June 25, 2018

Ms. Charlene Fitch
Chief, Engineering Section
Solid Waste Management Program
Division of Environmental Quality
Missouri Department of Natural Resources
1730 East Elm Street
Jefferson City, Missouri 65101

RE: Bridgeton Landfill
Assessment Monitoring Plan

Dear Ms. Fitch:

On behalf of Bridgeton Landfill, LLC, Feezor Engineering, Inc. (FEI) has prepared the enclosed *Assessment Monitoring Plan.* This plan has been prepared as a follow-up to the December 26, 2017 *Groundwater Evaluation Report* and to the May 8, 2018 Bridgeton Landfill, LLC responses to the MDNR's April 27, 2018 comment letter.

Should you have any questions or comments, please contact the undersigned at your convenience.

Sincerely,

Andrew Wyatt
Senior Hydrogeologist / Residuals Management Team Member

Attachment: Assessment Monitoring Plan

Cc: Justin Barker – United States Environmental Protection Agency (electronic)
Steve Jett – Jett Environmental Consulting (electronic)
Jessie Merrigan – Lathrop Gage LLP (electronic)
Mark Milward – St. Louis County Department of Public Health (electronic)
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Missouri Dept. of Natural Resources
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ASSESSMENT MONITORING PLAN

BRIDGETON LANDFILL

BRIDGETON, MISSOURI

Prepared For:

Bridgeton Landfill, LLC
13570 St. Charles Rock Rd
Bridgeton, MO 63044

June 25, 2018

Prepared By:

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406 East Walnut Street
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Project BT-171

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1 INTRODUCTION

On behalf of Bridgeton Landfill, LLC – Bridgeton Landfill, Feezor Engineering, Inc. (FEI) has prepared this Assessment Monitoring Plan (AMP) for the facility. The AMP has been prepared in response to 1) confirmed inorganic constituent statistical exceedances; 2) confirmed Maximum Contaminant Level (MCL) (National Primary Drinking Water Standard) exceedances; and 3) confirmed organic constituent detections observed in the facility's groundwater monitoring wells.

This AMP is intended to replace the facility's previous AMP, which was originally dated December 17, 2013 and was most recently updated on November 14, 2016. That AMP addressed confirmed groundwater exceedances / detections that have been identified at detection monitoring wells PZ-104-SS and PZ-104-SD. Assessment monitoring of these two wells has been ongoing since September 2014.

In response to an October 14, 2016 letter from the Missouri Department of Natural Resources' (MDNR) Solid Waste Management Program (SWMP), the facility conducted a comprehensive review of existing hydrogeologic and groundwater quality data from monitoring wells located near the Bridgeton Landfill but not routinely sampled under the facility's detection or assessment monitoring programs. This evaluation of these "non-program" wells was presented in the November 28, 2016 *Groundwater Technical Report* (GWTR). The report identified the non-program wells that exhibited confirmed detections of organic constituents, indicating a possible landfill-related impact to groundwater.

As recommended in the GWTR, the facility performed additional sampling of select non-program wells in 2017 to evaluate the nature and extent of the identified impacts. This sampling included analysis for all constituents listed in Appendix I and II of Title 10 of the Code of State Regulations (CSR) 80-3 (hereafter, App I and App II). The results of the additional non-program monitoring were presented to the MDNR-SWMP in the December 26, 2017 *Groundwater Evaluation Report* (GWER).

Based on the results observed at the non-program wells, the GWER recommended revisions to the facility's detection and assessment monitoring programs. In general, non-program wells that did not exhibit evidence of an impact – either from an off-site source or from the landfill – were recommended for addition to the detection monitoring program. Non-program wells that exhibited evidence of an impact potentially attributable to the landfill were recommended for addition to the assessment monitoring program.

In letter dated March 19, 2018, the MDNR-SWMP indicated that it generally concurred with the recommendations presented in the GWER. In a follow-up letter dated April 27, 2018, the MDNR-SWMP provided additional comments that were contributed by the Missouri Geological Survey (MGS). The MDNR-SWMP's second letter also instructed Bridgeton Landfill, LLC to submit a revised Groundwater Monitoring Plan (GWMP) for the facility – reflecting the GWER recommendations and the state's comments – within 15 days.

In a May 8, 2018 letter to the MDNR-SWMP, the facility responded to the state's comments, noting that the 15-day deadline specified in the April 27, 2018 letter was not possible to achieve, given that the GWMP had not been updated since 1999. The facility indicated that it would submit an updated GWMP within 30 days of the April 27, 2018 letter and a revised Groundwater Statistical Analysis Plan (StAP) and revised AMP within 60 days of the receipt of the letter.

A revised GWMP was submitted to the MDNR-SWMP on May 24, 2018, detailing an updated Detection Monitoring Plan (DMP) and an updated Groundwater Sampling and Analysis Plan (GWSAP) for the facility. This revised AMP and the revised StAP that has been prepared by Jett Environmental Consulting (Jett) (submitted separately) are intended to satisfy the second (60-day) submittal attested to in the May 8, 2018 letter.

This revised AMP expands the facility's assessment monitoring program to include 12 additional groundwater monitoring wells in six independent "assessment areas" where groundwater impacts have been identified, per the recommendations in the GWER. The AMP also presents groundwater protection standards (GWPSs) for the new assessment wells and updates the existing assessment monitoring requirements for wells PZ-104-SS and -SD.

2 SITE HYDROGEOLOGY

Four hydrogeologic zones are monitored at the Bridgeton Landfill. From shallowest to deepest, these zones are: the Alluvial Zone, the St. Louis / Upper Salem Zone, the Deep Salem Zone, and the Keokuk Zone.

The Alluvial Zone consists of alluvium overlain by loess. The materials range from a silty clay / clayey silt to a sand. The zone is under perched (unconfined) aquifer conditions, and groundwater elevations typically range from approximately 431 to 436 ft/msl. The monitorable extent of the Alluvial Zone is limited to the west-central, northwestern, and northern sides of the landfill. These correspond to areas where the alluvium is thickest and where perched groundwater occurs consistently. Groundwater monitoring wells screened in the Alluvial Zone are typically designated with the -AS suffix for a shallow alluvium well, -AI for an intermediate alluvium well, and -AD for a deep alluvium well. Older Alluvial Zone wells may instead be designated with the S-, I-, or D- prefix.

The St. Louis / Upper Salem Zone consists of the St. Louis formation and the upper portions of the Salem formation. The St. Louis formation and Salem formation are both limestones. Although geologically distinct, they are considered a single hydrogeologic unit at the Bridgeton Landfill. The zone is under semi-confined conditions, and groundwater elevations typically range from approximately 431 to 473 ft/msl. Monitoring wells screened in the St. Louis / Upper Salem Zone are typically designated with the -SS suffix.

The Deep Salem Zone consists of the lower portions of the Salem formation. The zone is under semi-confined conditions, and groundwater elevations typically range from approximately 432 to 473 ft/msl. Monitoring wells screened in the Deep Salem Zone are typically designated with the -SD suffix.

Below the Deep Salem Zone and above Keokuk Zone is the limestone, siltstone, and claystone Warsaw formation. The Warsaw formation is not a groundwater-bearing unit, however.

The Keokuk Zone consists of the Keokuk formation, another limestone. The zone is under confined aquifer conditions, and groundwater elevations typically range from approximately 458 to 469 ft/msl. Monitoring wells screened in the Keokuk Zone are typically designated with the -KS suffix. Most of the facility's Keokuk Zone wells are used groundwater elevation monitoring only, although well PZ-104-KS is a part of the assessment monitoring program.

The Bridgeton Landfill's groundwater monitoring network is illustrated on **Figure 3-1**.

3 ASSESSMENT HISTORY

This section presents a brief review of the history of the facility's groundwater assessment monitoring program to date.

3.1 Original Assessment Plan

As described in the February 20, 2013 *Groundwater Statistical Analysis Semi-Annual Report*, Deep Salem Zone well PZ-104-SD exhibited confirmed statistical exceedances and increasing statistical trends for several inorganic constituents during the November 2012 groundwater detection monitoring event. During the November 2012 event, PZ-104-SD also exhibited confirmed detections for the volatile organic compounds (VOCs) benzene and toluene.

In accordance with MDNR-SWMP correspondence dated October 23, 2003, a groundwater demonstration report or AMP was not required for a well that exhibited a confirmed exceedance and upward trend for an inorganic constituent, unless the well also exhibited a confirmed organic constituent detection above the laboratory reporting limit (RL). Accordingly, the February 20, 2013 report recommended that the facility prepare an AMP in response to the confirmed exceedances / detections at PZ-104-SD.

The April 2013 groundwater monitoring event was conducted at the Bridgeton Landfill while the MDNR-SWMP's comments on the February 20, 2013 report were under preparation. As described in the July 2, 2013 *Groundwater Statistical Analysis Semi-Annual Report*, most of the exceedances / detections observed at PZ-104-SD during in November 2012 were repeated in April 2013. In addition, the well also exhibited several new confirmed organic detections: 1,2-dichloroethane, 1,4-dichloorbenzene, 4-methyl-2-pentanone, ethylbenzene, methyl ethyl ketone, and total xylenes. During the April 2013 monitoring event, companion St. Louis / Upper Salem Zone well PZ-104-SS also exhibited several confirmed organic detections: 1,2-dichloroethane, 1,4-dichloorbenzene, 4-methyl-2-pentanone, benzene, ethylbenzene, methyl ethyl ketone, toluene, and total xylenes.

In response to the results of the April 2013 monitoring event, the scope of the original AMP was expanded to include the confirmed detections at PZ-104-SS in April 2013, as well as the confirmed exceedances / detections at PZ-104-SD in November 2012 and April 2013. The AMP was submitted to the MDNR-SWMP on December 17, 2013. In accordance with 10 CSR 80-30.010(11)(C)6.E, this original version of the AMP established GWPSs for those 10 CSR 80-3 Appendix II constituents that had been detected in PZ-104-SS and/or PZ-104-SD.

In addition to PZ-104-SS and -SD, the assessment monitoring program presented in the December 17, 2013 AMP included seven other wells. Three new St. Louis / Upper Salem Zone assessment wells and three new Deep Salem Zone assessment wells installed in

October 2013 provide horizontal monitoring: PZ-209-SS, PZ-209-SD, PZ-211-SS, and PZ-211-SD to the east of the PZ-104 wells; and PZ-210-SS and PZ-210-SD to the south. Existing Keokuk Zone companion well PZ-104-KS provides vertical monitoring below PZ-104-SD.

3.2 Monitoring and Reporting

In a letter dated July 30, 2014, the MDNR-SWMP conditionally approved the December 17, 2013 AMP with comments. In response to the state's comments, the facility submitted a letter on August 18, 2014 that included revised text pages and a revised table for the AMP. This response letter established additional GWPSs for the assessment program, in accordance with one of the MDNR-SWMP's comments.

In accordance with an August 6, 2014 telephone directive from the MDNR-SWMP, assessment monitoring began at the facility in September 2014. Per the AMP, assessment monitoring was conducted quarterly for one year, up to and including the May 2015 monitoring event. Thereafter, assessment monitoring was conducted semi-annually in the second and fourth quarters, apart from some supplementary quarterly background monitoring for select assessment constituents.

In accordance with the AMP, an Annual Assessment Monitoring Report (AAMR) for the facility is prepared and submitted each year by August 31. The annual report summarizes the assessment monitoring results from the previous year and compares the results to the GWPSs. The annual report also re-evaluates the concentrations, extents, and migration rates of the assessment constituents, based on the previous year's results. The facility established new GWPSs for select assessment constituents in a November 24, 2015 *Addendum to the 2015 Annual Assessment Report*.

In an October 14, 2016 comment letter, the MDNR-SWMP requested that the facility submit a complete, updated version of the AMP incorporating the revisions presented in the August 18, 2014 and November 24, 2015 submittals. The state also requested that the facility establish GWPSs for App II constituents that exhibited statistical exceedances between September 2014 and March 2016. The facility submitted this updated version of the AMP on November 14, 2016.

As described in the November 28, 2016 *Interim Corrective Measures Technical Report* (ICMTR), the facility began implementing interim corrective measures beginning in mid-2013. Implementation and monitoring of the measures have continued through the present day. These measures are intended to address the identified groundwater impacts at wells PZ-104-SS and PZ-104-SD. The measures include improvements designed to enhance the management of leachate and landfill gas at the facility, and thereby mitigate their potential to act as sources of groundwater impacts.

In general, the concentrations of assessment constituents at PZ-104-SS and PZ-104-SD have decreased or remained stable as interim corrective measures have been implemented at

the facility. Only one new App II constituent, o-dichlorobenzene (1,2-dichlorobenzene) has been detected at PZ-104-SS or -SD since assessment monitoring began in September 2014.

3.3 Expansion of Assessment Program

Based on a review of historical data and the results of additional monitoring conducted in 2017, the December 26, 2017 GWER identified 12 non-program monitoring wells near the Bridgeton Landfill that exhibited evidence of groundwater impacts (i.e., confirmed organic constituent detections or confirmed inorganic MCL exceedances not attributable to an off-site source). The GWER recommended that these wells be incorporated into the facility's assessment monitoring program. In its response letter dated March 19, 2018, the MDNR-SWMP generally concurred with the recommendations presented in the GWER, including the addition of the 12 non-program wells to the assessment monitoring program.

This updated AMP revises and expands the assessment monitoring program to incorporate the 12 wells identified in the GWER. It also updates the assessment program to reflect the progress to date in mitigating, through interim corrective measures, the impacts observed at wells PZ-104-SS and -SD.

4 MONITORING PLAN

The assessment monitoring program for the Bridgeton Landfill is summarized on **Table 4-1**. In accordance with 10 CSR 80-3.010(11)(C)6.C, the following components are included in this AMP:

1) The number, location, and depths of wells to be utilized in assessment monitoring;
2) The sampling and analytical methods to be utilized in assessment monitoring;
3) Procedures to be utilized to evaluate assessment monitoring data;
4) The approximate migration rate and extent of the assessment constituents; and
5) The approximate concentrations of the assessment constituents.

Items 1, 2, and 3 are addressed in this section. Items 4 and 5 are addressed in **Section 5**, below.

4.1 Assessment Wells

The facility's groundwater assessment monitoring network is comprised of 22 wells screened within four separate hydrogeologic zones:

<u>Alluvial Wells</u>

- D-85$^{(D)}$
- I-73$^{(D)}$
- PZ-112-AS$^{(D)}$
- PZ-114-AS$^{(D)}$
- PZ-205-AS$^{(D)}$
- PZ-207-AS$^{(D)}$
- S-84$^{(D)}$

<u>St. Louis / Upper Salem Wells</u>

- PZ-101-SS$^{(D)}$
- PZ-103-SS$^{(D)}$
- PZ-104-SS$^{(D)}$
- PZ-107-SS$^{(D)}$
- PZ-116-SS$^{(D)}$
- PZ-202-SS$^{(D)}$
- PZ-209-SS
- PZ-210-SS
- PZ-211-SS

<u>Deep Salem Wells</u>

- MW-1204$^{(D)}$
- PZ-104-SD$^{(D)}$
- PZ-209-SD
- PZ-210-SD
- PZ-211-SD

<u>Keokuk Wells</u>

- PZ-104-KS

Wells indicated with (D) are also a part of the facility's detection monitoring network. When assessment monitoring is no longer required at one of these wells, pursuant to 10 CSR 80-3.010(11)(C)6.G, routine detection monitoring will be reinstated at that well.

Table 4-2 summarizes the basic as-built information for the facility's groundwater assessment monitoring wells. **Figure 4-1** illustrates the layout of the assessment monitoring network. Except for PZ-114-AS (see below), the facility's assessment monitoring wells are broadly divisible into six independent "assessment areas," which are designated as follows:

Area I
(East-Central and Southeast Bedrock Wells)

- PZ-103-SS
- PZ-104-SS
- PZ-104-SD
- PZ-104-KS
- PZ-202-SS
- PZ-209-SS
- PZ-209-SD
- PZ-210-SS
- PZ-210-SD
- PZ-211-SS
- PZ-211-SD

Area II
(South-Central Bedrock Wells)

- MW-1204
- PZ-116-SS

Area III
(West-Central Alluvial and Bedrock Wells)

- I-73
- PZ-107-SS
- PZ-205-AS

Area IV
(Northwest Alluvial Well)

- PZ-112-AS

Area V
(North-Central Alluvial Wells)

- D-85
- PZ-207-AS
- S-84

Area VI
(Northeast Bedrock Well)

- PZ-101-SS

Each assessment area is monitored for a custom list of assessment constituents (see **Section 4.2**, below) based on historical groundwater monitoring results in the associated wells.

The groundwater impacts that have been observed at the hydraulically upgradient Alluvial Zone well PZ-114-AS have previously been identified with an off-site source on the upgradient Virbac Animal Health (formerly PM Resources, Inc.) property. Accordingly, PZ-114-AS is not associated with the assessment areas listed above. In accordance with the May 24, 2018 GWMP, PZ-114-AS is sampled annually for detection monitoring constituents, including the three organic compounds that have been historically detected at the well and attributed to the off-site source: benzene, chlorobenzene, and p-dichlorobenzene.

4.1.1 Sampling Method

As described in the May 24, 2018 GWMP, the preferred groundwater monitoring well sampling method at the Bridgeton Landfill is low-flow sampling via dedicated submersible pump. Complete details on the facility's sampling methods can be found in the GWSAP that is presented in Section 6 of the GWMP.

4.2 Assessment Constituents

The facility's groundwater assessment constituent list has been developed based on several considerations:

- Detection monitoring (App I) constituents that exhibited confirmed statistical exceedances (inorganics) or confirmed detections (organics) at wells PZ-104-SS and/or PZ-104-SD in 2012 – 2013.

- App II constituents detected at wells PZ-104-SS and/or PZ-104-SD during the first assessment event in September 2014.

- Constituents not listed in 10 CSR 80-3 but specified for inclusion in the program by the MDNR-SWMP in its July 30, 2014 comment letter based on the results of split-sampling the state performed at PZ-104-SD in November 2012.

- Inorganic App I constituents that exhibited confirmed MCL exceedances at non-program wells in 2015 – 2017.

- Organic App I or App II constituents detected at non-program wells in 2015 – 2017.

The assessment constituents for each assessment area are listed on **Table 4-3**. The list is generally consistent with the proposed sampling plan originally presented on Table 5-1 of the GWER. The assessment constituent list may be modified in future reports based on recent assessment monitoring results.

As presented on **Table 4-1**, some assessment constituents are monitored semi-annually and some are monitored annually. Each assessment area has a discrete monitoring schedule. Constituents designated for semi-annual monitoring in a given Area exhibited a confirmed MCL exceedance (for inorganics) or a confirmed detection (for organics) in that Area in 2016 or 2017. Constituents designated for annual monitoring in a given Area exhibited an unconfirmed MCL exceedance (for inorganics) or unconfirmed detection (for organics) in that Area in 2016 or 2017.

4.2.1 Changes to Area I Constituents

Several constituents listed in the previous AMP (November 14, 2016) are no longer included in the constituent list for PZ-104-SD and PZ-104-SS (Area I). The following

inorganic constituents were removed from the Area I program, due to the absence of any GWPS exceedances at assessment wells since the initiation of assessment monitoring in September 2014:

- Beryllium, Total
- Cadmium, Total
- Chromium, Total
- Copper, Total
- Lead, Total
- Selenium, Total
- Zinc, Total

[Note: Total chromium and total lead have exhibited recent MCL exceedances in Area II and Area III, respectively, and have been retained as assessment constituents in those areas only.]

The following organic constituents were removed from the Area I program, due to the absence of any confirmed detections at Area I assessment wells since the initiation of assessment monitoring:

- 1-Chlorobutane
- o-Dichlorobenzene
- 1,2-Dichloroethane
- Isopropylbenzene
- Phenol
- PCB-1221
- 1,2,4-Trimethylbenzene
- 1,3,5-Trimethylbenzene

[Note: Isopropylbenzene has exhibited recent detections in Area III and V; phenol has exhibited recent detections in Area II; 1,2,4-trimethylbenzene and 1,3,5-trimethylbenzene has exhibited recent detections in Area III. These constituents have been retained as assessment constituents in those areas only.]

4.2.2 Proposed Analytical Methods

Table 4-3 presents the suggested analytical methods for the assessment monitoring constituents. Individual sample containers will be filled in order of decreasing sensitivity to potential volatilization of the analytical constituents, as specified in **Table 4-4**. The table is organized according to the preservation methods associated with the suggested analytical methods listed on **Table 4-3**.

4.3 Groundwater Protection Standards

10 CSR 80-30.010(11)(C)6.E specifies that GWPSs be established for assessment constituents according to the following guidelines:

- If the constituent's MCL is greater than its background concentration, the GWPS is equal to the MCL.

- If the constituent's background concentration is great than its MCL, the GWPS is equal to the background concentration.

- If a MCL has not been established for the constituent, the GWPS is equal to the background concentration.

