



July 6, 2018

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**Subject: Phase II Targeted Brownfields Assessment  
Hiland Roberts St. Joseph Site  
St. Joseph, Buchanan County, Missouri  
EPA Region 7, START 4, Contract No. EP-S7-13-06, Task Order No. 0002.049  
Task Monitor: Todd Davis, Site Assessment Manager  
Randolph Brown, On-Scene Coordinator**

Dear Mr. Brown:

Tetra Tech, Inc. (Tetra Tech) is submitting the enclosed Phase II Targeted Brownfields Assessment (TBA) report regarding the Hiland Roberts St. Joseph site in St. Joseph, Missouri. If you have any questions or comments regarding this submittal, please call the Project Manager at (816) 412-1772.

Sincerely,

A handwritten signature in black ink that reads 'John R. Simpson'.

John R. Simpson, CHMM  
START Project Manager

A handwritten signature in blue ink that reads 'Ted Faile'.

Ted Faile, PG, CHMM  
START Program Manager

Enclosures

cc: Debra Dorsey, START Project Officer (cover letter only)  
Whitney Bynum, EPA Brownfields and Land Revitalization Branch

**PHASE II TARGETED BROWNFIELDS ASSESSMENT**

**HILAND ROBERTS ST. JOSEPH SITE  
ST. JOSEPH, MISSOURI**

**Superfund Technical Assessment and Response Team (START) 4**

**Contract No. EP-S7-13-06, Task Order No. 0002.049**

Prepared For:

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July 6, 2018

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## EXECUTIVE SUMMARY

The Tetra Tech, Inc. (Tetra Tech) Region 7 Superfund Technical Assessment and Response Team (START) was tasked by the U.S. Environmental Protection Agency (EPA) Region 7 Superfund Division to conduct a Phase II Targeted Brownfields Assessment (TBA) of the approximate 1.3-acre Hiland Roberts St. Joseph site (the site), in St. Joseph, Buchanan County, Missouri. The site is comprised of three parcels addressed 218, 221, and 302 S. 5<sup>th</sup> Street, south of downtown St. Joseph. The site has been historically used for industrial purposes, and currently hosts operations of a transit depot for Hiland Roberts Dairy Company.

START conducted this Phase II TBA in accordance with the *Standard Practice for Environmental Site Assessments: Phase II Environmental Site Assessment Process*, ASTM International (ASTM) designation E1903-97-11, and otherwise in compliance with EPA's "All Appropriate Inquiries" Rule (AAI Rule) (40 *Code of Federal Regulations* [CFR] Part 312) (ASTM 2011).

Seagull Environmental, Inc. (Seagull) conducted a Phase I Environmental Site Assessment (ESA) in October 2016, documenting 10 recognized environmental conditions (REC) related to historical uses of the site and adjacent properties (Seagull 2016). A Phase II ESA completed by Terracon Consultants, Inc. (Terracon) in October 2017 determined that concentrations of arsenic and lead in surface soil and dissolved lead in groundwater exceeded Missouri Department of Natural Resources (MDNR) Default Target Levels (DTL) (Terracon 2017a). Additionally, Terracon conducted an Asbestos and Lead Paint Survey that confirmed presence of asbestos-containing materials (ACM) and lead-based paint (LBP) at the subject property. This Phase II TBA was conducted to further delineate extents of contaminants identified during previous investigations.

In April 2018, START conducted a Phase II TBA at the subject property that included collection of soil and groundwater samples from direct-push technology (DPT) borings. This was subsequent to: (1) a Phase I ESA in October 2016 that had identified RECs involving former underground storage tanks (UST) and property usage for automotive repairs, and (2) a Phase II ESA in October 2017 that had identified concentrations of arsenic and lead in soil and groundwater.

START members Kirk Mammoliti, Tommy Rebecchi, and Quan Do conducted soil and groundwater sampling activities on April 18 and 19, 2018. Appendix A, Figure 3 depicts sampling locations at the site. Eight soil borings were advanced to depths ranging from 16 to 24 feet below ground surface (bgs). Soil borings were screened by use of a photoionization detector (PID), and samples were collected based on screening results and judgment of field personnel.

Laboratory analytical results from surface and subsurface soil samples indicated detections in one or more samples of volatile organic compounds (VOC), total petroleum hydrocarbons (TPH) – gasoline range organics (GRO), TPH – diesel range organics (DRO), TPH – oil range organics (ORO), polycyclic aromatic hydrocarbons (PAH), and metals.

In surface soil samples, several detections of arsenic, cadmium, and lead exceeded respective Missouri Risk-Based Corrective Action (MRBCA) DTLs; however, only one reported detection of lead in sample SB-5 (0-3) exceeded the MRBCA Tier 1 risk-based target level (RBTL) for non-residential surface soil. Additionally, one PAH detection in surface soil sample SB-3- (0-3) exceeded the MRBCA Tier 1 RBTL for non-residential surface soil.

No reported concentration of an analyte in a sample of subsurface soil exceeded a MRBCA Tier 1 RBTL for non-residential land use.

No reported concentration of a dissolved metal in the single groundwater sample collected exceeded an MRBCA DTL.

## **1.0 INTRODUCTION**

The Tetra Tech, Inc. (Tetra Tech) Region 7 Superfund Technical Assessment and Response Team (START) was tasked by the U.S. Environmental Protection Agency (EPA) Region 7 Superfund Division to conduct a Phase II Targeted Brownfields Assessment (TBA) of the approximate 1.3-acre Hiland Roberts St. Joseph site (the site or subject property), in St. Joseph, Buchanan County, Missouri (see Appendix A, Figures 1 and 2). The site is comprised of three parcels addressed 218, 221, and 302 S. 5<sup>th</sup> Street, south of downtown St. Joseph. The site has been historically used for industrial purposes, and currently hosts operations of a transit depot for Hiland Roberts Dairy Company.

Seagull Environmental, Inc. (Seagull) conducted a Phase I Environmental Site Assessment (ESA) in October 2016, documenting 10 recognized environmental conditions (REC) related to historical uses of the site and adjacent properties (Seagull 2016). A Phase II ESA completed by Terracon Consultants, Inc. in October 2017 determined that concentrations of arsenic and lead in surface soil and dissolved lead in groundwater exceeded Missouri Department of Natural Resources (MDNR) Default Target Levels (DTL) (Terracon 2017a). Additionally, Terracon conducted an Asbestos and Lead Paint Survey that confirmed presence of asbestos-containing materials (ACM) and lead-based paint (LBP) at the subject property. This Phase II TBA was conducted to further delineate extents of contaminants identified during previous investigations, in support of an Analysis of Brownfield Cleanup Alternatives (ABCA) that will be submitted under separate cover.

START conducted this Phase II TBA in accordance with the *Standard Practice for Environmental Site Assessments: Phase II Environmental Site Assessment Process*, ASTM International (ASTM) designation E1903-97-11, and otherwise in compliance with EPA's "All Appropriate Inquiries" Rule (AAI Rule) (40 *Code of Federal Regulations* [CFR] Part 312) (ASTM 2011).

### **1.1 PURPOSE**

This Phase II TBA was conducted to further delineate contaminants identified during previous site investigations, and to confirm or eliminate RECs identified during the Phase I ESA with intent to acquire information regarding the nature of contamination (if present) that would support informed business decisions about the property, and where applicable, satisfy the innocent purchaser defense under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (ASTM 2011). RECs specified in the Phase I ESA report pertain to current and historical site uses and adjacent property uses. Samples of surface and subsurface soil and groundwater were collected during the Phase II TBA to

confirm or eliminate RECs, and to identify the nature of contamination (if present) and risks posed by that contamination.

## **1.2 SPECIAL TERMS AND CONDITIONS**

No special terms or conditions were identified during the Phase II TBA.



## **2.0 BACKGROUND AND SITE HISTORY**

This section briefly describes the site and physical setting, recounts site history, and discusses land uses at the site and adjacent properties.

### **2.1 SITE DESCRIPTION AND FEATURES**

The site is south of downtown St. Joseph, Missouri in northwest Buchanan County, and is comprised of three parcels:

- The 218 South 5<sup>th</sup> Street parcel is a gravel and concrete parking lot at the northwest corner of the South 5<sup>th</sup> and Charles Street intersection. The 0.39-acre parcel hosts a permanent distribution trailer near the central portion of the parcel. Coordinates at the approximate center of the property are 39.765117 degrees north latitude and 94.853808 degrees west longitude. The parcel identification number (PIDN) for the parcel is 06-3.0-08-003-002-036.000 (Buchanan County Geographic Information System Website [BCGIS] 2018).
- The 221 South 5<sup>th</sup> Street parcel hosts a single store office building with an attached garage and asphalt-covered parking lot. The 0.25-acre parcel is at the northeast corner of the South 5<sup>th</sup> and Charles Street intersection. Coordinates at the approximate center of the parcel are 39.765136 north latitude and 94.853757 degrees west longitude. The PIDN for the parcel is 06-3.0-08-003-002-037.000 (BCGIS 2018).
- The 302 South 5<sup>th</sup> Street parcel hosts a raised concrete slab with a small cold storage building and a gravel parking lot. The 0.64-acre parcel is at the southwest corner of the South 5<sup>th</sup> and Charles Street intersection. Coordinates at the approximate center of the parcel are 39.764595 degrees north latitude and 94.8544554 degrees west longitude. The PIDN for the parcel is 06-3.0-08-003-002-056.000 (BCGIS 2018).

### **2.2 PHYSICAL SETTING**

The site is at 218, 221, and 302 S. 5<sup>th</sup> Street in St. Joseph, Missouri, in northwest Buchanan County (see Appendix B, Figures 1 and 2). The site is included on the Saint Joseph North and South, Missouri U.S. Geological Survey (USGS) 7.5 minute topographic series maps (USGS 1981a, b). Coordinates at the approximate center of the site are 39.764962 degrees north latitude and 94.854137 degrees west longitude. The site includes one structure at 221 S. 5<sup>th</sup> Street, and one structure at 302 S 5<sup>th</sup> Street, and is currently owned by Roberts Dairy Co. Historically, the site was used as an industrial dairy plant.

