This Remedial Action Optimization Work Plan (RAO) technical memorandum for the former Tronox Facility (Facility) in Springfield, MO was prepared by Environmental Works, Inc. and is being submitted by the Greenfield Environmental Multistate Trust LLC, not individually, but solely in its representative capacity as Trustee for the Multistate Environmental Response Trust (the Multistate Trust) in accordance with the requirements of the combined Resource Conservation and Recovery Act (RCRA) Permit # MOD007129406, issued by the Missouri Department of Natural Resources (MoDNR) and United States Environmental Protection Agency (EPA). This memorandum summarizes the current status of the Remedial Action Optimization (RAO) activities for the former Tronox Wood Treating Facility in Springfield, Missouri (Facility, see **Figure 1.0**). On December 12, 2016, the *Remedial Action Optimization Status Memorandum Revision 1* (*Memorandum Revision 1*) (EWI, 2016a) was submitted. This 2016 document (1) summarized the findings and conclusions of the RAO work performed to-date in 2016 in accordance with the *Remedial Action Optimization Work Plan* (EWI, 2016b) and (2) presented the recommended next steps to address remaining data gaps based on those findings in an attached *RAO Work Plan Addendum to Remedial Action Optimization Work Plan* (*Work Plan Addendum*) (EWI, 2016c). To recap, the *Memorandum Revision 1* provided information on the following RAO activities:

- Installation of Upper Flow Zone (UFZ) monitoring wells SMW-76, 77, 78, 79, 80, 81, 82, 83, 84, and 85 with details on observations and initial sampling results
- Installation of Secondary Flow Zone (SFZ) monitoring wells BMW-12, 13, and 14 with details on observations and initial sampling results
- Completion of 47 TarGOST borings in former on-Facility source areas and four Geoprobe borings with soil sampling
- Surficial soil sampling in the former Landfarm Area, the former Drip Track, and the former Black Tie Area
- Evaluation of potential vapor intrusion from groundwater data using the U.S. Environmental Protection Agency (USEPA) Vapor Intrusion Screening Level (VISL) software

The 2016 *Work Plan Addendum* proposed borings and soil vapor monitoring, and two new UFZ monitoring wells in the residential area as a result of findings and preliminary conclusions of the *Memorandum Revision 1*. The vapor inhalation exposure screening tasks described in the 2016 *Work Plan Addendum are* not addressed in this memorandum because this work was summarized in the *Indoor Air Work Plan* (EWI, 2017). Rather, this status memorandum focuses on the two new monitoring wells that were installed, evaluates groundwater monitoring results for all RAO monitoring wells and related delineation, recaps key facility investigations, identifies data gaps, and provides recommendations for additional investigation activities.

This memorandum contains the following sections:

1. Recent RAO Investigative Activities, Upper Flow Zone (UFZ) Investigation

Key objectives of the Phase 2 RAO investigation included delineation of the nature and extent of the off-site dense, non-aqueous phase liquid (DNAPL) and the dissolved phase plume chemicals of concern (COCs) consisting of benzene, toluene, ethylbenzene, xylenes, naphthalene (BTEXN) and polycyclic aromatic hydrocarbons (PAHS) within the Upper Flow Zone (UFZ). The UFZ consists of unconsolidated materials (mainly clay), weathered bedrock, and the upper portion of the bedrock that has fracturing and karst solution features. Saturation commonly occurs near the bedrock interface. As part of the RAO Phase 1 activities, an evaluation of the potential area fracture trends and possible migration pathways was developed. **Figure 2.0** illustrates the locations of potential fracture zones in the area of interest for the UFZ investigation. The RAO well locations within the UFZ targeted the intersections of these karst and fracture migration features. The RAO investigative approach included off-site UFZ monitoring well installations near possible fracture features in three targeted areas: off-site areas to the northeast (Northeast Clifton Drainage area), off-site to the east (Greene County Highway Department [GCHD] property) and off-site to the south and southwest (BNSF railroad and residential area).

The following summarizes the investigations completed to date within each of the targeted areas. *Memorandum Revision 1* includes more detailed observations made during drilling of the initial UFZ monitoring wells: SMW-76 through 85. Well construction information for all RAO wells has been added to the Summary of Monitoring Well and Recovery Well Construction Details and provided in **Table 1.0**. Groundwater levels and DNAPL monitoring are provided on **Table 2.0**, and analytical data from sampling events are provided on **Table 3.0.** Key summary information on geology, water levels, impact, and concentration trends for all new RAO wells is summarized on **Table 4.0**, The Data Quality Objectives (DQO) stated for RAO work are provided in **Table 5.0** and provided as reference to the RAO work performed; this table has been modified related to that work and its findings as noted in the sections below. **Table 6.0** provides a statistical analysis summary of plume stability for SFZ well BRW-2. Boring and well logs for all RAO wells are provided in **Attachment A**.

1.1 Northeast Clifton Drainage New UFZ Wells

Seven monitoring wells were installed along the Clifton Drainage northeast of the Facility as shown on **Figure 3.0**. Wells were installed in City of Springfield right-of-ways (ROW) targeting the interpreted fracture traces depicted in **Figure 2.0**. The wells were installed progressively in three phases to delineate the UFZ DNAPL and dissolved phase plume.

- Three monitoring wells (SMW-80, SMW-81, and SMW-82) were initially installed in the residential neighborhood located immediately northeast of the Facility.
- Wells SMW-84 and SMW-85 were subsequently installed further to the northeast along the Clifton Drainage on commercial properties.
- Wells SMW-86 and SMW-87 were installed in the northeast residential neighborhood for lateral delineation following preliminary evaluation of the previously installed UFZ wells as part of the 2016 *Work Plan Addendum* (EWI, 2016b).

The 2016 addendum also provided a phased approach for the installation and sampling of soil borings, UFZ monitoring wells and the installation and sampling from off-site soil vapor points. The soil boring, temporary groundwater well sampling and the soil vapor investigation was conducted in December 2016. The soil gas investigation is discussed in the *Indoor Air Work Plan* (EWI, 2017).

The following summarizes information and observations during drilling, installation, and initial sampling of the two newest wells, SMW-86 and SMW-87, installed within the northeast residential area:

SMW-86: (corner of Margret Street and Truman Street)

- Silty clay with thin weathered bedrock at 15 feet below land surface (ft bls), voids from 16 to 21 ft bls, and competent limestone with some chert to total depth of 40 ft bls.
- Zero PID readings noted, but creosote-like odor noted at 21 ft bls during drilling and subsequent development.
- Slow water production; did not enter well until after construction.
- Constructed with screen from 15 to 30 ft bls.
- Sheen noted during initial development and initial screening sampling in December 2016.
- Nine COCs exceeded groundwater protection standards (GWPS) in initial sampling, no detections in subsequent sampling.
- Well was re-developed in January 2017 due to siltation, prior to first quarter 2017 groundwater sampling. No DNAPL was observed during redevelopment or during the sampling event.

SMW-87: (Margret Street, east of Fulbright Avenue)

- Clay and chert with weathered limestone fragments to 25 ft bls, competent bedrock at 25 ft bls, and minor chert and indications of weathering from 25 to 40 ft bls total depth.
- No elevated PID readings and no creosote odors noted during drilling.
- Slow water production.
- Constructed with screen from 18 to 38 ft bls.
- Sheen, black DNAPL globules, and strong creosote odor were noted during purging prior to the initial December 2016 sampling; trace DNAPL noted during subsequent gauging/sampling events.
- 13 COCs exceeded GWPS in the initial groundwater sampling after installation; nine to 11 COCs exceed GWPS in subsequent sampling.

Observations and conclusions from a review of **Figure 3.0**, **Table 3.0** and **Table 4.0**, with an emphasis on DNAPL detections, magnitude of COC concentrations in groundwater, hydrogeology, and analytical data trends, are presented below for the northeast area UFZ RAO wells (including SMW-76 installed on-facility).

- Secondary porosity features (voids, fractures) were noted in five of the eight wells at depths above 20 ft bls. SMW-84 (northeast Clifton Drainage east of the residential area) is an exception with deeper voids (45-55 ft bls); these are similar in depth to the DNAPL void in RW-21 further to the northeast. Secondary porosity features are possibly present in all wells, but not amenable to detection due to the hammer/rotary air drilling technique used for three of the wells.
- With one exception, the deepest weathered bedrock is to 24 ft bls, and thickness of weathering varies less than one foot to 12 feet. SMW-87 is the exception, where weathered bedrock occurs 25 -40 ft bls. Thickness of weathering may be related to bedrock fracture or karst features, which are suspected groundwater (and contaminant) migration pathways. Thus, higher concentrations might be expected in such areas. Overall, however, thickness of weathering does not appear to correlate to magnitude of COC concentrations; i.e., higher concentrations do not always occur in areas of thicker weathering.

- COC concentration trends from initial sampling in 2016 to second quarter 2017 sampling have decreased in four wells, remained unchanged in 3 wells, and increased in one well (see **Table 3.0). Figure 3.0** depicts the number of COCs for order of magnitude range exceedances of the GWPs for each new well from the second quarter 2017 sampling event.
    - Concentrations are decreasing in SMW-76, SMW-81, SMW-86, and SMW-85. GWPS exceedances have significantly decreased in SMW-76, SMW-81, and SMW-85.
    - Concentrations are mostly unchanging in SMW-80, SMW-82, and SMW-87; these wells each have several COCs from 10 times to greater than 100 times the GWPS.
    - Concentrations are increasing in SMW-84. This well has the most COCs 10 times to greater than 100 times the GWPS (7 and 4, respectively).
    - Naphthalene has the highest concentration in wells with increasing or unchanging trends, while phenanthrene has the greatest concentration in wells with decreasing trends.
- Generally, wells with highest degree of impact (DNAPL, high dissolved concentrations, most GWPS exceedances, and steady or increasing concentration trends) occur closer to the presumed centerline of the Clifton Drainage hydrogeological feature, e.g. SMW-80, SMW-82, SMW-84. SMW-87 is an exception, being located more distant to the northwest from the main Clifton Drainage; this well may be situated on an impacted fracture migration pathway outside the main Clifton Drainage fracture/karst network.
- All eight wells had some level of creosote odor during drilling, development, or purging. Five of the wells had visual non-aqueous phase liquid (NAPL) as sheen or globules, but no well has accumulated DNAPL. This suggests that small amounts of DNAPL are present within the areas and horizons of the Clifton Drainage hydrogeological network investigated by RAO wells, but are largely immobile.
    - SMW-80, closest to the Facility, had the most NAPL impact during drilling (sheen on water and floating globules), but has had no subsequent DNAPL observed.
    - SMW-82, SMW-84, and SMW-87 had trace NAPL during multiple monitoring events.
    - SMW-86 had trace NAPL only initially, and dissolved phase concentrations have decreased to below GWPS.
    - SMW-76 (on-facility), SMW-81 (mid-residential area), and SMW-85 (northeasternmost) have had no NAPL.
- DNAPL continues to accumulate in wells RW-21 and WL MW-3 in the northern portion of the Clifton Drainage, suggesting that residual DNAPL in this area is possibly mobile.
    - Impact at these locations occurs at the lowest elevation (~1220 ft above mean sea level, amsl) within the Clifton Drainage, and appears related to a horizontal bedding plane feature identified in the *Woodlawn Spring Study Area Investigation Report* (Tronox, 2006).
    - This horizon is close to the void at 45 ft bls noted in SMW-84, suggesting a continuation of this potential migration pathway from the area of RW-21 to the area of SMW-84 (see **Figure 3.0**).
    - The impact and the horizontal bedding plane feature have been delineated downgradient to the north by the Woodlawn Spring investigation and subsequent groundwater sampling events, but has not been investigated further southwest along the Clifton Drainage.

Conclusions regarding plume delineation in the northeast Clifton Drainage are summarized below:

- The new wells have further defined horizontal delineation of UFZ impact.
- SMW-80, SMW-82, and SMW-84 define the area of higher impact within the main part of the Clifton Drainage network; impact is characterized by relatively unchanging, high concentrations of COCs orders of magnitude in excess of the GWPS, with largely immobile, residual DNAPL.
- SMW-81, SMW-85, and SMW-86 exhibit lower concentrations of COCs that are decreasing over time, and appear located in parts of the dissolved phase plume more distant from areas of residual DNAPL. This is also the case for on-facility well SMW-76.
- Sampling of the entire UFZ well network supports delineation of the plume boundary to the north (WLMW-2, WLMW-4, WLMW-11), east (SMW-73, SMW-85), south (SMW-71, SMW-75) given location of these wells with known groundwater flow direction to the northeast and north within the Clifton Drainage feature. COC exceedances of GWPS in SMW-85 are only slightly over their GWPS concentrations, have demonstrated decreasing trends over time, and do not include key COCs naphthalene and phenanthrene.
- The UFZ plume is not bounded to the northwest and west:
  - RW-21 by Kearney Street continues to yield accumulating DNAPL, and no wells exist to the west of RW-21 to delineate DNAPL or dissolved plume extent to the west. Based on the Woodlawn Spring Study (Tronox, 2006), other non-Facility related sources of petroleum impact are present in this north Clifton Drainage area, which complicates identification of the Facility-specific plume. Collection of DNAPL samples from RW21 and WL MW-3 for fingerpint analysis, as well as on-facility wells for comparison.
  - SMW-87 located northwest of the main plume contains GWPS exceedances at levels higher than concentrations in wells SMW-81 and SMW-86 that are closer to the main part of the plume. A new UFZ well located northwest of SMW-87 based on interpreted fracture trends is recommended.
- Vertical delineation of the DNAPL plume and related migration pathways does not appear complete.
  - DNAPL and horizontal solution feature migration pathways in the area of RW-21 occur at lower elevations (1220 amsl) than impact closer to the Facility (1250 ft amsl and above).
  - A similar horizon of impact was encountered in SMW-84 closer to the Facility area, and includes both DNAPL and elevated concentrations of COCs.
  - Horizontal extent and vertical stair-stepping nature of this lower 1220 ft amsl zone back toward the Facility has not been evaluated. Existing monitoring wells southwest of SMW-84 do not extend deep enough to investigate this situation.
  - Section 3 (Cross-Sections of Areas of Interest for Additional Investigation) presents additional information related to these observations.

1.2 Off-Site East Greene County New UFZ Wells

Two new monitoring wells (SMW-77 and SMW-78) were installed on the Greene County Highway Department (GCHD) property east of the Facility as depicted on **Figure 4.0.**

- These wells targeted similar depths to SMW-12C (located at the property line dividing the Facility from GCHD) to delineate the DNAPL and dissolved phase impact to the east of the

Facility. No fracture features were interpreted for this area, so well installation targeted possible horizontal bedding plane features which are known to be migration pathways particularly in the upper portion of the weathered limestone bedrock.

- Based on the observations during drilling and from the initial sampling event for these wells, no additional investigation in this area was recommended.

Observations and conclusions from a review of **Figure 4.0**, **Table 3.0** and **Table 4.0** are presented below for these east area UFZ RAO wells.

- No voids, fractures, or other secondary porosity features were noted in either well.
- Although the wells were installed with similar depths and screen intervals, water level ranges in SMW-78 and SMW-77 were dissimilar for the first two months of monitoring. The range of SMW-78 was 15.1 – 30.6 ft bls in January and February 2017, respectively. During that time period, water levels in SMW-78 were nearly twice as deep as water levels in SMW-77 (9.4 – 18.9 ft bls). However, during the April 2017 gauging event, the depth to water in both wells was near 9 ft bls. Both wells' water levels had been lower than that of SMW-12C (4.5 – 8.3 ft bls) in January and February 2017. The most recent level gauged in SMW-12C was 10.5 ft bls.
- No visual indications of Facility-related COCs were observed during drilling or subsequent sampling events. A possible diesel-like odor was noted during drilling of SMW-78.
- No GWPS exceedances have occurred in SMW-77. Seven initial detections of Facility COCs decreased to one (acenaphthene) in the second quarter 2017 sampling.
- SMW-78 reported 12 detections of Facility COCs during initial sampling with one GWPS exceedance (phenanthrene). All subsequent sampling has reported non-detect for all Facility COCs.

<u>Conclusions regarding plume delineation in the east GCHD area</u>: The repeated lack of impact above GWPS supports the previous recommendations that no additional investigation in this area is warranted. No further delineation is deemed warranted; however, these wells will be sampled quarterly throughout 2017 to verify that delineation has been achieved.

<u>1.3 Off-Site Southwest New UFZ Wells</u>

Two new monitoring wells (SMW-79 and SMW-83) were installed in City of Springfield ROW locations as depicted on **Figure 5.0**. Lack of BNSF access for drilling and obstacles from underground utilities prevented drilling the other proposed well locations as identified in the RAO Work Plan. Former well SMW-60, located 750 ft south of the BNSF/Facility property boundary, was rehabilitated in 2016 after damage by BNSF activities for use as a south delineation well, given the overall southward groundwater flow direction from the Facility. Use of SMW-60 for southern delineation has been added to the investigative approach in Section C of **Table 5.0**; sampling in September 2017 reported non-detect for all Facility COCs.

Observations and conclusions from a review of **Figure 5.0**, **Table 3.0** and **Table 4.0** are presented below for these southwest and south area UFZ RAO wells.

- No voids or fractures were noted in either well, although SMW-83 contained a horizon of weathered bedrock 20-29 ft bls.
- No indications of Facility-related impact were observed during drilling or subsequent sampling events.

- SWW-79 remained dry since installation, monitoring will continue for presence of water, and sampling will be conducted if water appears.
- SMW-83 required several days to accumulate sufficient water for sampling. Lack of groundwater (SMW-79 and earlier abandoned well SMW-53) and slow recharge in this area indicate very little groundwater movement to the southwest from the Facility.
- SMW-83 exhibited 3 detections of Facility COCs during initial sampling with one estimated COC exceedance (phenanthrene) slightly over the GWPS. All subsequent sampling has reported non-detect for all Facility COCs through second quarter 2017 sampling.
- SMW-60 was rehabilitated in October 2016. The new well construction was completed as flush mount and some debris that had entered the well was removed via airlifting. At the time of the rehabilitation, the well was dry. There were no odors or other indication of impact noted during the airlifting activities. The total depth was measured as approximately 34 ft bls, which is consistent with the original as-built depth. Initial sampling exhibited no Facility COCs detected.
- Based on established groundwater flow directions to the south-southwest, SMW-79, SMW-83, and SMW-60 provide adequate downgradient monitoring locations to the south Facility boundary.

<u>Conclusions regarding plume delineation in the southwest and south area</u>: A single COC detection slightly exceeding the GWPS in one well with subsequent repeated lack of detections, and dry wells, indicates that no additional delineation is warranted. Monitoring for groundwater presence and analytical sampling will continue throughout 2017 to verify continued plume absence.

2.0 Recent RAO Investigative Activities, Secondary Flow Zone Investigation

The Secondary Flow Zone (SFZ) is a zone of dolomitic limestone with increased permeability that occurs between 140 and 160 feet below ground surface, based on previous investigations and results of RAO work. The RAO investigation was designed to determine the lateral and vertical extents of impact in this zone and to provide more data on the connectivity between the UFZ and SFZ. All of the SFZ wells are located on the Facility. **Figure 6.0** depicts new RAO SFZ wells, BMW-12, BMW-13, BMW-14, as well as UFZ well SMW-76. For each well, the number of COCs per order of magnitude exceedance ranges of the GWPS from the second quarter 2017 sampling event are listed.

2.1 Secondary Flow Zone Lateral Delineation Monitoring Wells

Groundwater samples from the perimeter SFZ wells BMW-10R and BMW-2 have, historically, had COC concentrations above GWPS. Objectives for defining the extent of the SFZ plume in the area around BMW-10R and for confirming the decreasing treads from BMW-2 are included in Section F of **Table 5.0**.

To determine the horizontal extent of the SFZ plume north, northeast, and south of BMW-10R, three wells were planned for installation. The well to the northeast was also planned to evaluate the vertical connectivity between the UFZ and SFZ. Wells to the northeast and north of BMR-10R were planned on-facility and were drilled, while the third delineation well off-site to the southwest was not installed because access could not be obtained.

During drilling of the north targeted SFZ delineation well, a water producing void with creosote-like odor was encountered. Rather than build a SFZ well at this location, a UFZ well, designated SMW-76, was completed (see **Figure 5.0**). SMW-76 UFZ evaluation was included in previous Section 1.1. BMW-14 was subsequently installed to the northwest of SMW-76 and completed as a SFZ well with a total depth of 180 ft bls as planned.

Installation of the northeast delineation well (BMW-12) began with setting a surface casing into bedrock at 35 ft bls, and drilling to 80 ft bls as part of progressive installation to aid in sampling of multiple depths. DNAPL entered the bore from 35 to 75 ft bls, so the well was completed as a deep UFZ DNAPL recovery well.

Detailed descriptions of BMW-12 and BMW-14 drilling and installation were provided in the 2016 Memorandum Revision 1, and summary information of geology, hydrogeology, and chemistry are provided on **Table 3.0** and **Table 4.0**. Referencing these tables, **Figure 6.0**, and results of 2017 groundwater sampling events, key information regarding BMW-10R, BMW-12, and BMW-14 with an emphasis on delineation is provided below:

- No indications of creosote impact, odor, or PID detections were observed during drilling BMW-14 within the UFZ or SFZ zones.
- Two VOCs were detected during initial 2016 sampling of BMW-14, with three VOCs and naphthalene detected during the two 2017 sampling events. All concentrations are below GWPS. These results demonstrate delineation of the SFZ northwest of BMW-10R.
- Recharging DNAPL presence in BMW-12 demonstrates significant creosote impact in the UFZ which could extend deeper, however, the well is not deep enough to evaluate the expected SFZ zone (approximately 140 to 160 ft bls).
- No Facility COCs were detected in groundwater samples from BMW-10R in 2015 and 2016; 10 COCs were reported in September 2017 sampling, with three exceeding GWPS. Statistical analysis (e.g. Mann-Kendall Analysis) should be performed as part of the annual Corrective Action Effectiveness Reports to evaluate COC trends due to sporadic detections in BMW-10R. No further delineation to the south or southwest is proposed at this time, pending results of trend analysis and future sampling results.

Analytical data for BMW-2 is included on **Table 3.0** for 2012 through 2016; the well was not sampled in 2013. The following summarizes observations on delineation in the vicinity of BMW-2 at the northeast part of the Facility:

- From five to eight COC detections above GWPS were reported for BMW-2 since 2012, with the majority of detections in 2014. All exceedances are essentially at the GWPS concentration, with exception of phenanthrene.
- Phenanthrene detections have varied from 0.4 ug/L to 7 ug/L (4 to 70 times the GWPS), with concentrations decreasing over time.
- Trend graphs presented in the *2016 Annual Report Groundwater Corrective Action Effectiveness* (CAE Report, EWI, 2016d) have shown decreasing trends of naphthalene, acenaphthylene and acenaphthene from 2002 to 2016.
- Statistical evaluation (such as Mann Kendall Analysis) should be performed as part of the annual Corrective Action Effectiveness Reports to fully evaluate constituent trends. However, data suggest that BMW-2 is near the edge of the SFZ plume with decreasing concentrations.
- SFZ groundwater flow is to the northwest. The SFZ plume is further delineated by BMW-1, located immediately southeast of BMW-2, and BMW-4 located to the west-northwest of BMW-2. No detections of COCs exceeding GWPS are reported for these wells.

2.2 Secondary Flow Zone Monitoring Wells for Vertical Delineation

Previous investigations and groundwater monitoring data from the SFZ indicates vertical migration (from UFZ to SFZ) may be occurring. Objectives for evaluating vertical contaminant migration potential are outline in Section E of **Table 5.0**. These included drilling between BMW-10R and BMW-5 (new well BMW-12) to identify likely vertical migration features and investigate for DNAPL occurrence between the UFZ and SFZ horizons, and evaluating the presence of DNAPL in the SFZ laterally outward from BMW-5.

BMW-10R logging from 2005 describes fractures within the vertical horizon to a depth of 108 ft bls between the UFZ and SFZ, with indications of creosote or DNAPL presence. BMW-12 was drilled northeast of BMW-10R to further investigate the vertical extent of impact between BMW-10R and BMW-5 (center Facility), and was planned for progressive downward installation and sampling. As described in section 2.1, BMW-12 encountered DNAPL to a depth of 75 ft bls, well below the previously understood depth of DNAPL the UFZ on the order of 40 ft bls. This well was not completed as planned into the SFZ due to recharging DNAPL. Instead, this well has been used to recover DNAPL; approximately one gallon of DNAPL has been recovered over four manual extraction events. The presence of recharging DNAPL at this depth suggests the potential for deeper vertical impact in this part of the Facility.

In the Facility central area, DNAPL containing fractures were observed to depths of 80 ft bls (from 1285-1206 feet above mean sea level [ft amsl]) during the 1986 installation of the Tertiary Zone well, BMW-5A, which is located near SFZ well BMW-5. (Due to the lack of contaminated groundwater in the Tertiary Zone, no additional investigation of this zone was included in the RAO activities). BMW-5 was reported to contain DNAPL. Deep DNAPL-containing fractures indicate that the potential for deeper hydraulic connection between the UFZ and the SFZ may extend northeastward from the area of BMW-10R. To determine if vertical migration features are present, BMW-13 was installed about 180 ft west-northwest of BMW-5 and progressively videoed and sampled.

A detailed description of observations during installation of BMW-13 was provided in the 2016 *Memorandum Revision 1*. Summary information of geology, hydrogeology, and chemistry are provided on **Table 3.0** and **Table 4.0**, and key information regarding BMW-13 and evaluation of vertical pathways from the UFZ to the SFZ are provided below:

- No secondary porosity features or impact were noted to 80 ft bls during drilling or subsequent video, and very slow recharge was observed. Initial sampling results demonstrated naphthalene and phenanthrene exceeding GWPS by less than 10 times the GWPS.
- Video of the open bore bottom hole revealed a zone of secondary porosity from 143 – 158 ft bls, but no DNAPL entry. This weathered zone is thicker than the SFZ secondary porosity zone described in previous *CAE Reports* which indicated the secondary porosity zone was 8 to 10 ft thick at 150 ft bls.
- Horizon sampling of the bottom hole at 90, 150, and 175 ft bls resulted in detections of similar COCs (11 PAHs and four VOCs) with 6 GWPS exceedances at each interval.
    - More COCs were detected and at much higher concentrations than in the 80-ft sample.
    - Concentrations of all analytes were highest at 90 ft, and were lower value at 150 and 175 ft bls; all concentrations remain in the same relative GWPS exceedance ranges.
    - Naphthalene and phenanthrene exhibit the greatest GWPS exceedances at all horizons.
    - Benzene concentrations are much higher (150 – 160 ug/L) than other SFZ or UFZ wells.
    - The high concentration levels of key Facility COCs in BMW-13 vs. other SFZ wells could result from creosote DNAPL source material near the sampled horizon, i.e., within or near the SFZ in the central Facility area.

- Occurrences of impact above and within the SFZ indicate there is potential for vertical connectivity between the UFZ and the SFZ.
  - Similarly impacted groundwater in each BMW-13 horizon indicates connectivity from the 90 ft bls horizon to the 143-158 SFZ zone at this well.
  - The 90-ft horizon is only 10 vertical feet from DNAPL observed in fractures at 80 ft bls in this area. DNAPL was observed at 90 ft bls in BMW-10R to the southwest
  - The Burlington formation is known to exhibit very low permeability both horizontally and vertically, except where secondary porosity (solution features or fractures) is present. A thicker SFZ weathered horizon, observed fracturing to at least 90 ft bls, and similar high concentrations of COCs above and within the SFZ support the presence of hydraulic connectivity between the UFZ and the SFZ in this area.

<u>Conclusions regarding delineation in the SFZ</u>: The lateral extent of the impact within the SFZ has been defined by installation of new SFZ wells and sampling of all SFZ wells. Evaluation of observations and sampling results support vertical connectivity between the UFZ and the SFZ in the southwest and central Facility area.

- Declining COC concentrations to below GWPS and non-detection of COCs in new well BMW-14, with the generally northwest groundwater flow direction, indicate the SFZ is delineated in the southwestern Facility area.
- Significant impact exists in the central Facility area based in DNAPL in BMW-5 and BMW-13 sampling results. The central Facility SFZ area is delineated by no GWPS exceedances in SFZ wells BMW-9 to the southeast and BMW-6 to the northwest, given the northwesterly groundwater flow direction.
- Delineation of the SFZ dissolved phase plume at the northeast Facility area is primarily governed by the northwesterly groundwater flow direction of the SFZ, and depends on plume concentrations and stability at BMW-2. Delineation is supported by BMW-2 exhibiting declining COC concentrations, and lack of GWPS exceedances in BMW-1 to the southeast and BMW-4 to the northwest. A statistical verification of plume stability at BMW-2 (see **Table 6.0**) further supports delineation.
- The presence of DNAPL-bearing fractures to 90 ft bls in the southwest and central Facility area, combined with high concentrations of COCs at 90 ft bls above the SFZ and within the SFZ, and thickening of the SFZ weathered/secondary porosity zone in the central Facility area support vertical connectivity from the UFZ to the SFZ. This supports the RAO Work Plan supposition of a possible northeast-trending fracture zone through the main portion of the Facility.

3. Cross-Sections of Areas of Interest

To supplement evaluation and visualization of vertical delineation data gaps within the UFZ as stated in Section 1.2, as well as hydrogeological relationships and the question of vertical hydraulic connectivity between the UFZ and SFZ discussed in Section 2.2, four cross-sections were created across the Facility and off-site to the northeast. The locations of these transects are presented on **Figure 7.0**. Data used to develop these figures include boring logs from historic and recent monitoring well installation activities (see **Attachment A**), and water level/DNAPL gauging events. The hydrostratigraphic UFZ, SFZ, and intervening less permeable competent bedrock are color-coded on each cross-section, as well as the unconsolidated material and zone of weathered bedrock underlying the soil. Approximate locations of voids in borings are depicted where known from available well logs. UFZ and SFZ well monitoring intervals are shown, or depths noted if below the base of the section. DNAPL occurrence within wells and interpreted areas of possible residual DNAPL between wells are also indicated, as well as the potentiometric surface.

Cross-Section A-A' (Figure 8.0) is a generalized cross-section from the south Facility to the northern extent of the investigation area near WLMW-11. The following are key observations from this cross-section:

- Top of the bedrock roughly corresponds with the drop in topographic elevation towards the northeast, and bedrock occurs closer to the surface in the north near Woodlawn Spring.
- The UFZ potentiometric surface is within 10 ft of the surface in the southern portion of the section (to about SMW-82), and the SFZ water table is about 35 ft lower. A significant drop in the UFZ water table occurs between SMW-82 and SMW-84 to an elevation just above that of Woodlawn Spring (about 1218 ft amsl) with a significantly flattened hydraulic slope. Woodlawn Spring is the "hydraulic drain" of this hydrogeologic system, and defines the overall UFZ groundwater base flow elevation. As the endpoint of this system, Woodlawn Spring will continue to be monitored as "Outfall 003".
- DNAPL presence in wells, and interpreted residual DNAPL between wells, follows a similar progressively lower pattern of occurrence to the northeast with sloping topography, occurring mostly above the bedrock surface on-Facility (SMW-12C is an exception), but dropping significantly at SMW-84, RW-21, and WLMW-3 to a similar 1208 to 1220 ft amsl horizon as the water table.
- A solution zone/bedding plane feature is depicted southward from Woodlawn Spring at an elevation of about 1220 ft amsl. This feature was identified in several well borings in the 2006 *Woodlawn Spring Study Area Investigation Report*, and described as a solution-enlarged bedding plane with void space up to one foot thick, gently sloping to the elevation of Woodlawn Spring.
    - Similar solution features near this same elevation are in RW-21 and SMW-84. SMW-84 is the only RAO well sufficiently deep to intersect this feature. The feature is projected back to the Facility area on the section. Unfortunately, boring logs for SFZ wells BMW-2 and BMW-9 do not contain sufficient information to evaluate the presence of this feature further to the southwest from SMW-84.
    - This feature is likely controlling the water table, and appears related to DNAPL occurrence. This supports it being a horizontal migration pathway, and as such it represents the lowermost extent of the UFZ.
    - Not knowing if this solution feature migration pathway extends to the southwest beneath the Facility further defines the data gap for vertical delineation noted in Section 1.1. Whether the feature remains planar at 1220 ft amsl or stair-steps upward following topography, investigation of this vertical zone for its presence at the Facility is warranted. This zone for investigation is noted on the cross-section.
- While the 1220 ft amsl solution zone/bedding plane may be a lower migration pathway for DNAPL and impacted groundwater, the shallower UFZ zone of weathered bedrock and solution voids is still recognized as an important horizon to continue to evaluate as a contaminant migration pathway both on-facility and off-facility.

Cross-Section B-B' (**Figure 9.0**) transects the south-central Facility east-northeast from BMW-10R in the southwest to SMW-77 on the GCHD property. A portion of the boring for well BMW-5A showing occurrence of DNAPL-containing fractures has been projected into the section, and DNAPL-related fractures in BMW-10R are also depicted. The following are key observations from this cross-section:

- A dip in the top of competent bedrock and topographic elevation is present around SMW-19. This is the approximate area of intersection of two interpreted fracture traces just west of SMW-12C, and this dip and associated thickening of the weathered bedrock layer may support existence of this fracturing.
- Mobile DNAPL is present in SMW-12C, which recharges and is manually recovered on a routine basis. The 1260 to 1250 ft amsl depth of the screened interval in SMW-12C is significantly deeper than the shallower recovery wells and monitoring wells at the Facility which only target impact occurring in the upper portions of weathered bedrock. This deeper DNAPL occurrence in SMW-12C indicates connectivity deeper within the UFZ than the depth of the surrounding wells, and may be related to deeper UFZ migration pathway potential noted in Cross-Section A-A'. Of note, SMW-77 monitors a similar deeper UFZ horizon and contains no impact.
- DNAPL-containing fractures in BMW-10R, BMW-5A, and the DNAPL-producing interval in BMW-12visually support the potential UFZ-SFZ connectivity potential described in Section 2.2. This zone of deeper hydraulic connectivity extends from the southwest to central Facility area, and the vertical extent includes the elevation of the potential deep UFZ horizontal migration pathway noted in Cross-Section A-A').
    - Fractures with DNAPL occur from 45 - 108 ft bls (1258.5 - 1195.5 ft amsl) in BMW-10R.
    - DNAPL entry occurs from elevation 1266 to at least 1226 ft amsl in BMW-12.
    - Fracturing with DNAPL occurs from 40 - 80.5 ft bls (1246.6 - 1206.1 ft amsl) in BMW-5A.

Cross-Section C-C' (Figure 10.0) is a northwest-southeast trending profile across the northeast corner of the Facility. The following are key observations from this cross-section:

- The thickened zone of weathered bedrock from west of SMW-3 to the eastern edge of the section is a lateral profile across the Clifton Drainage hydrogeological feature. Residual DNAPL occurs within this weathered zone and deeper in bedrock (~1260 ft amsl) in this zone.
    - The screened interval of SMW-80, located immediately northeast, is projected on this profile to show the deepening of the Clifton Drainage progressing to the northeast.
    - The screen depth of SMW-84, further to the northeast, is also depicted on the section. This well is the closest well to the Facility that intersects the deeper 1220 ft amsl migration pathway feature. This depiction is done to show the vertical distance (about 30 ft) from known on-Facility UFZ impact to this lower migration zone, if it extends southwestward from SMW-84 at the same elevation. This is the vertical zone warranting further investigation noted for Cross-Section A-A'.
- The SFZ is below the base of the cross-section, but screen intervals for BMW-1 and BMW-4 are noted on the section. There is approximately 50 ft of vertical separation between the SFZ wells screened intervals and the base of impacted UFZ wells in the section.
- The potentiometric surfaces for the UFZ and SFZ are also shown, and are vertically separated by 22 ft in the east and 36 ft to the west, due to the westerly slope of the SFZ water table (groundwater flow in the SFZ is to the northwest)

Cross-Section D-D' (**Figure 11.0**) shows a northeasterly transect from the Facility near SMW-12C off-site to SMW-86. This is a similar profile to section A-A' (**Figure 8.0**), but provides more detail on the horizons of likely DNAPL impact within the weathered bedrock zone in the RAO UFZ wells. The following are key observations from this cross-section:

- The topography, bedrock surface, and water table all slope downward to the northeast. SMW-87 is projected onto the section from a higher topographic area to the northwest, resulting in the "stickup" of its well casing. The transect cuts across the Clifton Drainage at a shallow angle, resulting in an artificially expanded width to this feature.
- A significant increased thickness of the weathered bedrock is apparent, and directly related to the Clifton Drainage feature. In addition, this cross-section is approximately aligned with the direction of northeast-trending interpreted fractures that likely contributed to the formation of the Clifton Drainage karst trough. Increased weathering in the bedrock related to fracturing would be expected, as observed on this cross-section.
- Although SMW-87 is located some distance northwest of the edge of the Clifton Drainage, there is a similar thick weathered bedrock horizon developed at its location. This increased weathered zone supports the possibility that SMW-87 is located on a fracture zone as noted in Section 1.1.

4. TarGOST Investigation Summary

The 2016 *Memorandum Revision 1* included a summary of the 47 TarGOST borings that were advanced during the RAO historical source area residual DNAPL investigation (see **Figure 12.0**). TarGOST borings were completed on the Facility only, due to lack of access to off-site locations during TarGOST contractor availability. A Geoprobe soil boring (SB-B-2) was completed on the GCHD property east of SMW-12C for delineation of residual DNAPL to the east. No additional RAO work was completed regarding residual DNAPL and the TarGOST investigation; however, this information is included to have all phases of RAO field work summarized in this memorandum.

TarGOST results, confirmed by laboratory analytical results, indicate that an approximate 90,000 square-foot area of creosote appears present within, west, and south of the former pre-RCRA cell in the south-central Facility area at depths up to 16 ft bls. This indicates that not all impacted soil was removed during historical remediation of the pre-RCRA cell. TarGOST data also indicate that small pockets of residual creosote also appear present in the area of SMW-12C along the east Facility border, and at the former retort production area near the south Facility border. Soil borings and soil sampling may be warranted in the future as part of evaluating remedial action options if needed to better refine the nature and extent of contamination in this area.

5. Source Area Surficial Soil for Comparison with Screening Levels

Three surface soil samples were collected from historical source areas (Landfarm Area, Drip Track Area, and Black Tie Area) to determine if residual COCs in soil may be present that exceed the USEPA Regional Screening Level (RSL)-Industrial Soil. Locations are depicted on **Figure 13.0**, which also includes summary tables of analytical data for each sample.

- SS-1 (south side Drip Track Area near TG-34) at 1.5 ft bls: 17 PAHs and four BTEX detections, with five PAHs exceeding RSL-Industrial Soil.
- SS-2 (south-central Landfarm Area, at highest historical concentration location) at 1.25 ft bls: 19 PAHs and five BTEX detections, with eight PAHs exceeding RSL-Industrial Soil.
- SS-3 (Black Tie Area): two aliquots from 1.25 ft bls: 16 PAHs and no BTEX detections, with one PAH (benzo[a]pyrene) slightly exceeding (by less than two times) the RSL-Industrial Soil.

No additional RAO work was completed regarding near-surface soil impact investigation; however, this information is included to have all phases of RAO field work summarized in this memorandum. Concentrations of PAHs in the Landfarm Area have remained elevated; therefore, continued maintenance of the surface cap is required to achieve the established remedial action objectives.

Because soil in the Drip Track Area exceeds the RSL-Industrial Soil, additional investigation of the surficial zone is warranted to define nature and extent and allow comparison with screening levels.

6. Recommendations for Additional RAO Activities

The RAO investigation completed to date has greatly improved the understanding of the conceptual model of hydrogeology and the nature and extent of contamination. The recommendations described below focus on refining components of the conceptual model that could materially affect the evaluation and selection of remedial alternatives in the subsequent phase of the RAO process.

The TarGOST investigation identified residual creosote in the area of the pre-RCRA cell. Further investigation of this area is best deferred until a time when DQOs related to remedy evaluation and selection can be incorporated.

Uncertainty of source(s) for DNAPL observed in wells RW-21 and WL MW-3 near Kearney Street is an ongoing data gap regarding DNAPL plume delineation. Collection of DNAPL samples for fingerprint analysis would provide information to help evaluate source delineation.

We recommend installing at least two additional UFZ wells to the northwest and north of the existing network to investigate potential plume migration along interpreted fracture traces. This will verify delineation of the plume to the northwest and north. In addition, understanding the nature and connectivity of the bedding/solution feature in the northeast corner of the Facility could affect remedy evaluation and selection because it is not known whether this is a significant migration pathway from source areas into downgradient areas of the plume.

Delineation of the SFZ dissolved phase plume is supported by a northwesterly groundwater flow direction within the SFZ, no detections exceeding GWPS in BMW-6 (which is hydraulically downgradient of the highest concentration area of the SFZ plume), and a statistically decreasing concentrations at BMW-2. However, the logical direction for any plume expansion not identified would be in the hydraulically downgradient direction. The Multistate Trust will evaluate the need for any additional wells to delineate the SFZ dissolved phase plume in discussion with MoDNR.

The following specific RAO activities are proposed:

1. Collect DNAPL samples from wells RW-21 and WL MW-3, and on-facility wells SMW-12C (east Facility) and RW-9 (pre-RCRA cell) for fingerprint analyses to evaluate historical Facility releases as a source of the DNAPL in this north Clifton Drainage area.

   Objective: Use known on-facility DNAPL chemical fingerprinting as a basis for evaluating the contribution of facility creosote to off-facility DNAPL occurrences where other potential DNAPL sources are suspected.

   Investigative Approach: Collect and perform fingerprint analysis of DNAPL from these four wells, and compare the fingerprint chemical patterns for RW-21 and WL MW-3 to patterns from SMW-12C and RW-9 for similarities and differences.

2. Install two UFZ monitoring wells to approximately 1210 ft amsl to investigate the potential for contaminant migration pathways northwest and northeast of known impact in the Clifton Drainage.

   Objective: Delineate the northwestern and northeastern extent of UFZ impact utilizing possible migration pathways related to interpreted northwest and northeast fractures emanating from the known Clifton Drainage area of UFZ impact.

Investigative Approach: Install one UFZ monitoring well near Kearney Street northwest of SMW-87, and install one UFZ northeast of SMW-87 and northwest of SMW-84 near Kearney Street, based on northeast and northwest interpreted fracture intersections (see **Figure 14.0**). Drill the wells to approximately 30 ft bls to check for upper UFZ water production before extending the boring to a lower UFZ depth of 2010 ft amsl to target the 1220 ft amsl bedding/solution horizon. If water is produced at only one horizon, the well will be constructed to monitor that zone. If water is produced at both the upper and lower UFZ zones, two co-located monitoring wells are recommended so that each interval can be separately monitored.

3. Install one on-facility deep UFZ monitoring well to approximately 1215 ft amsl to investigate the potential for contaminant migration pathways deeper than the previously defined depth of the UFZ (see **Figure 14.0**).

   Objective: Delineate the southwestern extent of the 1220 ft amsl deep UFZ migration pathway, and determine if there is potential for deeper UFZ vertical extent of DNAPL and dissolved plume underlying the Facility.

   Investigative Approach: Install one deeper UFZ monitoring well near northeast Facility border targeting similar depth as SMW-84 and cased through upper weathered bedrock/soil interface.

4. A statistical Mann-Kendall Analysis of Complete a statistical evaluation of SFZ perimeter wells to determine plume trends as part of the 2017 Corrective Action Effectiveness Report (update note: this analysis has been performed for BMW-2; see Table 6.0).

   Objective: Substantiate delineation of the SFZ plume by verifying decreasing concentration tends at the northeastern and southwestern extents of the plume.

   Investigative Approach: Perform Mann-Kendall and graphical analysis of analytical data from BMW-2 and BMW-10R for COCs that define Facility-related groundwater plume.

Table 5.0 (RAO Data Quality Objectives) has been revised with updates to the RAO DQOs that reflect these proposed additional investigation actions. Pending approval from the MoDNR of these conceptual actions, a work plan addendum formally detailing these activities will be developed and submitted.

7. References

EWI, 2017. Indoor Air Work Plan, Former Tronox Facility, 2800 West High Street, Springfield, Missouri, RCRA Permit Number M0D007129406, Environmental Works Inc. (EWI), May 4, 2017

EWI, 2016a. Remedial Action Optimization Status Memorandum Revision 1, Former Tronox Facility, 2800 West High Street, Springfield, Missouri, RCRA Permit Number M0D007129406, Environmental Works Inc. (EWI), December 12, 2016

EWI, 2016b. Remedial Action Optimization Work Plan, Former Tronox Facility, 2800 West High Street, Springfield, Missouri, RCRA Permit Number M0D007129406, Environmental Works Inc. (EWI), August 8, 2016

EWI, 2016c. RAO Work Plan Addendum to Remedial Action Optimization Work Plan, Former Tronox Facility, 2800 West High Street, Springfield, Missouri, RCRA Permit Number M0D007129406, December 12, 2016.