- Alternately, the GWPS may be a level established by the department based upon a consideration of relevant factors, including: multiple contaminants in groundwater, exposure threats to sensitive environmental receptors, and other site-specific exposure or potential exposure to groundwater.

4.3.1 Background Concentrations

For organic constituents, the background concentration for all assessment wells is the laboratory RL. For inorganic constituents, the background concentration for each assessment well is determined from a representative unimpacted data set, as described in the sub-sections below. Unless otherwise specified, each background concentration is equal to the intra-well upper prediction limit determined from the indicated background data set.

AREA I

PZ-103-SS: The initial inorganic MCL exceedances at PZ-103-SS occurred during the well's first historical sampling event in August 2012; the initial organic detections occurred in July 2013. Accordingly, there are no pre-impact data available for this well. Data from the nearest unimpacted St. Louis / Upper Salem Zone well, detection well PZ-201A-SS, were used to determine background. PZ-103-SS background concentrations for most constituents were calculated from the May 2008 – February 2018 results at PZ-201A-SS, as described in the updated StAP.

PZ-104-SS: The initial organic detections at PZ-104-SS occurred in August 2012. Accordingly, background concentrations for most constituents were calculated from the February 1997 - November 2011 results at PZ-104-SS. (See the August 3, 2012 *Groundwater Statistical Analysis Report* for details.)

PZ-104-SD: The initial organic detections at PZ-104-SD occurred in May 2012. Background concentrations for most constituents were calculated from the February 1997 – November 2011 results at PZ-104-SD. (See the August 3, 2012 *Groundwater Statistical Analysis Report for details*.)

PZ-104-KS: The initial organic detections at companion Deep Salem Zone well PZ-104-SD occurred in May 2012. There are no data from PZ-104-KS prior to this event. Accordingly, PZ-104-KS background concentrations for most constituents were calculated from the February 1997 – November 2011 results at PZ-104-SD. (See the August 3, 2012 *Groundwater Statistical Analysis Report* for details.)

PZ-202-SS: The initial inorganic MCL exceedances at PZ-202-SS occurred during the well's first historical sampling event in August 1997; the initial organic detections occurred in July

2013. Accordingly, there are no pre-impact data available for this well. Pre-impact data from the nearest St. Louis / Upper Salem Zone well, PZ-104-SS, were used to determine background. Background concentrations for most constituents were calculated from the February 1997 - November 2011 results at PZ-104-SS. (See the August 3, 2012 *Groundwater Statistical Analysis Report* for details.)

PZ-209-SS: The initial organic detections at PZ-104-SS occurred in August 2012; however, PZ-209-SS was not installed until October 2013. Accordingly, PZ-209-SS background concentrations for most constituents were calculated from the February 1997 - November 2011 results at PZ-104-SS. (See the August 3, 2012 *Groundwater Statistical Analysis Report* for details.)

PZ-209-SD: The initial organic detections at PZ-104-SD occurred in May 2012; however, PZ-209-SD was not installed until October 2013. Accordingly, PZ-209-SD background concentrations for most constituents were calculated from the February 1997 - November 2011 results at PZ-104-SD. (See the August 3, 2012 *Groundwater Statistical Analysis Report* for details.)

PZ-210-SS: The initial organic detections at PZ-104-SS occurred in August 2012; however, PZ-210-SS was not installed until October 2013. Accordingly, PZ-210-SS background concentrations for most constituents were calculated from the February 1997 – November 2011 results at PZ-104-SS. (See the August 3, 2012 *Groundwater Statistical Analysis Report* for details.)

PZ-210-SD: The initial organic detections at PZ-104-SD occurred in May 2012; however, PZ-210-SD was not installed until October 2013. Accordingly, PZ-210-SD background concentrations for most constituents were calculated from the February 1997 - November 2011 results at PZ-104-SD. (See the August 3, 2012 *Groundwater Statistical Analysis Report* for details.)

PZ-211-SS: The initial organic detections at PZ-104-SS occurred in August 2012; however, PZ-211-SS was not installed until October 2013. Accordingly, PZ-211-SS background concentrations for most constituents were calculated from the February 1997 - November 2011 results at PZ-104-SS. (See the August 3, 2012 *Groundwater Statistical Analysis Report* for details.)

PZ-211-SD: The initial organic detections at PZ-104-SD occurred in May 2012; however, PZ-211-SD was not installed until October 2013. Accordingly, PZ-211-SD background concentrations for most constituents were calculated from the February 1997 - November 2011 results at PZ-104-SD. (See the August 3, 2012 *Groundwater Statistical Analysis Report* for details.)

AREA II

MW-1204: The initial inorganic MCL exceedances at MW-1204 occurred in October 2013; the initial organic detections occurred in July 2013. Accordingly, MW-1204 background concentrations for most constituents were calculated from the February 1997 – April 2013 results at MW-1204.

PZ-116-SS: The initial inorganic MCL exceedances at PZ-116-SS occurred in November 1997; the initial organic detections occurred in August 2016. There is only one event of pre-impact data available for this well (August 1997). Data from the nearest unimpacted St. Louis / Upper Salem Zone well, detection well PZ-105-SS, were used to determine background. PZ-116-SS background concentrations for most constituents were calculated from the May 2008 – February 2018 results at PZ-105-SS, as described in the updated StAP.

AREA III

I-73: The initial inorganic MCL exceedances and organic detections at I-73 occurred during the first historical sampling event in August 2012. Accordingly, there are no pre-impact data available for this well. Data from the nearest unimpacted Alluvial Zone well, detection well PZ-302-AI, were used to determine background. I-73 background concentrations for most constituents were calculated from the August 2012 – August 2016 results at PZ-302-AI.

PZ-107-SS: The initial inorganic MCL exceedances at PZ-107-SS occurred in April 2013; the initial organic detections occurred in August 2012. Accordingly, PZ-107-SS background concentrations for most constituents were calculated from the August 1997 – November 1998 results at PZ-107-SS.

PZ-205-AS: The initial inorganic MCL exceedances at PZ-205-AS occurred during the first historical sampling event in August 1997; the initial organic detections occurred in Aug. 2012. Accordingly, there are no pre-impact data available for this well. Data from the nearest unimpacted Alluvial Zone well, piezometer PZ-302-AI, were used to determine background. PZ-205-AS background concentrations for most constituents were calculated from the August 2012 – August 2016 results at PZ-302-AI.

AREA IV

PZ-112-AS: The initial inorganic MCL exceedances and organic detections at PZ-112-AS occurred during the first historical sampling event in August 1997. Accordingly, there are no pre-impact data available for this well. Data from the nearest unimpacted Alluvial Zone well, piezometer D-87, were used to determine background. PZ-112-AS background concentrations for most constituents were calculated from the August 2012 – October 2013 results at D-87.

AREA V

D-85: The initial inorganic MCL exceedances and organic detections at D-85 occurred during the first historical sampling event in August 2012. Accordingly, there are no pre-impact data available for this well. Data from the nearest unimpacted Alluvial Zone well, piezometer I-67, were used to determine background. D-85 background concentrations for most constituents were calculated from the August 2012 – October 2013 results at I-67.

PZ-207-AS: The initial inorganic MCL exceedances and organic detections at PZ-207-AS occurred during the first historical sampling event in August 1997. Accordingly, there are no pre-impact data available for this well. Data from the nearest unimpacted Alluvial Zone well, piezometer I-67, were used to determine background. PZ-207-AS background concentrations for most constituents were calculated from the August 2012 – October 2013 results at I-67.

S-84: The initial inorganic MCL exceedances and organic detections at S-84 occurred during the first historical sampling event in August 2012. Accordingly, there are no pre-impact data available for this well. Data from the nearest unimpacted Alluvial Zone well, piezometer I-67, were used to determine background. S-84 background concentrations for most constituents were calculated from the August 2012 – October 2013 results at I-67.

AREA VI

PZ-101-SS: The first inorganic MCL exceedances at PZ-101-SS occurred in March 2016; the first VOC detections occurred in July 2013. There are only two events of pre-impact data available for this well (August 2012 and April 2013). Data from the nearest unimpacted St. Louis / Upper Salem Zone well, detection well PZ-201A-SS, were used to determine background. PZ-101-SS background concentrations for most constituents were calculated from the May 2008 – February 2018 results at PZ-201A-SS, as described in the updated StAP.

[Note: Due to limited background data, background concentrations for those inorganic App II constituents which are not also App I detection constituents – cyanide, sulfide, and tin – were determined by alternate means. For sulfide, the background concentrations were calculated from the November 2014 – August 2015 results at background well PZ-212-SS (for Alluvial and St. Louis / Salem Zone wells) or PZ-212-SD (for Deep Salem or Keokuk Zone wells). For total cyanide and total tin, the background concentration was assumed to be equal to the laboratory RL.]

The GWPS for each assessment constituent at each assessment well is listed on the tables presented in **Appendix A**. Consistent with the MDNR-SWMP's July 30, 2014 comments on the original AMP, GWPSs have also been developed for all other Appendix II constituents, including those that have not been detected in assessment wells to date. Statistical summary table outputs for background concentrations not addressed in the StAP or the

August 3, 2012 *Groundwater Statistical Analysis Report* – i.e., for wells D-87, I-67, MW-1204, PZ-107-SS, PZ-212-SS, PZ-212-SD, and PZ-302-AI – are presented in **Appendix B**.

4.4 Evaluation of Assessment Monitoring Data

In accordance with 10 CSR 80-3.010(11)(C)6.F, a notification will be submitted to the MDNR-SWMP within 14 days of the receipt of final laboratory analytical results, but only if a new App II constituent is confirmed in an assessment monitoring well. That is, a well exhibits a confirmed detection for a constituent that is on the App II list but is not currently an assessment constituent at that well.

In accordance with 10 CSR 80-3.010(11)(C)6.J, an Annual Assessment Monitoring Report will be submitted to the MDNR-SWMP by August 31 of each year. The annual report will summarize the assessment monitoring results from the past year and compare the results to the GWPSs and background concentrations by means of lower confidence limits, as described in Section 14.0 of the updated StAP. The annual report will also re-evaluate the concentrations, extents, and migration rates of the assessment constituents, based on the past year's assessment monitoring results.

In accordance with 10 CSR 80-3.010(11)(C)6.G, if the annual report determines by means of statistical analysis that the concentrations of all assessment constituents are at or below background concentrations in an assessment monitoring well for two consecutive monitoring events, the facility may return that well to detection monitoring or groundwater elevation monitoring, as appropriate (assessment wells that are also detection wells are indicated in **Section 4.1**, above).

In accordance with 10 CSR 80-3.010(11)(C)6.H, if the annual report determines by means of statistical analysis that concentrations of any assessment constituents are above background concentrations but all concentrations are statistically below GWPSs in an assessment monitoring well, the facility may continue with assessment monitoring or develop an assessment of corrective measures (ACM), as determined to be appropriate by the SWMP.

In accordance with 10 CSR 80-3.010(11)(C)6.I, if the annual report determines by means of statistical analysis that concentrations of any Appendix II constituents are statistically above GWPSs in an assessment monitoring well, the facility will develop an ACM and, if necessary, install additional monitoring wells in order to further characterize the nature and extent of the impact to groundwater in the vicinity of the affected well(s). The facility will also continue with assessment monitoring during the development of the ACM and following the submittal of the ACM report.

5 CURRENT CONDITIONS

This section presents a summary of the current groundwater conditions with respect to the assessment monitoring constituents. In accordance with 10 CSR 80-3.010(11)(C)6.C, the concentrations, extents, and migration rates of the assessment constituents are addressed. The most recent monitoring event in which all the facility's assessment wells were sampled occurred in May 2017. This event comprised a detection monitoring event, an assessment monitoring event for select Area I assessment wells, and an "additional monitoring event" for other wells that have since been designated as Area I - VI assessment wells. The results from that event were accordingly reviewed for the purposes of this section.

The May 2017 results from select Area I wells were most recently evaluated in the *2017 Annual Assessment Monitoring Report*, submitted to the MDNR-SWMP on August 30, 2017. This section updates the information presented in that report to include all the assessment monitoring wells, as well as the updated list of assessment constituents (where such results are available). Once the MDNR-SWMP has approved this AMP, the updated assessment sampling schedule presented on **Table 4-1** will be implemented. It is anticipated that the concentrations, extents, and migration rates of all assessment constituents will then be re-evaluated in the *2019 Annual Assessment Monitoring Report*, which will be submitted by August 31, 2019.

5.1 Concentrations of Assessment Constituents

The assessment constituent results from the May 2017 groundwater monitoring event are summarized in **Appendix C**. This appendix presents the concentrations of the assessment constituents within each assessment area.

5.2 Extents of Assessment Constituents

Maps illustrating the horizontal extent of assessment constituents as of May 2017 are presented in **Appendix D**. Each constituent map indicates the extent of GWPS exceedances.

For inorganics, only those constituents that exhibited GWPS exceedances as of May 2017 are included in the maps presented in **Appendix D**. For organics, only those constituents that exhibited detections above the laboratory RL in one or more assessment wells as of May 2017 are included.

5.3 Migration Rates of Assessment Constituents

Migration rates for most of the wells and assessment constituents in Area I were evaluated in the *2017 Annual Assessment Monitoring Report*. As described in that August 30, 2017 report, the following changes were observed between second quarter 2016 and second quarter 2017:

- Benzene and p-isopropyltoluene GWPS exceedances were eliminated at PZ-104-KS;
- Sulfide GWPS exceedances were eliminated at PZ-209-SD;
- Sulfide GWPS exceedances appeared at PZ-209-SS; and
- Tetrahydrofuran exceedances appeared at PZ-104-SD.

Estimation of an upward migration rate for sulfide at the PZ-209 well cluster was not possible due to substantial fluctuation in the constituent's laboratory RL between second quarter 2016 and second quarter 2017. Estimation of a tetrahydrofuran migration rate was not possible due to the absence of detections in other Area I assessment wells.

Given that assessment constituents have historically been analyzed only intermittently at the facility's assessment wells outside of Area I, migration rates for those constituents cannot be evaluated at this time. The migration rates for all assessment constituents in all assessment areas will be evaluated once adequate data are collected, in accordance with updated assessment sampling schedule presented on **Table 4-1**. It is anticipated that by the time the *2019 Annual Assessment Monitoring Report* is prepared and submitted in August 2019, sufficient assessment monitoring data will be available to evaluate migration rates in the facility's assessment wells outside Area I.

TABLES

4-1 Summary of Assessment Monitoring Program
4-2 Assessment Monitoring Wells
4-3 Assessment Monitoring Constituents
4-4 Recommended Order of Groundwater Sample Container Collection

Table 4-1
Summary of Assessment Monitoring Program
Bridgeton Landfill, LLC - Bridgeton, Missouri

		AREA I											AREA II		AREA III			AREA IV	AREA V			AREA VI	
Constituent	**Type**	**PZ-103-SS**	**PZ-104-SS**	**PZ-104-SD**	**PZ-104-KS**	**PZ-202-SS**	**PZ-209-SS**	**PZ-209-SD**	**PZ-210-SS**	**PZ-210-SD**	**PZ-211-SS**	**PZ-211-SD**	**MW-1204**	**PZ-116-SS**	**I-73**	**PZ-107-SS**	**PZ-205-AS**	**PZ-112-AS**	**D-85**	**PZ-207-AS**	**S-84**	**PZ-101-SS**	**PZ-114-AS***
Arsenic, Total	App I+II	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	
Barium, Total	App I+II	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA		SA	SA	SA		
Chromium, Total	App I+II												SA	SA									
Cobalt, Total	App I+II	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA											
Lead, Total	App I+II														SA	SA	SA		SA	SA	SA		
Nickel, Total	App I+II	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA											
Sulfide	App II	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA											
Vandium, Total	App I+II	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA											
Acetone	App I+II	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA									
Benzene	App I+II	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA					
Bis(2-ethylhexyl) Phthalate	App II																		A	A	A		
Chlorobenzene	App I+II														SA	SA	SA	SA	SA	SA	SA	SA	
m+p-Cresols (3+4-Methylphenol)	App II	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA									
m-Dichlorobenzene (1,3-Dichlorobenzene)	App II																	A					
p-Dichlorobenzene (1,4-Dichlorobenzene)	App I+II	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A	A	A	SA					
Dichlorodifluoromethane (CFC 12)	App II														SA	SA	SA		A	A	A		
Di-n-butyl Phthalate	App II	A	A	A	A	A	A	A	A	A	A	A	A	A				A					
Ethylbenzene	App I+II	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA						
2-Hexanone (Methyl Butyl Ketone)	App I+II												SA	SA									
Isopropylbenzene (Cumene)	MDNR-Spec.														A	A	A		A	A	A		
p-Isopropyltoluene (4-Isopropyltoluene)	MDNR-Spec.	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA			A	A	A						
Methyl Ethyl Ketone (MEK, 2-Butanone)	App I+II	A	A	A	A	A	A	A	A	A	A	A	SA	SA								A	
Methyl Methanesulfonate	App II												A	A									
4-Methyl-2-pentanone (MIBK; Methyl Isobutyl Ketone)	App I+II	A	A	A	A	A	A	A	A	A	A	A	SA	SA									
Methyl-t-butyl Ether (MTBE; Methyl-tert-butyl Ether)	MDNR-Spec.	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA			A	A	A						
Methylene Chloride (Dichloromethane)	App I+II																		A	A	A		
Naphthalene	App II														A	A	A						
Phenanthrene	App II												A	A									
Phenol	App II												SA	SA									
Tetrahydrofuran (THF)	MDNR-Spec.	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	A	A	A						
Toluene	App I+II	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA						
1,1,2-Trichloroethane	App I+II	A	A	A	A	A	A	A	A	A	A	A											
1,2,4-Trimethylbenzene	MDNR-Spec.														A	A	A						
1,3,5-Trimethylbenzene	MDNR-Spec.														A	A	A						
Vinyl Chloride (Chloroethene)	App I+II	A	A	A	A	A	A	A	A	A	A	A											
Xylenes, Total	App I+II	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA						

Notes
SA: Semi-annual sampling in May and November.
A: Annual sampling in May.
* In accordance with the GWMP, well PZ-114-AS is sampled annual for detection monitoring constituents.