The site is within an industrial area south of downtown St. Joseph, with the three parcels intersected by Charles Street and S. 5<sup>th</sup> Street. The site parcels are surrounded mostly by commercial and industrial businesses.

### **2.2.1 Geologic Setting**

The site is within Buchanan County in northwest Missouri. The site is mostly urban land, soils (U.S. Department of Agriculture [USDA] 2018). Generally, urban land soils have been modified by disturbance of natural layers. The site is at the boundary of the Missouri River's 500-year floodplain, between the Missouri and Mississippi River Alluvium and Northwestern Missouri Groundwater Provinces. Geology in the region is generally characterized by unconsolidated alluvial deposits that overlie Pennsylvanian-aged bedrock of the Lansing Group, which consists primarily of limestone and shale (Environment International Government Ltd. [EIGov] 2010a).

### **2.2.2 Hydrogeology**

Groundwater in the site area likely flows west-southwest (following the topographic gradient) toward the Missouri River. Depth to groundwater in the site area ranges from 10 to 20 feet bgs. Potable water in the site area is supplied by Missouri American Water, and is obtained from groundwater sources along the Missouri River north of St. Joseph.

### **2.2.3 Hydrology**

Runoff from precipitation at the site likely flows over paved surfaces toward the south, where it is directed into stormwater inlets along S. 5<sup>th</sup> Street and along Sylvania Street. The Missouri River lies approximately 0.25 mile west of the site.

## **2.3 SITE HISTORY AND LAND USE**

Historically, the parcel addressed 218 S. 5<sup>th</sup> Street was used as a dairy, the parcel addressed 221 S. 5<sup>th</sup> Street was used as a dairy and an auto repair facility, and the parcel addressed 302 S. 5<sup>th</sup> Street was used as a dairy, coal yard, gasoline filling station, and automobile parking lot. Currently, the site is utilized by Hiland-Roberts Co. as office space (at 221 S. 5<sup>th</sup> Street) and as a transportation depot (at 218 and 302 S. 5<sup>th</sup> Street).

## **2.4 ADJACENT PROPERTY USE**

Areas surrounding the site are primarily occupied by commercial and industrial businesses. Historical records indicate that the adjoining/surrounding areas have been developed since the late 1800s, and have been commercial/industrial and residential properties (Seagull 2016).

## 2.5 SUMMARY OF PREVIOUS ASSESSMENTS

The following sections summarize previous assessments at the site:

### EIGov 2010 Phase I ESA

EIGov conducted a Phase I ESA of 302 S. 5<sup>th</sup> Street in April 2010. Significant findings are as follows (EIGov 2010a):

- Based on available Sanborn® maps, a coal yard and filling station were identified as previously present on the property. These former facilities and neighboring commercial and industrial facilities pose a REC to the subject property.
- An Environmental Data Resources, Inc. (EDR) environmental database search occurred pertaining to the 302 S. 5<sup>th</sup> Street property. EDR identified numerous listed facilities within ASTM International (ASTM)-recommended search distances from the subject property. These included two leaking underground storage tank (LUST) sites—Hiland Dairy Division (221 S. 5<sup>th</sup> Street) and Central Fire Station (401 S. 7<sup>th</sup> St)—both upgradient of 302 S. 5<sup>th</sup> Street. Although MDNR considers these sites closed, based on their proximity to and location upgradient of the 302 S. 5<sup>th</sup> Street property, they pose historical RECs to the subject property.

### EIGov 2010 Phase II ESA

EIGov conducted a Phase II ESA of 302 S. 5<sup>th</sup> Street in April 2010, following conclusion of the Phase I ESA. The Phase II ESA involved collection of six soil samples and one groundwater sample. Results from sampling indicated benzo(a)pyrene in surface soil (near the center of the property) at concentration exceeding the Lowest Default Target Level (LDTL) of 0.62 milligrams per kilogram (mg/kg) (EIGov 2010b). In addition, this sample was the only soil sample to contain polycyclic aromatic hydrocarbons (PAH), and contained highest concentrations of arsenic and lead. Total petroleum hydrocarbons (TPH) – diesel-range organics (DRO) and TPH – oil-range organics (ORO) were also detected in the deep sample collected from this same borehole, but not at levels exceeding risk-based criteria. EIGov indicated that these detections were likely the result of one or more localized historical fuel spills.

Acetone was detected in all six soil samples, and benzene was detected in all but one soil sample; however, concentrations were below risk-based criteria. Arsenic and lead were detected at concentrations above risk-based criteria in all soil samples. Other metals were also detected in soil, but not at levels exceeding LDTLs, including barium, cadmium, chromium, and mercury. EIGov concluded that because the 302 S. 5<sup>th</sup> Street property had been used as a parking and loading area since 1965, lead detected in

shallow soil was likely the result of localized fuel spills that have since degraded, thus leaving behind heavy metals.

Groundwater results indicated no contaminants at levels exceeding LDTLs. EIGov recommended further sampling to determine if more significant contamination exists, to assess possible migration pathways, and to eliminate additional source areas.

#### Seagull 2016 Phase I ESA

Seagull conducted a Phase I ESA of the Hiland Dairy Foods/Roberts Dairy site in October 2016. The Phase I ESA included 218, 221, and 302 S. 5<sup>th</sup> Street. Seagull found the following significant findings (Seagull 2016):

- The 221 S. 5<sup>th</sup> Street property is listed in the LUST, Underground Storage Tank (UST), and SPILLS databases. These databases note removals of USTs at the site in 1996 by Putnam Petroleum Services: two 4,000-gallon gasoline USTs, one 2,000-gallon gasoline UST, one 1,000-gallon waste oil UST, and one 500-gallon waste oil UST. A No Further Action (NFA) letter was issued for the site. However, because the NFA letter did not indicate whether soil or groundwater sampling had occurred, former presence of these USTs poses a REC to the subject properties.
- One nearby property is listed on the US Historical Cleaners database—Rusty's Downtown Laundry (301 S. 5<sup>th</sup> Street), adjacent to the subject properties. The site thus poses a REC to the subject properties.
- During initial vapor encroachment screening of the site, potential vapor encroachment conditions (pVEC) were identified due to historical uses of the subject and adjacent properties. Therefore, these pVECs pose RECs to the subject properties.
- The 302 S. 5th Street property was identified as a coal yard on the 1911 Sanborn® map. The coal yard poses a REC to the subject properties.
- The 302 S. 5th Street property was identified as a filling station with one tank on the 1949 Sanborn map. The filling station and tank pose a REC to the subject properties.
- The 221 S. 5th Street property was identified as an auto repair facility, and the 302 S. 5th Street property as an automobile parking lot on the 1955 Sanborn map. The auto repair facility poses a REC to the subject properties.
- The 302 S. 5th Street property was identified as an automobile parking lot and oil storage area on the 1965 Sanborn map. The oil storage area poses a REC to the subject properties.
- A chemical company, TKO Chemical Company, was identified at 303 S. 5th Street in the 1970, 1975, and 1980 city directories. Based on proximity and groundwater flow, the site poses a REC to the subject properties.

- A laundry, Rusty's Downtown Laundry, was identified at 301 S. 5th Street in the 1999 city directory. Based on proximity and groundwater flow, the site poses a REC to the subject properties.
- It was determined that ACM and LBP may be present at or within the office/garage at the 221 S. 5th Street property. In addition, electrical ballasts possibly containing polychlorinated biphenyls (PCB) were identified in the garage.

#### Terracon 2017 Asbestos and LBP Survey

Terracon conducted an Asbestos and LBP Survey at 218, 221, and 302 S 5<sup>th</sup> Street in October 2017 (Terracon 2017a). Terracon identified ACM in tar roofing (2,016 square feet) and transite cement asbestos flue pipe (9 linear feet) at the structure at 221 S. 5<sup>th</sup> Street. LBP was identified at 221 S. 5<sup>th</sup> Street on a garage restroom wood door, including jamb and casing; on a garage wood door opening jamb and casing; and on a garage overhead door wood frame and metal lintel. LBP was identified at 302 S. 5<sup>th</sup> Street at the base of a raised concrete slab and on a metal handrail.

#### Terracon 2017 Phase II ESA

Terracon conducted a Phase II ESA at the 218, 221, and 302 S. 5<sup>th</sup> Street properties in October 2017 (Terracon 2017b). Field activities included collection of seven surface soil and seven subsurface soil samples (three borings at 221 S. 5<sup>th</sup> Street and four borings at 302 S. 5<sup>th</sup> Street). Results indicated presence of volatile organic compounds (VOC) and TPH at concentrations below DTLs in both surface and subsurface soils. The following metals were also detected at concentrations below DTLs in surface and subsurface soils: barium, cadmium, chromium, mercury, selenium, and silver. Arsenic and lead were detected at concentrations in surface and subsurface soils at concentrations above DTLs and/or residential Missouri Risk-based Corrective Action (MRBCA) Tier 1 Risk Based Target Levels (RBTL), but below non-residential RBTLs.

Terracon also collected seven groundwater samples during the Phase II ESA. Concentrations of VOCs, TPH, arsenic, cadmium, mercury, selenium, and silver were below laboratory detection limits. Barium and chromium were detected, but at concentrations below MRBCA DTLs. Dissolved lead was detected in one groundwater sample at 0.0425 milligrams per liter (mg/L), above the DTL of 0.015 mg/L. Dissolved lead concentrations in the remaining groundwater samples were below laboratory detection limits.

### MDNR 2017 Findings

On October 10, 2017, MDNR issued a letter regarding findings of the Phase II ESA by Terracon. The letter indicated that Brownfield/Voluntary Cleanup Section (BVCP) had reviewed the Phase II ESA report and agreed with Terracon's conclusions. BVCP recommended the following (MDNR 2017):

- Further characterization of the site to determine if hazardous substances had been released to soil and groundwater.
- If Mo-Kan Regional Council wants to proceed with a Phase II ESA, that U.S. Environmental Protection Agency (EPA) should conduct this.

