:	2-INCH PVC
PIPE SCHEDULE:	40
PIPE JOINTS:	THREADED O-RINGS
SOLVENT USED?	NO
SCREEN TYPE:	2-INCH PVC
SCR. SLOT SIZE:	0.01-INCH
BOREHOLE DIAMETER:	3 IN. FROM 0 TO 24 FT.
SURF. CASING DIAMETER:	12 IN. FROM 0 TO 1 FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	SURGE AND PUMP
TIME DEVELOPING:	0.25 HOURS
WATER REMOVED:	20 GALLONS
WATER ADDED:	0 GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	Very Turbid
COLOR BEFORE:	Brown
CLARITY AFTER:	Slightly Turbid
COLOR AFTER:	Light Brown
ODOR (IF PRESENT):	None

WATER LEVEL SUMMARY				
MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	22.25	T/PVC	8/3/2011	9:34
DTB AFTER DEVELOPING:	22.85	T/PVC	8/8/2011	12:38
SWE BEFORE DEVELOPING:	6.29	T/PVC	8/3/2011	9:34
SWE AFTER DEVELOPING:	6.18	T/PVC	8/8/2011	12:38
OTHER SWE:		T/PVC		
OTHER SWE:		T/PVC		

PROTECTIVE CASING DETAILS	
PERMANENT, LEGIBLE WELL LABEL ADDED?	☒ YES ☐ NO
PROTECTIVE COVER AND LOCK INSTALLED?	☒ YES ☐ NO
LOCK KEY NUMBER:	3120

NOTES:



WELL CONSTRUCTION LOG

WELL NO. PRB-09s

Page 1 of 1

Facility/Project Name: Tecumseh Products PRB Monitoring Well Network		Date Drilling Started: 8/1/11	Date Drilling Completed: 8/1/11	Project Number: 186299	
Drilling Firm: Terra Probe, Inc.	Drilling Method: Direct Push	Surface Elev. (ft) 785.6	TOC Elevation (ft) 785.08	Total Depth (ft bgs) 12.0	Borehole Dia. (in) 3
Boring Location: 19 feet west of eastern fence, 450 feet north of PRB-06s in PRB. N: 181186.49 E: 13239307.57		Personnel Logged By - Jamie Hoffman Driller - Ray Bashaw		Drilling Equipment: Geoprobe 6620DT	
Civil Town/City/or Village: Tecumseh	County: Lenawee	State: MI	Water Level Observations: While Drilling: Date/Time 8/1/11 00:00 Depth (ft bgs) 6.0 After Drilling: Date/Time 8/5/11 10:40 Depth (ft bgs) 5.32		

SAMPLE	NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
				1 GP 50	SANDY LEAN CLAY mostly clay, some medium to coarse sand, low plasticity, yellowish brown (10YR 5/4), decomposition odor, dry, medium stiff.	CL			
				2	LEAN CLAY WITH SAND mostly clay, little medium to coarse sand, high plasticity, dark grayish brown (10YR 5/2), decomposition odor, dry, medium stiff.	CL			
				4	WELL GRADED SAND WITH CLAY mostly medium to coarse sand, some fine sand, few to little clay, trace fine gravel, dark grayish brown (10YR 4/2), moist, dense.				
				6	Change to saturated, very loose at 6.0 feet.				
				8	Same as above.	SW-SC			
				10					
				12	End of boring at 12.0 feet below ground surface.				

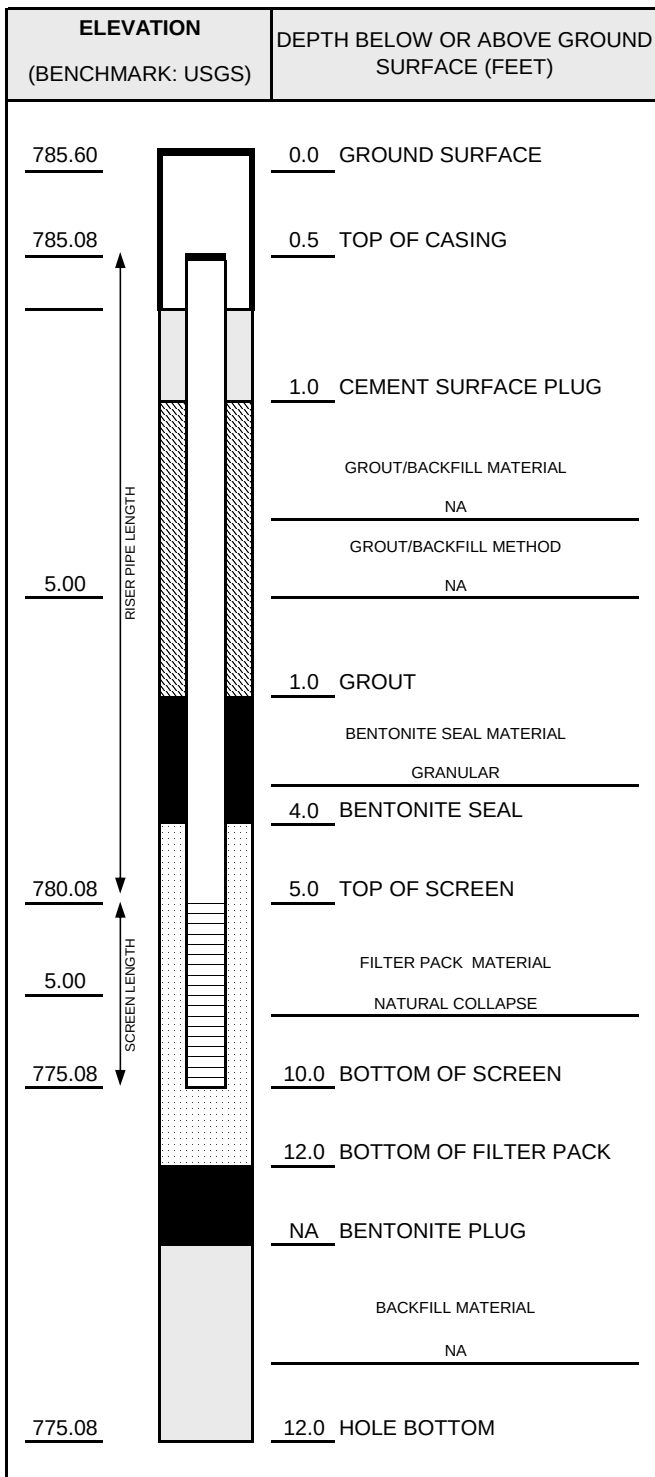
SOIL BORING WELL CONSTRUCTION LOG 8070.20 2011.GPJ TRC CORP.GDT 186299 11/16/11

Signature:	Firm: TRC Environmental Corp. 1540 Eisenhower Place Ann Arbor, MI	(734) 971-7080 Fax (734) 971-9022
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WELL CONSTRUCTION DIAGRAM

PROJ. NAME: TPC - PRB Well Installation		WELL ID: PRB-09s
PROJ. NO: 186299	DATE INSTALLED: 8/1/2011	INSTALLED BY: J. Hoffman
		CHECKED BY: S. Metz



NOTES:

CASING AND SCREEN DETAILS	
TYPE OF RISER:	2-INCH PVC
PIPE SCHEDULE:	40
PIPE JOINTS:	THREADED O-RINGS
SOLVENT USED?	NO
SCREEN TYPE:	2-INCH PVC
SCR. SLOT SIZE:	0.01-INCH
BOREHOLE DIAMETER:	3 IN. FROM 0 TO 12 FT.
	IN. FROM TO FT.
SURF. CASING DIAMETER:	12 IN. FROM 0 TO 1 FT.
	IN. FROM TO FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	SURGE AND PUMP
TIME DEVELOPING:	0.25 HOURS
WATER REMOVED:	2.5 GALLONS
WATER ADDED:	0 GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	Very Turbid
COLOR BEFORE:	Brown
CLARITY AFTER:	Turbid
COLOR AFTER:	Light Brown
ODOR (IF PRESENT):	Decomposition

WATER LEVEL SUMMARY				
MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	10.18	T/PVC	8/3/2011	11:06
DTB AFTER DEVELOPING:	10.12	T/PVC	8/5/2011	10:40
SWE BEFORE DEVELOPING:	5.35	T/PVC	8/3/2011	11:06
SWE AFTER DEVELOPING:	5.32	T/PVC	8/5/2011	10:40
OTHER SWE:		T/PVC		
OTHER SWE:		T/PVC		

PROTECTIVE CASING DETAILS	
PERMANENT, LEGIBLE WELL LABEL ADDED?	☒ YES ☐ NO
PROTECTIVE COVER AND LOCK INSTALLED?	☒ YES ☐ NO
LOCK KEY NUMBER:	3120



WELL CONSTRUCTION LOG

WELL NO. PRB-10s

Page 1 of 1

Facility/Project Name: Tecumseh Products PRB Monitoring Well Network		Date Drilling Started: 8/1/11	Date Drilling Completed: 8/3/11	Project Number: 186299	
Drilling Firm: Terra Probe, Inc.	Drilling Method: Direct Push	Surface Elev. (ft) 786.0	TOC Elevation (ft) 785.22	Total Depth (ft bgs) 12.0	Borehole Dia. (in) 3
Boring Location: 30 feet north of the north end of PRB Section 1. N: 181352.40 E: 13239306.06		Personnel Logged By - Jamie Hoffman Driller - Ray Bashaw		Drilling Equipment: Geoprobe 6620DT	
Civil Town/City/or Village: Tecumseh	County: Lenawee	State: MI	Water Level Observations: While Drilling: Date/Time 8/1/11 00:00 Depth (ft bgs) 7.0 After Drilling: Date/Time 8/5/11 08:19 Depth (ft bgs) 6.60		

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
				TOPSOIL				
1 GP	60		2	SANDY LEAN CLAY mostly clay, some fine to medium sand, little silt, nonplastic, brown (10YR 4/3), dry, stiff.	CL			
			4	LEAN CLAY WITH SAND mostly clay, little fine to medium sand, little silt, high plasticity, brown (10YR 4/4), decomposition odor, moist, medium stiff.	CL			
2 GP	50		6	CLAYEY SAND WITH GRAVEL mostly medium to coarse sand, some clay, little fine gravel, dark brown (10YR 3/3), moist, loose.	SC			
			6	LEAN CLAY WITH SAND mostly clay, little fine to medium sand, little silt, high plasticity, brown (10YR 4/4), decomposition odor, moist, medium stiff.	CL			
			8	POORLY GRADED SAND WITH GRAVEL mostly medium to coarse sand, some fine to medium gravel, few silt, trace coarse gravel, dark brown (10YR 3/3), dry, very loose. Change to saturated at 7.0 feet below ground surface.	SP			
3 GP	60		10					
			12	End of boring at 12.0 feet below ground surface.				

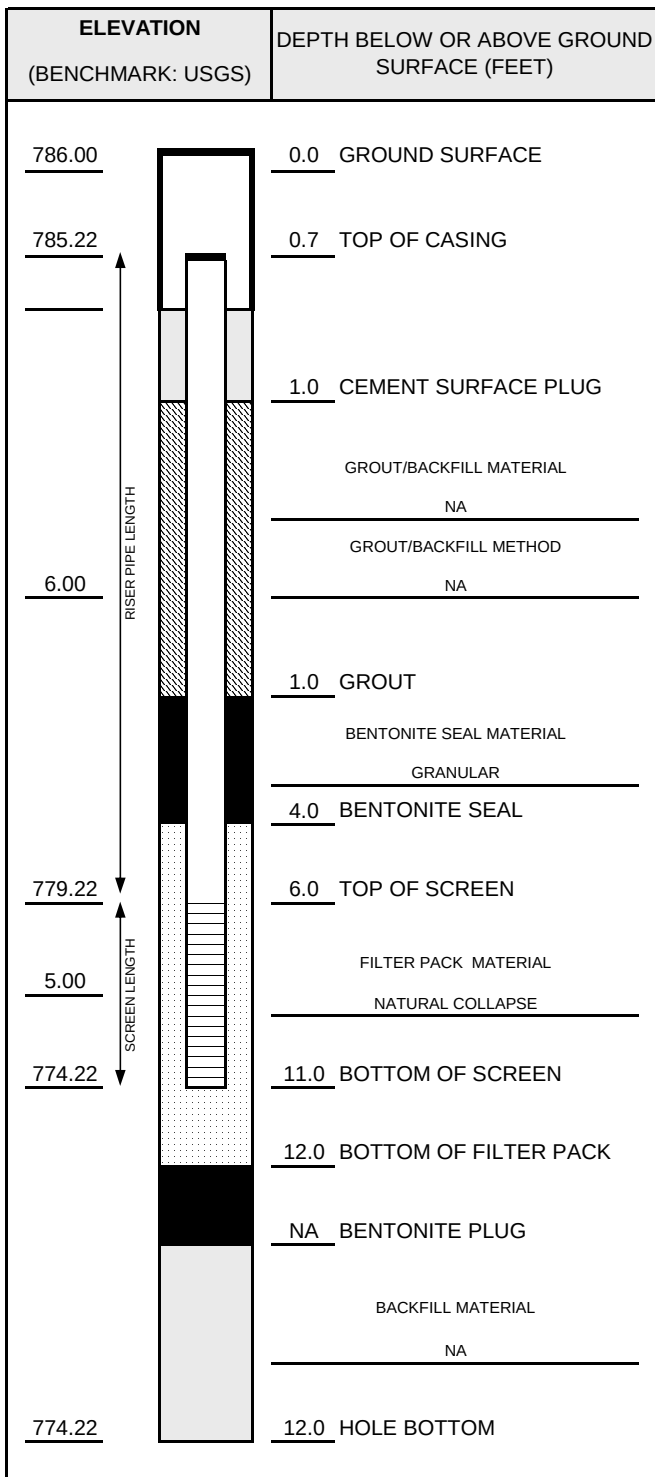
SOIL BORING WELL CONSTRUCTION LOG 8070.20 2011.GPJ TRC CORP.GDT 186299 11/16/11

Signature:	Firm: TRC Environmental Corp. 1540 Eisenhower Place Ann Arbor, MI	(734) 971-7080 Fax (734) 971-9022
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WELL CONSTRUCTION DIAGRAM

PROJ. NAME: TPC - PRB Well Installation				WELL ID:	PRB-10s		
PROJ. NO:	186299	DATE INSTALLED:	8/3/2011	INSTALLED BY:	J. Hoffman	CHECKED BY:	S. Metz



NOTES:

CASING AND SCREEN DETAILS	
TYPE OF RISER:	2-INCH PVC
PIPE SCHEDULE:	40
PIPE JOINTS:	THREADED O-RINGS
SOLVENT USED?	NO
SCREEN TYPE:	2-INCH PVC
SCR. SLOT SIZE:	0.01-INCH
BOREHOLE DIAMETER:	3 IN. FROM 0 TO 12 FT.
SURF. CASING DIAMETER:	12 IN. FROM 0 TO 1 FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	SURGE AND PUMP
TIME DEVELOPING:	0.25 HOURS
WATER REMOVED:	7 GALLONS
WATER ADDED:	0 GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	Very Turbid
COLOR BEFORE:	Brown
CLARITY AFTER:	Clear
COLOR AFTER:	None
ODOR (IF PRESENT):	None

WATER LEVEL SUMMARY				
MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	10.66	T/PVC	8/3/2011	15:03
DTB AFTER DEVELOPING:	10.59	T/PVC	8/5/2011	8:19
SWE BEFORE DEVELOPING:	6.71	T/PVC	8/3/2011	15:03
SWE AFTER DEVELOPING:	6.60	T/PVC	8/5/2011	8:19
OTHER SWE:		T/PVC		
OTHER SWE:		T/PVC		

PROTECTIVE CASING DETAILS	
PERMANENT, LEGIBLE WELL LABEL ADDED?	☒ YES ☐ NO
PROTECTIVE COVER AND LOCK INSTALLED?	☒ YES ☐ NO
LOCK KEY NUMBER:	3120



WELL CONSTRUCTION LOG

WELL NO. PRB-11s

Page 1 of 2

Facility/Project Name: Tecumseh Products PRB Monitoring Well Network		Date Drilling Started: 8/1/11	Date Drilling Completed: 8/1/11	Project Number: 186299	
Drilling Firm: Terra Probe, Inc.	Drilling Method: Direct Push	Surface Elev. (ft) 795.5	TOC Elevation (ft) 795.12	Total Depth (ft bgs) 20.0	Borehole Dia. (in) 3
Boring Location: 30 feet south of the south end of PRB Section 2. N: 180259.31 E: 13238765.60		Personnel Logged By - Jamie Hoffman Driller - Ray Bashaw		Drilling Equipment: Geoprobe 6620DT	
Civil Town/City/or Village: Tecumseh	County: Lenawee	State: MI	Water Level Observations: While Drilling: Date/Time 8/1/11 00:00 ☒ Depth (ft bgs) 16.0 After Drilling: Date/Time 8/8/11 11:41 ☒ Depth (ft bgs) 15.69		