Table 4-2
Assessment Monitoring Wells
Bridgeton Landfill, LLC - Bridgeton, Missouri

Well Designation	Alias	Well Type	Assess. Area	Installation Date	Original Ground Surface Elev. (ft/msl)	Original Ground Surface Ref.	Current Location Northing	Current Location Easting	Current Ground Surface Elevation (ft/msl)	Current Top of Riser Elevation (ft/msl)	Survey	Inner Casing Diam. (in.)	Riser Material	Screen Material	Screen Length (ft)	Depth to Top of Screen (ft)	Depth to Bottom of Screen (ft)	Top of Screen Elevation (ft/msl)	Bottom of Screen Elevation (ft/msl)	Screen Ref.	Comments
Keokuk Zone																					
PZ-104-KS	1215	A	I	6/19/1995	482.30	AB	1,066,993.0	516,820.5	482.24	484.60	8/12	2	PVC	PVC	9.80	397.37	407.17	84.93	75.13	AB (Depth)	
Deep Salem Zone																					
MW-1204	1204	D / A	II	4/5/1991	483.30	AB	1,066,420.2	515,824.3	475.80	478.04	4/16	2	PVC	PVC	10.00	213.50	223.50	269.80	259.80	AB (Depth)	No log available.
PZ-104-SD	1214	D / A	I	6/17/1995	482.10	AB	1,067,013.2	516,834.6	481.88	484.15	8/12	2	PVC	PVC	9.80	235.20	245.00	246.90	237.10	AB (Depth)	
PZ-209-SD		A	I	10/4/2013	487.24	AB	1,067,075.7	517,104.4	487.24	489.58	10/13	2	PVC	PVC	10.00	240.00	250.00	247.24	237.24	AB (Depth)	
PZ-210-SD		A	I	10/16/2013	484.48	AB	1,066,824.0	516,773.1	484.48	487.00	10/13	2	PVC	PVC	10.00	238.00	248.00	246.48	236.48	AB (Depth)	
PZ-211-SD		A	I	10/8/2013	484.83	AB	1,067,056.7	517,016.6	484.83	487.46	10/13	2	PVC	PVC	110.00	237.00	347.00	247.83	137.83	AB (Depth)	
St. Louis / Upper Salem Zone																					
PZ-101-SS	1210	D / A	VI	3/6/1995	474.90	AB	1,068,473.1	516,622.3	491.68	493.08	1/17	2	PVC	PVC	9.80	129.48	139.28	345.42	335.62	AB (Depth)	
PZ-103-SS	1212	D / A	I	2/27/1995	477.80	AB	1,067,660.3	516,723.1	480.31	484.21	8/12	2	PVC	PVC	9.80	134.70	144.50	343.10	333.30	AB (Depth)	
PZ-104-SS	1213	D / A	I	6/4/1995	481.60	AB	1,067,027.8	516,847.3	482.05	484.00	8/12	2	PVC	PVC	9.80	134.50	144.30	347.10	337.30	AB (Depth)	
PZ-107-SS	1220	D / A	III	5/22/1995	462.60	AB	1,067,163.1	515,254.6	463.25	465.41	8/12	2	PVC	PVC	9.80	92.60	102.40	370.00	360.20	AB (Depth)	
PZ-116-SS	1232	D / A	II	6/20/1995	483.10	AB	1,066,410.5	515,843.7	475.80	478.21	4/16	2	PVC	PVC	9.60	151.40	161.00	331.70	322.10	AB (Depth)	
PZ-202-SS	1234	D / A	I	3/12/1995	479.00	AB	1,067,320.2	517,101.4	479.88	481.82	8/12	2	PVC	PVC	48.90	40.20	89.10	438.80	389.90	AB (Depth)	
PZ-209-SS		A	I	10/5/2013	487.39	AB	1,067,071.5	517,108.6	487.39	489.68	10/13	2	PVC	PVC	10.00	140.00	150.00	347.39	337.39	AB (Depth)	
PZ-210-SS		A	I	10/16/2013	484.53	AB	1,066,828.4	516,777.4	484.53	486.90	10/13	2	PVC	PVC	10.00	138.00	148.00	346.53	336.53	AB (Depth)	
PZ-211-SS		A	I	10/8/2013	485.06	AB	1,067,060.8	517,012.2	485.06	487.41	10/13	2	PVC	PVC	10.00	137.00	147.00	348.06	338.06	AB (Depth)	
Alluvial Zone																					
D-85	WL-105A	D / A	V	8/22/1984	453.10	BHL	1,069,626.3	516,430.5	454.66	457.67	8/12	2	PVC	PVC	20.00	62.00	82.00	391.10	371.10	BHL (Depth)	No as-built available.
I-73	38	D / A	III	6/23/1978	458.90	WS	1,067,695.2	515,570.7	459.44	461.96	11/14	2	PVC	PVC	3.00	43.20	46.20	415.70	412.70	WS (Elev)	No as-built available.
PZ-112-AS	1226	D / A	IV	4/10/1995	457.90	AB	1,069,002.0	515,674.8	458.60	462.29	4/13	2	PVC	PVC	4.80	29.60	34.40	428.30	423.50	AB (Depth)	
PZ-114-AS	1230	D / A	N/A	4/20/1995	449.80	AB	1,069,419.0	516,768.3	449.97	452.14	8/12	2	PVC	PVC	9.80	19.90	29.70	429.90	420.10	AB (Depth)	
PZ-205-AS	1237	D / A	III	5/6/1995	459.30	AB	1,067,463.1	515,462.8	461.48	464.77	11/14	2	PVC	PVC	9.80	38.55	48.35	420.75	410.95	AB (Depth)	
PZ-207-AS	1240	D / A	V	4/10/1995	461.90	AB	1,069,645.0	516,037.6	460.38	462.17	4/13	2	PVC	PVC	4.80	34.90	39.70	427.00	422.20	AB (Depth)	
S-84		D / A	V	8/24/1984	452.90	WS	1,069,633.3	516,439.6	454.64	457.45	8/12	2	PVC	PVC	10.00	20.90	30.90	432.00	422.00	BHL (Depth)	No as-built available.

Notes
D: Detection monitoring well.
A: Assessment monitoring well.
AB: Original as-built diagram.
BHL: Original borehole log.
WS: Well Summary Table. 1997. Original document and author unknown.

Surveys
8/12 - Survey performed on 8/13, 8/21-22, 8/29, and 8/31/12.
4/13 - Survey performed on 4/17/13.
10/13 - Survey performed on 10/21 - 10/22/13.
11/14- Survey performed on 11/12/14.
4/16 - Survey performed on 4/7/16.
1/17 -Survey performed on 1/30/17.

Table 4-3
Assessment Monitoring Constituents
Bridgeton Landfill, LLC - Bridgeton, Missouri

AREA I

(PZ-103-SS, PZ-104-SS, PZ-104-SD, PZ-104-KS, PZ-202-SS, PZ-209-SS, PZ-209-SD, PZ-210-SS, PZ-210-SD, PZ-211-SS, PZ-211-SD)

Constituent	Constituent Type	Suggested Analytical Method
Arsenic, Total	10 CSR 80-3 App I+II	SW-846 6020
Barium, Total	10 CSR 80-3 App I+II	SW-846 6010
Cobalt, Total	10 CSR 80-3 App I+II	SW-846 6010
Nickel, Total	10 CSR 80-3 App I+II	SW-846 6010
Sulfide	10 CSR 80-3 App II	SM 4500-S2-D
Vandium, Total	10 CSR 80-3 App I+II	SW-846 6020
Acetone	10 CSR 80-3 App I+II	SW-846 8260
Benzene	10 CSR 80-3 App I+II	SW-846 8260
m+p-Cresols (3+4-Methylphenol)	10 CSR 80-3 App II	SW-846 8270
Di-n-butyl Phthalate	10 CSR 80-3 App II	SW-846 8270
p-Dichlorobenzene (1,4-Dichlorobenzene)	10 CSR 80-3 App I+II	SW-846 8260
Ethylbenzene	10 CSR 80-3 App I+II	SW-846 8260
p-Isopropyltoluene (4-Isopropyltoluene)	MDNR-Specified	SW-846 8260
Methyl Ethyl Ketone (MEK, 2-Butanone)	10 CSR 80-3 App I+II	SW-846 8260
4-Methyl-2-pentanone (MIBK; Methyl Isobutyl Ketone)	10 CSR 80-3 App I+II	SW-846 8260
Methyl-t-butyl Ether (MTBE; Methyl-tert-butyl Ether)	MDNR-Specified	SW-846 8260
Tetrahydrofuran (THF)	MDNR-Specified	SW-846 8260
Toluene	10 CSR 80-3 App I+II	SW-846 8260
1,1,2-Trichloroethane	10 CSR 80-3 App I+II	SW-846 8260
Vinyl Chloride (Chloroethene)	10 CSR 80-3 App I+II	SW-846 8260
Xylenes, Total	10 CSR 80-3 App I+II	SW-846 8260

Table 4-3
Assessment Monitoring Constituents
Bridgeton Landfill, LLC - Bridgeton, Missouri

AREA II
(MW-1204, PZ-116-SS)

Constituent	Constituent Type	Suggested Analytical Method
Arsenic, Total	10 CSR 80-3 App I+II	SW-846 6020
Barium, Total	10 CSR 80-3 App I+II	SW-846 6010
Chromium, Total	10 CSR 80-3 App I+II	SW-846 6020
Acetone	10 CSR 80-3 App I+II	SW-846 8260
Benzene	10 CSR 80-3 App I+II	SW-846 8260
m+p-Cresols (3+4-Methylphenol)	10 CSR 80-3 App II	SW-846 8270
Di-n-butyl Phthalate	10 CSR 80-3 App II	SW-846 8270
p-Dichlorobenzene (1,4-Dichlorobenzene)	10 CSR 80-3 App I+II	SW-846 8260
Ethylbenzene	10 CSR 80-3 App I+II	SW-846 8260
2-Hexanone (Methyl Butyl Ketone)	10 CSR 80-3 App I+II	SW-846 8260
Methyl Ethyl Ketone (MEK; 2-Butanone)	10 CSR 80-3 App I+II	SW-846 8260
4-Methyl-2-pentanone (MIBK; Methyl Isobutyl Ketone)	10 CSR 80-3 App I+II	SW-846 8260
Phenanthrene	10 CSR 80-3 App II	SW-846 8270
Phenol	10 CSR 80-3 App II	SW-846 8270
Tetrahydrofuran (THF)	MDNR-Specified	SW-846 8260
Toluene	10 CSR 80-3 App I+II	SW-846 8260
Xylenes, Total	10 CSR 80-3 App I+II	SW-846 8260

AREA III
(I-73, PZ-107-SS, PZ-205-AS)

Constituent	Constituent Type	Suggested Analytical Method
Arsenic, Total	10 CSR 80-3 App I+II	SW-846 6020
Barium, Total	10 CSR 80-3 App I+II	SW-846 6010
Lead, Total	10 CSR 80-3 App I+II	SW-846 6020
Benzene	10 CSR 80-3 App I+II	SW-846 8260
Chlorobenzene	10 CSR 80-3 App I+II	SW-846 8260
p-Dichlorobenzene (1,4-Dichlorobenzene)	10 CSR 80-3 App I+II	SW-846 8260
Dichlorodifluoromethane (CFC 12)	10 CSR 80-3 App II	SW-846 8260
Ethylbenzene	10 CSR 80-3 App I+II	SW-846 8260
Isopropylbenzene (Cumene)	MDNR-Specified	SW-846 8260
p-Isopropyltoluene (4-Isopropyltoluene)	MDNR-Specified	SW-846 8260
Methyl-t-butyl Ether (MTBE; Methyl-tert-butyl Ether)	MDNR-Specified	SW-846 8260
Naphthalene	10 CSR 80-3 App II	SW-846 8270
Tetrahydrofuran	MDNR-Specified	SW-846 8260
Toluene	10 CSR 80-3 App I+II	SW-846 8260
1,2,4-Trimethylbenzene	MDNR-Specified	SW-846 8260
1,3,5-Trimethylbenzene	MDNR-Specified	SW-846 8260
Xylenes, Total	10 CSR 80-3 App I+II	SW-846 8260

Table 4-3
Assessment Monitoring Constituents
Bridgeton Landfill, LLC - Bridgeton, Missouri

AREA IV
(PZ-112-AS)

Constituent	Constituent Type	Suggested Analytical Method
Arsenic, Total	10 CSR 80-3 App I+II	SW-846 6020
Benzene	10 CSR 80-3 App I+II	SW-846 8260
Chlorobenzene	10 CSR 80-3 App I+II	SW-846 8260
Di-n-butyl Phthalate	10 CSR 80-3 App II	SW-846 8270
m-Dichlorobenzene (1,3-Dichlorobenzene)	10 CSR 80-3 App II	SW-846 8260
p-Dichlorobenzene (1,4-Dichlorobenzene)	10 CSR 80-3 App I+II	SW-846 8260

AREA V
(D-85, PZ-207-AS, S-84)

Constituent	Constituent Type	Suggested Analytical Method
Arsenic, Total	10 CSR 80-3 App I+II	SW-846 6020
Barium, Total	10 CSR 80-3 App I+II	SW-846 6010
Lead, Total	10 CSR 80-3 App I+II	SW-846 6020
Bis(2-ethylhexyl) Phthalate	10 CSR 80-3 App II	SW-846 8270
Chlorobenzene	10 CSR 80-3 App I+II	SW-846 8260
Dichlorodifluoromethane (CFC 12)	10 CSR 80-3 App II	SW-846 8260
Isopropylbenzene (Cumene)	MDNR-Specified	SW-846 8260
Methylene Chloride (Dichloromethane)	10 CSR 80-3 App I+II	SW-846 8260

AREA VI
(PZ-101-SS)

Constituent	Constituent Type	Suggested Analytical Method
Arsenic, Total	10 CSR 80-3 App I+II	SW-846 6020
Chlorobenzene	10 CSR 80-3 App I+II	SW-846 8260
Methyl Ethyl Ketone (MEK; 2-Butanone)	10 CSR 80-3 App I+II	SW-846 8260

Table 4-4
Recommended Order of Groundwater Sample Container Collection
Bridgeton Landfill, LLC - Bridgeton, Missouri

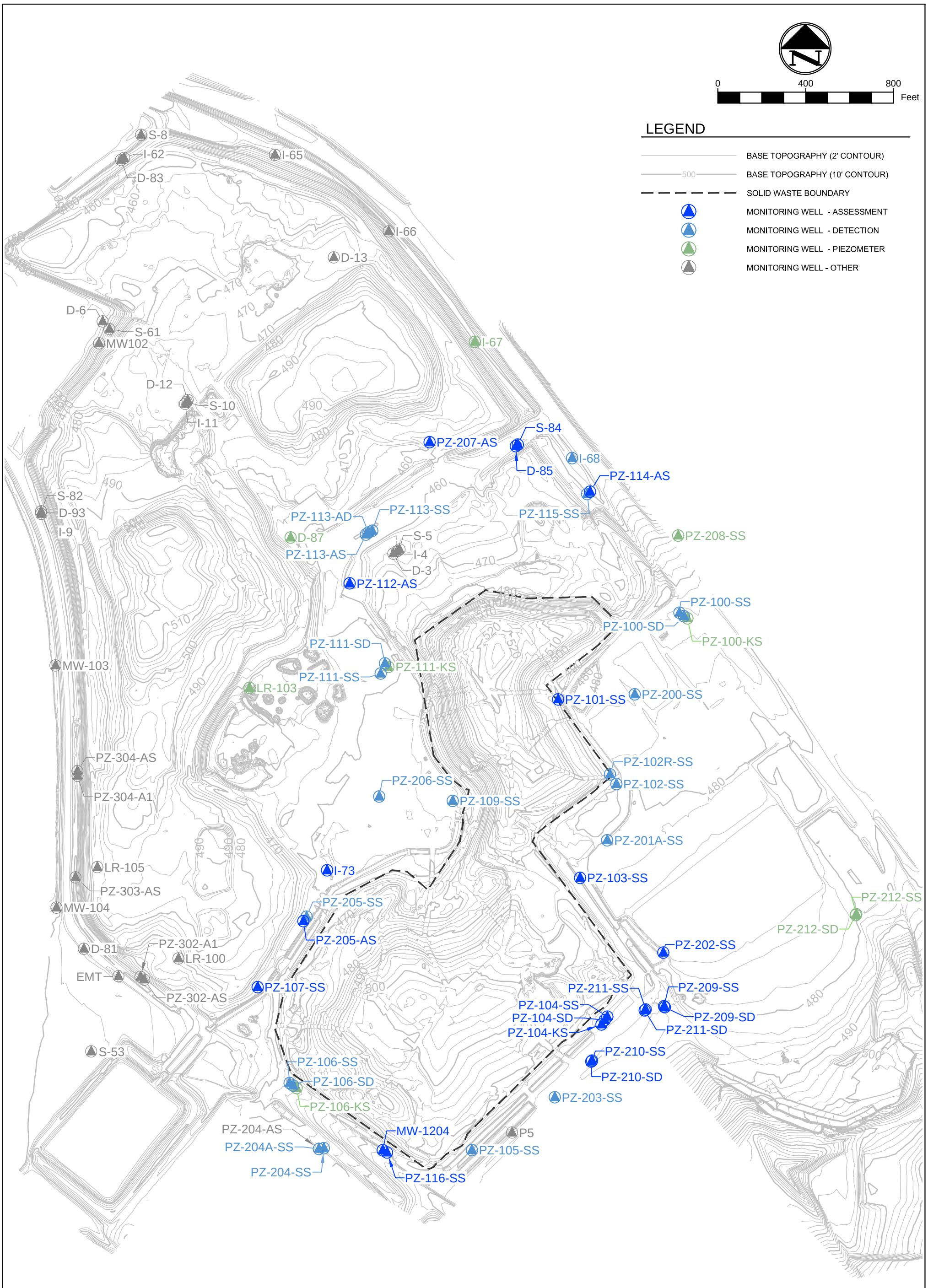
Sample Order	Constituents	Suggested Analytical Methods	Preservation Methods for Suggested Analytical Methods
1	VOCs	SW-846 8260	Cooled to ≤ 6 °C; HCl to pH < 2
2	SVOCs	SW-846 8270	Cooled to ≤ 6 °C
3	Metals	SW-846 6010; SW-846 6020	HNO_3 to pH < 2
	Mercury	SW-846 7470	
	Hardness (Calculated as $CaCO_3$)	SM 2340	
4	Phosphorus	EPA 365.1	Cooled to ≤ 4 °C; H_2SO_4 to pH < 2
	Total Organic Carbon (TOC)	SM 5310C	
5	Ammonia (as Nitrogen)	SM 4500-NH_3 G	Cooled to ≤ 4 °C; H2SO4 to pH < 2
	Chemical Oxygen Demand (COD)	EPA 410.4	
	Nitrate + Nitrite (as Nitrogen)	EPA 353.2	
6	Sulfide	SM4500-S2-D	Cooled to ≤ 4 °C; $C_4H_6O_4Zn$; NaOH to pH > 12
7	Chloride	SW-946 9056	Cooled to ≤ 6 °C (≤ 4 °C for SM)
	Fluoride		
	Sulfate		
	Total Dissolved Solids (TDS)	SM 2540C	

Notes

Analytical methods that are associated exclusively with the facility's detection monitoring are included for reference purposes.

FIGURES

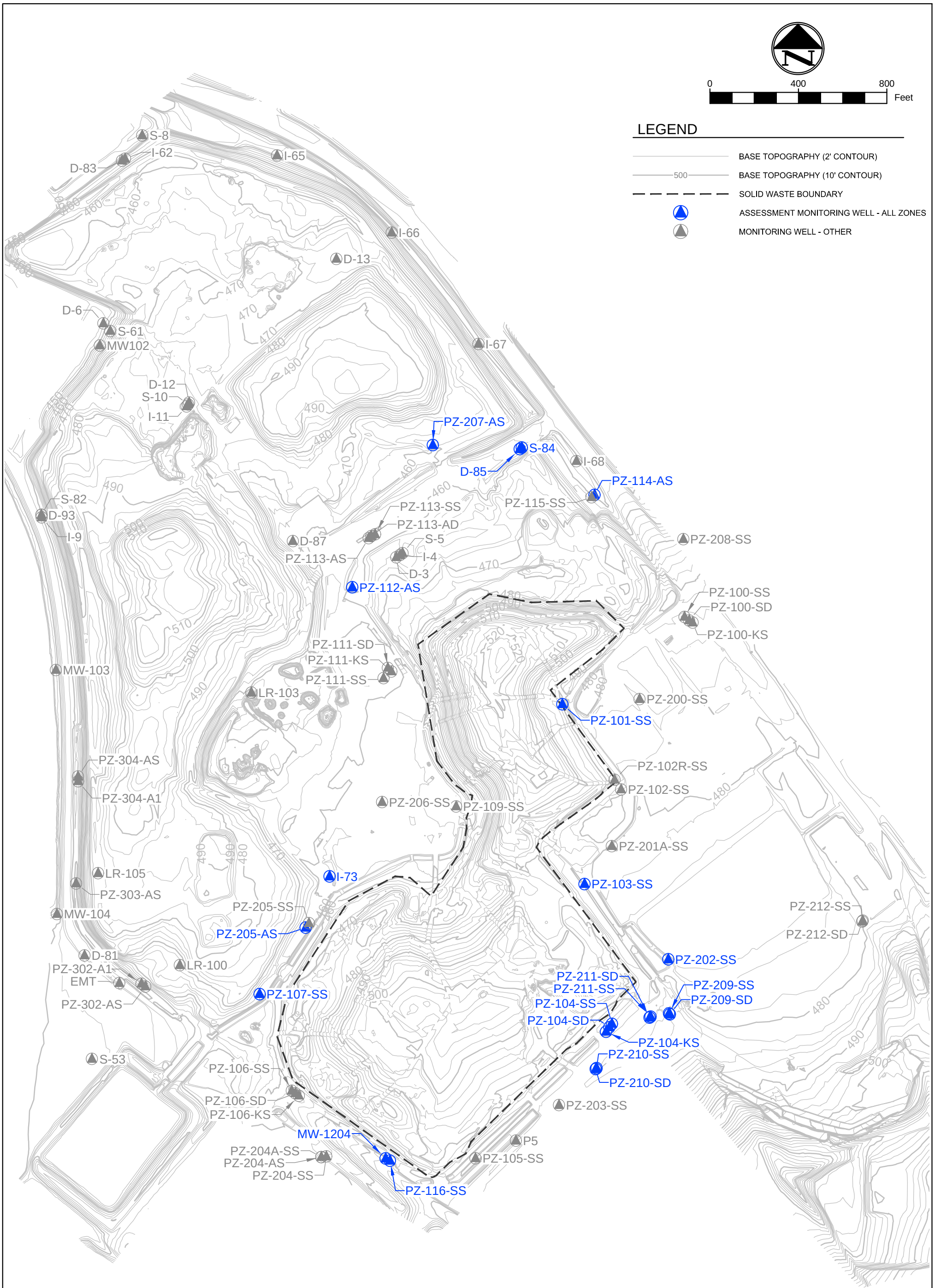
3-1 Groundwater Monitoring Well Network (All Zones)
4-1 Assessment Monitoring Network (All Zones)



NOTES:

- *AERIAL TOPOGRAPHY PROVIDED BY COOPER AERIAL SURVEYS CO. AND IS DATED DECEMBER 1, 2017*

BRIDGETON LANDFILL, LLC 13570 ST. CHARLES ROCK ROAD BRIDGETON, MISSOURI 63044	BRIDGETON LANDFILL ASSESSMENT MONITORING PLAN	Engineering for a Better World FEEZOR ENGINEERING, INC.	JUNE 2018 DESIGNED BY: PML APPROVED BY: ---	DRAWING NO.:
GROUNDWATER MONITORING NETWORK (ALL ZONES)			REVISION DATE	**3-1**
PROJECT NUMBER: BT-171	FILE PATH: C:\Users\plins\Dropbox (Feezor Engineering)\Bridgeton\BT-171 Assessment Monitoring Plan\drawings\BT-179_4-1 Groundwater Monitoring Network (All Zones).dwg			



NOTES:

- *AERIAL TOPOGRAPHY PROVIDED BY COOPER AERIAL SURVEYS CO. AND IS DATED DECEMBER 1, 2017*

BRIDGETON LANDFILL, LLC 13570 ST. CHARLES ROCK ROAD BRIDGETON, MISSOURI 63044	BRIDGETON LANDFILL ASSESSMENT MONITORING PLAN	Engineering for a Better World FEEZOR ENGINEERING, INC.	MAY 2018 DESIGNED BY: IN APPROVED BY: ---	DRAWING NO.:
ASSESSMENT MONITORING NETWORK (ALL ZONES)			REVISION DATE	**4-1**
PROJECT NUMBER: BT-171	FILE PATH: C:\Users\plins\Dropbox (Feezor Engineering)\Bridgeton\BT-179 (Groundwater Sampling And Analysis Plan)\drawing\working\BT-179_Figures 5-1 5-2 5-3.dwg (PDF edit for BT-171)			

APPENDIX A

GROUNDWATER PROTECTION STANDARDS

Appendix A
Groundwater Protection Standards
Bridgeton Landfill, LLC - Bridgeton, Missouri

Inorganic Assessment Constituents

AREA I

			PZ-103-SS[A]		PZ-104-SS[B]		PZ-104-SD[C]		PZ-104-KS[C]	
Constituent	**Units**	**MCL**	**BG**	**GWPS**	**BG**	**GWPS**	**BG**	**GWPS**	**BG**	**GWPS**
Arsenic, Total	ug/L	10	RL	**10**	11	**11**	RL	**10**	RL	**10**
Barium, Total	ug/L	2,000	150	**2,000**	110.7	**2,000**	218.8	**2,000**	218.8	**2,000**
Cobalt, Total	ug/L	NE	RL	**RL**	RL	**RL**	RL	**RL**	RL	**RL**
Nickel, Total	ug/L	NE	11	**11**	23	**23**	20	**20**	20	**20**
Sulfide[J]	mg/L	NE	RL	**RL**	RL	**RL**	RL	**RL**	RL	**RL**
Vandium, Total	ug/L	NE	RL	**RL**	RL	**RL**	RL	**RL**	RL	**RL**

			PZ-202-SS[B]		PZ-209-SS[B]		PZ-209-SD[C]		PZ-210-SS[B]	
Constituent	**Units**	**MCL**	**BG**	**GWPS**	**BG**	**GWPS**	**BG**	**GWPS**	**BG**	**GWPS**
Arsenic, Total	ug/L	10	11	**11**	11	**11**	RL	**10**	11	**11**
Barium, Total	ug/L	2,000	110.7	**2,000**	110.7	**2,000**	218.8	**2,000**	110.7	**2,000**
Cobalt, Total	ug/L	NE	RL	**RL**	RL	**RL**	RL	**RL**	RL	**RL**
Nickel, Total	ug/L	NE	23	**23**	23	**23**	20	**20**	23	**23**
Sulfide[J]	mg/L	NE	RL	**RL**	RL	**RL**	RL	**RL**	RL	**RL**
Vandium, Total	ug/L	NE	RL	**RL**	RL	**RL**	RL	**RL**	RL	**RL**

			PZ-210-SD[C]		PZ-211-SS[B]		PZ-211-SD[C]	
Constituent	**Units**	**MCL**	**BG**	**GWPS**	**BG**	**GWPS**	**BG**	**GWPS**
Arsenic, Total	ug/L	10	RL	**10**	11	**11**	RL	**10**
Barium, Total	ug/L	2,000	218.8	**2,000**	110.7	**2,000**	218.8	**2,000**
Cobalt, Total	ug/L	NE	RL	**RL**	RL	**RL**	RL	**RL**
Nickel, Total	ug/L	NE	20	**20**	23	**23**	20	**20**
Sulfide[J]	mg/L	NE	RL	**RL**	RL	**RL**	RL	**RL**
Vandium, Total	ug/L	NE	RL	**RL**	RL	**RL**	RL	**RL**

AREA II

			MW-1204[D]		PZ-116-SS[E]	
Constituent	**Units**	**MCL**	**BG**	**GWPS**	**BG**	**GWPS**
Arsenic, Total	ug/L	10	RL	**10**	RL	**10**
Barium, Total	ug/L	2,000	436.2	**2,000**	220	**2,000**
Chromium, Total	ug/L	100	RL	**100**	RL	**100**

AREA III

			I-73[F]		PZ-107-SS[G]		PZ-205-AS[F]	
Constituent	**Units**	**MCL**	**BG**	**GWPS**	**BG**	**GWPS**	**BG**	**GWPS**
Arsenic, Total	ug/L	10	RL	**10**	RL	**10**	RL	**10**
Barium, Total	ug/L	2,000	546.5	**2,000**	772.9	**2,000**	546.5	**2,000**
Lead, Total	ug/L	15	RL	**15**	4	**15**	RL	**15**

Appendix A
Groundwater Protection Standards
Bridgeton Landfill, LLC - Bridgeton, Missouri

Inorganic Assessment Constituents

AREA IV

			PZ-112-AS[H]	
Constituent	**Units**	**MCL**	**BG**	**GWPS**
Arsenic, Total	ug/L	10	RL	**10**

AREA V

			D-85[I]		PZ-207-AS[I]		S-84[I]	
Constituent	**Units**	**MCL**	**BG**	**GWPS**	**BG**	**GWPS**	**BG**	**GWPS**
Arsenic, Total	ug/L	10	RL	**10**	RL	**10**	RL	**10**
Barium, Total	ug/L	2,000	361.7	**2,000**	361.7	**2,000**	361.7	**2,000**
Lead, Total	ug/L	15	RL	**15**	RL	**15**	RL	**15**

AREA VI

			PZ-101-SS[A]	
Constituent	**Units**	**MCL**	**BG**	**GWPS**
Arsenic, Total	ug/L	10	RL	**10**

Notes

MCL: Maximum contaminant level (National Primary Drinking Water Standard).

GWPS: Groundwater protection standard.

NE: MCL not established.

RL: Laboratory reporting limit.

(A) Background from 5/08 - 2/18 data at PZ-201A-SS.

(B) Background from 5/97 - 11/11 data at PZ-104-SS.

(C) Background from 5/97 - 11/11 data at PZ-104-SD.

(D) Background from 2/97 - 4/13 data at MW-1204.

(E) Background from 5/08 - 2/18 data at PZ-105-SS.

(F) Background from 8/12 - 8/16 data at PZ-302-AI.

(G) Background from 8/97 - 8/98 data at PZ-107-SS.

(H) Background from 8/12 - 8/13 data at D-87.

(I) Background from 8/12 - 8/13 data at I-67.

(J) Background from 11/14 - 8/15 data at PZ-212-SS/PZ-212-SD.

Appendix A
Groundwater Protection Standards
Bridgeton Landfill, LLC - Bridgeton, Missouri

Organic Assessment Constituents

ALL WELLS

Constituent	MCL	GWPS
Acetone	NE	RL
Benzene	5	5
Bis(2-ethylhexyl) Phthalate	6	6
Chlorobenzene	100	100
m+p-Cresols (3+4-Methylphenol)	NE	RL
m-Dichlorobenzene (1,3-Dichlorobenzene)	NE	RL
p-Dichlorobenzene (1,4-Dichlorobenzene)	75	75
Dichlorodifluoromethane (CFC 12)	NE	RL
Di-n-butyl Phthalate	NE	RL
Ethylbenzene	700	700
2-Hexanone (Methyl Butyl Ketone)	NE	RL
Isopropylbenzene (Cumene)	NE	RL
p-Isopropyltoluene (4-Isopropyltoluene)	NE	RL
Methyl Ethyl Ketone (MEK, 2-Butanone)	NE	RL
Methyl Methanesulfonate	NE	RL
4-Methyl-2-pentanone (MIBK; Methyl Isobutyl Ketone)	NE	RL
Methyl-t-butyl Ether (MTBE; Methyl-tert-butyl Ether)	NE	RL
Methylene Chloride (Dichloromethane)	5	5
Naphthalene	NE	RL
Phenanthrene	NE	RL
Phenol	NE	RL
Tetrahydrofuran (THF)	NE	RL
Toluene	1,000	1,000
1,1,2-Trichloroethane	5	5
1,2,4-Trimethylbenzene	NE	RL
1,3,5-Trimethylbenzene	NE	RL
Vinyl Chloride (Chloroethene)	2	2
Xylenes, Total	10,000	10,000

Notes
All concentrations presented in units of ug/L.
MCL: Maximum contaminant level (National Primary Drinking Water Standard).
GWPS: Groundwater protection standard.
NE: MCL not established.
RL: Laboratory reporting limit.

Appendix A
Groundwater Protection Standards
Bridgeton Landfill, LLC - Bridgeton, Missouri

Other Inorganic App II Constituents

			AREA I											
			PZ-103-SS[A]		PZ-104-SS[B]		PZ-104-SD[C]		PZ-104-KS[C]		PZ-202-SS[B]		PZ-209-SS[C]	
Constituent	**Units**	**MCL**	**BG**	**GWPS**	**BG**	**GWPS**	**BG**	**GWPS**	**BG**	**GWPS**	**BG**	**GWPS**	**BG**	**GWPS**
Antimony, Total	ug/L	6	RL	**6**	RL	**6**	RL	**6**	RL	**6**	RL	**6**	RL	**6**
Arsenic, Total	ug/L	10	-	-	-	-	-	-	-	-	-	-	-	-
Barium, Total	ug/L	2,000	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium, Total	ug/L	4	RL	**4**	RL	**4**	27.5	**27.5**	27.5	**27.5**	RL	**4**	RL	**4**
Cadmium, Total	ug/L	5	RL	**5**	RL	**5**	67.2	**67.2**	67.2	**67.2**	RL	**5**	RL	**5**
Chromium, Total	ug/L	100	7.5	**100**	6.6	**100**	6	**100**	6	**100**	7.5	**100**	6.6	**100**
Cobalt, Total	ug/L	NE	-	-	-	-	-	-	-	-	-	-	-	-
Copper, Total	ug/L	1,300	7.0	**1,300**	RL	**1,300**	72	**1,300**	72	**1,300**	7.0	**1,300**	RL	**1,300**
Cyanide, Total*	mg/L	0.2	*	**0.2**	*	**0.2**	*	**0.2**	*	**0.2**	*	**0.2**	*	**0.2**
Lead, Total	ug/L	15	RL	**15**	RL	**15**	250	**250**	250	**250**	RL	**15**	RL	**15**
Mercury, Total	ug/L	2	RL	**2**	RL	**2**	RL	**2**	RL	**2**	RL	**2**	RL	**2**
Nickel, Total	ug/L	NE	-	-	-	-	-	-	-	-	-	-	-	-
Selenium, Total	ug/L	50	RL	**50**	RL	**50**	RL	**50**	RL	**50**	RL	**50**	RL	**50**
Silver, Total	ug/L	NE	RL	**RL**	RL	**RL**	RL	**RL**	RL	**RL**	RL	**RL**	RL	**RL**
Sulfide[J]	mg/L	NE	-	-	-	-	-	-	-	-	-	-	-	-
Thallium, Total	ug/L	2	RL	**2**	RL	**2**	RL	**2**	RL	**2**	RL	**2**	RL	**2**
Tin, Total*	ug/L	NE	*	**RL**	*	**RL**	*	**RL**	*	**RL**	*	**RL**	*	**RL**
Vanadium, Total	ug/L	NE	-	-	-	-	-	-	-	-	-	-	-	-
Zinc, Total	ug/L	NE	74	**74**	220	**220**	2,950	**2,950**	2,950	**2,950**	74	**74**	220	**220**

Appendix A
Groundwater Protection Standards
Bridgeton Landfill, LLC - Bridgeton, Missouri

Other Inorganic App II Constituents

			AREA I										AREA II	
			PZ-209-SD[C]		PZ-210-SS[B]		PZ-210-SD[C]		PZ-211-SS[B]		PZ-211-SD[C]		MW-1204[D]	
Constituent	**Units**	**MCL**	**BG**	**GWPS**	**BG**	**GWPS**	**BG**	**GWPS**	**BG**	**GWPS**	**BG**	**GWPS**	**BG**	**GWPS**
Antimony, Total	ug/L	6	RL	**6**	RL	**6**	RL	**6**	RL	**6**	RL	**6**	RL	**6**
Arsenic, Total	ug/L	10	-	-	-	-	-	-	-	-	-	-	-	-
Barium, Total	ug/L	2,000	-	-	-	-	-	-	-	-	-	-	-	-
Beryllium, Total	ug/L	4	27.5	**27.5**	RL	**4**	27.5	**27.5**	RL	**4**	27.5	**27.5**	RL	**4**
Cadmium, Total	ug/L	5	67.2	**67.2**	RL	**5**	67.2	**67.2**	RL	**5**	67.2	**67.2**	RL	**5**
Chromium, Total	ug/L	100	6	**100**	6.6	**100**	6	**100**	6.6	**100**	6	**100**	-	-
Cobalt, Total	ug/L	NE	-	-	-	-	-	-	-	-	-	-	RL	**RL**
Copper, Total	ug/L	1,300	72	**1,300**	RL	**1,300**	72	**1,300**	RL	**1,300**	72	**1,300**	RL	**1,300**
Cyanide, Total*	mg/L	0.2	*	**0.2**	*	**0.2**	*	**0.2**	*	**0.2**	*	**0.2**	*	**0.2**
Lead, Total	ug/L	15	250	**250**	RL	**15**	250	**250**	RL	**15**	250	**250**	25	**25**
Mercury, Total	ug/L	2	RL	**2**	RL	**2**	RL	**2**	RL	**2**	RL	**2**	RL	**2**
Nickel, Total	ug/L	NE	-	-	-	-	-	-	-	-	-	-	RL	**RL**
Selenium, Total	ug/L	50	RL	**50**	RL	**50**	RL	**50**	RL	**50**	RL	**50**	RL	**50**
Silver, Total	ug/L	NE	RL	**RL**	RL	**RL**	RL	**RL**	RL	**RL**	RL	**RL**	RL	**RL**
Sulfide[J]	mg/L	NE	-	-	-	-	-	-	-	-	-	-	RL	**RL**
Thallium, Total	ug/L	2	RL	**2**	RL	**2**	RL	**2**	RL	**2**	RL	**2**	RL	**2**
Tin, Total*	ug/L	NE	*	**RL**	*	**RL**	*	**RL**	*	**RL**	*	**RL**	RL	**RL**
Vanadium, Total	ug/L	NE	-	-	-	-	-	-	-	-	-	-	RL	**RL**
Zinc, Total	ug/L	NE	2,950	**2,950**	220	**220**	2,950	**2,950**	220	**220**	2,950	**2,950**	34	**34**

Appendix A
Groundwater Protection Standards
Bridgeton Landfill, LLC - Bridgeton, Missouri

Other Inorganic App II Constituents

			AREA II		AREA III						AREA IV		AREA V	
			PZ-116-SS[E]		I-73[F]		PZ-107-SS[G]		PZ-205-AS[F]		PZ-112-AS[H]		D-85[I]	
Constituent	**Units**	**MCL**	**BG**	**GWPS**	**BG**	**GWPS**	**BG**	**GWPS**	**BG**	**GWPS**	**BG**	**GWPS**	**BG**	**GWPS**
Antimony, Total	ug/L	6	RL	**6**	RL	**6**	RL	**6**	RL	**6**	RL	**6**	RL	**6**
Arsenic, Total	ug/L	10	-	-	-	-	-	-	-	-	-	-	-	-
Barium, Total	ug/L	2,000	-	-	-	-	-	-	-	-	2,175	**2,175**	-	-
Beryllium, Total	ug/L	4	RL	**4**	RL	**4**	RL	**4**	RL	**4**	RL	**4**	RL	**4**
Cadmium, Total	ug/L	5	RL	**5**	RL	**5**	RL	**5**	RL	**5**	RL	**5**	RL	**5**
Chromium, Total	ug/L	100	-	-	RL	**100**	8.4	**100**	RL	**100**	RL	**100**	RL	**100**
Cobalt, Total	ug/L	NE	RL	**RL**	125	**125**	RL	**RL**	125	**125**	RL	**RL**	RL	**RL**
Copper, Total	ug/L	1,300	RL	**1,300**	RL	**1,300**	41.6	**1,300**	RL	**1,300**	RL	**1,300**	RL	**1,300**
Cyanide, Total*	mg/L	0.2	*	**0.2**	*	**0.2**	*	**0.2**	*	**0.2**	*	**0.2**	*	**0.2**
Lead, Total	ug/L	15	RL	**15**	-	-	-	-	-	-	RL	**15**	-	-
Mercury, Total	ug/L	2	RL	**2**	RL	**2**	RL	**2**	RL	**2**	RL	**2**	RL	**2**
Nickel, Total	ug/L	NE	10	**10**	100	**100**	264.2	**264.2**	100	**100**	RL	**RL**	RL	**RL**
Selenium, Total	ug/L	50	RL	**50**	RL	**50**	RL	**50**	RL	**50**	RL	**50**	RL	**50**
Silver, Total	ug/L	NE	RL	**RL**	RL	**RL**	RL	**RL**	RL	**RL**	RL	**RL**	RL	**RL**
Sulfide[J]	mg/L	NE	RL	**RL**	RL	**RL**	RL	**RL**	RL	**RL**	RL	**RL**	RL	**RL**
Thallium, Total	ug/L	2	RL	**2**	RL	**2**	RL	**2**	RL	**2**	RL	**2**	RL	**2**
Tin, Total*	ug/L	NE	*	**RL**	*	**RL**	*	**RL**	*	**RL**	*	**RL**	*	**RL**
Vanadium, Total	ug/L	NE	RL	**RL**	RL	**RL**	RL	**RL**	RL	**RL**	RL	**RL**	RL	**RL**
Zinc, Total	ug/L	NE	RL	**RL**	RL	**RL**	261.4	**RL**	RL	**RL**	RL	**RL**	RL	**RL**

Appendix A
Groundwater Protection Standards
Bridgeton Landfill, LLC - Bridgeton, Missouri

Other Inorganic App II Constituents

			AREA V				AREA VI	
			PZ-207-AS[I]		S-84[I]		PZ-101-SS[A]	
Constituent	**Units**	**MCL**	**BG**	**GWPS**	**BG**	**GWPS**	**BG**	**GWPS**
Antimony, Total	ug/L	6	RL	6	RL	6	RL	6
Arsenic, Total	ug/L	10	-	-	-	-	-	-
Barium, Total	ug/L	2,000	-	-	-	-	150	2,000
Beryllium, Total	ug/L	4	RL	4	RL	4	RL	4
Cadmium, Total	ug/L	5	RL	5	RL	5	RL	5
Chromium, Total	ug/L	100	RL	100	RL	100	7.5	100
Cobalt, Total	ug/L	NE	RL	RL	RL	RL	RL	RL
Copper, Total	ug/L	1,300	RL	1,300	RL	1,300	7.0	1,300
Cyanide, Total*	mg/L	0.2	*	0.2	*	0.2	*	0.2
Lead, Total	ug/L	15	-	-	-	-	RL	15
Mercury, Total	ug/L	2	RL	2	RL	2	RL	2
Nickel, Total	ug/L	NE	RL	RL	RL	RL	11	11
Selenium, Total	ug/L	50	RL	50	RL	50	RL	50
Silver, Total	ug/L	NE	RL	RL	RL	RL	RL	RL
Sulfide[J]	mg/L	NE	RL	RL	RL	RL	RL	RL
Thallium, Total	ug/L	2	RL	2	RL	2	RL	2
Tin, Total*	ug/L	NE	*	RL	*	RL	*	RL
Vanadium, Total	ug/L	NE	RL	RL	RL	RL	RL	RL
Zinc, Total	ug/L	NE	RL	RL	RL	RL	74	74

Notes

MCL: Maximum contaminant level (National Primary Drinking Water Standard).
GWPS: Groundwater protection standard.
NE: MCL not established.
RL: Laboratory reporting limit.
(A) Background from 5/08 - 2/18 data at PZ-201A-SS.
(B) Background from 5/97 - 11/11 data at PZ-104-SS.
(C) Background from 5/97 - 11/11 data at PZ-104-SD.
(D) Background from 2/97 - 4/13 data at MW-1204.
(E) Background from 5/08 - 2/18 data at PZ-105-SS.
(F) Background from 8/12 - 8/16 data at PZ-302-AI.
(G) Background from 8/97 - 8/98 data at PZ-107-SS.
(H) Background from 8/12 - 8/13 data at D-87.
(I) Background from 8/12 - 8/13 data at I-67.
(J) Background from 11/14 - 8/15 data at PZ-212-SS/PZ-212-SD.
* Negligible historical data available. GWPS = RL.