### **3.0 PHASE II TARGETED BROWNFIELDS ASSESSMENT ACTIVITIES**

The following subsections describe the scope, field exploration, and methods implemented during the Phase II TBA. START members Kirk Mammoliti, Tommy Rebecchi, and Quan Do conducted soil and groundwater sampling on April 18 and 19, 2018. Photographs taken to document Phase II TBA field activities are in Appendix B. Phase II TBA activities were recorded in a site logbook, a copy of which is in Appendix C.

#### **3.1 SCOPE OF THE ASSESSMENT**

START conducted environmental sampling to determine if surface and subsurface soils and groundwater had been contaminated by current and/or historical activities at the subject property. Sampling accorded with the Quality Assurance Project Plan (QAPP) approved by EPA on April 13, 2018 (Tetra Tech 2017).

##### **3.1.1 Sampling Plan**

The proposed sampling scheme for this project incorporated a combination of biased and judgmental sampling and definitive laboratory analysis, in accordance with procedures included in the *Guidance for Performing Site Inspections under CERCLA*, Office of Solid Waste and Emergency Response (OSWER) Directive #9345.1-05, September 1992. All samples were submitted for analysis to an off-site laboratory subcontracted by START. Objectives of soil and groundwater sampling were to characterize possible releases to the environment. Appendix A, Figure 3 depicts sampling locations at the site. Sampling at the site was as follows:

- Eight surface soil and eight subsurface soil samples were collected at eight Geoprobe direct-push technology (DPT) locations on the subject property. From each boring, one soil sample was collected within the 0- to 3-foot bgs interval, and a subsurface soil sample was collected within a selected 2-foot interval at depth exceeding 3 feet bgs.
- One groundwater sample was collected at a co-located DPT boring location.

##### **3.1.2 Chemical Testing Plan**

Laboratory analyses for chemical parameters were selected based on possibly present contaminants associated with current and historical uses of the subject property. Assuming association of site-related contamination with the site's historical use as a gasoline filling station and automotive garage (including storage of waste oil), analyses of soil and groundwater samples were to proceed as recommended in Table 5-1 from the MDNR MRBCA Process for Petroleum Storage Tanks Guidance Document (updated October 2013). However, groundwater samples collected were analyzed only for dissolved metals listed

in the MDNR MRBCA Process for Petroleum Storage Tanks Guidance Document, because previous investigations had not yielded significant concentrations of any other contaminants of concern covered by this guidance. Table 1 below summarizes analyses recommended by this guidance. All samples were submitted to Pace Analytical Services, LLC (Pace) of Lenexa, Kansas for analyses.

**TABLE 1**  
**ANALYSES OF SAMPLES**

Analyte	Analytical Method	
	Soil	Groundwater
<b>Volatiles</b>		
Benzene	8260B	NC
Toluene	8260B	NC
Ethylbenzene	8260B	NC
Xylenes (total)	8260B	NC
1,2-Dibromoethane/Ethylene dibromide (EDB)	8260B	NC
1,2-Dichloroethane/Ethylene dichloride (EDC)	8260B	NC
<b>Oxygenates</b>		
Methyl tertiary butyl ether (MTBE)	8260B	NC
Tertiary amyl methyl ether (TAME)	8260B	NC
Tertiary butyl alcohol (TBA)	8260B	NC
Ethyl tertiary butyl ether (ETBE)	8260B	NC
Diisopropyl ether (DIPE)	8260B	NC
<b>Total Petroleum Hydrocarbons (TPH)</b>		
TPH-Gasoline-range organics (GRO)	8260B	NC
TPH-Diesel-range organics (DRO)	8270C	NC
TPH-Oil-range organics (ORO)	8270C	NC
<b>PAHs</b>		
Acenaphthene	8270C	NC
Anthracene	8270C	NC
Benzo(a)anthracene	8270C	NC
Benzo(a)pyrene	8270C	NC
Benzo(b)fluoranthene	8270C	NC
Benzo(k)fluoranthene	8270C	NC
Chrysene	8270C	NC
Dibenzo(a,h)anthracene	8270C	NC
Fluoranthene	8270C	NC
Fluorene	8270C	NC
Naphthalene	8260B, 8270C	NC
Pyrene	8270C	NC



**TABLE 1 (Continued)**  
**ANALYSES OF SAMPLES**

Analyte	Analytical Method	
	Soil	Groundwater
<b>Metals</b>		
Arsenic	6010B	6020
Barium	6010B	6020
Cadmium	6010B	6020
Chromium	6010B	6020
Lead	6010B	6020
Selenium	6010B	6020

Notes:

Analytes and analytical methods follow Table 5-1 of MRBCA Guidance Document (October 2013).

DRO	Diesel-range organics	ORO	Oil-range organics
GRO	Gasoline-range organics	PAH	Polycyclic aromatic hydrocarbon
NC	Analyte not to be collected	TPH	Total petroleum hydrocarbons

### 3.1.3 Deviations from the QAPP

The following deviations from the QAPP occurred during Phase II TBA activities:

A groundwater sample was collected at only one of the five proposed temporary well locations (SB-2). Groundwater was not encountered at three of the proposed temporary well locations (SB-5, SB-7, and SB-8). One other temporary well (at SB-4) was found to produce groundwater, but a sample was not collected because the well had been damaged by a semi-truck before sampling could occur.

## 3.2 FIELD EXPLORATION AND METHODS

Field activities at the site occurred on April 18 and 19, 2018. Samples were delivered to Pace on April 20, 2018. The following sections summarize soil and groundwater sample collections. Sampling locations are depicted on Figure 3 in Appendix A.

### 3.2.1 Soil Sampling

Sixteen soil samples were collected during Phase II activities at select locations to investigate possibly present contamination from historical and current activities at the site (see Appendix A, Figure 3). Sampling proceeded by use of a Geoprobe® DPT rig. Soil cores were collected by use of Geoprobe 4-foot-long, Macro-Core samplers with disposable polyvinyl chloride (PVC) liners. At all eight DPT locations, soil borings were advanced to 4 feet bgs for collection of surface soil samples, and were advanced beyond 4 feet bgs for collection of subsurface soil samples. No geologic refusal was encountered at depths above 25 feet bgs at those locations. Surface soil samples were collected from the

top 3 feet of soil encountered. Subsurface soil samples were collected within the 2-foot depth interval where the greatest photoionization detector (PID) reading was induced or where soil staining appeared or where odor was detected. If no staining, odor, or elevated PID readings were detected, a sample was collected from the bottom 2 feet of the boring. In borings at SB-1 and SB-7, elevated PID readings and obvious petroleum-related staining were observed in subsurface soils. PID results and soil boring logs are in Appendix D.

Within each sample interval, a grab sample for analyses for VOCs, TPH-GRO, and oxygenates was collected in accordance with EPA SW-846 Method 5035—consisting of two 40-milliliter (mL) vials, each preserved with sodium bisulfate and containing approximately 5 grams of soil, one also including methanol. In addition, one unpreserved 40 mL vial was packed with soil for percent solids determination. Remaining soil from each sample interval was placed in a disposable aluminum pie pan by use of a disposable stainless-steel spoon, homogenized, and placed into sample containers for analyses for TPH-DRO, TPH-ORO, PAHs, and metals.

Following collection of each sample, its location (i.e., depth and global positioning system [GPS] coordinates) was recorded in the site logbook. Each sample was labeled and packaged accordingly, and placed in a cooler maintained at or below a temperature of 4 degrees Celsius (°C) from time of collection until submittal to Pace for analysis. After completion of sampling, all DPT boreholes were plugged with bentonite from bottom of hole to ground surface. Table 2 below summarizes soil samples collected during this Phase II TBA.

**TABLE 2**  
**SOIL BORING AND SAMPLE SUMMARY**  
**HILAND-ROBERTS DAIRY, ST. JOSEPH, MISSOURI**

Boring ID	Sample ID(s)	Depth Interval (ft bgs)	Latitude (°N)	Longitude (°W)	Analyses Performed
SB-1	SB-1 (0-3)	0-3	39.765175	94.853680	VOCs, oxygenates, TPH-GRO, TPH-DRO, TPH-ORO, PAHs, arsenic, barium, cadmium, chromium, lead, and selenium
	SB-1 (18-20)	18-20			
SB2-	SB-2 (0-3)	0-3	39.765083	94.853890	
	SB-2 (18-20)	18-20			
SB-3	SB-3 (0-3)	0-3	39.765212	94.854345	
	SB-3 (22-24)	22-24			
SB-4	SB-4 (0-3)	0-3	39.765361	94.854485	
	SB-4 (22-24)	22-24			
SB-5	SB-5 (0-3)	0-3	39.765112	94.854639	
	SB-5 (22-24)	22-24			
SB-6	SB-6 (0-3)	0-3	39.764815	94.854295	
	SB-6 (22-24)	22-24			
SB-7	SB-7 (0-3)	0-3	39.764852	94.854423	
	SB-7 (14-16)	14-16			
SB-8	SB-8 (0-3)	0-3	39.764505	94.854722	
	SB-8 (22-24)	22-24			

Notes:

Latitude and longitude obtained from WGS 1984 data.

°	Decimal degrees	PAH	Polycyclic aromatic hydrocarbon
DRO	Diesel-range organics	SB	Soil boring
ft bgs	Feet below ground surface	SVOC	Semivolatile organic hydrocarbon
GRO	Gasoline-range organics	TPH	Total petroleum hydrocarbons
ID	Identification	VOC	Volatile organic compound
N	North	W	West
ORO	Oil-range organics	WGS	World Geodetic System

### 3.2.2 Groundwater Sampling

One groundwater sample was collected at soil boring location SB-2 (see Appendix A, Figure 3). START attempted to collect groundwater samples at five boring locations; however, groundwater was encountered only at two borings (SB-2 and SB-4). At both locations, temporary PVC wells were installed and allowed to sit overnight. No sample was collected from boring SB-4 because the temporary well had been damaged by a truck prior to sampling.

One groundwater sample for analysis for dissolved metals (via SW-846 Method 6020) was filtered in the field through a 0.45-micrometer filter and collected in one 500-mL plastic container preserved with nitric acid (HNO<sub>3</sub>) to a pH less than (<) 2.