SAMPLE NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
				TOPSOIL				
1 GP	60		2	GRAVELLY LEAN CLAY WITH SAND mostly clay, some fine to coarse gravel, little fine to medium sand, nonplastic, strong brown (7.5YR 4/6), dry, stiff.	CL			
			4	WELL GRADED SAND WITH GRAVEL mostly medium to coarse sand, some fine sand, little fine to coarse gravel, brown (10YR 4/3), dry, loose.				
				Same as above.	SW			
2 GP	70		6					
			8	SANDY LEAN CLAY mostly clay, some medium to coarse sand, nonplastic, strong brown (7.5YR 4/6), dry, stiff.	CL			
				WELL GRADED SAND WITH GRAVEL mostly medium to coarse sand, some fine sand, little fine to coarse gravel, few cobbles, brown (10YR 4/3), dry, loose.				
3 GP	70		10	Change to brown (7.5YR 4/4), moist at 10.0 feet.	SW			
			12					

SOIL BORING WELL CONSTRUCTION LOG 8070.20 2011.GPJ TRC CORP.GDT 186299 11/16/11

Signature: 	Firm: TRC Environmental Corp. 1540 Eisenhower Place Ann Arbor, MI	(734) 971-7080 Fax (734) 971-9022
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WELL CONSTRUCTION LOG

WELL NO. PRB-11s

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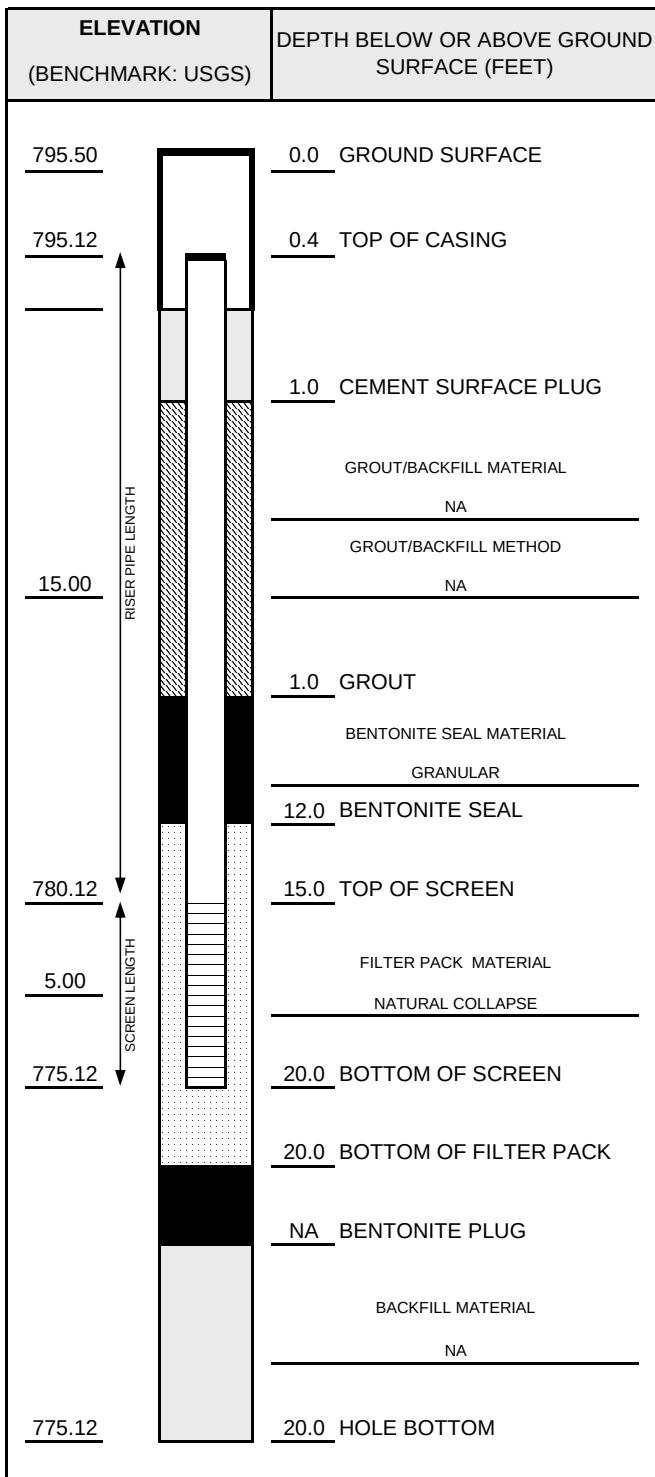
SOIL BORING WELL CONSTRUCTION LOG 8070.20_2011.GPJ TRC_CORP.GDT 8070.20 12/19/11

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
4 GP	70		14	Same as above.				
5 GP	60		16	▼ ▽ Change to saturated at 16.0 feet.	SW			
			18					
			20	End of boring at 20.0 feet below ground surface.				
			22					
			24					
			26					
			28					



WELL CONSTRUCTION DIAGRAM

PROJ. NAME: TPC - PRB Well Installation		WELL ID: PRB-11s
PROJ. NO: 186299	DATE INSTALLED: 8/1/2011	INSTALLED BY: J. Hoffman
		CHECKED BY: S. Metz



CASING AND SCREEN DETAILS	
TYPE OF RISER:	2-INCH PVC
PIPE SCHEDULE:	40
PIPE JOINTS:	THREADED O-RINGS
SOLVENT USED?	NO
SCREEN TYPE:	2-INCH PVC
SCR. SLOT SIZE:	0.01-INCH
BOREHOLE DIAMETER:	3 IN. FROM 0 TO 20 FT.
	IN. FROM TO FT.
SURF. CASING DIAMETER:	12 IN. FROM 0 TO 1 FT.
	IN. FROM TO FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	SURGE AND PUMP
TIME DEVELOPING:	0.25 HOURS
WATER REMOVED:	14 GALLONS
WATER ADDED:	0 GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	Very Turbid
COLOR BEFORE:	Brown
CLARITY AFTER:	Clear
COLOR AFTER:	None
ODOR (IF PRESENT):	None

WATER LEVEL SUMMARY				
MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	19.96	T/PVC	8/3/2011	10:10
DTB AFTER DEVELOPING:	19.84	T/PVC	8/8/2011	11:41
SWE BEFORE DEVELOPING:	15.62	T/PVC	8/3/2011	10:10
SWE AFTER DEVELOPING:	15.69	T/PVC	8/8/2011	11:41
OTHER SWE:		T/PVC		
OTHER SWE:		T/PVC		

PROTECTIVE CASING DETAILS	
PERMANENT, LEGIBLE WELL LABEL ADDED?	☒ YES ☐ NO
PROTECTIVE COVER AND LOCK INSTALLED?	☒ YES ☐ NO
LOCK KEY NUMBER:	3120

NOTES:



WELL CONSTRUCTION LOG

WELL NO. PRB-12s

Page 1 of 2

Facility/Project Name: Tecumseh Products PRB Monitoring Well Network		Date Drilling Started: 8/1/11	Date Drilling Completed: 8/1/11	Project Number: 186299	
Drilling Firm: Terra Probe, Inc.	Drilling Method: Direct Push	Surface Elev. (ft) 795.7	TOC Elevation (ft) 795.46	Total Depth (ft bgs) 20.0	Borehole Dia. (in) 3
Boring Location: On fenceline, 20 feet north of southern fence along PRB Section 2. N: 180412.20 E: 13238770.21		Personnel Logged By - Jamie Hoffman Driller - Ray Bashaw		Drilling Equipment: Geoprobe 6620DT	
Civil Town/City/or Village: Tecumseh	County: Lenawee	State: MI	Water Level Observations: While Drilling: Date/Time 8/1/11 00:00 After Drilling: Date/Time 8/8/11 08:17		
			Depth (ft bgs) 16.0 Depth (ft bgs) 16.05		

SAMPLE		RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE									
					TOPSOIL				
1 GP		50		2	SANDY LEAN CLAY mostly clay, some fine to medium sand, few silt, high plasticity, dark brown (10YR 3/3), decomposition odor, dry, medium stiff.	CL			
				4	WELL GRADED SAND WITH GRAVEL mostly medium to coarse sand, some fine sand, little fine to coarse gravel, brown (10YR 4/3), dry, loose. Change to some fine to medium gravel at 4.0 feet.				
2 GP		60		6					
				8	Same as above.	SW			
3 GP		60		10					
				12					

SOIL BORING WELL CONSTRUCTION LOG 8070.20 2011.GPJ TRC CORP.GDT 186299 11/16/11

Signature:	Firm: TRC Environmental Corp. 1540 Eisenhower Place Ann Arbor, MI	(734) 971-7080 Fax (734) 971-9022
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WELL CONSTRUCTION LOG

WELL NO. PRB-12s

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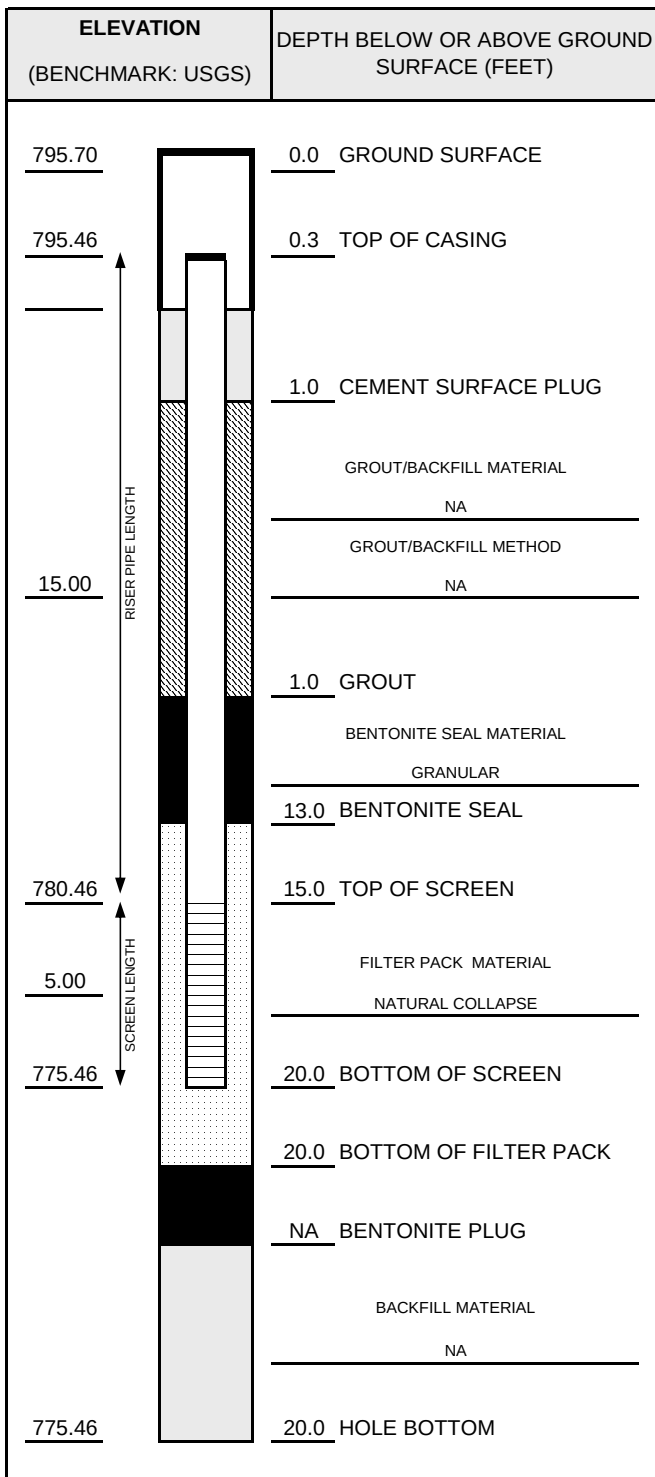
SOIL BORING WELL CONSTRUCTION LOG 8070.20_2011.GPJ TRC_CORP.GDT 8070.20 12/19/11

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
4 GP	60		14	Same as above.	SW			
			16	WELL GRADED SAND mostly fine to coarse sand, trace fine to coarse gravel, brown (10YR 4/3), dry, loose.	SW			
5 GP	50		18	POORLY GRADED SAND mostly medium to coarse sand, some fine gravel, brown (10YR 4/3), saturated, loose.	SP			
			20	End of boring at 20.0 feet below ground surface.				
			22					
			24					
			26					
			28					



WELL CONSTRUCTION DIAGRAM

PROJ. NAME: TPC - PRB Well Installation				WELL ID:	PRB-12s		
PROJ. NO:	186299	DATE INSTALLED:	8/1/2011	INSTALLED BY:	J. Hoffman	CHECKED BY:	S. Metz



NOTES:

CASING AND SCREEN DETAILS	
TYPE OF RISER:	2-INCH PVC
PIPE SCHEDULE:	40
PIPE JOINTS:	THREADED O-RINGS
SOLVENT USED?	NO
SCREEN TYPE:	2-INCH PVC
SCR. SLOT SIZE:	0.01-INCH
BOREHOLE DIAMETER:	3 IN. FROM 0 TO 20 FT.
SURF. CASING DIAMETER:	12 IN. FROM 0 TO 1 FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	SURGE AND PUMP
TIME DEVELOPING:	0.25 HOURS
WATER REMOVED:	4 GALLONS
WATER ADDED:	0 GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	Very Turbid
COLOR BEFORE:	Brown
CLARITY AFTER:	Clear
COLOR AFTER:	None
ODOR (IF PRESENT):	Decomposition

WATER LEVEL SUMMARY				
MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	19.98	T/PVC	8/3/2011	12:40
DTB AFTER DEVELOPING:	19.91	T/PVC	8/8/2011	8:17
SWE BEFORE DEVELOPING:	15.96	T/PVC	8/3/2011	12:40
SWE AFTER DEVELOPING:	16.05	T/PVC	8/8/2011	8:17
OTHER SWE:		T/PVC		
OTHER SWE:		T/PVC		

PROTECTIVE CASING DETAILS	
PERMANENT, LEGIBLE WELL LABEL ADDED?	☒ YES ☐ NO
PROTECTIVE COVER AND LOCK INSTALLED?	☒ YES ☐ NO
LOCK KEY NUMBER:	3120



WELL CONSTRUCTION LOG

WELL NO. PRB-13s

Page 1 of 2

Facility/Project Name: Tecumseh Products PRB Monitoring Well Network		Date Drilling Started: 8/1/11	Date Drilling Completed: 8/2/11	Project Number: 186299	
Drilling Firm: Terra Probe, Inc.	Drilling Method: Direct Push	Surface Elev. (ft) 797.9	TOC Elevation (ft) 797.20	Total Depth (ft bgs) 24.0	Borehole Dia. (in) 3
Boring Location: Upgradient well, 200 feet north and 30 feet west of PRB-12s. N: 180620.75 E: 13238706.31		Personnel Logged By - Jamie Hoffman Driller - Ray Bashaw		Drilling Equipment: Geoprobe 6620DT	
Civil Town/City/or Village: Tecumseh	County: Lenawee	State: MI	Water Level Observations: While Drilling: Date/Time 8/1/11 00:00 Depth (ft bgs) 20.0 After Drilling: Date/Time 8/8/11 08:40 Depth (ft bgs) 17.68		

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
				GRAVEL ROAD BASE				
1 GP	30		2	SANDY LEAN CLAY mostly clay, some fine to medium sand, nonplastic, very dark grayish brown (10YR 3/2), dry, medium stiff.	CL			
2 GP	60		4	WELL GRADED SAND WITH GRAVEL mostly medium to coarse sand, some fine sand, little fine to coarse gravel, brown (10YR 4/3), dry, loose.	SW			
			8	Same as above.				
3 GP	70		10	WELL GRADED SAND mostly medium to coarse sand, some fine sand, trace fine gravel, brown (10YR 4/3), dry, loose.	SW			
			12	Change to very loose at 12.0 feet.				