Appendix A
Groundwater Protection Standards
Bridgeton Landfill, LLC - Bridgeton, Missouri

Other Organic App II Constituents

ALL WELLS

Constituent	MCL	GWPS
Acenaphthene	NE	RL
Acenaphthylene	NE	RL
Acetonitrile (Methyl Cyanide)	NE	RL
Acetophenon	NE	RL
2-Acetylaminofluorene (2-AAF)	NE	RL
Acrolein	NE	RL
Acrylonitrile	NE	RL
Aldrin	NE	RL
Allyl Chloride	NE	RL
4-Aminobipheny	NE	RL
Anthracene	NE	RL
Benzo(a)anthracene (Benzanthracene)	NE	RL
Benzo(b)fluoranthene	NE	RL
Benzo(k)fluoranthene	NE	RL
Benzo(ghi)perylene	NE	RL
Benzo(a)pylene	NE	RL
Benzyl Alcohol	NE	RL
alpha-BHC	NE	RL
beta-BHC	NE	RL
delta-BHC	NE	RL
gamma-BHC (Lindane)	0.2	0.2
Bis(2-chloroethoxy)methane	NE	RL
Bis(2-chloroethyl) Ether (Dichloroethyl Ether)	NE	RL
Bis(2-chloro-1-methylethyl) Ether (2,2'-Dichlorodiisopropyl Ether; DCIP)	NE	RL
Bromochloromethane (Chlorobromomethane)	NE	RL
Bromodichloromethane (Chlorodibromomethane)	100*	100
Bromoform (Tribromomethane)	100*	100
4-Bromophenylphenyl Ether	NE	RL
Butyl Benzyl Phthalate (Benzyl Butyl Phthalate)	NE	RL
Carbon Disulfide	NE	RL
Carbon Tetrachloride	5	5
Chlordane	NE	RL
p-Chloroaniline	NE	RL
Chlorobenzilate	NE	RL
p-Chloro-m-cresol (4-Chloro-3-methylphenol)	NE	RL
Chloroethane (Ethyl Chloride)	NE	RL
Chloroform (Trichloromethane)	100*	100
2-Chloronaphthalene	NE	RL

Appendix A
Groundwater Protection Standards
Bridgeton Landfill, LLC - Bridgeton, Missouri

Other Organic App II Constituents

ALL WELLS

Constituent	MCL	GWPS
2-Chlorophenol	NE	RL
4-Chlorophenyl Phenyl Ether	NE	RL
Chloroprene	NE	RL
Chrysene	NE	RL
o-Cresol (2-Methylphenol)	NE	RL
2,4-D (2,4-Dichlorophenoxyacetic Acid)	70	70
4,4'-DDD	NE	RL
4,4'-DDE	NE	RL
4,4'-DDT	NE	RL
Diallate	NE	RL
Dibenz(a,h)anthracene	NE	RL
Dibenzofuran	NE	RL
Dibromochloromethane (Chlorodibromomethane)	100*	100
1,2-Dibromo-3-chloropropane (DBCP)	0.2	0.2
1,2-Dibromoethane (Ethylene Dibromide; EDB)	0.05	0.05
Di-n-butyl Phthalate	NE	RL
o-Dichlorobenzene (1,2-Dichlorobenzene)	600	600
3,3'-Dichlorobenzidine	NE	RL
trans-1,4-Dichloro-2-butene	NE	RL
1,1-Dichloroethane (Ethyldidene Chloride)	NE	RL
1,1-Dichloroethylene (1,1-Dichloroethene; Vinylidene Chloride)	7	7
1,2-Dichloroethane (Ethylene Dichloride)	5	5
cis-1,2-Dichloroethylene (cis-1,2-Dichloroethene)	70	70
trans-1,2-Dichloroethylene (trans-1,2-Dichloroethene)	100	100
2,4-Dichlorophenol	NE	RL
2,6-Dichlorophenol	NE	RL
1,2-Dichloropropane (Propylene Dichloride)	5	5
1,3-Dichloropropane (Trimethylene Dichloride)	NE	RL
2,2-Dichloropropane (Isopropylidene Chloride)	NE	RL
1,1-Dichloropropene	NE	RL
cis-1,3-Dichloropropene	NE	RL
trans-1,3-Dichloropropene	NE	RL
Dieldrin	NE	RL
Diethyl Phthalate	NE	RL
o,o-Diethyl o-2-pyrazinyl Phosphorothioate (Thionazin)	NE	RL
Dimethoate	NE	RL
p-(Dimethylamino)azobenzen	NE	RL

Appendix A
Groundwater Protection Standards
Bridgeton Landfill, LLC - Bridgeton, Missouri

Other Organic App II Constituents

ALL WELLS

Constituent	MCL	GWPS
7,12-Diemthylbenz(a)anthracene	NE	RL
3,3'-Diemthylbenzidine	NE	RL
2,4-Dimethylphenol (m-Xylenol)	NE	RL
Dimethyl Phthalate	NE	RL
m-Dinitrobenzene	NE	RL
4,6-Dinitro-o-cresol (4,6-Dinitro-2-methylphenol)	NE	RL
2,4-Dinitrophenol	NE	RL
2,4-Dinitrotoluene	NE	RL
2,6-Dinitrotoluene	NE	RL
Dinoseb (DNBP; 2-sec-Butyl-4,6-dinitrophenol)	7	7
Di-n-octyl Phthalate	NE	RL
Diphenylamine	NE	RL
Disulfoton	NE	RL
Endosulfan I	NE	RL
Endosulfan II	NE	RL
Endosulfan Sulfate	NE	RL
Endrin	2	2
Endrin Aldehyde	NE	RL
Ethyl Methacrylsate	NE	RL
Ethyl Methanesulfonate	NE	RL
Famphur	NE	RL
Fluoranthene	NE	RL
Fluorene	NE	RL
Heptachlor	0.4	0.4
Heptachlor Epoxide	0.2	0.2
Hexachlorobenzene	1	1
Hexachlorobutadiene	NE	RL
Hexachlorocyclopentadiene	50	50
Hexachloroethane	NE	RL
Hexachloropropene	NE	RL
Indeno(1,2,3-cd)pyrene	NE	RL
Isobutyl Alcohol	NE	RL
Isodrin	NE	RL
Isophorone	NE	RL
Isosafrole	NE	RL
Kepone	NE	RL
Methacrylonitrile	NE	RL
Methapyrilene	NE	RL
Methoxychlor	NE	RL

Appendix A
Groundwater Protection Standards
Bridgeton Landfill, LLC - Bridgeton, Missouri

Other Organic App II Constituents

ALL WELLS

Constituent	MCL	GWPS
Methyl Bromide (Bromomethane)	NE	RL
Methyl Chloride (Chloromethane)	NE	RL
3-Methylcholanthrene	NE	RL
Methyl Iodide (Iodomethane)	NE	RL
Methyl Methacrylate	NE	RL
2-Methylnaphthalene	NE	RL
Methyl Parathion (Parathion Methyl)	NE	RL
Methylene Bromide (Dibromomethane)	NE	RL
1,4-Naphthoquinone	NE	RL
1-Naphthylamine	NE	RL
2-Naphthylamine	NE	RL
o-Nitroaniline (2-Nitroaniline)	NE	RL
m-Nitroaniline (3-Nitroaniline)	NE	RL
p-Nitroaniline (4-Nitroaniline)	NE	RL
Nitrobenzene	NE	RL
o-Nitrophenol (2-Nitrophenol)	NE	RL
p-Nitrophenol (4-Nitrophenol)	NE	RL
n-Nitrosodi-n-butylamine	NE	RL
n-Nitrosodiethylamine	NE	RL
n-Nitrosodimethylamine	NE	RL
n-Nitrosodiphenylamine	NE	RL
n-Nitrossodipropylamine (n-Nitroso-n-dipropylamine)	NE	RL
Di-n-propylnitrosamine	NE	RL
n-Nitrosomethylethylamine	NE	RL
n-Nitrosopiperidine	NE	RL
n-Nitrosopyrrolidine	NE	RL
5-Nitro-o-toluidine	NE	RL
Parathion	NE	RL
Pentachlorobenzene	NE	RL
Pentachloronitrobenzene	NE	RL
Pentachlorophenol	2	2
Phenacetin	NE	RL
p-Phenylenediamine	NE	RL
Phorate	NE	RL
Polychlorinated Biphenyls (PCBs; Aroclors)	0.5	0.5
Pronamide	NE	RL
Propionitrile (Ethyl Cyanide)	NE	RL
Pyrene	NE	RL
Safrole	NE	RL

Appendix A
Groundwater Protection Standards
Bridgeton Landfill, LLC - Bridgeton, Missouri

Other Organic App II Constituents

ALL WELLS

Constituent	MCL	GWPS
Silvex (2,4,5-TP)	50	**50**
Styrene	100	**100**
2,4,5-T (2,4,5-Trichlorophenoxyacetic Acid)	NE	**RL**
1,2,4,5-Tetrachlorobenzene	NE	**RL**
1,1,1,2-Tetrachloroethane	NE	**RL**
1,1,2,2-Tetrachloroethane	NE	**RL**
Tetrachloroethylene (Tetrachloroethene; Perchloroethylene)	5	**5**
2,3,4,6-Tetrachlorophenol	NE	**RL**
o-Toluidine	NE	**RL**
Toxaphene	3	**3**
1,2,4-Trichlorobenzene	70	**70**
1,1,1-Trichloroethane (Methylchloroform)	200	**200**
Trichloroethylene (Trichloroethene)	5	**5**
Trichlorofluoromethane (CFC-11)	100*	**100**
2,4,5-Trichlorophenol	NE	**RL**
2,4,6-Trichlorophenol	NE	**RL**
1,2,3-Trichloropropane	NE	**RL**
0,0,0-Triethyl Phosphorothioate	NE	**RL**
sym-Trinitrobenzene	NE	**RL**
Vinyl Acetate	NE	**RL**

Notes
All concentrations presented in units of ug/L.
MCL: Maximum contaminant level (National Primary Drinking Water Standard).
GWPS: Groundwater protection standard.
NE: MCL not established.
RL: Laboratory reporting limit.
* Listed MCL is for total trihalomethanes (TTHM).

APPENDIX B

STATISTICAL SUMMARY TABLES FOR BACKGROUND CONCENTRATIONS

Prediction Limit

Bridgeton Landfill Client: Bridgeton Landfill, LLC Data: Bridgeton - Non-Progam Wells Printed 6/15/2018, 11:30 AM

Constituent	Well	Upper Lim.	Bg N	Bg Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Antimony Total (ug/L)	D-87	50	4	n/a	n/a	100	n/a	n/a	0.06138	NP Intra (NDs) 1 of 2
Arsenic Total (ug/L)	D-87	50	4	n/a	n/a	100	n/a	n/a	0.06138	NP Intra (NDs) 1 of 2
Barium Total (ug/L)	D-87	2175	4	1378	184.5	0	None	No	0.002769	Param Intra 1 of 2
Beryllium Total (ug/L)	D-87	25	4	n/a	n/a	100	n/a	n/a	0.06138	NP Intra (NDs) 1 of 2
Cadmium Total (ug/L)	D-87	25	4	n/a	n/a	100	n/a	n/a	0.06138	NP Intra (NDs) 1 of 2
Chromium Total (ug/L)	D-87	50	4	n/a	n/a	100	n/a	n/a	0.06138	NP Intra (NDs) 1 of 2
Cobalt Total (ug/L)	D-87	250	4	n/a	n/a	100	n/a	n/a	0.06138	NP Intra (NDs) 1 of 2
Copper Total (ug/L)	D-87	130	4	n/a	n/a	100	n/a	n/a	0.06138	NP Intra (NDs) 1 of 2
Lead Total (ug/L)	D-87	50	4	n/a	n/a	100	n/a	n/a	0.06138	NP Intra (NDs) 1 of 2
Mercury Total (ug/L)	D-87	0.2	4	n/a	n/a	100	n/a	n/a	0.06138	NP Intra (NDs) 1 of 2
Nickel Total (ug/L)	D-87	200	4	n/a	n/a	100	n/a	n/a	0.06138	NP Intra (NDs) 1 of 2
Selenium Total (ug/L)	D-87	75	4	n/a	n/a	100	n/a	n/a	0.06138	NP Intra (NDs) 1 of 2
Silver Total (ug/L)	D-87	50	4	n/a	n/a	100	n/a	n/a	0.06138	NP Intra (NDs) 1 of 2
Thallium Total (ug/L)	D-87	100	4	n/a	n/a	100	n/a	n/a	0.06138	NP Intra (NDs) 1 of 2
Vanadium Total (ug/L)	D-87	250	4	n/a	n/a	100	n/a	n/a	0.06138	NP Intra (NDs) 1 of 2
Zinc Total (ug/L)	D-87	100	4	n/a	n/a	100	n/a	n/a	0.06138	NP Intra (NDs) 1 of 2

Prediction Limit

Bridgeton Landfill Client: Bridgeton Landfill, LLC Data: Bridgeton - Non-Progam Wells Printed 6/15/2018, 11:34 AM

Constituent	Well	Upper Lim.	Bg N	Bg Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Antimony Total (ug/L)	I-67	50	4	n/a	n/a	100	n/a	n/a	0.06138	NP Intra (NDs) 1 of 2
Arsenic Total (ug/L)	I-67	50	4	n/a	n/a	100	n/a	n/a	0.06138	NP Intra (NDs) 1 of 2
Barium Total (ug/L)	I-67	361.7	4	270	21.21	25	Kaplan-Meier	No	0.002769	Param Intra 1 of 2
Beryllium Total (ug/L)	I-67	25	4	n/a	n/a	100	n/a	n/a	0.06138	NP Intra (NDs) 1 of 2
Cadmium Total (ug/L)	I-67	25	4	n/a	n/a	100	n/a	n/a	0.06138	NP Intra (NDs) 1 of 2
Chromium Total (ug/L)	I-67	50	4	n/a	n/a	100	n/a	n/a	0.06138	NP Intra (NDs) 1 of 2
Cobalt Total (ug/L)	I-67	250	4	n/a	n/a	100	n/a	n/a	0.06138	NP Intra (NDs) 1 of 2
Copper Total (ug/L)	I-67	130	4	n/a	n/a	100	n/a	n/a	0.06138	NP Intra (NDs) 1 of 2
Lead Total (ug/L)	I-67	50	4	n/a	n/a	100	n/a	n/a	0.06138	NP Intra (NDs) 1 of 2
Mercury Total (ug/L)	I-67	0.2	4	n/a	n/a	100	n/a	n/a	0.06138	NP Intra (NDs) 1 of 2
Nickel Total (ug/L)	I-67	200	4	n/a	n/a	100	n/a	n/a	0.06138	NP Intra (NDs) 1 of 2
Selenium Total (ug/L)	I-67	75	4	n/a	n/a	100	n/a	n/a	0.06138	NP Intra (NDs) 1 of 2
Silver Total (ug/L)	I-67	50	4	n/a	n/a	100	n/a	n/a	0.06138	NP Intra (NDs) 1 of 2
Thallium Total (ug/L)	I-67	100	4	n/a	n/a	100	n/a	n/a	0.06138	NP Intra (NDs) 1 of 2
Vanadium Total (ug/L)	I-67	250	4	n/a	n/a	100	n/a	n/a	0.06138	NP Intra (NDs) 1 of 2
Zinc Total (ug/L)	I-67	100	4	n/a	n/a	100	n/a	n/a	0.06138	NP Intra (NDs) 1 of 2

Prediction Limit

Bridgeton Landfill Client: Bridgeton Landfill, LLC Data: Bridgeton - Non-Progam Wells Printed 6/14/2018, 10:28 AM

Constituent	Well	Upper Lim.	Bg N	Bg Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Antimony Total (ug/L)	1204	50	7	n/a	n/a	100	n/a	n/a	0.02765	NP Intra (NDs) 1 of 2
Arsenic Total (ug/L)	1204	50	7	n/a	n/a	100	n/a	n/a	0.02765	NP Intra (NDs) 1 of 2
Barium Total (ug/L)	1204	436.2	7	5.249	0.3139	0	None	ln(x)	0.002769	Param Intra 1 of 2
Beryllium Total (ug/L)	1204	25	7	n/a	n/a	100	n/a	n/a	0.02765	NP Intra (NDs) 1 of 2
Cadmium Total (ug/L)	1204	25	7	n/a	n/a	100	n/a	n/a	0.02765	NP Intra (NDs) 1 of 2
Chromium Total (ug/L)	1204	50	7	n/a	n/a	100	n/a	n/a	0.02765	NP Intra (NDs) 1 of 2
Cobalt Total (ug/L)	1204	250	7	n/a	n/a	100	n/a	n/a	0.02765	NP Intra (NDs) 1 of 2
Copper Total (ug/L)	1204	130	7	n/a	n/a	100	n/a	n/a	0.02765	NP Intra (NDs) 1 of 2
Lead Total (ug/L)	1204	25	7	n/a	n/a	85.71	n/a	n/a	0.02765	NP Intra (NDs) 1 of 2
Mercury Total (ug/L)	1204	0.2	7	n/a	n/a	100	n/a	n/a	0.02765	NP Intra (NDs) 1 of 2
Nickel Total (ug/L)	1204	200	7	n/a	n/a	100	n/a	n/a	0.02765	NP Intra (NDs) 1 of 2
Selenium Total (ug/L)	1204	75	7	n/a	n/a	100	n/a	n/a	0.02765	NP Intra (NDs) 1 of 2
Silver Total (ug/L)	1204	50	7	n/a	n/a	100	n/a	n/a	0.02765	NP Intra (NDs) 1 of 2
Thallium Total (ug/L)	1204	100	7	n/a	n/a	100	n/a	n/a	0.02765	NP Intra (NDs) 1 of 2
Vanadium Total (ug/L)	1204	250	7	n/a	n/a	100	n/a	n/a	0.02765	NP Intra (NDs) 1 of 2
Zinc Total (ug/L)	1204	34	7	n/a	n/a	57.14	n/a	n/a	0.02765	NP Intra (NDs) 1 of 2

Prediction Limit

Bridgeton Landfill Client: Bridgeton Landfill, LLC Data: Bridgeton - Non-Progam Wells Printed 6/14/2018, 10:35 AM

Constituent	Well	Upper Lim.	Sig.	Bg N	Bg Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Antimony Total (ug/L)	107-SS	5	n/a	5	n/a	n/a	100	n/a	n/a	0.04755	NP Intra (NDs) 1 of 2
Arsenic Total (ug/L)	107-SS	5.74	n/a	5	n/a	n/a	60	n/a	n/a	0.04755	NP Intra (NDs) 1 of 2
Barium Total (ug/L)	107-SS	772.9	n/a	4	5.7e16	3.6e16	0	None	x^6	0.002769	Param Intra 1 of 2
Beryllium Total (ug/L)	107-SS	2	n/a	5	n/a	n/a	100	n/a	n/a	0.04755	NP Intra (NDs) 1 of 2
Cadmium Total (ug/L)	107-SS	2	n/a	5	n/a	n/a	100	n/a	n/a	0.04755	NP Intra (NDs) 1 of 2
Chromium Total (ug/L)	107-SS	8.4	n/a	5	n/a	n/a	60	n/a	n/a	0.04755	NP Intra (NDs) 1 of 2
Cobalt Total (ug/L)	107-SS	5	n/a	5	n/a	n/a	100	n/a	n/a	0.04755	NP Intra (NDs) 1 of 2
Copper Total (ug/L)	107-SS	41.6	n/a	5	n/a	n/a	80	n/a	n/a	0.04755	NP Intra (NDs) 1 of 2
Lead Total (ug/L)	107-SS	4	n/a	5	n/a	n/a	80	n/a	n/a	0.04755	NP Intra (NDs) 1 of 2
Mercury Total (ug/L)	107-SS	0.2	n/a	5	n/a	n/a	100	n/a	n/a	0.04755	NP Intra (NDs) 1 of 2
Nickel Total (ug/L)	107-SS	264.2	n/a	5	3.777	0.5012	20	Kaplan-Meier	ln(x)	0.002769	Param Intra 1 of 2
Selenium Total (ug/L)	107-SS	5	n/a	5	n/a	n/a	100	n/a	n/a	0.04755	NP Intra (NDs) 1 of 2
Silver Total (ug/L)	107-SS	5	n/a	5	n/a	n/a	100	n/a	n/a	0.04755	NP Intra (NDs) 1 of 2
Thallium Total (ug/L)	107-SS	5	n/a	5	n/a	n/a	100	n/a	n/a	0.04755	NP Intra (NDs) 1 of 2
Vanadium Total (ug/L)	107-SS	10	n/a	5	n/a	n/a	100	n/a	n/a	0.04755	NP Intra (NDs) 1 of 2
Zinc Total (ug/L)	107-SS	261.4	n/a	5	78.02	51.06	0	None	No	0.002769	Param Intra 1 of 2