Following collection of the sample, its location (i.e., depth and GPS coordinates) was recorded in the site logbook. The sample was labeled and packaged accordingly, and placed in a cooler maintained at or below a temperature of 4° C from time of collection until submittal to Pace for analysis. After completion of sampling, all DPT wells were plugged with bentonite from bottom of hole to ground surface. Table 3 below summarizes groundwater samples collected during this Phase II TBA.

**TABLE 3**  
**GROUNDWATER SAMPLE SUMMARY**  
**HILAND-ROBERTS DAIRY, ST. JOSEPH, MISSOURI**

Boring ID	Sample ID(s)	Static Water Level (ft bgs)	Screened Interval (ft bgs)	Latitude(°N), Longitude(°W)	Analyses Performed
SB-2	SB-2-GW	13.5	20-25	39.765083 94.853890	Dissolved arsenic, barium, cadmium, chromium, lead, and selenium

Notes:

Latitude and longitude obtained from WGS 1984 data.

°        Decimal degrees  
ft bgs   Feet below ground surface  
ID       Identification  
N        North  
SB       Soil boring  
W        West  
WGS    World Geodetic System

### 3.2.3 Quality Control Sampling

Field quality control (QC) sampling for this investigation included one equipment rinsate blank. The equipment rinsate blank was analyzed for dissolved metals. Analytical data from the equipment rinsate blank were used to verify that equipment had been properly decontaminated after sampling, and that cross-contamination had not occurred.

## **4.0 EVALUATION AND PRESENTATION OF RESULTS**

The following sections present analytical data from soil and groundwater samples collected during the Phase II TBA. Soil sample results from this TBA were compared to MRBCA DTLs, and MRBCA Tier 1 RBTLs for Type 1 (sandy) in residential and non-residential soils (MDNR 2013). Analytical results from the groundwater sample were compared to EPA Maximum Contaminant Levels (MCL), MRBCA DTLs, and MRBCA Tier 1 non-residential RBTLs for groundwater via dermal contact in Type 1 (sandy) soils.

Comparisons of analytical data to applicable screening values appear in Appendix E, Tables E-1 through E-3. Copies of analytical data packages and a data validation report are in Appendix F.

### **4.1 SURFACE SOIL SAMPLES**

Eight surface soil samples were collected at eight locations to assess impacts on soil from historical and current site activities. Soil samples were submitted to Pace for analyses for VOCs, oxygenates, TPH-GRO, TPH-DRO, TPH-ORO, PAHs, arsenic, barium, cadmium, chromium, lead, and selenium. Table E-1 in Appendix E summarizes analytical data from all surface soil samples collected during this Phase II TBA.

Several detections of TPH-DRO, TPH-ORO, PAHs, and several metals were reported in all eight of the surface soil samples. None of the TPH-DRO or TPH-ORO detections exceeded MRBCA DTLs. Of the detection of PAHs, only one exceeded the applicable MRBCA DTL: benzo(a)pyrene was detected in sample SB-3 (0-3) at a concentration of 2,470 micrograms per kilogram ( $\mu\text{g/kg}$ ), exceeding the MRBCA DTL of 620  $\mu\text{g/kg}$  and the MRBCA Tier 1 RBTL for non-residential surface soil of 2,110  $\mu\text{g/kg}$ .

Regarding metals analyses, several detections of arsenic and lead, and one detection of cadmium exceeded the respective MRBCA DTLs. Arsenic concentrations in seven of the eight samples—highest of which was 11 mg/kg—also exceeded the MRBCA DTL/Tier 1 RBTL for residential surface soil of 3.89 mg/kg, but not the MRBCA Tier 1 RBTL for non-residential surface soil of 15.9 mg/kg. One reported detection of lead in sample SB-5 (0-3) of 1,080 mg/kg exceeded the MRBCA Tier 1 RBTL for non-residential surface soil of 660 mg/kg.

No detections of VOCs or oxygenates were reported above laboratory analytical reporting limits in any surface soil sample analyzed.

## **4.2 SUBSURFACE SOIL SAMPLES**

Eight subsurface soil samples were collected at eight locations to assess impacts on soil from historical and current site activities. Soil samples were submitted to Pace for analyses for VOCs, oxygenates, TPH-GRO, TPH-DRO, TPH-ORO, PAHs, arsenic, barium, cadmium, chromium, lead, and selenium. Table E-2 in Appendix E summarizes analytical data from all subsurface soil samples collected during this Phase II TBA.

Two VOCs were detected in surface soil sample SB-1 (20-22); however, neither reported concentration exceeded a MRBCA DTL.

TPH-GRO, -DRO, and -ORO were detected in several subsurface soil samples; none of the reported concentrations exceeded a MRBCA DTL.

Detections of arsenic and lead exceeded the MRBCA DTLs in all eight subsurface soil samples analyzed, but none of the concentrations exceeded an established MRBCA Tier 1 RBTL for residential or non-residential subsurface soil.

Oxygenates were not detected at levels above laboratory reporting limits in any subsurface soil sample analyzed.

## **4.3 GROUNDWATER SAMPLES**

One groundwater sample, collected at soil boring location SB-2, was submitted to Pace for analyses for dissolved arsenic, barium, cadmium, chromium, lead, and selenium. Table E-3 in Appendix E summarizes analytical data from that groundwater sample.

No reported dissolved metals concentration exceeded a MRBCA DTL.

## **4.4 QUALITY CONTROL SAMPLES**

Barium, cadmium, chromium, and lead were reported in the equipment rinsate sample at estimated concentrations above MDLs and below reporting limits. All reported concentrations were below MRBCA DTLs, and at least one order of magnitude below concentrations reported in the groundwater sample.

## **5.0 DISCUSSION OF FINDINGS AND CONCLUSIONS**

On April 18 and 19, 2018, START conducted a Phase II TBA at the subject property that included collection of soil and groundwater samples from DPT borings. Appendix A, Figure 3 depicts sampling locations at the site. Eight soil borings were advanced to depths ranging from 16 to 24 feet bgs. Soil borings were screened by use of a PID, and samples were collected based on screening results and judgement of field personnel.

Laboratory analytical results from surface and subsurface soil samples indicated detections of VOCs; TPH-GRO, -DRO, and -ORO; PAHs; and metals in one or more samples analyzed.

In surface soil samples, several detections of arsenic, cadmium, and lead exceeded the respective MRBCA DTLs; however, only one reported detection of lead in sample SB-5 (0-3) exceeded the MRBCA Tier 1 RBTL for non-residential surface soil. Additionally, one PAH detection in surface soil sample SB-3- (0-3) exceeded the MRBCA Tier 1 RBTL for non-residential surface soil.

No reported concentration of an analyte in samples of subsurface soil exceeded a MRBCA Tier 1 RBTL for non-residential land use.

No reported concentration of a dissolved metal in the groundwater sample exceeded a MRBCA DTLs.

## 6.0 REFERENCES

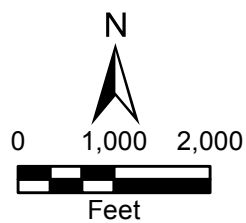
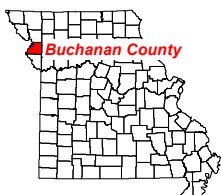
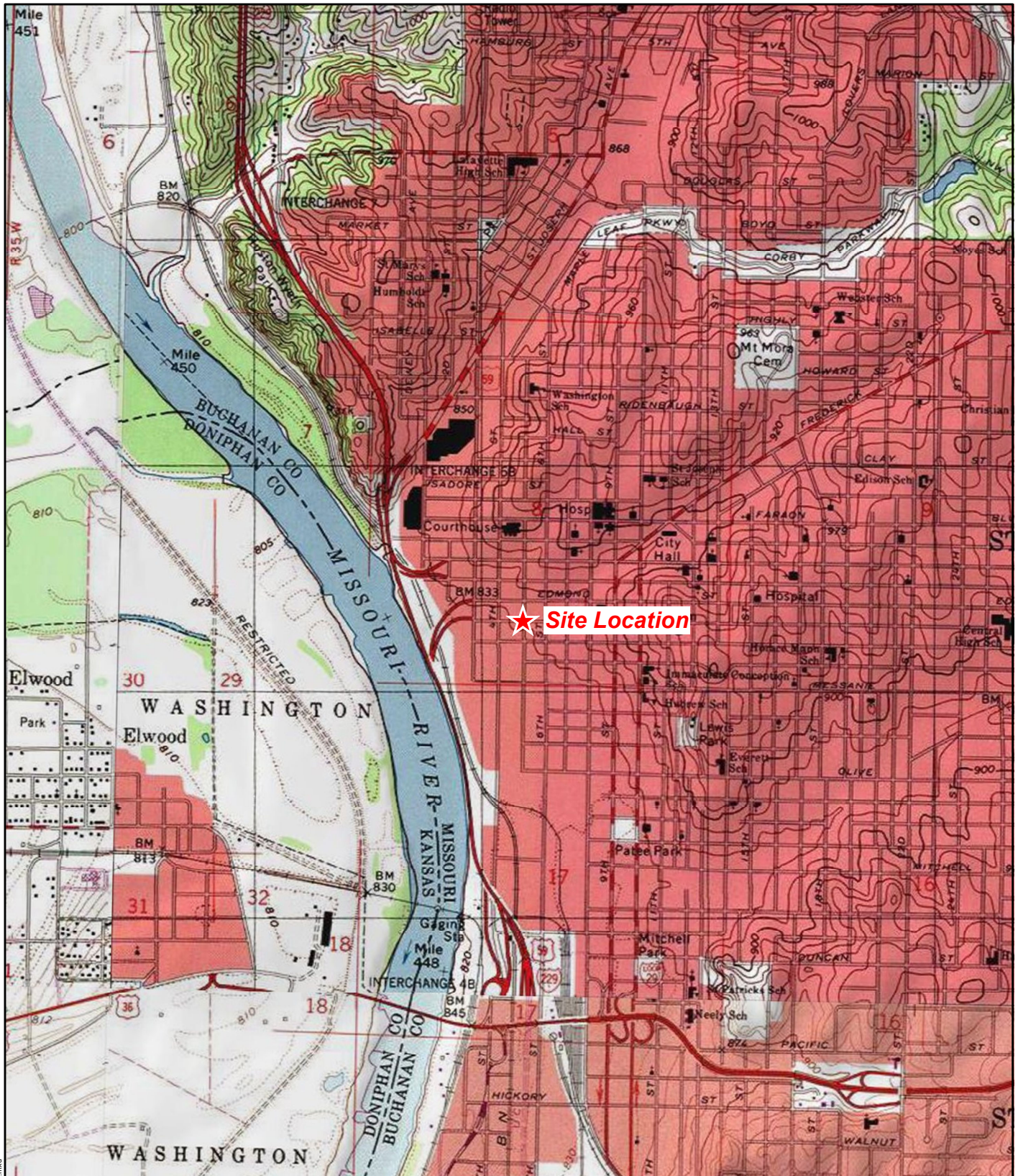
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- USGS. 1981b. Saint Joseph South, MO 7.5 Minute Topo Quad.