SOIL BORING WELL CONSTRUCTION LOG 8070.20 2011.GPJ TRC CORP.GDT 186299 11/16/11

Signature:	Firm: TRC Environmental Corp. 1540 Eisenhower Place Ann Arbor, MI	(734) 971-7080 Fax (734) 971-9022
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WELL CONSTRUCTION LOG

WELL NO. PRB-13s

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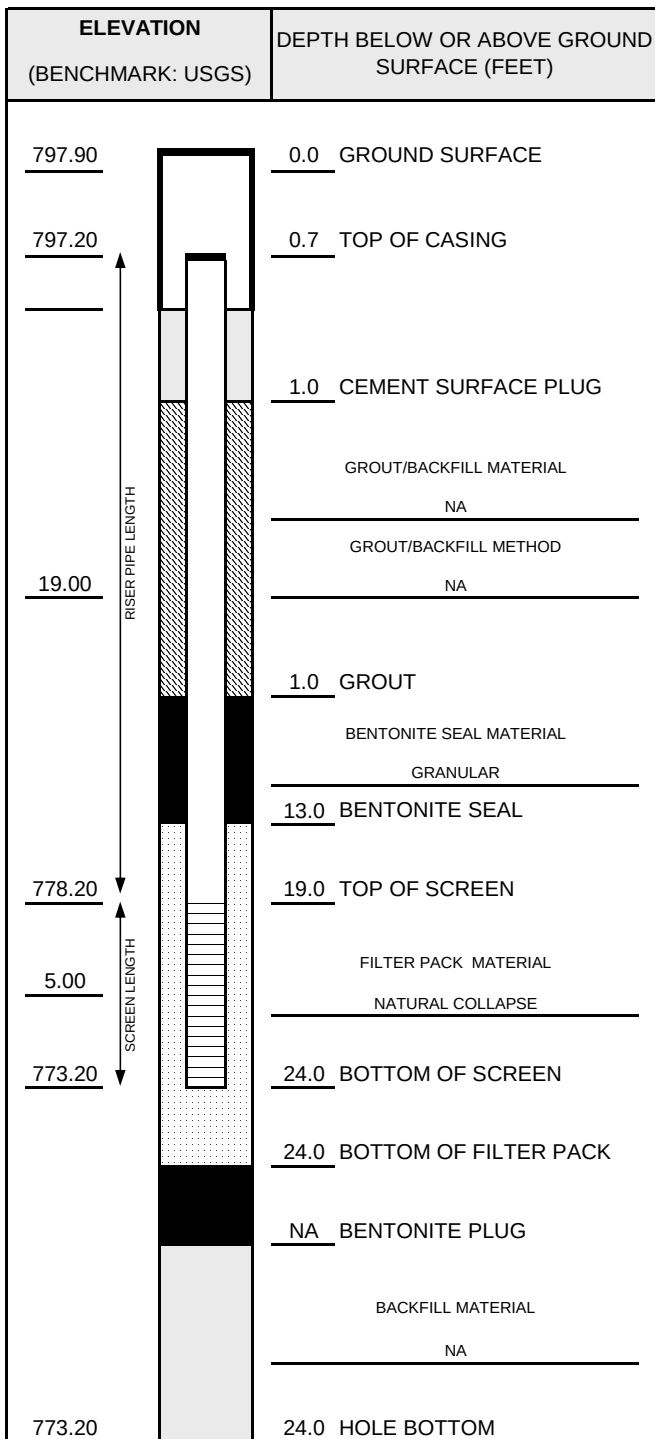
SOIL BORING WELL CONSTRUCTION LOG 8070.20_2011.GPJ TRC_CORP.GDT 8070.20 12/19/11

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
4 GP	70		14					
5 GP	50		16					
			18	▼ Change to moist at 17.5 feet.				
			20	▽ Change to saturated at 20.0 feet.				
6 GP	70		22					
			24	End of boring at 24.0 feet below ground surface.				
			26					
			28					



WELL CONSTRUCTION DIAGRAM

PROJ. NAME: TPC - PRB Well Installation				WELL ID:	PRB-13s		
PROJ. NO:	186299	DATE INSTALLED:	8/2/2011	INSTALLED BY:	J. Hoffman	CHECKED BY:	S. Metz



NOTES:

CASING AND SCREEN DETAILS	
TYPE OF RISER:	2-INCH PVC
PIPE SCHEDULE:	40
PIPE JOINTS:	THREADED O-RINGS
SOLVENT USED?	NO
SCREEN TYPE:	2-INCH PVC
SCR. SLOT SIZE:	0.01-INCH
BOREHOLE DIAMETER:	3 IN. FROM 0 TO 24 FT.
SURF. CASING DIAMETER:	12 IN. FROM 0 TO 1 FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	SURGE AND PUMP
TIME DEVELOPING:	0.25 HOURS
WATER REMOVED:	12 GALLONS
WATER ADDED:	0 GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	Very Turbid
COLOR BEFORE:	Brown
CLARITY AFTER:	Clear
COLOR AFTER:	None
ODOR (IF PRESENT):	None

WATER LEVEL SUMMARY				
MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	23.32	T/PVC	8/3/2011	12:50
DTB AFTER DEVELOPING:	24.21	T/PVC	8/8/2011	8:40
SWE BEFORE DEVELOPING:	17.63	T/PVC	8/3/2011	12:50
SWE AFTER DEVELOPING:	17.68	T/PVC	8/8/2011	8:40
OTHER SWE:		T/PVC		
OTHER SWE:		T/PVC		

PROTECTIVE CASING DETAILS	
PERMANENT, LEGIBLE WELL LABEL ADDED?	☒ YES ☐ NO
PROTECTIVE COVER AND LOCK INSTALLED?	☒ YES ☐ NO
LOCK KEY NUMBER:	3120



WELL CONSTRUCTION LOG

WELL NO. PRB-14s

Page 1 of 2

Facility/Project Name: Tecumseh Products PRB Monitoring Well Network		Date Drilling Started: 8/1/11	Date Drilling Completed: 8/2/11	Project Number: 186299	
Drilling Firm: Terra Probe, Inc.	Drilling Method: Direct Push	Surface Elev. (ft) 797.1	TOC Elevation (ft) 796.70	Total Depth (ft bgs) 24.0	Borehole Dia. (in) 3
Boring Location: In-barrier well 30 feet east of PRB-13s. N: 180620.32 E: 13238753.95		Personnel Logged By - Jamie Hoffman Driller - Ray Bashaw		Drilling Equipment: Geoprobe 6620DT	
Civil Town/City/or Village: Tecumseh	County: Lenawee	State: MI	Water Level Observations: While Drilling: Date/Time 8/1/11 00:00 Depth (ft bgs) 20.5 After Drilling: Date/Time 8/8/11 09:07 Depth (ft bgs) 17.26		

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
1 GP	25		2	GRAVEL ROAD BASE				
			4	SANDY LEAN CLAY mostly clay, some fine to medium sand, nonplastic, very dark grayish brown (10YR 3/2), dry, medium stiff.	CL			
2 GP	50		6	WELL GRADED SAND WITH GRAVEL mostly medium to coarse sand, some fine sand, little fine to coarse gravel, brown (10YR 4/3), dry, loose.				
			8	Same as above.	SW			
3 GP	80		10	Change to moist at 10.0 feet.				
			12					

SOIL BORING WELL CONSTRUCTION LOG 8070.20 2011.GPJ TRC CORP.GDT 186299 11/16/11

Signature:	Firm: TRC Environmental Corp. 1540 Eisenhower Place Ann Arbor, MI	(734) 971-7080 Fax (734) 971-9022
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WELL CONSTRUCTION LOG

WELL NO. PRB-14s

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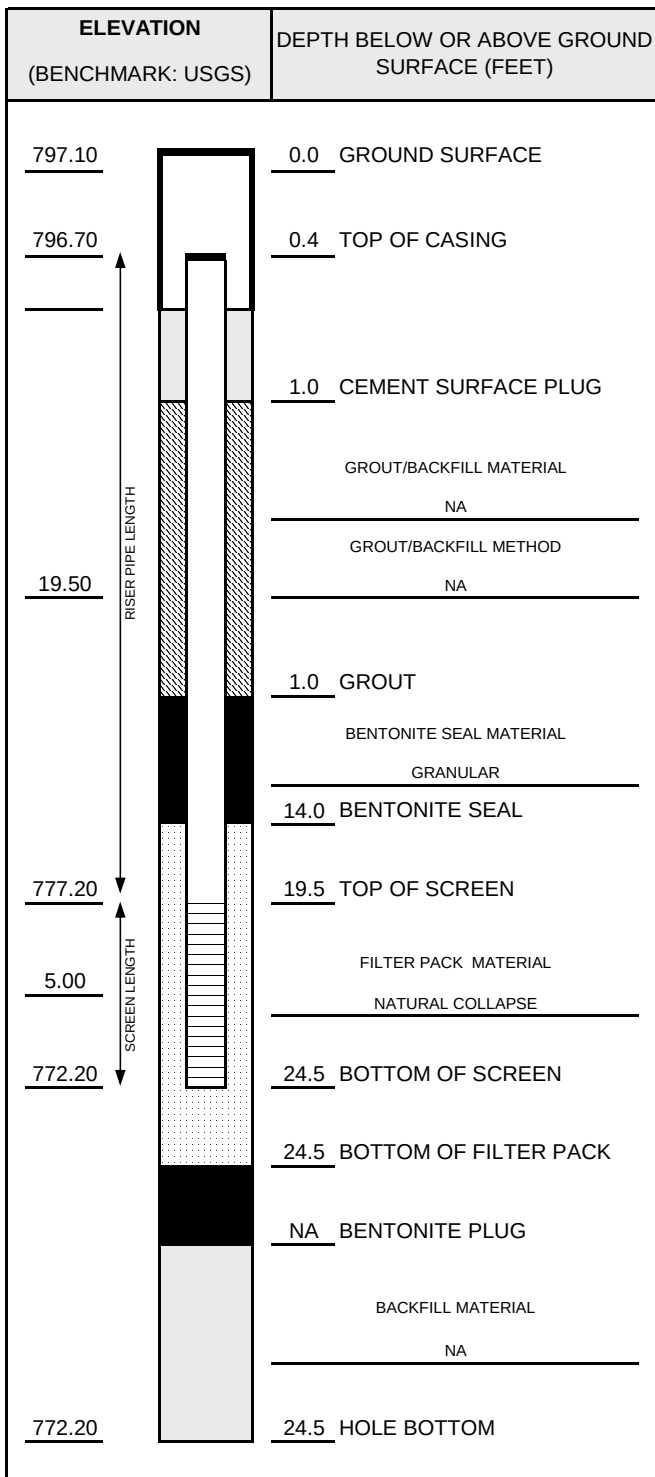
SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
4 GP	60		14					
5 GP	60		16					
			18					
			20	6-inch seam of black (10YR 2/1) staining, slight metallic odor at 19.5 feet.				
6 GP	50		20.5	Change to saturated at 20.5 feet.				
			22					
			24	End of boring at 24.0 feet below ground surface.				
			26					
			28					

SOIL BORING WELL CONSTRUCTION LOG 8070.20_2011.GPJ TRC_CORP.GDT 8070.20 12/19/11



WELL CONSTRUCTION DIAGRAM

PROJ. NAME: TPC - PRB Well Installation				WELL ID:	PRB-14s		
PROJ. NO:	186299	DATE INSTALLED:	8/2/2011	INSTALLED BY:	J. Hoffman	CHECKED BY:	S. Metz



NOTES:

CASING AND SCREEN DETAILS	
TYPE OF RISER:	2-INCH PVC
PIPE SCHEDULE:	40
PIPE JOINTS:	THREADED O-RINGS
SOLVENT USED?	NO
SCREEN TYPE:	2-INCH PVC
SCR. SLOT SIZE:	0.01-INCH
BOREHOLE DIAMETER:	3 IN. FROM 0 TO 24.5 FT.
SURF. CASING DIAMETER:	12 IN. FROM 0 TO 1 FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	SURGE AND PUMP
TIME DEVELOPING:	0.25 HOURS
WATER REMOVED:	13 GALLONS
WATER ADDED:	0 GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	Very Turbid
COLOR BEFORE:	Brown
CLARITY AFTER:	Clear
COLOR AFTER:	None
ODOR (IF PRESENT):	None

WATER LEVEL SUMMARY				
MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	24.90	T/PVC	8/3/2011	13:30
DTB AFTER DEVELOPING:	24.44	T/PVC	8/8/2011	9:07
SWE BEFORE DEVELOPING:	17.21	T/PVC	8/3/2011	13:30
SWE AFTER DEVELOPING:	17.26	T/PVC	8/8/2011	9:07
OTHER SWE:		T/PVC		
OTHER SWE:		T/PVC		

PROTECTIVE CASING DETAILS	
PERMANENT, LEGIBLE WELL LABEL ADDED?	☒ YES ☐ NO
PROTECTIVE COVER AND LOCK INSTALLED?	☒ YES ☐ NO
LOCK KEY NUMBER:	3120



WELL CONSTRUCTION LOG

WELL NO. PRB-15s

Page 1 of 2

Facility/Project Name: Tecumseh Products PRB Monitoring Well Network		Date Drilling Started: 8/1/11	Date Drilling Completed: 8/2/11	Project Number: 186299	
Drilling Firm: Terra Probe, Inc.	Drilling Method: Direct Push	Surface Elev. (ft) 796.0	TOC Elevation (ft) 795.35	Total Depth (ft bgs) 20.0	Borehole Dia. (in) 3
Boring Location: Downgradient well, 30 feet east of PRB-14s. N: 180620.52 E: 13238805.64		Personnel Logged By - Jamie Hoffman Driller - Ray Bashaw		Drilling Equipment: Geoprobe 6620DT	
Civil Town/City/or Village: Tecumseh	County: Lenawee	State: MI	Water Level Observations: While Drilling: Date/Time <u>8/1/11 00:00</u> Depth (ft bgs) <u>16.0</u> After Drilling: Date/Time <u>8/8/11 09:28</u> Depth (ft bgs) <u>15.9</u>		

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
1 GP	40		2	TOPSOIL/GRAVEL ROAD BASE				
				SANDY LEAN CLAY mostly clay, some fine to medium sand, nonplastic, very dark grayish brown (10YR 3/2), dry, medium stiff.	CL			
2 GP	50		6	WELL GRADED SAND WITH GRAVEL mostly medium to coarse sand, some fine sand, little fine to coarse gravel, brown (10YR 4/3), dry, loose.				
			8	Same as above.	SW			
3 GP	50		10					
			12					

SOIL BORING WELL CONSTRUCTION LOG 8070.20 2011.GPJ TRC CORP.GDT 186299 11/16/11

Signature:

Firm: TRC Environmental Corp.
1540 Eisenhower Place Ann Arbor, MI

(734) 971-7080
Fax (734) 971-9022



WELL CONSTRUCTION LOG

WELL NO. PRB-15s

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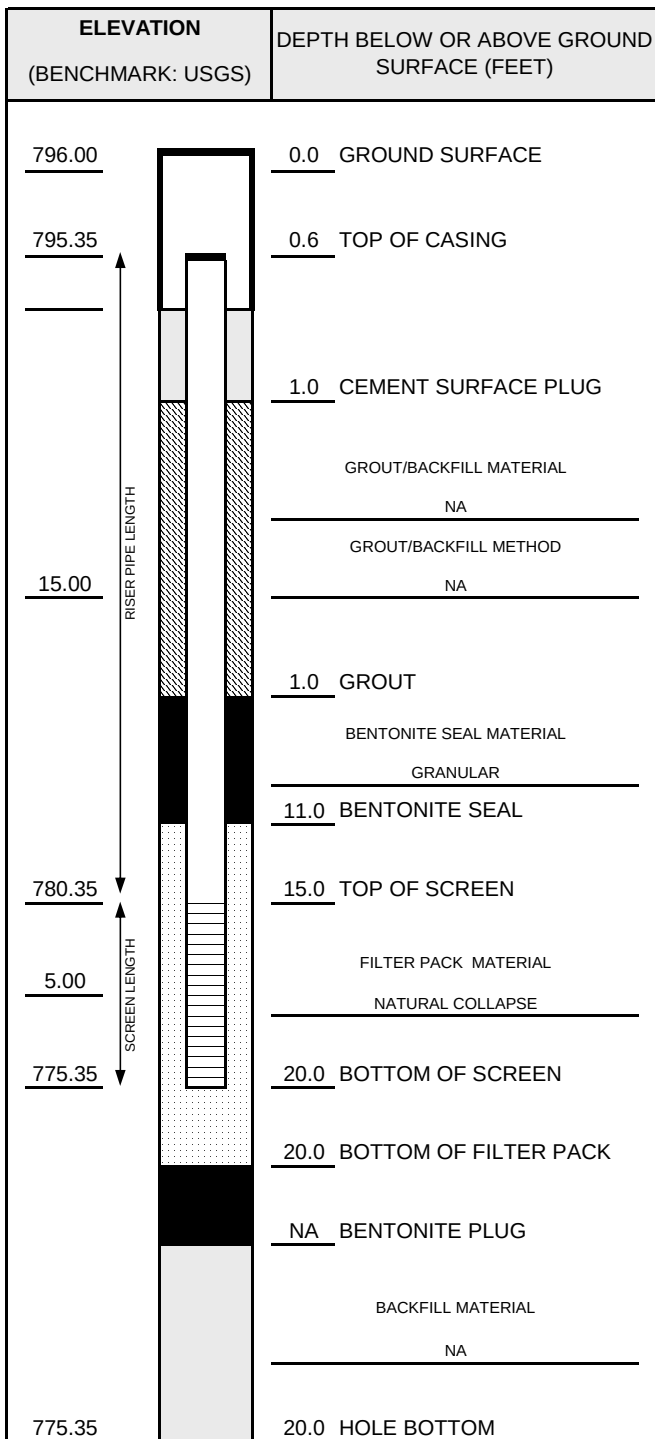
SOIL BORING WELL CONSTRUCTION LOG 8070.20_2011.GPJ TRC_CORP.GDT 8070.20 12/19/11