EWI, 2016d. 2016 Annual Report: Groundwater Corrective Action Effectiveness, Former Wood Treating Facility, Springfield, Missouri, March 1, 2016

Tronox, 2006. Woodlawn Spring Study Area Investigation Report, Springfield, Missouri, Tronox LLC, March 2006

FIGURES

REMEDIAL ACTION OPTIMIZATION UPDATE AND MEMORANDUM

Former Tronox Facility
2800 High Street, Springfield, Missouri

LEGEND

APPROXIMATE FACILITY BOUNDARY
FENCE
LEASE AREA
CLIFTON DRAINAGE

NORTH

CHECKED BY:
B. LANNING

E.W.I. # 150683
UPDATED BY: JWP
Jul. 21, 2017

SCALE IN FEET
0 250 500
APPROXIMATE

PREPARED FOR:
Greenfield Environmental Multistate Trust, LLC, Trustee of the Multistate Environmental Response Trust

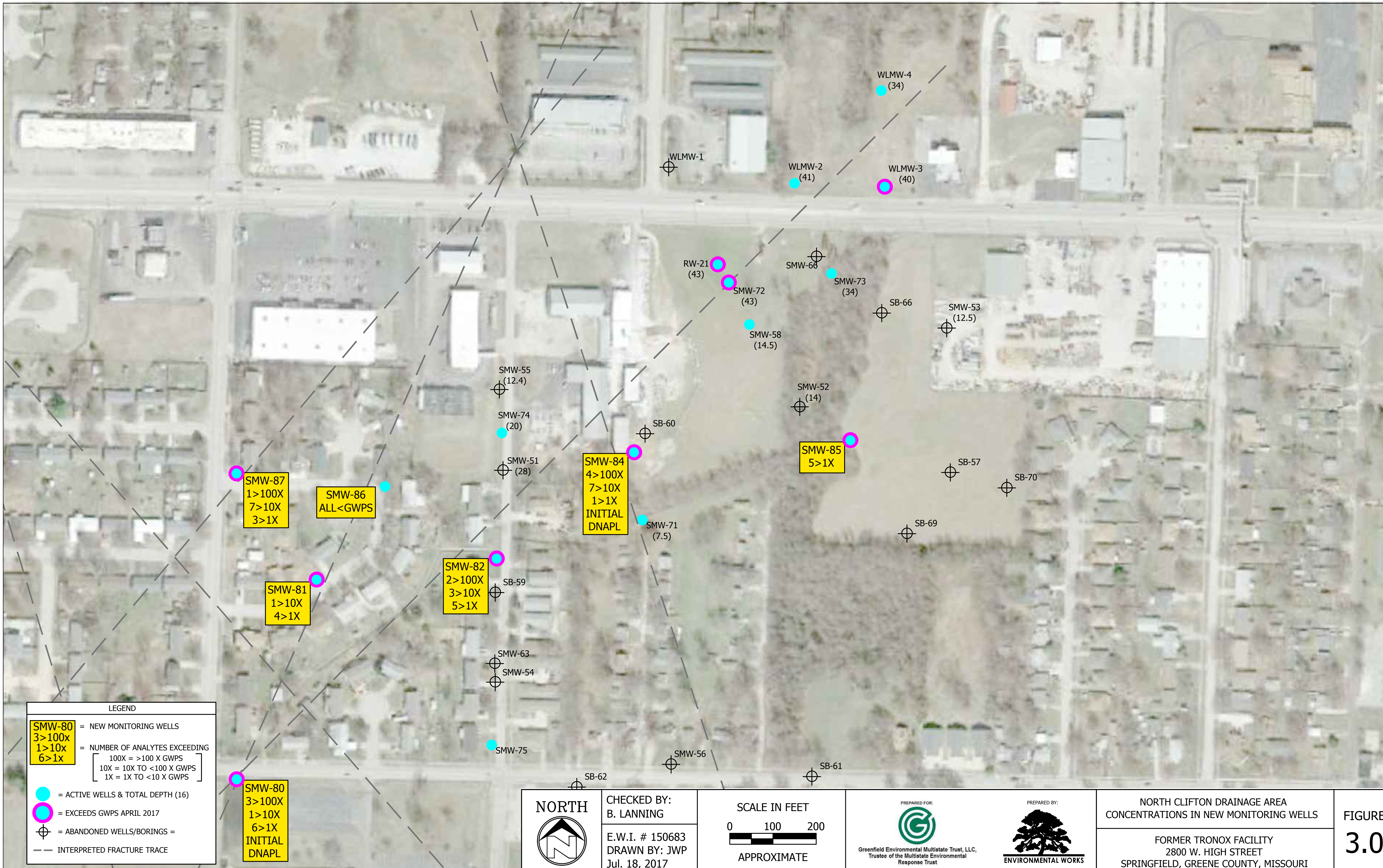
PREPARED BY:
ENVIRONMENTAL WORKS

FACILITY LOCATION MAP

FORMER TRONOX FACILITY
2800 WEST HIGH ST.
SPRINGFIELD, GREENE COUNTY, MISSOURI

FIGURE
1.0

CHECKED BY: B. LANNING E.W.I. # 150683 DRAWN BY: JWP Jul. 21, 2017	NORTH	PREPARED FOR: Greenfield Environmental Multistate Trust, LLC, Trustee of the Multistate Environmental Response Trust	PREPARED BY: ENVIRONMENTAL WORKS	SCALE IN FEET 0 250 500 APPROXIMATE	NEW MONITORING WELLS AND MONITORING WELL NETWORK FORMER TRONOX FACILITY 2800 W. HIGH STREET SPRINGFIELD, GREENE COUNTY, MISSOURI	FIGURE 2.0


WLMW-4
(34)
WLMW-1
WLMW-2
(41)
WLMW-3
(40)
RW-21
(43)
SMW-66
SMW-73
(34)
SMW-72
(43)
SB-66
SMW-53
(12.5)
SMW-58
(14.5)
SMW-55
(12.4)
SMW-52
(14)
SMW-74
(20)
SB-60
SMW-85
5>1X
SB-57
SMW-51
(28)
SMW-84
4>100X
7>10X
1>1X
INITIAL
DNAPL
SB-70
SMW-87
1>100X
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3>1X
SMW-86
ALL<GWPS
SMW-71
(7.5)
SB-69
SMW-82
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3>10X
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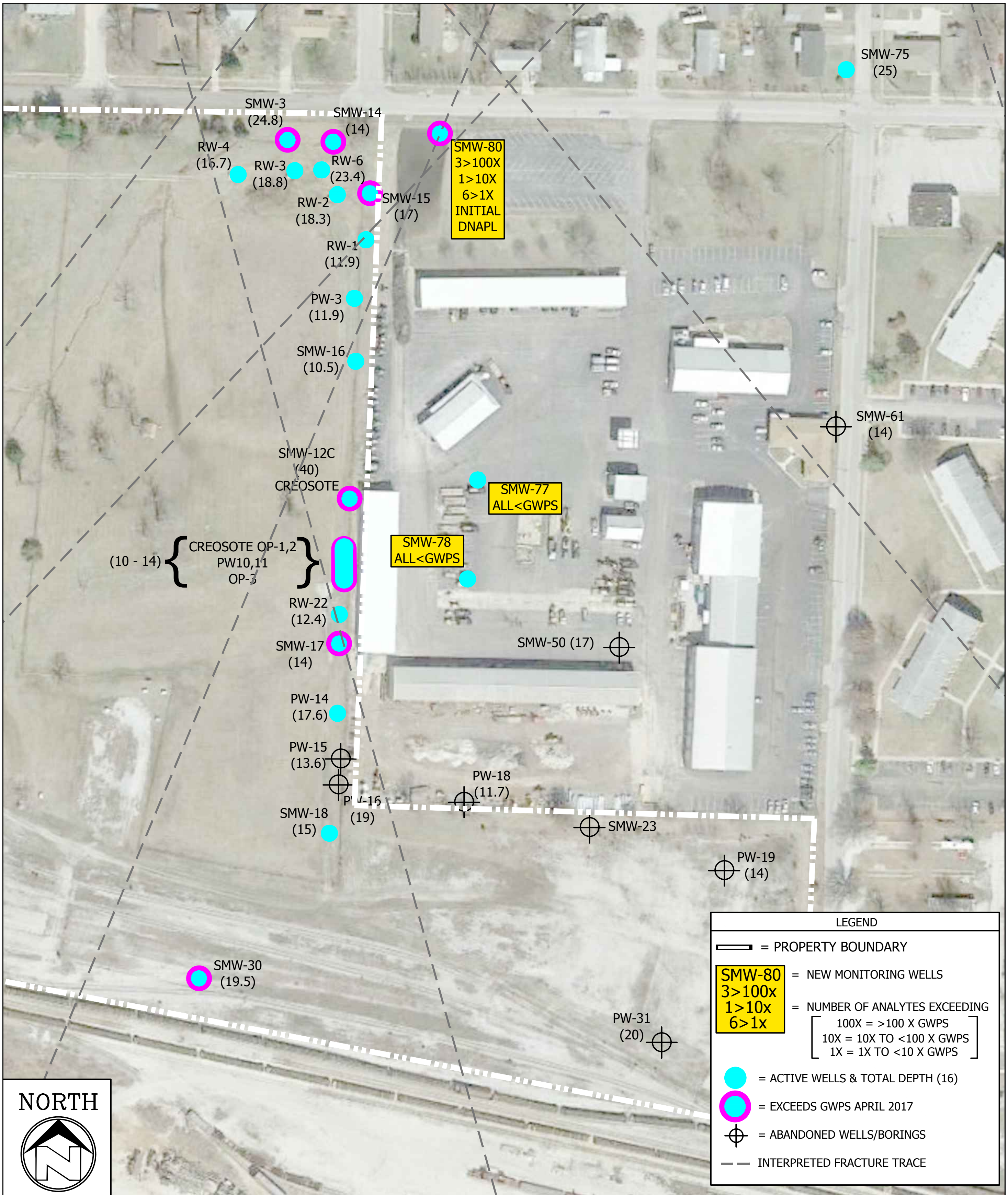
SB-59
SMW-81
1>10X
4>1X
SMW-63
SMW-54
SMW-75
SMW-56
SB-61
SB-62
SMW-80
3>100X
1>10X
6>1X
INITIAL
DNAPL
LEGEND
SMW-80
3>100x
1>10x
6>1x
= NEW MONITORING WELLS
= NUMBER OF ANALYTES EXCEEDING
100X = >100 X GWPS
10X = 10X TO <100 X GWPS
1X = 1X TO <10 X GWPS
= ACTIVE WELLS & TOTAL DEPTH (16)
= EXCEEDS GWPS APRIL 2017
= ABANDONED WELLS/BORINGS =
= INTERPRETED FRACTURE TRACE
NORTH
CHECKED BY:
B. LANNING
E.W.I. # 150683
DRAWN BY: JWP
Jul. 18, 2017
SCALE IN FEET
0 100 200
APPROXIMATE
PREPARED FOR:
Greenfield Environmental Multistate Trust, LLC,
Trustee of the Multistate Environmental
Response Trust
PREPARED BY:
ENVIRONMENTAL WORKS
NORTH CLIFTON DRAINAGE AREA
CONCENTRATIONS IN NEW MONITORING WELLS
FORMER TRONOX FACILITY
2800 W. HIGH STREET
SPRINGFIELD, GREENE COUNTY, MISSOURI
FIGURE
3.0



SCALE (FEET)
0 1000 2000

EWI# 150683
DRAWN BY: JWP
Jul. 18, 2017

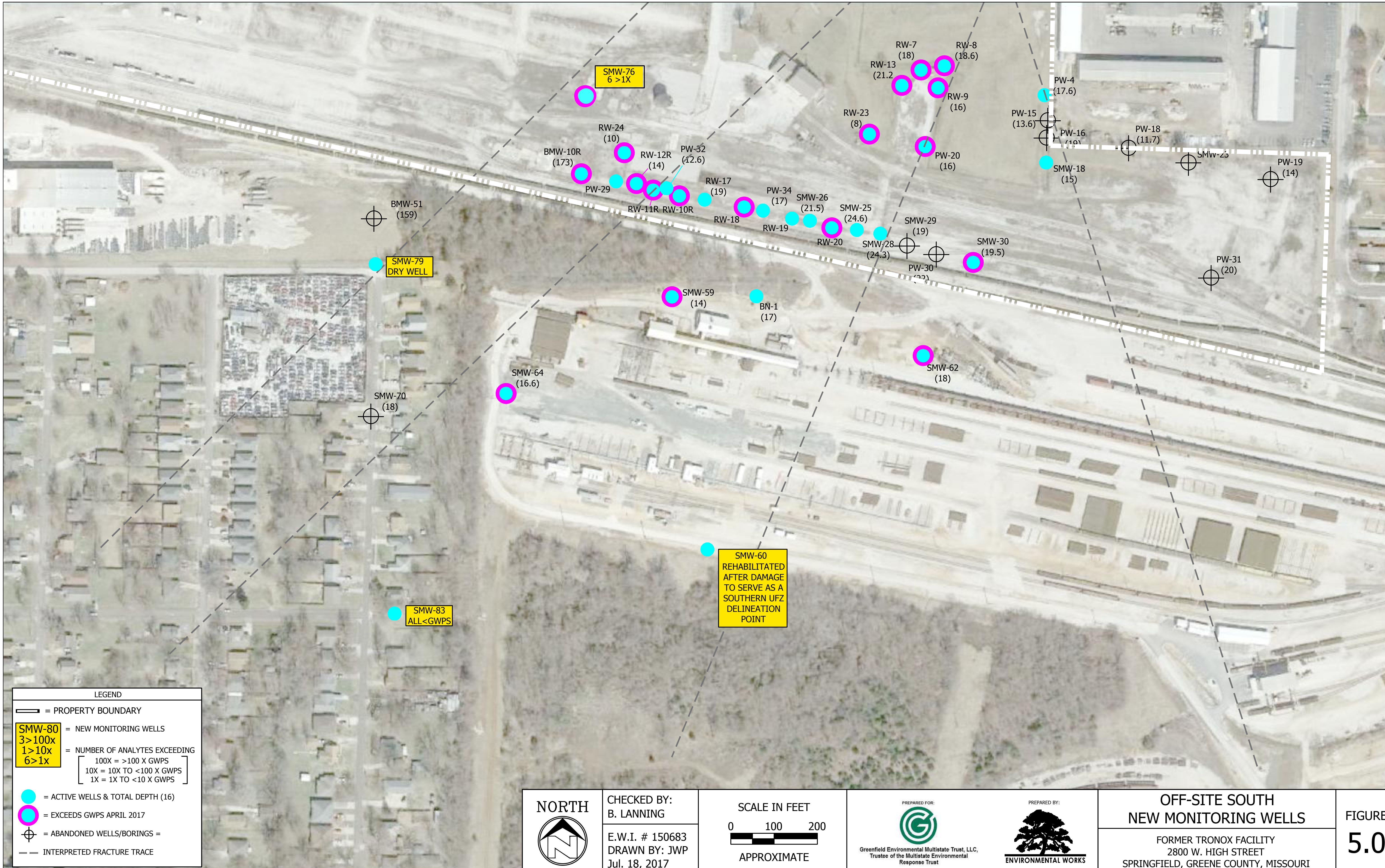
PREPARED FOR:
Greenfield Environmental Multistate Trust, LLC, Trustee of the Multistate Environmental Response Trust

PREPARED BY:
ENVIRONMENTAL WORKS

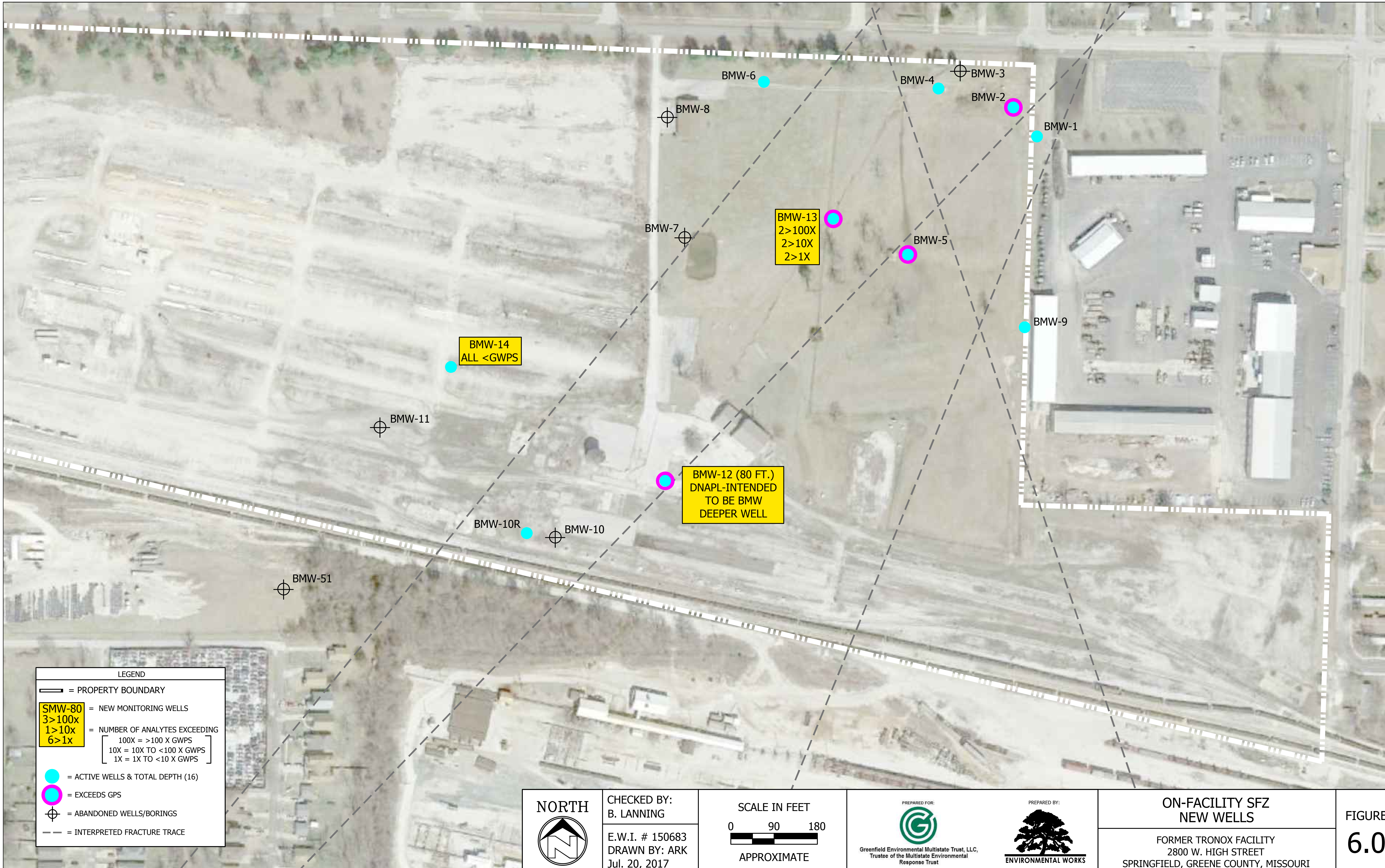
OFF-SITE EAST NEW MONITORING WELLS

FORMER TRONOX FACILITY
2800 W. HIGH STREET
SPRINGFIELD, GREENE COUNTY, MISSOURI

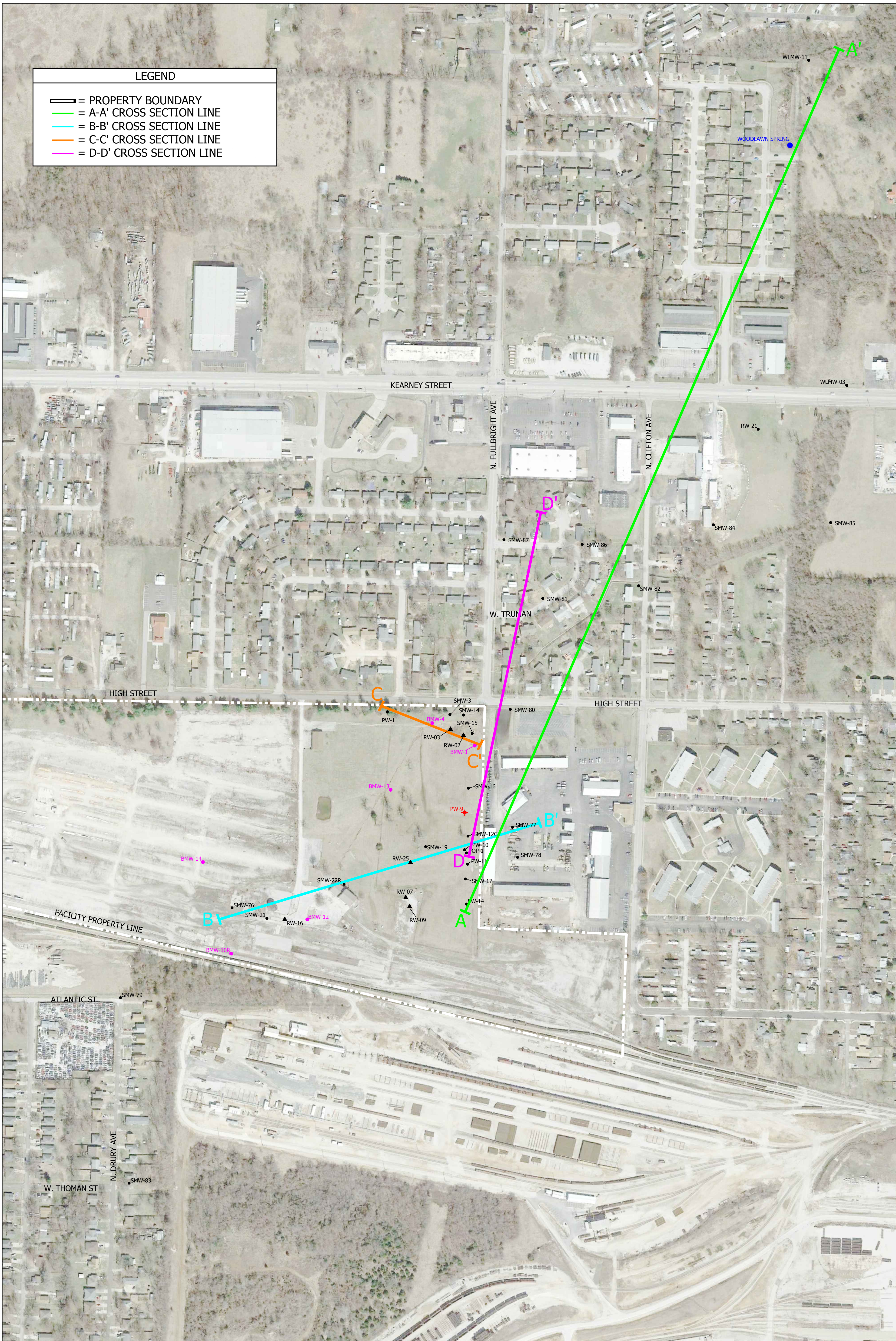
FIGURE
4.0



SMW-76
6 >1X
RW-7
(18)
RW-8
(18.6)
RW-13
(21.2
RW-9
(16)
PW-4
(17.6)
PW-15
(13.6)
PW-16
PW-18
(11.7)
SMW-23
PW-19
(14)
RW-23
(8)
PW-20
(16)
SMW-18
(15)
RW-24
(10)
BMW-10R
(173)
RW-12R
(14)
PW-32
(12.6)
PW-29
RW-11R
RW-10R
RW-17
(19)
PW-34
(17)
SMW-26
(21.5)
SMW-25
(24.6)
RW-18
RW-19
RW-20
SMW-28
(24.3)
SMW-29
(19)
PW-30
SMW-30
(19.5)
PW-31
(20)
BMW-51
(159)
SMW-79
DRY WELL
SMW-59
(14)
BN-1
(17)
SMW-62
(18)
SMW-64
(16.6)
SMW-70
(18)
SMW-60
REHABILITATED
AFTER DAMAGE
TO SERVE AS A
SOUTHERN UFZ
DELINEATION
POINT
SMW-83
ALL<GWPS
LEGEND
= PROPERTY BOUNDARY
SMW-80
3>100x
1>10x
6>1x
= NEW MONITORING WELLS
= NUMBER OF ANALYTES EXCEEDING
100X = >100 X GWPS
10X = 10X TO <100 X GWPS
1X = 1X TO <10 X GWPS
= ACTIVE WELLS & TOTAL DEPTH (16)
= EXCEEDS GWPS APRIL 2017
= ABANDONED WELLS/BORINGS =
INTERPRETED FRACTURE TRACE
NORTH
CHECKED BY:
B. LANNING
E.W.I. # 150683
DRAWN BY: JWP
Jul. 18, 2017
SCALE IN FEET
0
100
200
APPROXIMATE
PREPARED FOR:
Greenfield Environmental Multistate Trust, LLC,
Trustee of the Multistate Environmental
Response Trust
PREPARED BY:
ENVIRONMENTAL WORKS
OFF-SITE SOUTH
NEW MONITORING WELLS
FORMER TRONOX FACILITY
2800 W. HIGH STREET
SPRINGFIELD, GREENE COUNTY, MISSOURI
FIGURE
5.0



BMW-6
BMW-4
BMW-3
BMW-2
BMW-8
BMW-1
BMW-13
2>100X
2>10X
2>1X
BMW-7
BMW-5
BMW-9
BMW-14
ALL <GWPS
BMW-11
BMW-12 (80 FT.)
DNAPL-INTENDED
TO BE BMW
DEEPER WELL
BMW-10R
BMW-10
BMW-51
LEGEND
= PROPERTY BOUNDARY
SMW-80 3>100x 1>10x 6>1x = NEW MONITORING WELLS
= NUMBER OF ANALYTES EXCEEDING
100X = >100 X GWPS
10X = 10X TO <100 X GWPS
1X = 1X TO <10 X GWPS
= ACTIVE WELLS & TOTAL DEPTH (16)
= EXCEEDS GPS
= ABANDONED WELLS/BORINGS
= INTERPRETED FRACTURE TRACE
NORTH
CHECKED BY:
B. LANNING
E.W.I. # 150683
DRAWN BY: ARK
Jul. 20, 2017
SCALE IN FEET
0 90 180
APPROXIMATE
PREPARED FOR:
Greenfield Environmental Multistate Trust, LLC, Trustee of the Multistate Environmental Response Trust
PREPARED BY:
ENVIRONMENTAL WORKS
ON-FACILITY SFZ
NEW WELLS
FORMER TRONOX FACILITY
2800 W. HIGH STREET
SPRINGFIELD, GREENE COUNTY, MISSOURI
FIGURE
6.0



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B. LANNING

E.W.I. # 150683
DRAWN BY: JWP
Jul. 18, 2017

NORTH

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Greenfield Environmental Multistate Trust, LLC, Trustee of the Multistate Environmental Response Trust

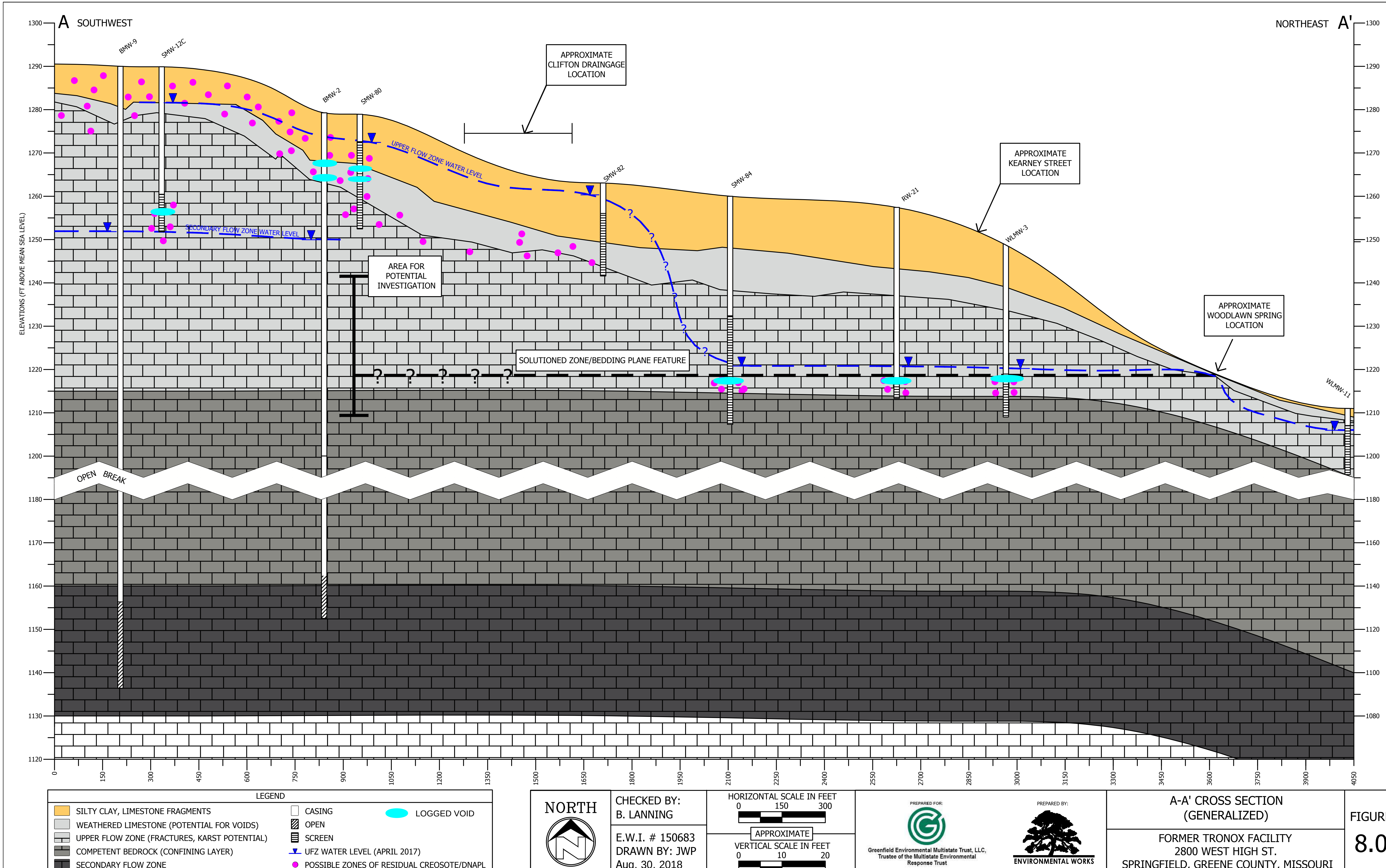
PREPARED BY:
ENVIRONMENTAL WORKS

SCALE IN FEET
0 200 400
APPROXIMATE

CROSS SECTION TRANSECTS

FORMER TRONOX FACILITY
2800 WEST HIGH ST.
SPRINGFIELD, GREENE COUNTY, MISSOURI

FIGURE
7.0



NORTH

CHECKED BY:
B. LANNING

E.W.I. # 150683
DRAWN BY: JWP
Aug. 30, 2018

HORIZONTAL SCALE IN FEET
0 150 300

APPROXIMATE
VERTICAL SCALE IN FEET
0 10 20

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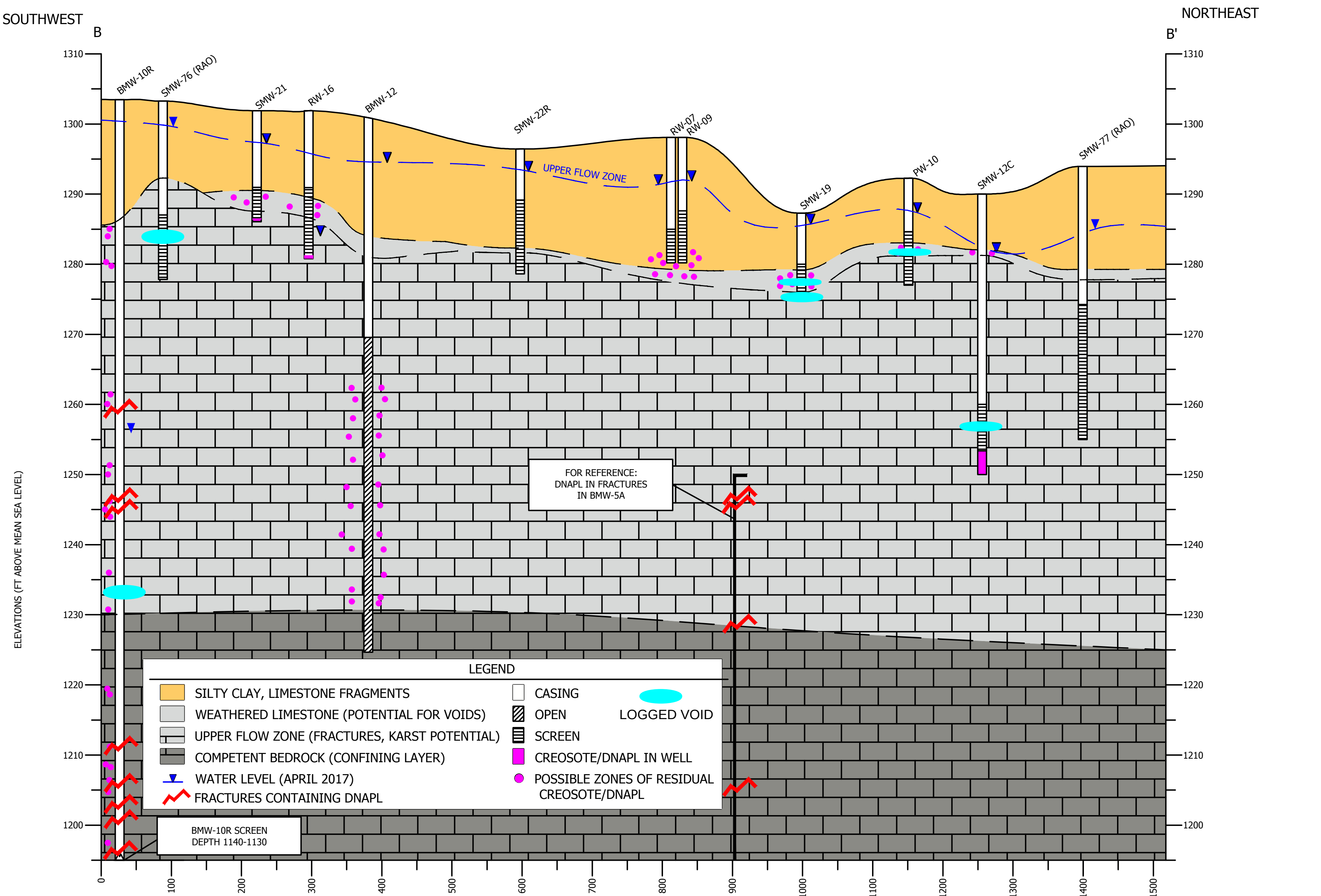
Greenfield Environmental Multistate Trust, LLC, Trustee of the Multistate Environmental Response Trust

PREPARED BY:
ENVIRONMENTAL WORKS

A-A' CROSS SECTION
(GENERALIZED)

FORMER TRONOX FACILITY
2800 WEST HIGH ST.
SPRINGFIELD, GREENE COUNTY, MISSOURI

FIGURE
8.0



NORTH

CHECKED BY:
B. LANNING

E.W.I. # 150683
DRAWN BY: JWP
Aug. 30, 2018

HORIZONTAL SCALE IN FEET
0 100 200

APPROXIMATE

VERTICAL SCALE IN FEET
0 10 20

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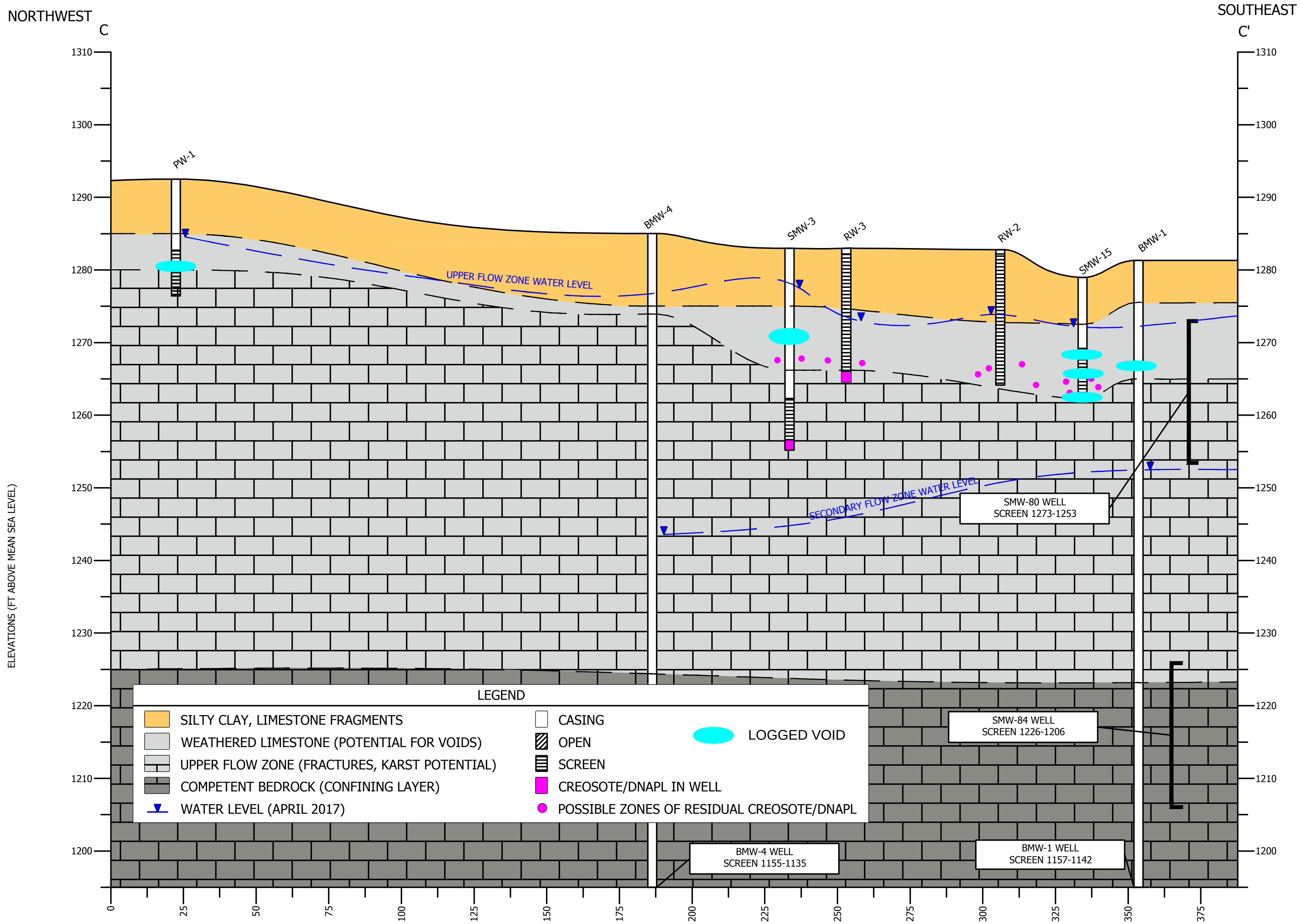
Greenfield Environmental Multistate Trust, LLC, Trustee of the Multistate Environmental Response Trust

ENVIRONMENTAL WORKS

CROSS SECTION (B-B')

FORMER TRONOX FACILITY
2800 WEST HIGH ST.
SPRINGFIELD, GREENE COUNTY, MISSOURI

FIGURE
9.0



NORTH

CHECKED BY:
B. LANNING

E.W.I. # 150683
DRAWN BY: JWP
Aug. 30, 2018

HORIZONTAL SCALE IN FEET
0 25 50

APPROXIMATE

VERTICAL SCALE IN FEET
0 10 20

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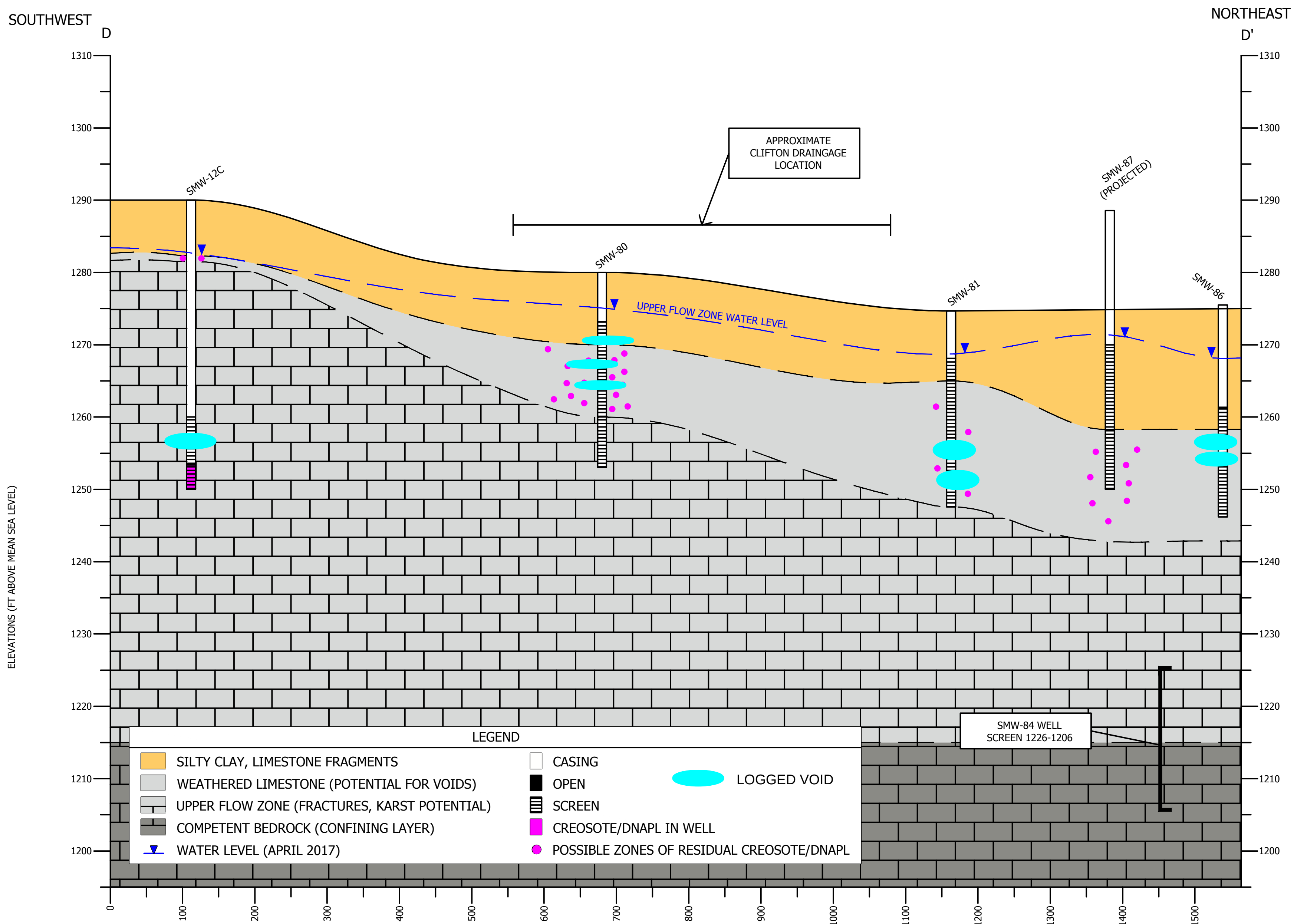
Response Trust

ENVIRONMENTAL WORKS

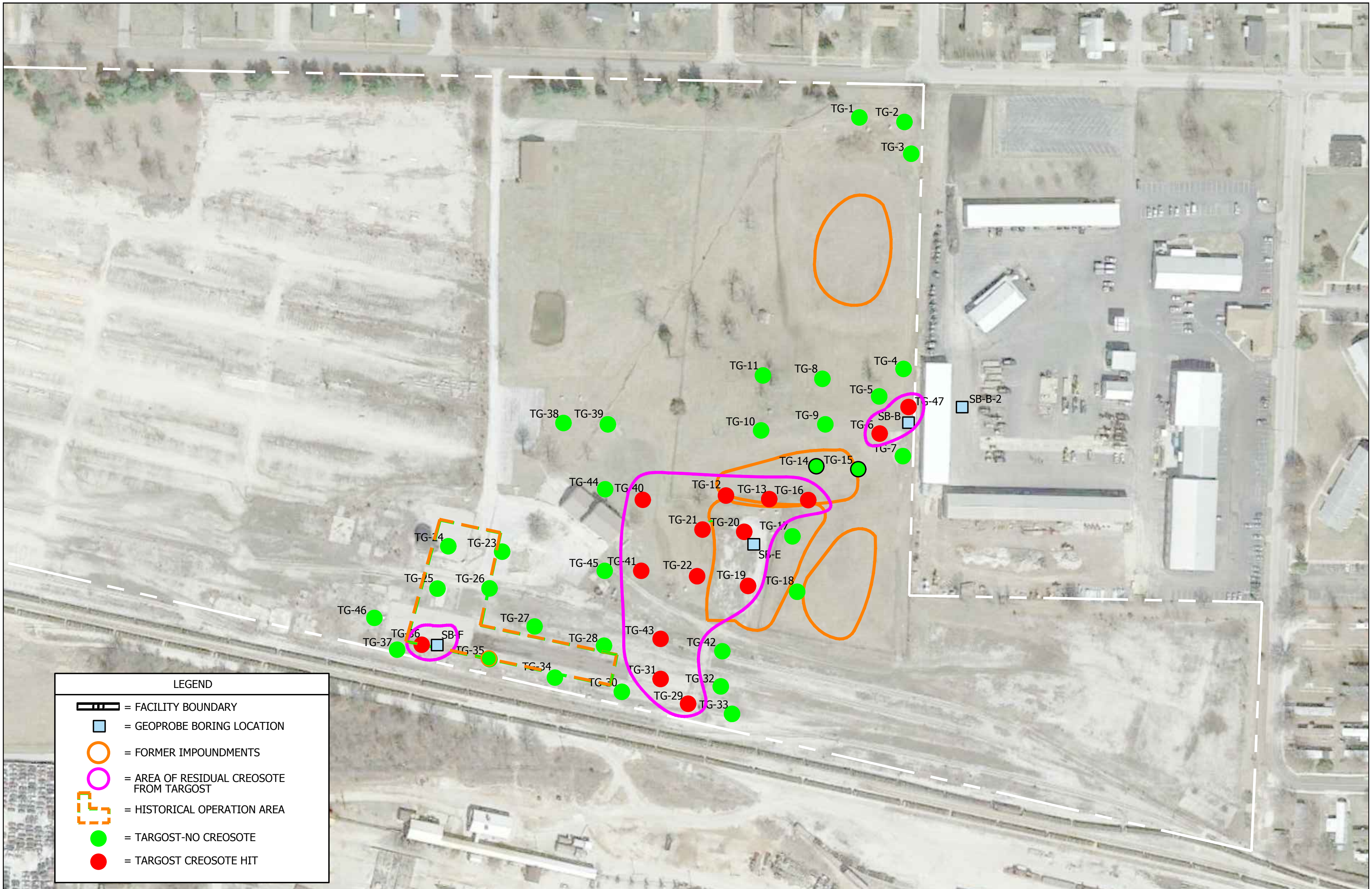
CROSS SECTION (C-C')

FORMER TRONOX FACILITY
2800 WEST HIGH ST.
SPRINGFIELD, GREENE COUNTY, MISSOURI

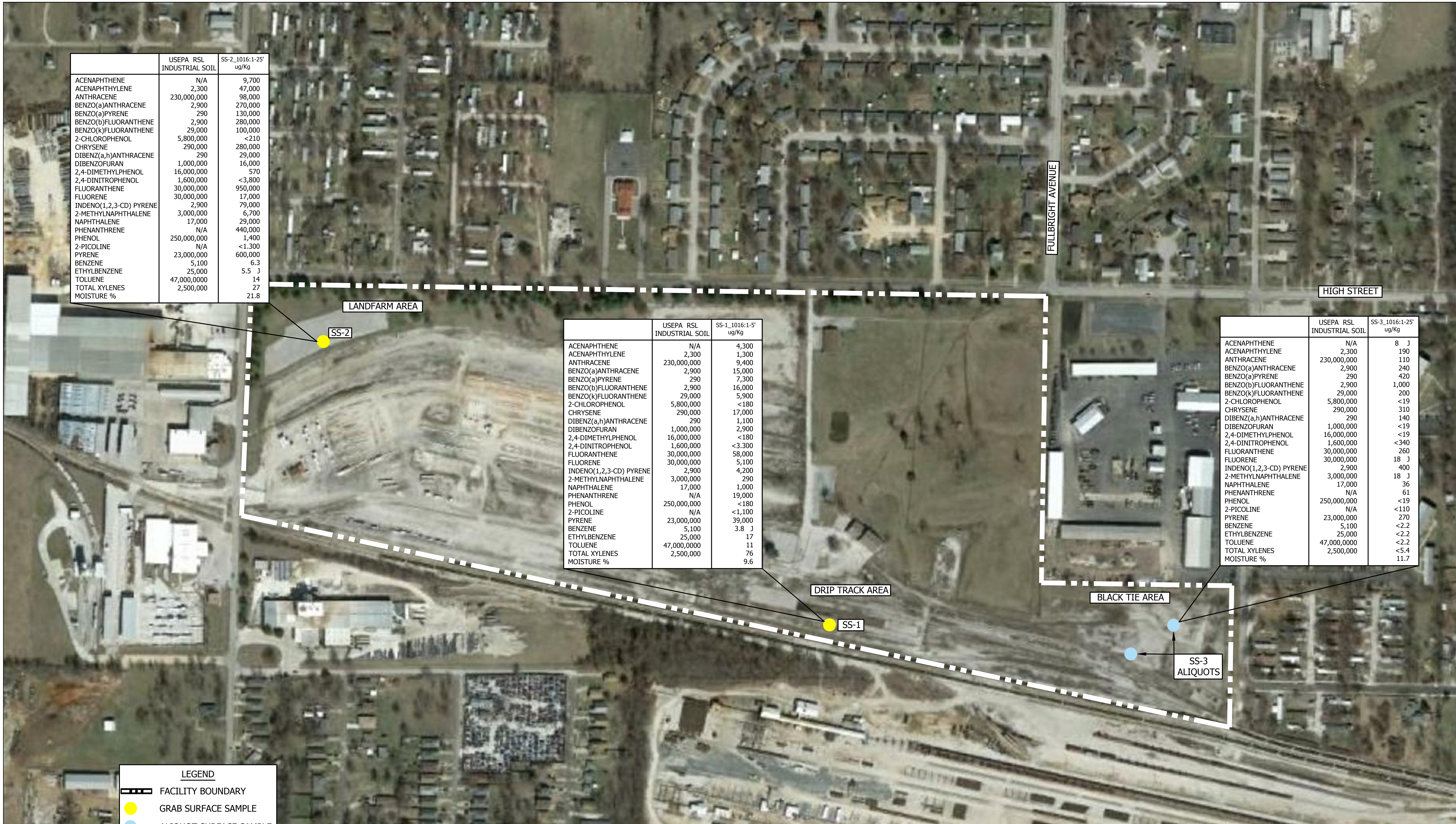
FIGURE
10.0



NORTH	CHECKED BY: B. LANNING E.W.I. # 150683 DRAWN BY: JWP Aug. 30, 2018	HORIZONTAL SCALE IN FEET 0 100 200 APPROXIMATE VERTICAL SCALE IN FEET 0 10 20	PREPARED FOR: Greenfield Environmental Multistate Trust, LLC, Trustee of the Multistate Environmental Response Trust ENVIRONMENTAL WORKS	CROSS SECTION (D-D') FORMER TRONOX FACILITY 2800 WEST HIGH ST. SPRINGFIELD, GREENE COUNTY, MISSOURI	FIGURE 11.0



NORTH	CHECKED BY: B. LANNING E.W.I. # 150683 DRAWN BY: JWP Jul. 19, 2017	SCALE IN FEET 0 125 250 APPROXIMATE	PREPARED FOR: Greenfield Environmental Multistate Trust, LLC, Trustee of the Multistate Environmental Response Trust ENVIRONMENTAL WORKS	TARGOST BORING LOCATIONS FORMER TRONOX FACILITY 2800 WEST HIGH ST. SPRINGFIELD, GREENE COUNTY, MISSOURI	FIGURE 12.0