Prediction Limit

Bridgeton Landfill Client: Bridgeton Landfill, LLC Data: Bridgeton - Non-Progam Wells Printed 6/20/2018, 9:33 AM

Constituent	Well	Upper Lim.	Bg N	Bg Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Sulfide as S (mg/L)	212-SD	1	4	n/a	n/a	100	n/a	n/a	0.06138	NP Intra (NDs) 1 of 2
Sulfide as S (mg/L)	212-SS	1	4	n/a	n/a	100	n/a	n/a	0.06138	NP Intra (NDs) 1 of 2

Prediction Limit

Bridgeton Landfill Client: Bridgeton Landfill, LLC Data: Bridgeton - Non-Progam Wells Printed 6/15/2018, 11:41 AM

Constituent	Well	Upper Lim.	Bg N	Bg Mean	Std. Dev.	%NDs	ND Adj.	Transform	Alpha	Method
Antimony Total (ug/L)	302-AI	5	5	n/a	n/a	100	n/a	n/a	0.04755	NP Intra (NDs) 1 of 2
Arsenic Total (ug/L)	302-AI	5	5	n/a	n/a	100	n/a	n/a	0.04755	NP Intra (NDs) 1 of 2
Barium Total (ug/L)	302-AI	546.5	5	363.6	50.94	0	None	No	0.002769	Param Intra 1 of 2
Beryllium Total (ug/L)	302-AI	2	5	n/a	n/a	100	n/a	n/a	0.04755	NP Intra (NDs) 1 of 2
Cadmium Total (ug/L)	302-AI	0.2	5	n/a	n/a	100	n/a	n/a	0.04755	NP Intra (NDs) 1 of 2
Chromium Total (ug/L)	302-AI	5	5	n/a	n/a	100	n/a	n/a	0.04755	NP Intra (NDs) 1 of 2
Cobalt Total (ug/L)	302-AI	125	5	n/a	n/a	80	n/a	n/a	0.04755	NP Intra (NDs) 1 of 2
Copper Total (ug/L)	302-AI	5	5	n/a	n/a	100	n/a	n/a	0.04755	NP Intra (NDs) 1 of 2
Lead Total (ug/L)	302-AI	5	5	n/a	n/a	100	n/a	n/a	0.04755	NP Intra (NDs) 1 of 2
Mercury Total (ug/L)	302-AI	0.2	5	n/a	n/a	100	n/a	n/a	0.04755	NP Intra (NDs) 1 of 2
Nickel Total (ug/L)	302-AI	100	5	n/a	n/a	80	n/a	n/a	0.04755	NP Intra (NDs) 1 of 2
Selenium Total (ug/L)	302-AI	5	5	n/a	n/a	100	n/a	n/a	0.04755	NP Intra (NDs) 1 of 2
Silver Total (ug/L)	302-AI	5	5	n/a	n/a	100	n/a	n/a	0.04755	NP Intra (NDs) 1 of 2
Thallium Total (ug/L)	302-AI	2	5	n/a	n/a	100	n/a	n/a	0.04755	NP Intra (NDs) 1 of 2
Vanadium Total (ug/L)	302-AI	10	5	n/a	n/a	100	n/a	n/a	0.04755	NP Intra (NDs) 1 of 2
Zinc Total (ug/L)	302-AI	20	5	n/a	n/a	100	n/a	n/a	0.04755	NP Intra (NDs) 1 of 2

APPENDIX C

MAY 2017 ASSESSMENT CONSTITUENT RESULTS

Appendix C
May 2017 Assessment Constituent Results
Bridgeton Landfill, LLC - Bridgeton, Missouri

AREA I

Constituents	Units	PZ-103-SS		PZ-104-SS		PZ-104-SD		PZ-104-KS		PZ-202-SS		PZ-209-SS		PZ-209-SD		PZ-210-SS		PZ-210-SD		PZ-211-SS		PZ-211-SD	
		GWPS	5/9/17	GWPS	5/8/17	GWPS	5/8/17	GWPS	5/8/17	GWPS	5/2/17	GWPS	5/3/17	GWPS	5/3/17	GWPS	5/2/17	GWPS	5/2/17	GWPS	5/2/17	GWPS	5/2/17
Arsenic, Total	ug/L	10	<5.0	11	16.2	10	<5.0	10	<5.0	11	153	11	<5.0	10	<5.0	11	<5.0	10	<5.0	11	<5.0	10	<5.0
Barium, Total	ug/L	2,000	753	2,000	574	2,000	105	2,000	92.4	2,000	3,190	2,000	84.0	2,000	49.0	2,000	88.3	2,000	69.4	2,000	63.1	2,000	39.7
Cobalt, Total	ug/L	RL	<5.0	RL	<5.0	RL	<5.0	RL	<5.0	RL	10.3	RL	<5.0	RL	<5.0	RL	<5.0	RL	<5.0	RL	<5.0	RL	<5.0
Nickel, Total	ug/L	11	<10.0	23	48.5	20	<10.0	20	<10.0	23	59.5	23	<10.0	20	<10.0	23	<10.0	20	<10.0	23	<10.0	20	<10.0
Sulfide	mg/L	RL	2.3	RL	<1.0	RL	<10.0	RL	<1.0	RL	NA	RL	2.1	RL	<1.2	RL	<1.0	RL	<1.0	RL	<1.0	RL	<5.0
Vandium, Total	ug/L	RL	<10.0	RL	<10.0	RL	<10.0	RL	<10.0	RL	<20.0	RL	<10.0	RL	<10.0	RL	<10.0	RL	<10.0	RL	<10.0	RL	<10.0
Acetone	ug/L	RL	<10.0	RL	<10.0	RL	<10.0	RL	<10.0	RL	<100	RL	<10.0	RL	<10.0	RL	<1.0	RL	<10.0	RL	<10.0	RL	<10.0
Benzene	ug/L	5	40.6	5	213	5	400	5	<5.0	5	251	5	<5.0	5	<5.0	5	<5.0	5	<5.0	5	<5.0	5	<5.0
m+p-Cresols (3+4-Methylphenol)	ug/L	RL	NA	RL	<10.0	RL	<10.0	RL	<10.0	RL	NA	RL	<10.0	RL	<10.0	RL	<10.0	RL	<10.0	RL	<10.0	RL	<10.0
p-Dichlorobenzene (1,4-Dichlorobenzene)	ug/L	75	<5.0	75	<5.0	75	<5.0	75	<5.0	75	<50.0	75	<5.0	75	<5.0	75	<5.0	75	<5.0	75	<5.0	75	<5.0
Di-n-butyl Phthalate	ug/L	RL	NA	RL	NA	RL	NA	RL	NA	RL	<10.0	RL	NA	RL	NA	RL	NA	RL	NA	RL	NA	RL	NA
Ethylbenzene	ug/L	700	<5.0	700	<5.0	700	<5.0	700	<5.0	700	<50.0	700	<5.0	700	<5.0	700	<5.0	700	<5.0	700	<5.0	700	<5.0
p-Isopropyltoluene (4-Isopropyltoluene)	ug/L	RL	NA	RL	<5.0	RL	<5.0	RL	<5.0	RL	<50.0	RL	<5.0	RL	<5.0	RL	<5.0	RL	<5.0	RL	<5.0	RL	<5.0
Methyl Ethyl Ketone (MEK, 2-Butanone)	ug/L	RL	<10.0	RL	<10.0	RL	<10.0	RL	<10.0	RL	<100	RL	<10.0	RL	<10.0	RL	<10.0	RL	<10.0	RL	<10.0	RL	<10.0
4-Methyl-2-pentanone (MIBK; Methyl Isobutyl Ketone)	ug/L	RL	<10.0	RL	<10.0	RL	<10.0	RL	<10.0	RL	<100	RL	<10.0	RL	<10.0	RL	<10.0	RL	<10.0	RL	<10.0	RL	<10.0
Methyl-t-butyl Ether (MTBE; Methyl-tert-butyl Ether)	ug/L	RL	NA	RL	7.9	RL	<5.0	RL	<5.0	RL	<50.0	RL	<5.0	RL	<5.0	RL	<5.0	RL	<5.0	RL	<5.0	RL	<5.0
Tetrahydrofuran (THF)	ug/L	RL	NA	RL	<100	RL	1,150	RL	<100	RL	2,310	RL	<100	RL	<100	RL	<100	RL	<100	RL	<100	RL	<100
Toluene	ug/L	1,000	7.6	1,000	25.4	1,000	34.3	1,000	<5.0	1,000	<50.0	1,000	<5.0	1,000	<5.0	1,000	<5.0	1,000	<5.0	1,000	<5.0	1,000	<5.0
1,1,2-Trichloroethane	ug/L	5	<5.0	5	<5.0	5	<5.0	5	<5.0	5	<50.0	5	<5.0	5	<5.0	5	<5.0	5	<5.0	5	<5.0	5	<5.0
Vinyl Chloride (Chloroethene)	ug/L	2	<2.0	2	<2.0	2	<2.0	2	<2.0	2	<20.0	2	<2.0	2	<2.0	2	<2.0	2	<2.0	2	<2.0	2	<2.0
Xylenes, Total	ug/L	10,000	<5.0	10,000	7.4	10,000	20.4	10,000	<5.0	10,000	<50.0	10,000	<5.0	10,000	<5.0	10,000	<5.0	10,000	<5.0	10,000	<5.0	10,000	<5.0

Notes
GWPS: Groundwater protection standard.
NA: Constituent not analyzed.
Organic constituent result exceeds laboratory RL.
Result exceeds GWPS.

Appendix C
May 2017 Assessment Constituent Results
Bridgeton Landfill, LLC - Bridgeton, Missouri

AREA II

Constituents	Units	MW-1204		PZ-116-SS	
		GWPS	5/10/17	GWPS	5/8/17
Arsenic, Total	ug/L	10	9.8	10	<5.0
Barium, Total	ug/L	2,000	6,130	2,000	87.1
Chromium, Total	ug/L	100	35.5	100	<5.0
Acetone	ug/L	RL	14.3	RL	<10.0
Benzene	ug/L	5	6.9	5	16.1
m+p-Cresols (3+4-Methylphenol)	ug/L	RL	620	RL	NA
p-Dichlorobenzene (1,4-Dichlorobenzene)	ug/L	75	<5.0	75	6.0
Di-n-butyl Phthalate	ug/L	RL	NA	RL	<10.0
Ethylbenzene	ug/L	700	<5.0	700	<5.0
2-Hexanone (Methyl Butyl Ketone)	ug/L	RL	<10.0	RL	<10.0
Methyl Ethyl Ketone (MEK, 2-Butanone)	ug/L	RL	<10.0	RL	<10.0
4-Methyl-2-pentanone (MIBK; Methyl Isobutyl Ketone)	ug/L	RL	<10.0	RL	<10.0
Phenanthrene	ug/L	RL	NA	RL	NA
Phenol	ug/L	RL	10.2	RL	NA
Tetrahydrofuran (THF)	ug/L	RL	472	RL	<100
Toluene	ug/L	1,000	275	1,000	<5.0
Xylenes, Total	ug/L	10,000	<5.0	10,000	<5.0

Notes

GWPS: Groundwater protection standard.

NA: Constituent not analyzed.

Organic constituent result exceeds laboratory RL.

Result exceeds GWPS.

Appendix C
May 2017 Assessment Constituent Results
Bridgeton Landfill, LLC - Bridgeton, Missouri

AREA III

Constituents	Units	I-73		PZ-107-SS		PZ-205-AS	
		GWPS	5/10/17	GWPS	5/8/17	GWPS	5/8/17
Arsenic, Total	ug/L	10	233	10	8.1	10	58.4
Barium, Total	ug/L	2,000	1,640	2,000	844	2,000	4,830
Lead, Total	ug/L	15	<5.0	15	<5.0	15	<10.0
Benzene	ug/L	5	21.4	5	<5.0	5	718
Chlorobenzene	ug/L	100	1,570	100	<5.0	100	7.0
p-Dichlorobenzene (1,4-Dichlorobenzene)	ug/L	75	10.9	75	<5.0	75	21.5
Dichlorodifluoromethane (CFC 12)	ug/L	RL	NA	RL	18.7	RL	NA
Ethylbenzene	ug/L	700	<5.0	700	<5.0	700	19.1
Isopropylbenzene (Cumene)	ug/L	RL	NA	RL	NA	RL	7.6
p-Isopropyltoluene (4-Isopropyltoluene)	ug/L	RL	NA	RL	NA	RL	17.4
Methyl-t-butyl Ether (MTBE; Methyl-tert-butyl Ether)	ug/L	RL	NA	RL	NA	RL	8.5
Naphthalene	ug/L	RL	NA	RL	NA	RL	<10.0
Tetrahydrofuran	ug/L	RL	NA	RL	NA	RL	14,500
Toluene	ug/L	1,000	<5.0	1,000	<5.0	1,000	81.3
1,2,4-Trimethylbenzene	ug/L	RL	NA	RL	NA	RL	18.8
1,3,5-Trimethylbenzene	ug/L	RL	NA	RL	NA	RL	5.0
Xylenes, Total	ug/L	10,000	<5.0	10,000	<5.0	10,000	52.2

Notes

GWPS: Groundwater protection standard.

NA: Constituent not analyzed.

Organic constituent result exceeds laboratory RL.

Result exceeds GWPS.

Appendix C
May 2017 Assessment Constituent Results
Bridgeton Landfill, LLC - Bridgeton, Missouri

AREA IV

Constituents	Units	PZ-112-AS	
		GWPS	5/9/17
Arsenic, Total	ug/L	10	233
Benzene	ug/L	5	21.4
Chlorobenzene	ug/L	100	1,570
m-Dichlorobenzene (1,3-Dichlorobenzene)	ug/L	RL	<10.0
p-Dichlorobenzene (1,4-Dichlorobenzene)	ug/L	75	10.9
Di-n-butyl Phthalate	ug/L	75	<10.0

Notes

GWPS: Groundwater protection standard.

Organic constituent result exceeds laboratory RL.

Result exceeds GWPS.

Appendix C
May 2017 Assessment Constituent Results
Bridgeton Landfill, LLC - Bridgeton, Missouri

AREA V

Constituents	Units	D-85		PZ-207-AS		S-84	
		GWPS	5/15/17	GWPS	5/12/17	GWPS	5/15/17
Arsenic, Total	ug/L	10	38.7	10	<5.0	10	417
Barium, Total	ug/L	2,000	2,730	2,000	529	2,000	1,070
Lead, Total	ug/L	15	42.4	15	<5.0	15	11.3
Bis(2-ethylhexyl) Phthalate	ug/L	6	NA	6	<10.0	6	NA
Chlorobenzene	ug/L	100	46.1	100	15.4	100	11.5
Dichlorodifluoromethane (CFC 12)	ug/L	RL	NA	RL	12.6	RL	NA
Isopropylbenzene (Cumene)	ug/L	RL	NA	RL	5.4	RL	NA
Methylene Chloride	ug/L	5	<5.0	5	<5.0	5	<5.0

Notes

GWPS: Groundwater protection standard.

NA: Constituent not analyzed.

Organic constituent result exceeds laboratory RL.

Result exceeds GWPS.

Appendix C
May 2017 Assessment Constituent Results
Bridgeton Landfill, LLC - Bridgeton, Missouri

AREA VI

Constituents	Units	PZ-101-SS	
		GWPS	5/9/17
Arsenic, Total	ug/L	10	101
Chlorobenzene	ug/L	100	6.8
Methyl Ethyl Ketone (MEK, 2-Butanone)	ug/L	RL	<10.0

Notes

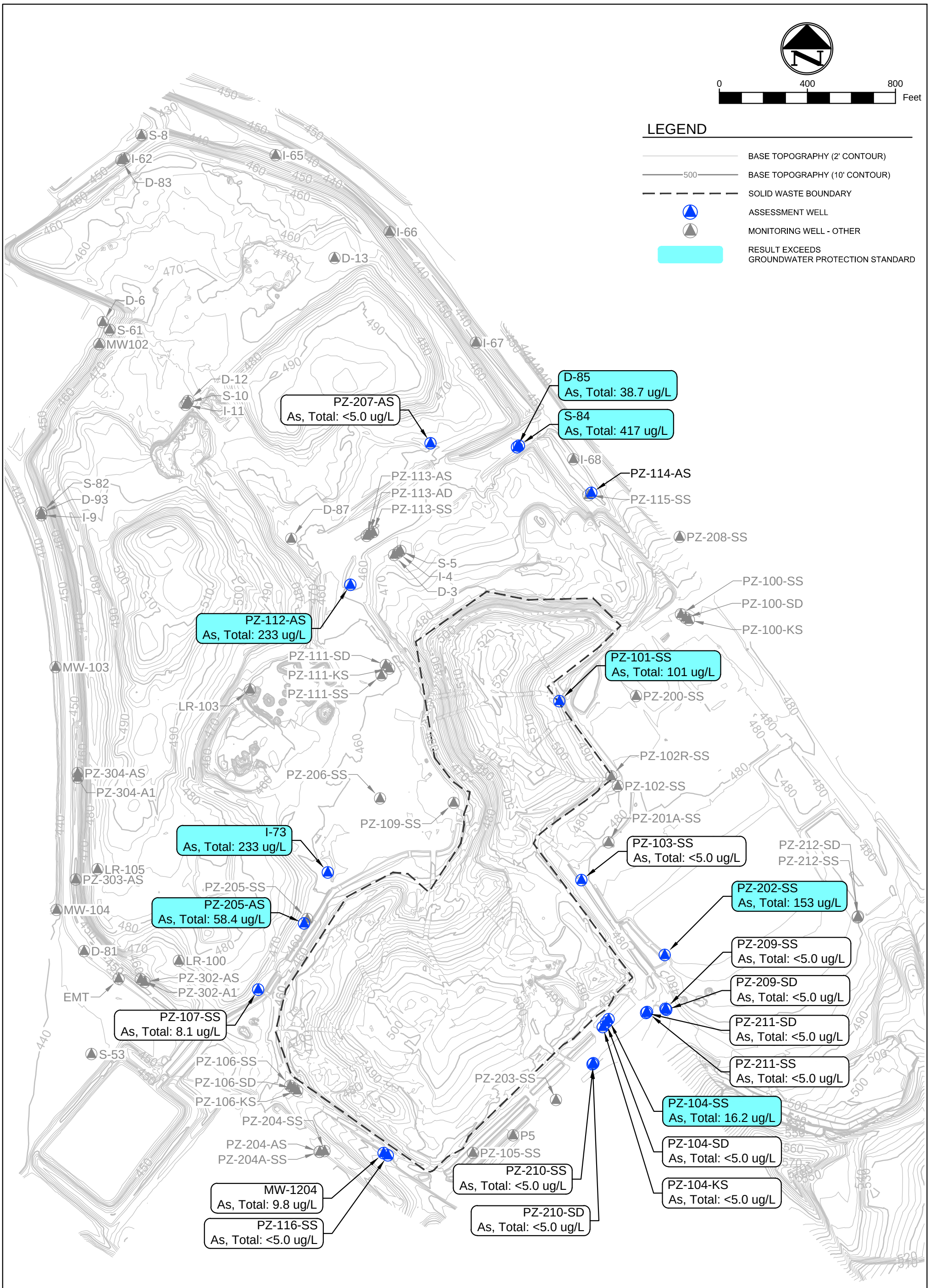
GWPS: Groundwater protection standard.

Organic constituent result exceeds laboratory RL.

Result exceeds GWPS.