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
4 GP	50		14					
5 GP	60		16	▼ Change to saturated at 16.0 feet.				
			18		SW			
			20	6-inch seam of black (10YR 2/1) staining, slight metallic odor at 19.5 feet.				
6 GP	80		22					
			24	End of boring at 24.0 feet below ground surface.				
			26					
			28					



WELL CONSTRUCTION DIAGRAM

PROJ. NAME: TPC - PRB Well Installation				WELL ID:	PRB-15s		
PROJ. NO:	186299	DATE INSTALLED:	8/2/2011	INSTALLED BY:	J. Hoffman	CHECKED BY:	S. Metz



NOTES:

CASING AND SCREEN DETAILS	
TYPE OF RISER:	2-INCH PVC
PIPE SCHEDULE:	40
PIPE JOINTS:	THREADED O-RINGS
SOLVENT USED?	NO
SCREEN TYPE:	2-INCH PVC
SCR. SLOT SIZE:	0.01-INCH
BOREHOLE DIAMETER:	3 IN. FROM 0 TO 20 FT.
SURF. CASING DIAMETER:	12 IN. FROM 0 TO 1 FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	SURGE AND PUMP
TIME DEVELOPING:	0.25 HOURS
WATER REMOVED:	13 GALLONS
WATER ADDED:	0 GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	Very Turbid
COLOR BEFORE:	Brown
CLARITY AFTER:	Clear
COLOR AFTER:	None
ODOR (IF PRESENT):	None

WATER LEVEL SUMMARY				
MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	20.09	T/PVC	8/3/2011	13:45
DTB AFTER DEVELOPING:	20.04	T/PVC	8/8/2011	9:28
SWE BEFORE DEVELOPING:	15.89	T/PVC	8/3/2011	13:45
SWE AFTER DEVELOPING:	15.90	T/PVC	8/8/2011	9:28
OTHER SWE:		T/PVC		
OTHER SWE:		T/PVC		

PROTECTIVE CASING DETAILS	
PERMANENT, LEGIBLE WELL LABEL ADDED?	☒ YES ☐ NO
PROTECTIVE COVER AND LOCK INSTALLED?	☒ YES ☐ NO
LOCK KEY NUMBER:	3120



WELL CONSTRUCTION LOG

WELL NO. PRB-15d

Page 1 of 3

Facility/Project Name: Tecumseh Products PRB Monitoring Well Network		Date Drilling Started: 8/1/11	Date Drilling Completed: 8/2/11	Project Number: 186299	
Drilling Firm: Terra Probe, Inc.	Drilling Method: Direct Push	Surface Elev. (ft) 796.0	TOC Elevation (ft) 795.43	Total Depth (ft bgs) 34.0	Borehole Dia. (in) 3
Boring Location: Downgradient well, 30 feet east of PRB-14s. N: 180620.35 E: 13238806.80		Personnel Logged By - Jamie Hoffman Driller - Ray Bashaw		Drilling Equipment: Geoprobe 6620DT	
Civil Town/City/or Village: Tecumseh	County: Lenawee	State: MI	Water Level Observations: While Drilling: Date/Time 8/1/11 00:00 Depth (ft bgs) 16.0 After Drilling: Date/Time 8/8/11 10:02 Depth (ft bgs) 16.03		

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
1 GP	40		2	TOPSOIL/GRAVEL ROAD BASE				
				SANDY LEAN CLAY mostly clay, some fine to medium sand, nonplastic, very dark grayish brown (10YR 3/2), dry, medium stiff.	CL			
2 GP	50		6	WELL GRADED SAND WITH GRAVEL mostly medium to coarse sand, some fine sand, little fine to coarse gravel, brown (10YR 4/3), dry, loose.				
3 GP	50		10	Same as above.	SW			
			12					

SOIL BORING WELL CONSTRUCTION LOG 8070.20 2011.GPJ TRC CORP.GDT 186299 11/16/11

Signature:	Firm: TRC Environmental Corp. 1540 Eisenhower Place Ann Arbor, MI	(734) 971-7080 Fax (734) 971-9022
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WELL CONSTRUCTION LOG

WELL NO. PRB-15d

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SOIL BORING WELL CONSTRUCTION LOG 8070.20_2011.GPJ TRC_CORP.GDT 8070.20 12/19/11

SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
4 GP	50		14					
5 GP	60		16	▼ Change to saturated at 16.0 feet.				
			18		SW			
			20	6-inch seam of black (10YR 2/1) staining, slight metallic odor at 19.5 feet.				
6 GP	80		22					
			24	NO RECOVERY				
			26					
			28					



WELL CONSTRUCTION LOG

WELL NO. PRB-15d

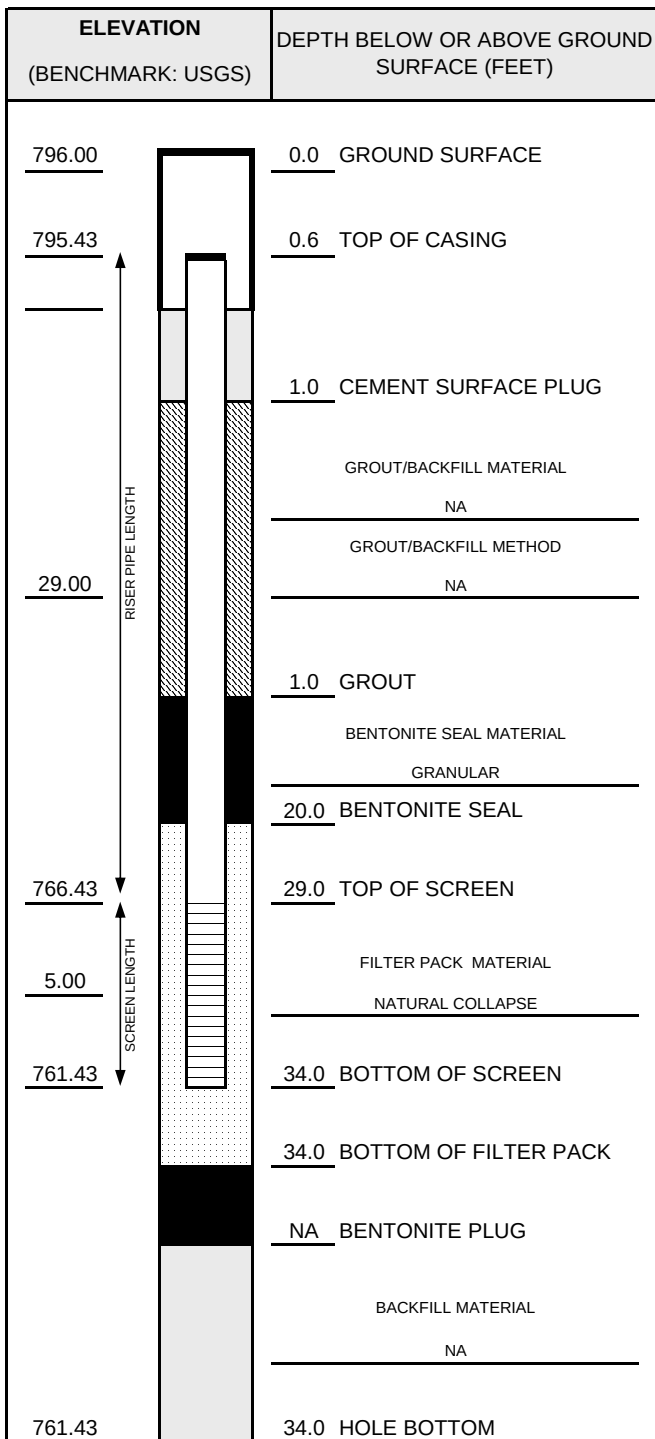
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SAMPLE		BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
NUMBER AND TYPE	RECOVERY (%)							
			30					
			32					
			34	End of boring at 34.0 feet below ground surface.				
			36					
			38					
			40					
			42					
			44					



WELL CONSTRUCTION DIAGRAM

PROJ. NAME:	TPC - PRB Well Installation			WELL ID:	PRB-15d		
PROJ. NO:	186299	DATE INSTALLED:	8/2/2011	INSTALLED BY:	J. Hoffman	CHECKED BY:	S. Metz



CASING AND SCREEN DETAILS	
TYPE OF RISER:	2-INCH PVC
PIPE SCHEDULE:	40
PIPE JOINTS:	THREADED O-RINGS
SOLVENT USED?	NO
SCREEN TYPE:	2-INCH PVC
SCR. SLOT SIZE:	0.01-INCH
BOREHOLE DIAMETER:	3 IN. FROM 0 TO 34 FT.
SURF. CASING DIAMETER:	12 IN. FROM 0 TO 1 FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	SURGE AND PUMP
TIME DEVELOPING:	0.25 HOURS
WATER REMOVED:	10 GALLONS
WATER ADDED:	0 GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	Very Turbid
COLOR BEFORE:	Brown
CLARITY AFTER:	Clear
COLOR AFTER:	None
ODOR (IF PRESENT):	None

WATER LEVEL SUMMARY				
MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	34.78	T/PVC	8/3/2011	13:50
DTB AFTER DEVELOPING:	34.49	T/PVC	8/8/2011	10:02
SWE BEFORE DEVELOPING:	15.91	T/PVC	8/3/2011	13:50
SWE AFTER DEVELOPING:	16.03	T/PVC	8/8/2011	10:02
OTHER SWE:		T/PVC		
OTHER SWE:		T/PVC		

PROTECTIVE CASING DETAILS	
PERMANENT, LEGIBLE WELL LABEL ADDED?	☒ YES ☐ NO
PROTECTIVE COVER AND LOCK INSTALLED?	☒ YES ☐ NO
LOCK KEY NUMBER:	3120

NOTES:

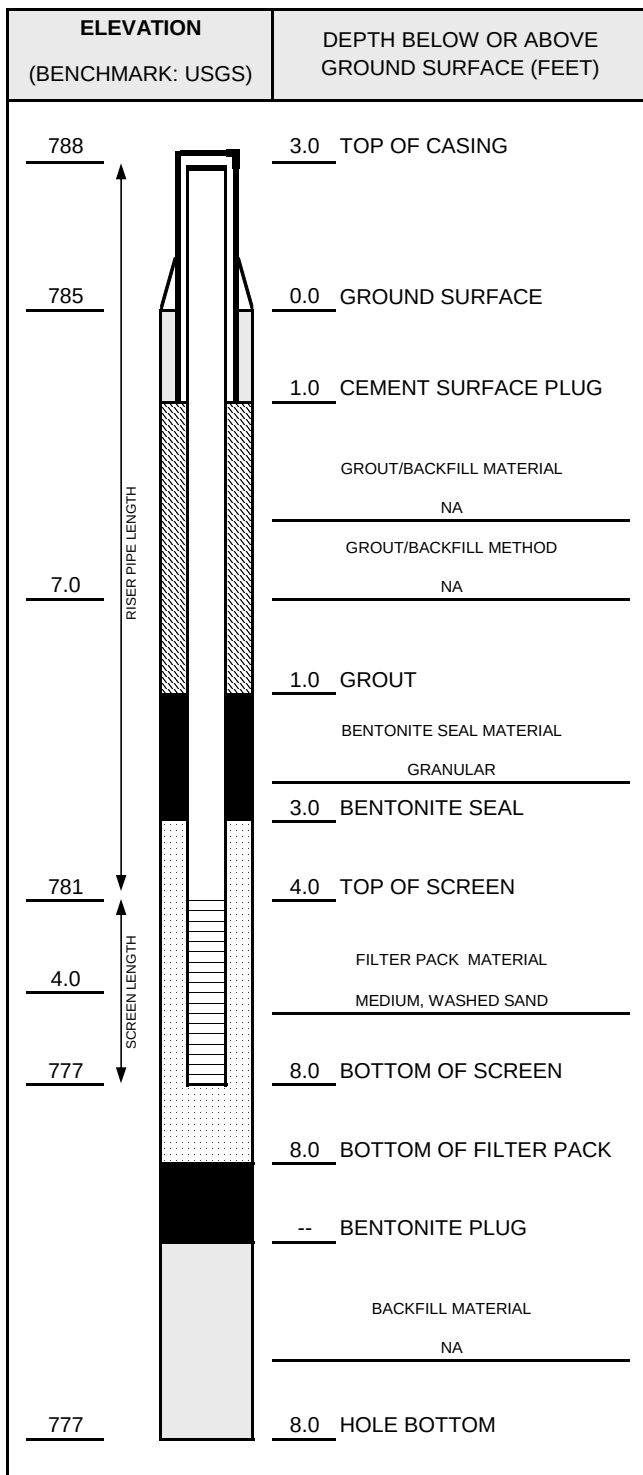
Appendix E

Passive Vent Construction Forms



WELL CONSTRUCTION DIAGRAM

PROJ. NAME: TPC - Passive Vent Installation	WELL ID: V-01
PROJ. NO: 2751.16	DATE INSTALLED: 10/27/2011 INSTALLED BY: J. Bacon
CHECKED BY: S. Metz	



NOTES:

Ground surface elevation is approximate.

Location: 20 ft south of north end of PRB.

CASING AND SCREEN DETAILS

TYPE OF RISER: 3-INCH GALVANIZED STEEL

PIPE SCHEDULE: 40

PIPE JOINTS: THREADED O-RINGS

SOLVENT USED? NO

SCREEN TYPE: 3-INCH PVC

SCR. SLOT SIZE: 0.01-INCH

BOREHOLE DIAMETER: 4.25 IN. FROM 0 TO 8 FT.

 IN. FROM TO FT.

SURF. CASING DIAMETER: 12 IN. FROM 0 TO 1 FT.

 IN. FROM TO FT.

WELL DEVELOPMENT

DEVELOPMENT METHOD:

TIME DEVELOPING: NA HOURS

WATER REMOVED: NA GALLONS

WATER ADDED: NA GALLONS

WATER CLARITY BEFORE / AFTER DEVELOPMENT

CLARITY BEFORE: NA

COLOR BEFORE: NA

CLARITY AFTER: NA

COLOR AFTER: NA

ODOR (IF PRESENT): NA

WATER LEVEL SUMMARY

MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	NA	T/PVC		
DTB AFTER DEVELOPING:	NA	T/PVC		
SWE BEFORE DEVELOPING:	NA	T/PVC		
SWE AFTER DEVELOPING:	NA	T/PVC		
OTHER SWE:		T/PVC		
OTHER SWE:		T/PVC		

PROTECTIVE CASING DETAILS

PERMANENT, LEGIBLE WELL LABEL ADDED? ☒ YES ☐ NO

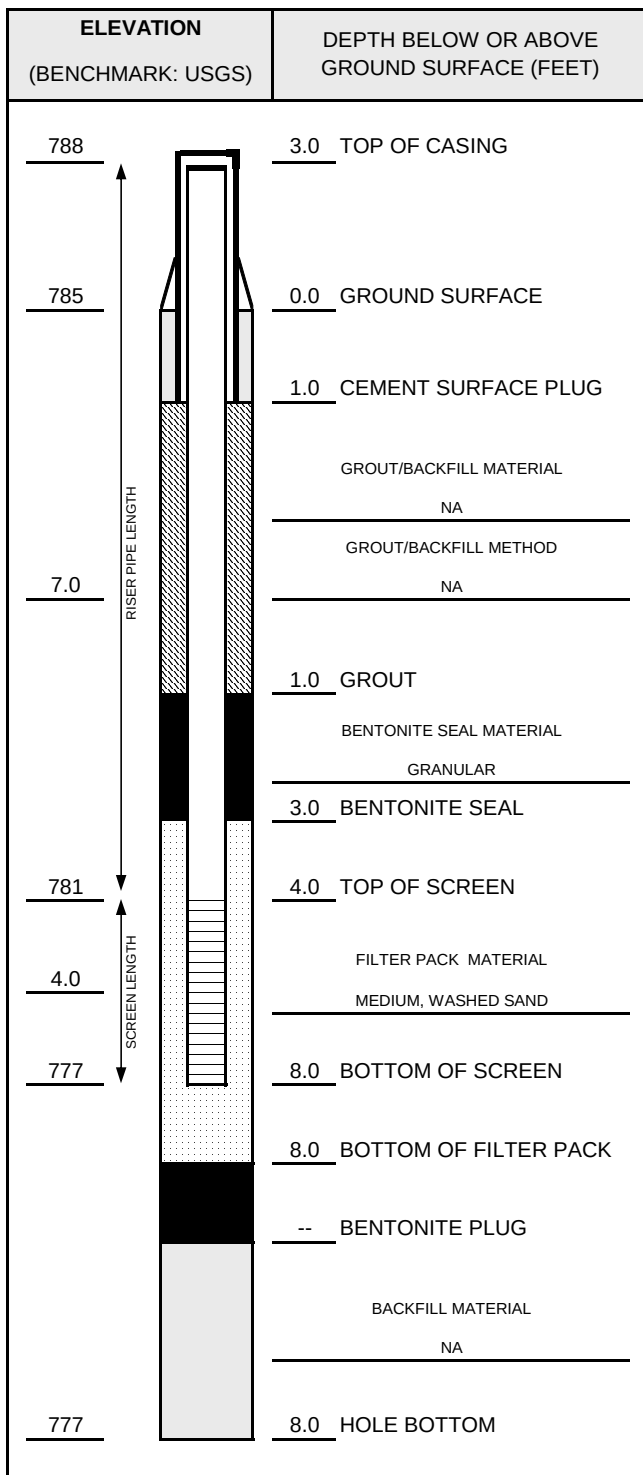
PROTECTIVE COVER AND LOCK INSTALLED? ☐ YES ☒ NO

LOCK KEY NUMBER: NA



WELL CONSTRUCTION DIAGRAM

PROJ. NAME: TPC - Passive Vent Installation	WELL ID: V-02
PROJ. NO: 2751.16	DATE INSTALLED: 10/27/2011 INSTALLED BY: J. Bacon
CHECKED BY: S. Metz	



NOTES:
Ground surface elevation is approximate.