## **APPENDIX A**

### **FIGURES**





Hiland Roberts Dairy St. Joseph  
St. Joseph, Buchanan County, Missouri

**Figure 1**  
Site Location Map



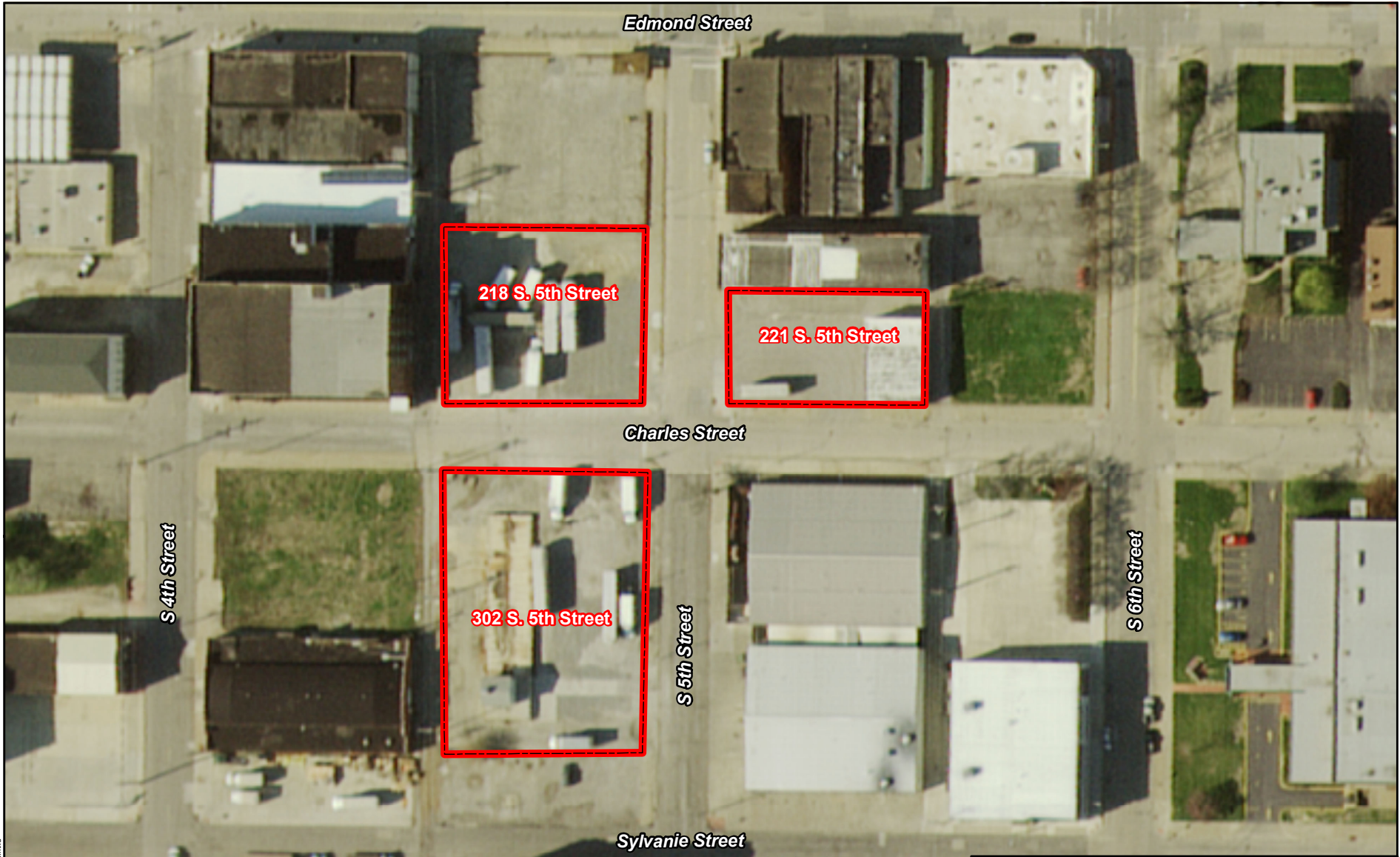
Source: USGS Halls, MO 7.5 Minute Topo Quad, 1981;  
USGS Saint Joseph North, MO 7.5 Minute Topo Quad, 1981;  
USGS Saint Joseph South, MO 7.5 Minute Topo Quad, 1981;  
USGS Wathena, MO 7.5 Minute Topo Quad, 1981.

Date: 2/5/2018


Drawn By: Nick Wiederholt

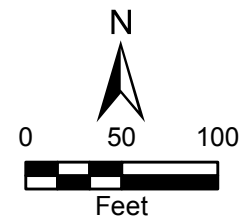
Project No: X9025.14.0002.049





Legend

 Approximate property boundary



Hiland Roberts Dairy St. Joseph  
St. Joseph, Buchanan County, Missouri

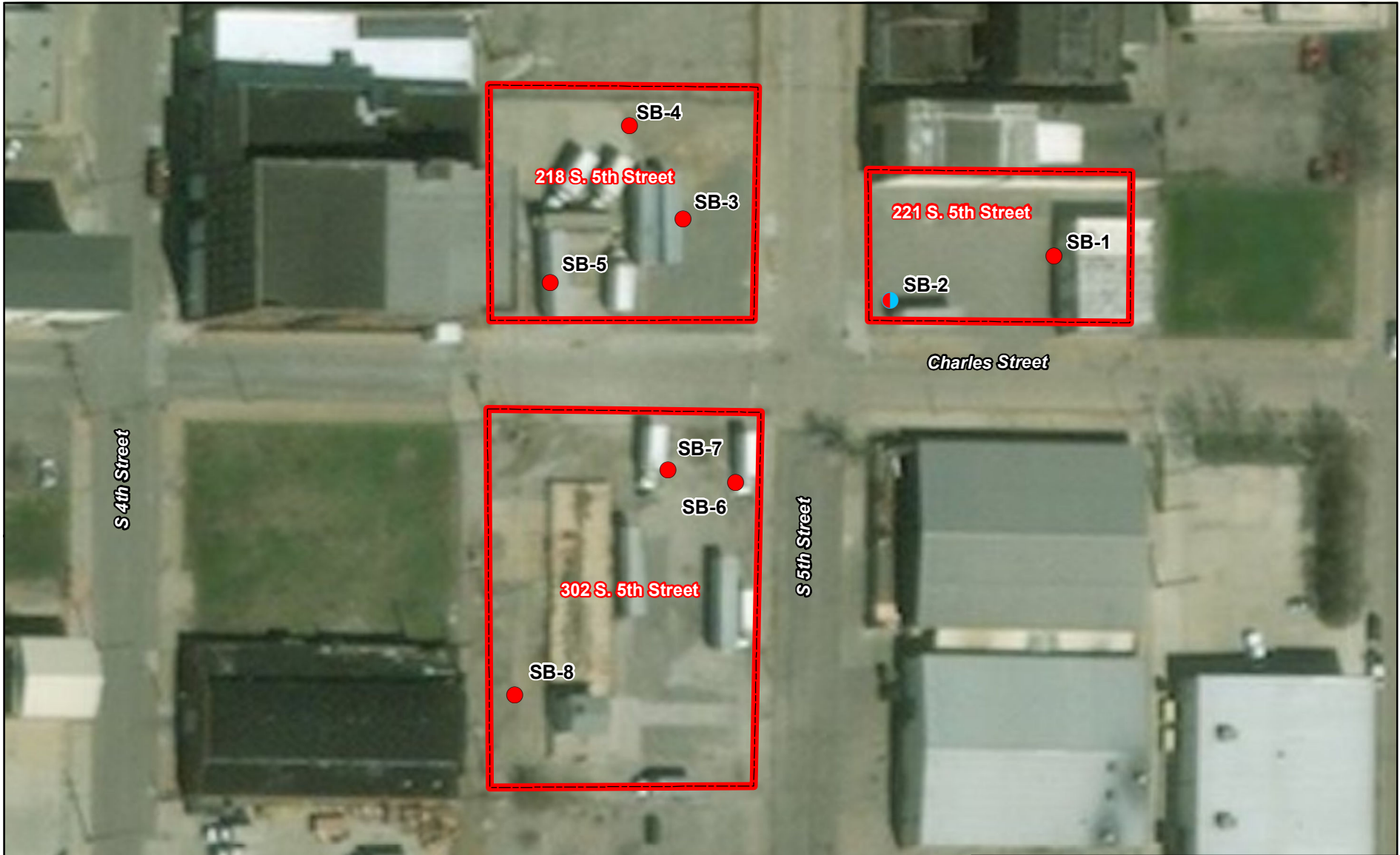
**Figure 2**  
Site Layout Map



Date: 2/5/2018

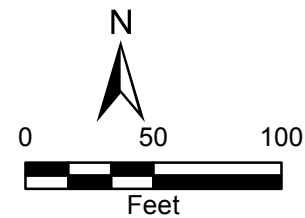
Drawn By: Nick Wiederholt

Project No: X9025.14.0002.049



**Legend**

- Soil sample location
- Soil/groundwater sample location
- Approximate property boundary