	USEPA RSL INDUSTRIAL SOIL	SS-2_1016:1-25' ug/Kg
ACENAPHTHENE	N/A	9,700
ACENAPHTHYLENE	2,300	47,000
ANTHRACENE	230,000,000	98,000
BENZO(a)ANTHRACENE	2,900	270,000
BENZO(a)PYRENE	290	130,000
BENZO(b)FLUORANTHENE	2,900	280,000
BENZO(k)FLUORANTHENE	29,000	100,000
2-CHLOROPHENOL	5,800,000	<210
CHRYSENE	290,000	280,000
DIBENZ(a,h)ANTHRACENE	290	29,000
DIBENZOFURAN	1,000,000	16,000
2,4-DIMETHYLPHENOL	16,000,000	570
2,4-DINITROPHENOL	1,600,000	<3,800
FLUORANTHENE	30,000,000	950,000
FLUORENE	30,000,000	17,000
INDENO(1,2,3-CD) PYRENE	2,900	79,000
2-METHYLNAPHTHALENE	3,000,000	6,700
NAPHTHALENE	17,000	29,000
PHENANTHRENE	N/A	440,000
PHENOL	250,000,000	1,400
2-PICOLINE	N/A	<1.300
PYRENE	23,000,000	600,000
BENZENE	5,100	6.3
ETHYLBENZENE	25,000	5.5 J
TOLUENE	47,000,0000	14
TOTAL XYLENES	2,500,000	27
MOISTURE %		21.8

	USEPA RSL INDUSTRIAL SOIL	SS-1_1016:1-5' ug/Kg
ACENAPHTHENE	N/A	4,300
ACENAPHTHYLENE	2,300	1,300
ANTHRACENE	230,000,000	9,400
BENZO(a)ANTHRACENE	2,900	15,000
BENZO(a)PYRENE	290	7,300
BENZO(b)FLUORANTHENE	2,900	16,000
BENZO(k)FLUORANTHENE	29,000	5,900
2-CHLOROPHENOL	5,800,000	<180
CHRYSENE	290,000	17,000
DIBENZ(a,h)ANTHRACENE	290	1,100
DIBENZOFURAN	1,000,000	2,900
2,4-DIMETHYLPHENOL	16,000,000	<180
2,4-DINITROPHENOL	1,600,000	<3.300
FLUORANTHENE	30,000,000	58,000
FLUORENE	30,000,000	5,100
INDENO(1,2,3-CD) PYRENE	2,900	4,200
2-METHYLNAPHTHALENE	3,000,000	290
NAPHTHALENE	17,000	1,000
PHENANTHRENE	N/A	19,000
PHENOL	250,000,000	<180
2-PICOLINE	N/A	<1,100
PYRENE	23,000,000	39,000
BENZENE	5,100	3.8 J
ETHYLBENZENE	25,000	17
TOLUENE	47,000,0000	11
TOTAL XYLENES	2,500,000	76
MOISTURE %		9.6

	USEPA RSL INDUSTRIAL SOIL	SS-3_1016:1-25' ug/Kg
ACENAPHTHENE	N/A	8 J
ACENAPHTHYLENE	2,300	190
ANTHRACENE	230,000,000	110
BENZO(a)ANTHRACENE	2,900	240
BENZO(a)PYRENE	290	420
BENZO(b)FLUORANTHENE	2,900	1,000
BENZO(k)FLUORANTHENE	29,000	200
2-CHLOROPHENOL	5,800,000	<19
CHRYSENE	290,000	310
DIBENZ(a,h)ANTHRACENE	290	140
DIBENZOFURAN	1,000,000	<19
2,4-DIMETHYLPHENOL	16,000,000	<19
2,4-DINITROPHENOL	1,600,000	<340
FLUORANTHENE	30,000,000	260
FLUORENE	30,000,000	18 J
INDENO(1,2,3-CD) PYRENE	2,900	400
2-METHYLNAPHTHALENE	3,000,000	18 J
NAPHTHALENE	17,000	36
PHENANTHRENE	N/A	61
PHENOL	250,000,000	<19
2-PICOLINE	N/A	<110
PYRENE	23,000,000	270
BENZENE	5,100	<2.2
ETHYLBENZENE	25,000	<2.2
TOLUENE	47,000,0000	<2.2
TOTAL XYLENES	2,500,000	<5.4
MOISTURE %		11.7

CHECKED BY:
B. LANNING

E.W.I. # 150683
DRAWN BY: JWP
Aug. 30, 2018

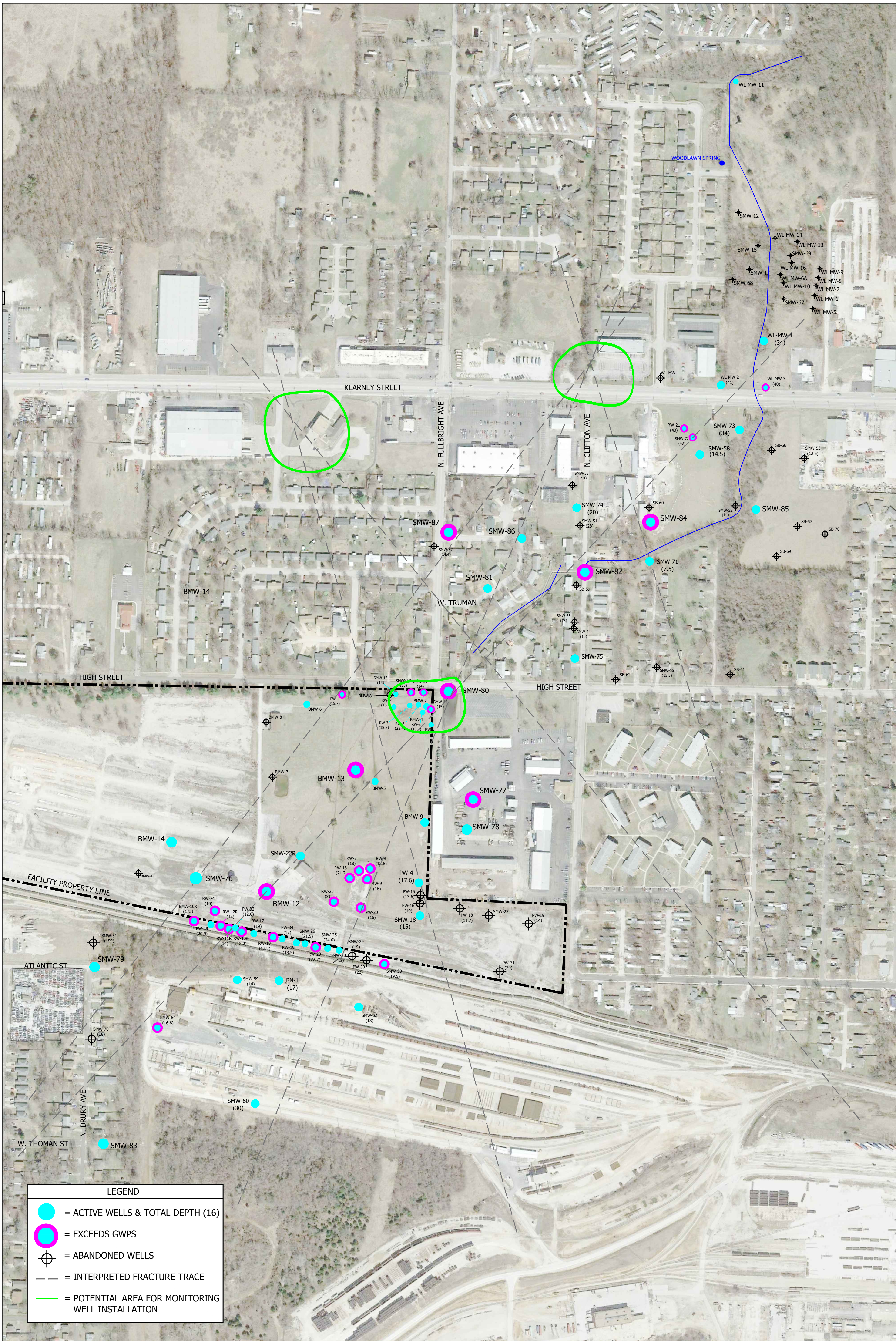
PREPARED FOR:
Greenfield Environmental Multistate Trust, LLC, Trustee of the Multistate Environmental Response Trust

PREPARED BY:
ENVIRONMENTAL WORKS

SURFICIAL SOIL SAMPLES

FORMER TRONOX FACILITY
2800 W. HIGH STREET
SPRINGFIELD, GREENE COUNTY, MISSOURI

FIGURE
13.0



CHECKED BY:
B. LANNING

E.W.I. # 150683
DRAWN BY: JWP
May 18, 2018

NORTH

PREPARED FOR:
Greenfield Environmental Multistate Trust, LLC, Trustee of the Multistate Environmental Response Trust

PREPARED BY:
ENVIRONMENTAL WORKS

0 250 500

PROPOSED WELL LOCATIONS FOR DELINEATION

FORMER TRONOX FACILITY
2800 W. HIGH STREET
SPRINGFIELD, GREENE COUNTY, MISSOURI

FIGURE
14.0

TABLES

REMEDIAL ACTION OPTIMIZATION UPDATE AND MEMORANDUM

Former Tronox Facility
2800 High Street, Springfield, Missouri

TABLE 1.0 - SUMMARY OF WELL CONSTRUCTION DETAILS
FORMER TRONOX FACILITY
SPRINGFIELD, GREENE COUNTY, MISSOURI

DRAFT

Well Name	Designation or Pumping Center	Install Date	Well Purpose	Casing Diam (in.)	Casing Type	Screen Type	Slot Size	Stickup* (ft.)	Screen Length (ft.)	Sump Length (ft.)	Measured Total Depth (ft.)	TD Elev	Top of Screen/Open Bore Elev	Pad Elevation (ft.)**	Top of Casing Elevation (ft.)**
ACTIVE WELLS															
Upper Flow Zone															
BN-1		x	Monitor	x	x	x	x	2.07	5.0	0.00	20.00	1276.83	1281.83	x	1296.83 +
OP-1		8/20/1994	Piezometer	2	PVC	PVC	0.01	4.35	9.7	0.00	13.92	1283.11	1292.81	1292.68	1297.03
OP-2		3/20/1994	Piezometer	2	PVC	PVC	0.01	3.94	9.2	0.00	17.69	1280.73	1289.93	1294.48	1298.42
OP-3		3/20/1994	Piezometer	2	PVC	PVC	0.01	3.81	8.7	0.00	17.95	1279.22	1287.92	1293.36	1297.17
PW-1		2/19/1986	Piezometer	2	PVC	PVC	0.01	2.07	5.0	0.00	18.39	1277.78	1282.78	1294.10	1296.17 +
PW-3		3/4/1986	Piezometer	2	PVC	PVC	0.01	2.37	5.0	0.00	14.26	1272.68	1277.68	1284.57	1286.94
PW-10		2/27/1986	Piezometer	2	PVC	PVC	0.01	1.90	5.0	0.00	15.26	1278.91	1283.91	1292.27	1294.17
PW-11	PC-2	2/20/1986	Piezometer	2	PVC	PVC	0.01	2.47	5.0	0.00	17.04	1278.91	1283.91	1293.48	1295.95
PW-14		2/25/1986	Piezometer	2	PVC	PVC	0.01	2.30	5.0	0.00	19.84	1280.14	1285.14	1297.68	1299.98
PW-20	POC	3/30/1987	Piezometer	2	PVC	PVC	0.01	1.68	5.0	0.00	17.35	1281.28	1286.28	1296.95	1298.63
PW-29		6/30/1987	Piezometer	2	PVC	PVC	0.01	2.17	5.0	0.00	22.67	1282.42	1287.42	1302.92	1305.09
PW-32		12/19/1988	Piezometer	2	PVC	PVC	0.01	2.20	5.0	0.00	19.00	1286.16	1291.16	1302.96	1305.16
PW-34		12/20/1988	Piezometer	2	PVC	PVC	0.01	2.24	5.0	0.00	22.08	1281.94	1286.94	1301.78	1304.02
RW-01	PC-1	9/1/1985	Recovery	36	GAL	GAL	0.03	0.95			12.33			1282.57	1283.52
RW-02	PC-1	9/1/1985	Recovery	36	GAL	GAL	0.03	1.35			19.50			1281.58	1282.93
RW-03	PC-1	9/1/1985	Recovery	36	GAL	GAL	0.03	0.89			19.75			1282.63	1283.52
RW-04	PC-1	9/1/1985	Recovery	36	GAL	GAL	0.03	1.27			17.92			1285.58	1286.85
RW-05	PC-3	9/1/1985	Recovery	36	GAL	GAL	0.03	1.40			13.58			1287.62	1289.02
RW-06	PC-1	4/23/1987	Recovery	36	GAL	GAL	0.03	0.62			24.00			1281.98	1282.60
RW-07	PC-5	10/1/1990	Recovery	6	B.IRON	GAL	0.03	0.64			18.67			1297.77	1298.41
RW-08	PC-5	10/1/1990	Recovery	6	B.IRON	GAL	0.03	0.30			18.92			1298.25	1298.55
RW-09	PC-5	10/1/1990	Recovery	6	B.IRON	GAL	0.03	0.26			18.25			1297.84	1298.10
RW-10R	PC-7	3/16/2004	Recovery	6	SS	SS	0.02	0.50			18.76			1301.99	1302.49
RW-11R	PC-7	3/16/2004	Recovery	6	SS	SS	0.02	0.45			14.90			1302.41	1302.86
RW-12R	PC-7	3/16/2004	Recovery	6	SS	SS	0.02	0.52			14.69			1302.51	1303.03
RW-13	PC-5	7/17/1991	Recovery	6	GAL	GAL	0.02	0.29			21.50			1295.36	1295.65
RW-14	PC-4	7/18/1991	Recovery	6	GAL	GAL	0.02	0.45			18.33			1296.59	1297.04
RW-15	PC-4	7/18/1991	Recovery	6	GAL	GAL	0.02	0.47			16.75			1295.52	1295.99
RW-16	PC-6	7/20/1991	Recovery	6	GAL	GAL	0.02	0.41			21.25			1302.37	1302.78
RW-17	PC-7	7/21/1991	Recovery	6	GAL	GAL	0.02	0.33			19.50			1301.05	1301.38
RW-18	PC-7	7/21/1991	Recovery	6	GAL	GAL	0.02	0.34			18.12			1301.05	1301.39
RW-19	PC-7	7/21/1991	Recovery	6	GAL	GAL	0.02	0.39			18.90			1301.09	1301.48
RW-20	PC-7	7/22/1991	Recovery	6	GAL	GAL	0.02	0.42			23.00			1301.51	1301.93
RW-21	MoDNR	4/27/1994	Monitor	6	Carbon Steel	GAL	0.03	-0.49	5.0	0.00	44.50	1213.40	1218.40	1258.39	1257.90
RW-22	PC-2	3/20/1994	Recovery	24	GAL	GAL	x	2.29			16.00			1294.15	1296.44
RW-23	PC-5	9/1/1995	Recovery	24	GAL	GAL	x	0.86			9.00			1298.07	1298.93
RW-24	PC-7	3/1/1996	Recovery	24	GAL	GAL	x	1.12			11.00			1302.22	1303.34
RW-25	PC-3	x	Recovery	x	x	x	x	0.49						1288.67	1289.16
SLMW-6		12/29/1987	Monitor	2	SS	SS	x	2.02	5.0	1.85	29.08	1296.63	1301.63	1323.69	1325.71
SMW-1		2/5/1982	Monitor	4	PVC	PVC	x	2.35	17.0	0.00	26.63	1272.73	1289.73	1297.01	1299.36
SMW-3		11/17/1981	Monitor	4	PVC	PVC	x	2.34	10.0	0.00	27.18	1258.91	1268.91	1283.75	1286.09
SMW-11B	POC	4/17/1985	Monitor	x	PVC	PVC	0.01	2.23	2.0	0.00	15.00	1278.92	1280.92	1291.69	1293.92
SMW-12C		4/18/1985	Monitor/Recovery	2 & 4	PVC	PVC	0.01	2.22	10.0	0.00	42.07	1250.84	1260.84	1290.69	1292.91
SMW-13	POC	3/6/1985	Monitor	2	SS	SS	0.01	2.43	5.0	0.00	15.29	1274.56	1279.56	1287.42	1289.85
SMW-14	POC	3/6/1985	Monitor	2	SS	SS	0.01	0.95	5.0	0.00	15.26	1266.28	1271.28	1280.59	1281.54
SMW-15	POC	3/4/1985	Monitor/Recovery	2	SS	SS	0.01	2.22	5.0	0.00	19.10	1263.71	1268.71	1280.59	1282.81

TABLE 1.0 - SUMMARY OF WELL CONSTRUCTION DETAILS
FORMER TRONOX FACILITY
SPRINGFIELD, GREENE COUNTY, MISSOURI

DRAFT

Well Name	Designation or Pumping Center	Install Date	Well Purpose	Casing Diam (in.)	Casing Type	Screen Type	Slot Size	Stickup* (ft.)	Screen Length (ft.)	Sump Length (ft.)	Measured Total Depth (ft.)	TD Elev	Top of Screen/Open Bore Elev	Pad Elevation (ft.)**	Top of Casing Elevation (ft.)**
SMW-16	POC	9/14/1988	Monitor	2	SS	SS	x	2.25	5.0	2.60	15.22	1274.74	1279.74	1287.71	1289.96
SMW-17	POC	9/15/1988	Monitor	2	SS	SS	0.01	2.20	5.0	0.00	18.90	1278.06	1283.06	1294.76	1296.96
SMW-18	POC	9/15/1988	Monitor	2	SS	SS	x	2.37	5.0	0.00	20.26	1281.25	1286.25	1299.14	1301.51
SMW-19		9/16/1988	Monitor/Recovery	2	SS	SS	0.01	2.59	5.0	0.80	16.29	1273.78	1278.78	1287.48	1290.07
SMW-20		4/22/1990	Monitor	2	PVC	PVC	0.01	2.18	4.0	0.80	23.32	1280.91	1284.91	1302.05	1304.23
SMW-21		4/23/1990	Monitor/Recovery	2	PVC	PVC	0.01	2.52	4.0	0.80	19.07	1286.81	1290.81	1303.36	1305.88
SMW-22R	POC	2/3/2004	Monitor	2	PVC	PVC	0.01	1.97	8.0	0.25	16.80	1281.66	1289.66	1296.49	1298.46
SMW-24		5/1/1990	Monitor	2	PVC	PVC	0.01	2.24	4.0	0.80	14.81	1280.96	1284.96	1293.53	1295.77
SMW-25		33007	Monitor	2	PVC	PVC	0.01	2.25	4.0	0.80	27.64	1276.98	1280.98	1302.37	1304.62
SMW-26		5/20/1990	Monitor	2	PVC	PVC	0.01	2.17	4.0	0.80	24.54	1279.70	1283.70	1302.07	1304.24
SMW-27		5/1/1991	Monitor	2	SS	SS	0.01	2.47	4.0	0.00	13.92	1289.58	1293.58	1301.03	1303.50
SMW-28		12/14/1991	Monitor	2	PVC	PVC	0.01	2.19	4.0	1.08	27.55	1277.40	1281.40	1302.76	1304.95
SMW-30	Detection / Primary	12/16/1991	Monitor	2	PVC	PVC	0.01	2.17	4.00	1.0	22.68	1279.70	1283.70	1300.21	1302.38
SMW-58		6/14/1990	Monitor	2	SS	SS	0.01	-0.31	4.80	1.75	14.15	1241.57	1246.37	1256.03	1255.72
SMW-59		6/16/1990	Monitor	2	PVC	PVC	0.01	-0.25	4.00	0.8	14.59	1279.17	1283.17	1294.01 +	1293.76 +
SMW-60		6/26/1990	Monitor	2	SS	SS	0.01	0.00	4.8	1.8	33.74	1255.08	1259.88	1288.82 +	1288.82 +
SMW-62	MoDNR	6/28/1990	Monitor	2	SS	SS	0.01	-0.10	7.00	1.85	17.96	1278.29	1285.29	1296.35 +	1296.25 +
SMW-64	Detection / Primary	6/30/1990	Monitor	2	SS	SS	0.01	1.32	4.80	3.99	21.89	1270.98	1275.78	1291.55 +	1292.87 +
SMW-71	Detection/ Primary	12/10/1991	Monitor	2	SS	SS	0.01	-0.16	5.00	0.33	7.41	1247.81	1252.81	1255.38	1255.22
SMW-72		4/26/1994	Monitor	2	SS	SS	0.01	-0.44	10.00	0.35	43.39	1213.94	1223.94	1257.77	1257.33
SMW-73	Detection/ Primary	2/20/1996	Monitor	2	SS	SS	0.01	-0.58	5.00	0.0	33.89	1206.38	1211.38	1240.85	1240.27
SMW-74	Detection/ Primary	2/21/1996	Monitor	2	SS	SS	0.01	-0.60	5.00	0.0	19.86	1248.51	1253.51	1268.97	1268.37
SMW-75		2/20/1996	Monitor	2	SS	SS	0.01	-0.26	5.00	0.0	24.81	1248.64	1253.64	1273.71	1273.45
SMW-76	RAO	9/28/2016	Monitor	2	PVC	PVC	0.01	2.80	10		25.00	1281.13	1291.13	1303.33	1306.13
SMW-77	RAO	10/5/2016	Monitor	2	PVC	PVC	0.01	-0.40	20.00		40.00	1254.08	1274.08	1294.48	1294.08
SMW-78	RAO	10/5/2016	Monitor	2	PVC	PVC	0.01	-0.36	20		42.00	1252.91	1272.91	1295.27	1294.91
SMW-79	RAO	10/6/2016	Monitor	2	PVC	PVC	0.01	-0.31	5.00		25.00	1269.70	1274.70	1295.01	1294.70
SMW-80	RAO	10/10/2016	Monitor	2	PVC	PVC	0.01	-0.52	20		27.00	1252.41	1272.41	1279.93	1279.41
SMW-81	RAO	10/13/2016	Monitor	2	PVC	PVC	0.01	-0.30	20.00		27.00	1247.50	1267.50	1274.80	1274.50
SMW-82	RAO	10/17/2016	Monitor	2	PVC	PVC	0.01	-0.55	15		21.00	1241.59	1256.59	1263.14	1262.59
SMW-83	RAO	10/18/2016	Monitor	2	PVC	PVC	0.01	-0.43	25.00		33.50	1254.31	1279.31	1288.24	1287.81
SMW-84	RAO	11/17/2016	Monitor	2	PVC	PVC	0.01	0.50	20		54.50	1207.42	1227.42	1261.42	1261.92
SMW-85	RAO	11/14/2016	Monitor	2	PVC	PVC	0.01	-0.35	20.00		57.00	1197.60	1217.60	1254.95	1254.60
SMW-86	RAO	12/20/2016	Monitor	2	PVC	PVC	0.01	0.50	15		30.00	1245.73	1260.73	1275.23	1275.73
SMW-87	RAO	12/27/2016	Monitor	2	PVC	PVC	0.01	-0.43	20.00		38.00	1249.57	1269.57	1288.00	1287.57
WLMW-02	Woodlawn_Spring	10/5/2005	Monitor	2	PVC	PVC	0.01	4.70	10.0	0.40	45.70	1207.10	1217.10	1248.1 +	1252.8 +
WLMW-03	Woodlawn_Spring	10/11/2005	Monitor	2	PVC	PVC	0.01	2.90	10.0	0.40	42.90	1209.90	1219.90	1249.9 +	1252.8 +
WLMW-04	Woodlawn_Spring	10/13/2005	Monitor	2	PVC	PVC	0.01	2.98	10.0	0.40	36.98	1214.20	1224.20	1248.2 +	1251.18 +
WLMW-11	Woodlawn_Spring	10/25/2005	Monitor	2	PVC	PVC	0.01	3.41	10.0	0.70	18.71	1195.90	1205.90	1211.2 +	1214.61 +

TABLE 1.0 - SUMMARY OF WELL CONSTRUCTION DETAILS
FORMER TRONOX FACILITY
SPRINGFIELD, GREENE COUNTY, MISSOURI

DRAFT

Well Name	Designation or Pumping Center	Install Date	Well Purpose	Casing Diam (in.)	Casing Type	Screen Type	Slot Size	Stickup* (ft.)	Screen Length (ft.)	Sump Length (ft.)	Measured Total Depth (ft.)	TD Elev	Top of Screen/Open Bore Elev	Pad Elevation (ft.)**	Top of Casing Elevation (ft.)**
Secondary Flow Zone															
BMW-1	POC	4/1/1986	Monitor	4 & 7	PVC	open bore	NA	2.37	14.5	0.00	142.08	1142.40	1156.90	1282.11	1284.48
BMW-2	POC, CorrAction	3/25/1986	Monitor	4 & 7	PVC	open bore	NA	2.18	10.0	0.00	130.55	1152.95	1162.95	1281.32	1283.50
BMW-4	POC	3/27/1986	Monitor	4 & 7	PVC	open bore	NA	2.36	20.0	1.00	153.17	1134.82	1154.82	1285.63	1287.99
BMW-5		4/4/1986	Recovery	4 & 7 SS-Surf	PVC	open bore	NA	0.16			160.00	1127.54	1127.54	1287.38	1287.54
BMW-6		4/2/1986	Monitor	4 & 7	PVC	PVC	NA	2.65	14.0	1.00	161.60	1139.93	1153.93	1298.88	1301.53
BMW-9	POC	12/9/1988	Monitor	4	PVC	PVC	NA	0.54	20.0	0.00	154.98	1136.64	1156.64	1291.08	1291.62
BMW-10R	Detection / Primary	10/11/2005	Monitor	2 & 8-5/8	SS	SS	0.01	2.66	9.6	0.00	176.16	1130.00	1139.60	1303.5 +	1306.16 +
BMW-12	RAO							-0.19	44.0		80	1221.15	1265.15	1301.34	1301.15
BMW-13	RAO	9/29/2016	Monitor	6.625	Steel	open bore	NA	0.99	98.0		180	1110.24	1208.24	1289.25	1290.24
BMW-14	RAO	9/30/2016	Monitor	6.625	Steel	open bore	NA	1.53	98.0		180	1127.61	1225.61	1306.08	1307.61
Tertiary Flow Zone															
BMW-4A		12/12/1988	Monitor	2 & 4	PVC	PVC	NA	0.79	40.0	0.00	252.00	1034.24	1074.24	1285.45	1286.24
BMW-5A		4/6/1986	Monitor	2 & 4	PVC	PVC	NA	0.74	10.0	0.00	215.58	1071.78	1081.78	1286.62	1287.36
BMW-6A		4/3/1986	Monitor	4	PVC	PVC	NA	3.51	10.0	0.00	210.85	1090.50	1100.50	1297.84	1301.35
ABANDONED WELLS															
PW-4		3/5/1986	Piezometer	2	PVC	PVC	0.01	2.24			11.88			1285.75	1287.99
PW-5		3/5/1986	Piezometer	2	PVC	PVC	0.01	2.26			NA			1285.50	1287.76
PW-6		3/3/1986	Piezometer	2	PVC	PVC	0.01	2.05			NA			1286.60	1288.65
PW-7		3/31/1986	Piezometer	2	PVC	PVC	0.01	2.72			NA			1286.00	1288.72
PW-8		3/28/1986	Piezometer	2	PVC	PVC	0.01	3.28			NA			1286.60	1289.88
PW-9		2/28/1986	Piezometer	2	PVC	PVC	0.01	2.35			NA			1288.20	1290.55
PW-2		2/20/1986	Piezometer	2	PVC	PVC	0.01	3.02			NA			1291.80	1294.82
PW-12		2/21/1986	Piezometer	2	PVC	PVC	0.01	2.47			NA			1293.00	1295.47
PW-13		2/24/1986	Piezometer	2	PVC	PVC	0.01	2.49			NA			1294.50	1296.99
PW-15		2/25/1986	Piezometer	2	PVC	PVC	0.01	2.39			16.02			1297.98	1300.37
PW-16		2/26/1986	Piezometer	2	PVC	PVC	0.01	1.91			NA			1296.90	1298.81
PW-17		2/26/1986	Piezometer	2	PVC	PVC	0.01	2.79			NA			1298.30	1301.09
PW-18		3/31/1987	Piezometer	2	PVC	PVC	0.01	2.62			NA			1300.40	1303.02
PW-19		3/31/1987	Piezometer	2	PVC	PVC	0.01	2.13			NA			1303.30	1305.43
PW-21		3/30/1987	Piezometer	2	PVC	PVC	0.01	2.17			NA			1297.90	1300.07
PW-22		7/7/1987	Piezometer	2	PVC	PVC	0.01	2.18			10.45			1285.79	1287.97
PW-23		7/7/1987	Piezometer	2	PVC	PVC	0.01	1.78			NA			1283.80	1285.58
PW-24		6/30/1987	Piezometer	2	PVC	PVC	0.01	2.90			26.23			1321.90	1324.80
PW-25		6/30/1987	Piezometer	2	PVC	PVC	0.01	3.11			NA			1323.60	1326.71
PW-26		7/1/1987	Piezometer	2	PVC	PVC	0.01	2.95			17.81			1324.38	1327.33
PW-27		6/30/1987	Piezometer	2	PVC	PVC	0.01	-0.30			9.39			1317.91	1317.61
PW-28		6/30/1987	Piezometer	2	PVC	PVC	0.01	2.37			13.10			1304.06	1306.43
PW-30		7/1/1987	Piezometer	2	PVC	PVC	0.01	2.92			NA			1297.80	1300.72
PW-31		6/30/1987	Piezometer	2	PVC	PVC	0.01	-0.32			19.85			1304.05	1303.73
PW-33		12/20/1988	Piezometer	2	PVC	PVC	0.01	2.96			20.20			1300.58	1303.54
PW-35		12/21/1988	Piezometer	2	PVC	PVC	0.01	3.05			17.30			1301.44	1304.49
PW-36		3/24/1995	Piezometer	2	PVC	PVC	0.01	-0.12			18.62			1302.67	1302.55
RW-10		10/8/1990	Recovery	6	CarbonSteel	GAL	0.03	0.25			17.67			1299.59	1299.84
RW-11		10/8/1990	Recovery	6	CarbonSteel	GAL	0.03	0.55			14.08			1299.21	1299.76
RW-12		10/8/1990	Recovery	6	CarbonSteel	GAL	0.03	0.25			12.83			1299.60	1299.85
SLMW-1		3/23/1981	Monitor	4	PVC	PVC		2.76			34.34			1321.75	1324.51

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TABLE 1.0 - SUMMARY OF WELL CONSTRUCTION DETAILS
FORMER TRONOX FACILITY
SPRINGFIELD, GREENE COUNTY, MISSOURI

Well Name	Designation or Pumping Center	Install Date	Well Purpose	Casing Diam (in.)	Casing Type	Screen Type	Slot Size	Stickup* (ft.)	Screen Length (ft.)	Sump Length (ft.)	Measured Total Depth (ft.)	TD Elev	Top of Screen/Open Bore Elev	Pad Elevation (ft.)**	Top of Casing Elevation (ft.)**
SLMW-2		4/22/1981	Monitor	x	PVC	PVC	0.01	2.35			NA			1324.70	1327.05
SLMW-3		2/4/1982	Monitor	x	PVC	PVC	0.01	2.53			NA			1322.30	1324.83
SLMW-4		4/23/1981	Monitor	x	PVC	PVC	0.01	2.11			NA			1321.30	1323.41
SLMW-5		12/28/1987	Monitor	2	SS	SS	0.01	2.27			27.00			1322.66	1324.93
SLMW-7		12/30/1987	Monitor	2	SS	SS	0.01	2.28			29.34			1324.55	1326.83
SMW-2		2/5/1982	Monitor	4	PVC	PVC		1.52			24.52			1284.06	1285.58
SMW-4		2/16/1982	Monitor	4.5	PVC(OD)	PVC	3/8" perf	1.02			24.00			1288.07	1289.09
SMW-5		2/25/1983	Monitor	4.5	PVC	PVC	3/8" perf	0.02			17.00			1295.50	1295.52
SMW-6		2/25/1983	Monitor	4.5	PVC	PVC	3/8" perf	-0.02			15.50			1296.70	1296.68
SMW-7		4/25/1985	Monitor	2	PVC	PVC	0.01	2.84			12.67			1285.54	1288.38
SMW-8		4/25/1985	Monitor	x	PVC	PVC	0.01	4.35			12.00			1286.80	1291.15
SMW-9		4/26/1985		2	PVC	PVC	0.01	3.39			14.00			1287.40	1290.79
SMW-10A		4/18/1985	Monitor	2	PVC	PVC	0.01	3.11			11.03			1280.49	1283.60
SMW-10B		4/18/1985	Monitor	2	PVC	PVC	0.01	3.73			10.48			1280.12	1283.85
SMW-10C		4/18/1985	Monitor	2	PVC	PVC	0.01	2.09			40.00			1281.40	1283.49
SMW-11A		4/17/1985	Monitor	2	PVC	PVC	0.01	0.28			12.16			1291.30	1291.58
SMW-11C		4/17/1985	Monitor	2	PVC	PVC	0.01	2.18			40.00			1291.07	1293.25
SMW-11CR		3/3/1986	Monitor	4	PVC/OH	PVC	open bore	1.31			43.29			1291.26	1292.57
SMW-12A		4/24/1985	Monitor	2	PVC	PVC	0.01	2.54			9.14			1290.53	1293.07
SMW-12B		4/18/1985	Monitor	2	PVC	PVC	0.01	1.75			11.53			1290.40	1292.15
SMW-22		4/24/1990	Monitor/Recovery	2	PVC	PVC	0.01	-0.26			16.69			1295.90	1295.64
SMW-23		4/30/1990	Monitor	2	PVC	PVC	0.01	-0.15			0.00			1302.08	1301.93
SMW-29		12/16/1991	Monitor	2	PVC	PVC	0.01	-0.30			19.57			1301.38	1301.08
SMW-50		5/5/1990	Monitor	2	PVC	PVC	0.01	-0.16			23.50			1297.27	1297.11
SMW-51		5/22/1990	Monitor	2	PVC	PVC	0.01	-0.27			28.30			1266.14	1265.87
SMW-52		6/3/1990	Monitor	2	PVC	PVC	0.01	-0.75			14.00			1247.47	1246.72
SMW-53		6/5/1990	Monitor	2	PVC	PVC	0.01	-0.14			12.50			1258.51	1258.37
SMW-54		6/12/1990	Monitor	2	PVC	PVC	0.01	-0.50			10.85			1269.91	1269.41
SMW-55		6/14/1990	Monitor	2	PVC	PVC	0.01	-0.27			14.45			1270.85	1270.58
SMW-56		6/13/1990	Monitor	2	PVC	PVC	0.01	-0.49			17.60			1277.12	1276.63
SMW-57		6/13/1990	Monitor	2	PVC	PVC	0.01	-0.46			16.80			1288.02	1287.56
SMW-61		6/27/1990	Monitor	2	SS	SS	0.01	-0.39			16.00			1289.59	1289.20
SMW-63		9/29/1990	Monitor	2	SS	SS	0.01	-0.44			23.26			1269.77	1269.33
SMW-65		9/27/1990	Monitor	2	SS	SS	0.01	-0.29			47.21			1257.58	1257.29
SMW-66		9/29/1990	Monitor	2	SS	SS	0.01	-37.82			49.67			1239.72	1201.90
SMW-67		10/23/1990	Monitor	2	SS	SS	0.01	-0.20			54.80			1240.68	1240.48
SMW-68		10/25/1990	Monitor	2	SS	SS	0.01	-0.40			50.00			1240.28	1239.88
SMW-69		10/24/1990	Monitor	2	SS	SS	0.01	-0.50			49.70			1237.05	1236.55
SMW-70		7/16/1991	Monitor	2	SS	SS	0.02	-0.10			22.50			1291.79	1291.69
WLMW-01		11/9/2005	Monitor	2	PVC	PVC	0.01	-0.33			54.83			1263.30	1262.97
WLMW-05		10/17/2005	Monitor	2	PVC	PVC	0.01	2.99			53.80			1248.10	1251.09
WLMW-06		10/19/2005	Monitor	2	PVC	PVC	0.01	-177.11			34.00			1427.00	1249.89
WLMW-07		10/13/2005	Monitor	2	PVC	PVC	0.01	2.92			52.00			1245.50	1248.42
WLMW-08		10/20/2005	Monitor	2	PVC	PVC	0.01	2.86			28.50			1246.60	1249.46
WLMW-08A		10/20/2005	Monitor	2	PVC	PVC	0.01	3.06			23.80			1241.55	1244.61
WLMW-09		10/18/2005	Monitor	2	PVC	PVC	0.01	2.72			52.00			1247.40	1250.12
WLMW-10		10/19/2005	Monitor	2	PVC	PVC	0.01	2.50			39.30			1241.70	1244.20
WLMW-12		10/24/2005	Monitor	2	PVC	PVC	0.01	3.08			29.00			1223.20	1226.28

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TABLE 1.0 - SUMMARY OF WELL CONSTRUCTION DETAILS
FORMER TRONOX FACILITY
SPRINGFIELD, GREENE COUNTY, MISSOURI

Well Name	Designation or Pumping Center	Install Date	Well Purpose	Casing Diam (in.)	Casing Type	Screen Type	Slot Size	Stickup* (ft.)	Screen Length (ft.)	Sump Length (ft.)	Measured Total Depth (ft.)	TD Elev	Top of Screen/Open Bore Elev	Pad Elevation (ft.)**	Top of Casing Elevation (ft.)**
WLMW-13		10/24/2005	Monitor	2	PVC	PVC	0.01	3.53			24.00			1235.80	1239.33
WLMW-14		10/27/2005	Monitor	2	PVC	PVC	0.01	3.21			33.00			1227.10	1230.31
WLMW-15		10/28/2005	Monitor	2	PVC	PVC	0.01	3.19			27.00			1225.60	1228.79
WLMW-16		11/3/2005	Monitor	2	PVC	PVC	0.01	3.24			28.00			1236.50	1239.74
WLMW-17		11/7/2005	Monitor	2	PVC	PVC	0.01	3.10			29.80			1230.30	1233.40
BMW-3		3/26/1986	Monitor	4	PVC	open bore	NA	NA			NA			1281.60	NA
BMW-7		12/8/1988	Monitor	4	PVC	PVC	NA	0.92			165.69			1299.57	1300.49
BMW-8		12/13/1988	Monitor	4	PVC	PVC	NA	0.97			165.11			1301.62	1302.59
BMW-10		12/8/1988	Monitor	4	PVC	open bore	NA	0.02			172.52			1303.50	1303.52
BMW-11		7/15/1991	Monitor	2	PVC/SS	SS	0.01	0.20			162.20			1304.90	1305.10
BMW-50		12/14/1991	Monitor	2	PVC	PVC	0.01	-0.29			107.71			1255.97	1255.68
BMW-51		12/15/1991	Monitor	2	PVC	PVC	0.01	-0.19			158.81			1299.16	1298.97
4A				4	PVC	open bore	NA	NA			NA			NA	NA

*** = Stickup is calculated from 2016 Wellhead Survey as (TOC Elevation - Pad Elevation)**
**** = Elevation in feet above mean sea level (AMSL) from 2016 Wellhead Survey (Anderson Engineering)**
***** = SMW-60 was converted to flush-mount during the RAO work and was not included in the 2016 Wellhead Survey**
+ = Well was not included in 2016 Anderson Engineering Wellhead Survey
Data Source: 2008

TABLE 2.0 - WATER LEVELS AND NAPL THICKNESSES
FORMER TRONOX FACILITY
SPRINGFIELD, GREENE COUNTY, MISSOURI

Well Number	Measuring Point Elevation	Well Monitoring Date	Depth to Static Water Level (ft. bmp)	DNAPL Thickness (ft.)	Groundwater Elevation (ft.)	Depth to Well Terminus (ft.)
UPPER FLOW ZONE (UFZ) WELLS						
RW-21	1257.90	1/19/2017	38.04	0.00	1219.86	39.39
		2/1/2017	38.23	NM	1219.67	NM
		2/20/2017	38.30	NM	1219.60	NM
		4/24/2017	37.32	Trace	1220.58	43.71
		AVERAGE	**37.97**	**NA**	**1219.71**	
SMW-58	1255.72	1/19/2017	11.89	0.00	1243.83	14.17
		2/1/2017	12.05	NM	1243.67	NM
		2/20/2017	12.16	NM	1243.56	NM
		4/24/2017	11.00	NM	1244.72	NM
		AVERAGE	**11.78**	**0.00**	**1243.69**	
SMW-71	1254.77	1/19/2017	NM	NM	NM	NM
		2/1/2017	NM	NM	NM	NM
		2/20/2017	1.90	NM	1252.87	NM
		4/24/2017	1.01	NM	1253.76	7.43
		AVERAGE	**1.90**	**NA**	**1252.87**	
SMW-72	1257.33	1/19/2017	NM	NM	NM	NM
		2/1/2017	37.75	NM	1219.58	NM
		2/20/2017	37.80	NM	1219.53	NM
		4/24/2017	36.85	NM	1220.48	NM
		AVERAGE	**37.47**	**NA**	**1219.56**	
SMW-73	1240.27	1/19/2017	NM	NM	NM	NM
		2/1/2017	20.55	NM	1219.72	NM
		2/20/2017	21.12	NM	1219.15	NM
		4/24/2017	31.64	NM	1208.63	33.90
		AVERAGE	**24.44**	**NA**	**1219.44**	
SMW-74	1268.37	1/19/2017	4.91	0.00	1263.46	19.91
		2/1/2017	6.32	NM	1262.05	NM
		2/20/2017	8.90	NM	1259.47	NM
		4/24/2017	1.91	NM	1266.46	19.89
		AVERAGE	**5.51**	**0.00**	**1261.66**	
SMW-75	1273.45	1/19/2017	3.29	0.00	1270.16	24.78
		2/1/2017	6.80	0.00	1266.65	NM
		2/20/2017	9.60	NM	1263.85	NM
		4/24/2017	1.48	NM	1271.97	NM
		AVERAGE	**5.29**	**0.00**	**1266.89**	
SMW-76	1306.22	10/14/2016	10.23	0.00	1295.99	27.60
		1/19/2017	7.98	0.00	1298.24	27.65
		2/1/2017	10.18	0.00	1296.04	27.70
		2/20/2017	NM	NM	NM	NM
		4/24/2017	5.84	NM	NM	27.60
		AVERAGE	**8.56**	**0.00**	**1296.76**	

TABLE 2.0 - WATER LEVELS AND NAPL THICKNESSES
FORMER TRONOX FACILITY
SPRINGFIELD, GREENE COUNTY, MISSOURI

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Well Number	Measuring Point Elevation	Well Monitoring Date	Depth to Static Water Level (ft. bmp)	DNAPL Thickness (ft.)	Groundwater Elevation (ft.)	Depth to Well Terminus (ft.)
SMW-77	1294.47	10/7/2016	23.79	0.00	1270.68	40.04
		1/19/2017	9.43	0.00	1285.04	39.60
		2/1/2017	18.90	0.00	1275.57	39.55
		2/20/2017	NM	NM	NM	NM
		4/24/2017	8.87	NM	1285.60	39.54
		AVERAGE	**15.25**	**0.00**	**1277.10**	
SMW-78	1295.25	10/7/2016	26.45	NM	1268.80	NM
		1/19/2017	15.10	0.00	1280.15	40.90
		2/1/2017	30.58	0.00	1264.67	40.90
		2/20/2017	NM	NM	NM	NM
		4/24/2017	9.36	NM	1285.89	40.91
		AVERAGE	**20.37**	**0.00**	**1271.21**	
SMW-79	1295.04	10/20/2016	DRY	DRY	DRY	24.86
		1/19/2017	DRY	DRY	DRY	24.86
		2/1/2017	DRY	DRY	DRY	NM
		2/20/2017	NM	NM	NM	NM
		4/24/2017	DRY	DRY	DRY	24.79
		AVERAGE	**NA**	**NA**	**NA**	
SMW-80	1279.88	12/13/2016	8.73	0.00	1271.15	25.33
		1/19/2017	4.56	0.00	1275.32	28.30
		2/1/2017	7.62	0.00	1272.26	28.30
		2/20/2017	7.16	NM	1272.72	NM
		4/24/2017	4.16	NM	1275.72	28.25
		AVERAGE	**6.45**	**0.00**	**1273.43**	
SMW-81	1274.80	10/14/2016	11.38	0.00	1263.42	27.30
		1/19/2017	8.66	0.00	1266.14	27.37
		2/1/2017	10.05	0.00	1264.75	27.35
		2/20/2017	12.97	NM	1261.83	NM
		4/24/2017	5.12	NM	1269.68	27.29
		AVERAGE	**9.64**	**0.00**	**1264.04**	
SMW-82	1263.15	10/19/2016	2.70	0.00	1260.45	17.20
		1/19/2017	2.51	0.00	1260.64	18.49
		2/1/2017	2.73	0.00	1260.42	17.50
		2/20/2017	3.51	NM	1259.64	NM
		4/24/2017	1.89	NM	1261.26	17.45
		AVERAGE	**2.67**	**0.00**	**1260.29**	
SMW-83	1288.23	11/10/2016	27.60	0.00	1260.63	33.10
		1/19/2017	16.94	0.00	1271.29	33.07
		2/1/2017	19.34	0.00	1268.89	33.12
		2/20/2017	NM	NM	NM	NM
		4/24/2017	5.09	NM	1283.14	33.05
		AVERAGE	**17.24**	**0.00**	**1266.94**	
SMW-84	1261.42	11/10/2016	41.15	Trace	1220.27	54.23
		1/19/2017	40.93	Trace	1220.49	54.25
		2/1/2017	41.30	0.00	1220.12	54.60
		2/20/2017	41.36	NM	1220.06	NM
		4/24/2017	40.28	NM	1221.14	54.21
		AVERAGE	**41.00**	**0.00**	**1220.24**	

TABLE 2.0 - WATER LEVELS AND NAPL THICKNESSES
FORMER TRONOX FACILITY
SPRINGFIELD, GREENE COUNTY, MISSOURI

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Well Number	Measuring Point Elevation	Well Monitoring Date	Depth to Static Water Level (ft. bmp)	DNAPL Thickness (ft.)	Groundwater Elevation (ft.)	Depth to Well Terminus (ft.)
SMW-85	1254.97	11/16/2016	35.05	0.00	1219.90	55.30
		1/19/2017	34.88	0.00	1220.07	56.70
		2/1/2017	34.94	0.00	1220.01	56.42
		2/20/2017	34.97	NM	1219.98	NM
		4/24/2017	34.02	NM	1220.93	56.38
		AVERAGE	**34.77**	**0.00**	**1219.99**	
SMW-86	1275.19	12/28/2016	16.47	0.00	1258.72	28.75
		1/19/2017	10.99	Trace	1264.20	28.74
		2/1/2017	11.94	0.00	1263.25	28.72
		2/20/2017	14.85	NM	1260.34	NM
		4/24/2017	5.63	NM	1269.56	28.54
		AVERAGE	**11.98**	**0.00**	**1261.63**	
SMW-87	1297.97	12/28/2016	29.61	Trace	1268.36	38.25
		1/19/2017	23.35	Trace	1274.62	37.40
		2/1/2017	24.88	Trace	1273.09	38.20
		2/20/2017	27.96	NM	1270.01	NM
		4/24/2017	16.63	NM	1281.34	37.53
		AVERAGE	**24.49**	**NA**	**1271.52**	
SMW-12C	1292.91	4/18/2016	7.55	0.0	1285.36	NM
		9/16/2016	6.78	0.0	1286.13	NM
		4/24/2017	10.51	0.0	1282.40	NM
		AVERAGE	**8.28**	**0.00**	**1284.63**	
BMW-12	1303.03	9/29/2016	79.40	0.10	1223.63	80.80
		10/5/2016	76.36	0.45	1226.67	80.80
		10/21/2016	53.12	1.10	1249.91	80.80
		1/27/2017	6.05	1.70	1296.98	80.80
		2/28/2017	NM	2.30	NM	NM
		3/31/2017	3.15	1.90	1299.88	NM
		4/24/2017	2.80	2.50	1300.23	80.80
		AVERAGE	**36.81**	**1.44**	**1259.41**	
SECONDARY FLOW ZONE (SFZ) WELLS						
BMW-13	1292.10	10/3/2016	54.58	NM	1237.52	NM
		1/19/2017	51.70	NM	1240.40	NM
		1/31/2017	50.24	NM	1241.86	NM
		2/20/2017	NM	NM	NM	NM
		4/24/2017	41.60	NM	1250.50	181.20
		AVERAGE	**49.53**	**NA**	**1239.93**	
BMW-14	1308.95	10/5/2016	67.45	NM	1241.50	NM
		1/19/2017	74.29	NM	1234.66	NM
		1/31/2017	65.72	NM	1243.23	NM
		2/20/2017	NM	NM	NM	NM
		4/24/2017	56.66	NM	1252.29	179.70
		AVERAGE	**66.03**	**NA**	**1239.80**	

NOTES:

Wells listed are those related to 2016-2017 RAO technical evaluations

NM = not measured

NA = not applicable

ft. bmp = feet below preliminary measuring point

Static water level measurements are recorded as feet below the preliminary measuring point.