Location: 50 ft south of V-01.

CASING AND SCREEN DETAILS	
TYPE OF RISER:	3-INCH GALVANIZED STEEL
PIPE SCHEDULE:	40
PIPE JOINTS:	THREADED O-RINGS
SOLVENT USED?	NO
SCREEN TYPE:	3-INCH PVC
SCR. SLOT SIZE:	0.01-INCH
BOREHOLE DIAMETER:	4.25 IN. FROM 0 TO 8 FT.
	IN. FROM TO FT.
SURF. CASING DIAMETER:	12 IN. FROM 0 TO 1 FT.
	IN. FROM TO FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	
TIME DEVELOPING:	NA HOURS
WATER REMOVED:	NA GALLONS
WATER ADDED:	NA GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	NA
COLOR BEFORE:	NA
CLARITY AFTER:	NA
COLOR AFTER:	NA
ODOR (IF PRESENT):	NA

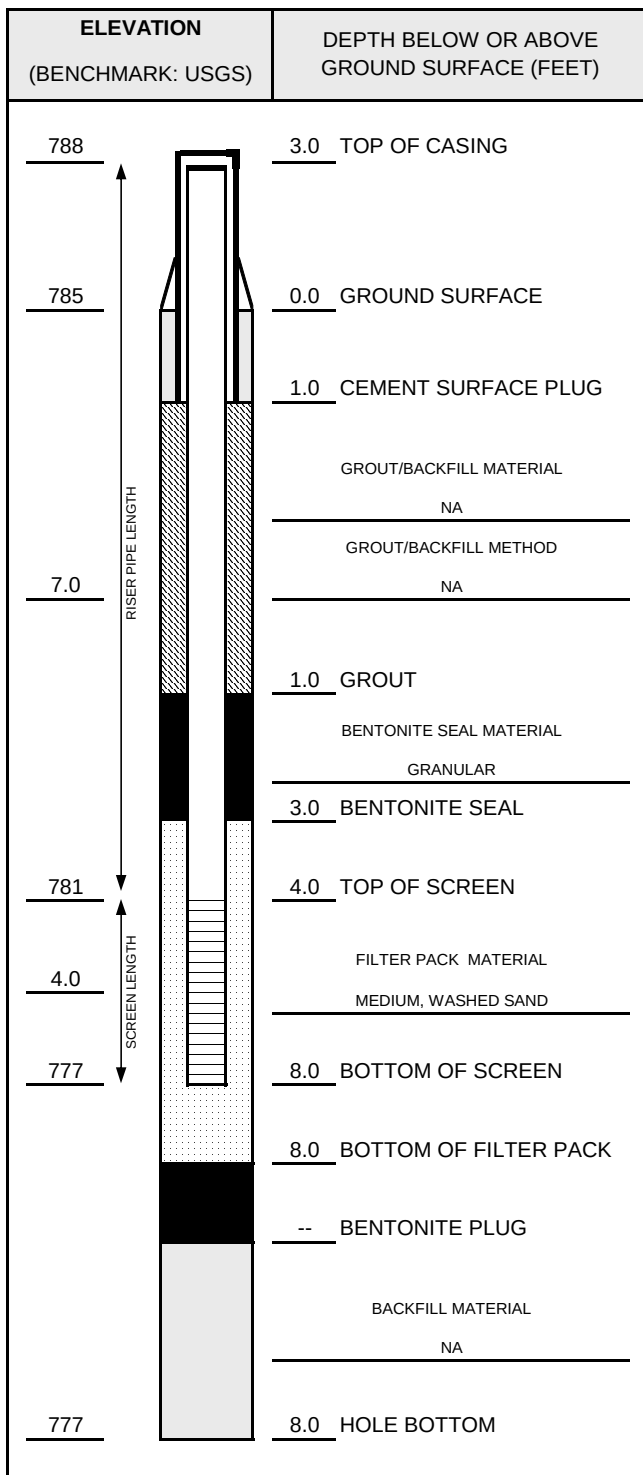
WATER LEVEL SUMMARY			DATE	TIME
MEASUREMENT (FEET)				
DTB BEFORE DEVELOPING:	NA	T/PVC		
DTB AFTER DEVELOPING:	NA	T/PVC		
SWE BEFORE DEVELOPING:	NA	T/PVC		
SWE AFTER DEVELOPING:	NA	T/PVC		
OTHER SWE:		T/PVC		
OTHER SWE:		T/PVC		

PROTECTIVE CASING DETAILS	
PERMANENT, LEGIBLE WELL LABEL ADDED?	☒ YES ☐ NO
PROTECTIVE COVER AND LOCK INSTALLED?	☐ YES ☒ NO
LOCK KEY NUMBER:	NA



WELL CONSTRUCTION DIAGRAM

PROJ. NAME: TPC - Passive Vent Installation	WELL ID: V-03
PROJ. NO: 2751.16	DATE INSTALLED: 10/27/2011 INSTALLED BY: J. Bacon
CHECKED BY: S. Metz	



NOTES:
Ground surface elevation is approximate.
Location: 50 ft south of V-02.

CASING AND SCREEN DETAILS	
TYPE OF RISER:	3-INCH GALVANIZED STEEL
PIPE SCHEDULE:	40
PIPE JOINTS:	THREADED O-RINGS
SOLVENT USED?	NO
SCREEN TYPE:	3-INCH PVC
SCR. SLOT SIZE:	0.01-INCH
BOREHOLE DIAMETER:	4.25 IN. FROM 0 TO 8 FT.
	IN. FROM TO FT.
SURF. CASING DIAMETER:	12 IN. FROM 0 TO 1 FT.
	IN. FROM TO FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	
TIME DEVELOPING:	NA HOURS
WATER REMOVED:	NA GALLONS
WATER ADDED:	NA GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	NA
COLOR BEFORE:	NA
CLARITY AFTER:	NA
COLOR AFTER:	NA
ODOR (IF PRESENT):	NA

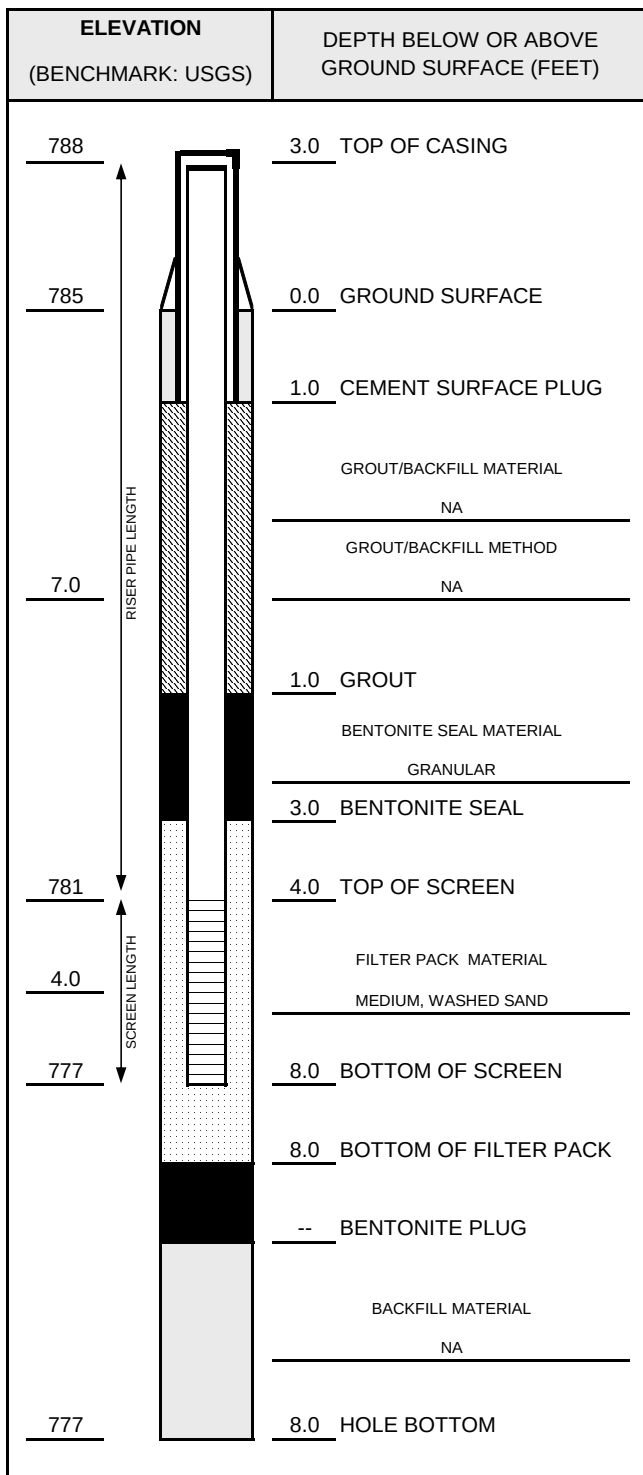
WATER LEVEL SUMMARY			DATE	TIME
MEASUREMENT (FEET)				
DTB BEFORE DEVELOPING:	NA	T/PVC		
DTB AFTER DEVELOPING:	NA	T/PVC		
SWE BEFORE DEVELOPING:	NA	T/PVC		
SWE AFTER DEVELOPING:	NA	T/PVC		
OTHER SWE:		T/PVC		
OTHER SWE:		T/PVC		

PROTECTIVE CASING DETAILS	
PERMANENT, LEGIBLE WELL LABEL ADDED?	☒ YES ☐ NO
PROTECTIVE COVER AND LOCK INSTALLED?	☐ YES ☒ NO
LOCK KEY NUMBER:	NA



WELL CONSTRUCTION DIAGRAM

PROJ. NAME: TPC - Passive Vent Installation	WELL ID: V-04
PROJ. NO: 2751.16	DATE INSTALLED: 10/27/2011 INSTALLED BY: J. Bacon
CHECKED BY: S. Metz	



NOTES:

Ground surface elevation is approximate.

Location: 40 ft south of V-03 and 60 ft north of V-05 so the entry gate is not obstructed.

CASING AND SCREEN DETAILS	
TYPE OF RISER:	3-INCH GALVANIZED STEEL
PIPE SCHEDULE:	40
PIPE JOINTS:	THREADED O-RINGS
SOLVENT USED?	NO
SCREEN TYPE:	3-INCH PVC
SCR. SLOT SIZE:	0.01-INCH
BOREHOLE DIAMETER:	4.25 IN. FROM 0 TO 8 FT.
	IN. FROM TO FT.
SURF. CASING DIAMETER:	12 IN. FROM 0 TO 1 FT.
	IN. FROM TO FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	
TIME DEVELOPING:	NA HOURS
WATER REMOVED:	NA GALLONS
WATER ADDED:	NA GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	NA
COLOR BEFORE:	NA
CLARITY AFTER:	NA
COLOR AFTER:	NA
ODOR (IF PRESENT):	NA

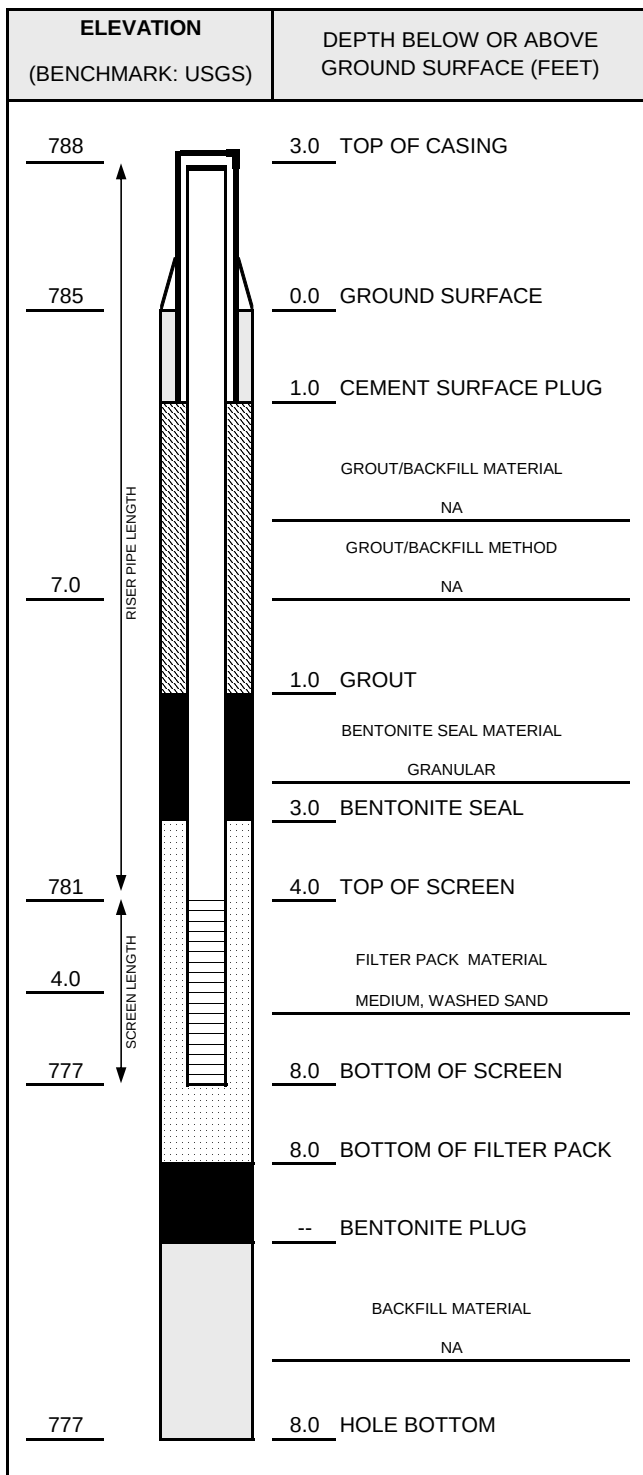
WATER LEVEL SUMMARY				
MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	NA	T/PVC		
DTB AFTER DEVELOPING:	NA	T/PVC		
SWE BEFORE DEVELOPING:	NA	T/PVC		
SWE AFTER DEVELOPING:	NA	T/PVC		
OTHER SWE:		T/PVC		
OTHER SWE:		T/PVC		

PROTECTIVE CASING DETAILS	
PERMANENT, LEGIBLE WELL LABEL ADDED?	☒ YES ☐ NO
PROTECTIVE COVER AND LOCK INSTALLED?	☐ YES ☒ NO
LOCK KEY NUMBER:	NA



WELL CONSTRUCTION DIAGRAM

PROJ. NAME: TPC - Passive Vent Installation	WELL ID: V-05
PROJ. NO: 2751.16	DATE INSTALLED: 10/27/2011 INSTALLED BY: J. Bacon
CHECKED BY: S. Metz	



NOTES:
Ground surface elevation is approximate.
Location: 60 ft south of V-04.