Hiland Roberts Dairy St. Joseph  
St. Joseph, Buchanan County, Missouri

**Figure 3**  
Sample Location Map



**APPENDIX B**  
**PHOTOGRAPHIC DOCUMENTATION**



## Hiland-Roberts Dairy St. Joseph Phase II Assessment St. Joseph, Missouri



<b>TETRA TECH PROJECT NO.</b> 103X9025140002.049  <b>Direction:</b> East	<b>DESCRIPTION</b>	This photograph shows the general layout of the 221 South (S.) 5 <sup>th</sup> Street parcel.	1
	<b>CLIENT</b>	U.S. Environmental Protection Agency Region 7	<b>Date</b> 4/18/2018
	<b>PHOTOGRAPHER</b>	K. Mammoliti	



<b>TETRA TECH PROJECT NO.</b> 103X9025140002.049  <b>Direction:</b> Northwest	<b>DESCRIPTION</b>	This photograph shows the general layout of the 218 S. 5 <sup>th</sup> Street parcel.	2
	<b>CLIENT</b>	U.S. Environmental Protection Agency Region 7	<b>Date</b> 4/18/2018
	<b>PHOTOGRAPHER</b>	K. Mammoliti	

## Hiland-Roberts Dairy St. Joseph Phase II Assessment St. Joseph, Missouri



<p>TETRA TECH PROJECT NO. 103X9025140002.049</p> <p>Direction: South</p>	DESCRIPTION	This photograph shows the general appearance of the 302 S. 5 <sup>th</sup> Street parcel. The arrow identifies the former filling station foundation slab.	3
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
	PHOTOGRAPHER	K. Mammoliti	4/18/2018



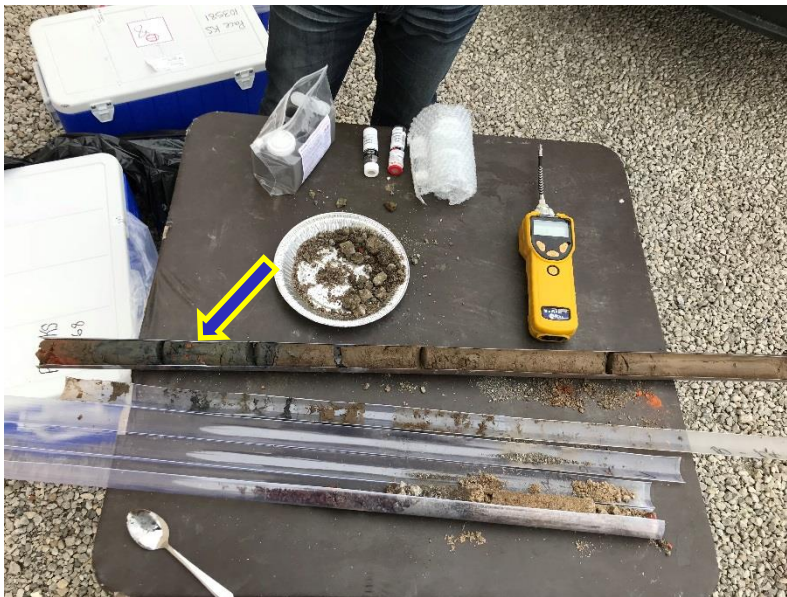
<p>TETRA TECH PROJECT NO. 103X9025140002.049</p> <p>Direction: Southwest</p>	DESCRIPTION	This photograph shows Seagull Environmental, Inc. personnel drilling at location SB-2.	4
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
	PHOTOGRAPHER	K. Mammoliti	4/18/2018



## Hiland-Roberts Dairy St. Joseph Phase II Assessment St. Joseph, Missouri



<b>TETRA TECH PROJECT NO.</b> 103X9025140002.049  Direction: North	<b>DESCRIPTION</b>	This photograph shows U.S. Environmental Protection Agency personnel near drilling at SB-1.	5
	<b>CLIENT</b>	U.S. Environmental Protection Agency Region 7	Date
	<b>PHOTOGRAPHER</b>	K. Mammoliti	4/18/2018



<b>TETRA TECH PROJECT NO.</b> 103X9025140002.049  Direction: North	<b>DESCRIPTION</b>	This photograph shows the boring core interval from 20 to 24 feet below ground surface with petroleum staining (identified by arrow).	6
	<b>CLIENT</b>	U.S. Environmental Protection Agency Region 7	Date
	<b>PHOTOGRAPHER</b>	K. Mammoliti	4/18/2018



## Hiland-Roberts Dairy St. Joseph Phase II Assessment St. Joseph, Missouri



<b>TETRA TECH PROJECT NO.</b> 103X9025140002.049  Direction: Southwest	<b>DESCRIPTION</b>	This photograph shows direct-push boring location SB-7.	7
	<b>CLIENT</b>	U.S. Environmental Protection Agency Region 7	Date
	<b>PHOTOGRAPHER</b>	K. Mammoliti	4/18/2018



<b>TETRA TECH PROJECT NO.</b> 103X9025140002.049  Direction: North	<b>DESCRIPTION</b>	This photograph shows direct-push boring location SB-6.	8
	<b>CLIENT</b>	U.S. Environmental Protection Agency Region 7	Date
	<b>PHOTOGRAPHER</b>	K. Mammoliti	4/18/2018

## Hiland-Roberts Dairy St. Joseph Phase II Assessment St. Joseph, Missouri



<b>TETRA TECH PROJECT NO.</b> 103X9025140002.049  Direction: South	<b>DESCRIPTION</b>	This photograph shows direct-push soil boring location SB-8.	9
	<b>CLIENT</b>	U.S. Environmental Protection Agency Region 7	Date
	<b>PHOTOGRAPHER</b>	K. Mammoliti	4/18/2018



<b>TETRA TECH PROJECT NO.</b> 103X9025140002.049  Direction: Southwest	<b>DESCRIPTION</b>	This photograph shows direct-push soil boring location SB-3.	10
	<b>CLIENT</b>	U.S. Environmental Protection Agency Region 7	Date
	<b>PHOTOGRAPHER</b>	K. Mammoliti	4/19/2018



## Hiland-Roberts Dairy St. Joseph Phase II Assessment St. Joseph, Missouri



TETRA TECH PROJECT NO. 103X9025140002.049  Direction: East	DESCRIPTION	This photograph shows direct-push soil boring location SB-4.	11
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
	PHOTOGRAPHER	K. Mammoliti	4/19/2018



TETRA TECH PROJECT NO. 103X9025140002.049  Direction: Northeast	DESCRIPTION	This photograph shows direct-push soil boring location SB-5.	12
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
	PHOTOGRAPHER	K. Mammoliti	4/19/2018

**APPENDIX C**  
**SITE LOGBOOK**

KS1690



*Rite in the Rain*

ALL-WEATHER

**LEVEL**

Nº 311FX

*Hiland - Roberts  
Dairy Phase II*

*St. Joseph, MO*

The logo is enclosed in a black, hand-drawn style rectangular border with rounded corners. At the top, the words "MADE IN TACOMA" are written in a small, black, sans-serif font. Below this, the phrase "— SINCE 1916 —" is written in a similar font. The central part of the logo features the brand name "Rite in the Rain" in a large, elegant, black cursive script. At the bottom, the phrase "— DEFYING MOTHER NATURE —" is written in a black, sans-serif font, matching the top text.

Name Tetra Tech, Inc.

Address 415 Oak Street

Address Kansas City, MO 64106

Phone 816-412-1741

Project Hiland-Roberts St. Joseph

St. Joseph, MO

103X9025140002.049



**RiteintheRain.com**



4-18-18

0700. Arrived at office &amp; prepped

0815. Departed for site

0915. Arrived @ site + marked locations

0925. Began boring @ SB-2 on SW corner of 221 S. 5th St parcel.

SB-2: 39.765083  
-94.853890

0930. Collected SB-2(0-3)

1010. Hit water @ ~24' bgs

Collected SB-2(18-20)

1015. Began push for GW

+ Set screen from 24-28' + Collected partial sample as volume was not available. Will reset PVC wells tomorrow.

1105. Began cleanup @ GW SB-2

1115. Began boring @ SB-1 near 221 S. 5th St. Building.

SB-1: 39.765175  
-94.853680

1121. Collected SB-1(0-3)

1145. Collected SB-1(20-22) = some petroleum staining

1215. Lunch

1525. Began boring @ SB-7 on NE corner of 302 S. 5th parcel on west side of former filling station

SB-7: 39.764852

-94.854423

1526. Collected SB-7(0-3)

1350. Collected SB-7(14-16) = petroleum stained w/ 12.7 ppm

1400. Moved to SB-6 + began boring  
SB-6: 39.764815  
-94.854295

1405. Collected SB-6(0-3)

1435. Collected SB-6(22-24)

+ SB-6 was located near SE corner of former filling station at end of pump island.

1445. Began boring @ SB-8 along alley at SW corner of 302 parcel

1448. Collected SB-8(0-3) SB-8: 39.764805

1520. Collected SB-8(22-24) -94.854722

1530. Pushed to 30' for GW.

+ Dry from 26-50'

+ Dry from 24-28'

1535. Moved back to SB-7 to find GW

+ Dry from 26-30'

+ Dry from 24-28'

1550. Began cleanup.

1600. Q. D., T. Rebecchi, + K. Mammolite departed site.

1745. End of day

Hk 14  
4-18-18

Rite in the Rain.



4-19-18

0820. Reported Tetra Tech office w/ K. Monasli, T. Rebecchi, & Q. Do for site.

0915. Arrived @ site - 221 S. 5th parcel.

+ Set temporary PVC well to sit during field activities today in order to collect GW at SB-2. Screen set from 20-25'

0940. Began boring @ SB-3 near central portion of 218 S. 5th Street parcel.

SB-3: 39.765212  
-94.854345

+ Collected SB-3 (0-3)

1044. Collected SB-3 (22-24)

1020. Moved to SB-4 on NW corner of 218 parcel + began boring.

SB-4: 39.765361  
-94.854485

+ SB-4 moved ~ 50 east now on NE portion of property due to continuous shallow refusal likely caused by historical building foot

1055. Collected SB-4 (0-3)

1105. Collected SB-4 (22-24)

+ Some moisture observed throughout boring + water present at bottom of 24'

- Will set PVC well screened from 25-30' in attempt for GW

1125. Moved to SB-5 in SW corner of 218 parcel + began boring.

1130. Collected SB-5 (0-3)

SB-5:

1150. Check WL @ SB-4 39.765112  
SWL = 20.5' -94.854639

1155. Check WL @ SB-2

SWL = 13.5

1200. Collected SB-5 (22-24)

1210. Set PVC well @ SB-5 from 25-30.

1220. Collected SB-2-GW

1245. Lunch

1320. Returned to sample SB-4-GW

1330. Hiland Roberts truck ran over well!

+ broke riser ~ 4.5' sub surface.