Trace = << 0.01 ft

TABLE 3.0 - SUMMARY OF RAO and HISTORICAL GROUNDWATER ANALYTICAL RESULTS
FORMER TRONOX FACILITY
SPRINGFIELD, GREENE COUNTY, MISSOURI

Analyte		GWPS	Initial	1Q17	2Q17	Initial	Dec-16	1Q17	2Q17	Initial	1Q17	2Q17	Initial	1Q17	2Q17
			SMW-76			SMW-80				SMW-81			SMW-82		
			Results	Results	Results	Results	Results	Results	Results	Results	Results	Results	Results	Results	Results
Acenaphthene	ug/l	1200	150	41	29	370	740	310	200	320	18	26	470	260	300
Acenaphthylene	ug/l	0.1	6	2	0.8	18	34	14	10	3	0.2 J	0.4 J	1.9	1	2
Anthracene	ug/l	9600	16	0.8	0.6	14	140	9	9	61	2	1	22	9	10
Benzo(a)anthracene	ug/l	0.1	36	2	0.8	0.5	240	0.5	0.9	68	0.8	0.3 J	10	0.5	2
Benzo(a)pyrene	ug/l	0.2	17	0.7	<0.1	<0.1	98	0.1 J	0.3 J	23	0.2 J	<0.1	2.6	0.2 J	0.30 J
Benzo(b)fluoranthene	ug/l	0.1	25	0.9	0.2 J	0.1 J	140	0.2	0.5 J	33	0.3 J	0.2 J	5	0.3 J	0.80
Benzo(k)fluoranthene	ug/l	0.1	11	0.4 J	<0.1	<0.1	57	<0.1	0.2 J	13	0.2 J	<0.1	2.1	0.2 J	0.40 J
2-Chlorophenol	ug/l	0.5	<0.5	<0.6	<0.5	<0.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	ug/l	0.1	26	2	0.4 J	0.4 J	170	0.4 J	0.7	47	0.7	0.4 J	7	0.5 J	0.90 J
Dibenz(a,h)anthracene	ug/l	0.1	2	<0.1	<0.1	<0.1	9	<0.1	<0.1	2	<0.1	<0.1	0.32 J	<0.1 J	<0.1
Dibenzofuran	ug/l	7.9	100	5	16	270	630	220	140	220	5	12	290	160	180
2,4-Dimethylphenol	ug/l	540	<0.5	<0.6	<0.5	2	3	<0.5	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2,4-Dinitrophenol	ug/l	70	<10	<12	<11	<10	<10	<10	<11	<10	<10	<11	<10	<11	<11
Fluoranthene	ug/l	300	170	48	20	23	1,200	21	17	400	11	8	83	16	21
Fluorene	ug/l	1300	100	4	15	230	750	200	130	350	19	21	300	160	170
Indeno(1,2,3-cd)pyrene	ug/l	0.1	6	0.1 J	<0.1	<0.1	28	<0.1	<0.1	6	<0.1	<0.1	1.3	<0.1	0.10 J
2-Methylnaphthalene	ug/l	36	11	<0.1	<0.1	630	740	520	240	43	<0.1	<0.1	470	300	320
Naphthalene	ug/l	20	67	<0.1	4	11,000	8,200	9700	4,300	4	<0.1	<0.1	3900	2,700	3300
Phenanthrene	ug/l	0.1	110	1	0.3 J	210	1,700	190	130	950	25	7	390	160	160
Phenol	ug/l	300	<0.5	<0.6	<0.5	0.5 J	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2-Picoline	ug/l	NA	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.1	<2	<2.
Pyrene	ug/l	960	100	21	6	11	650	10	9	240	6	3	47	8	13
Benzene	ug/l	5	<0.2	<0.2	<0.2	10	9.3	8	3.7	<0.2	<0.2	<0.2	<1.0	0.2 J	0.30 J
Ethylbenzene	ug/l	700	1.7	<0.2	0.3 J	94	92	78	41	0.7 J	<0.2	0.3 J	13	12	14
Toluene	ug/l	1000	<0.2	<0.2	<0.2	47	45	39	18	<0.2	<0.2	0.3 J	2.6 J	2.3	2
Total Xylenes	ug/l	10000	3.8	<0.2	0.7 J	310	300	270	150	2.7	0.3 J	2	38	39	38

Notes:

J = estimated value ≥ the Method Detection Limit (MDL or DL) and < the Limit of Quantitation (LOQ or RL)

GWPS = Groundwater Protection Standards

Yellow = 1x-10x GWPS

Orange = 10x-100x GWPS

Red = >100x GWPS

< = Less than

NA = Not Analyzed

TABLE 3.0 - SUMMARY OF RAO and HISTORICAL GROUNDWATER ANALYTICAL RESULTS
FORMER TRONOX FACILITY
SPRINGFIELD, GREENE COUNTY, MISSOURI

Analyte		GWPS	Initial	1Q17	2Q17	Initial	1Q17	2Q17	Initial	1Q17	2Q17	Initial	1Q17	2Q17
			SMW-86			SMW-87			SMW-84			SMW-85		
			Results	Results	Results	Results	Results	Results	Results	Results	Results	Results	Results	Results
Acenaphthene	ug/l	1200	88	1	0.30 J	550	81	53	410	340	330	37	<0.1	<0.1
Acenaphthylene	ug/l	0.1	3	<0.1	<0.1	7	0.7	1	3	2	5	1 J	<0.1	<0.1
Anthracene	ug/l	9600	7	<0.1	<0.1	87	8	8	17	27	33	5 J	<0.1	<0.1
Benzo(a)anthracene	ug/l	0.1	2	<0.1	<0.1	97	1	8	2	20	24	6	0.1 J	0.1 J
Benzo(a)pyrene	ug/l	0.2	0.5 J	<0.1	<0.1	36	0.2 J	3	0.5 J	9	10	6	0.2 J	0.3 J
Benzo(b)fluoranthene	ug/l	0.1	0.7	<0.1	<0.1	50	0.4 J	4	0.7	12	13	9	0.4 J	0.3 J
Benzo(k)fluoranthene	ug/l	0.1	0.4 J	<0.1	<0.1	20	0.1 J	2	0.3 J	5	6	4 J	0.2 J	0.1 J
2-Chlorophenol	ug/l	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	ug/l	0.1	1	<0.1	<0.1	64	0.7	5	1	16	19	5	<0.1	0.1 J
Dibenz(a,h)anthracene	ug/l	0.1	<0.1	<0.1	<0.1	4	<0.1	0.5 J	<0.1	0.8	1	<1	<0.1	<0.1
Dibenzofuran	ug/l	7.9	45	<0.5	<0.5	440	58	38	290	250	220	24	<0.5	<0.5
2,4-Dimethylphenol	ug/l	540	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1	<0.5	<0.5	<0.5	<0.5	<0.5
2,4-Dinitrophenol	ug/l	70	<11	<11	<11	<10	<10	<10	<10	<11	<10	<100	<10	<10
Fluoranthene	ug/l	300	35	0.3 J	0.3 J	470	25	47	28	98	120	42	0.2 J	0.3 J
Fluorene	ug/l	1300	62	<0.1	<0.1	470	68	45	230	220	220	32	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	ug/l	0.1	0.2 J	<0.1	<0.1	12	<0.1	1	0.1 J	3	4	3 J	0.1 J	0.1 J
2-Methylnaphthalene	ug/l	36	0.5 J	<0.1	<0.1	460	30	14	540	350	230	<1	<0.1	<0.1
Naphthalene	ug/l	20	2	<0.1	0.3 J	5,400	98	150	5000	3,300	1700	<1	<0.1	<0.1
Phenanthrene	ug/l	0.1	13	<0.1	<0.1	1,000	100	81	240	350	350	32	<0.1	<0.1
Phenol	ug/l	300	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	1	<0.5	<0.5	<0.5	<0.5	<0.5
2-Picoline	ug/l	NA	<2	<2	<2	<2	<2	<2	<2	<2	<2	<20	<2	<2
Pyrene	ug/l	960	18	<0.1	0.1 J	280	13	29	14	60	75	26	0.1 J	<0.1
Benzene	ug/l	5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.5 J	0.5 J	0.2 J	<0.2	<0.2	<0.2
Ethylbenzene	ug/l	700	0.3 J	<0.2	<0.2	14	0.3 J	<0.2	20	16	8	<0.2	<0.2	<0.2
Toluene	ug/l	1000	<0.2	<0.2	<0.2	1.3	0.4 J	<0.2	5	4.6	2	<0.2	<0.2	<0.2
Total Xylenes	ug/l	10000	0.8 J	<0.2	<0.2	49	2.9	2	82	61	30	<0.2	<0.2	<0.2

Notes:

J = estimated value ≥ the Method Detection Limit (MDL or DL) and < the Limit of Quantitation (LOQ or RL)

GWPS = Groundwater Protection Standards

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Orange = 10x-100x GWPS

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TABLE 3.0 - SUMMARY OF RAO and HISTORICAL GROUNDWATER ANALYTICAL RESULTS
FORMER TRONOX FACILITY
SPRINGFIELD, GREENE COUNTY, MISSOURI

DRAFT

Analyte		GWPS	Initial	1Q17	2Q17	Initial	1Q17	2Q17	Initial	1Q17	2Q17	2H2012	2013	2H2014	2H2015	2H2016
			SMW-77			SMW-78			SMW-83			BMW-2				
			Results	Results	Results	Results	Results	Results	Results	Results	Results	Results		Results	Results	Results
Acenaphthene	ug/l	1200	0.16 J	3	1	1.0	<0.1	<0.1	<0.1	<0.1	<0.1	4	not sampled in 2013	3	8	7
Acenaphthylene	ug/l	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.3 J		0.3 J	0.2 J	0.1 J
Anthracene	ug/l	9600	<0.1	<0.1	<0.1	0.70	<0.1	<0.1	<0.1	<0.1	<0.1	0.9		0.2 J	0.3 J	0.7
Benzo(a)anthracene	ug/l	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2 J		0.1 J	0.1 J	0.3 J
Benzo(a)pyrene	ug/l	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1 J		0.3 J	<0.1	<0.1
Benzo(b)fluoranthene	ug/l	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1 J		0.3 J	<0.1	0.2 J
Benzo(k)fluoranthene	ug/l	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		0.2 J	<0.1	<0.1
2-Chlorophenol	ug/l	0.5	<0.5	<0.6	<0.5	<0.5	<0.6	<0.5	<0.5	<0.6	<0.5	<0.5		<0.5	<0.5	<0.5
Chrysene	ug/l	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2 J		0.2 J	0.2 J	0.2 J
Dibenz(a,h)anthracene	ug/l	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1
Dibenzofuran	ug/l	7.9	<0.5	<0.6	<0.5	0.9 J	<0.6	<0.5	<0.5	<0.6	<0.5	3		1	4	5
2,4-Dimethylphenol	ug/l	540	<0.5	<0.6	<0.5	<0.5	<0.6	<0.5	<0.5	<0.6	<0.5	<0.5		<0.5	<0.5	<0.5
2,4-Dinitrophenol	ug/l	70	<11	<13	<11	<10	<11	<10	<10	<12	<10.0	<10		<10	<10	<10
Fluoranthene	ug/l	300	0.69	1	<0.1	0.15 J	<0.1	<0.1	0.2 J	<0.1	<0.1	3		0.9	4	4
Fluorene	ug/l	1300	0.15 J	0.3 J	<0.1	2.6	<0.1	<0.1	<0.1	<0.1	<0.1	3		2	7	6
Indeno(1,2,3-cd)pyrene	ug/l	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		0.2 J	<0.1	<0.1
2-Methylnaphthalene	ug/l	36	<0.1	<0.1	<0.1	0.28 J	<0.1	<0.1	<0.1	<0.1	<0.1	0.8		<0.1	0.3 J	0.4 J
Naphthalene	ug/l	20	0.14 J	0.3 J	<0.1	0.54	<0.1	<0.1	<0.1	<0.1	<0.1	4		0.9	4	<0.1
Phenanthrene	ug/l	0.1	<0.1	<0.1	<0.1	1.6	<0.1	<0.1	0.2 J	<0.1	<0.1	7		0.4 J	6	5
Phenol	ug/l	300	<0.5	<0.6	<0.5	<0.5	<0.6	<0.5	<0.5	<0.6	<0.5	<0.2		<0.2	<0.2	<0.5
2-Picoline	ug/l	NA	<2	<3	<2.0	<2	<2	<2	<2	<2	<2.0	<2		NA	NA	<2
Pyrene	ug/l	960	0.48 J	0.7	<0.1	0.29 J	<0.1	<0.1	0.3 J	<0.1	<0.1	1		0.6	2	3
Benzene	ug/l	5	0.3 J	<0.2	<0.2	0.6 J	<0.2	<0.2	<0.2	<0.2	<0.2	1.7		0.5 J	0.4 J	0.5 J
Ethylbenzene	ug/l	700	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	6.2		3.1	2.2	5.1
Toluene	ug/l	1000	0.4 J	<0.2	<0.2	1 J	<0.2	<0.2	<0.2	<0.2	<0.2	0.5 J		<0.2	<0.2	0.2 J
Total Xylenes	ug/l	10000	<0.2	<0.2	<0.2	0.8 J	<0.2	<0.2	<0.2	<0.2	<0.2	8.3		4.4	3.3	6.1

Notes:

J = estimated value ≥ the Method Detection Limit (MDL or DL) and < the Limit of Quantitation (LOQ or RL)

GWPS = Groundwater Protection Standards

Yellow = 1x-10x GWPS

Orange = 10x-100x GWPS

Red = >100x GWPS

< = Less than

NA = Not Analyzed

DRAFT

TABLE 3.0 - SUMMARY OF RAO and HISTORICAL GROUNDWATER ANALYTICAL RESULTS
FORMER TRONOX FACILITY
SPRINGFIELD, GREENE COUNTY, MISSOURI

Analyte		GWPS	2H2013	2H2014	2H2015	2H2016	Initial	Initial	Initial	Initial	1Q17	2Q17	Initial	1Q17	2Q17
			BMW-10R				BMW-13						BMW-14		
			Results	Results	Results	Results	80-ft	90-ft	150-ft	175-ft	90 ft	-	107-ft	107-ft	-
Acenaphthene	ug/l	1200	<0.1	57	<0.1	<0.1	0.4 J	93	58	48	63	42	<0.1	<0.1	<0.1
Acenaphthylene	ug/l	0.1	<0.1	0.8	<0.1	<0.1	<0.1	4	3	2	2	2	<0.1	<0.1	<0.1
Anthracene	ug/l	9600	<0.1	1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	4	3	<0.1	<0.1	<0.1
Benzo(a)anthracene	ug/l	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene	ug/l	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b)fluoranthene	ug/l	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(k)fluoranthene	ug/l	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-Chlorophenol	ug/l	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene	ug/l	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenz(a,h)anthracene	ug/l	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzofuran	ug/l	7.9	<0.5	30	<0.5	<0.5	<0.5	91	57	47	<0.5	37	<0.5	<0.5	<0.5
2,4-Dimethylphenol	ug/l	540	<0.5	13	<0.5	<0.5	1	6	8	6	7	12	<0.5	<0.5	<0.5
2,4-Dinitrophenol	ug/l	70	<10	<10	<10	<10	<10	<10	<10	<10	12 J	<11	<11	<10	<10
Fluoranthene	ug/l	300	<0.1	0.6	<0.1	<0.1	0.1 J	4	3	2	1	0.5 J	<0.1	<0.1	<0.1
Fluorene	ug/l	1300	<0.1	28	<0.1	<0.1	0.7	41	26	22	23	14	<0.1	<0.1	<0.1
Indeno(1,2,3-cd)pyrene	ug/l	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2-Methylnaphthalene	ug/l	36	<0.1	47	<0.1	<0.1	1	330	200	160	220	150	<0.1	<0.1	<0.1
Naphthalene	ug/l	20	0.3 J	920	<0.1	<0.1	58	6400	4000	3400	4,200	3100	<0.1	<0.1	0.3 J
Phenanthrene	ug/l	0.1	0.2 J	14	<0.1	<0.1	0.6	54	36	27	31	20	<0.1	<0.1	<0.1
Phenol	ug/l	300	<0.5	<0.5	<0.5	<0.5	3	<0.5	<0.5	<0.5	3	3	<0.5	<0.5	<0.5
2-Picoline	ug/l	NA	NA	NA	NA	<2	<2	5 J	5 J	5 J	<2	<2	<2	<2	<2
Pyrene	ug/l	960	<0.1	0.4 J	<0.1	<0.1	0.1 J	2	2	1	0.5 J	0.30 J	<0.1	<0.1	<0.1
Benzene	ug/l	5	0.3 J	<0.2	<0.2	<0.2	1.9	180	160	150	160	160	0.2 J	0.4 J	0.4 J
Ethylbenzene	ug/l	700	<0.2	0.2 J	<0.2	<0.2	1.0	73	51	42	74	61	<0.2	<0.2	<0.2
Toluene	ug/l	1000	<0.2	<0.2	<0.2	0.3 J	2.9	190	150	130	180	160	0.4 J	0.7 J	0.6 J
Total Xylenes	ug/l	10000	<0.6	<0.2	<0.2	<0.2	3.3	290	200	170	280	240	<0.2	0.3 J	0.3 J

Notes:

J = estimated value ≥ the Method Detection Limit (MDL or DL) and < the Limit of Quantitation (LOQ or RL)

GWPS = Groundwater Protection Standards

Yellow = 1x-10x GWPS

Orange = 10x-100x GWPS

Red = >100x GWPS

< = Less than

NA = Not Analyzed

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TABLE 4.0 - GEOLOGY, WATER LEVELS, IMPACT, CHEMICAL TRENDS
NEW RAO MONITORING WELLS
FORMER TRONOX FACILITY
SPRINGFIELD, GREENE COUNTY, MISSOURI

Well	Total Boring Depth (ft)	Depth to Bedrock (ft)	Thickness Weathered Bedrock (ft)	Fractures & Voids (depth range ft)	Water Production	Water Level Range (ft)	DNAPL?	Creosote Odor?	Analytes Exceeding GWPS			Concentration Trend: Number of Analytes for Orders of magnitude ranges greater than GWPS					
									Initial in 2016	2nd Qtr. 2017	Highest Initial Concentration (ug/L)	Initial			2 Qtr. 2017		
												100x	10x	1x	100x	10x	1x
UFZ - OFF-SITE NORTHEAST																	
SMW-76	25	11	<1	Void 18 - 20	Yes (void)	8 - 10.2	No	Yes	11	6	Phenanthrene 110	5	4	2	0	0	6
SMW-80	30	12	12	None noted	Yes	4.6 - 8.7	Yes, during drilling	Yes, strong	9	10	Naphthalene 11,000	3	2	4	3	1	6
SMW-81	27	10	12	Voids 14 - 19 , 21 - 22	Yes	8.7 - 13.0	No	Minor odors	12	5	Phenanthrene 950	6	4	2	0	1	4
SMW-82	30	6	10	Possible 6-16	Yes	2.5 - 3.5	Trace, sheen	Yes	12	10	Naphthalene 3,900	3	8	1	2	3	5
SMW-86	40	15	<1	Voids 16-20	Yes, slow	11.0 - 14.8	Trace, sheen early	Yes, during drilling	9	0	Phenanthrene 13	1	3	5	0	0	0
SMW-87	40	25	from 25 - 40	None noted	Yes, slow	23.3 - 29.6	Trace, sheen	Yes, during purging	13	11	Naphthalene 5,400	8	4	1	1	7	3
SMW-84	60	12	<1	Multiple 45 - 55	Yes	40.9 - 41.4	Trace, variable	Yes, during purging	11	12	Naphthalene 5,000	2	5	4	4	7	1
SMW-85	57	10	<1	None noted	Yes, at 38 ft	34.9 - 35.0	No	Slight odor during purge	9	5	Phenanthrene 32	1	8	0	0	0	5
UFZ - OFF-SITE EAST																	
SMW-77	40	10	5	None noted	Yes	9.4 - 18.9	No	No	0	0	Fluoranthene 0.69	0	0	0	0	0	0
SMW-78	42	15	5	None noted	Yes	15.1 - 30.6	No	No. Possible diesel odor	1	0	Phenanthrene 1.6	0	1	0	0	0	0
UFZ - OFF-SITE SOUTHWEST																	
SMW-79	26	17	<1	None noted	No - Dry	Dry well	No	No	Not sampled - well has remained dry								
SMW-83	35	15	20 -29	None noted	No, took days	16.9 - 19.3	No	No	1	0	Phenanthrene 0.2	0	0	1	0	0	0
SFZ ON-SITE																	
BMW-12	80	18	2	None noted	Yes above 35. Slow below	3.1 - 6	From 37 - 75, 1.1 - 2.3 ft accumulates	Yes, strong	Not sampled due to constant presence of DNAPL								
BMW-13	180	12	5, also 143-158	None noted to 80 Secondary porosity 143-158	Minor above 80	50.2 - 54.6	No	Yes, faint at 155 ft	6	6	Naphthalene 6,400	2	3	1	2	2	2
BMW-14	180	19	<1	None noted	Minor at 43	65.7 - 74.3	No	No	0	0	Toluene 0.4	0	0	0	0	0	0

Notes:
1. **Ft** = Feet **DNAPL**=Dense Non-Aqueous Phase Liquid **GWPS**= Groundwater Protection Standard
2. Northeast UFZ wells listed in order progressively outward from Facility to northeast
3. Concentration trends with respect to orders of magnitude greater than GWPS
4. 1x = 1 to <10x GWPS, 10x = 10x to <100x GWPS, and 100x= > 100x GWPS

Concentration Trends:
- Decreasing
- No change
- Increasing

TABLE 5.0 – UDPATED RAO DATA QUALITY OBJECTIVES
FORMER TRONOX FACILITY
SPRINGFIELD, GREENE COUNTY, MISSOURI

REVISED – 8/30/2018

Issue Statements	Objective	Investigation Approach	Status/Recommendations	Decision Factors or Criteria
A. UPDATE MONITORING WELL ELEVATION DATA TO ENSURE ACCURATE HYDROGEOLOGIC INFORMATION				
Many original monitoring well elevations are more than 25 years old, and require verification to confirm casings have not shifted over time	Have accurate monitoring well top-of-casing elevations to generate accurate potentiometric elevations and maps for SRFI evaluations	1. Resurvey monitoring well monitoring points and land surface elevations using state-registered company 2. Revise tables with new elevations, note differences, and generate revised potentiometric maps as needed	1. Activity completed 2. Table elevations revised; no further surveying of old wells needed	1. Measuring point elevation differences above 0.1 ft trigger revision of potentiometric maps
Potentiometric evaluation may have combined differing UFZ hydrogeologic zones data for off-site north area; prudent to verify for all zones and wells	Accurately categorize monitoring wells for appropriate monitoring intervals of hydrogeologic zones	1. Review monitoring well geologic log data for saturation levels and likely water migration pathway horizons 2. Compare well screen depths with saturation and migration depth intervals 3. Identify wells with inappropriate screened intervals 4. Categorize wells for grouping into similar hydrogeologic zones	1. Reviews completed 2. Comparisons completed 3. Well screen evaluation completed 4. Hydrogeologic characterization completed**, additional evaluation needed for new wells only**	1. Well logs must have geologic description to evaluate 2. Migration/monitoring indicators are geologic fractures, karst, DNAPL presence, saturation, water levels 3. "Similar hydrogeologic zones" are those with migration horizons contiguous and separated by more impermeable horizons greater than 10 ft thick
B. UPDATE CHARACTERIZATION OF UPPER FLOW ZONE DNAPL – GROUNDWATER FLOW AND MIGRATION PATHWAYS				
Fracture networks and karst features appear present but not fully defined by work to-date • On-site DNAPL zones and high concentration dissolved phase plume connections are not characterized • Off-site to north: Clifton Drainage is karst trough with possible intersecting fracture zones near Kearney St; role as migration pathway not defined • Off-site north: sinkhole, DNAPL occurrence, downstream springs are pathway indicators needing evaluation • Off-site north: isolated DNAPL & high concentration plume area (RW-21, SMW-72) movement from source area is unknown • Off-site BNSF area south: Plume migration movement needs evaluation	• Primary objective is to characterize groundwater flow patterns and migration pathways. • Identify locations, depths, and orientations of plume migration hydrogeologic features explaining plume distribution • Determine if utility corridors have acted as impacted groundwater or creosote migration pathways	1. Review stratigraphic migration pathway features identified from Section A, other documents, and map their plan view and vertical distribution on- and off-site 2. Map and evaluate distribution and vertical occurrence of DNAPL from logged data 3. Perform fracture trace/lineament analysis using historical air photos and topographic maps; evaluate well horizon and drainage elevations at RW-21 4. Map locations of documented and visually identified karst features in the area 5. Evaluate contour patterns of potentiometric maps for varying recharge conditions, and evaluate head differences and variations within well groupings as indicators of fracture control 6. Screen off-site stormwater manholes, water line vaults, and other under-ground utility accesses in City ROWs in off-site Clifton drainage area for indicators of impact (visual, photoionization device readings, odor) 7. Combine all inputs above to estimate location and direction of migration-controlling features. Project features into areas needing additional delineation 8. Perform horizontal geophysical resistivity surveys in north Clifton Drainage area to localize identified fracture zones & orientations for well placement.	1. Stratigraphic migration pathway features reviewed 2. Distribution and vertical occurrence of DNAPL mapped from available data 3. Fracture trace/lineament analysis, with RW-21 drainage elevation completed 4. Karst feature locations mapped 5. Potentiometric contour patterns and well head differences/variations evaluated 6. Screening completed of off-site stormwater and available utility manholes in off-site Clifton drainage area 7. Locations and direction of migration-controlling features for delineation completed; **additional delineation should be updated with data from new wells**. 8. Geophysical resistivity surveys completed; no additional geophysical surveys are recommended.	1. Recharging DNAPL well locations, similar water elevations with similar variations between wells, linear orientation of high volume DNAPL locations and high concentration plume locations are indicators of hydrogeologic controls 2. Line-up of kinks/undulations in potentiometric contours may indicate hydrogeologic influence 3. Linear topographic features crossing drainage basins, stream jogs, sinkhole or other karst feature lineups, and similar features with discoloration and vegetation patterns on air photos are indicators of lineaments/fracture zones 4. Known northeast-southwest and northwest-southeast regional joint patterns are guides for lineament/fracture orientation evaluation 5. If utility corridor screening indicates potential impact, develop additional investigation approaches to further characterize potential, including screening access vaults on private property

Issue Statements	Objective	Investigation Approach	Status/Recommendations	Decision Factors or Criteria
C. UPDATE DELINEATION OF UPPER FLOW ZONE DNAPL AND DISSOLVED PHASE PLUME				
DNAPL distribution, mobility and migration are no longer fully defined	Determine DNAPL horizontal and vertical areas of concentration, identify migration pathways, and migration potential to identify potential source control corrective actions	1. Evaluate DNAPL occurrence from log reviews in Section B and recoverability extent to identify DNAPL "hot spots". Update evaluation following TarGOST investigation results 2. Match hydrogeologic migration pathways identified from evaluation above with identified DNAPL horizontal and vertical zones of concentration to evaluate potential framework for migration 3.Review history of DNAPL occurrence and recoverability in wells over time for pattern of increased recoverability moving outward from source areas	1. Activity completed; DNAPL evaluation continues for any new wells 2. Migration framework evaluation completed; update with data from any new wells 3. Initial evaluation of **DNAPL recoverability done, and continues as recovery wells are rehabilitated**	1. If likely migration pathways are identified, use information to focus location for new delineation monitoring wells. 2. Use identified hot spots and migration pathways to focus TarGOST borings 3. If offsite migration potential is likely, evaluate current recovery network and recommend changes if appropriate
UFZ DNAPL and plume not fully delineated to the north and north east of the Facility. • Several PAHs at NE corner of Facility consistently exceed GWPS • No longer delineated by POC wells • Apparent creosote in residential sewer trench Feb 2009	Delineate the nature and extent of the dissolved phase plume to the north-northeast of the Facility.	1. Install up to 4 UFZ monitoring wells to 25 ft within 1,000 ft of site border in street or city right-of-ways (ROWs) field log for impact horizons 2. Check wells for DNAPL, obtain groundwater samples, and analyze for VOCs & SVOCs 3. If indicated by decision criteria, install step-out wells in outward and downgradient locations sited on fracture/karst migration orientations	1. Installed 4 UFZ monitoring wells 2. **Checking wells for DNAPL and sampling groundwater is ongoing** 3 Two additional step-out wells installed outward and downgradient locations sited on fracture/karst migration orientations. **Recommend installing 3 deeper UFZ monitoring well: northeast Facility, and near Kearney Street at fracture intersections to target 1220 elevation depth to test deep migration pathway**	1. Focus well locations along identified fracture/karst features from Section B 2. Plume edge for delineation is defined by COC concentrations greater than GWPS 3. If DNAPL present, no groundwater sampling is needed **4. New wells along Kearney Street will be checked for groundwater production in both shallow UFZ and deeper migration pathway. If no water production is evident in boring, no well will be constructed in that zone. If water produced in both zones, two wells will be installed and constructed to separately monitor each zone**
Isolated UFZ impact in north Clifton Drainage near Kearney Street not characterized or delineated • DNAPL observed in RW-21 & WL MW-3 • High concentration COCs in SMW-72 • Connection to Facility unknown	• Define the downgradient horizontal extent of this zone and vertical impact pattern • Characterize horizontal and vertical connectivity within Clifton Drainage migration pathway	1. Utilize migration pathways evaluation from Section B to install 3 UFZ wells to 40-50 ft downgradient in fracture zones field log bores for DNAPL horizons 2. Check wells for DNAPL, sample groundwater, and analyze for VOCs & SVOCs 3. Install up to 2 UFZ monitoring wells to 30-40 ft south of impact area guided by fracture location/orientation evaluation to investigate connection with Clifton Drainage residential area impact	1. Installed one UFZ monitoring well 2. Checking well for DNAPL and sampling groundwater is ongoing 3. Installed one UFZ monitoring well for Clifton Drainage connection. No additional step-out wells are recommended.	1. Focus well locations along identified fracture/karst features from Section B 2. Plume edge for delineation is defined by COC concentrations greater than GWPS 3. If DNAPL present, no groundwater sampling is needed 4. If groundwater sampled results exceed GWPS, evaluate need for downgradient step-out wells based on plume definition by identified fracture control and analytical data
Delineation of DNAPL and plume in isolated Kearney Street area complicated by other potential sources (asphalt production plant, petrochemical liquid transporter)	• Focus extent delineation effort to avoid, as practicable, other potential sources • Determine if impact in this area is related to Site or other source	1. Use refined fracture zone locations from Section B to focus new delineation well installations in migration pathways 2. Research characteristics of other potential source locations and releases 3.Compare chemistry of DNAPL and plume COCs in wells to chemical data from other potential sources	1. No additional wells are recommended in this area 2. Other potential source locations and releases were researched **3. Collect DNAPL from RW-21, WL MW-3, SMW-12C, and RW-9 for fingerprint analyses and comparisons**	1. Location of other source areas on/near fracture zones and in upgradient locations increases potential as source of impact; locations distant or downgradient lessens potential **2. Similar chemical signature of other source impact to chemical signature of impact in wells increases other source potential; dissimilar signature lessens potential** **3. Similarity of impact chemistry in Kearney St area to Site**

Issue Statements	Objective	Investigation Approach	Status/Recommendations	Decision Factors or Criteria
				impact chemistry increases potential **4. If other sources are more likely than Site, recommend no further characterization; if Site is likely source and new wells fail to delineate, recommend additional delineation**
UFZ DNAPL and plume not delineated at/beyond east Facility boundary • DNAPL observed deep at east Site border (SMW-12C) • Dissolved phase plume concentrations exceed GWPS at Facility boundary	Define the UFZ horizontal extent of DNAPL and dissolved plume, and vertical distribution of DNAPL, to the east using a step-out investigation approach	1. Install 2 UFZ monitoring wells to 40 ft within 300 ft of site border northeast and southeast of Site impacted border area. (SMW-77 and SMW-78) Field log bores to identify DNAPL horizons 2. Check wells for DNAPL, obtain groundwater samples, and analyze for VOCs & SVOCs 3. If indicated by decision criteria, install step-out wells outward to east-northeast & east-southeast along fracture/karst migration orientations from Section B	1. Two UFZ monitoring wells east of Facility installed 2. **Checking wells for DNAPL and groundwater sampling is ongoing** 3. Based on results of groundwater sampling, no additional monitoring wells are recommended	1. Focus well locations along identified fracture/karst features identified from Section B 2. Plume edge for delineation is defined by COC concentrations greater than GWPS 3. If DNAPL present, no groundwater sampling is needed 4. If groundwater sampled results exceed GWPS, install step-out wells as a phased approach utilizing street and/or ROWs
UFZ dissolved plume is no longer fully delineated to South • Higher dissolved phase concentrations have shifted south from SMW-60 • Detections in SMW-62 & SMW-64 exceed GWPS • Influence from possible northeast-southwest fracture trend is unknown	Define the UFZ horizontal extent of plume in the off-site area southwest, south and-southeast of Site impact, considering both fracture direction and groundwater flow direction	1. Utilize migration pathways evaluation from Section B to install 2 UFZ wells to 25 ft in the southwest off-site area (see **Figure 10.0**) 2. Install one UFZ well to 30 ft south of RW-20 (a DNAPL well) for delineation and to evaluate capture of the PC-7 pumping network at this central location 2. Utilize groundwater flow direction, and any new migration pathways evaluation from Section B, to install 2 UFZ wells to 25 ft in the south and southeast off-site areas downgradient of SMW-62 & SMW-64 (see **Figure 10.0)** 3. Check wells for DNAPL, obtain groundwater samples, and analyze for VOCs & SVOCs 4. Collect water level data from new monitoring wells and other south area monitoring wells to better define groundwater flow patterns	1. Two UFZ monitoring wells southwest of Facility installed, one remains dry 2. Lack of BNSF access prevented new wells to the south and southeast of Pumping Center 7. One off-site existing well on BNSF property south of Facility (SMW-60) was rehabilitated as southern delineation point. 3. **Checking wells for DNAPL and groundwater sampling is ongoing** 4. **Evaluation of groundwater flow patterns is ongoing**. No additional monitoring wells are recommended	1. Focus well locations along identified fracture/karst features from Section B and downgradient flow directions 2. Plume edge for delineation is defined by COC concentrations greater than GWPS 3. If DNAPL present, no groundwater sampling is needed 4. If sampled groundwater results exceed GWPS, evaluate need for further step-out wells based on plume definition and analytical data
D. IDENTIFY AND CHARACTERIZE POTENTIAL EXPOSURE PATHWAYS TO DNAPL AND DISSOLVED PHASE PLUMES				
Because the nature and extent of DNAPL and UFZ plume are no longer delineated by the existing well network, it is not possible to determine if potentially complete effective exposure pathways (e.g. vapor intrusion, dermal contact, whole body contact), and construction worker) are present.	Identify potentially complete exposure pathways based on updated groundwater data and evaluate the potential for unacceptable risk	1. Perform an initial assessment of analytical results from existing wells at the northeastern and eastern Facility boundaries, reviewing concentrations and depth to groundwater by compare existing groundwater analytical data, and analytical results from newly installed wells to applicable U.S. EPA screening levels for vapor intrusion, dermal exposure, whole body contact exposure pathways. Update evaluation with recent analytical data from new monitoring well sampling 2. Complete delineation of DNAPL and dissolved phase plumes as described in Section C above	1. Groundwater analytical data from existing and new wells were evaluated by VISL for vapor intrusion pathway. 2. DNAPL and dissolved phase plumes are delineated	1. If groundwater analytical data comparisons to U.S. EPA screening levels for vapor intrusion, dermal exposure, and whole body contact exposure pathways, identify potential receptors 2. Determine whether immediate action is necessary to be protective of human health while investigations are being completed 3. Identify additional sampling needed to complete potential exposure and risk evaluations • Delineate extent of screening level exceedances in groundwater

Issue Statements	Objective	Investigation Approach	Status/Recommendations	Decision Factors or Criteria
		3. Install shallow and deep soil vapor wells if VISL evaluation indicates potentially complete exposure pathway, collect vapor samples, analyze for volatile organic site COCs and naphthalene, and compare data to applicable U.S. EPA screening levels	3. Soil gas sampling was performed, followed by residential indoor and outdoor air sampling**. Indoor and outdoor air sampling, and residential media sampling, is being implemented under the Indoor Air Work Plan (EWI, 2017)**	• If groundwater VISL evaluation indicates potential risk, then soil vapor wells will be installed 4. Determine next steps based on all sampling results, including implementation of interim actions, if necessary, to control potential exposure(s)
Potential for current and future on-site exposure from near surface residual contamination at former operations area has not been fully evaluated, for example: • Former Landfarm area • Drip Track area • Black Tie storage area	Determine if concentrations of residual contaminants in soil at on-site former operations areas pose potential unacceptable risk for surface uses of Facility	1. Evaluate historical soil sample analytical data from former operations areas, and compare results to appropriate U.S. EPA screening levels for potential exposure risk 2. As appropriate from historical evaluation in (1), collect shallow (< 2 ft) soil samples for analysis of Facility COCs from former operational areas with indicated risk, or from areas lacking historical data. Compare analytical results to appropriate U.S. EPA screening levels	1. Historical soil sample analytical data was evaluated for potential exposure risk 2. Three shallow soil samples were collected from operational areas and evaluated. **Shallow soil sampling and risk evaluation in more extensive Facility areas by Incremental Sampling Methodology is recommended**	1. If initial screening indicates Facility areas with potential risk or areas with no data, sample to obtain recent data from those areas 2. If recent sampling results indicate potential exposure risk, determine appropriate mitigation options for present and future land use
E. UPDATE UNDERSTANDING OF POTENTIAL FOR CONTAMINANT VERTICAL MIGRATION PATHWAY FROM UFZ TO SFZ				
Groundwater monitoring data indicates vertical migration (from UFZ to SFZ) may be occurring: • BMW-5A in center Site had DNAPL and fractures to 80 ft deep, with apparent hydraulic connection to BMW-5 at 138 ft • BMW-10R in southwest Site has high plume COC concentrations, and fractures spanning the UFZ and SFZ • These wells lie along extension of southwest-trending Clifton Drainage karst trough	• Identify and characterize likely vertical migration pathway to SFZ to aid in effective design of further delineation and/or corrective measures for SFZ impact • Identify SFZ migration zone and impacted horizon depths in SFZ for appropriate design of well monitoring intervals to avoid potential cross-contamination between UFZ and SFZ • Determine if DNAPL is present in the SFZ beyond BMW-5	Two phased approach: 1. Evaluate historical records • Review UFZ and SFZ well boring logs near BMW-5 and BMW-10R for evidence of vertical migration features and DNAPL occurrence • Evaluate head differences and changes for historical water levels in those UFZ and SFZ wells for evidence of hydraulic connectivity 2. Install one SFZ monitoring well each near BMW-5 and BMW-10R within likely footprint of northeast fracture zone, using this iterative drilling and monitoring process: • Case well 15 ft into bedrock and drill to 80 ft as open bore • Video well and collect low flow samples at 25 and 60 ft depths for VOC & SVOC analysis • Ream out 10" to 80 ft, grout in 6" casing, and open bore drill to 180 ft • Video well and collect low flow samples at 90, 125, and 175 ft depths for VOC & SVOC analysis 3. Evaluate logged, video, and vertical sampling data for indications of impact horizons and potential vertical migration potential, and compare results to monitoring intervals in other BMW wells	1. Evaluated historical records, no additional records evaluation needed 2. Installed and videoed new BMW well near BMW-5. No additional wells there are needed. Planned BMW well near BMW-10R only installed to 80 ft due to DNAPL entry. No additional well at this location is recommended. 3. Evaluated video of wells; **DNAPL monitoring and evaluation of downward migration is ongoing**	1. Well logs must have geologic description to evaluate 2. Migration/monitoring indicators are geologic fractures, karst, DNAPL presence, water entry indications 3. Small UFZ-SFZ head differences combined with lower UFZ elevations than other wells suggest hydraulic connection; similar patterns through seasons of UFZ with SFZ well vs other pairs may also indicate connectivity 4. Field evidence of UFZ-SFZ connection via fractures: • DNAPL horizons spanning UFZ – SFZ • Visual vertical fractures or evidence of fracturing into the SFZ • Similar analytical data in UFZ and SFZ • Rapid recharge of water into SFZ when removed

Issue Statements	Objective	Investigation Approach	Status/Recommendations	Decision Factors or Criteria
F. UPDATE DELINEATION OF SECONDARY FLOW ZONE DISSOLVED PHASE PLUME				
On-site SFZ plume is not delineated at two locations • Southwest at BMW-10R (high COC concentrations) • North at BMW-02 (decreasing concentration trend)	• Define the on-site and off-site SFZ horizontal extent of plume in area of BMW-10R • Determine need for/scope of corrective measures.	1. Install 2 SFZ monitoring wells in addition to the SFZ vertical delineation well from (E) to 180 ft, northwest and southwest of BMW-10R. Field log bores to identify DNAPL horizons 2. Check wells for DNAPL, obtain groundwater samples, and analyze for VOCs and SVOCs 3. Evaluate plume concentration trends in BMW-2 from Permit sampling events**. Perform Mann-Kendall Analysis to evaluate plume stability**	1. Installed one SFZ monitoring well northwest of BMW-10R after first attempt encountered void and completed as SMW well. Southwest well not installed due to no off-site access. **Recommend evaluating BMW-10R concentration trend for further delineation need**. 2. Checking wells for DNAPL and groundwater sampling is ongoing 3. **Evaluate BMW-2 statistical trends**	1. Plume edge for delineation is defined by COC concentrations greater than GWPS 2. If DNAPL present, no groundwater sampling is needed 3. If sampled groundwater results exceed GWPS, evaluate need for further step-out wells based on plume definition and analytical data. **If statistical increasing or unstable concentration trend is indicated, evaluate additional step-out well options. If statistical decreasing trends predominate, evaluate as likely stable and evaluate delineation based on groundwater flow direction**
G. UPDATE IDENTIFICATION AND CHARACTERIZATION OF ON-SITE SOURCE MATERIAL				
Extent of remediation of former SWMUs is uncertain, and residual source material may be present • Ongoing DNAPL recovery north, east, central Site areas • High plume COC concentrations on-site	1. Confirm on-site source areas have been identified by previous investigations. 2. Update information on the location, volume, mobility and leachability of source material present. 3. Identify physical site characteristics that affect ability to remove, treat and/or contain source materials.	1. Perform TarGOST investigation in source areas with borings on 45-ft spacing in orthogonal grid pattern around source SWMU ponds (see **Figure 12.0**) • Grid orientation north-south, east-west to intersect northwest and northeast fracture trends that may act to collect mobile DNAPL • Target edges of former ponds where DNAPL is recovered • Extend grid lines and fill in as necessary to delineate DNAPL masses 2. Use Geoprobe borings to sample TarGOST "hot spots" for visual evaluation and to collect and analyze samples for chemical verification and geotechnical parameters that may be needed for remedial option evaluation	1. TarGOST investigation completed. 2. Three follow-up Geoprobe borings were completed and sampled **Additional residual DNAPL borings may be considered if needed for remedial option evaluation**	1. If DNAPL masses are indicated in two nearby evaluated areas, use fill-in borings to test for connection 2. If results indicate large masses of DNAPL, evaluate mobility potential (mass size, DNAPL volume estimate, proximity to migration pathways, historical recovery downgradient) 3. If DNAPL masses are present and have mobility potential, design appropriate stabilization, removal, or treatment measures options.
H. EVALUATE PUMPING CENTER 1 HYDRAULIC CAPTURE AND CURRENT CAPACITY OF PUMPING CENTERS				
Hydraulic control at Pumping Center 1 may not be consistent, and capacity to handle increased pumping is not known • Concentrations of COCs in downgradient wells remain elevated • Groundwater surface seep occurs during high precipitation recharge events	Determine strength, consistency, and potential need for increased hydraulic control in central area of Pumping Center 1 near seep	1. Evaluate historical hydraulic control at PC-1 from historical potentiometric map patterns, water level data, and pumping rate changes 2. Evaluate current hydraulic control at central PC-1 area near seep • Install unconsolidated zone piezometer at area of high recharge seep • Collect manual and automatic-recorded water levels from piezometer and immediate downgradient monitoring wells • Perform short term pumping test with higher rate pump and monitor water levels	1. Historical evaluation of PC-1, and other PCs, completed. 2. Piezometer not installed due increased hydraulic control from repaired recovery wells. **Water level auto-recording in PC-1 is ongoing**. Increased hydraulic control and semi-continuous water level recording precludes need for pumping test	1. Hydraulic control indicated by: • Hydraulic gradient toward pumping center • Monitoring well head decreases with increased pumping • Controlled piezometer water level during precipitation induced increased recharge events 2. Data from dry and wet seasons are needed for full evaluation

Issue Statements	Objective	Investigation Approach	Status/Recommendations	Decision Factors or Criteria
Recovery system capacities are uncertain at system Pumping Centers • Design capacity of current system pumping centers are not known • Potential to increase pumping within Pumping Centers existing infrastructure has not been determined	Determine current system effluent flow capacities for each pumping center, and combined centers capacity for system	1. Calculate effluent line capacity capability using piping dimensions, infrastructure restrictions, friction losses, existing pumping outputs, and treatment system in-flow mechanical arrangements for each pumping center for existing network setups 2. Calculate maximum pump rate output for each pumping center based on calculated existing piping capacity for that pumping center	1. Effluent line capacities at all PCs were calculated 2. Maximum pump rates were calculated for all PCs. Actual effluent pumping and treatment system capacities have been monitored. **PC output and treatment system handling capability monitoring is ongoing**	1. Calculations based on available piping data, map measurements, and current pump performance data 2. Calculations assume unobstructed pipe internal volume 3. Friction losses and other engineering parameters for calculations will use standard textbook reference values for piping type, dimensions, and restrictions as estimated where not available from design documents 4. No field measurements or testing will be done as part of this capacity evaluation

NOTE:

BOLD FONT indicates ongoing or investigation actions that still need to be performed

Table 6.0
MANN-KENDALL ANALYSIS OF ANALYTICAL DATA FOR BRW-2

SAMPLE LOCATION	DATE	Acenaphthylene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Indeno(1,2,3-cd)pyrene	Naphthalene	Phenanthrene
		(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
BRW-2	9/16/2010	4	33	19	30	28	3	9	740	-
	9/28/2011	2	6	5	7	6	1	3	1	-
	10/16/2012	0.3	0.2	0.1	0.1	0.2	<0.1	<0.1	4	7
	9/22/2014	0.3	0.1	0.3	0.3	0.2	<0.1	0.2	0.9	0.4
	9/23/2015	0.2	0.1	<0.1	<0.1	0.2	<0.1	<0.1	4	6
	9/6/2016	0.1	0.3	<0.1	0.2	0.2	<0.1	<0.1	<0.1	5
	9/23/2017	<0.1	0.6	<0.1	<0.1	0.4	<0.1	<0.1	<0.1	1
	Number of Times Sampled (n) =	7	7	7	7	7	7	7	7	5
	Number of Detects	6	7	4	5	7	2	3	5	5
	Range (Min-Max)	.0500 - 4.0000	.1000 - 33.0000	.0500 - 19.0000	.0500 - 30.0000	2000 - 28.000	.0500 - 3.0000	.0500 - 9.0000	.0500 - 740.0000	.4000 - 7.0000
	Recent Maximum =	0.3	0.6	0.3	0.3	0.4	0.05	0.2	4	7
	Recent Average =	0.19	0.26	0.11	0.14	0.24	0.05	0.08	1.8	3.88
	Standard Deviation =	1.4906	12.2031	7.0712	11.1513	10.3547	1.113	3.3686	279.0689	2.9953
	Coefficient of Variation (CV) =	1.5014	2.1196	2.0162	2.0705	2.0592	1.8331	1.9016	2.6046	0.772
	Trend >= 80% Confidence Level	Decreasing	Neither	Decreasing	Decreasing	Decreasing	Decreasing	Decreasing	Decreasing	Neither
	Trend >= 90% Confidence Level	Decreasing	Neither	Decreasing	Decreasing	Neither	Decreasing	Decreasing	Decreasing	Neither
	Trend Stability	N/A	Non-Stable	N/A	N/A	N/A	N/A	N/A	N/A	Stable
TOTALS	**Parameter Totals**	Acenaphthylene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Indeno(1,2,3-cd)pyrene	Naphthalene	Phenanthrene
	# of Increasing Trends	0	0	0	0	0	0	0	0	0
	# of Decreasing Trends	1	0	1	1	1	1	1	1	0
	# of No Trend/Stable	0	0	0	0	0	0	0	0	1
	# of No Trend/Non-Stable	0	1	0	0	0	0	0	0	0
	OverAll Totals									
	# of Monitoring Locations									1
	# of Increasing Trends									0
	# of Decreasing Trends									7
	# of No Trend/Stable									1
	# of No Trend/Non-Stable									1