APPENDIX D

EXTENTS OF ASSESSMENT MONITORING CONSTITUENTS AS OF MAY 2017



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TOTAL ARSENIC CONCENTRATIONS IN ASSESSMENT WELLS			REVISION DATE	**D-1**
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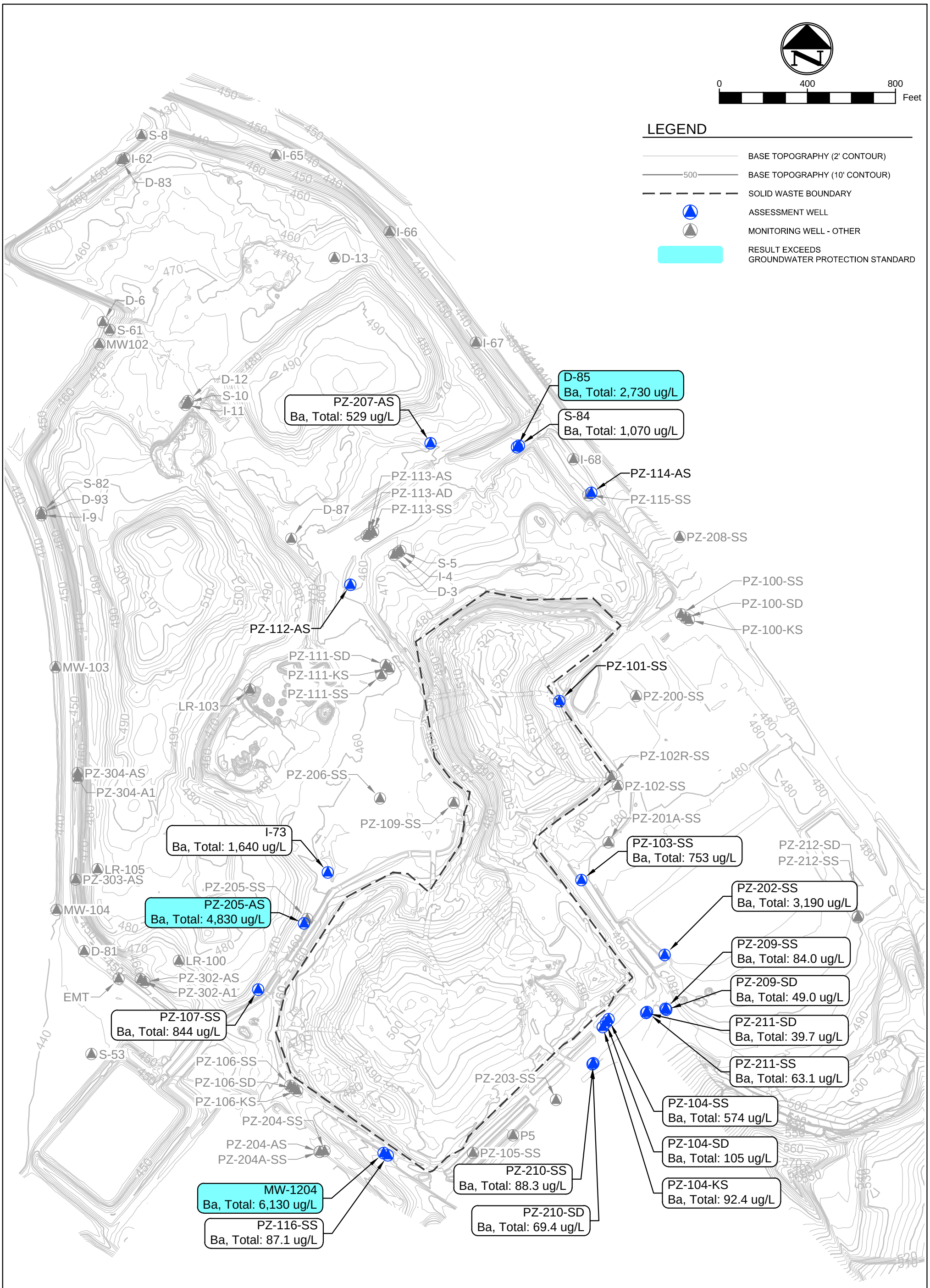

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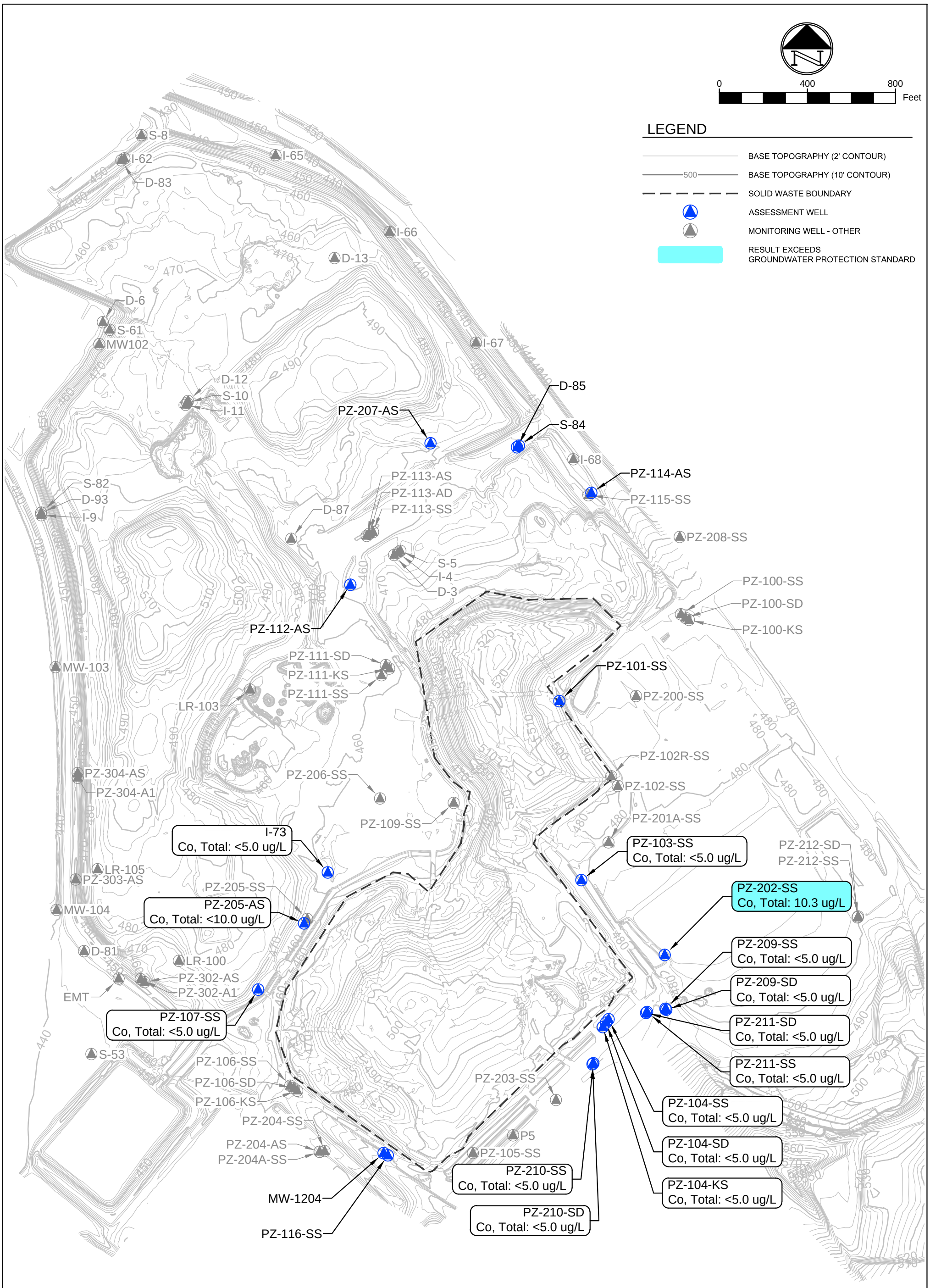

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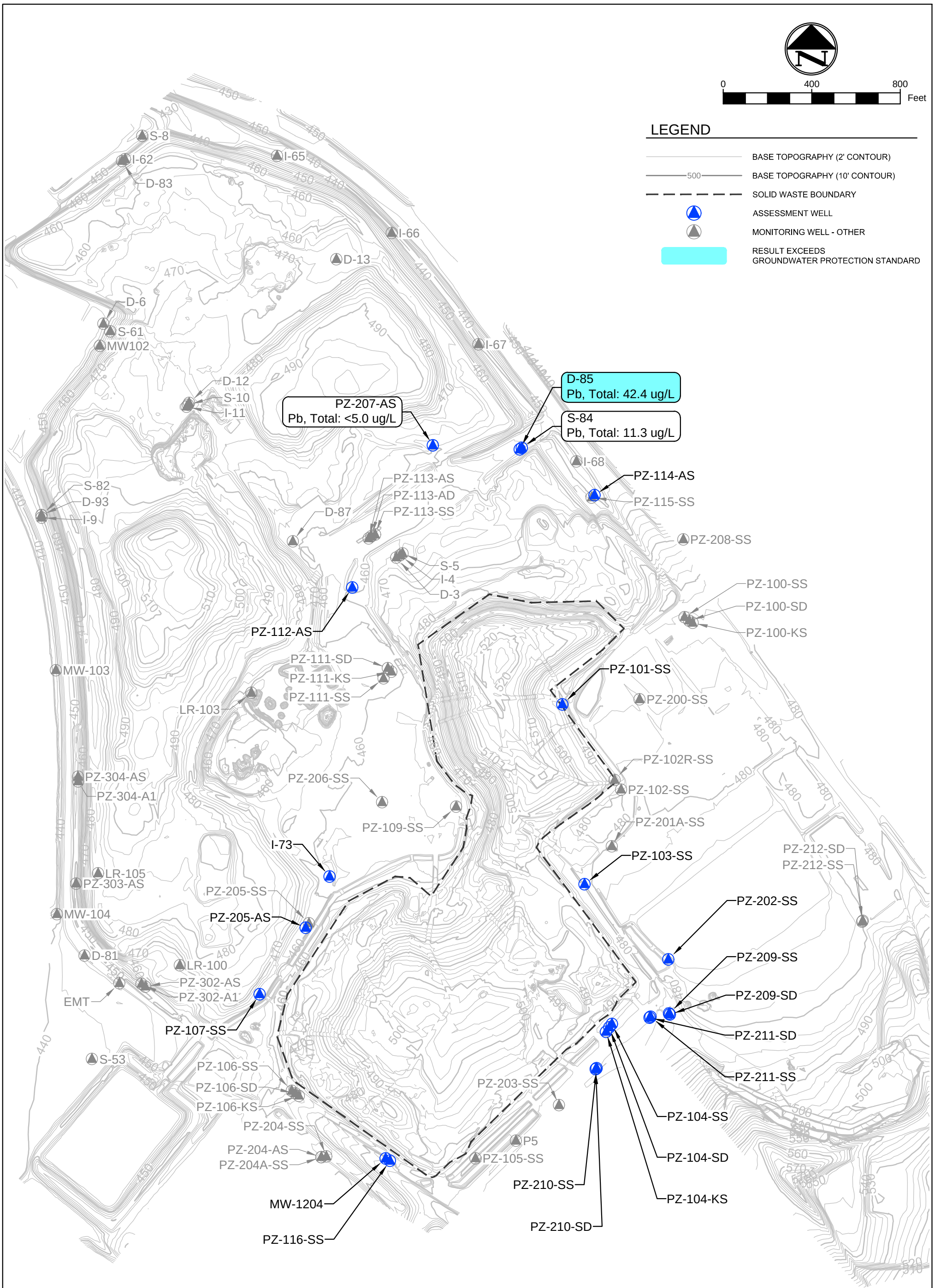

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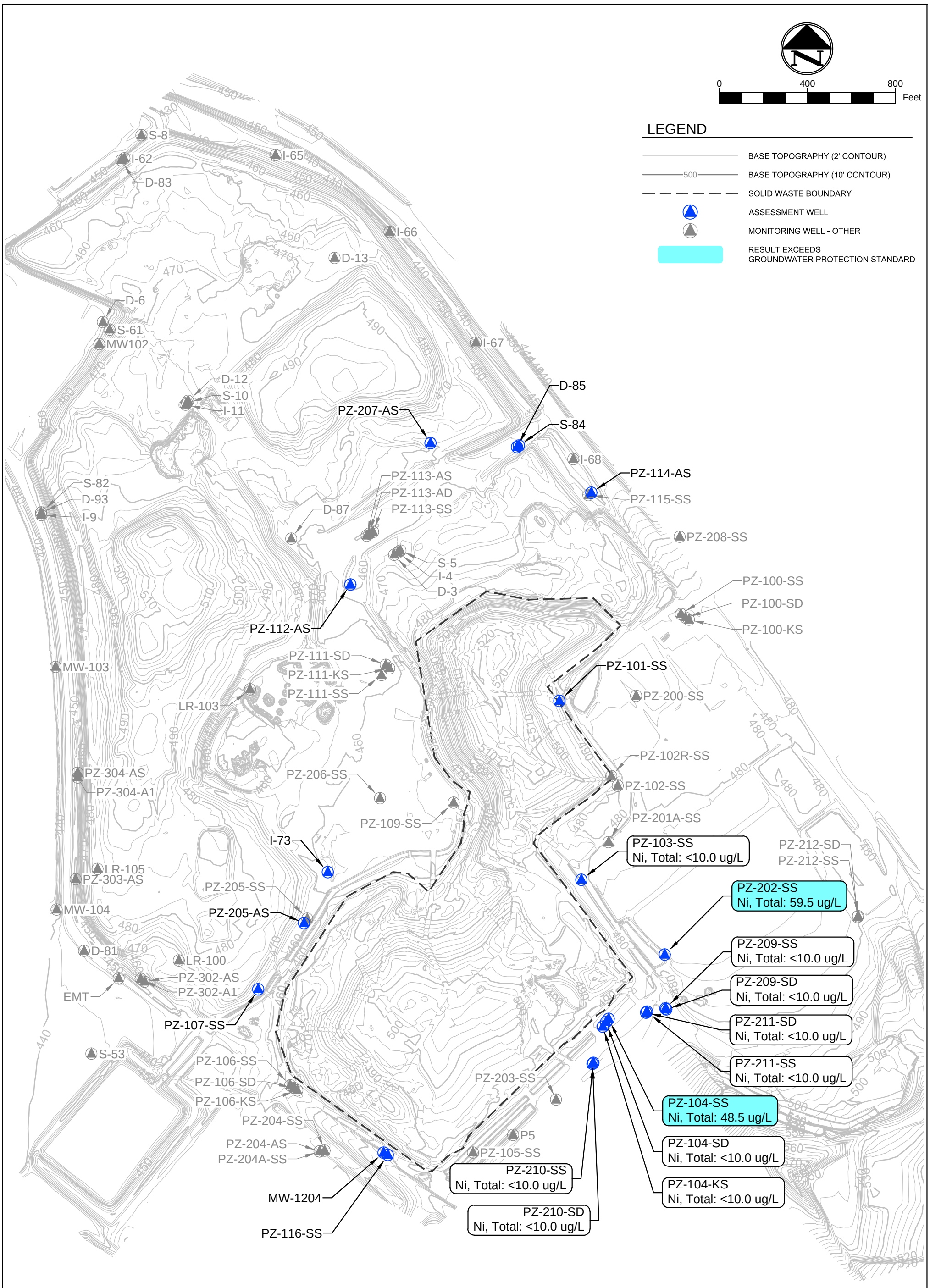

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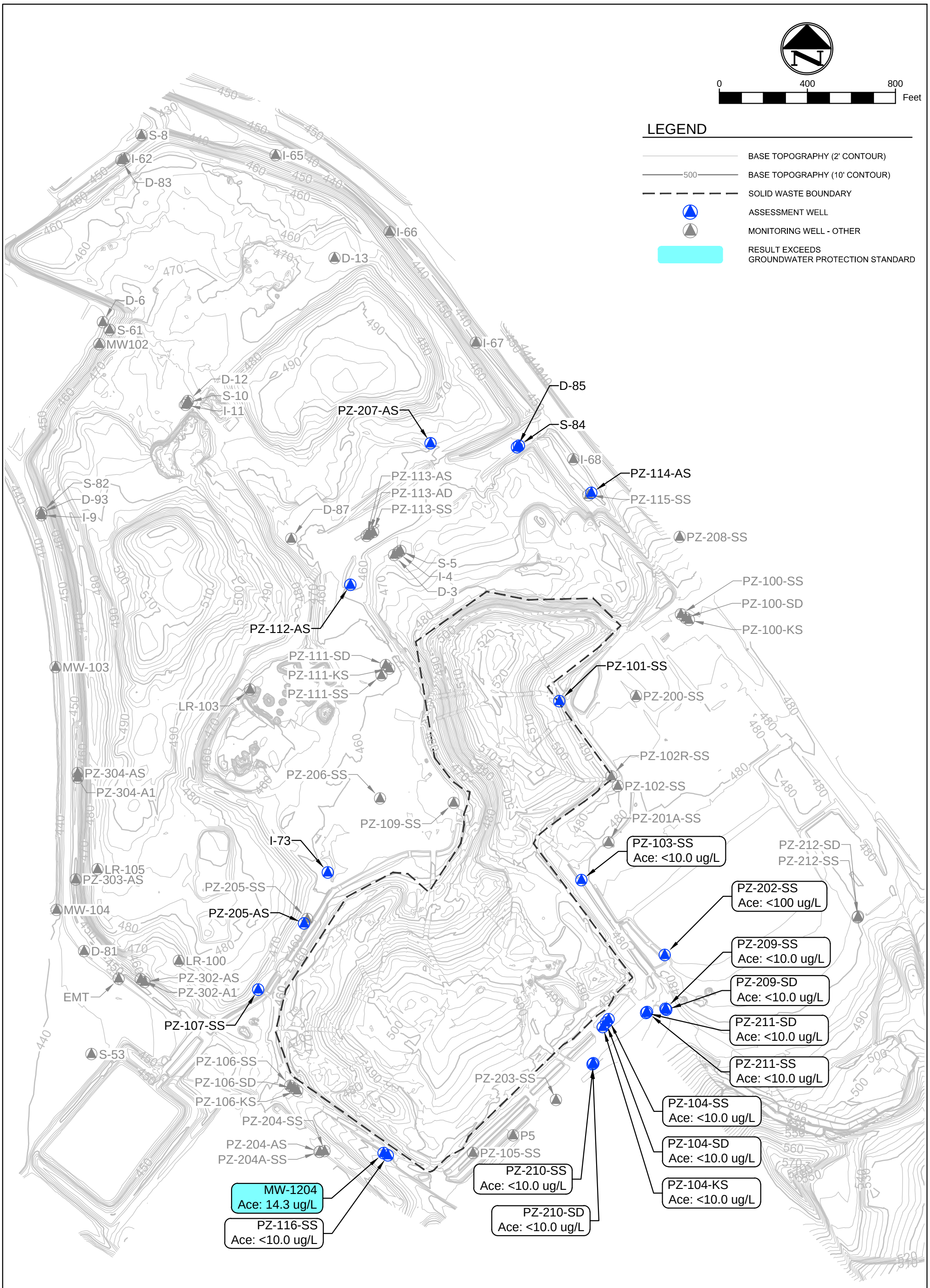

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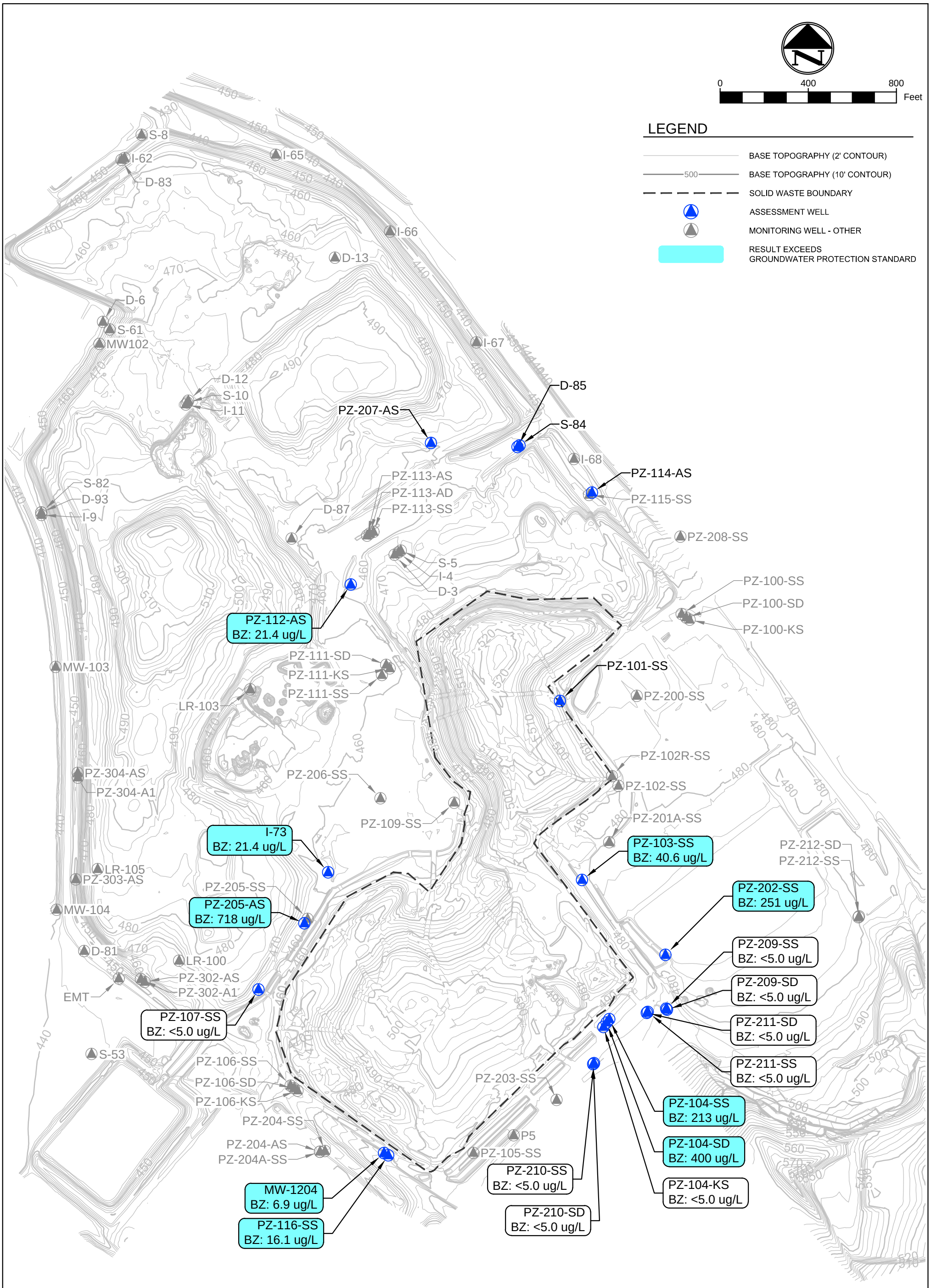