- Will not collect water @ SB-4-GW

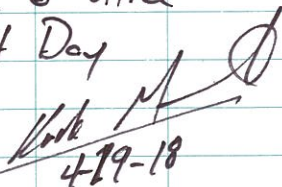
SWL @ SB-5 = 20.5'

+ Not enough volume in well for sample collection. Will not leave temporary well overnight due to heavy truck traffic.

1350. Began cleanup

1455. Arrived @ office

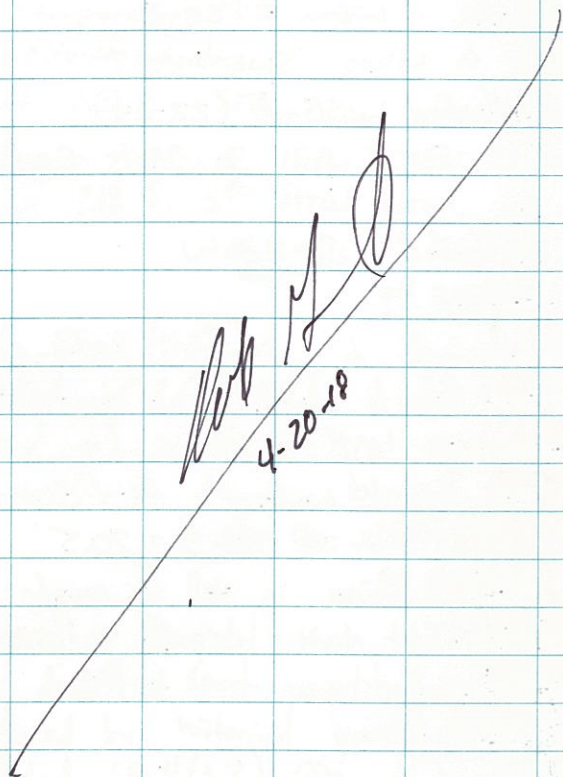
1610. End of Day

Work   
4-19-18



4-20-18

0950 - Pace Courier picked up samples  
for delivery to Lab.



4-20-18

# Summary of Photos

- ① SB-2 looking SW
- ② SB-2 looking E
- ③ SB-1 looking N
- ④ " "
- ⑤ Petroleum in 16-20" @ SB-1
- ⑥ Near SB-1 looking E
- ⑦ " "
- ⑧ 302 S. 5th parcel - former filling station footprint  
looking South
- ⑨ SB-7 looking west
- ⑩ " "
- ⑪ SB-6 looking NE
- ⑫ SB-6 looking N
- ⑬ 302 S. 5th parcel looking S
- ⑭ Intersection of Charles + S. 5th looking east  
towards 221 S. 5th parcel
- ⑮ 218 S. 5th St parcel looking N
- ⑯ 218 S. 5th St parcel looking NW
- ⑰ SB-8 looking South
- ⑱ " "
- ⑲ SB-3 looking SW
- ⑳ SB-4 looking E
- ㉑ Intended location of SB-4 - retrieval ducts fill
- ㉒ SB-4 looking E
- ㉓ SB-5 looking NE

**APPENDIX D**

**BORING LOGS**

# Boring Log



Site Name: <b>Hiland-Roberts St. Joseph</b>	Boring Number: <b>SB-1</b>	Drilling Date: <b>4/18/2018</b>
Project Number: <b>103X9025140002.049</b>	Boring Depth: <b>24 feet</b>	
Drilling Method: <b>Geoprobe</b>	Depth to Water:	
Drilling Company: <b>Seagull Environmental</b>	Geologist: <b>Mammoliti</b>	
Site Elevation: <b>850 ft</b>	Weather:	
Boring Coordinates: <b>39.765175, -94.853680</b>	General boring Location: <b>221 S. 5th Street Parcel</b>	

Depth (ft)	PID (ppm)	Analytical Sample Interval	Description	Recovery (%)
4 ft	0.0	0-3	Brick, asphalt, and gravel fill	75
	0.0			
8 ft	0.0		Sand fill	25
	0.0			
12 ft	0.0		No recovery	0
	0.0			
16 ft	0.0			0
	0.0			
20 ft	0.0		Silty clay, brown, intermixed red brick, sand, medium plasticity, soft, moist	100
	0.0			
24 ft	50	20-22	Silty clay, petroleum stained, intermixed sand, medium plasticity, very soft, moist	100
	0.7		Silty clay, brown, intermixed sand, medium plasticity, soft, wet	

# Boring Log



Site Name: <b>Hiland-Roberts St. Joseph</b>	Boring Number: <b>SB-2</b>	Drilling Date: <b>4/18/2018</b>
Project Number: <b>103X9025140002.049</b>	Boring Depth: <b>24 feet</b>	
Drilling Method: <b>Geoprobe</b>	Depth to Water:	
Drilling Company: <b>Seagull Environmental, I</b>	Geologist: <b>Mammoliti</b>	
Site Elevation: <b>850 ft</b>	Weather:	
Boring Coordinates: <b>39.765083, -94.853890</b>	General boring Location: <b>221 S. 5th Street Parcel</b>	

Depth (ft)	PID (ppm)	Analytical Sample Interval	Description	Recovery (%)		
4 ft	0.0	0-3	Brick, asphalt, and gravel fill	50		
	0.0					
8 ft	0.0			25		
	0.0					
12 ft	0.0			Silty clay, brown, intermixed red brick, sand, medium plasticity, soft, moist	100	
	0.0					
16 ft	0.0				No recovery	0
	0.0					
20 ft	0.0		18-20			100
	0.0					
24 ft	0.0		100			
	0.0					

# Boring Log



Site Name: <b>Hiland-Roberts St. Joseph</b>	Boring Number: <b>SB-3</b>	Drilling Date: <b>4/19/2018</b>
Project Number: <b>103X9025140002.049</b>	Boring Depth: <b>24 feet</b>	
Drilling Method: <b>Geoprobe</b>	Depth to Water:	
Drilling Company: <b>Seagull Environmental, LLC</b>	Geologist: <b>Mammoliti</b>	
Site Elevation: <b>850 ft</b>	Weather:	
Boring Coordinates: <b>39.765212, -94.854345</b>	General boring Location: <b>218 S. 5th Street Parcel</b>	

Depth (ft)	PID (ppm)	Analytical Sample Interval	Description	Recovery (%)
4 ft	0.0	0-3	Brick, asphalt, and gravel fill	100
	0.0			
8 ft	0.0		Silty clay, dark brown, intermixed red brick, trace plasticity, hard, dry	100
	0.0			
12 ft	0.0		Silty clay, brown, intermixed sand, medium plasticity, soft, moist	75
	0.0			
16 ft	0.0			100
	0.0			
20 ft	0.0			100
	0.0			
24 ft	0.0			100
	0.0	22-24	Silty clay, brown, intermixed sand, medium plasticity, very soft, moist	

# Boring Log



Site Name: <b>Hiland-Roberts St. Joseph</b>	Boring Number: <b>SB-4</b>	Drilling Date: <b>4/19/2018</b>
Project Number: <b>103X9025140002.049</b>	Boring Depth: <b>24 feet</b>	
Drilling Method: <b>Geoprobe</b>	Depth to Water:	
Drilling Company: <b>Seagull Environmental, I</b>	Geologist: <b>Mammoliti</b>	
Site Elevation: <b>850 ft</b>	Weather:	
Boring Coordinates: <b>39.765361, -94.854485</b>	General boring Location: <b>218 S. 5th Street Parcel</b>	

Depth (ft)	PID (ppm)	Analytical Sample Interval	Description	Recovery (%)
4 ft	0.0	0-3	Brick, asphalt, and gravel fill	100
	0.0			
8 ft	0.0		Silty clay, dark brown, intermixed red brick, trace plasticity, hard, dry	100
	0.0			
12 ft	0.0			75
	0.0			
16 ft	0.0		Silty clay, brown, intermixed sand, medium plasticity, soft, moist	100
	0.0			
20 ft	0.0			100
	0.0			
24 ft	0.0			100
	0.0	22-24	Silty clay, brown, intermixed red brick, sand, medium plasticity, very soft, wet	

# Boring Log



Site Name: <b>Hiland-Roberts St. Joseph</b>	Boring Number: <b>SB-5</b>	Drilling Date: <b>4/19/2018</b>
Project Number: <b>103X9025140002.049</b>	Boring Depth: <b>24 feet</b>	
Drilling Method: <b>Geoprobe</b>	Depth to Water:	
Drilling Company: <b>Seagull Environmental, I</b>	Geologist: <b>Mammoliti</b>	
Site Elevation: <b>850 ft</b>	Weather:	
Boring Coordinates: <b>39.765112, -94.854639</b>	General boring Location: <b>218 S. 5th Street Parcel</b>	

Depth (ft)	PID (ppm)	Analytical Sample Interval	Description	Recovery (%)
4 ft	0.0	0-3	Brick, asphalt, and gravel fill	100
	0.0			
8 ft	0.0		Silty clay, dark brown, intermixed red brick, trace plasticity, hard, dry	100
	0.0			
12 ft	0.0			100
	0.0			
16 ft	0.0		Silty clay, brown, intermixed sand, medium plasticity, soft, moist	100
	0.0			
20 ft	0.0			100
	0.0			
24 ft	0.0			100
	0.0	22-24		

# Boring Log



Site Name: <b>Hiland-Roberts St. Joseph</b>	Boring Number: <b>SB-6</b>	Drilling Date: <b>4/18/2018</b>
Project Number: <b>103X9025140002.049</b>	Boring Depth: <b>24 feet</b>	
Drilling Method: <b>Geoprobe</b>	Depth to Water:	
Drilling Company: <b>Seagull Environmental, LLC</b>	Geologist: <b>Mammoliti</b>	
Site Elevation: <b>850 ft</b>	Weather:	
Boring Coordinates: <b>39.764815, -94.854295</b>	General boring Location: <b>302 S. 5th Street Parcel</b>	