NOTES:

mg/L = milligrams per liter

ATTACHMENT A

REMEDIAL ACTION OPTIMIZATION UPDATE AND MEMORANDUM

Former Tronox Facility
2800 High Street, Springfield, Missouri

WELL ID	SAMPLE DATE	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranther	Benzo(k)fluoranther	2-Chlorophenol	Chrysene	Dibenz(a,h)anthrace	Dibenzofuran	2,4-Dimethylphenol	2,4-Dinitrophenol	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyr	2-Methylnaphthalen	Naphthalene	Phenanthrene	Phenol	2-Picoline	Pyrene	2,4-D	Total PAHs	Benzene	Ethylbenzene	Toluene	Xylenes (Total)
		µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l
GROUNDWATER PROTECTION STANDARD		**1200**	**0.1**	**9600**	**0.1**	**0.2**	**0.1**	**0.1**	**0.5**	**0.1**	**0.1**	**7.9**	**540**	**70**	**300**	**1300**	**0.1**	**36**	**20**	**0.1**	**300**	**NS**	**960**	**NS**	**NS**	**5**	**700**	**1000**	**10000**
UPPER FLOW ZONE ON-SITE WELLS																													
PW-01	12/6/2013	32	0.3 J	0.5 J	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	6	<0.5	<10	4	15	<0.1	<0.1	2	2	<0.5	NS	<2	NS	NS	<0.2	<0.2	<0.2	<0.6
	9/23/2015	17	0.1 J	0.2	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	0.1 J	2	<0.5	<10	2	8	<0.1	0.1 J	8	0.4 J	<0.5	NS	1	NS	36.9	<0.2	<0.2	<0.2	<0.2
	9/9/2016	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.6	<0.1	<0.1	<0.6	<0.6	<11	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.6	<2	<0.1	NS	0	<0.2	<0.2	<0.2	<0.2
PW-03	12/6/2013	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	<0.1	<0.1	<0.1	0.1 J	<0.1	<0.5	NS	<0.1	NS	NS	<0.2	<0.2	<0.2	<0.6
PW-14	12/6/2013	28	<0.1	0.3 J	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	7	6	<0.1	<0.1	0.1 J	<0.1	<0.5	NS	3	NS	NS	<0.2	<0.2	<0.2	<0.6
PW-20	2/4/2010	390	6	NS	<1	<1	<1	NS	<1	<1	<1	NS	<3	<20	29	NS	<1.0	NS	7400	NS	<1	NS	NS	NS	7825	<3	50	12 J	130
	4/12/2011	450	6	NS	<1	<1	<1	NS	<1	<1	<1	NS	7 J	<10	28	NS	<1.0	NS	6500	NS	<1	NS	NS	NS	7023	6.5	63	19	150
	9/26/2011	410	7	NS	1 J	<1	<1	NS	<5	<1	<1	NS	9 J	<100	36	NS	<1.0	NS	5300	NS	<5	NS	NS	NS	5753	8.1	57	22	150
	4/1/2012	400	7	13	0.7	0.2 J	0.3 J	0.1 J	<0.5	0.5	<0.1	260	2	<10	35	240	<0.1	600	5700	280	<0.5	31	18	<0.17	6694	11	73	24	170
	12/7/2013	390	6	10	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	240	5	<10	26	230	<0.1	560	6100	260	<0.5	NS	13	NS	NS	6.9	67	21	170
	4/15/2014	430	5	10	0.2 J	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	290	9	<10	23	270	<0.1	430	6700	240	<0.5	28	11	<0.15	7689	6.3	46	15	130
	4/20/2015	370	4	8	0.2 J	<0.1	<0.1	<0.1	<0.5	0.2 J	<0.1	220	2	<10	23	200	<0.1	530	5400	230	<0.5	NS	12	NS	6247.4	9.8	62	16	140
	4/27/2017	300	4	9	0.2 J	<0.1	<0.1	<0.1	<0.5	0.2 J	<0.1	180	11	<11	18	170	<0.1	390	4500	200	<0.5	24	10	NS	NS	14	76	23	180
SMW-01	12/5/2013	<0.1	<0.1	<0.1	0.3 J	0.2 J	0.2 J	0.1 J	<0.5	0.2 J	<0.1	<0.5	<0.5	<10	0.6	<0.1	<0.1	<0.1	<0.1	0.2 J	<0.5	NS	0.5	NS	NS	<0.2	<0.2	<0.2	<0.6
SMW-03	12/6/2013	0.2 J	1	1	15	8	15	6	<0.5	16	0.8	<0.5	<0.5	<10	18	0.5	3	<0.1	0.2 J	2	<0.5	NS	18	NS	NS	<0.2	<0.2	<0.2	<0.6
	9/23/2015	DNAPL IN WELL																											
	9/9/2016	19	0.8	0.4 J	0.1 J	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	14	<0.5	<10	4	15	<0.1	9	25	16	<0.5	<2.0	2	NS	82.30	<0.2	0.8 J	0.8 J	2.7
SMW-11B	9/16/2010	38	<1.0	NS	<1.0	<1.0	<1.0	NS	<1.0	<1.0	<1.0	NS	<3.0	<10	2 J	NS	<1.0	NS	<1.0	NS	3 J	NS	NS	NS	38	<0.2	1.8	0.3 J	2.4 J
	9/27/2011	85	0.6 J	NS	<0.3	<0.3	0.3 J	NS	<1.0	<0.3	<0.3	NS	<1.0	<27	4	NS	<0.3	NS	1 J	NS	<1.0	NS	NS	NS	89	<0.2	1.7	<0.2	2.5 J
	10/16/2012	23	0.2 J	0.6	<0.1	<0.1	<0.1	<0.1	<0.6	<0.1	<0.1	2	<0.6	<11	2	14	<0.1	0.25	0.5 J	11	<0.6	<2.0	0.7	NS	51	<0.2	1	<0.2	1.4 J
	12/7/2013	<0.1	<0.1	0.1 J	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	0.2 J	2	<0.1	<0.1	<0.1	0.8	<0.5	NS	<0.1	NS	NS	<0.2	<0.2	<0.2	<0.6
	9/23/2014	23	0.1 J	0.3 J	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	2	<0.5	<10	1	13	<0.1	0.7	69	8	<0.5	<2	0.6	NS	115	<0.2	0.8 J	<0.2	1.1
	9/24/2015	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	0.2 J	<0.1	<0.1	<0.1	<0.1	0.2 J	<0.5	NS	0.4 J	NS	0.8	<0.2	<0.2	<0.2	<0.2
	9/9/2016	0.1 J	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	0.1 J	0.2 J	<0.1	<0.1	<0.1	0.2 J	<0.5	<2.0	<0.1	NS	0.6	<0.2	<0.2	1.5	0.8 J
SMW-12C	12/6/2013	NAPL IN WELL, NO SAMPLE																											
SMW-13	9/15/2010	<1	<1	NS	<1	<1	<1	NS	<1	<1	<1	NS	<3	<10	<1	NS	<1	NS	<1	NS	<1	NS	NS	NS	0	<0.2	<0.2	<0.2	<0.6
	9/27/2011	<0.1	<0.1	NS	<0.1	<0.1	<0.1	NS	<0.5	<0.1	<0.1	NS	<0.5	<10	0.3 J	NS	<0.1	NS	<0.1	NS	<0.5	NS	NS	NS	0	<0.2	<0.2	<0.2	<0.6
	10/16/2012	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<2	<0.1	NS	0	<0.2	<0.2	<0.2	<0.6
	12/6/2013	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	0.1 J	<0.1	<0.1	<0.1	<0.1	<0.5	NS	0.3 J	NS	NS	<0.2	<0.2	<0.2	<0.6
	4/15/2014	0.7	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	0.2 J	0.6	<0.1	<0.1	1	0.1 J	<0.5	<2	0.2 J	NS	2	<0.2	<0.2	<0.2	<0.2
	9/23/2014	0.7	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	0.2 J	0.6	<0.1	<0.1	1	0.1 J	<0.5	<2	0.2 J	NS	2	<0.2	<0.2	<0.2	<0.2
	9/23/2015	0.8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	0.7	<0.1	0.2 J	6	0.2 J	<0.5	NS	0.6	NS	8.3	<0.2	<0.2	<0.2	<0.2
	9/9/2016	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<2	0.2 J	NS	0.2	<0.2	<0.2	<0.2	<0.2
SMW-14	9/15/2010	220	3 J	NS	3 J	1 J	3 J	NS	<1	2 J	<1	NS	<3	<10	50	NS	<1	NS	1600	NS	<1	NS	NS	NS	1870	0.9 J	6.2	0.8 J	16
	9/27/2011	200	3	NS	3	0.6	1	NS	<0.5	2	<0.1	NS	<0.5	<10	44	NS	0.3 J	NS	1300	NS	<0.5	NS	NS	NS	1553.6	2.7 J	8.9	1.8 J	17
	10/16/2012	260	3	4	1	0.2 J	0.6	0.2 J	<0.5	0.9	<0.1	130	<0.5	<11	34	140	0.1 J	69	1400	41	<0.5	<2	14	NS	1899	1.9	7.7	0.8 J	13
	12/6/2013	250	2	3	0.5 J	<0.1	<0.1	<0.1	<0.5	0.3 J	<0.1	130	<0.5	<10	24	140	<0.1	16	1200	27	<0.5	NS	11	NS	NS	1.6	4.7	0.5 J	8.8
	4/15/2014	230	2	5	2	0.4 J	0.6	0.2 J	<0.5	1	<0.1	100	<0.5	<10	41	140	<0.1	11	680	14	<0.5	<2	25	NS	1141	2	5.8	0.6 J	8.5
	9/23/2014	230	2	5	2	0.4 J	0.6	0.2 J	<0.5	1	<0.1	100	<0.5	<10	41	140	<0.1	11	680	14	<0.5	<2	25	NS	1141	2	5.8	0.6 J	8.5
	9/23/2015	410	2	10	3	0.6	0.9	0.4 J	<0.5	2	<0.1	250	<0.5	<10	46	250	0.1 J	140	3200	87	<0.5	NS	26	NS	4038	1.5	7.5	0.9 J	17

Gray shading indicates well not sampled
Yellow shading indicates 1x-10x GWPS
Orange indicates 10x-100x GWPS
Red indicates >100x GWPS

WELL ID	SAMPLE DATE	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranther	Benzo(k)fluoranther	2-Chlorophenol	Chrysene	Dibenz(a,h)anthrace	Dibenzofuran	2,4-Dimethylphenol	2,4-Dinitrophenol	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyr	2-Methylnaphthalen	Naphthalene	Phenanthrene	Phenol	2-Picoline	Pyrene	2,4-D	Total PAHs	Benzene	Ethylbenzene	Toluene	Xylenes (Total)
		µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l
GROUNDWATER PROTECTION STANDARD		1200	0.1	9600	0.1	0.2	0.1	0.1	0.5	0.1	0.1	7.9	540	70	300	1300	0.1	36	20	0.1	300	NS	960	NS	NS	5	700	1000	10000
SMW-15	9/15/2010	210	9	NS	94	43	75	NS	<1	63	5	NS	<3	<10	350	NS	15	NS	77	NS	<1	NS	NS	NS	941	2.7	6.4	1.9	9.3
	9/27/2011	170	8	NS	56	25	47	NS	<3	38	2 J	NS	<3	<51	250	NS	9	NS	55	NS	<3	NS	NS	NS	658	4.8	9.7	2.1	11
	10/16/2012	210	8	30 D	79	29 D	51 D	18 D	<0.5	41 D	2	110	<0.5	<10	340	160	10	9	230	160 D	<0.5	<2.0	180 D	NS	1547	3.2	9.6	2	15
	12/6/2013	100	2	4	1	0.2 J	0.4 J	0.2 J	<0.5	0.7	<0.1	43	<0.5	<10	20	65	<0.1	0.2 J	89	4	<0.5	NS	10	NS	NS	7	12	1.6	11
	4/15/2014	130	2	5	1	0.3 J	0.6	0.2 J	<0.5	0.9	<0.1	43	<0.5	<10	26	81	<0.1	2	170	3	<0.5	<2.0	13	NS	433	5.6	9.7	2.4	14
	9/23/2014	130	2	5	1	0.3 J	0.6	0.2 J	<0.5	0.9	<0.1	43	0.8 J	<10	26	71	<0.1	2	170	3	<0.5	<2.0	13	NS	433	5.6	9.7	2.4	14
	9/24/2015	100	1	4	2	0.9	1	0.5	<0.5	2	0.1 J	17	<0.5	<10	24	63	0.4 J	<0.1	<0.1	4	<0.5	NS	13	NS	215.9	5.6	3.2	0.5 J	3.3
	9/10/2016	51	0.5 J	2	1	0.4 J	0.7	0.2 J	<0.5	0.7	<0.1	3.0	<0.5	<11	16	34	0.2 J	<0.1	0.2	0.7	<0.5	<2.0	9	NS	116.6	<0.2	<0.2	<0.2	<0.2
SMW-16	9/16/2010	<1.0	<1.0	NS	<1.0	<1.0	<1.0	NS	<1.0	<1.0	<1.0	NS	<3.0	<10	<1.0	NS	<1.0	NS	<1.0	NS	<1.0	NS	NS	NS	0	<0.2	<0.2	<0.2	<0.6
	9/27/2011	<0.6	<0.6	NS	<0.6	<0.6	<0.6	NS	<3.0	<0.6	<0.6	NS	<3.0	<55	<0.6	NS	<0.6	NS	<0.6	NS	<3.0	NS	NS	NS	0	<0.2	<0.2	<0.2	<0.6
	10/17/2012	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	0.1 J	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<2.0	0.1 J	NS	0	<0.2	<0.2	<0.2	<0.6
	12/6/2013	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	<0.2	<0.2	<0.2	<0.6
	4/15/2014	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<11	<0.1	<0.1	<0.1	<0.1	0.1 J	<0.1	<0.5	<2.0	<0.1	NS	0	<0.2	<0.2	<0.2	<0.2
	9/23/2014	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	<0.1	<0.1	<0.1	0.1 J	<0.1	<0.5	<2.0	<0.1	NS	0	<0.2	<0.2	<0.2	<0.2
	9/24/2015	0.3 J	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	0.1 J	<0.1	<0.1	0.8	<0.1	<0.5	NS	<0.1	NS	1.2	<0.2	<0.2	<0.2	<0.2
	9/10/2016	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.6	<0.1	<0.1	<0.6	<0.6	<11	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.6	<2.0	<0.1	NS	0	<0.2	<0.2	<0.2	<0.2
SMW-17	2/4/2010	330	21	NS	5 J	2 J	4 J	NS	<1.0	4 J	<1.0	NS	<3.0	<21	41	NS	<1.0	NS	4800	NS	<1.0	NS	NS	NS	5192	<3.0	25 J	<4.0	37
	4/12/2011	560	35	NS	1 J	<1.0	<1.0	NS	<1.0	<1.0	<1.0	NS	<3.0	<10	32	NS	<1.0	NS	10000	NS	<1.0	NS	NS	NS	10527	1.8	44	4.7	59
	9/27/2011	450	26	NS	17	6	11	NS	<5.0	12	<1.0	NS	<5.0	<100	110	NS	2 J	NS	5500	NS	<5.0	NS	NS	NS	6132	2.3 J	50	6.2	81
	4/1/2012	390	17	12	8	3	5	2	<0.5	5	0.3 J	220	<0.5	<10	43	200	0.9	360	4400	220	<0.5	<2.0	25	<0.17	5331	1.2	23	3.1	35
	12/5/2013	300	11	6	0.2 J	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	160	<0.5	<10	10	150	<0.1	200	3000	120	<0.5	NS	6	NS	NS	3.1	27	4.3	35
	4/15/2014	380	15	9	0.3 J	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	210	<0.5	<10	20	180	<0.1	230	3300	160	<0.5	<2.0	10	<0.15	4074	2.3	13	3.7	39
	4/20/2015	110	3	1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	56	<0.5	<10	2	49	<0.1	89	1200	28	<0.5	NS	0.9	NS	1393.9	1 J	7	1	10
	4/27/2017	47	0.6	0.3 J	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	5	0.6 J	<11	0.3 J	16	<0.1	<0.1	<0.1	3	<0.6	<2.0	<0.1	NS	NS	0.3 J	3.3	0.6 J	5.5
SMW-18	9/17/2010	<1.0	<1.0	NS	<1.0	<1.0	<1.0	NS	<1.0	<1.0	<1.0	NS	<3.0	<10	<1.0	NS	<1.0	NS	<1.0	NS	<1.0	NS	NS	NS	0	<0.2	<0.2	<0.2	<0.6
	9/27/2011	<0.1	<0.1	NS	<0.1	<0.1	<0.1	NS	<0.5	<0.1	<0.1	NS	<0.5	<10	<0.1	NS	<0.1	NS	<0.1	NS	<0.5	NS	NS	NS	0	<0.2	<0.2	<0.2	<0.6
	10/17/2012	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	0.1 J	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<2.0	<0.1	NS	0	<0.2	<0.2	<0.2	<0.6
	12/6/2013	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	NS	<0.1	NS	NS	<0.2	<0.2	<0.2	<0.6
	4/15/2014	0.1 J	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	0.4 J	<0.1	<0.1	0.3 J	<0.1	<0.5	<2.0	<0.1	NS	0	<0.2	<0.2	<0.2	<0.2
	9/23/2014	0.1 J	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	0.1 J	<0.1	<0.1	0.3 J	<0.1	<0.5	<2.0	<0.1	NS	0	<0.2	<0.2	<0.2	<0.2
	9/24/2015	0.4 J	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	0.2 J	<0.1	<0.1	0.3 J	<0.1	<0.5	NS	<0.1	NS	0.9	<0.2	<0.2	<0.2	<0.2
	9/10/2016	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.6	<0.1	<0.1	<0.6	<0.6	<12	<0.1	<0.1	<0.1	<0.1	0.2 J	<0.1	<0.6	<2.0	<0.1	NS	0.2	<0.2	<0.2	<0.2	<0.2
SMW-19	12/6/2013	NAPL IN WELL, NO SAMPLE																											
SMW-22R	2/4/2010	530	11	NS	37	16	24	NS	<1.0	27	<1.0	NS	<3.0	<20	220	NS	5	NS	9500	NS	<1.0	NS	NS	NS	10370	12 J	31	12 J	97
	9/16/2010	NAPL IN WELL, NO SAMPLE																											
	4/12/2011	570	6	NS	6	2 J	4 J	NS	<1.0	5	<1.0	NS	11	<10	51	NS	<1.0	NS	8300	NS	<1.0	NS	NS	NS	7949	7.9	29	9.6	84
	9/26/2011	590	9	NS	41	16	28	NS	<5.0	30	<1.0	NS	<5.0	<100	210	NS	5	NS	6700	NS	<5.0	NS	NS	NS	7629	8.5	33	10	98
	4/1/2012	510	7	21	16	5 J	9	4 J	<5.0	12	<1.0	370	<5.0	<100	110	330	1 J	670	7300	370	<5.0	<21	64	<0.16	7849	12	30	12	95
	12/5/2013	420	5 J	10 J	<2.0	<2.0	<2.0	<2.0	<10	<2.0	<2.0	280	13 J	<200	18	250	<2.0	400	5700	250	<10	NS	10	NS	NS	13	29	13	95
	4/15/2014	370	8	11	0.3 J	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	230	6 J	<10	21	220	<0.1	530	6500	240	<0.5	3 J	9	<3.0	7379	23	25	25	110
	4/7/2015	480	4	9	0.1 J	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	320	3	<10	19	270	<0.1	410	4700	250	<0.5	NS	10	NS	5742.1	9	21	7.2	58
	4/26/2017	350	3	6	0.1 J	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	220	28	<11	16	200	<0.1	240	3400	190	<0.5	<2.0	9	NS	NS	9.6	15	6.8	45
SMW-27	12/5/2013	WELL DRY NO SAMPLE																											

Gray shading indicates well not sampled
Yellow shading indicates 1x-10x GWPS
Orange indicates 10x-100x GWPS
Red indicates >100x GWPS

WELL ID	SAMPLE DATE	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranther	Benzo(k)fluoranther	2-Chlorophenol	Chrysene	Dibenz(a,h)anthrace	Dibenzofuran	2,4-Dimethylphenol	2,4-Dinitrophenol	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyr	2-Methylnaphthalen	Naphthalene	Phenanthrene	Phenol	2-Picoline	Pyrene	2,4-D	Total PAHs	Benzene	Ethylbenzene	Toluene	Xylenes (Total)
		µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l
GROUNDWATER PROTECTION STANDARD		**1200**	**0.1**	**9600**	**0.1**	**0.2**	**0.1**	**0.1**	**0.5**	**0.1**	**0.1**	**7.9**	**540**	**70**	**300**	**1300**	**0.1**	**36**	**20**	**0.1**	**300**	**NS**	**960**	**NS**	**NS**	**5**	**700**	**1000**	**10000**
SMW-30	2/4/2010	**160**	**2 J**	NS	<1.0	<1.0	<1.0	NS	<1.0	<1.0	<1.0	NS	**3 J**	<21	**5**	NS	<1.0	NS	**1200**	NS	<1.0	NS	NS	NS	1365	**0.4 J**	**1.4**	**3.9**	**7.2**
	9/17/2010	**7**	<1.0	NS	<1.0	<1.0	<1.0	NS	<1.0	<1.0	<1.0	NS	<3.0	<10	<1.0	NS	<1.0	NS	**33**	NS	<1.0	NS	NS	NS	40	<0.2	**0.4 J**	<0.2	**0.7**
	4/12/2011	**260**	**3 J**	NS	<1.0	<1.0	<1.0	NS	<1.0	<1.0	<1.0	NS	**25**	<10	**5**	NS	<1.0	NS	**2500**	NS	<1.0	NS	NS	NS	2785	**0.7 J**	**5.8**	**2.2**	**12 J**
	9/27/2011	**290**	**3**	NS	<0.1	<0.1	<0.1	NS	<0.5	<0.1	<1.0	NS	**25**	<10	**6**	NS	<0.1	NS	**2900**	NS	<0.5	NS	NS	NS	3224	**1.2 J**	**6.5**	**3.2 J**	**15**
	4/1/2012	**240**	**3**	**7**	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	**140**	**3**	0	**7**	**140**	<0.1	**200**	**2600**	**83**	<0.5	<2.0	**3**	NS	3083	**0.6 J**	**5.7**	**2.2**	**12**
	10/16/2012	**200**	**2**	**7**	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	**110**	**3**	<10	**7**	**110**	<0.1	**110**	**1800**	**83**	<0.5	<2.0	**3**	NS	2212	**0.4 J**	**4.1**	**1.6**	**7.8**
	12/7/2013	**230**	**2**	**8**	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	**140**	**61**	<10	**5**	**130**	<0	**210**	**2500**	**95**	<1.0	NS	**2**	NS	NS	**1 J**	**6**	**3**	**13**
	4/14/2014	**5**	<0.1	**0.4 J**	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	**2**	**2**	<10	**0.1 J**	**3**	<0.1	<0.1	**0.2 J**	**1**	<0.5	<2.0	**0.1 J**	NS	9	<0.2	<0.2	<0.2	<0.2
	9/23/2014	**0.1 J**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	<0.1	<0.1	<0.1	**0.1 J**	<0.1	<0.5	<2.0	<0.1	NS	0	<0.2	**1.6**	**0.7 J**	**3.4**
	4/7/2015	**3**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	**2**	<0.5	<10	<0.1	**1**	<0.1	<0.1	<0.1	**0.5 J**	<0.5	NS	<0.1	NS	4.5	<0.2	<0.2	<0.2	**0.3 J**
	9/23/2015	**52**	**0.6**	**0.7**	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	**26**	**14**	<10	**0.5**	**23**	<0.1	**33**	**140**	**5**	<0.5	NS	**0.3 J**	NS	221.1	**0.2 J**	**1.8**	**0.8 J**	**3.9**
	9/8/2016	**8.0**	**0.1 J**	**0.3 J**	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	**4.0**	**1.0**	<10	**0.1 J**	**5**	<0.1	<0.1	<0.1	**2.0**	<0.5	<2.0	<0.1	NS	20.5	<0.2	<0.2	<0.2	<0.2
	4/28/2017	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<11	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<2.0	<0.1	NS	NS	<0.2	<0.2	<0.2	<0.2
SMW-76	10/16/2016	**150**	**6**	**16**	**36**	**17**	**25**	**11**	<0.5	**26**	**2**	**100**	<0.5	<1.0	**170**	**100**	**6**	**11**	**67**	**110**	<0.5	<2.0	**100**	NS	842	<0.2	**1.7**	<0.2	**3.8**
	2/1/2017	**41**	**2**	**0.8**	**2**	**0.7**	**0.9**	**0.4 J**	<0.6	**2**	<0.1	**5**	<0.6	<12	**48**	**4**	**0.1 J**	<0.1	<0.1	**1**	<0.6	<2	**21**	NS	NS	<0.2	<0.2	<0.2	<0.2
	4/27/2016	**29**	**0.8**	**0.6**	**0.8**	<0.1	**0.2**	<0.1	<0.5	**0.4 J**	<0.1	**16**	<0.5	<11	**20**	**15**	<0.1	<0.1	**4**	**0.3 J**	<0.5	<2.0	**6**	NS	NS	<0.2	**0.3 J**	<0.2	**0.7 J**
RW-01	11/13/2013	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	<0.1	<0.1	<0.1	**0.4 J**	<0.1	<0.5	NS	<0.1	NS	NS	<0.2	<0.2	<0.2	<0.6
RW-02	11/13/2013	**2**	<0.1	**0.5 J**	**2**	**0.4 J**	**0.6**	**0.3 J**	<0.6	**2**	<0.1	<0.6	<0.6	<12	**36**	<0.1	<0.1	<0.1	<0.1	**0.2 J**	<0.6	NS	**33**	NS	NS	<0.2	<0.2	<0.2	<0.6
RW-03	11/13/2013	**0.2 J**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.6	<0.1	<0.1	<0.6	<0.6	<11	**1**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.6	NS	**0.3 J**	NS	NS	<0.2	**0.6 J**	<0.2	**1.2 J**
RW-04	11/13/2013	**41**	**0.8**	**11**	**4**	**0.9**	**1**	**0.6**	<0.5	**2**	<0.1	**17**	<0.5	<10	**63**	**65**	**0.2 J**	<0.1	<0.1	**100**	<0.5	NS	**37**	NS	NS	<0.2	**1 J**	<0.2	**2 J**
RW-05	11/13/2013	NAPL IN WELL, NO SAMPLE																											
RW-06	11/13/2013	**120**	**7**	**22**	**36**	**28**	**36**	**11**	<0.5	**20**	**2**	**9**	<0.5	<11	**230**	**65**	**13**	<0.1	<0.1	**190**	<0.5	NS	**160**	NS	NS	<0.2	**0.6 J**	<0.2	**1.1**
RW-07	11/13/2013	**1200**	**260**	**300**	**430**	**150**	**220**	**100**	<5.0	**260**	**14**	**1000**	**3100**	<110	**2000**	**1400**	**44**	**1700**	**15000**	**3800**	**5100**	NS	**1300**	NS	NS	**210**	**81**	**400**	**530**
RW-08	11/13/2013	NAPL IN WELL, NO SAMPLE																											
RW-09	11/13/2013	NAPL IN WELL, NO SAMPLE																											
RW-10R	11/13/2013	**540**	**17**	**63**	**77**	**34**	**49**	**20**	<0.5	**73**	**2**	**360**	**1**	<10	**320**	**400**	**12**	**360**	**700**	**720**	<0.5	NS	**200**	NS	NS	**0.4 J**	**2.7**	**0.5 J**	**5.1**
RW-11	11/13/2013	**74**	**1**	**2**	**0.3 J**	**0.2 J**	**0.2 J**	<0.1	<0.5	**0.2 J**	<0.1	**22**	**8**	<10	**5**	**31**	<0.1	**6**	**85**	**7**	<0.5	NS	**3**	NS	NS	**6.2**	**6.3**	**0.7 J**	**6.8**
RW-12R	11/13/2013	**100**	**0.7**	**0.4 J**	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	**28**	**2**	<10	**3**	**19**	<0.1	**2**	**44**	**12**	<0.5	NS	**1**	NS	NS	**7.4**	**8.7**	**0.8 J**	**6.6**
RW-13	11/13/2013	NAPL IN WELL, NO SAMPLE																											
RW-14	11/13/2013	**410**	**6**	**51** `	**120**	**46**	**67**	**26**	<0.5	**80**	**4**	**240**	<0.5	<10	**490**	**290**	**16**	**100**	**310**	**630**	<0.5	NS	**330**	NS	NS	<1.0	10	<1.0	13
RW-15	11/13/2013	**440**	**3**	**16**	**3**	**0.9**	**1**	<0.6	**0.6**	**2**	<0.1	**250**	**0.7 J**	<11	**58**	**230**	**0.2 J**	**230**	**2700**	**320**	<0.6	NS	**33**	NS	NS	**2**	**25**	**4.4**	**40**
RW-16	11/13/2013	**1900**	**84**	**320**	**470**	**160**	**230**	**100**	<12	**320**	**9 J**	**1300**	150	<240	**2400**	**1500**	**55**	**1600**	**12000**	**4600**	55	NS	**1600**	NS	NS	**42**	**97**	**58**	**180**
RW-17	11/13/2013	**15**	**0.2 J**	**0.2 J**	**0.7**	<0.1	<0.1	<0.1	<0.6	**0.5 J**	<0.1	<0.6	<0.6	<12	**20**	**19**	<0.1	<0.1	**0.5 J**	**0.1 J**	<0.6	NS	**9**	NS	NS	<0.2	<0.2	<0.2	<0.6
RW-18	11/13/2013	**100**	**1**	**8**	**0.7**	**0.2 J**	**0.2 J**	<0.1	<0.6	**0.5 J**	<0.1	**55**	<0.6	<11	**40**	**130**	<0.1	<0.1	**1**	**7**	<0.6	NS	**21**	NS	NS	<0.2	**0.3 J**	<0.2	<0.6
RW-19	11/13/2013	**57**	**1**	**0.8**	**0.2 J**	<0.1	<0.1	<0.1	<0.6	**0.3 J**	<0.1	**5**	<0.6	<11	**10**	**33**	<0.1	<0.1	**2**	**0.8**	<0.6	NS	**3**	NS	NS	<0.2	**0.2 J**	<0.2	<0.6
RW-20	11/13/2013	**190**	**9**	**22**	**6**	**2**	**3**	**2**	<0.5	**5**	**0.3 J**	**100**	**53**	<11	**55**	**120**	**0.8**	**140**	**1300**	**170**	**5**	NS	**31**	NS	NS	**27**	**57**	**22**	**93**
RW-22	11/13/2013	**490**	**18**	**80**	**150**	**61**	**83**	**37**	<0.5	**120**	**4**	**290**	**2**	<11	**720**	**390**	**20**	**140**	**1100**	**1100**	<0.5	NS	**470**	NS	NS	**8.5**	**58**	**12**	**89**
RW-23	11/13/2013	**77**	**3**	**20**	**10**	**4**	**6**	**2**	<0.5	**7**	**0.3 J**	**45**	**2**	<10	**72**	**98**	**2**	<0.1	0.6	**170**	<0.5	NS	**43**	NS	NS	**0.9 J**	**3.7**	**3.4**	**16**
RW-24	11/13/2013	**110**	**11**	**32**	**20**	**7**	**10**	**5**	<0.5	**16**	**0.5 J**	**59**	**42**	<10	**110**	**79**	**2**	**82**	**720**	**190**	**4**	NS	**70**	NS	NS	**28**	**53**	**27**	**95**
RW-25	11/13/2013	**220**	**12**	**11**	**3**	**0.6**	**0.9**	**0.4 J**	<0.6	**2**	<0.1	**120**	**75**	<11	**43**	**130**	**0.1 J**	**140**	**3400**	**170**	**15**	NS	**23**	NS	NS	**12**	**32**	**21**	**81**

Gray shading indicates well not sampled
Yellow shading indicates 1x-10x GWPS
Orange indicates 10x-100x GWPS
Red indicates >100x GWPS

WELL ID	SAMPLE DATE	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranther	Benzo(k)fluoranther	2-Chlorophenol	Chrysene	Dibenz(a,h)anthrace	Dibenzofuran	2,4-Dimethylphenol	2,4-Dinitrophenol	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyr	2-Methylnaphthaler	Naphthalene	Phenanthrene	Phenol	2-Picoline	Pyrene	2,4-D	Total PAHs	Benzene	Ethylbenzene	Toluene	Xylenes (Total)
		µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l
GROUNDWATER PROTECTION STANDARD		1200	0.1	9600	0.1	0.2	0.1	0.1	0.5	0.1	0.1	7.9	540	70	300	1300	0.1	36	20	0.1	300	NS	960	NS	NS	5	700	1000	10000
OFF-SITE WELLS																													
SMW-58	12/4/2013	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	<0.1	<0.1	<0.1	0.6	<0.1	<0.5	NS	<0.1	NS	NS	<0.2	<0.2	<0.2	<0.6
SMW-59	12/4/2013	25	0.5	0.3 J	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	5	<0.5	<10	3	11	<0.1	<0.1	0.9	0.2 J	<0.5	NS	2	NS	NS	<0.2	<0.2	<0.2	<0.6
SMW-62	2/5/2010	<1.0	<1.0	NS	<1.0	<1.0	<1.0	NS	<1.0	<1.0	<1.0	NS	<3.0	<21	<1.0	NS	<1.0	NS	<1.0	NS	<1.0	NS	NS	NS	0	<0.2	<0.2	<0.2	<0.6
	9/27/2011	<0.1	<0.1	NS	<0.1	<0.1	0.2 J	NS	<0.5	0.1 J	<0.1	NS	<0.5	<10	<0.1	NS	<0.1	NS	0.1 J	NS	<0.5	NS	NS	NS	0	<0.2	<0.2	<0.2	<0.6
	10/16/2012	<0.1	<0.1	0.1 J	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<2.0	<0.1	NS	0	<0.2	<0.2	<0.2	<0.6
	12/4/2013	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	NS	<0.1	NS	NS	<0.2	<0.2	<0.2	<0.6
	9/23/2014	0.9	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	0.1 J	0.4 J	<0.1	<0.1	2	0.3 J	<0.5	<2.0	<0.1	NS	3	<0.2	<0.2	<0.2	<0.2
	9/24/2015	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	6	<0.5	<10	<0.1	<0.1	<0.1	<0.1	0.4 J	<0.1	<0.5	NS	<0.1	NS	0.4	<0.2	<0.2	<0.2	<0.2
	9/9/2016	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<2.0	<0.1	NS	0	<0.2	<0.2	<0.2	<0.2
SMW-64	2/5/2010	210	2 J	NS	<1.0	<1.0	<1.0	NS	<1.0	<1.0	<1.0	NS	<3.0	<20	20	NS	<1.0	NS	470	NS	<1.0	NS	NS	NS	700	2.4	<0.2	2.9	5.1
	9/16/2010	200	2 J	NS	<1.0	<1.0	<1.0	NS	<1.0	<1.0	<1.0	NS	<3.0	<10	22	NS	<1.0	NS	720	NS	<1.0	NS	NS	NS	942	2.2	2.9	<0.2	5
	4/12/2011	210	2 J	NS	<1.0	<1.0	<1.0	NS	<1.0	<1.0	<1.0	NS	<3.0	<10	18	NS	<1.0	NS	730	NS	<1.0	NS	NS	NS	958	3.1	9.8	0.5 J	11
	9/27/2011	210	2	NS	0.8	<0.1	0.2 J	NS	<0.5	0.5 J	<1.0	NS	<0.5	<10	27	NS	<0.1	NS	840	NS	<0.5	NS	NS	NS	1079.8	2.7	8.2	0.2 J	7.3
	4/1/2012	190	2	5	0.4 J	<0.1	<0.1	<0.1	<0.5	0.2 J	<0.1	6	<0.5	<10	20	79	<0.1	15	260	74	<0.5	<2.0	9	NS	657	1.9	2.6	<0.2	4.2 J
	10/16/2012	230	1	6	0.5 J	<0.1	0.1 J	<0.1	<0.5	0.3 J	<0.1	6	<0.5	<10	26	120	<0.1	38	470	100	<0.5	<2.0	12	NS	965	2.9	5.1	0.2 J	6.2
	12/5/2013	130	1	4	0.4 J	<0.1	<0.1	<0.1	<0.5	0.2 J	<0.1	11	<0.5	<10	18	74	<0.1	1	89	50	<0.5	NS	9	NS	NS	1.1	0.7 J	<0.2	1.5
	4/14/2014	160	1	3	0.3 J	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	6	<0.5	<10	16	78	<0.1	0.8	71	40	<0.5	<2.0	7	NS	376	1.1	2.5	0.2 J	2.9
	9/23/2014	160	1	4	0.3 J	<0.1	<0.1	<0.1	<0.5	0.1 J	<0.1	9	<0.5	<10	21	88	<0.1	8	230	50	<0.5	<2.0	10	NS	564	0.9 J	6.1	0.3 J	6.4
	4/7/2015	130	1	3	0.2 J	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	8	<0.5	<10	14	73	<0.1	6	130	33	<0.5	NS	6	NS	390.2	0.8 J	2.6	<0.2	3.4
	9/24/2015	130	0.6	2	0.4 J	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	16	64	<0.1	3	51	19	<0.5	NS	9	NS	292	0.3 J	1.6	<0.2	2.2
	9/9/2016	140	0.8	2	0.4 J	<0.1	<0.1	<0.1	<0.5	0.2 J	<0.1	5	<0.5	<10	15	75	<0.1	8	30	25	<0.5	<2.0	7	NS	308.4	0.6 J	0.8 J	<0.2	1.7
	4/28/2017	130	0.9	2	0.3 J	<0.1	<0.1	<0.1	<0.1	0.1 J	<0.1	3	<0.5	<11	13	73	<0.1	8	3	36	<0.5	<2.0	6	NS	NS	1.4	1.5	<0.2	3.1
SMW-71	2/5/2010	<1.0	<1.0	NS	<1.0	<1.0	<1.0	NS	<1.0	<1.0	<1.0	NS	<3.0	<20	5 J	NS	<1.0	NS	<1.0	NS	<1.0	NS	NS	NS	0	<0.2	<0.2	<0.2	<0.6
	9/17/2010	<1.0	<1.0	NS	<1.0	<1.0	<1.0	NS	<1.0	<1.0	<1.0	NS	<3.0	<10	10	NS	<1.0	NS	<1.0	NS	<1.0	NS	NS	NS	10	<0.2	<0.2	<0.2	<0.6
	4/13/2011	1 J	<1.0	NS	<1.0	<1.0	<1.0	NS	<1.0	<1.0	<1.0	NS	<3.0	<10	6	NS	<1.0	NS	<1.0	NS	<1.0	NS	NS	NS	6	<0.2	<0.2	<0.2	<0.6
	9/27/2011	3	0.2 J	NS	0.5	0.1 J	0.2 J	NS	<0.5	<0.1	<0.1	NS	<0.5	<10	12	NS	<0.1	NS	<0.1	NS	<0.5	NS	NS	NS	15	<0.2	<0.2	<0.2	<0.6
	4/1/2012	6	0.1 J	0.8	0.9	0.2 J	0.4 J	0.2 J	<0.5	0.5 J	<0.1	<0.5	<0.5	<10	26	13	<0.1	<0.1	<0.1	0.1 J	<0.5	<2.0	12	NS	59	<0.2	<0.2	<0.2	<0.6
	10/16/2012	2	<0.1	0.1 J	0.3 J	<0.1	<0.1	<0.1	<0.5	0.1 J	<0.1	<0.5	<0.5	<10	10	4	<0.1	<0.1	<0.1	<0.1	<0.5	<2.0	4	NS	20	<0.2	<0.2	<0.2	<0.6
	12/5/2013	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	NS	<0.1	NS	NS	<0.2	<0.2	<0.2	<0.6
	4/15/2014	3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	2	<0.5	<10	<0.1	2	<0.1	3	37	1	<0.5	<2.0	<0.1	NS	43	0.2 J	0.3 J	0.3 J	1.2
	9/22/2014	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<2.0	0.2 J	NS	0	<0.2	<0.2	<0.2	<0.2
	4/7/2015	2	<0.1	0.1 J	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	0.8 J	<0.5	<10	2	3	<0.1	0.9	9	0.7	<0.5	NS	0.9	NS	17.7	<0.2	<0.2	<0.2	<0.2
	9/24/2015	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	110	<0.5	<10	2	<0.1	<0.1	<0.1	0.6	<0.1	<0.5	NS	2	NS	4.6	<0.2	<0.2	<0.2	<0.2
	9/8/2016	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<11	1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<2.0	0.9	NS	1.9	<0.2	<0.2	0.2 J	<0.2
	4/24/2017	1	<0.1	0.1 J	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	6	2	<0.1	<0.1	<0.1	<0.1	<0.5	<2	4	ND	NS	<0.2	<0.2	<0.2	<0.2
SMW-72	12/4/2013	25	0.6	2	2	0.7	0.9	0.4 J	<0.5	1	<0.1	29	<0.5	<10	9	24	0.3 J	20	120	13	<0.5	NS	6	NS	NS	0.2 J	3.3	0.3 J	3 J
	9/9/2016	4	0.3 J	2	1	0.6	0.8	0.4 J	<0.6	1	<0.1	65 D	<0.6	<11	12 D	46 D	0.3 J	0.2 J	4 D	1	<0.6	<2.0	6 D	NS	144.6	<0.2	1.5	0.3 J	0.7 J
	9/24/2015	14	0.6	4	3	2	2	0.8	<0.5	3	0.3 J	<0.5	<0.5	<10	22	86	0.8	0.6	1	3	<0.5	NS	13	NS	155.5	<0.2	4	0.2 J	0.8 J

Gray shading indicates well not sampled
Yellow shading indicates 1x-10x GWPS
Orange indicates 10x-100x GWPS
Red indicates >100x GWPS

WELL ID	SAMPLE DATE	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranther	Benzo(k)fluoranther	2-Chlorophenol	Chrysene	Dibenz(a,h)anthrace	Dibenzofuran	2,4-Dimethylphenol	2,4-Dinitrophenol	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyr	2-Methylnaphthalen	Naphthalene	Phenanthrene	Phenol	2-Picoline	Pyrene	2,4-D	Total PAHs	Benzene	Ethylbenzene	Toluene	Xylenes (Total)
		µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l
GROUNDWATER PROTECTION STANDARD		**1200**	**0.1**	**9600**	**0.1**	**0.2**	**0.1**	**0.1**	**0.5**	**0.1**	**0.1**	**7.9**	**540**	**70**	**300**	**1300**	**0.1**	**36**	**20**	**0.1**	**300**	**NS**	**960**	**NS**	**NS**	**5**	**700**	**1000**	**10000**
SMW-73	2/5/2010	<1.0	<1.0	NS	<1.0	<1.0	<1.0	NS	<1.0	<1.0	<1.0	NS	<3.0	<21	<1.0	NS	<1.0	NS	<1.0	NS	<1.0	NS	NS	NS	0	<0.2	<0.2	<0.2	<0.6
	9/17/2010	<1.0	<1.0	NS	<1.0	<1.0	<1.0	NS	<1.0	<1.0	<1.0	NS	<3.0	<10	<1.0	NS	<1.0	NS	<1.0	NS	<1.0	NS	NS	NS	0	<0.2	<0.2	<0.2	<0.6
	4/13/2011	<1.0	<1.0	NS	<1.0	**1 J**	**2 J**	NS	<1.0	**1 J**	<1.0	NS	<3.0	<10	**1 J**	NS	<1.0	NS	<1.0	NS	<1.0	NS	NS	NS	0	<0.2	<0.2	<0.2	<0.6
	9/27/2011	<0.1	**0.6**	NS	**1**	**2**	**3**	NS	<0.5	**1**	**0.3 J**	NS	<0.5	<10	**1**	NS	**1**	NS	<0.1	NS	<0.5	NS	NS	NS	9.6	<0.2	<0.2	<0.2	<0.6
	4/1/2012	<0.1	**0.2 J**	**0.1 J**	**0.6**	**0.8**	**1**	**0.5 J**	<0.5	**0.8**	**0.1 J**	<0.5	<0.5	<10	**0.6**	<0.1	**0.4 J**	<0.1	<0.1	**0.1 J**	<0.5	<2.0	**0.5**	NS	4	<0.2	<0.2	<0.2	<0.6
	10/16/2012	<0.1	**0.3 J**	**0.2 J**	**0.8**	**0.9**	**2**	**0.6**	<0.5	**0.8**	**0.1 J**	<0.5	<0.5	<10	**0.7**	<0.1	**0.5 J**	<0.1	<0.1	**0.1 J**	<0.5	<2.0	**0.5**	NS	6	<0.2	<0.2	<0.2	<0.6
	12/4/2013	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	<0.1	<0.1	<0.1	**0.2 J**	<0.1	<0.5	NS	<0.1	NS	NS	<0.2	<0.2	<0.2	<0.6
	4/15/2014	**2**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	**0.9 J**	<0.5	<10	<0.1	**0.8**	<0.1	**0.6**	**8**	**0.7**	<0.5	<2.0	<0.1	NS	12	<0.2	<0.2	<0.2	<0.2
	9/22/2014	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	<0.1	<0.1	<0.1	<0.1	**0.1 J**	<0.5	<2.0	<0.1	NS	0	<0.2	<0.2	<0.2	<0.2
	4/20/2015	**2**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	**2**	<0.5	<10	<0.1	**1**	<0.1	**2**	**24**	**1**	<0.5	NS	<0.1	NS	28	<0.5	<0.2	<0.5	<0.5
	9/24/2015	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	<0.1	<0.1	<0.1	**0.1 J**	<0.1	<0.5	NS	<0.1	NS	0.1	<0.2	<0.2	<0.2	<0.2
	9/8/2016	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<2.0	<0.1	NS	0	<0.2	<0.2	**0.2 J**	<0.2
	4/25/2017	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<2.0	<0.1	NS	NS	<0.2	<0.2	<0.2	<0.2
SMW-74	2/5/2010	**14**	<1.0	NS	**1 J**	**2 J**	**3 J**	NS	<1.0	**3 J**	<1.0	NS	<3.0	<20	**3 J**	NS	**1 J**	NS	**5 J**	NS	<1.0	NS	NS	NS	**14**	<0.2	<0.2	<0.2	<0.6
	9/17/2010	**2 J**	**1 J**	NS	**4 J**	**5 J**	**8**	NS	<1.0	**7**	<1.0	NS	<3.0	<10	<1.0	NS	**3 J**	NS	<1.0	NS	<1.0	NS	NS	NS	**15**	<0.2	<0.2	<0.2	<0.5
	4/13/2011	**10**	<1.0	NS	<1.0	<1.0	<1.0	NS	<1.0	<1.0	<1.0	NS	<3.0	<10	**2 J**	NS	<1.0	NS	**2 J**	NS	<1.0	NS	NS	NS	**10**	<0.2	<0.2	<0.2	<0.6
	9/27/2011	**22**	**0.6**	NS	**0.7**	**0.9**	**1**	NS	<0.5	**1**	**0.1 J**	NS	<0.5	<10	**8**	NS	**0.5 J**	NS	**4**	NS	<0.5	NS	NS	NS	**38.2**	<0.2	<0.2	<0.2	<0.6
	4/1/2012	**26**	**0.8**	**2**	**2**	**3**	**3**	**2**	<0.5	**3**	**0.5 J**	**9**	<0.5	<10	**7**	**19**	**2**	**0.3 J**	**4**	**2**	<0.5	<2.0	**2**	NS	**78**	<0.2	<0.2	<0.2	<0.6
	10/16/2012	**33**	**2**	**3**	**6**	**7**	**11**	**4**	<0.5	**9**	**0.8**	**14**	<0.5	<10	**11**	**27**	**4**	**0.4 J**	**4**	**4**	<0.5	<2.0	**5**	NS	**127**	<0.2	<0.2	<0.2	<0.6
	12/5/2013	**0.5 J**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	0.8 J	<0.5	<10	**0.1 J**	**0.6**	<0.1	<0.1	<0.1	**0.1 J**	<0.5	NS	<0.1	NS	NS	<0.2	<0.2	<0.2	<0.6
	4/15/2014	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	**1**	<0.1	<0.1	**1**	<0.1	<0.5	<2.0	<0.1	NS	**2**	<0.2	<0.2	<0.2	<0.2
	9/22/2014	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<2.0	<0.1	NS	**0**	<0.2	<0.2	<0.2	<0.2
	4/8/2015	**0.9**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	**0.4 J**	<0.1	**0.5**	**8**	**0.2 J**	<0.5	NS	<0.1	NS	**9.5**	<0.2	<0.2	<0.2	<0.2
	9/24/2015	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	<0.1	<0.1	<0.1	**0.6**	<0.1	<0.5	NS	<0.1	NS	**0.6**	<0.2	<0.2	<0.2	<0.2
	9/8/2016	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<2.0	<0.1	NS	**0**	<0.2	<0.2	**0.2 J**	<0.2
	4/24/2016	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<2.0	<0.1	ND	ND	<0.2	<0.2	<0.2	<0.2
SMW-75	2/5/2010	**21**	<1.0	NS	**2 J**	<1.0	<1.0	NS	<1.0	**1 J**	<1.0	NS	<3.0	<21	**60**	NS	<1.0	NS	**11**	NS	<1.0	NS	NS	NS	92	<0.2	<0.2	<0.2	<0.6
	4/13/2011	**12**	<1.0	NS	**2 J**	<1.0	<1.0	NS	<1.0	**1 J**	<1.0	NS	<3.0	<10	**43**	NS	<1.0	NS	**2 J**	NS	<1.0	NS	NS	NS	55	<0.2	<0.2	<0.2	<0.6
	12/5/2013	**2**	<0.1	0.2 J	**0.4 J**	<0.1	<0.1	<0.1	<0.5	**0.2 J**	<0.1	<0.5	<0.5	<10	**20**	**3**	<0.1	<0.1	**0.1 J**	<0.1	<0.5	NS	**6**	NS	NS	<0.2	<0.2	<0.2	<0.6
	4/7/2015	**2**	<0.1	0.1 J	**0.2 J**	**0.1 J**	**0.2 J**	<0.1	<0.5	**0.2 J**	<0.1	<0.5	<0.5	<10	**3**	**0.3 J**	<0.1	<0.1	<0.1	**0.1 J**	<0.5	NS	**1**	NS	7.2	<0.2	<0.2	<0.2	<0.3
SMW-77	10/16/2016	**0.16 J**	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.54	<0.11	< 0.11	<0.54	<0.54	<1.0	**0.69**	**0.15 J**	<0.11	<0.11	**0.14 J**	<0.11	<0.54	<0.22	**0.48 J**	NS	2.55	**0.3 J**	<0.2	**0.4 J**	<0.2
	1/31/2017	**3**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.6	<0.1	<0.1	<0.6	<0.6	<13	**1**	**0.3 J**	<0.1	<0.1	**0.3 J**	<0.1	<0.6	<3.0	**0.7**	NS	NS	<0.2	<0.2	<0.2	<0.2
	4/26/2017	**1**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<11	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<2.0	<0.1	NS	NS	<0.2	<0.2	<0.2	<0.2
SMW-78	10/16/2016	**1**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.51	<0.1	<0.1	**0.9**	<0.51	<1.0	**0.15 J**	**2.6**	<0.1	**0.28 J**	**0.54**	**1.6**	<0.51	<2.0	**0.29 J**	NS	6.62	**0.6 J**	**<0.2**	**1 J**	**0.8**
	1/31/2017	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.6	<0.1	<0.1	<0.6	<0.6	<11	0.1	0.1	0.1	0.1	0.1	0.1	<0.6	<2.0	<0.1	NS	NS	<0.2	<0.2	<0.2	<0.2
	4/24/2016	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<2.0	<0.1	NS	NS	<0.2	<0.2	<0.2	<0.2
SMW-79	-	WELL DRY																											