CASING AND SCREEN DETAILS	
TYPE OF RISER:	3-INCH GALVANIZED STEEL
PIPE SCHEDULE:	40
PIPE JOINTS:	THREADED O-RINGS
SOLVENT USED?	NO
SCREEN TYPE:	3-INCH PVC
SCR. SLOT SIZE:	0.01-INCH
BOREHOLE DIAMETER:	4.25 IN. FROM 0 TO 8 FT.
	IN. FROM TO FT.
SURF. CASING DIAMETER:	12 IN. FROM 0 TO 1 FT.
	IN. FROM TO FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	
TIME DEVELOPING:	NA HOURS
WATER REMOVED:	NA GALLONS
WATER ADDED:	NA GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	NA
COLOR BEFORE:	NA
CLARITY AFTER:	NA
COLOR AFTER:	NA
ODOR (IF PRESENT):	NA

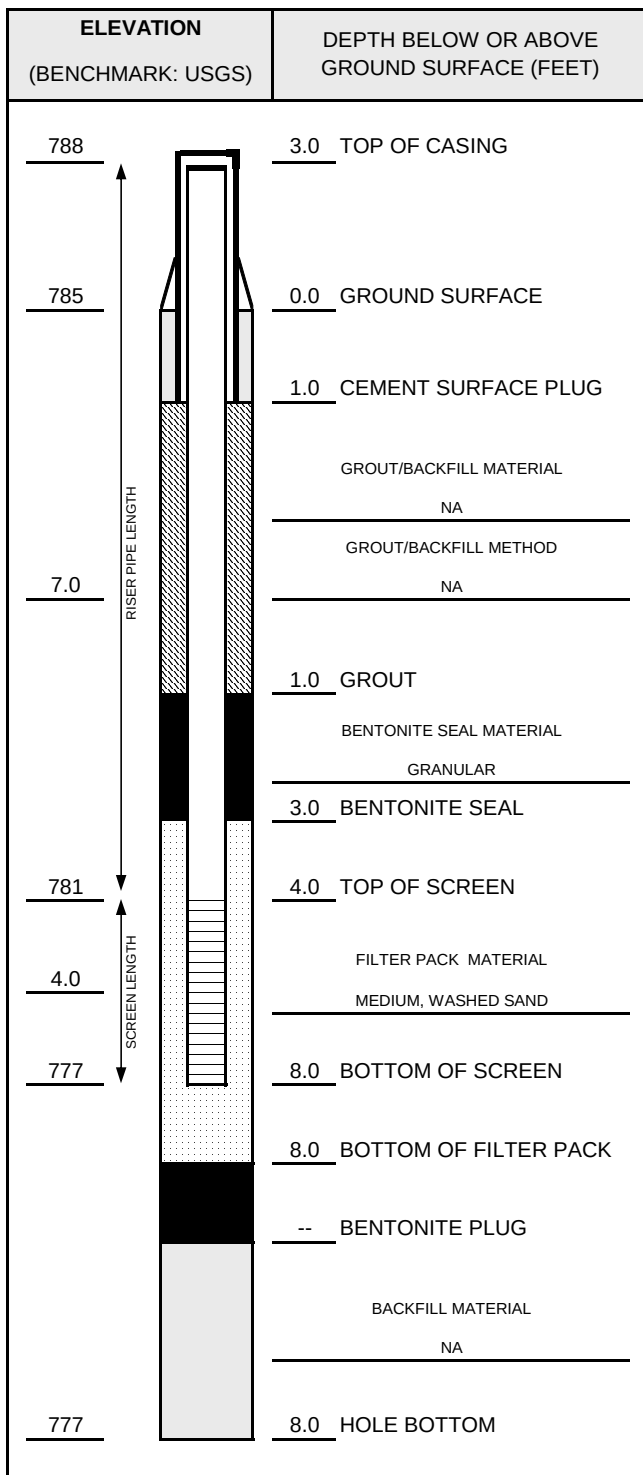
WATER LEVEL SUMMARY		
MEASUREMENT (FEET)	DATE	TIME
DTB BEFORE DEVELOPING:	NA	T/PVC
DTB AFTER DEVELOPING:	NA	T/PVC
SWE BEFORE DEVELOPING:	NA	T/PVC
SWE AFTER DEVELOPING:	NA	T/PVC
OTHER SWE:		T/PVC
OTHER SWE:		T/PVC

PROTECTIVE CASING DETAILS	
PERMANENT, LEGIBLE WELL LABEL ADDED?	☒ YES ☐ NO
PROTECTIVE COVER AND LOCK INSTALLED?	☐ YES ☒ NO
LOCK KEY NUMBER:	NA



WELL CONSTRUCTION DIAGRAM

PROJ. NAME: TPC - Passive Vent Installation	WELL ID: V-06
PROJ. NO: 2751.16	DATE INSTALLED: 10/27/2011 INSTALLED BY: J. Bacon
CHECKED BY: S. Metz	



NOTES:
Ground surface elevation is approximate.
Location: 50 ft south of V-05.

CASING AND SCREEN DETAILS	
TYPE OF RISER:	3-INCH GALVANIZED STEEL
PIPE SCHEDULE:	40
PIPE JOINTS:	THREADED O-RINGS
SOLVENT USED?	NO
SCREEN TYPE:	3-INCH PVC
SCR. SLOT SIZE:	0.01-INCH
BOREHOLE DIAMETER:	4.25 IN. FROM 0 TO 8 FT.
	IN. FROM TO FT.
SURF. CASING DIAMETER:	12 IN. FROM 0 TO 1 FT.
	IN. FROM TO FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	
TIME DEVELOPING:	NA HOURS
WATER REMOVED:	NA GALLONS
WATER ADDED:	NA GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	NA
COLOR BEFORE:	NA
CLARITY AFTER:	NA
COLOR AFTER:	NA
ODOR (IF PRESENT):	NA

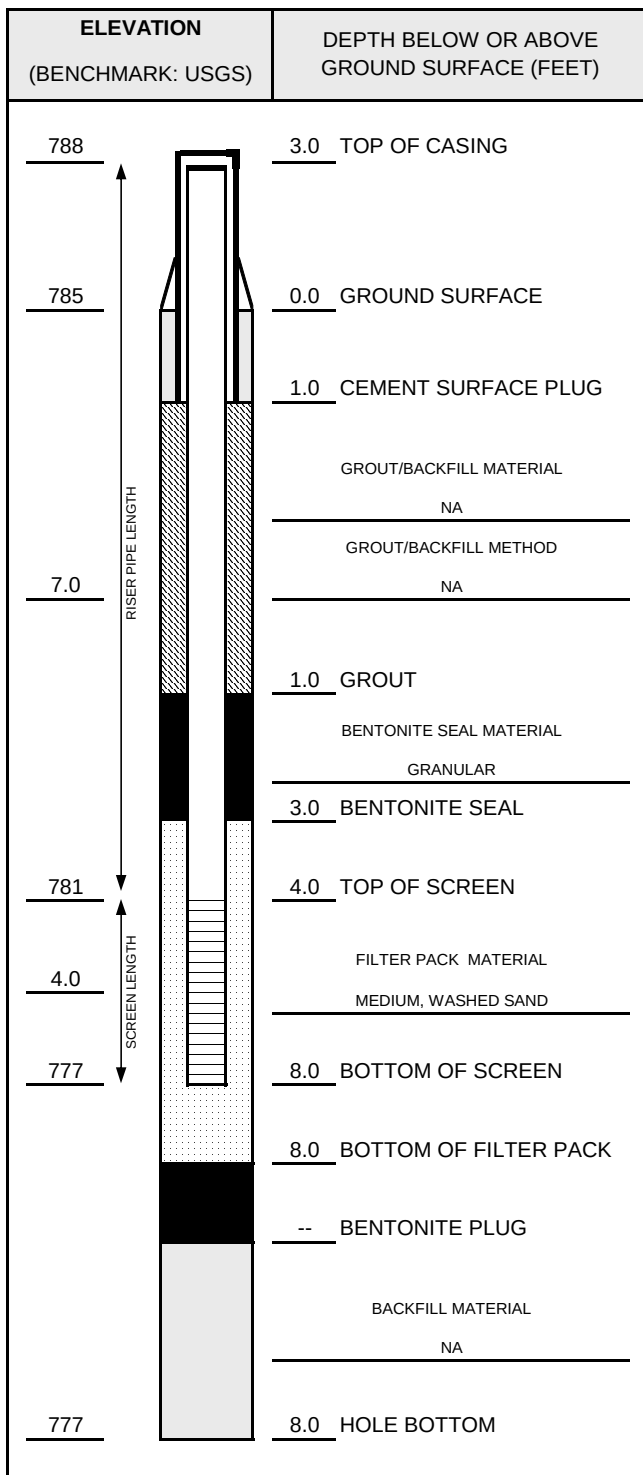
WATER LEVEL SUMMARY		
MEASUREMENT (FEET)	DATE	TIME
DTB BEFORE DEVELOPING:	NA	T/PVC
DTB AFTER DEVELOPING:	NA	T/PVC
SWE BEFORE DEVELOPING:	NA	T/PVC
SWE AFTER DEVELOPING:	NA	T/PVC
OTHER SWE:		T/PVC
OTHER SWE:		T/PVC

PROTECTIVE CASING DETAILS	
PERMANENT, LEGIBLE WELL LABEL ADDED?	☒ YES ☐ NO
PROTECTIVE COVER AND LOCK INSTALLED?	☐ YES ☒ NO
LOCK KEY NUMBER:	NA



WELL CONSTRUCTION DIAGRAM

PROJ. NAME: TPC - Passive Vent Installation	WELL ID: V-07
PROJ. NO: 2751.16	DATE INSTALLED: 10/27/2011 INSTALLED BY: J. Bacon
CHECKED BY: S. Metz	



NOTES:
Ground surface elevation is approximate.
Location: 50 ft south of V-06.

CASING AND SCREEN DETAILS	
TYPE OF RISER:	3-INCH GALVANIZED STEEL
PIPE SCHEDULE:	40
PIPE JOINTS:	THREADED O-RINGS
SOLVENT USED?	NO
SCREEN TYPE:	3-INCH PVC
SCR. SLOT SIZE:	0.01-INCH
BOREHOLE DIAMETER:	4.25 IN. FROM 0 TO 8 FT.
	IN. FROM TO FT.
SURF. CASING DIAMETER:	12 IN. FROM 0 TO 1 FT.
	IN. FROM TO FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	
TIME DEVELOPING:	NA HOURS
WATER REMOVED:	NA GALLONS
WATER ADDED:	NA GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	NA
COLOR BEFORE:	NA
CLARITY AFTER:	NA
COLOR AFTER:	NA
ODOR (IF PRESENT):	NA

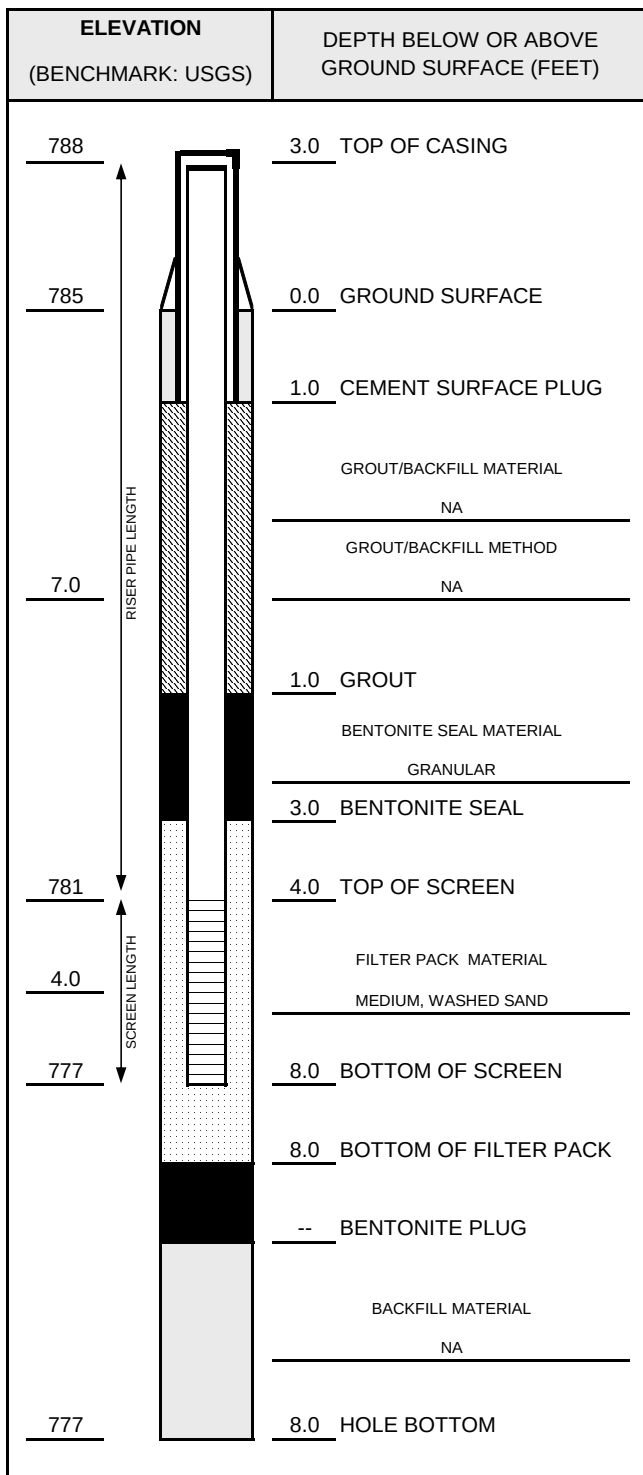
WATER LEVEL SUMMARY		
MEASUREMENT (FEET)	DATE	TIME
DTB BEFORE DEVELOPING:	NA	T/PVC
DTB AFTER DEVELOPING:	NA	T/PVC
SWE BEFORE DEVELOPING:	NA	T/PVC
SWE AFTER DEVELOPING:	NA	T/PVC
OTHER SWE:		T/PVC
OTHER SWE:		T/PVC

PROTECTIVE CASING DETAILS	
PERMANENT, LEGIBLE WELL LABEL ADDED?	☒ YES ☐ NO
PROTECTIVE COVER AND LOCK INSTALLED?	☐ YES ☒ NO
LOCK KEY NUMBER:	NA



WELL CONSTRUCTION DIAGRAM

PROJ. NAME: TPC - Passive Vent Installation	WELL ID: V-08
PROJ. NO: 2751.16	DATE INSTALLED: 10/27/2011 INSTALLED BY: J. Bacon
CHECKED BY: S. Metz	



NOTES:
Ground surface elevation is approximate.
Location: 50 ft south of V-07.

CASING AND SCREEN DETAILS	
TYPE OF RISER:	3-INCH GALVANIZED STEEL
PIPE SCHEDULE:	40
PIPE JOINTS:	THREADED O-RINGS
SOLVENT USED?	NO
SCREEN TYPE:	3-INCH PVC
SCR. SLOT SIZE:	0.01-INCH
BOREHOLE DIAMETER:	4.25 IN. FROM 0 TO 8 FT.
	IN. FROM TO FT.
SURF. CASING DIAMETER:	12 IN. FROM 0 TO 1 FT.
	IN. FROM TO FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	
TIME DEVELOPING:	NA HOURS
WATER REMOVED:	NA GALLONS
WATER ADDED:	NA GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	NA
COLOR BEFORE:	NA
CLARITY AFTER:	NA
COLOR AFTER:	NA
ODOR (IF PRESENT):	NA

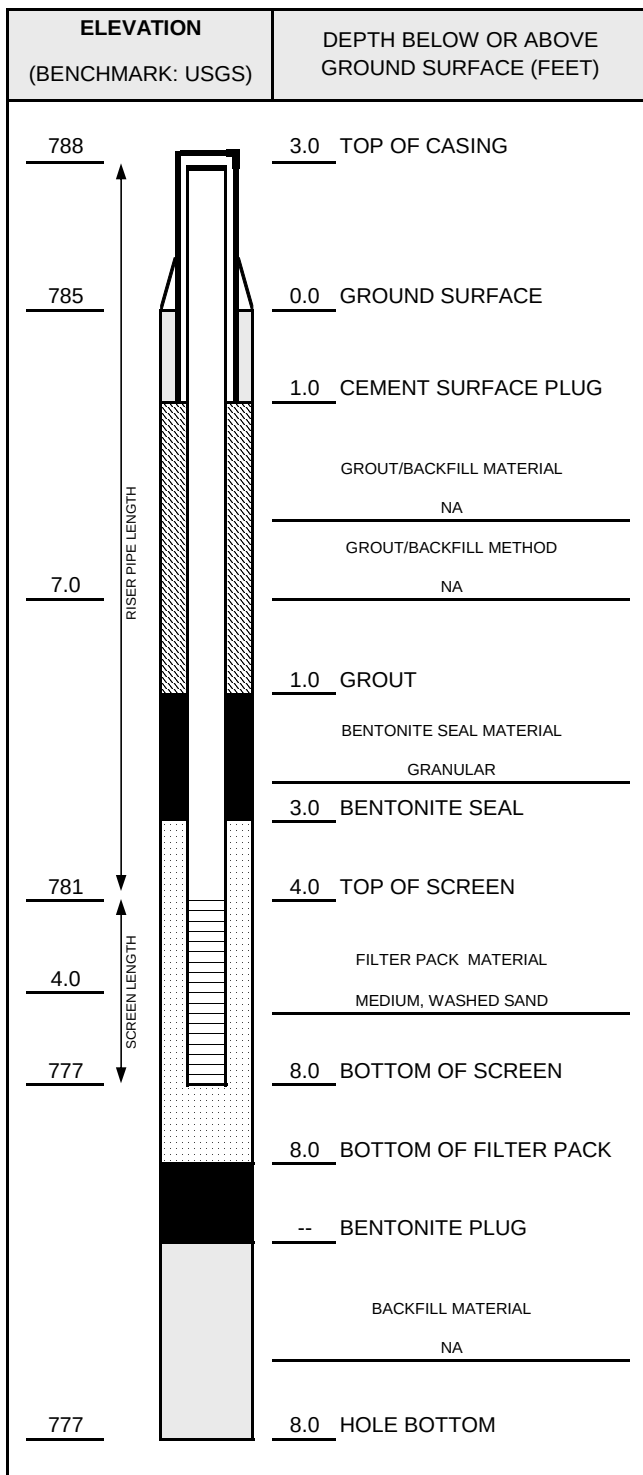
WATER LEVEL SUMMARY		
MEASUREMENT (FEET)	DATE	TIME
DTB BEFORE DEVELOPING:	NA	T/PVC
DTB AFTER DEVELOPING:	NA	T/PVC
SWE BEFORE DEVELOPING:	NA	T/PVC
SWE AFTER DEVELOPING:	NA	T/PVC
OTHER SWE:		T/PVC
OTHER SWE:		T/PVC

PROTECTIVE CASING DETAILS	
PERMANENT, LEGIBLE WELL LABEL ADDED?	☒ YES ☐ NO
PROTECTIVE COVER AND LOCK INSTALLED?	☐ YES ☒ NO
LOCK KEY NUMBER:	NA



WELL CONSTRUCTION DIAGRAM

PROJ. NAME: TPC - Passive Vent Installation		WELL ID: V-09
PROJ. NO: 2751.16	DATE INSTALLED: 10/27/2011	INSTALLED BY: J. Bacon
		CHECKED BY: S. Metz



NOTES:
Ground surface elevation is approximate.
Location: 50 ft south of V-08.