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BENZENE CONCENTRATIONS IN ASSESSMENT WELLS			REVISION DATE	**D-7**
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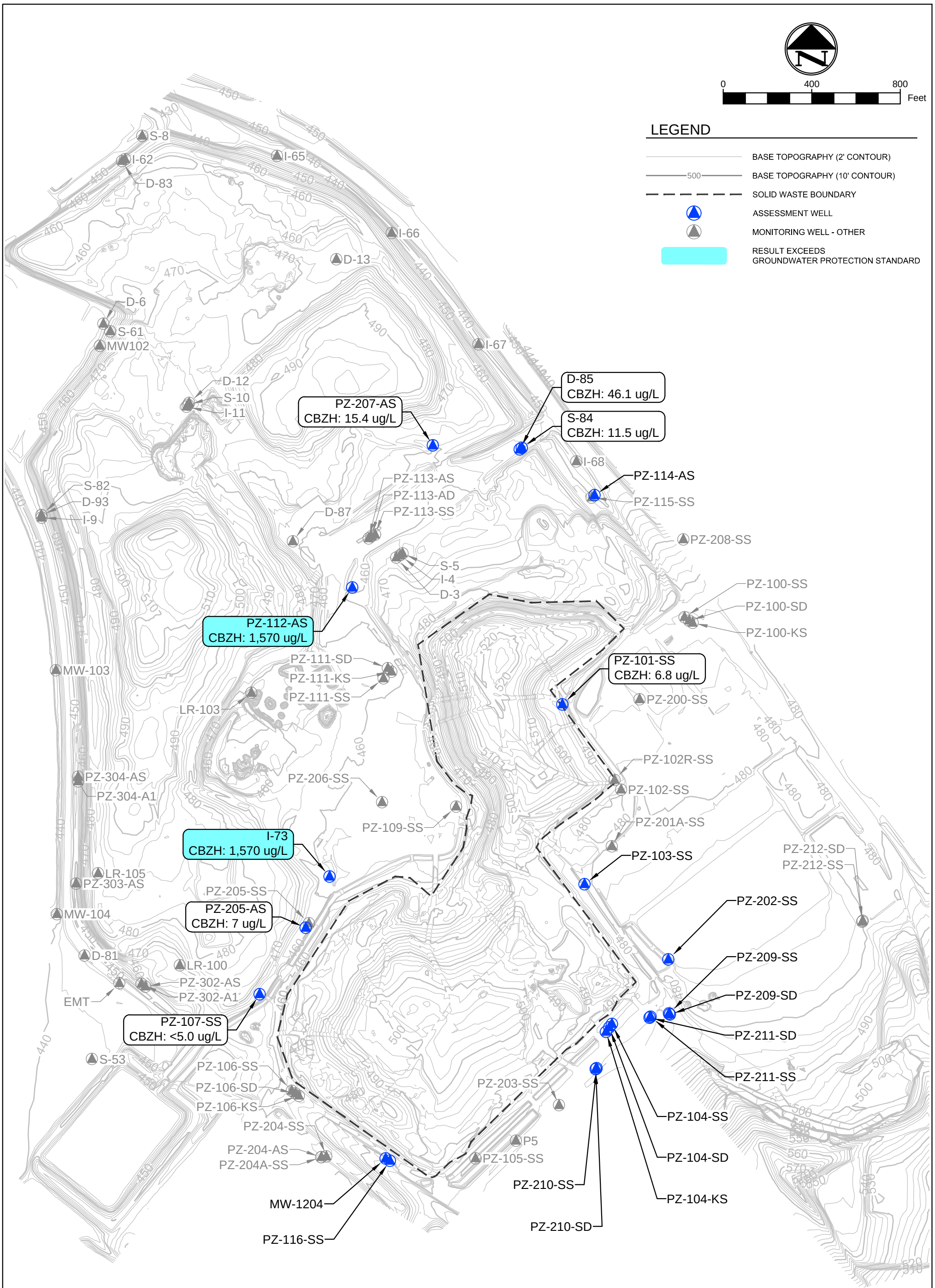

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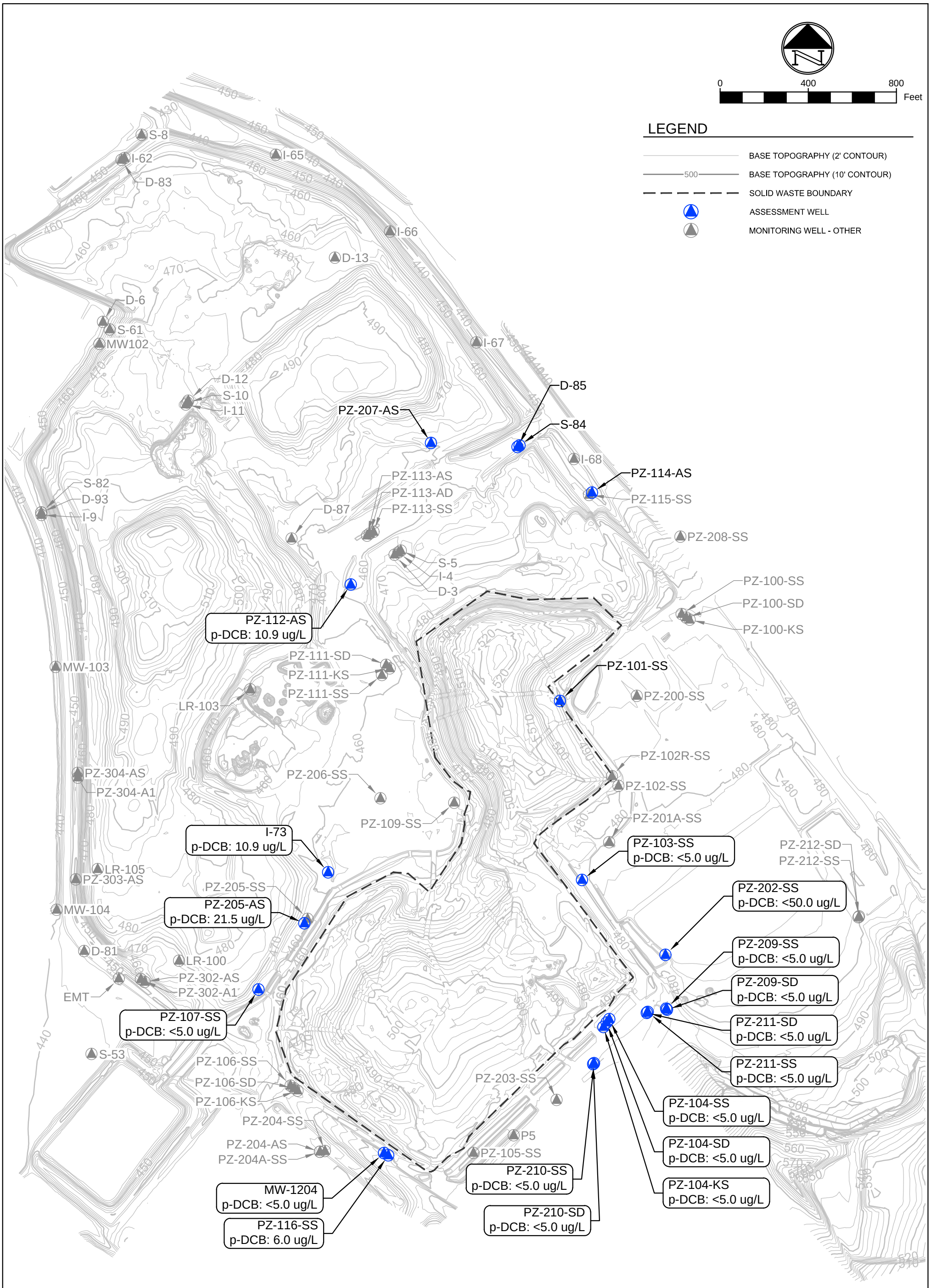

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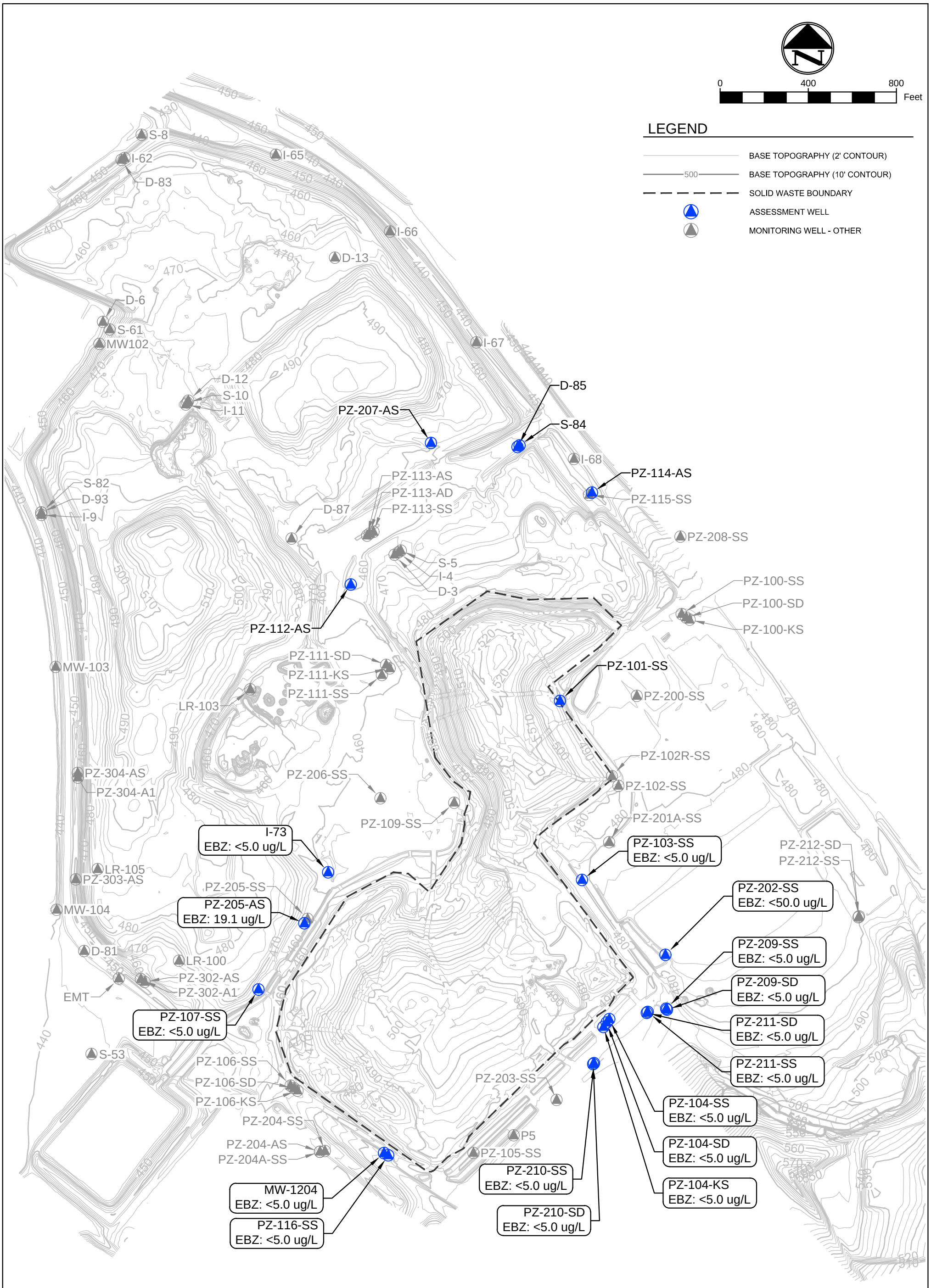

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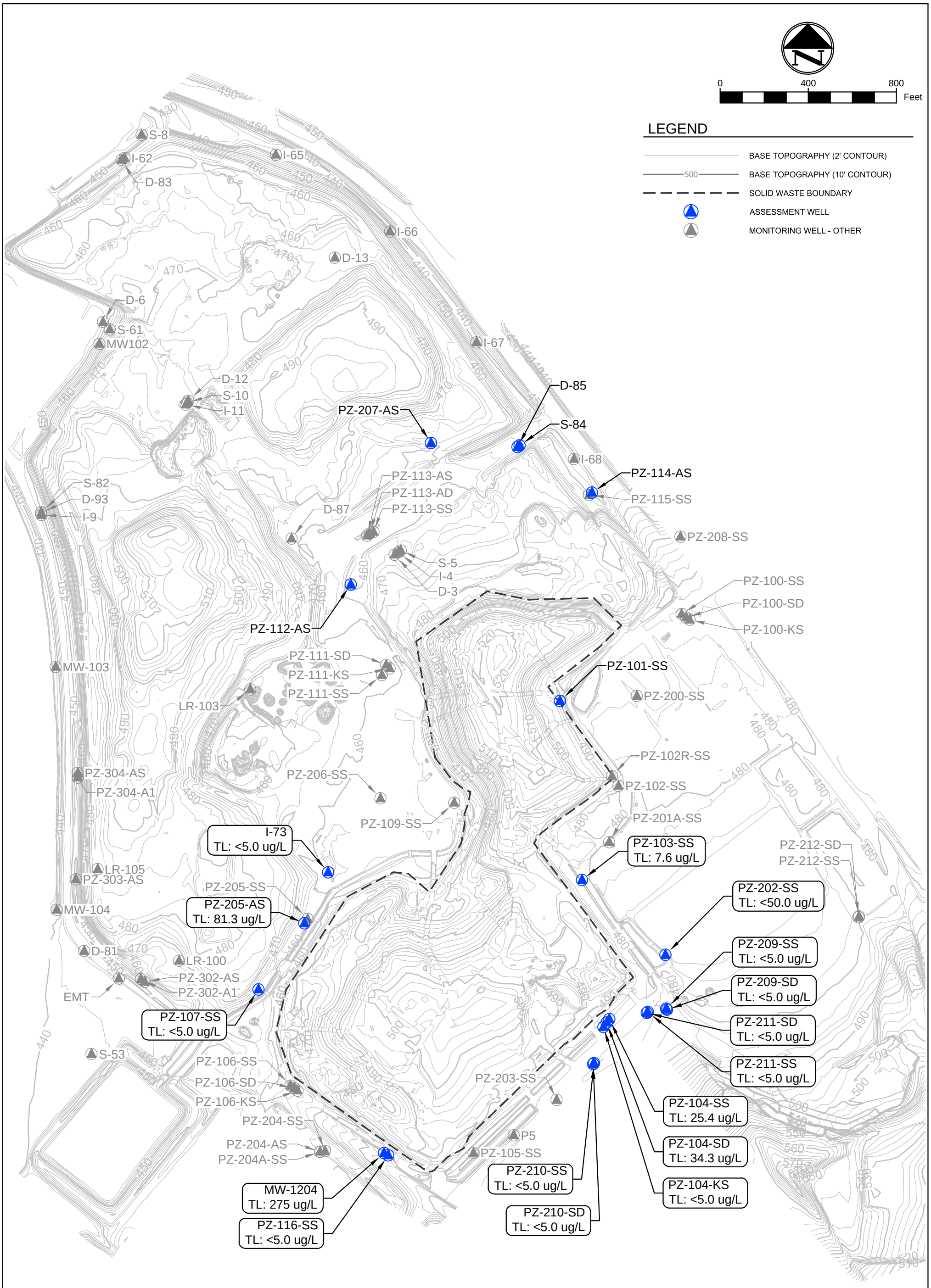

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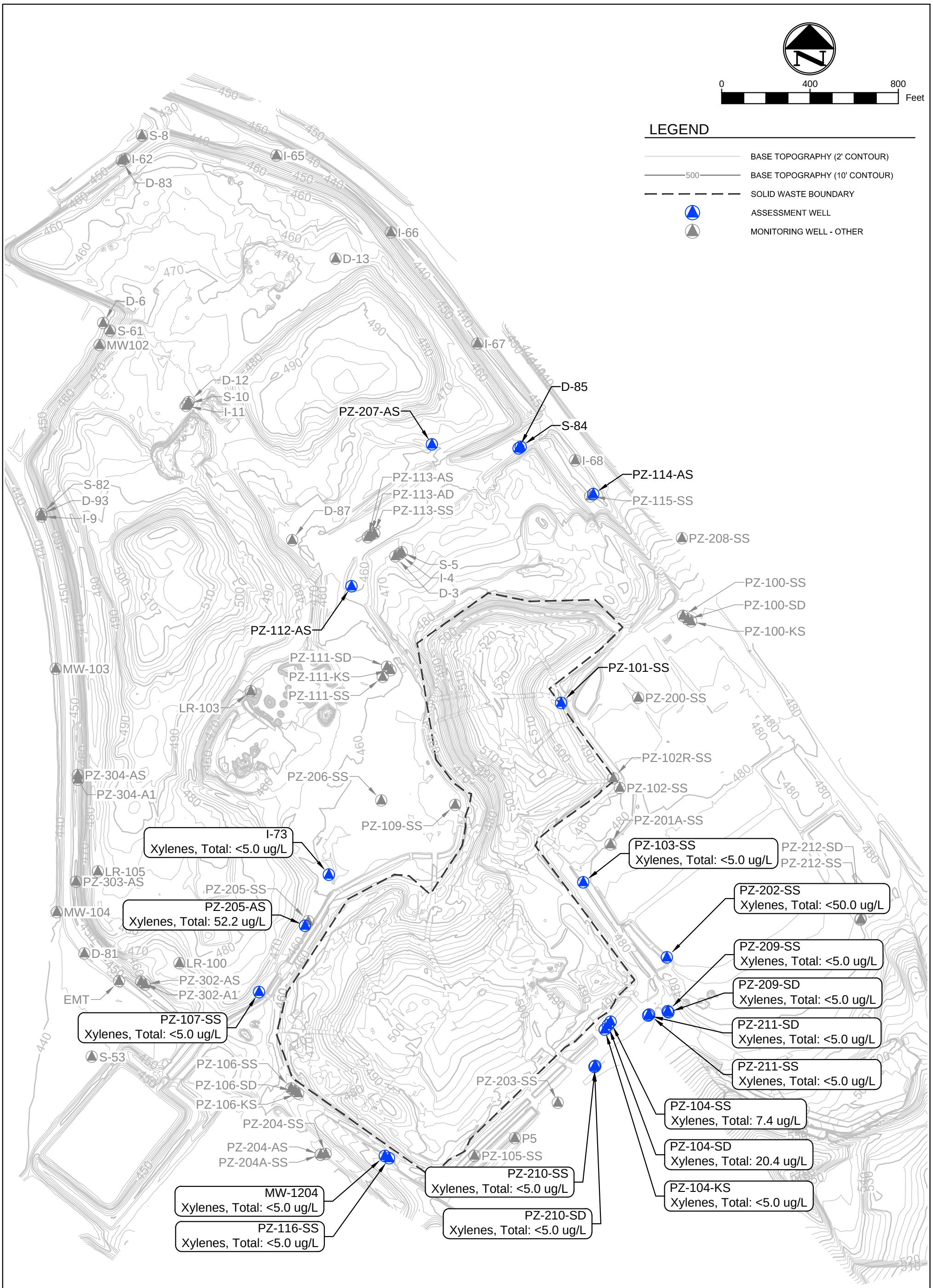

NOTES:

- *AERIAL TOPOGRAPHY PROVIDED BY COOPER AERIAL SURVEYS CO. AND IS DATED DECEMBER 1, 2017*

BRIDGETON LANDFILL, LLC 13570 ST. CHARLES ROCK ROAD BRIDGETON, MISSOURI 63044	BRIDGETON LANDFILL ASSESSMENT MONITORING PLAN	Engineering for a Better World FEEZOR ENGINEERING, INC.	JUNE 2018 DESIGNED BY: PML APPROVED BY: ---	DRAWING NO.:
TOTAL XYLENES CONCENTRATIONS IN ASSESSMENT WELLS			REVISION DATE	**D-12**
PROJECT NUMBER: BT-171	FILE PATH: C:\Users\plins\Dropbox (Feezor Engineering)\Bridgeton\BT-171 Assessment Monitoring Plan\drawings\BT-171_12 Maps.dwg			