Gray shading indicates well not sampled
Yellow shading indicates 1x-10x GWPS
Orange indicates 10x-100x GWPS
Red indicates >100x GWPS

WELL ID	SAMPLE DATE	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranther	Benzo(k)fluoranther	2-Chlorophenol	Chrysene	Dibenz(a,h)anthrace	Dibenzofuran	2,4-Dimethylphenol	2,4-Dinitrophenol	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyr	2-Methylnaphthalen	Naphthalene	Phenanthrene	Phenol	2-Picoline	Pyrene	2,4-D	Total PAHs	Benzene	Ethylbenzene	Toluene	Xylenes (Total)
		µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l
GROUNDWATER PROTECTION STANDARD		1200	0.1	9600	0.1	0.2	0.1	0.1	0.5	0.1	0.1	7.9	540	70	300	1300	0.1	36	20	0.1	300	NS	960	NS	NS	5	700	1000	10000
SMW-80	11/21/2016	370	18	14	0.5	<0.1	0.1 J	<0.1	<0.5	0.4 J	<0.1	270	2	<1.0	23	230	<0.1	630	11000	210	0.5 J	<2.0	11	NS	12778.6	10	94	47	310
	12/16/2016	740	34	140	240	98	140	57	<0.5	170	9	630	3	<1.0	1200	750	28	740	8200	1700	<0.5	<2.0	650	NS	14156	9.3	92	45	300
	2/2/2017	310	14	9	0.5	0.1 J	0.2 J	<0.1	<0.5	0.4 J	<0.1	220	<0.5	<10	21	200	<0.1	520	9700	190	<0.5	<2.0	10	NS	NS	8	78	39	270
	4/27/2017	200	10	9	0.9	0.3 J	0.5 J	0.2 J	<0.5	0.7	<0.1	140	1	<11	17	130	<0.1	240	4300	130	<0.5	<2.0	9	NS	NS	3.7	41	18	150
SMW-81	10/16/2016	320	3	61	68	23	33	13	<0.5	47	2	220	<0.5	<1.0	400	350	6	43	4	950	<0.5	<2.0	240	NS	2520	<0.2	0.7 J	<0.2	2.7 J
	2/1/2017	18	0.2 J	2	0.8	0.2 J	0.3 J	0.2 J	<0.5	0.7	<0.1	5	<0.5	<10	11	19	<0.1	<0.1	<0.1	25	<0.5	<2	6	NS	NS	<0.2	<0.2	<0.2	0.3 J
	2/1/2017 MS	66	45	51	50	46	49	48	39	51	41	54	25	33	63	68	41	44	42	74	19	34	53	NS	NS	23	23	23	71
	2/1/2017 MSD	66	47	52	53	48	52	50	43	53	44	54	28	65	64	68	44	45	44	71	22	38	54	NS	NS	23	23	23	71
	4/28/2017	26	0.4 J	1	0.3	<0.1	0.2	<0.1	<0.5	0.4 J	<0.1	12	<0.5	<11	8	21	<0.1	<0.1	<0.1	7	<0.5	<2.0	3	NS	NS	<0.2	0.3 J	0.3 J	2
SMW-82	10/16/2016	470	1.9	22	9.8	2.6	5.4	2.1	<0.52	7.2	0.32 J	290	<0.52	<1.0	83	300	1.3	470	3900	390	<0.52	<2.0	47	NS	5242.62	<1.0	13	2.6 J	38
	2/2/2017	260	1	9	0.5	0.2 J	0.3 J	0.2 J	<0.5	0.5 J	<0.1	160	<0.5	<11	16	160	<0.1	300	2,700	160	<0.5	<2.0	8	NS	NS	0.2 J	12	2.3	39
	4/24/2016	300	2	10	2	0.3 J	0.8 J	0.4 J	<0.5	0.9	<0.1	180	<0.5	<11	21	170	0.1 J	320	3,300	160	<0.5	<2.0	<0.1	NS	NS	0.3 J	14	2.2	38
SMW-83	11/16/2016	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<1.0	0.2 J	<0.1	<0.1	<0.1	<0.1	0.2 J	<0.5	<2.0	0.3 J	NS	1.4	<0.2	<0.2	<0.2	<0.2
	2/1/2017	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.6	<0.1	<0.1	<0.6	<0.6	<12	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.6	<2.0	<0.1	NS	NS	<0.2	<0.2	<0.2	<0.2
	4/24/2016	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<2.0	<0.1	NS	NS	<0.2	<0.2	<0.2	<0.2
SMW-84	11/16/2016	410	3	17	2	0.5	0.7	0.3 J	<0.5	1	<0.1	290	1	<1.0	28	230	0.1 J	540	5000	240	1	<2.0	14	NS	6488.5	0.5 J	20	5	82
	2/2/2017	340	2	27	20	9	12	5	<0.5	16	0.8	250	<0.5	<11	98	220	3	350	3,300	350	<0.5	<2.0	60	NS	NS	0.6 J	16	4.6	61
	4/27/2017	330	5	33	24	10	13	6	<0.5	19	1	220	<0.5	<10	120	220	4	230	1,700	350	<0.5	<2.0	75	NS	NS	0.2 J	8.3	1.8	30
SMW-85	11/16/2016	37	1 J	5 J	6	6	9	4 J	<5.0	5	<1.0	24	<5.0	<1.00	42	32	3 J	<1.0	<1.0	32	<5.0	<2.0	26	NS	221	<0.2	<0.2	<0.2	<0.2
	2/1/2017	<0.1	<0.1	<0.1	0.1 J	0.2 J	0.4 J	0.2 J	<0.5	<0.1	<0.1	<0.5	<0.5	<10	0.2 J	<0.1	0.1 J	<0.1	<0.1	<0.1	<0.5	<2.0	0.1 J	NS	NS	<0.2	<0.2	<0.2	<0.2
	4/27/2017	<0.1	<0.1	<0.1	0.1 J	0.3 J	0.3 J	0.1 J	<0.5	0.1 J	<0.1	<0.5	<0.5	<10	0.3 J	<0.1	0.1 J	<0.1	<0.1	<0.1	<0.5	<2.0	<0.1	NS	NS	<0.2	<0.2	<0.2	<0.2
SMW-86	12/28/2016	88	3	7	2	0.5 J	0.7	0.4 J	<0.5	1	<0.1	45	<0.5	<1.0	35	62	0.2 J	0.5 J	2	13	<0.5	<2.0	18	NS	233.9	<0.2	0.3 J	<0.2	0.8
	2/1/2017	1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<11	0.3 J	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<2.0	<0.1	NS	NS	<0.2	<0.2	<0.2	<0.2
	4/24/2017	0.3 J	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<11	0 J	<0.1	<0.1	<0.1	0.3 J	<0.1	<0.5	<2.0	0.1 J	NS	NS	<0.2	<0.2	<0.2	<0.2
SMW-87	12/28/2016	550	7	87	97	36	50	20	<0.5	64	4	440	<0.5	<10.0	470	470	12	460	5400	1000	<0.5	<2.0	280	NS	8547	<0.2	14	1.3	49
	2/2/2017	81	0.7	8	1	0.2 J	0.4 J	0.1 J	<0.5	0.7	<0.1	58	<0.5	<10	25	68	<0.1	30	98	100	<0.5	<2.0	13	NS	NS	<0.2	0.3 J	0.4 J	2.9
	4/27/2017	53	1	8	8	3	4	2	<0.5	5	0.5 J	38	<0.5	<10	47	45	1	14	150	81	<0.5	<2.0	29	NS	NS	<0.2	<0.2	<0.2	1.6
RW-21	4/13/2011	NAPL IN WELL, NO SAMPLE																											
	10/16/2012	NAPL IN WELL, NO SAMPLE																											
	11/13/2013	NAPL IN WELL, NO SAMPLE																											
	4/15/2014	NAPL IN WELL, NO SAMPLE																											
	9/23/2014	NAPL IN WELL, NO SAMPLE																											
	4/20/2015	490	12	67	110	48	68	27	<0.5	77	5	260	3	<10	490	340	18	300	2300	550	7	NS	310	NS	4912	6	57	16	350
	9/23/2015	DNAPL IN WELL																											
	9/9/2016	230	5	15	5	2	3	1	<0.5	3	0.2 J	130	6	<11	40	130	0.7	220	2,000	140	7	<2.0	23	NS	2,598	6.8	27	9.4	140
WLMW-2	2/4/2010	<1.0	<1.0	NS	<1.0	<1.0	<1.0	NS	<1.0	<1.0	<1.0	NS	<3.0	<21	1 J	NS	<1.0	NS	<1.0	NS	<1.0	NS	NS	NS	0	<0.2	<0.2	<0.2	<0.6
	9/17/2010	<1.0	<1.0	NS	<1.0	<1.0	<1.0	NS	<1.0	<1.0	<1.0	NS	<3.0	<10	5 J	NS	<1.0	NS	<1.0	NS	<1.0	NS	NS	NS	0	<0.2	<0.2	<0.2	<0.6
	4/13/2011	<1.0	<1.0	NS	<1.0	<1.0	1 J	NS	<1.0	1 J	<1.0	NS	<3.0	<10	<1.0	NS	<1.0	NS	<1.0	NS	<1.0	NS	NS	NS	0	<0.2	<0.2	<0.2	<0.6
	10/16/2012	WELL NOT SAMPLED																											
	4/15/2014	NO ACCESS																											
	9/23/2014	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<2.0	<0.1	NS	0	<0.2	<0.2	<0.2	<0.2
	4/7/2015	<0.1	<0.1	<0.1	<0.1	<0.1	0.1 J	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	NS	<0.1	NS	0.1	<0.2	<0.2	<0.2	<0.4
	9/23/2015	<0.1	0.3 J	0.2 J	2	3	4	2	<0.5	2	0.4 J	<0.5	<0.5	<10	2	<0.1	1	<0.1	<0.1	0.3 J	<0.5	NS	1	NS	18.2	<0.2	<0.2	<0.2	<0.2
	9/6/2016	<0.1	<0.1	<0.1	0.2 J	0.3 J	0.4 J	0.1 J	<0.5	0.2 J	<0.1	<0.5	<0.5	<10	0.2 J	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<2.0	0.1 J	NS	1.5	<0.2	<0.2	<0.2	<0.2
	4/26/2017	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<11	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<2.0	<0.1	NS	NS	<0.2	<0.2	<0.2	<0.2

Gray shading indicates well not sampled
Yellow shading indicates 1x-10x GWPS
Orange indicates 10x-100x GWPS
Red indicates >100x GWPS

Attachment A: Groundwater Analytical Summary-UFZ 2010-2017
Springfield, Missouri

WELL ID	SAMPLE DATE	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranther	Benzo(k)fluoranther	2-Chlorophenol	Chrysene	Dibenz(a,h)anthrace	Dibenzofuran	2,4-Dimethylphenol	2,4-Dinitrophenol	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyr	2-Methylnaphthalen	Naphthalene	Phenanthrene	Phenol	2-Picoline	Pyrene	2,4-D	Total PAHs	Benzene	Ethylbenzene	Toluene	Xylenes (Total)
		µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l
GROUNDWATER PROTECTION STANDARD		**1200**	**0.1**	**9600**	**0.1**	**0.2**	**0.1**	**0.1**	**0.5**	**0.1**	**0.1**	**7.9**	**540**	**70**	**300**	**1300**	**0.1**	**36**	**20**	**0.1**	**300**	**NS**	**960**	**NS**	**NS**	**5**	**700**	**1000**	**10000**
WLMW-3	2/4/2010	**390**	**8**	NS	**76**	**34**	**55**	NS	<1	**39**	**4 J**	NS	<3.0	<20	**480**	NS	**13**	NS	**370**	NS	<1.0	NS	NS	NS	1465	<0.2	**0.3 J**	**0.4 J**	**2.5**
	9/17/2010	NAPL IN WELL, NO SAMPLE																											
	4/13/2011	NAPL IN WELL, NO SAMPLE																											
	4/1/2012	NAPL IN WELL, NO SAMPLE																											
	10/16/2012	WELL NOT SAMPLED																											
	4/15/2014	NO ACCESS																											
	9/23/2014	NAPL IN WELL, NO SAMPLE																											
	4/7/2015	DNAPL IN WELL																											
	9/23/2015	DNAPL IN WELL																											
	9/6/2016	NAPL IN WELL, NO SAMPLE																											
WLMW-4	9/17/2010	<1.0	<1.0	NS	**1 J**	**1 J**	**2 J**	NS	<1.0	**1 J**	<1.0	NS	<1.0	<10	**1 J**	NS	<1.0	NS	<1.0	NS	<1.0	NS	NS	NS	0	<0.2	<0.2	<0.2	<0.6
	4/13/2011	<1.0	<1.0	NS	<1.0	<1.0	<1.0	NS	<1.0	<1.0	<1.0	NS	<1.0	<10	<1.0	NS	<1.0	NS	<1.0	NS	<1.0	NS	NS	NS	0	<0.2	<0.2	<0.2	<0.6
	4/1/2012	**0.2 J**	<0.1	<0.1	<0.1	**0.1 J**	**0.2 J**	<0.1	<0.5	**0.1 J**	<0.1	<0.5	<0.5	<10	**0.2 J**	<0.1	<0.1	<0.1	**0.9**	**0.2 J**	<0.5	<2.0	**0.5 J**	NS	0.9	<0.2	<0.2	**14**	<0.6
	10/16/2012	WELL NOT SAMPLED																											
	4/15/2014	NO ACCESS																											
	9/23/2014	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<2.0	<0.1	NS	0	<0.2	<0.2	<0.2	<0.2
	4/7/2015	<0.1	<0.1	<0.1	<0.1	<0.1	**0.2 J**	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	**0.1 J**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	NS	**0.1 J**	NS	0.4	<0.2	<0.2	<0.2	<0.5
	9/23/2015	<0.1	<0.1	<0.1	<0.1	**0.2 J**	**0.3 J**	**0.1 J**	<0.5	**0.1 J**	<0.1	<0.5	<0.5	<10	**0.2 J**	<0.1	**0.2 J**	<0.1	<0.1	<0.1	<0.5	NS	**0.2 J**	NS	1.3	<0.2	<0.2	<0.2	<0.2
	9/6/2016	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<2.0	<0.1	NS	0	<0.2	<0.2	<0.2	<0.2
	4/24/2017	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<11	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<2.0	<0.1	NS	NS	<0.2	<0.2	<0.2	<0.2
WLMW-11	10/16/2012	WELL NOT SAMPLED																											
	12/4/2013	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	NS	<0.1	NS	NS	<0.2	<0.2	<0.2	<0.6
	4/15/2014	NO ACCESS																											
	9/22/2014	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<2.0	<0.1	NS	0	<0.2	<0.2	<0.2	<0.2
	4/7/2015	**0.4 J**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	**0.2 J**	<0.1	**0.4 J**	**5**	**0.1 J**	<0.5	NS	<0.1	NS	5.7	<0.2	<0.2	<0.2	<0.2
	9/23/2015	<0.1	<0.1	<0.1	<0.1	<0.1	**0.1 J**	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	NS	<0.1	NS	0.1	<0.2	<0.2	<0.2	<0.2
	9/9/2016	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<11	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<2.0	<0.1	NS	0	<0.2	<0.2	**0.5 J**	<0.2
	4/24/2017	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<2.0	<0.1	NS	S	<0.2	<0.2	<0.2	<0.2

Notes:

GWPS = Groundwater Protection Standard

DNAPL = Well contained dense non-aqueous phase liquid and was not sampled.

< = Compound not detected, Method Detection Limit reported.

J = Estimated value greater than the method detection limit and less than the limit of quantification.

V = Indicates that the analyte was detected in both the sample and the associated method blank. Note: the value in the blank shall not be subtracted from associated samples.

P = Concentration difference between the primary and confirmation column >40%. The lower result is reported.

D = Field duplicate imprecision. Result is considered estimated.

NS = Analyte not included

µg/l = micrograms per liter

Gray shading indicates well not sampled

Yellow shading indicates 1x-10x GWPS

Orange indicates 10x-100x GWPS

Red indicates >100x GWPS

Attachment A: Groundwater Analytical Summary - SFZ 2010-2017
Springfield, Missouri

WELL ID	SAMPLE DATE	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranther	Benzo(k)fluoranther	2-Chlorophenol	Chrysene	Dibenz(a,h)anthrace	Dibenzofuran	2,4-Dimethylphenol	2,4-Dinitrophenol	Fluoranthene	Fluorene	Indeno(1,2,3-cd)pyr	2-Methylnaphthalen	Naphthalene	Phenanthrene	Phenol	2-Picoline	Pyrene	2,4-D	Benzene	Ethylbenzene	Toluene	Xylenes (Total)
		µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l
GROUNDWATER PROTECTION STANDARD		1200	0.1	9600	0.1	0.2	0.1	0.1	0.5	0.1	0.1	7.9	540	70	300	1300	0.1	36	20	0.1	300	NS	960	NS	5	700	1000	10000
SECONDARY FLOW ZONE																												
BMW-1	9/16/2010	<1	<1	NS	<1	<1	<1	NS	<1	<1	<1	NS	<3	<10	<1	NS	<1	NS	<1	NS	<1	NS	NS	NS	<0.2	<0.2	0.3 J	<0.6
	9/28/2011	<0.1	<0.1	NS	<0.1	<0.1	<0.1	NS	<0.5	<0.1	<0.1	NS	<0.5	<10	0.1 J	NS	<0.1	NS	0.1 J	NS	<0.5	NS	NS	NS	<0.2	<0.2	<0.2	<0.6
	10/16/2012	0.2 J	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	0.2 J	0.2 J	<0.1	<0.1	<0.1	0.3 J	<0.5	<2	0.1	NS	<0.2	<0.2	<0.2	<0.6
	12/4/2013	1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	NS	<0.1	NS	<0.2	<0.2	0.2 J	<0.6
	9/23/2014	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<2	<0.1	NS	<0.2	<0.2	<0.2	<0.2
	9/23/2015	2	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	<0.5	<0.1	<0.1	1	<0.5	<10	0.1 J	1	<0.1	0.2 J	0.9	1	<0.5	NS	<0.1	NS	<0.2	<0.2	<0.2	<0.2
	9/8/2016	0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<2	<0.1	NS	<0.2	<0.2	0 J	<0.2
BMW-2	9/16/2010	66	4 J	NS	33	19	30	NS	<1	28	3 J	NS	<3	<11	100	NS	9	NS	740	NS	<1	NS	NS	NS	7.9	25	12	47
	9/28/2011	17	2	NS	6	5	7	NS	<0.5	6	1	NS	<0.5	<10	24	NS	3	NS	1	NS	<0.5	NS	NS	NS	1.3	4.5	0.3 J	6.1
	9/28/2011	4	0.3 J	0.9	0.2 J	0.1 J	0.1 J	<0.1	<0.5	0.2 J	<0.1	3	<0.5	<10	3	3	<0.1	0.8	4	7	<0.5	<2	1	NS	1.7	6.2	0.5 J	8.3
	9/22/2014	3	0.3 J	0.2 J	0.1 J	0.3 J	0.3 J	0.2 J	<0.5	0.2 J	<0.1	1	<0.5	<10	0.9	2	0.2 J	<0.1	0.9	0.4 J	<0.5	<2	0.6	NS	0.5	3.1	<0.2	4.4
	9/23/2015	8	0.2 J	0.3 J	0.1 J	<0.1	<0.1	<0.1	<0.5	0.2 J	<0.1	4	<0.5	<10	4	7	<0.1	0.3 J	4	6	<0.5	NS	2	NS	0.4 J	2.2	<0.2	3.3
	9/6/2016	7	0.1 J	0.7	0.3 J	<0.1	0.2 J	<0.1	<0.5	0.2 J	<0.1	5	<0.5	<10	4 D	6	<0.1	0.4 J	<0.1	5	<0.5	<2	3	NS	0.5 J	5.1	0.2 J	6.1
	9/6/2016	8	0.1 J	0.9	0.4 J	<0.1	0.2 J	<0.1	<0.5	0.3 J	<0.1	6	<540	<70	5	5	<0.1	3	9	5	< 300	<0.5	3	NS	0.5 J	5.4	0.3 J	6.5
BMW-4	9/16/2010	<1	<1	NS	<1	<1	<1	NS	<1	<1	<1	NS	<3	<10	<1	NS	<1	NS	<1	NS	<1	NS	NS	NS	0.2	<.2	<0.2	<0.6
	9/28/2011	<0.1	<0.1	NS	<0.1	<0.1	<0.1	NS	<0.5	<0.1	<0.1	NS	<0.5	<10	<0.1	NS	<0.1	NS	0.3 J	NS	<0.5	NS	NS	NS	<0.2	<0.2	<0.2	<0.6
	10/16/2012	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<11	<0.1	<0.1	<0.1	<0.1	0.2 J	<0.1	<0.5	<2	<0.1	NS	<0.2	<0.2	<0.2	<0.6
	12/5/2013	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	<0.1	<0.1	<0.1	0.3 J	<0.1	<0.5	NS	<0.1	NS	<0.2	<0.2	<0.2	<0.6
	9/23/2014	0.4 J	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	0.2 J	<0.1	<0.1	0.4 J	<0.1	<0.5	<2	<0.1	NS	<0.2	<0.2	<0.2	<0.2
	9/23/2015	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	NS	<0.1	NS	<0.2	<0.2	<0.2	<0.2
	9/8/2016	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<2	<0.1	NS	<0.2	<0.2	1 J	<0.2
BMW-9	9/17/2010	<1	<1	NS	<1	<1	<1	NS	<1	<1	<1	NS	<3	<10	<1	NS	<1	NS	<1	NS	<1	NS	NS	NS	<0.2	<0.2	<0.2	<0.6
	9/27/2011	<0.1	<0.1	NS	<0.1	<0.1	<0.1	NS	<0.5	<0.1	<0.1	NS	<0.5	<10	<0.1	NS	<0.1	NS	0.1 J	NS	<0.5	NS	NS	NS	<0.2	<0.2	<0.2	<0.6
	10/17/2012	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	0.2 J	0.1 J	<0.1	<0.1	0.1 J	<0.1	<0.5	<2	0.1	NS	<0.2	<0.2	<0.2	<0.6
	12/4/2013	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	NS	<0.1	NS	<0.2	<0.2	<0.2	<0.6
	9/23/2014	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	0.1 J	<0.1	<0.1	0.1 J	0.5 J	<0.5	<2	<0.1	NS	<0.2	<0.2	<0.2	<0.2
	9/23/2015	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	NS	<0.1	NS	<0.2	<0.2	<0.2	<0.2
	9/6/2016	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.5	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<2	<0.1	NS	<0.2	<0.2	<0.2	<0.2
BMW-10R	9/17/2010	<1	<1	NS	<1	<1	<1	NS	<1	<1	<1	NS	<4	<12	<1	NS	<1	NS	<1	NS	<1	NS	NS	NS	<0.2	<0.2	<0.2	<0.6
	9/28/2011	0.1 J	<0.1	NS	<0.1	<0.1	<0.1	NS	<0.5	<0.1	<0.1	NS	<0.5	<10	<0.1	NS	<0.1	NS	<0.1	NS	<0.5	NS	NS	NS	0.3	<0.2	<0.2	<0.6
	10/16/2012	0.9	<0.1	0.1 J	<0.1	0.1 J	<0.1	<0.1	<0.5	0.2 J	<0.1	0.7 J	<0.5	<11	0.7	0.6	<0.1	1	25	1	<0.5	<2	0.4	NS	2.6	0.6 J	2.2	2.2
	12/4/2013	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	<0.1	<0.1	<0.1	0.3 J	0.2 J	<0.5	NS	<0.1	NS	0.3	<0.2	<0.2	<0.6
	9/23/2014	57	0.8	1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	30	13	<10	0.6	28	<0.1	47	920	14	<0.5	<2	0.4	NS	<0.2	0.2 J	<0.2	<0.2
	9/23/2015	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	NS	<0.1	NS	<0.2	<0.2	<0.2	<0.2
	9/8/2016	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<2	<0.1	NS	<0.2	<0.2	0.3 J	<0.2
BMW-13-80'	09/16/16	0.4 J	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	1.0	<10.0	0.1 J	0.7	<0.1	1.0	58	0.6	3.0	<2.0	0.1 J	NS	1.9	1.0	2.9	3.3
BMW-13-90'	10/16/16	93	4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	91	6	<10.0	4	41	<0.1	330	6400	54	<0.5	5.0 J	2	NS	180	73	190	290
BMW-13-150'	10/16/16	58	3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	57	8	<11.0	3	26	<0.1	200	4,000	36	<0.5	5.0 J	2	NS	160	51	150	200
BMW-13-175'	10/16/16	48	2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	47	6	<10.0	2	22	<0.1	160	3,400	27	<0.5	5.0 J	1	NS	150	42	130	170
BMW-13-90'	1/31/2017	63	2	4	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	55	7	12 J	1	23	<0.1	220	4,200	31	3	<2	0.5 J	NS	160	74	180	280
	4/27/2017	42	2	3	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	37	12	<11	0.5 J	14	<0.1	150	3,100	20	3	<2	0.3 J	NS	160	61	160	240
BMW-14-107.5'	10/16/16	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.54	<0.11	<0.11	<0.54	<0.54	<11.0	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.54	<2.2	<0.11	NS	0.2 J	<0.2	0.4 J	<0.2
BMW-14 -107.5'	1/31/2017	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<2	<0.1	NS	0.4 J	<0.2	0.7 J	0.3 J
	4/27/2017	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.5	<0.1	<0.1	<0.5	<0.5	<10	<0.1	<0.1	<0.1	<0.1	0.3 J	<0.1	<0.5	<2	<0.1	NS	0.4 J	<0.2	0.6 J	0.3 J

Notes:
GWPS = Groundwater Protection Standard
DNAPL = Well contained dense non-aqueous phase liquid and was not sampled.
< = Compound not detected, Method Detection Limit reported.
J = Estimated value greater than the method detection limit and less than the limit of quantification.
P = Concentration difference between the primary and confirmation column >40%. The lower result is reported.
NS = Analyte not included
µg/l = micrograms per liter

Gray shading indicates well not sampled
Yellow shading indicates 1x-10x GWPS
Orange indicates 10x-100x GWPS
Red indicates >100x GWPS

2Q17 Groundwater Elevation, Total Depth, & NAPL Measurements
Springfield, Missouri

MEASUREMENT DATES:	**4/24/2017 (SFZ, TFZ, RW) and 4/25/2017 (UFZ monitoring wells)**
PERSONNEL:	**Jon McKinney (JM) and Max Hoffman (MH) Environmental Works, Inc.**
MEASUREMENT METHODS:	**WL and NAPL presence: Interface probe (IM-1 for clean wells, IM-3 for recovery and NAPL wells, IM-5 for wells with historically higher dissolved phase concentrations). NAPL gauging conducted using disposable equipment.**

AS INSTALLED				AS MEASURED ON THIS DATE					
WELL NUMBER	ZONE	TOP OF CASING ELEVATION	AS BUILT TOTAL DEPTH	DEPTH TO WATER	MEASURED TOTAL WELL DEPTH[1]	NAPL PRESENT?	NAPL THICKNESS	WELL BOTTOM CONDITION	COMMENTS
-	-	Feet AMSL	Feet	Feet below TOC	Feet below TOC	LNAPL/DNAPL	Feet	Soft/Hard	-
SMW-1	Upper	1299.36	26.63	5.21					
SMW-3	Upper	1286.09	27.18	7.84		DNAPL	TRACE		
SMW-11B	Upper	1293.92	15.00	7.23					
SMW-12C	Upper	1292.91	42.07	10.51		DNAPL	3.7'		
SMW-13	Upper	1289.85	15.29	9.11					
SMW-14	Upper	1281.54	15.26	4.01					
SMW-15	Upper	1282.81	19.10	10.08		NO			
SMW-16	Upper	1289.96	15.22	6.72					
SMW-17	Upper	1296.96	18.90	5.65	19.08	NO		HARD	
SMW-18	Upper	1301.51	20.26	3.71					
SMW-19	Upper	1290.07	16.29	3.65		DNAPL	0.5'		
SMW-20	Upper	1304.23	23.32	7.55		DNAPL	TRACE		
SMW-21	Upper	1305.88	19.07	7.78		DNAPL	0.6'		
SMW-22R	Upper	1298.46	16.80	4.35	16.74	NO		HARD	
SMW-24	Upper	1295.77	14.81	3.04					
SMW-25	Upper	1304.62	27.64	7.53					
SMW-26	Upper	1304.24	24.54	6.31					
SMW-27	Upper	1303.50	13.92	9.22					
SMW-28	Upper	1304.95	27.55	8.03					
SMW-30	Upper	1302.38	22.68	5.28	22.3	NO		HARD	
SMW-58	Upper	1255.72	14.15	11.00					
SMW-59	Upper	1293.76	14.59	1.36					Vault was full of water w/ pvc slip cap instead of J-plug
SMW-60	Upper	1288.82	34.74	2.79					
SMW-62	Upper	1296.25	17.96	2.30					
SMW-64	Upper	1292.87	21.89	3.03	21.49	NO		SOFT	
SMW-71	Upper	1254.77	7.41	1.01	7.43	NO		HARD	
SMW-72	Upper	1257.33	43.39	36.85					
SMW-73	Upper	1240.27	33.89	31.64	33.9	NO		UNABLE TO DETERMINE	
SMW-74	Upper	1268.37	19.86	1.91	19.9	NO		UNABLE TO DETERMINE	
SMW-75	Upper	1273.45	24.81	1.47					
SMW-76	Upper	1306.13	27.65	5.84	27.6	NO		SOFT	
SMW-77	Upper	1294.08	39.60	8.87	39.5	NO		SOFT	
SMW-78	Upper	1294.91	40.90	9.36	40.9	NO		UNABLE TO DETERMINE	
SMW-79	Upper	1294.70		DRY	24.8	NO		HARD	
SMW-80	Upper	1279.41	28.30	4.16	28.3	NO		HARD	
SMW-81	Upper	1274.50	27.37	5.12	27.3	NO		SOFT	
SMW-82	Upper	1262.59	18.49	1.89	17.5	NO		HARD	

2Q17 Groundwater Elevation, Total Depth, & NAPL Measurements
Springfield, Missouri

MEASUREMENT DATES: 4/24/2017 (SFZ, TFZ, RW) and 4/25/2017 (UFZ monitoring wells)

PERSONNEL: Jon McKinney (JM) and Max Hoffman (MH) Environmental Works, Inc.

MEASUREMENT METHODS: WL and NAPL presence: Interface probe (IM-1 for clean wells, IM-3 for recovery and NAPL wells, IM-5 for wells with historically higher dissolved phase concentrations). NAPL gauging conducted using disposable equipment.

AS INSTALLED				AS MEASURED ON THIS DATE					
WELL NUMBER	ZONE	TOP OF CASING ELEVATION	AS BUILT TOTAL DEPTH	DEPTH TO WATER	MEASURED TOTAL WELL DEPTH[1]	NAPL PRESENT?	NAPL THICKNESS	WELL BOTTOM CONDITION	COMMENTS
-	-	Feet AMSL	Feet	Feet below TOC	Feet below TOC	LNAPL/DNAPL	Feet	Soft/Hard	-
SMW-83	Upper	1287.81	33.07	5.09	33.1	NO		UNABLE TO DETERMINE	
SMW-84	Upper	1260.92	54.25	40.28	54.2	NO		UNABLE TO DETERMINE	trace sheen in purge water
SMW-85	Upper	1254.60	56.70	34.02	56.4	NO		UNABLE TO DETERMINE	silt on probe
SMW-86	Upper	1274.73	28.74	5.63	28.5	NO		HARD	
SMW-87	Upper	1287.57	37.40	16.63	37.5	NO		UNABLE TO DETERMINE	trace sheen in purge water
SLMW-6	Upper	1325.71	29.08	7.62					
OP-1	Upper	1297.03	13.92	10.27		NO			
OP-2	Upper	1298.42	17.69	10.42		NO			
OP-3	Upper	1297.17	17.95	13.21		DNAPL	TRACE		

2Q17 Groundwater Elevation, Total Depth, & NAPL Measurements
Springfield, Missouri

MEASUREMENT DATES: 4/24/2017 (SFZ, TFZ, RW) and 4/25/2017 (UFZ monitoring wells)

PERSONNEL: Jon McKinney (JM) and Max Hoffman (MH) Environmental Works, Inc.

MEASUREMENT METHODS: WL and NAPL presence: Interface probe (IM-1 for clean wells, IM-3 for recovery and NAPL wells, IM-5 for wells with historically higher dissolved phase concentrations). NAPL gauging conducted using disposable equipment.

AS INSTALLED				AS MEASURED ON THIS DATE					
WELL NUMBER	ZONE	TOP OF CASING ELEVATION	AS BUILT TOTAL DEPTH	DEPTH TO WATER	MEASURED TOTAL WELL DEPTH[1]	NAPL PRESENT?	NAPL THICKNESS	WELL BOTTOM CONDITION	COMMENTS
-	-	Feet AMSL	Feet	Feet below TOC	Feet below TOC	LNAPL/DNAPL	Feet	Soft/Hard	-
PW-1	Upper	1296.17	18.39	11.40					
PW-3	Upper	1286.94	14.26	7.14					
PW-10	Upper	1294.17	15.26	6.74		NO			
PW-11	Upper	1295.95	17.04	9.34					
PW-14	Upper	1299.98	19.84	4.07					
PW-20	Upper	1298.63	17.35	2.80	17.4	NO		HARD	
PW-29	Upper	1305.09	22.67	5.14					
PW-32	Upper	1305.16	19.00	6.26					
PW-34	Upper	1304.02	22.08	5.11					
BMW-1	Secondary	1284.48	142.08	32.37					survey mark is on inner 2" pump casing
BMW-2	Secondary	1283.50	130.55	32.65					below top of protective casing
BMW-4	Secondary	1287.99	153.17	43.02					
BMW-4A	Tertiary	1286.24	252.00	112.88					
BMW-5	Secondary	1287.54	160.00	55.50					pump offline
BMW-5A	Tertiary	1287.36	215.58	99.90					
BMW-6	Secondary	1301.53	161.60	61.81					
BMW-6A	Tertiary	1301.35	210.85	121.78					
BMW-9	Secondary	1291.62	154.98	30.61					
BMW-10R	Secondary	1306.16	176.16	50.27					
BMW-12	Secondary	1301.15	81.80	2.80	80380.0	DNAPL	2.5'	SOFT	
BMW-13	Secondary	1290.24		41.60	181.2	NO		HARD	
BMW-14	Secondary	1307.61		56.66	179.7	NO		SOFT	LS frag and particles on weight
BN-1	Upper	1296.83	20.00	3.65					
WL MW-2	Woodlawn	1252.80	45.70	31.02	44.0	NO		SOFT	
WL MW-3	Woodlawn	1252.80	42.90	32.50	42.8	DNAPL	0.1'	SOFT	
WL MW-4	Woodlawn	1251.18	36.98	31.05	36.6	NO		SOFT	
WL MW-11	Woodlawn	1214.61	18.71	7.91	18.1	NO		HARD	
RW1	Recovery (Upper)	1283.52	12.33	10.40		NO			
RW2	Recovery (Upper)	1282.93	19.50	8.90		DNAPL	TRACE		
RW3	Recovery (Upper)	1283.52	19.75	9.80		DNAPL	TRACE		
RW4	Recovery (Upper)	1286.85	17.92	10.00		DNAPL	0.05'		
RW5	Recovery (Upper)	1289.02	13.58	10.20		DNAPL	1.1'		
RW6	Recovery (Upper)	1282.60	24.00	6.90		DNAPL	TRACE		
RW7	Recovery (Upper)	1298.41	18.67	7.50		DNAPL	0.3'		well offline
RW8	Recovery (Upper)	1298.55	18.92	16.40		DNAPL	0.5'		
RW9	Recovery (Upper)	1298.10	18.25	6.00		DNAPL	1.0'		level control issue
RW10R	Recovery (Upper)	1302.49	18.76	18.10		DNAPL	TRACE		

2Q17 Groundwater Elevation, Total Depth, & NAPL Measurements
Springfield, Missouri

MEASUREMENT DATES: 4/24/2017 (SFZ, TFZ, RW) and 4/25/2017 (UFZ monitoring wells)

PERSONNEL: Jon McKinney (JM) and Max Hoffman (MH) Environmental Works, Inc.

MEASUREMENT METHODS: WL and NAPL presence: Interface probe (IM-1 for clean wells, IM-3 for recovery and NAPL wells, IM-5 for wells with historically higher dissolved phase concentrations). NAPL gauging conducted using disposable equipment.

AS INSTALLED				AS MEASURED ON THIS DATE					
WELL NUMBER	ZONE	TOP OF CASING ELEVATION	AS BUILT TOTAL DEPTH	DEPTH TO WATER	MEASURED TOTAL WELL DEPTH[1]	NAPL PRESENT?	NAPL THICKNESS	WELL BOTTOM CONDITION	COMMENTS
-	-	Feet AMSL	Feet	Feet below TOC	Feet below TOC	LNAPL/DNAPL	Feet	Soft/Hard	-
RW11R	Recovery (Upper)	1302.86	14.90	12.30		NO			
RW12R	Recovery (Upper)	1303.03	14.69	3.10		NO			well offline
RW13	Recovery (Upper)	1295.65	21.50	1.80		DNAPL	0.4'		well offline
RW14	Recovery (Upper)	1297.04	18.33	11.40		DNAPL	0.5'		
RW15	Recovery (Upper)	1295.99	16.75	3.00		DNAPL	0.1'		well offline
RW16	Recovery (Upper)	1302.59	21.25	18.00		DNAPL	0.2'		
RW17	Recovery (Upper)	1301.38	19.50	19.00		NO			
RW18	Recovery (Upper)	1301.39	18.12	4.60		NO			well offline
RW19	Recovery (Upper)	1301.48	18.90	2.70		NO			well offline
RW20	Recovery (Upper)	1301.93	23.00	4.60		DNAPL	TRACE		well offline
RW21	Recovery (Upper)	1257.90	44.50	37.32		DNAPL	TRACE		NAPL smears on probe
RW22	Recovery (Upper)	1296.44	16.00	13.10		DNAPL	TRACE		
RW23	Recovery (Upper)	1298.93	9.00	8.10		DNAPL	0.2'		
RW24	Recovery (Upper)	1303.34	11.00	6.10		NO			rest relays, well is pumping down
RW25	Recovery (Upper)	1289.16		1.90		DNAPL	0.6'		pump running

·oundwater sampling program. All other wells will have total depth measured biennially.

2) Well was converted from a recovery well to a monitoring well in October 2013. Modifications included removal of the well house structure and converting the aboveground completion to a flush-mount completion.