CASING AND SCREEN DETAILS	
TYPE OF RISER:	3-INCH GALVANIZED STEEL
PIPE SCHEDULE:	40
PIPE JOINTS:	THREADED O-RINGS
SOLVENT USED?	NO
SCREEN TYPE:	3-INCH PVC
SCR. SLOT SIZE:	0.01-INCH
BOREHOLE DIAMETER:	4.25 IN. FROM 0 TO 8 FT.
	IN. FROM TO FT.
SURF. CASING DIAMETER:	12 IN. FROM 0 TO 1 FT.
	IN. FROM TO FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	
TIME DEVELOPING:	NA HOURS
WATER REMOVED:	NA GALLONS
WATER ADDED:	NA GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	NA
COLOR BEFORE:	NA
CLARITY AFTER:	NA
COLOR AFTER:	NA
ODOR (IF PRESENT):	NA

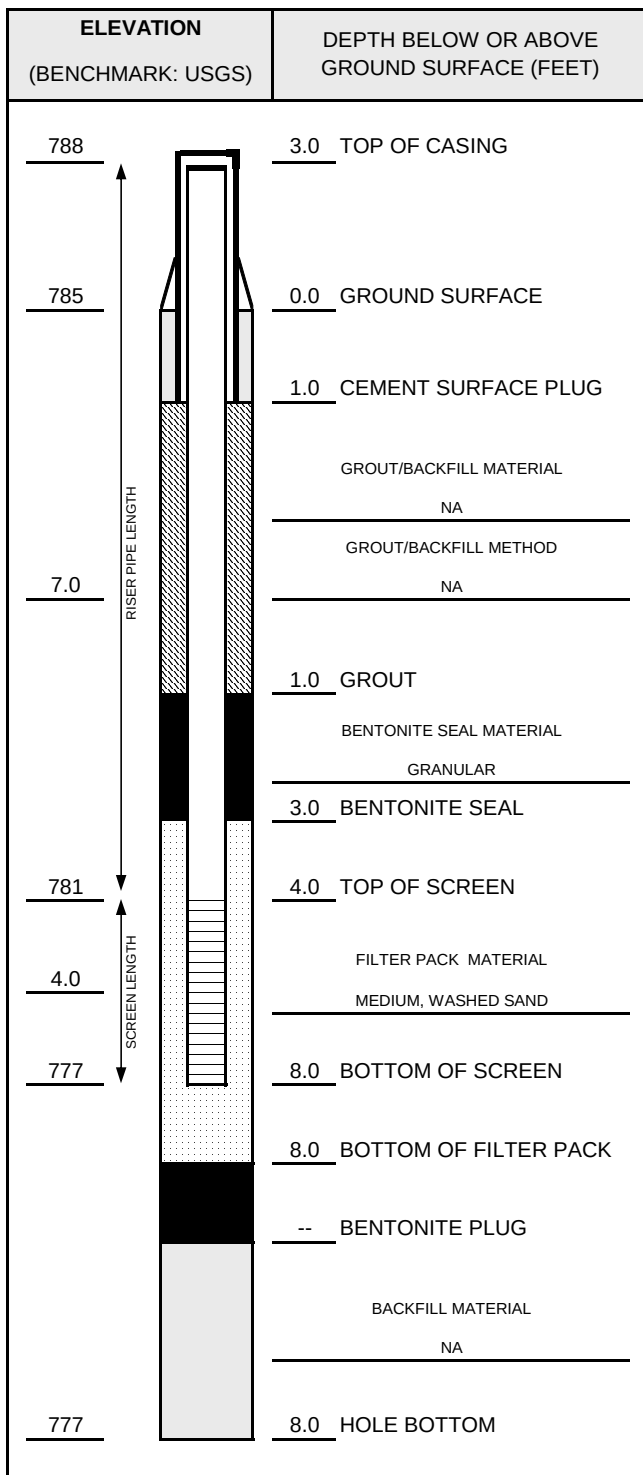
WATER LEVEL SUMMARY			DATE	TIME
MEASUREMENT (FEET)				
DTB BEFORE DEVELOPING:	NA	T/PVC		
DTB AFTER DEVELOPING:	NA	T/PVC		
SWE BEFORE DEVELOPING:	NA	T/PVC		
SWE AFTER DEVELOPING:	NA	T/PVC		
OTHER SWE:		T/PVC		
OTHER SWE:		T/PVC		

PROTECTIVE CASING DETAILS	
PERMANENT, LEGIBLE WELL LABEL ADDED?	☒ YES ☐ NO
PROTECTIVE COVER AND LOCK INSTALLED?	☐ YES ☒ NO
LOCK KEY NUMBER:	NA



WELL CONSTRUCTION DIAGRAM

PROJ. NAME: TPC - Passive Vent Installation		WELL ID: V-10
PROJ. NO: 2751.16	DATE INSTALLED: 10/27/2011	INSTALLED BY: J. Bacon
		CHECKED BY: S. Metz



NOTES:
Ground surface elevation is approximate.
Location: 50 ft south of V-09.

CASING AND SCREEN DETAILS	
TYPE OF RISER:	3-INCH GALVANIZED STEEL
PIPE SCHEDULE:	40
PIPE JOINTS:	THREADED O-RINGS
SOLVENT USED?	NO
SCREEN TYPE:	3-INCH PVC
SCR. SLOT SIZE:	0.01-INCH
BOREHOLE DIAMETER:	4.25 IN. FROM 0 TO 8 FT.
	IN. FROM TO FT.
SURF. CASING DIAMETER:	12 IN. FROM 0 TO 1 FT.
	IN. FROM TO FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	
TIME DEVELOPING:	NA HOURS
WATER REMOVED:	NA GALLONS
WATER ADDED:	NA GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	NA
COLOR BEFORE:	NA
CLARITY AFTER:	NA
COLOR AFTER:	NA
ODOR (IF PRESENT):	NA

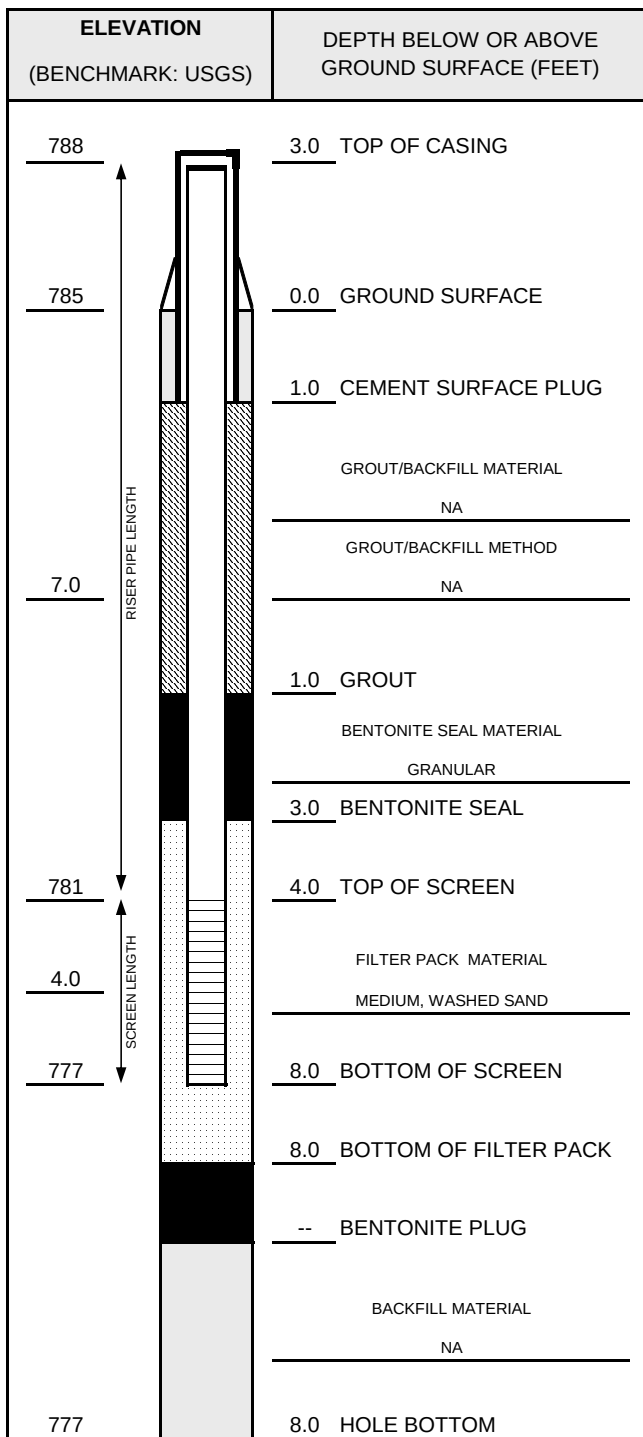
WATER LEVEL SUMMARY		
MEASUREMENT (FEET)	DATE	TIME
DTB BEFORE DEVELOPING:	NA	T/PVC
DTB AFTER DEVELOPING:	NA	T/PVC
SWE BEFORE DEVELOPING:	NA	T/PVC
SWE AFTER DEVELOPING:	NA	T/PVC
OTHER SWE:		T/PVC
OTHER SWE:		T/PVC

PROTECTIVE CASING DETAILS	
PERMANENT, LEGIBLE WELL LABEL ADDED?	☒ YES ☐ NO
PROTECTIVE COVER AND LOCK INSTALLED?	☐ YES ☒ NO
LOCK KEY NUMBER:	NA



WELL CONSTRUCTION DIAGRAM

PROJ. NAME: TPC - Passive Vent Installation	WELL ID: V-11
PROJ. NO: 2751.16	DATE INSTALLED: 10/27/2011 INSTALLED BY: J. Bacon
CHECKED BY: S. Metz	



NOTES:
Ground surface elevation is approximate.

Location: 50 ft south of V-10.

CASING AND SCREEN DETAILS	
TYPE OF RISER:	3-INCH GALVANIZED STEEL
PIPE SCHEDULE:	40
PIPE JOINTS:	THREADED O-RINGS
SOLVENT USED?	NO
SCREEN TYPE:	3-INCH PVC
SCR. SLOT SIZE:	0.01-INCH
BOREHOLE DIAMETER:	4.25 IN. FROM 0 TO 8 FT.
	IN. FROM TO FT.
SURF. CASING DIAMETER:	12 IN. FROM 0 TO 1 FT.
	IN. FROM TO FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	
TIME DEVELOPING:	NA HOURS
WATER REMOVED:	NA GALLONS
WATER ADDED:	NA GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	NA
COLOR BEFORE:	NA
CLARITY AFTER:	NA
COLOR AFTER:	NA
ODOR (IF PRESENT):	NA

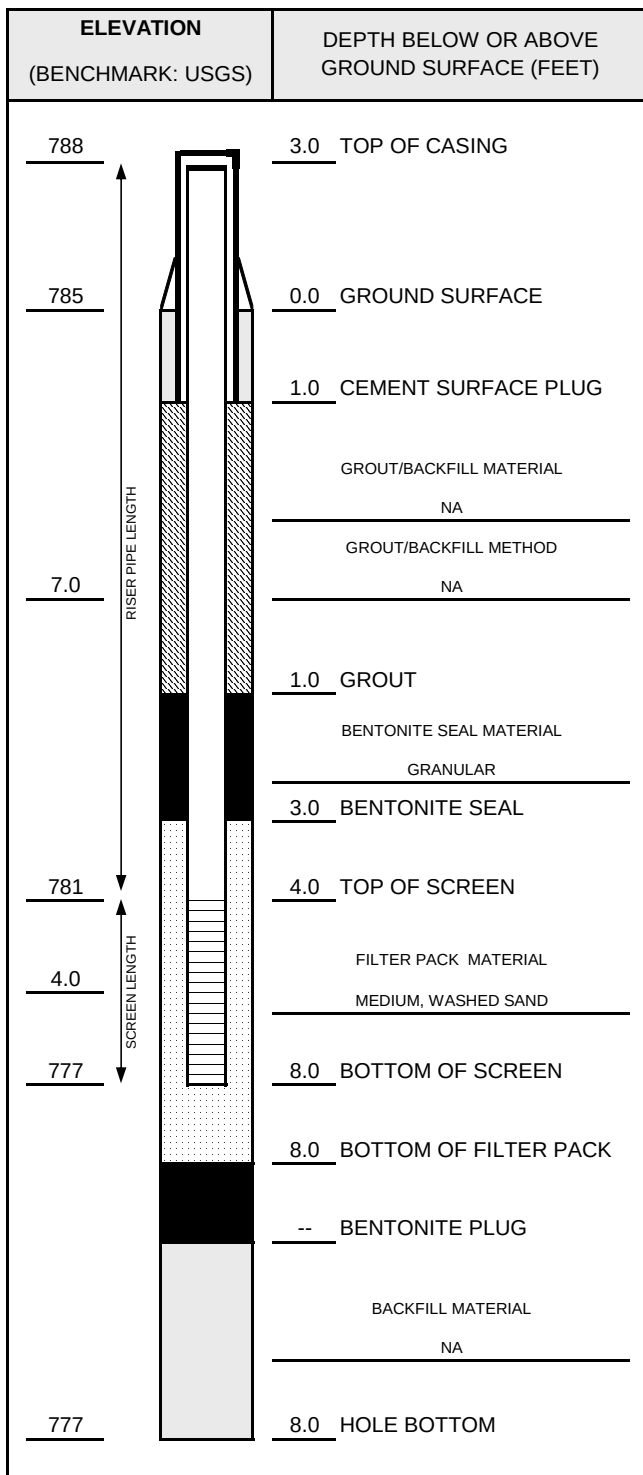
WATER LEVEL SUMMARY			DATE	TIME
MEASUREMENT (FEET)				
DTB BEFORE DEVELOPING:	NA	T/PVC		
DTB AFTER DEVELOPING:	NA	T/PVC		
SWE BEFORE DEVELOPING:	NA	T/PVC		
SWE AFTER DEVELOPING:	NA	T/PVC		
OTHER SWE:		T/PVC		
OTHER SWE:		T/PVC		

PROTECTIVE CASING DETAILS	
PERMANENT, LEGIBLE WELL LABEL ADDED?	☒ YES ☐ NO
PROTECTIVE COVER AND LOCK INSTALLED?	☐ YES ☒ NO
LOCK KEY NUMBER:	NA



WELL CONSTRUCTION DIAGRAM

PROJ. NAME: TPC - Passive Vent Installation	WELL ID: V-12
PROJ. NO: 2751.16	DATE INSTALLED: 10/28/2011 INSTALLED BY: J. Bacon
CHECKED BY: S. Metz	



NOTES:
Ground surface elevation is approximate.

Location: 50 ft south of V-11.