ıMSL = Above mean sea level

NA = Not applicable

NM = Not measured

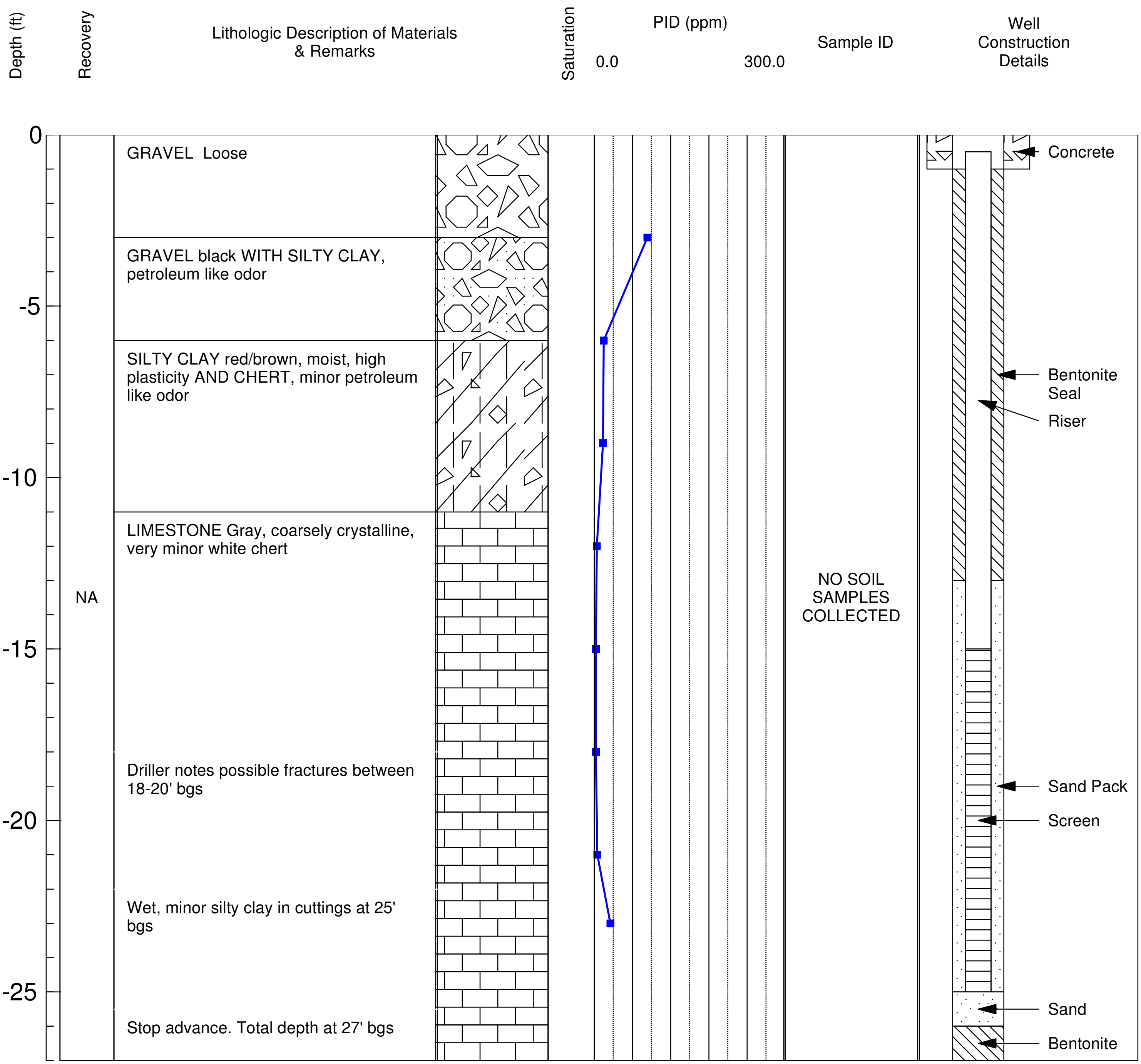
TOC = Top of Casing

= Dense Non-Aqueous Phase Liquid

= Light Non-Aqueous Phase Liquid

Boring Log:SMW-76

Site Name: Springfield Facility: Greenfield Environmental Multistate Trust, LLC
Site Address: 2800 West High Street, Springfield, Greene County, MO
Date: 9/26/2016
Driller/Method: Sunbelt Environmental Services Inc./Air Rotary
Diameter: 11"
Total Depth: 27' bgs
Sampling Method/Interval: Cuttings, varying intervals

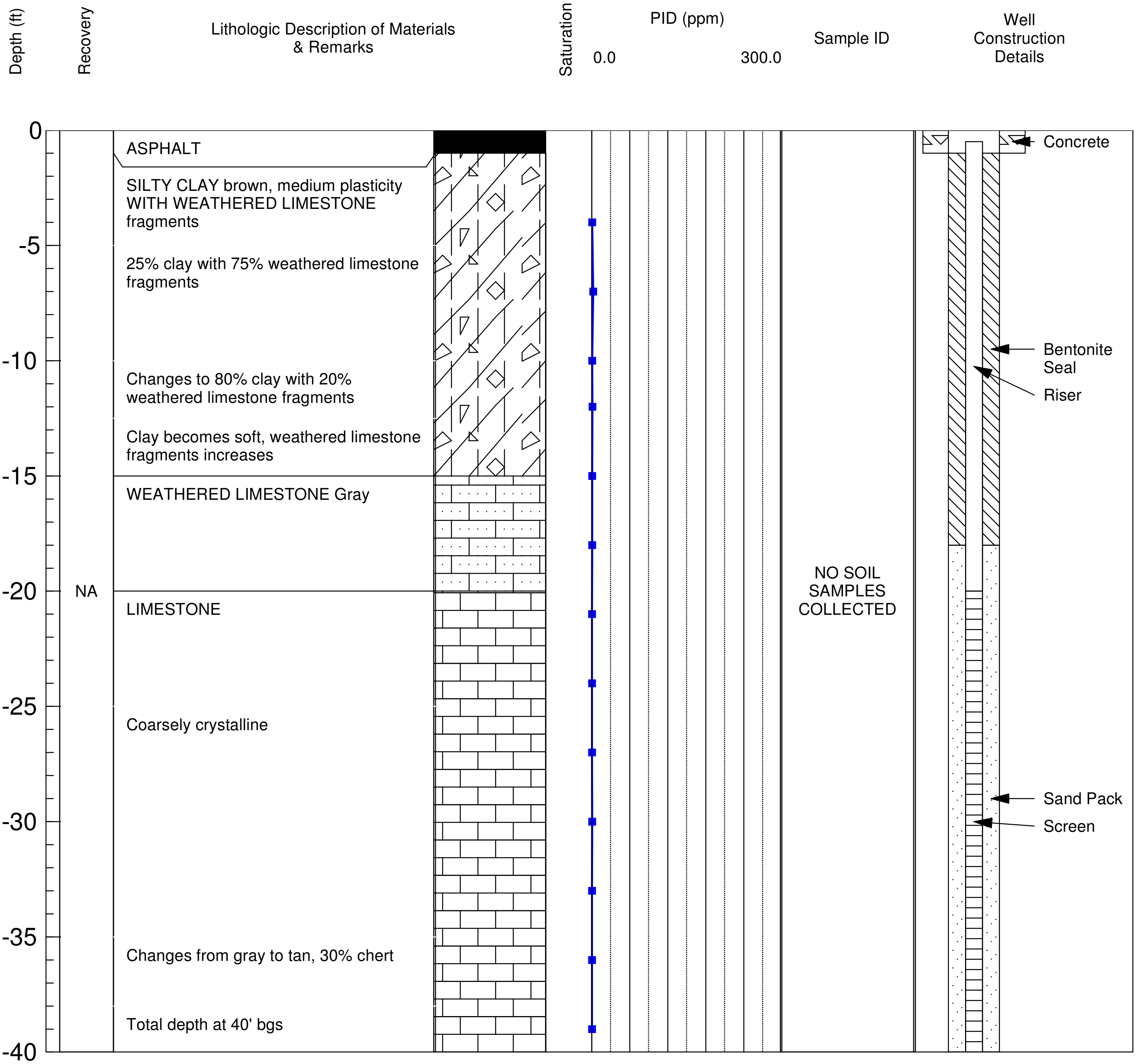


Borehole Log: SMW-76
Logged By: BG, Environmental Works Inc.
Drilled By: Sunbelt Environmental Services Inc.
Lab Analysis By: Lancaster Labs

Drafted By: MG
Checked By: BG
Date Compiled: 4/6/2017

Boring Log:SMW-77

Site Name: Springfield Facility: Greenfield Environmental Multistate Trust, LLC
Site Address: 2800 West High Street, Springfield, Greene County, MO
Date: 10/5/2016
Driller/Method: Sunbelt Environmental Services Inc./Air Rotary
Diameter: 6.125"
Total Depth: 40' bgs
Sampling Method/Interval: Cuttings, varying intervals

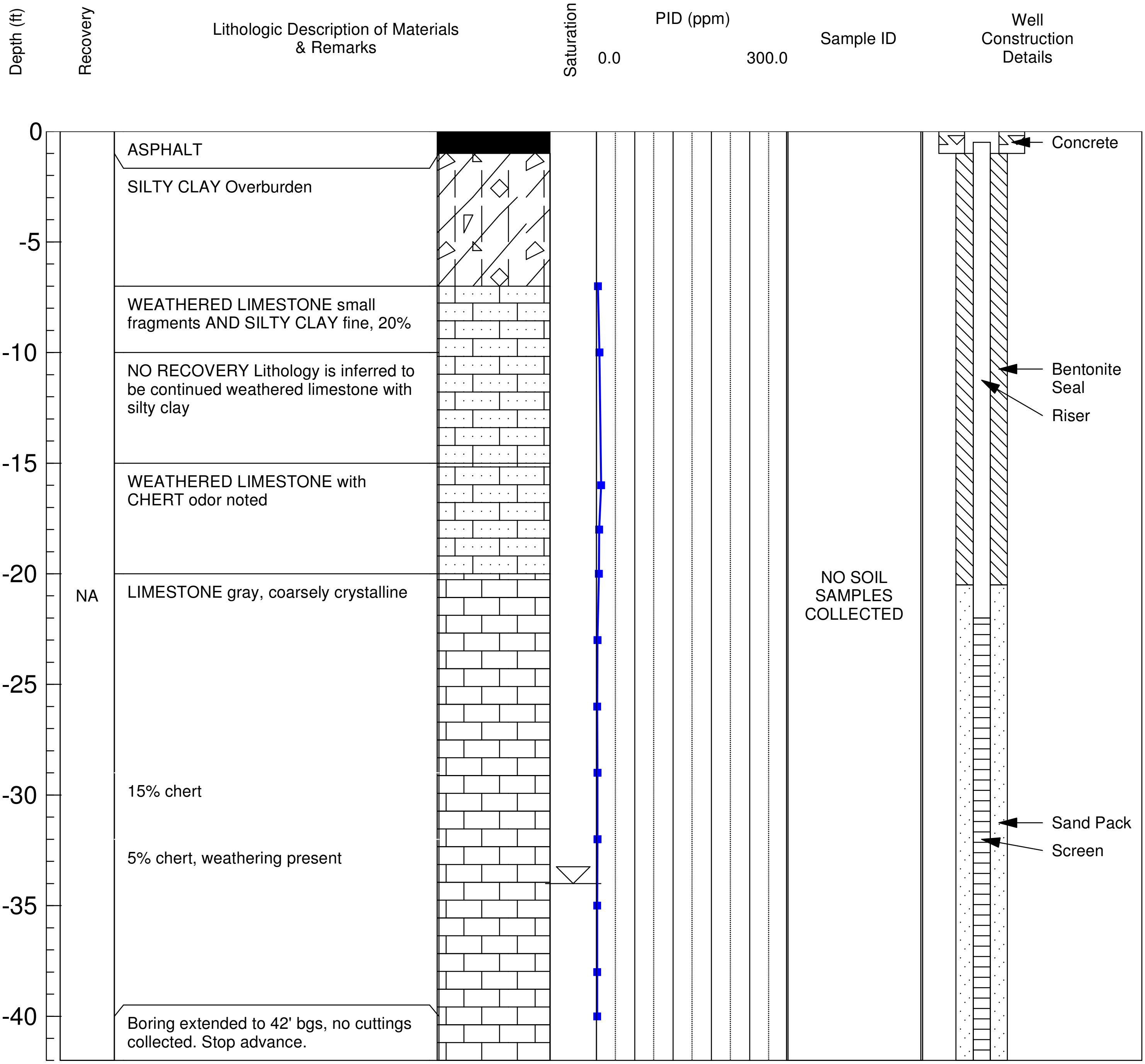


Borehole Log: SMW-77
Logged By: BG, Environmental Works Inc.
Drilled By: Sunbelt Environmental Services Inc.
Lab Analysis By: Lancaster Labs

Drafted By: MG
Checked By: BG
Date Compiled: 4/6/2017

Boring Log:SMW-78

Site Name: Springfield Facility: Greenfield Environmental Multistate Trust, LLC
Site Address: 2800 West High Street, Springfield, Greene County, MO
Date: 10/5/2016
Driller/Method: Sunbelt Environmental Services Inc./Air Rotary
Diameter: 6.125"
Total Depth: 42' bgs
Sampling Method/Interval: Cuttings, varying intervals

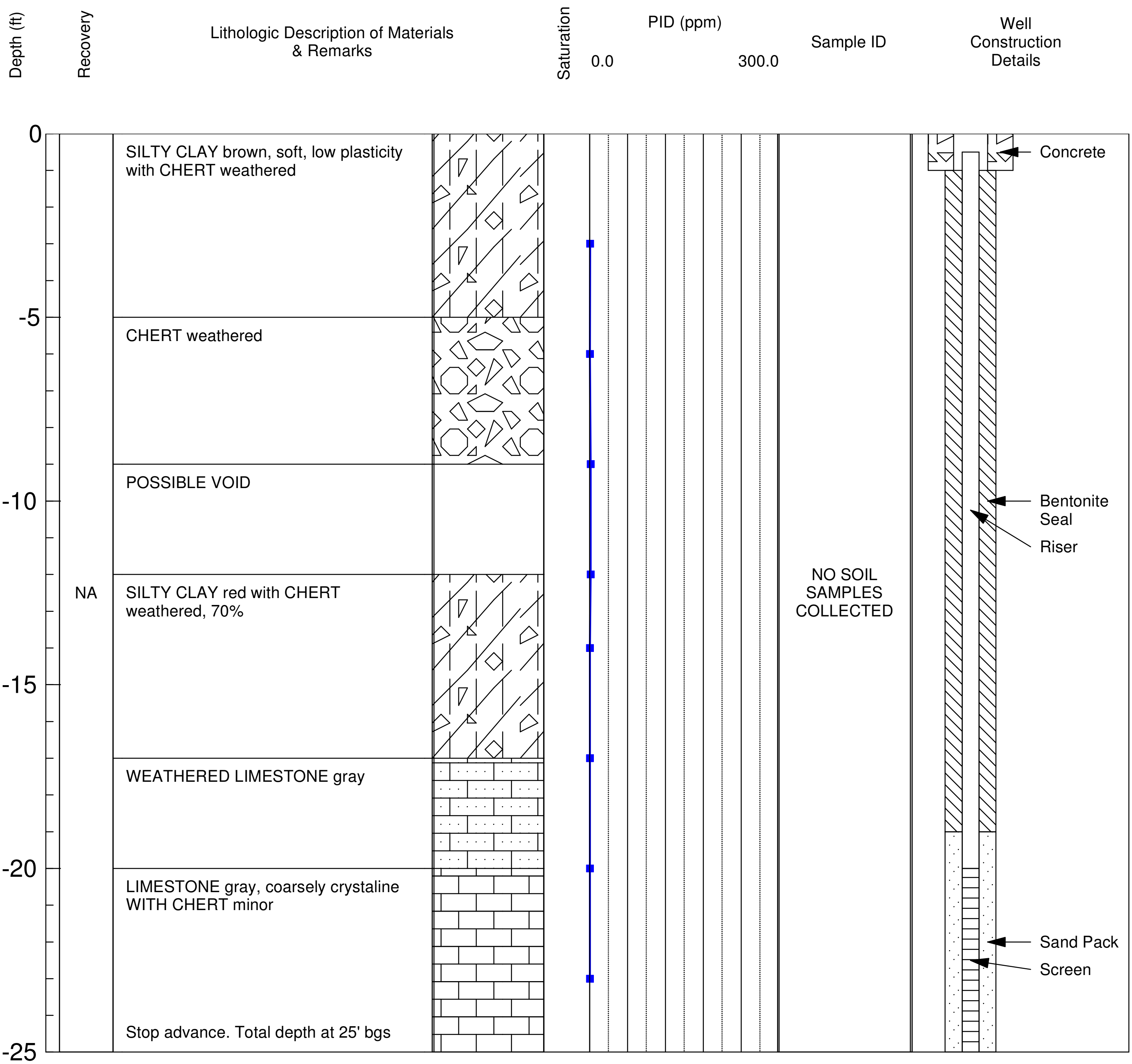


Borehole Log: SMW-78
Logged By: TL, Environmental Works Inc.
Drilled By: Sunbelt Environmental Services Inc.
Lab Analysis By: Lancaster Labs

Drafted By: MG
Checked By: BG
Date Compiled: 4/6/2017

Boring Log:SMW-79

Site Name: Springfield Facility: Greenfield Environmental Multistate Trust, LLC
Site Address: 2800 West High Street, Springfield, Greene County, MO
Date: 10/6/2016
Driller/Method: Sunbelt Environmental Services Inc./Air Rotary
Diameter: 6.125"
Total Depth: 25' bgs
Sampling Method/Interval: Cuttings, varying intervals

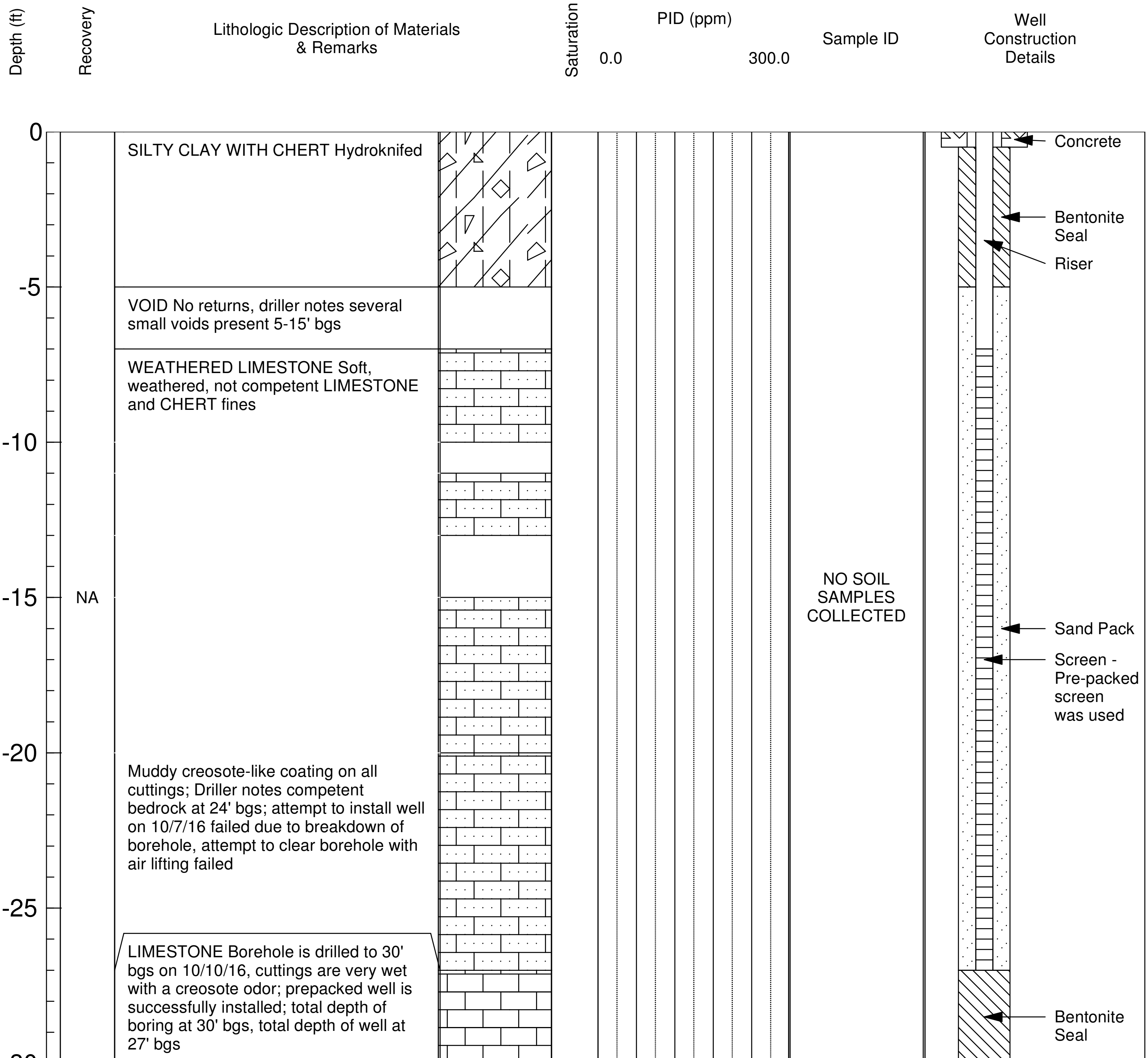


Borehole Log: SMW-79
Logged By: TL, Environmental Works Inc.
Drilled By: Sunbelt Environmental Services Inc.
Lab Analysis By: Lancaster Labs

Drafted By: MG
Checked By: BG
Date Compiled: 4/6/2017

Boring Log: SMW-80

Site Name: Springfield Facility: Greenfield Environmental Multistate Trust, LLC
Site Address: 2800 West High Street, Springfield, Greene County, MO
Date: 10/7/2016 - 10/10/2016
Driller/Method: Sunbelt Environmental Services Inc./Air Rotary
Diameter: 6.125"
Total Depth: 30' bgs
Sampling Method/Interval: Cuttings, varying intervals

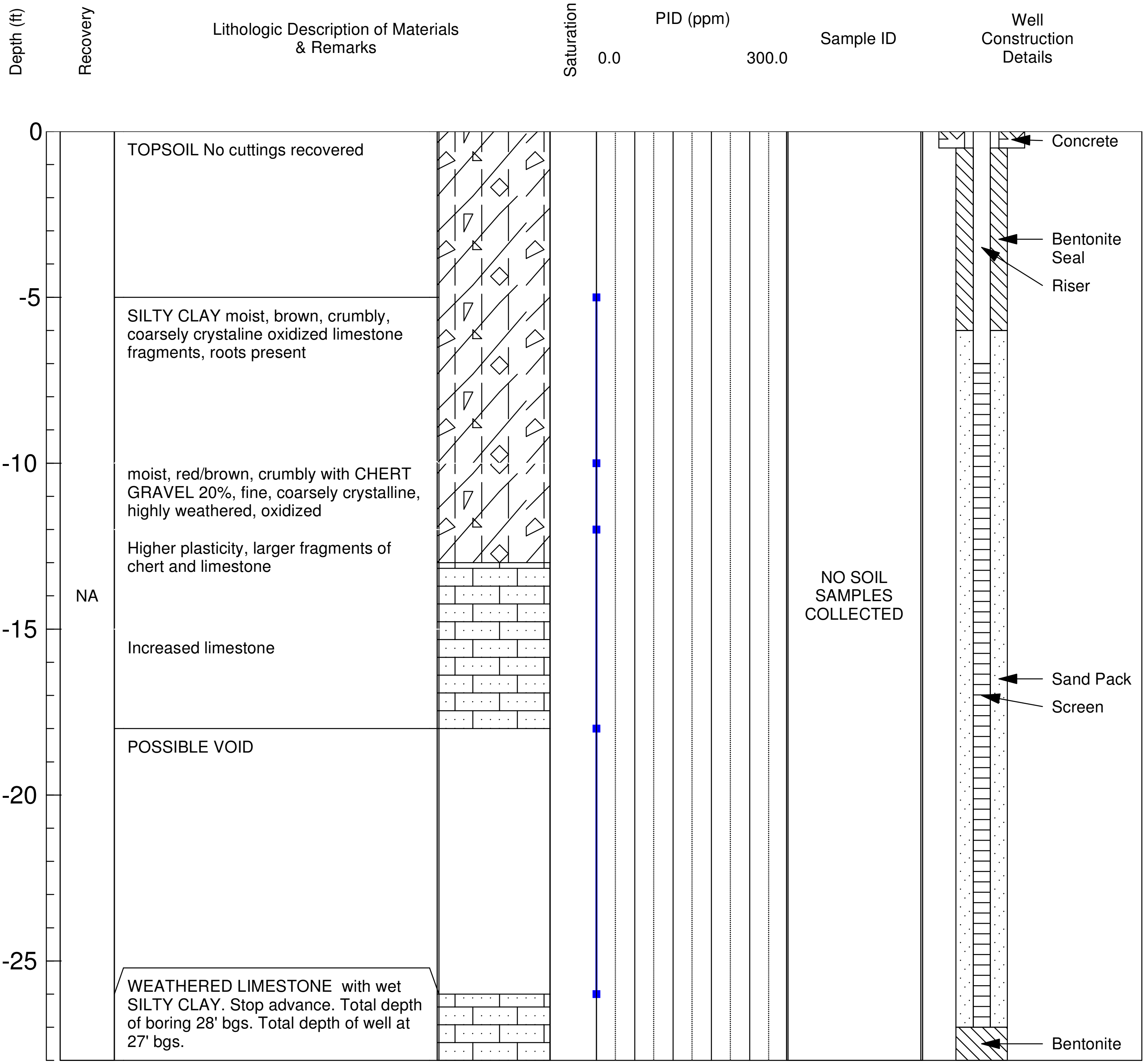


Borehole Log: SMW-80
Logged By: TL, Environmental Works Inc.
Drilled By: Sunbelt Environmental Services Inc.
Lab Analysis By: Lancaster Labs

Drafted By: MG
Checked By: BG
Date Compiled: 4/6/2017

Boring Log: SMW-81

Site Name: Springfield Facility: Greenfield Environmental Multistate Trust, LLC
Site Address: 2800 West High Street, Springfield, Greene County, MO
Date: 10/13/2016
Driller/Method: Sunbelt Environmental Services Inc./Air Rotary
Diameter: 6.125"
Total Depth: Boring - 28' bgs; Well - 27' bgs
Sampling Method/Interval: Cuttings, varying intervals

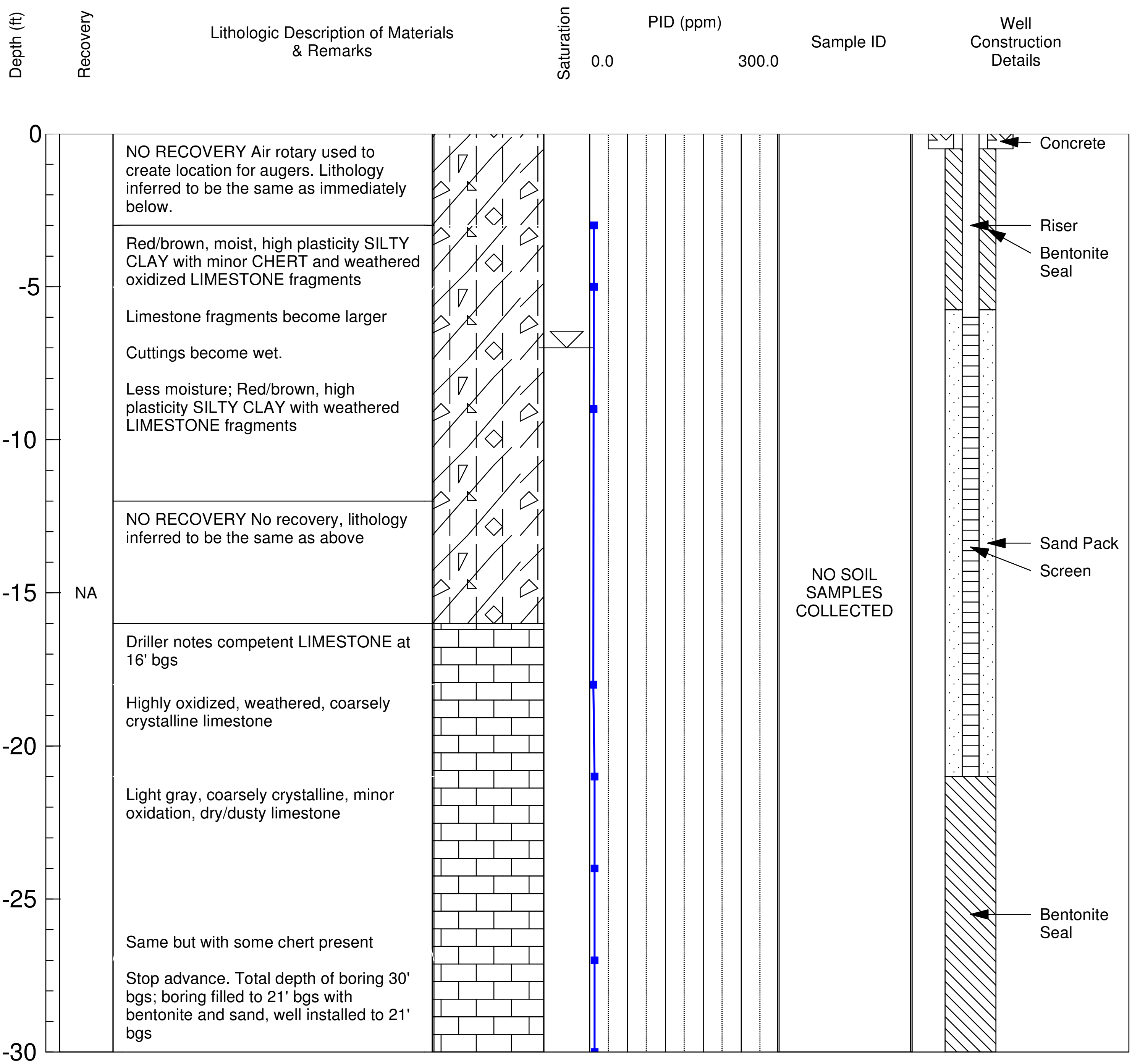


Borehole Log: SMW-81
Logged By: TL, Environmental Works Inc.
Drilled By: Sunbelt Environmental Services Inc.
Lab Analysis By: Lancaster Labs

Drafted By: MG
Checked By: BG
Date Compiled: 4/6/2017

Boring Log:SMW-82

Site Name: Springfield Facility: Greenfield Environmental Multistate Trust, LLC
Site Address: 2800 West High Street, Springfield, Greene County, MO
Date: 10/17/2016
Driller/Method: Sunbelt Environmental Services Inc./Air Rotary
Diameter: HSA 12"/AR 6"
Total Depth: Boring - 30' bgs; Well - 21' bgs
Sampling Method/Interval: Cuttings, varying intervals



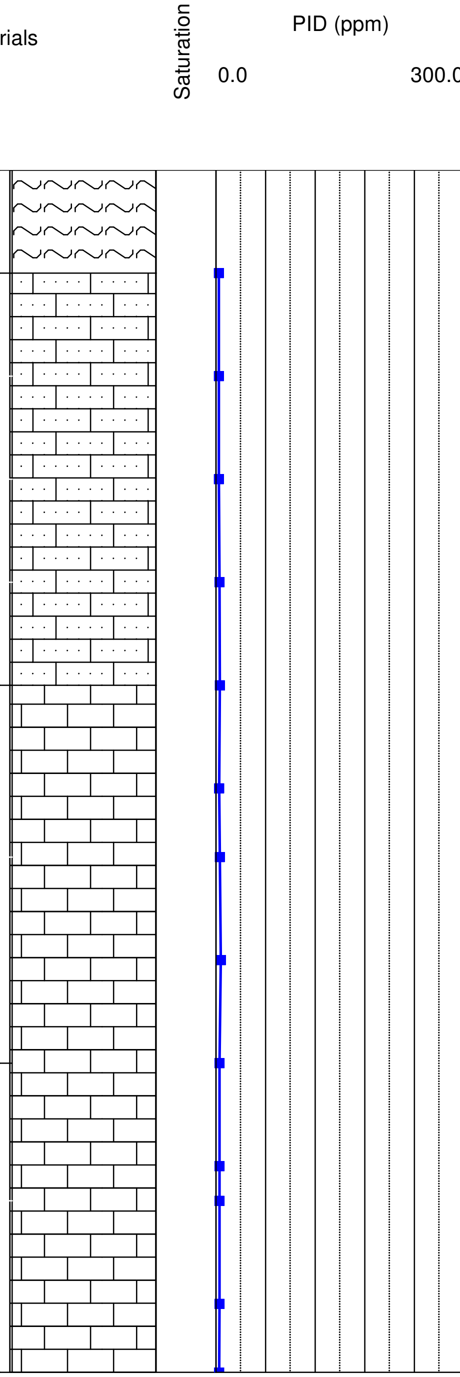
Borehole Log: SMW-82
Logged By: TL, Environmental Works Inc.
Drilled By: Sunbelt Environmental Services Inc.
Lab Analysis By: Lancaster Labs

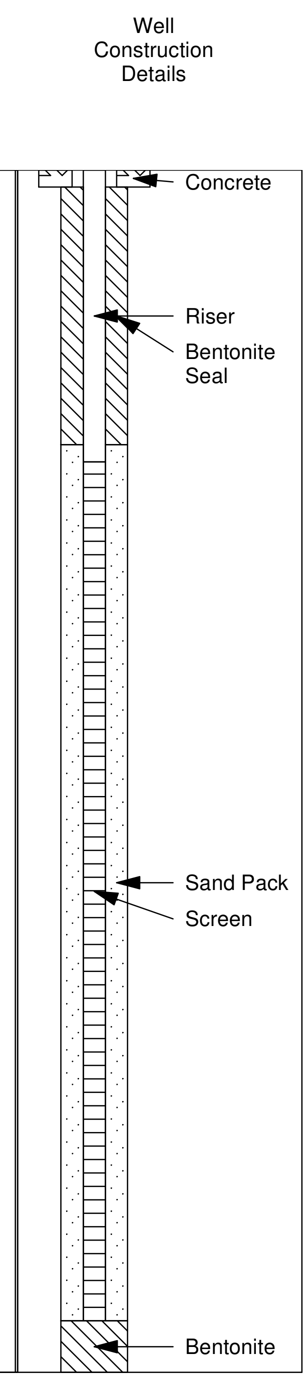
Drafted By: MG
Checked By: BG
Date Compiled: 4/6/2017

Boring Log:SMW-83

Site Name: Springfield Facility: Greenfield Environmental Multistate Trust, LLC
Site Address: 2800 West High Street, Springfield, Greene County, MO
Date: 10/18/2016
Driller/Method: Sunbelt Environmental Services Inc./Air Rotary
Diameter: 6.125"
Total Depth: Boring - 35' bgs; Well - 33.5' bgs
Sampling Method/Interval: Cuttings, varying intervals

Depth (ft)	Recovery	Lithologic Description of Materials & Remarks	Sample ID
0	NA	Red/brown SILTY CLAY and brown TOPSOIL with weathered, oxidized, coarsely crystalline LIMESTONE SAND	NO SOIL SAMPLES COLLECTED
		Highly oxidized, coarsely crystalline WEATHERED LIMESTONE with some red/brown SILTY CLAY	
-5		75% corasely crystalline, heavily oxidized weathered limestone fragments and 25% red silty clay	
-10		Same, except 50% limestone and 50% clay	
		Gray, coarsely crystalline weathered limestone with minor chert and significant silty clay	
-15		Light gray, coarsely crystalline LIMESTONE with minor white, lightly oxidized CHERT and some CLAY	
-20		Limestone becomes highly oxidized	
-25		Medium gray, coarsely crystalline LIMESTONE with minor gray CHERT; light weathering and oxidation present	
-30		Grades to abundant white chert	
-35		Stop advance. Total depth of boring at 35' bgs; total depth of well at 33.5' bgs	



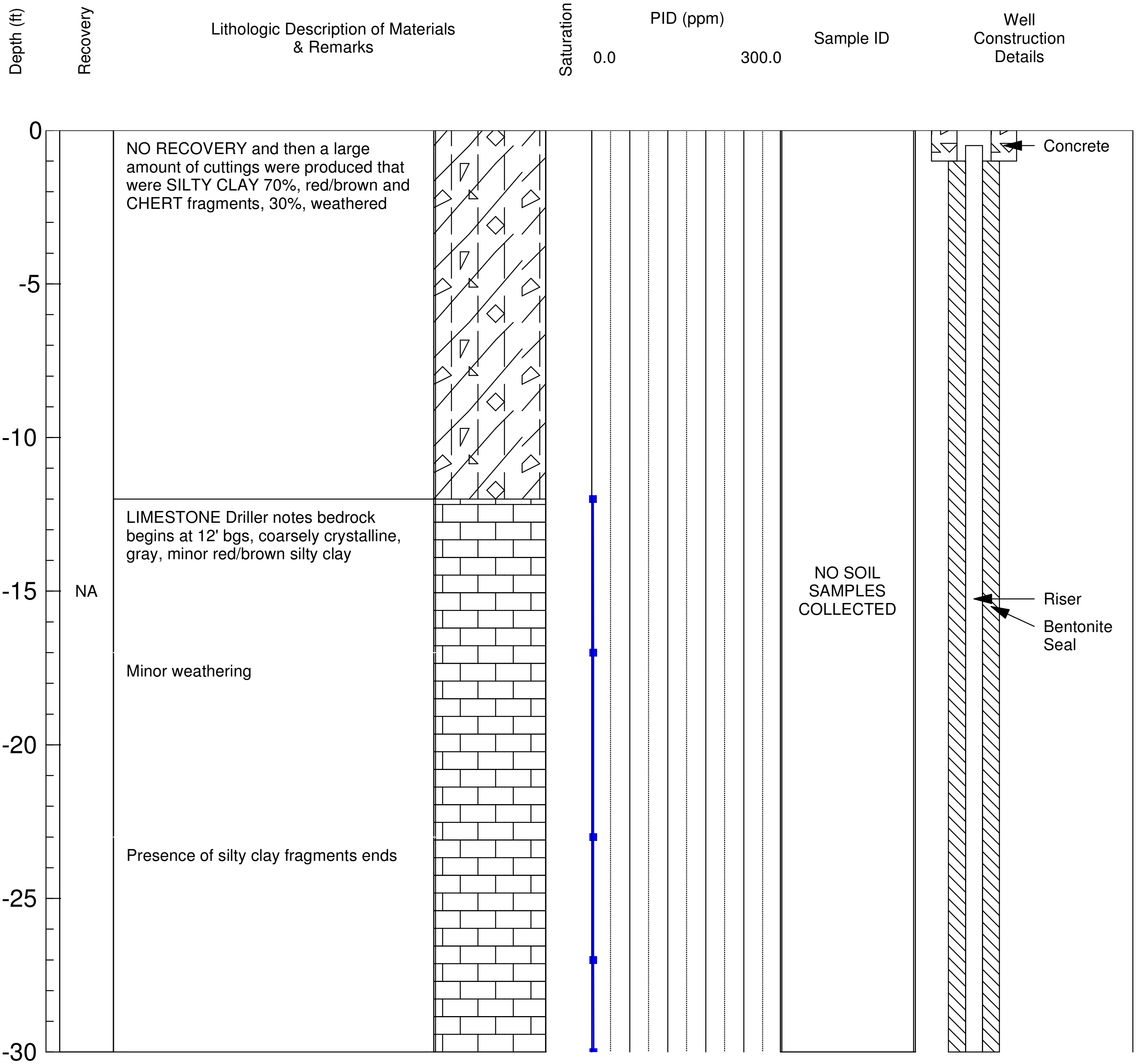


Borehole Log: SMW-83
Logged By: TL, Environmental Works Inc.
Drilled By: Sunbelt Environmental Services Inc.
Lab Analysis By: Lancaster Labs

Drafted By: MG
Checked By: BG
Date Compiled: 4/6/2017

Boring Log:SMW-84

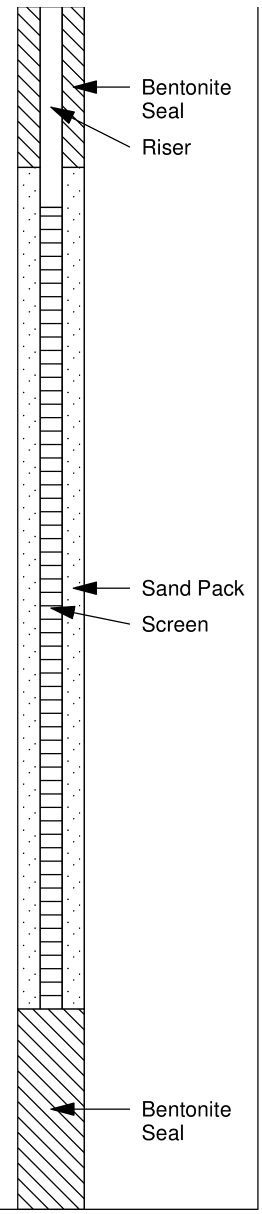
Site Name: Springfield Facility: Greenfield Environmental Multistate Trust, LLC
Site Address: 2800 West High Street, Springfield, Greene County, MO
Date: 11/7/2016
Driller/Method: Sunbelt Environmental Services Inc./Air Rotary
Diameter: 6.125"
Total Depth: 60' bgs
Sampling Method/Interval: Cuttings, varying intervals



Boring Log:SMW-84

Site Name: Springfield Facility: Greenfield Environmental Multistate Trust, LLC
Site Address: 2800 West High Street, Springfield, Greene County, MO
Date: 11/7/2016
Driller/Method: Sunbelt Environmental Services Inc./Air Rotary
Diameter: 6.125"
Total Depth: 60' bgs
Sampling Method/Interval: Cuttings, varying intervals

Depth (ft)	Recovery	Lithologic Description of Materials & Remarks	Saturation	PID (ppm) 0.0 – 300.0	Sample ID	Well Construction Details
-30		LIMESTONE Coarsely crystalline, gray, minor weathering				
-35		Weathering ends				
-40						
-45	NA	Driller notes void at 45' bgs			NO SOIL SAMPLES COLLECTED	
-50		Variation in limestone begins, varying between light and dark, fragments become larger				
-55		Becomes uniform again, confirming competent limestone. Boring is filled to 55' with bentonite in order to build the well at the required depth. Stop advance. Total depth of boring 60' bgs, total depth of well 55' bgs				
-60						

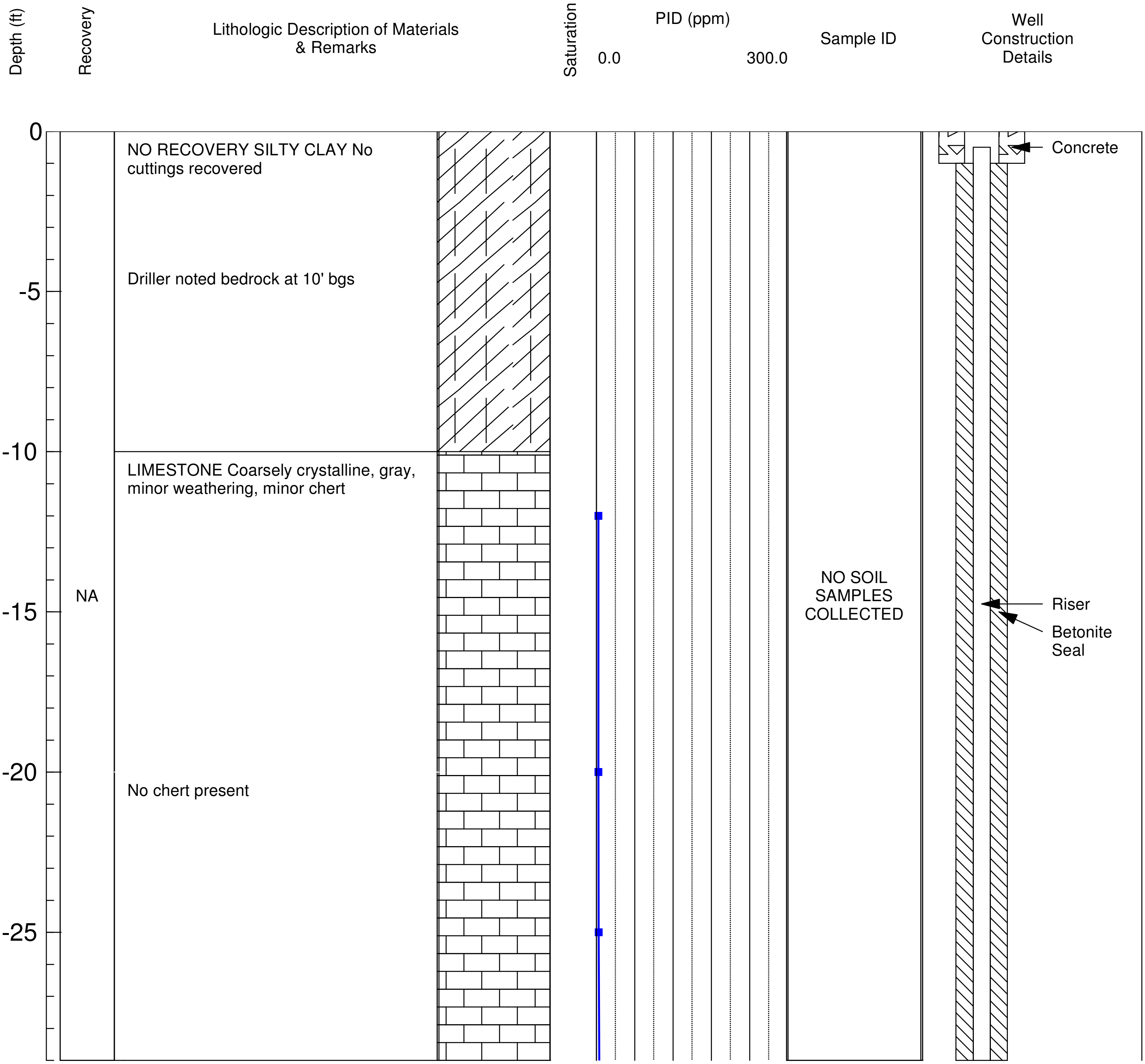


Borehole Log: SMW-84
Logged By: MG, Environmental Works Inc.
Drilled By: Sunbelt Environmental Services Inc.
Lab Analysis By: Lancaster Labs

Drafted By: MG
Checked By: BG
Date Compiled: 4/6/2017

Boring Log:SMW-85

Site Name: Springfield Facility: Greenfield Environmental Multistate Trust, LLC
Site Address: 2800 West High Street, Springfield, Greene County, MO
Date: 11/14/2016
Driller/Method: Sunbelt Environmental Services Inc./Air Rotary
Diameter: 6.25"
Total Depth: 57' bgs
Sampling Method/Interval: Cuttings, varying intervals

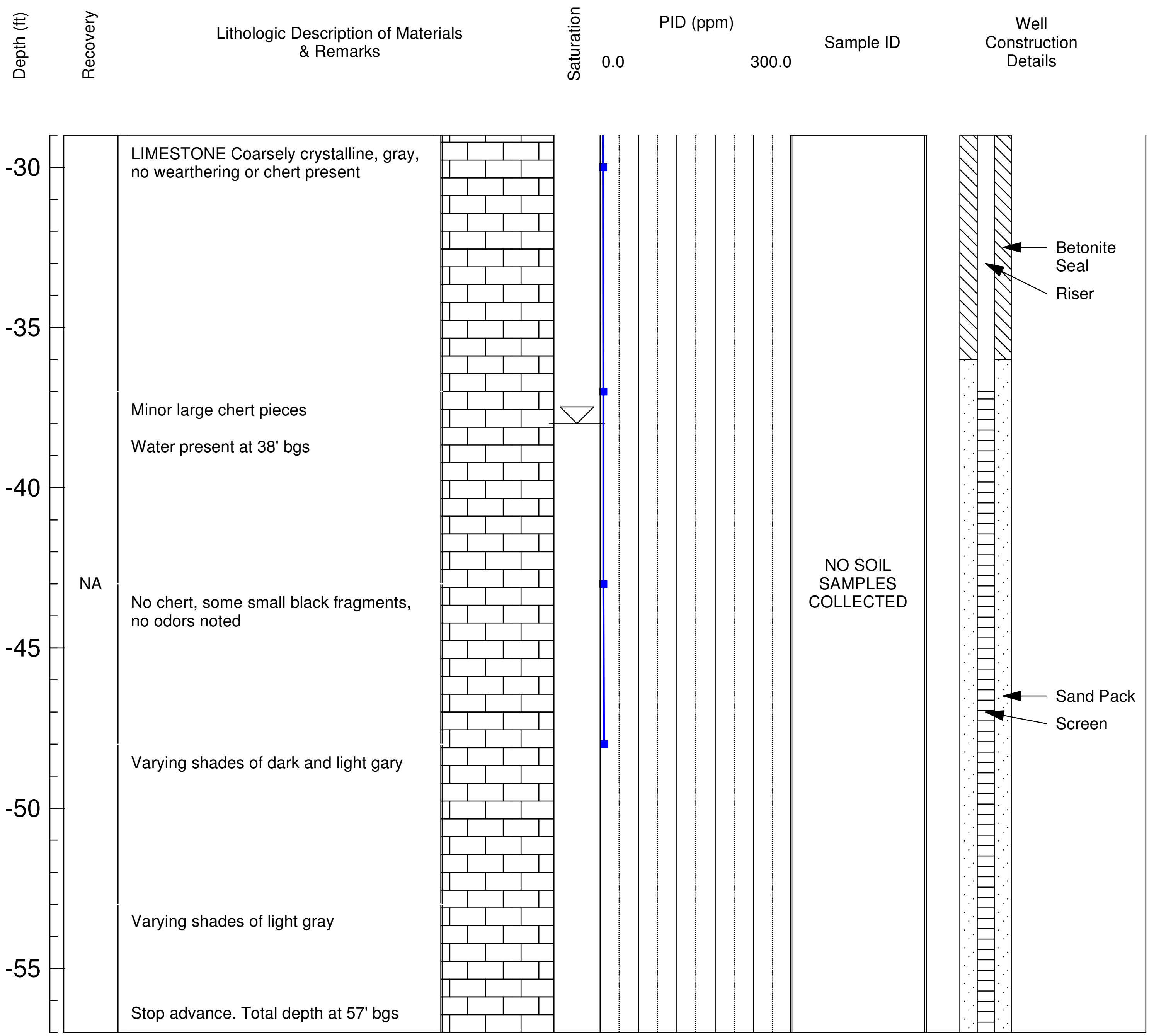


Borehole Log: SMW-85
Logged By: MG, Environmental Works Inc.
Drilled By: Sunbelt Environmental Services Inc.
Lab Analysis By: Lancaster Labs

Drafted By: MG
Checked By: BG
Date Compiled: 4/6/2017

Boring Log:SMW-85

Site Name: Springfield Facility: Greenfield Environmental Multistate Trust, LLC
Site Address: 2800 West High Street, Springfield, Greene County, MO
Date: 11/14/2016
Driller/Method: Sunbelt Environmental Services Inc./Air Rotary
Diameter: 6.25"
Total Depth: 57' bgs
Sampling Method/Interval: Cuttings, varying intervals



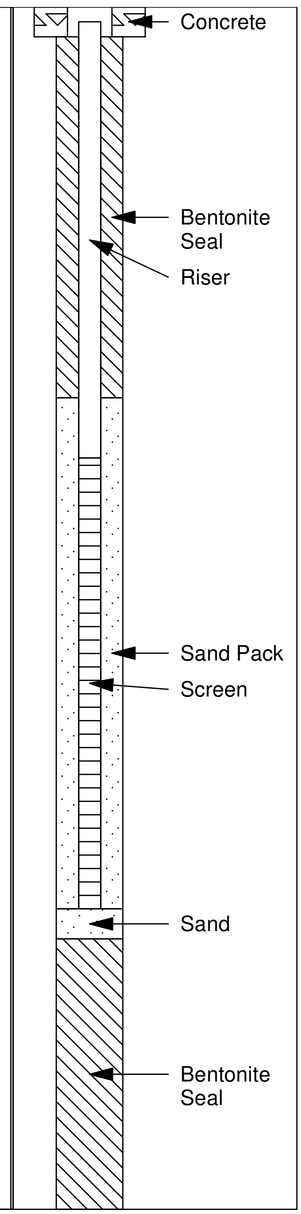
Borehole Log: SMW-85
Logged By: MG, Environmental Works Inc.
Drilled By: Sunbelt Environmental Services Inc.
Lab Analysis By: Lancaster Labs

Drafted By: MG
Checked By: BG
Date Compiled: 4/6/2017

Boring Log: SMW-86

Site Name: Springfield Facility: Greenfield Environmental Multistate Trust, LLC
Site Address: 2800 West High Street, Springfield, Greene County, MO
Date: 12/20/2016
Driller/Method: Sunbelt Environmental Services Inc./Air Rotary
Diameter: 6.125"
Total Depth: 40' bgs
Sampling Method/Interval: Cuttings, varying intervals

Depth (ft)	Recovery	Lithologic Description of Materials & Remarks	Saturation	PID (ppm) 0.0 – 300.0	Sample ID	Well Construction Details
0		Red SILTY CLAY with WEATHERED CHERT fragments				
-3		Silty clay becomes very loose and soft, weathered chert fragments remain				
-15		WEATHERED LIMESTONE				
-16		VOID				
-20	NA				NO SOIL SAMPLES COLLECTED	
-21		Gray, coarsely crystalline, poor returns				
		Faint creosote odor noted at 21' bgs				
-28		Coarsely crystalline limestone with 35% chert				
-30		Few cuttings returned				
		Creosote odor becomes stronger				
-35		Same limestone, 20% chert				
-40		Stop advance. Total depth at 40 ft bgs.				