CASING AND SCREEN DETAILS	
TYPE OF RISER:	3-INCH GALVANIZED STEEL
PIPE SCHEDULE:	40
PIPE JOINTS:	THREADED O-RINGS
SOLVENT USED?	NO
SCREEN TYPE:	3-INCH PVC
SCR. SLOT SIZE:	0.01-INCH
BOREHOLE DIAMETER:	4.25 IN. FROM 0 TO 8 FT.
	IN. FROM TO FT.
SURF. CASING DIAMETER:	12 IN. FROM 0 TO 1 FT.
	IN. FROM TO FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	
TIME DEVELOPING:	NA HOURS
WATER REMOVED:	NA GALLONS
WATER ADDED:	NA GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	NA
COLOR BEFORE:	NA
CLARITY AFTER:	NA
COLOR AFTER:	NA
ODOR (IF PRESENT):	NA

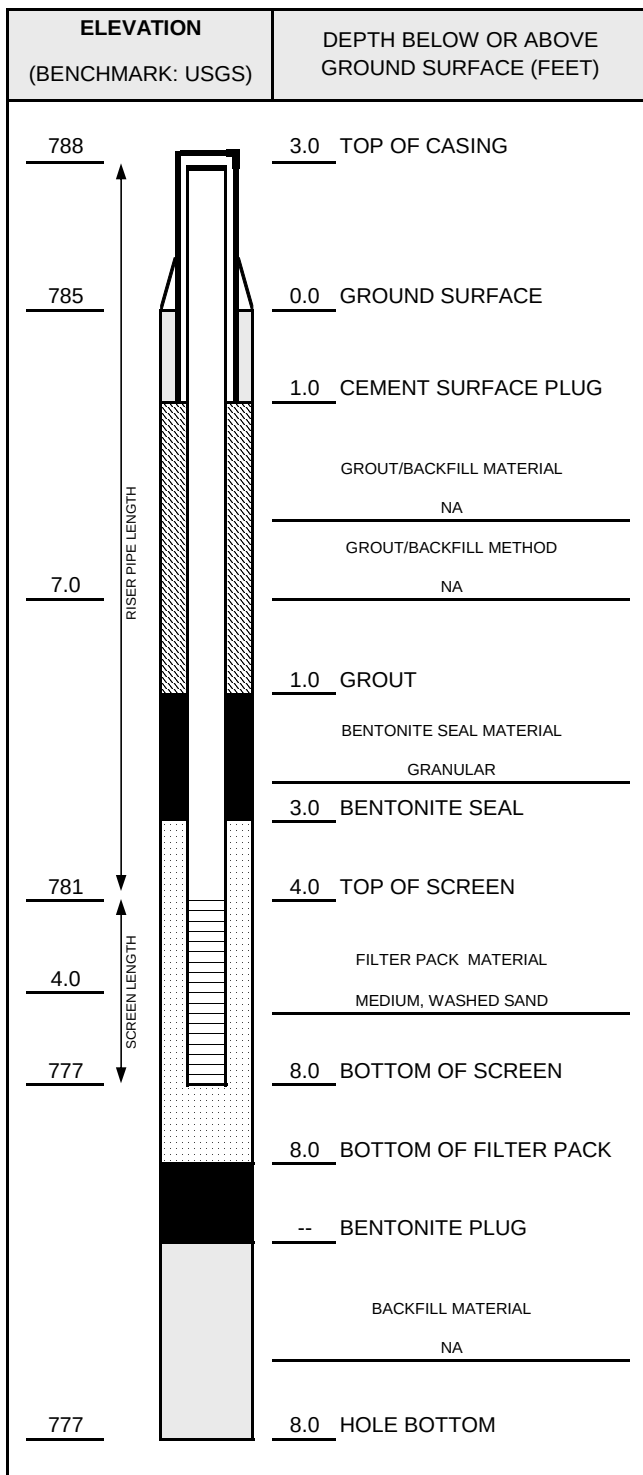
WATER LEVEL SUMMARY				
MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	NA	T/PVC		
DTB AFTER DEVELOPING:	NA	T/PVC		
SWE BEFORE DEVELOPING:	NA	T/PVC		
SWE AFTER DEVELOPING:	NA	T/PVC		
OTHER SWE:		T/PVC		
OTHER SWE:		T/PVC		

PROTECTIVE CASING DETAILS	
PERMANENT, LEGIBLE WELL LABEL ADDED?	☒ YES ☐ NO
PROTECTIVE COVER AND LOCK INSTALLED?	☐ YES ☒ NO
LOCK KEY NUMBER:	NA



WELL CONSTRUCTION DIAGRAM

PROJ. NAME: TPC - Passive Vent Installation	WELL ID: V-13
PROJ. NO: 2751.16	DATE INSTALLED: 10/28/2011 INSTALLED BY: J. Bacon
CHECKED BY: S. Metz	



NOTES:
Ground surface elevation is approximate.
Location: 50 ft south of V-12.

CASING AND SCREEN DETAILS	
TYPE OF RISER:	3-INCH GALVANIZED STEEL
PIPE SCHEDULE:	40
PIPE JOINTS:	THREADED O-RINGS
SOLVENT USED?	NO
SCREEN TYPE:	3-INCH PVC
SCR. SLOT SIZE:	0.01-INCH
BOREHOLE DIAMETER:	4.25 IN. FROM 0 TO 8 FT.
	IN. FROM TO FT.
SURF. CASING DIAMETER:	12 IN. FROM 0 TO 1 FT.
	IN. FROM TO FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	
TIME DEVELOPING:	NA HOURS
WATER REMOVED:	NA GALLONS
WATER ADDED:	NA GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	NA
COLOR BEFORE:	NA
CLARITY AFTER:	NA
COLOR AFTER:	NA
ODOR (IF PRESENT):	NA

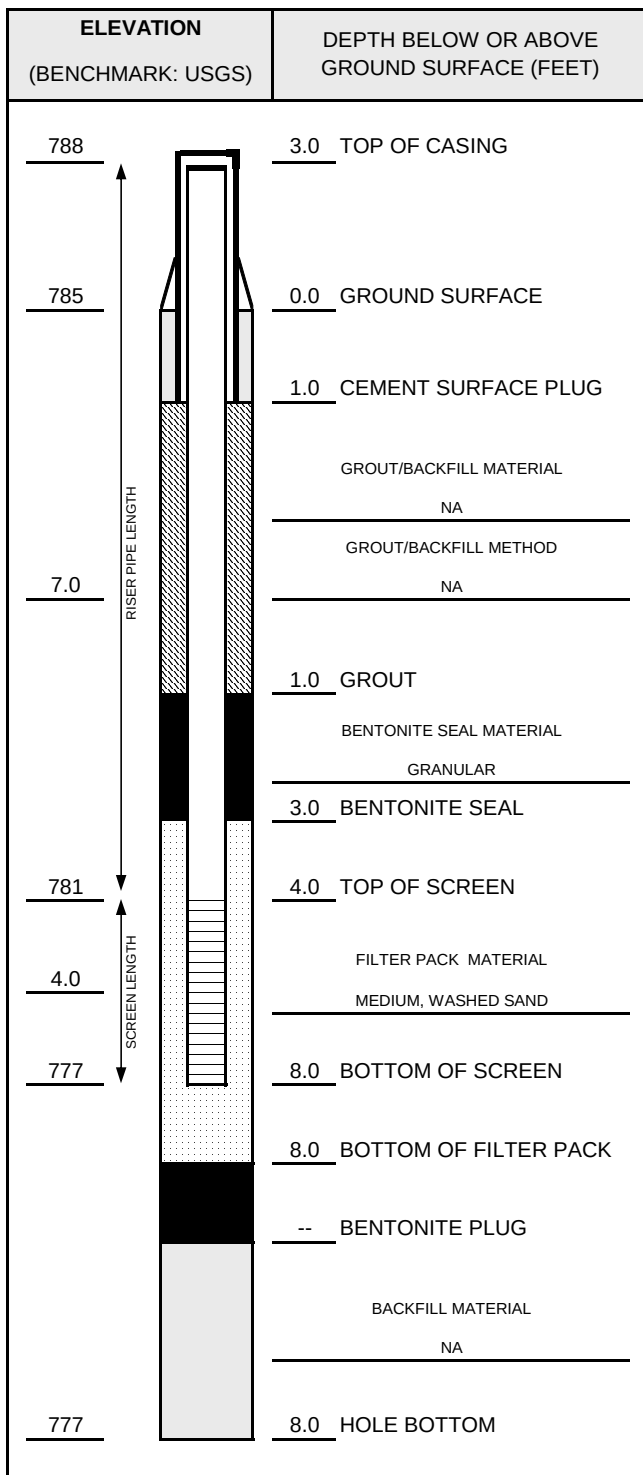
WATER LEVEL SUMMARY			DATE	TIME
MEASUREMENT (FEET)				
DTB BEFORE DEVELOPING:	NA	T/PVC		
DTB AFTER DEVELOPING:	NA	T/PVC		
SWE BEFORE DEVELOPING:	NA	T/PVC		
SWE AFTER DEVELOPING:	NA	T/PVC		
OTHER SWE:		T/PVC		
OTHER SWE:		T/PVC		

PROTECTIVE CASING DETAILS	
PERMANENT, LEGIBLE WELL LABEL ADDED?	☒ YES ☐ NO
PROTECTIVE COVER AND LOCK INSTALLED?	☐ YES ☒ NO
LOCK KEY NUMBER:	NA



WELL CONSTRUCTION DIAGRAM

PROJ. NAME: TPC - Passive Vent Installation	WELL ID: V-14
PROJ. NO: 2751.16	DATE INSTALLED: 10/28/2011 INSTALLED BY: J. Bacon
CHECKED BY: S. Metz	



NOTES:
Ground surface elevation is approximate.
Location: 50 ft south of V-13.

CASING AND SCREEN DETAILS	
TYPE OF RISER:	3-INCH GALVANIZED STEEL
PIPE SCHEDULE:	40
PIPE JOINTS:	THREADED O-RINGS
SOLVENT USED?	NO
SCREEN TYPE:	3-INCH PVC
SCR. SLOT SIZE:	0.01-INCH
BOREHOLE DIAMETER:	4.25 IN. FROM 0 TO 8 FT.
	IN. FROM TO FT.
SURF. CASING DIAMETER:	12 IN. FROM 0 TO 1 FT.
	IN. FROM TO FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	
TIME DEVELOPING:	NA HOURS
WATER REMOVED:	NA GALLONS
WATER ADDED:	NA GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	NA
COLOR BEFORE:	NA
CLARITY AFTER:	NA
COLOR AFTER:	NA
ODOR (IF PRESENT):	NA

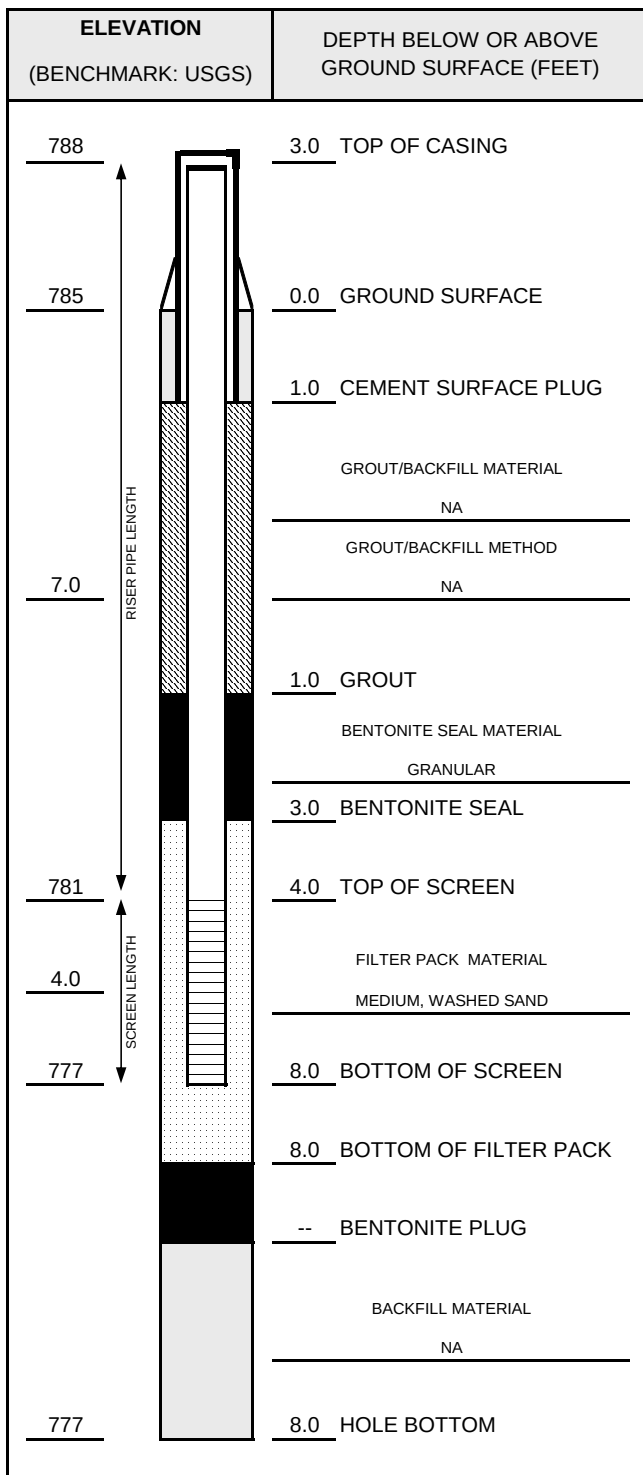
WATER LEVEL SUMMARY			DATE	TIME
MEASUREMENT (FEET)				
DTB BEFORE DEVELOPING:	NA	T/PVC		
DTB AFTER DEVELOPING:	NA	T/PVC		
SWE BEFORE DEVELOPING:	NA	T/PVC		
SWE AFTER DEVELOPING:	NA	T/PVC		
OTHER SWE:		T/PVC		
OTHER SWE:		T/PVC		

PROTECTIVE CASING DETAILS	
PERMANENT, LEGIBLE WELL LABEL ADDED?	☒ YES ☐ NO
PROTECTIVE COVER AND LOCK INSTALLED?	☐ YES ☒ NO
LOCK KEY NUMBER:	NA



WELL CONSTRUCTION DIAGRAM

PROJ. NAME: TPC - Passive Vent Installation	WELL ID: V-15
PROJ. NO: 2751.16	DATE INSTALLED: 10/28/2011 INSTALLED BY: J. Bacon
CHECKED BY: S. Metz	



NOTES:
Ground surface elevation is approximate.
Location: 50 ft south of V-14 and 5 ft north of southern fence.

CASING AND SCREEN DETAILS	
TYPE OF RISER:	3-INCH GALVANIZED STEEL
PIPE SCHEDULE:	40
PIPE JOINTS:	THREADED O-RINGS
SOLVENT USED?	NO
SCREEN TYPE:	3-INCH PVC
SCR. SLOT SIZE:	0.01-INCH
BOREHOLE DIAMETER:	4.25 IN. FROM 0 TO 8 FT.
	IN. FROM TO FT.
SURF. CASING DIAMETER:	12 IN. FROM 0 TO 1 FT.
	IN. FROM TO FT.

WELL DEVELOPMENT	
DEVELOPMENT METHOD:	
TIME DEVELOPING:	NA HOURS
WATER REMOVED:	NA GALLONS
WATER ADDED:	NA GALLONS
WATER CLARITY BEFORE / AFTER DEVELOPMENT	
CLARITY BEFORE:	NA
COLOR BEFORE:	NA
CLARITY AFTER:	NA
COLOR AFTER:	NA
ODOR (IF PRESENT):	NA

WATER LEVEL SUMMARY			DATE	TIME
MEASUREMENT (FEET)				
DTB BEFORE DEVELOPING:	NA	T/PVC		
DTB AFTER DEVELOPING:	NA	T/PVC		
SWE BEFORE DEVELOPING:	NA	T/PVC		
SWE AFTER DEVELOPING:	NA	T/PVC		
OTHER SWE:		T/PVC		
OTHER SWE:		T/PVC		

PROTECTIVE CASING DETAILS	
PERMANENT, LEGIBLE WELL LABEL ADDED?	☒ YES ☐ NO
PROTECTIVE COVER AND LOCK INSTALLED?	☐ YES ☒ NO
LOCK KEY NUMBER:	NA

Appendix F

Photographic Log – Methane Vent Construction

US EPA ARCHIVE DOCUMENT

Photographic Log

Client Name: Tecumseh Products Company		Site Location: Former TPC Site Tecumseh, MI	Project No.: 02751.16
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Photo No. 1	Date 10/27/2011
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Description

Fifteen passive vents were installed at 50-foot spacing near the eastern fence line, along the length of PRB Section 1.



Photo No. 2	Date 2/9/2012
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Description

Active ventilation units were installed to replace passive ventilation at the three northernmost vent locations.