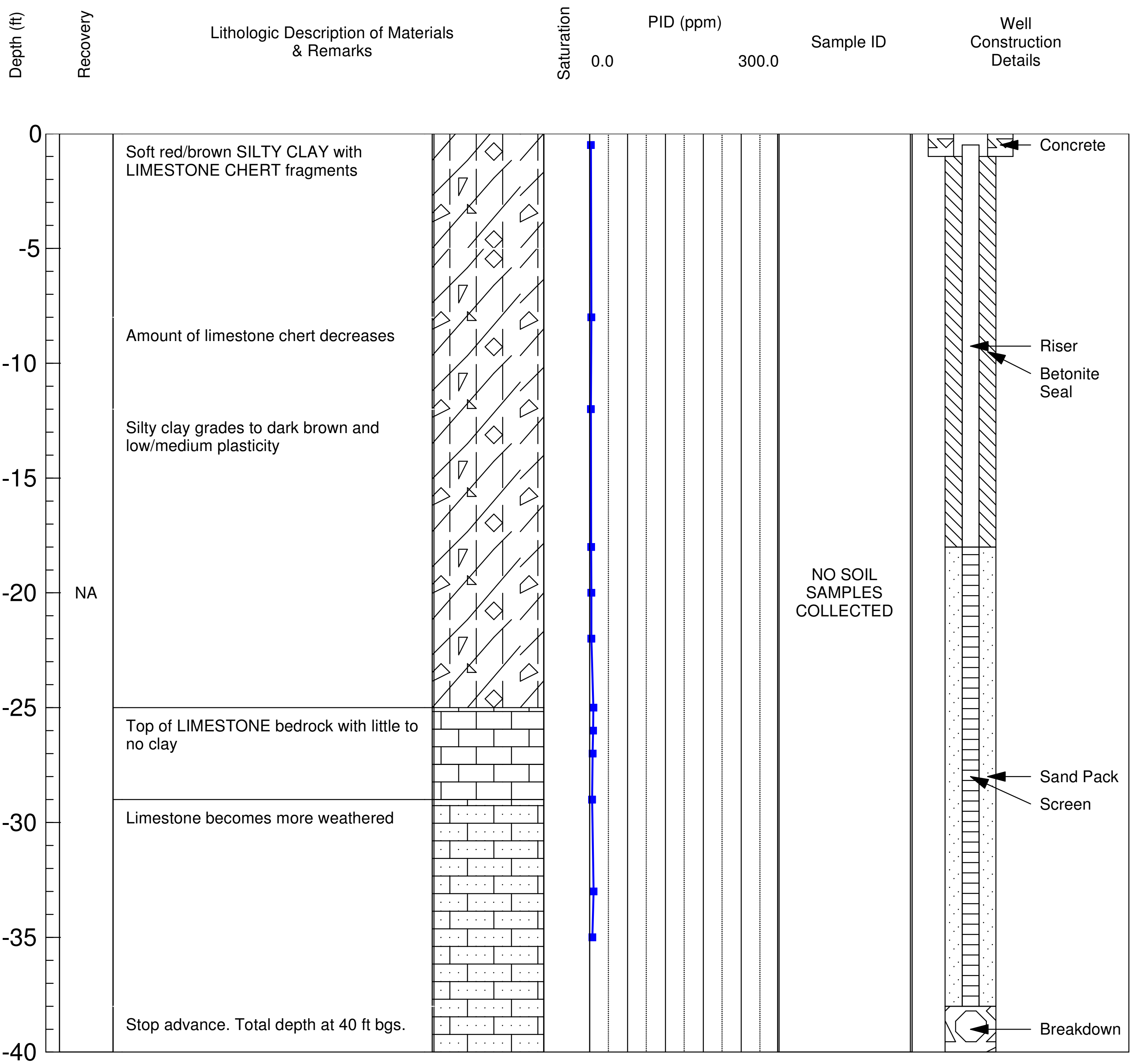


Borehole Log: SMW-86
Logged By: TL, Environmental Works Inc.
Drilled By: Sunbelt Environmental Services Inc.
Lab Analysis By: Lancaster Labs

Drafted By: MG
Checked By: BG
Date Compiled: 4/6/2017

Boring Log:SMW-87

Site Name: Springfield Facility: Greenfield Environmental Multistate Trust, LLC
Site Address: 2800 West High Street, Springfield, Greene County, MO
Date: 12/27/2016
Driller/Method: Sunbelt Environmental Services Inc./Air Rotary
Diameter: 6.125"
Total Depth: 40' bgs
Sampling Method/Interval: Cuttings, varying intervals

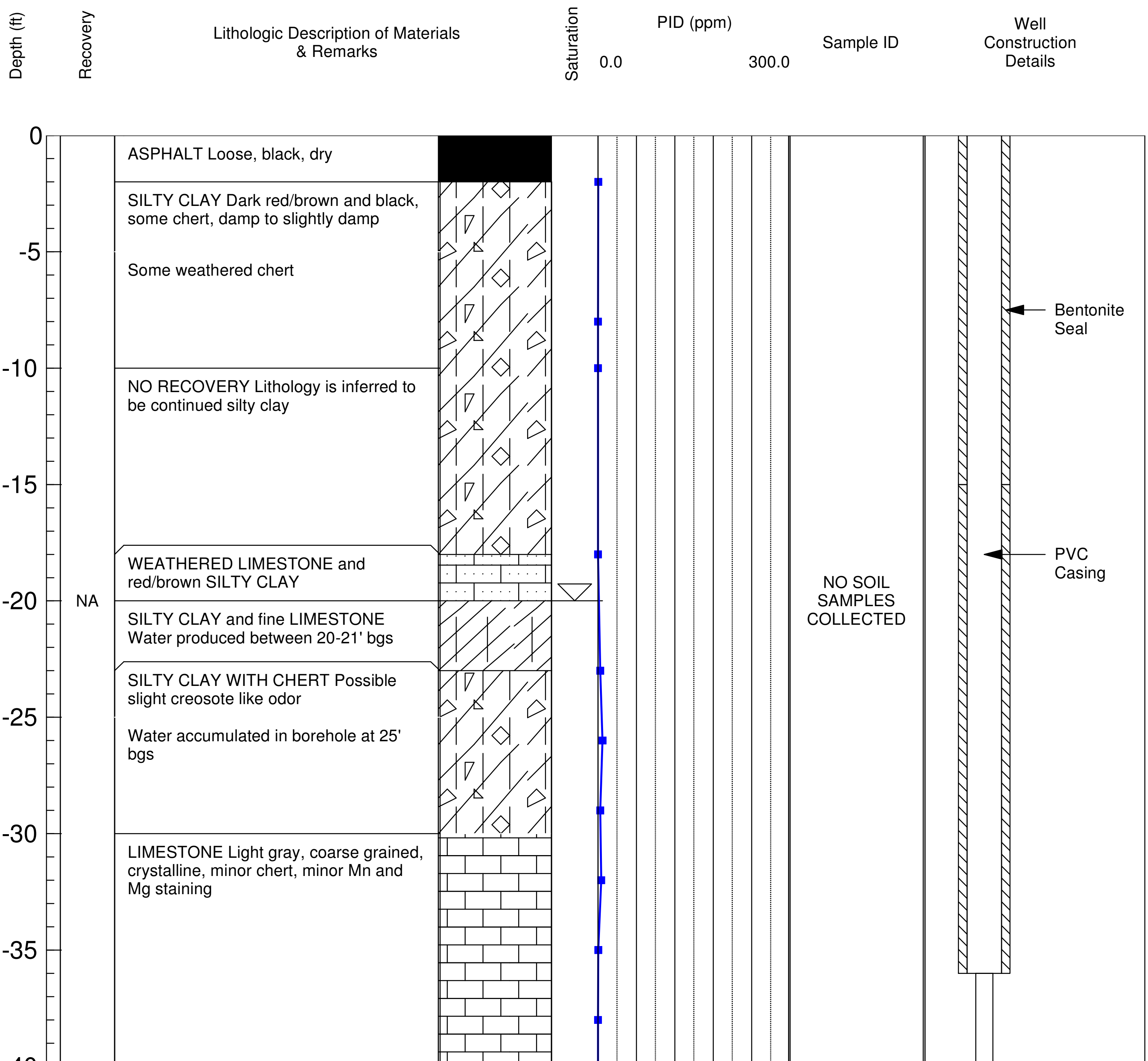


Borehole Log: SMW-87
Logged By: MH, Environmental Works Inc.
Drilled By: Sunbelt Environmental Services Inc.
Lab Analysis By: Lancaster Labs

Drafted By: MG
Checked By: BG
Date Compiled: 4/3/2017

Boring Log: BMW-12

Site Name: Springfield Facility: Greenfield Environmental Multistate Trust, LLC
Site Address: 2800 West High Street, Springfield, Greene County, MO
Date: 9/21/2016-9/22/2016
Driller/Method: Sunbelt Environmental Services Inc./Air Rotary
Diameter: 11" from 0-36' bgs, 5 5/8" from 36' to 80'
Total Depth: 80' bgs
Sampling Method/Interval: Cuttings, varying intervals



Borehole Log: BMW-12
Logged By: BG, Environmental Works Inc.
Drilled By: Sunbelt Environmental Services Inc.
Lab Analysis By: Lancaster Labs

Drafted By: MG
Checked By: BG
Date Compiled: 4/6/2017

Boring Log: BMW-12

Site Name: Springfield Facility: Greenfield Environmental Multistate Trust, LLC
Site Address: 2800 West High Street, Springfield, Greene County, MO
Date: 9/21/2016-9/22/2016
Driller/Method: Sunbelt Environmental Services Inc./Air Rotary
Diameter: 11" from 0-36' bgs, 5 5/8" from 36' to 80'
Total Depth: 80' bgs
Sampling Method/Interval: Cuttings, varying intervals

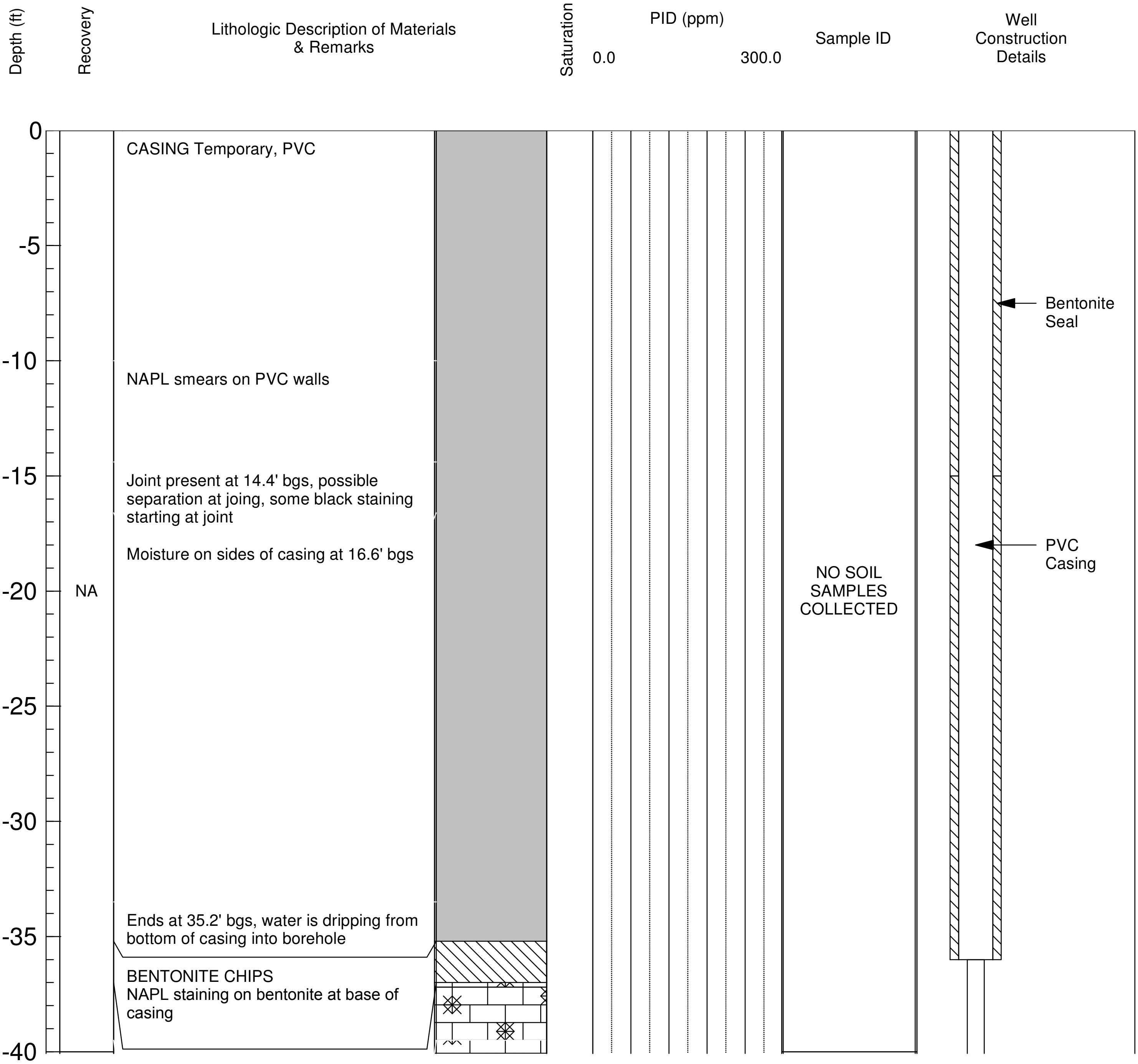
Depth (ft)	Recovery	Lithologic Description of Materials & Remarks	Saturation	PID (ppm) 0.0 – 300.0	Sample ID	Well Construction Details
-40		LIMESTONE Poor recovery due to soft limestone, all powder, unable to collect cuttings				
-45						
-50						
-55						← Open borehole
-60	NA	Larger fragments collected, light gray, coarse grained, no staining, no chert			NO SOIL SAMPLES COLLECTED	
-65						
-70		Minor manganese staining				
-75						
-80		Stop advance. Total depth at 80' bgs				

Borehole Log: BMW-12
Logged By: BG, Environmental Works Inc.
Drilled By: Sunbelt Environmental Services Inc.
Lab Analysis By: Lancaster Labs

Drafted By: MG
Checked By: BG
Date Compiled: 4/6/2017

Soil Boring Log:BMW-12: Downhole Video Camera Footage Summary

Site Name: Springfield Facility: Greenfield Environmental Multistate Trust, LLC
Site Address: 2800 West High Street, Springfield, Greene County, MO
Date: 9/27/2016
Driller/Method: NA
Diameter: 11" from 0-36' bgs, 5 5/8" from 36' to 80'
Total Depth: 80' bgs
Sampling Method/Interval: NA

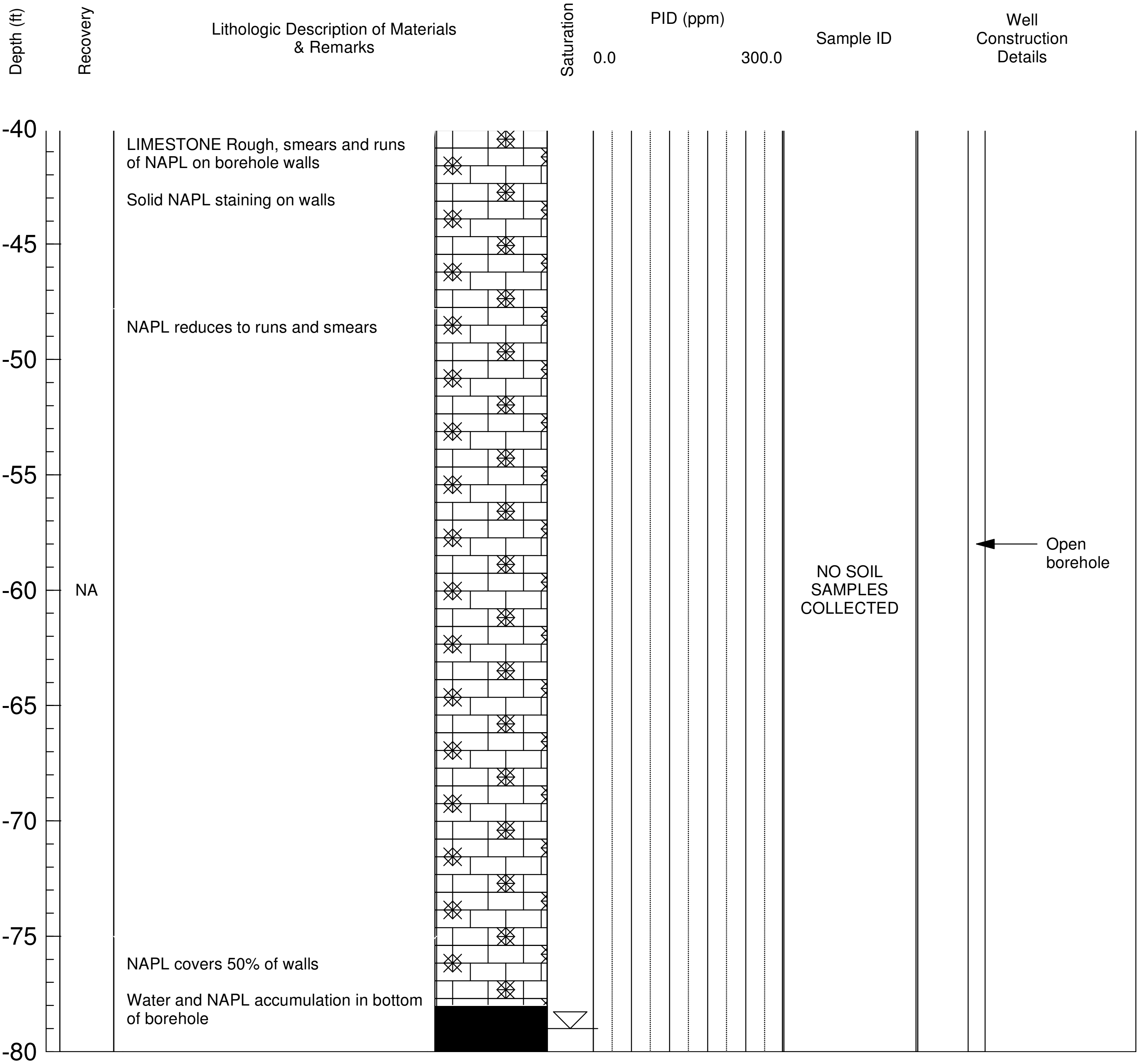


Borehole Log: BMW-12: Downhole Video Camera Footage Summary
Logged By: JM, Environmental Works Inc.
Drilled By: Sunbelt Environmental Services Inc.
Lab Analysis By: Lancaster Labs

Drafted By: MG
Checked By: BG
Date Compiled: 1/4/2017

Soil Boring Log:BMW-12: Downhole Video Camera Footage Summary

Site Name: Springfield Facility: Greenfield Environmental Multistate Trust, LLC
Site Address: 2800 West High Street, Springfield, Greene County, MO
Date: 9/27/2016
Driller/Method: NA
Diameter: 11" from 0-36' bgs, 5 5/8" from 36' to 80'
Total Depth: 80' bgs
Sampling Method/Interval: NA

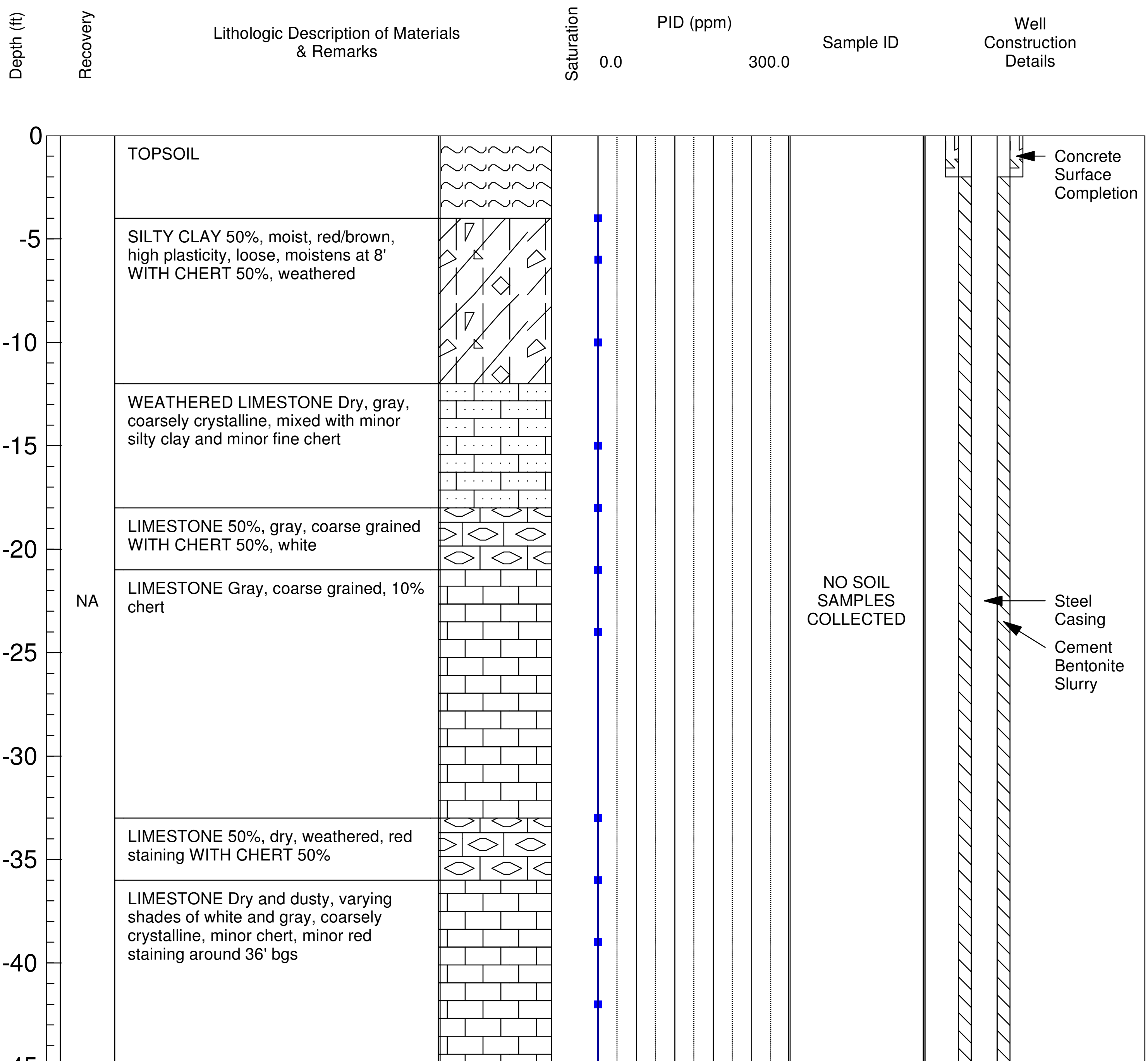


Borehole Log: BMW-12: Downhole Video Camera Footage Summary
Logged By: JM, Environmental Works Inc.
Drilled By: Sunbelt Environmental Services Inc.
Lab Analysis By: Lancaster Labs

Drafted By: MG
Checked By: BG
Date Compiled: 1/4/2017

Boring Log: BMW-13

Site Name: Springfield Facility: Greenfield Environmental Multistate Trust, LLC
Site Address: 2800 West High Street, Springfield, Greene County, MO
Date: Advanced 0-80' bgs on 9/23/2016 and 80-180' bgs on 9/29/2016
Driller/Method: Sunbelt Environmental Services Inc./Air Rotary
Diameter: 11" from 0-80' bgs, 6 1/8" from 80' to 180'
Total Depth: 180' bgs
Sampling Method/Interval: Cuttings, varying intervals

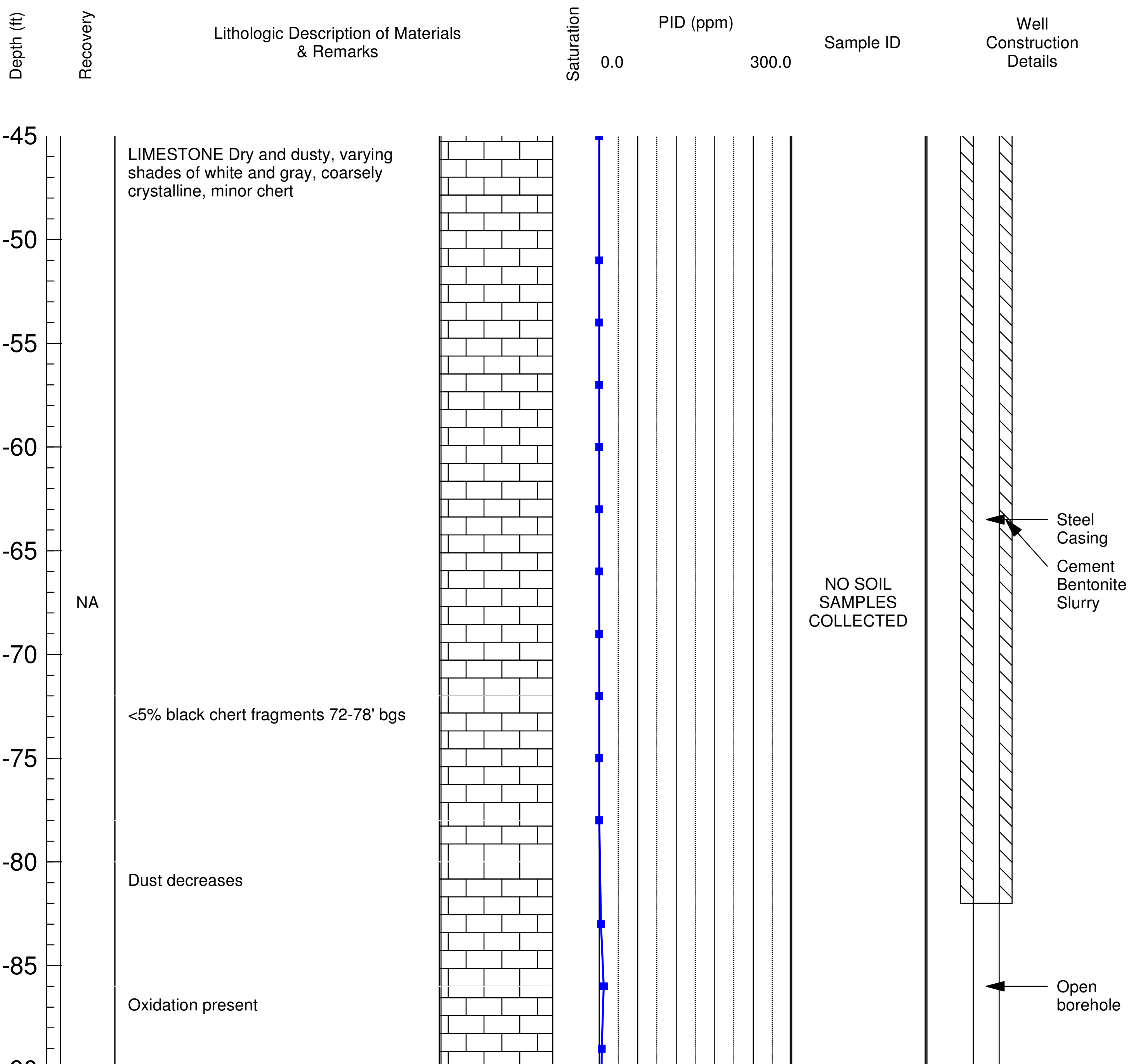


Borehole Log: BMW-13
Logged By: BG & JM, Environmental Works Inc.
Drilled By: Sunbelt Environmental Services Inc.
Lab Analysis By: Lancaster Labs

Drafted By: MG
Checked By: BG
Date Compiled: 4/6/2017

Boring Log: BMW-13

Site Name: Springfield Facility: Greenfield Environmental Multistate Trust, LLC
Site Address: 2800 West High Street, Springfield, Greene County, MO
Date: Advanced 0-80' bgs on 9/23/2016 and 80-180' bgs on 9/29/2016
Driller/Method: Sunbelt Environmental Services Inc./Air Rotary
Diameter: 11" from 0-80' bgs, 6 1/8" from 80' to 180'
Total Depth: 180' bgs
Sampling Method/Interval: Cuttings, varying intervals

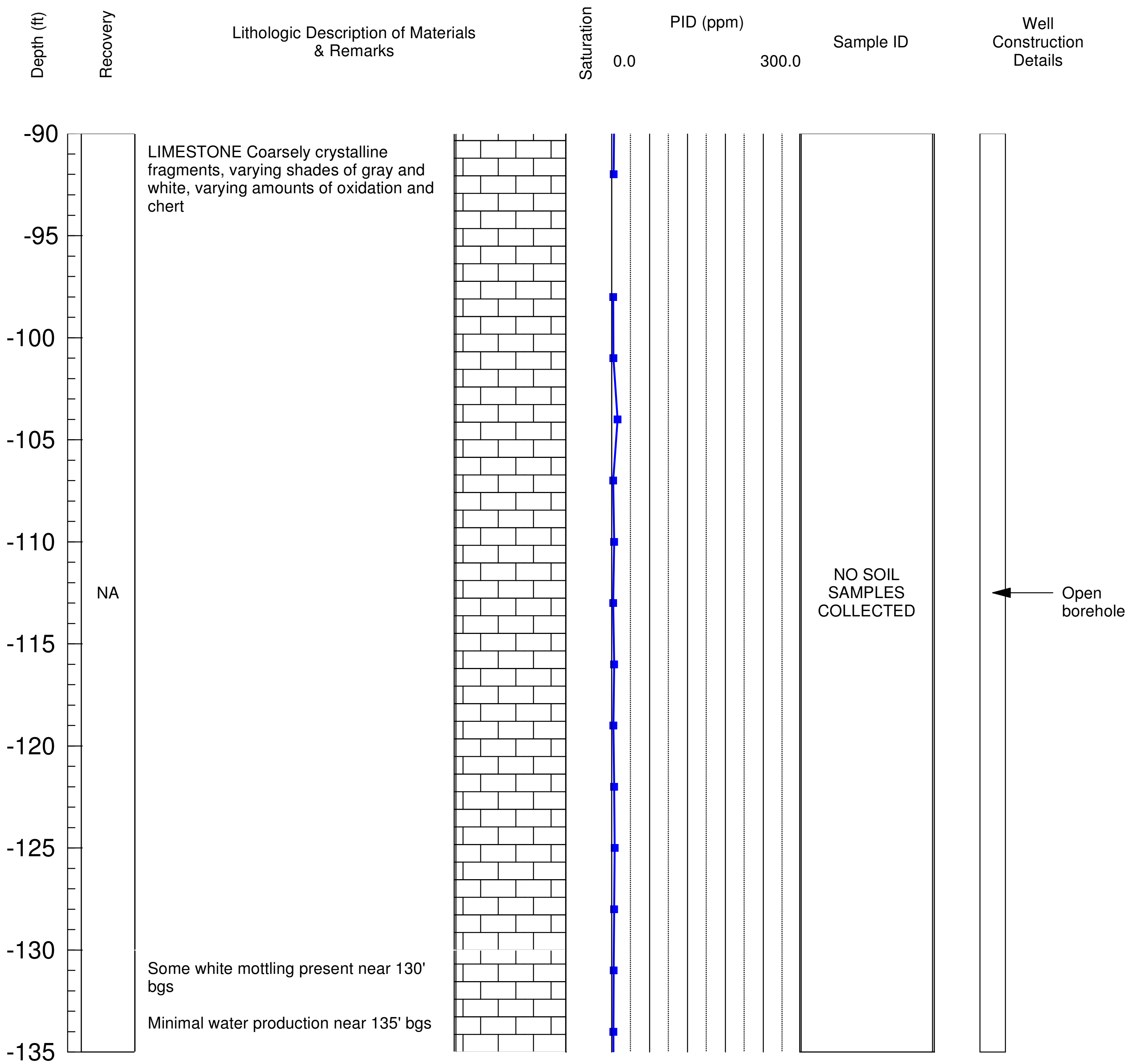


Borehole Log: BMW-13
Logged By: BG & JM, Environmental Works Inc.
Drilled By: Sunbelt Environmental Services Inc.
Lab Analysis By: Lancaster Labs

Drafted By: MG
Checked By: BG
Date Compiled: 4/6/2017

Boring Log: BMW-13

Site Name: Springfield Facility: Greenfield Environmental Multistate Trust, LLC
Site Address: 2800 West High Street, Springfield, Greene County, MO
Date: Advanced 0-80' bgs on 9/23/2016 and 80-180' bgs on 9/29/2016
Driller/Method: Sunbelt Environmental Services Inc./Air Rotary
Diameter: 11" from 0-80' bgs, 6 1/8" from 80' to 180'
Total Depth: 180' bgs
Sampling Method/Interval: Cuttings, varying intervals



Borehole Log: BMW-13
Logged By: BG & JM, Environmental Works Inc.
Drilled By: Sunbelt Environmental Services Inc.
Lab Analysis By: Lancaster Labs

Drafted By: MG
Checked By: BG
Date Compiled: 4/6/2017

Boring Log: BMW-13

Site Name: Springfield Facility: Greenfield Environmental Multistate Trust, LLC
Site Address: 2800 West High Street, Springfield, Greene County, MO
Date: Advanced 0-80' bgs on 9/23/2016 and 80-180' bgs on 9/29/2016
Driller/Method: Sunbelt Environmental Services Inc./Air Rotary
Diameter: 11" from 0-80' bgs, 6 1/8" from 80' to 180'
Total Depth: 180' bgs
Sampling Method/Interval: Cuttings, varying intervals

Depth (ft)	Recovery	Lithologic Description of Materials & Remarks	Saturation	PID (ppm) 0.0 – 300.0	Sample ID	Well Construction Details
-135	NA	LIMESTONE Coarsely crystalline fragments, varying shades of gray and white, varying amounts of oxidation and chert			NO SOIL SAMPLES COLLECTED	Open borehole
-143		Oxidation is significant				
-152		Oxidation decreases				
-155		Faint creosote like odor				
-164		Water production	▽			
-176		Increased water production				
-178		Total depth at 180' bgs				
-180						

Borehole Log: BMW-13
Logged By: BG & JM, Environmental Works Inc.
Drilled By: Sunbelt Environmental Services Inc.
Lab Analysis By: Lancaster Labs

Drafted By: MG
Checked By: BG
Date Compiled: 4/6/2017

Soil Boring Log:BMW-13: Downhole Video Camera Footage

Site Name: Springfield Facility: Greenfield Environmental Multistate Trust, LLC
Site Address: 2800 West High Street, Springfield, Greene County, MO
Date: Recorded 9/27/2016, before boring is extended to 180' bgs
Driller/Method: Sunbelt Environmental Services Inc./Air Rotary
Diameter: 11" from 0-80' bgs, 6 1/8" from 80' to 180'
Total Depth: 89' bgs
Sampling Method/Interval: NA

Depth (ft)	Recovery	Lithologic Description of Materials & Remarks	Saturation	PID (ppm) 0.0 – 300.0	Sample ID	Well Construction Details
0	NA	No video recorded			NO SOIL SAMPLES COLLECTED	Concrete Surface Completion
-5		PVC CASING				
-20 to -25						Steel Casing; Cement Bentonite Slurry
-30		Casing ends at 32.4' bgs				
-32.4		LIMESTONE Coarsely crystalline, staining present on walls near 32' bgs				
-45						

Borehole Log: BMW-13: Downhole Video Camera Footage
Logged By: BG & JM, Environmental Works Inc.
Drilled By: Sunbelt Environmental Services Inc.
Lab Analysis By: Lancaster Labs

Drafted By: MG
Checked By: BG
Date Compiled: 1/4/2017

Soil Boring Log:BMW-13: Downhole Video Camera Footage

Site Name: Springfield Facility: Greenfield Environmental Multistate Trust, LLC
Site Address: 2800 West High Street, Springfield, Greene County, MO
Date: Recorded 9/27/2016, before boring is extended to 180' bgs
Driller/Method: Sunbelt Environmental Services Inc./Air Rotary
Diameter: 11" from 0-80' bgs, 6 1/8" from 80' to 180'
Total Depth: 89' bgs
Sampling Method/Interval: NA

Depth (ft)	Recovery	Lithologic Description of Materials & Remarks	Saturation	PID (ppm) 0.0 – 300.0	Sample ID	Well Construction Details
-45	NA	LIMESTONE Coarsely crystalline			NO SOIL SAMPLES COLLECTED	
-50		Walls become rough, some pieces missing				
		Potential bedding plane or fracture feature				
-55		Bedding plane				
		Possible bedding plane				
-60		Staining on walls				
		Possible bedding plane				Steel Casing
-65		Wall roughness increases				Cement Bentonite Slurry
-70		Wall roughness decreases				
		Oxidation stain, water dripping from wall				
-75						
		Possilbe bedding plane				
-80		Large chert nodules visible in wall, possible bedding plane				
-85		Water dripping from wall near 85' bgs	▽			Open borehole
		Camera enters pooled water				
		Camera stopped. Boring end not visible				

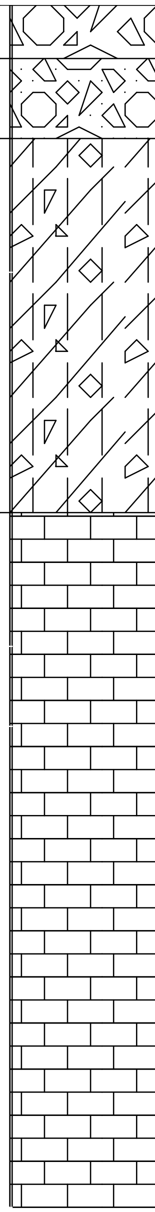
Borehole Log: BMW-13: Downhole Video Camera Footage
Logged By: BG & JM, Environmental Works Inc.
Drilled By: Sunbelt Environmental Services Inc.
Lab Analysis By: Lancaster Labs

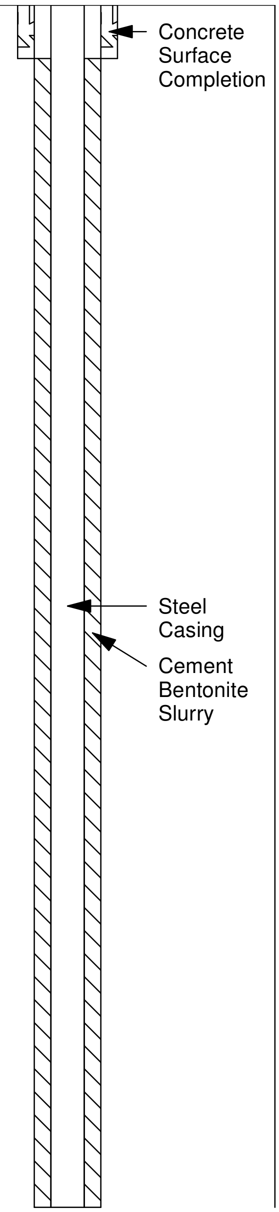
Drafted By: MG
Checked By: BG
Date Compiled: 1/4/2017

Boring Log: BMW-14

Site Name: Springfield Facility: Greenfield Environmental Multistate Trust, LLC
Site Address: 2800 West High Street, Springfield, Greene County, MO
Date: Advanced 0-80' bgs on 9/28/2016 and 80-180' bgs on 9/30/2016
Driller/Method: Sunbelt Environmental Services Inc./Air Rotary
Diameter: 11" from 0-80' bgs, 6 1/8" from 80' to 180'
Total Depth: 180' bgs
Sampling Method/Interval: Cuttings, varying intervals

Depth (ft)	Recovery	Lithologic Description of Materials & Remarks	Saturation	PID (ppm) 0.0 – 300.0	Sample ID	Well Construction Details
0		GRAVEL FILL				
		GRAVEL loose WITH SILT black, possible burnt wood present				
-5		SILTY CLAY red/brown, damp, high plasticity WITH CHERT				
-10		Clay is dry, chert becomes weathered				
-15						
-20		LIMESTONE Coarsely crystalline, tan to gray, some silty clay, 15% chert weathered with manganese and iron staining				
	NA				NO SOIL SAMPLES COLLECTED	
-25		25% chert, no silty clay				
		Chert decreases				
-30						
-35						
-40						
-45						



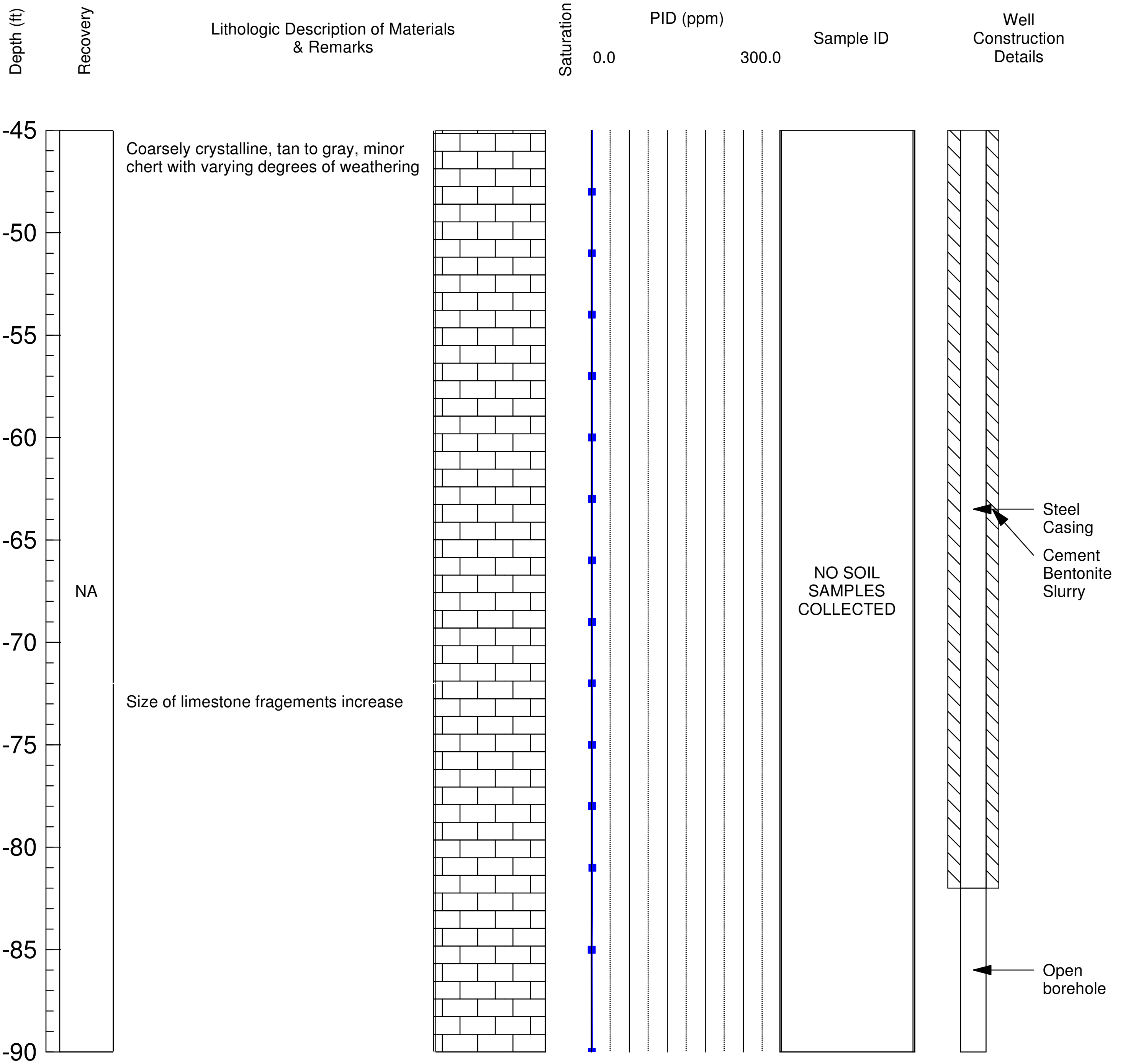


Borehole Log: BMW-14
Logged By: BG & TL, Environmental Works Inc.
Drilled By: Sunbelt Environmental Services Inc.
Lab Analysis By: Lancaster Labs

Drafted By: MG
Checked By: BG
Date Compiled: 4/6/2017

Boring Log: BMW-14

Site Name: Springfield Facility: Greenfield Environmental Multistate Trust, LLC
Site Address: 2800 West High Street, Springfield, Greene County, MO
Date: Advanced 0-80' bgs on 9/28/2016 and 80-180' bgs on 9/30/2016
Driller/Method: Sunbelt Environmental Services Inc./Air Rotary
Diameter: 11" from 0-80' bgs, 6 1/8" from 80' to 180'
Total Depth: 180' bgs
Sampling Method/Interval: Cuttings, varying intervals



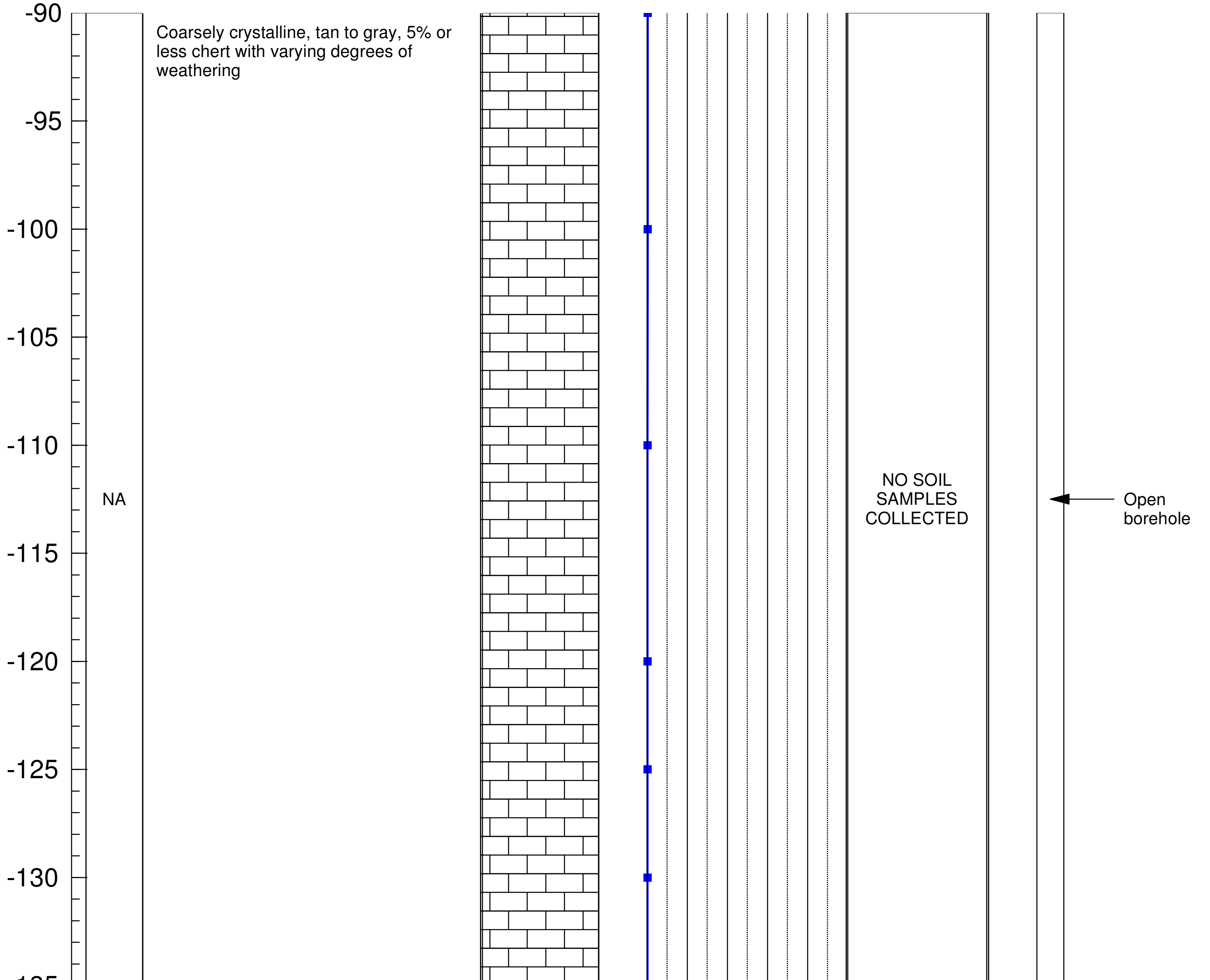
Borehole Log: BMW-14
Logged By: BG & TL, Environmental Works Inc.
Drilled By: Sunbelt Environmental Services Inc.
Lab Analysis By: Lancaster Labs

Drafted By: MG
Checked By: BG
Date Compiled: 4/6/2017

Boring Log: BMW-14

Site Name: Springfield Facility: Greenfield Environmental Multistate Trust, LLC
Site Address: 2800 West High Street, Springfield, Greene County, MO
Date: Advanced 0-80' bgs on 9/28/2016 and 80-180' bgs on 9/30/2016
Driller/Method: Sunbelt Environmental Services Inc./Air Rotary
Diameter: 11" from 0-80' bgs, 6 1/8" from 80' to 180'
Total Depth: 180' bgs
Sampling Method/Interval: Cuttings, varying intervals

Depth (ft)	Recovery	Lithologic Description of Materials & Remarks	Saturation	PID (ppm) 0.0 – 300.0	Sample ID	Well Construction Details
-90 to -135	NA	Coarsely crystalline, tan to gray, 5% or less chert with varying degrees of weathering			NO SOIL SAMPLES COLLECTED	Open borehole



Boring Log: BMW-14

Site Name: Springfield Facility: Greenfield Environmental Multistate Trust, LLC
Site Address: 2800 West High Street, Springfield, Greene County, MO
Date: Advanced 0-80' bgs on 9/28/2016 and 80-180' bgs on 9/30/2016
Driller/Method: Sunbelt Environmental Services Inc./Air Rotary
Diameter: 11" from 0-80' bgs, 6 1/8" from 80' to 180'
Total Depth: 180' bgs
Sampling Method/Interval: Cuttings, varying intervals

Depth (ft)	Recovery	Lithologic Description of Materials & Remarks	Saturation	PID (ppm) 0.0 – 300.0	Sample ID	Well Construction Details
-135	NA	Coarsely crystalline, tan to gray, minor chert with varying degrees of weathering			NO SOIL SAMPLES COLLECTED	Open borehole
-160		LIMESTONE WITH CHERT Chert increases to 30-50%				
-175		Some dolostone present				
-178		Stop advance. Total depth 180' bgs				
-180						

Borehole Log: BMW-14
Logged By: BG & TL, Environmental Works Inc.
Drilled By: Sunbelt Environmental Services Inc.
Lab Analysis By: Lancaster Labs

Drafted By: MG
Checked By: BG
Date Compiled: 4/6/2017