Depth (ft)	PID (ppm)	Analytical Sample Interval	Description	Recovery (%)
4 ft	0.0	0-3	Brick, asphalt, and gravel fill	100
	0.0			
8 ft	0.0		Silty clay, dark brown, intermixed red brick, trace plasticity, hard, dry	100
	0.0			
12 ft	0.0			100
	0.0			
16 ft	0.0		Silty clay, brown, intermixed sand, medium plasticity, soft, moist	100
	0.0			
20 ft	0.0			100
	0.0			
24 ft	0.0			100
	0.0	22-24		



# Boring Log



Site Name: <b>Hiland-Roberts St. Joseph</b>	Boring Number: <b>SB-7</b>	Drilling Date: <b>4/18/2018</b>
Project Number: <b>103X9025140002.049</b>	Boring Depth: <b>24 feet</b>	
Drilling Method: <b>Geoprobe</b>	Depth to Water:	
Drilling Company: <b>Seagull Environmental, I</b>	Geologist: <b>Mammoliti</b>	
Site Elevation: <b>850 ft</b>	Weather:	
Boring Coordinates: <b>39.764852, -94.854423</b>	General boring Location: <b>302 S. 5th Street Parcel</b>	

Depth (ft)	PID (ppm)	Analytical Sample Interval	Description	Recovery (%)
4 ft	0.0	0-3	Asphalt, sand, and gravel fill	75
	0.0			
8 ft	0.0		Silty clay, dark brown, intermixed red brick, trace plasticity, hard, dry	75
	0.0			
12 ft	0.0			100
	0.0			
16 ft	0.0	14-16	Silty clay, petroleum stained, intermixed sand, medium plasticity, soft, moist	100
	12.7			
20 ft	0.0		Silty clay, brown, intermixed sand, medium plasticity, soft, moist	100
	0.0			
24 ft	0.0			100
	0.0			

Boring Log



Site Name: <b>Hiland-Roberts St. Joseph</b>	Boring Number: <b>SB-8</b>	Drilling Date: <b>4/18/2018</b>
Project Number: <b>103X9025140002.049</b>	Boring Depth: <b>24 feet</b>	
Drilling Method: <b>Geoprobe</b>	Depth to Water:	
Drilling Company: <b>Seagull Environmental, Inc.</b>	Geologist: <b>Mammoliti</b>	
Site Elevation: <b>850 ft</b>	Weather:	
Boring Coordinates: <b>39.764505, -94.854722</b>	General boring Location: <b>302 S. 5th Street Parcel</b>	

Depth (ft)	PID (ppm)	Analytical Sample Interval	Description	Recovery (%)
4 ft	0.0	0-3	Brick, asphalt, and gravel fill	100
	0.0		Silty clay, dark brown, intermixed red brick, trace plasticity, hard, dry	
8 ft	0.0		Silty clay, brown, intermixed sand, medium plasticity, soft, moist	100
	0.0			
12 ft	0.0			100
	0.0			
16 ft	0.0			100
	0.0			
20 ft	0.0			100
	0.0			
24 ft	0.0			100
	0.0	22-24		

**APPENDIX E**  
**ANALYTICAL TABLES**

TABLE E-1  
SUMMARY OF ANALYTICAL RESULTS FROM SURFACE SOIL SAMPLES

HILAND ROBERTS DAIRY ST. JOSEPH  
ST. JOSEPH, BUCHANAN COUNTY, MISSOURI

Sample ID	SB-1 (0-3)	SB-2 (0-3)	SB-3 (0-3)	SB-4 (0-3)	SB-5 (0-3)	SB-6 (0-3)	SB-7 (0-3)	SB-8 (0-3)	MRBCA Default Target Level (DTL)	MRBCA RBTL Tier 1 Residential Surface Soil <sup>1</sup>	MRBCA RBTL Tier 1 Non-Residential Surface Soil <sup>2</sup>
Collection Depth (ft bgs)	0-3	0-3	0-3	0-3	0-3	0-3	0-3	0-3			
Collection Date	4/18/2018	4/18/2018	4/18/2018	4/18/2018	4/18/2018	4/18/2018	4/18/2018	4/18/2018			
VOCs (µg/kg)											
Benzene	<3.4	<3.0	<3.7	<3.0	<4.0	<2.9	<2.9	<2.8	56.1	177,000	763,000
Toluene	<3.4	<3.0	<3.7	<3.0	<4.0	<2.9	<2.9	<2.8	29,800	6,210,000	81,100,000
Ethylbenzene	<3.4	<3.0	<3.7	<3.0	<4.0	<2.9	<2.9	<2.8	39,900	7,450,000	97,500,000
Xylenes (total)	<6.8	<5.9	<7.4	<6.0	<7.9	<5.7	<5.8	<5.5	24,700	7,830,000	104,000,000
1,2-Dibromoethane/Ethylene dibromide (EDB)	<3.4	<3.0	<3.7	<3.0	<4.0	<2.9	<2.9	<2.8	0.473	3,020	12,500
1,2-Dichloroethane/Ethylene dichloride (EDC)	<3.4	<3.0	<3.7	<3.0	<4.0	<2.9	<2.9	<2.8	20.6	66,500	276,000
Oxygenates (µg/kg)											
Methyl tertiary butyl ether (MTBE)	<3.4	<3.0	<3.7	<3.0	<4.0	<2.9	<2.9	<2.8	398	3,450,000	14,900,000
Tertiary amyl methyl ether (TAME)	<3.4	<3.0	<3.7	<3.0	<4.0	<2.9	<2.9	<2.8	677	2,500,000	32,900,000
Tertiary butyl alcohol (TBA)	<17.1	<14.8	<18.5	<15.1	<19.8	<14.3	<14.5	<13.8	558	6,110,000	80,300,000
Ethyl tertiary butyl ether (ETBE)	<3.4	<3.0	<3.7	<3.0	<4.0	<2.9	<2.9	<2.8	106	78,100	1,030,000
Diisopropyl ether (DIPE)	<3.4	<3.0	<3.7	<3.0	<4.0	<2.9	<2.9	<2.8	4,120	6,910,000	90,700,000
TPHs (mg/kg)											
TPH-GRO	<0.34	<0.30	<0.37	<0.30	<0.40	<0.29	<0.29	<0.28	385	354,000	4,560,000
TPH-DRO	58.5 J	104	104	8.3 J	68	11.7 J	12.8 J	4.9 J	4,150	140,000	1,410,000
TPH-ORO	395	746	642	31.7	145	24.9	25.8	19.3 J	124,000	124,000	1,250,000
PAHs (µg/kg)											
Acenaphthene	25.5 J	29.4 J	205	<4.0	48.8	<3.8	<3.5	<11.8	174,000	3,130,000	30,700,000
Anthracene	75.5	95.2	665	<4.0	88.6	<3.8	<3.5	<11.8	3,060,000	15,700,000	154,000,000
Benzo(a)anthracene	303	269	2,620	5.7 J	359	8.7	<3.5	<11.8	6,120	6,200	21,100
Benzo(a)pyrene	254	195	2,470	4.4 J	385	6.3 J	<3.5	<11.8	620	620	2,110
Benzo(b)fluoranthene	436	322	3,460	9.3	550	21.5	4.5 J	<11.8	6,190	6,190	21,000
Benzo(k)fluoranthene	208	179	2,040	<4.0	253	4.8 J	<3.5	<11.8	62,000	62,000	211,000
Chrysene	313	255	2,820	7.6 J	386	25.9	<3.5	<11.8	599,000	599,000	1,990,000
Dibenzo(a,h)anthracene	37.4	28.0 J	373	<4.0	57.1	<3.8	<3.5	<11.8	620	620	2,110
Fluoranthene	676	684	5,420	10.9	742	14	3.8 J	17.1 J	2,280,000	2,280,000	21,800,000
Fluorene	<17.7	20.09 J	206	<4.0	35.3	<3.8	<3.5	<11.8	211,000	2,200,000	20,700,000
Naphthalene	46.3	<17.6	121	<4.0	101	8	<3.5	<11.8	325	36,300	119,000
Pyrene	534	520	4,500	9	666	13.5	7.1	13.9 J	1,500,000	1,710,000	16,400,000
Metals (mg/kg)											
Arsenic	5.2	4.4	6.4	3.4	11	6.9	7.3	5.3	3.89	3.89	15.9
Barium	29.3	56 J	203	137	319	221	18.5	144	2,040	15,000	181,000
Cadmium	7.4	0.39 J	0.97	0.27 J	9.4	0.6	0.30 J	0.29 J	9.31	16.8	74.8
Chromium	4.8	3.2	14.7	6.6	16.4	12.6	9.7	9.1	74,600	74,600	472,000
Lead	22.7	59.9 J	51.8	19.5	1,080	40.7	10.7	30	3.74	260	660
Selenium	<0.45	<0.52	<0.51	<0.60	<0.53	<0.54	<0.43	<0.59	6.27	380	4,780

Notes:

Bold font indicates concentration above detection limit.

Blue fill indicates concentration above Default Target Level

Yellow fill indicates concentration above Residential RBTL

Red fill indicates concentration above Non-Residential RBTL

<sup>1</sup> MBRCA Tier 1 RBTL for residential land use, surficial soil (MRBCA Tanks Guidance Document, October 2013)

<sup>2</sup> MBRCA Tier 1 RBTL for non-residential land use, surficial soil (MRBCA Tanks Guidance Document, October 2013)

ft bgs

Feet below ground surface

J

Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

µg/kg

Micrograms per kilogram

mg/kg

Milligrams per kilogram

MRBCA

Missouri Risk-Based Corrective Action

NA

Not analyzed

NE

Not established

PAHs

Polycyclic aromatic hydrocarbons

RBTL

Risk-Based Target Level

TPH-DRO

Total petroleum hydrocarbons – diesel-range organics

TPH-GRO

Total petroleum hydrocarbons – gasoline-range organics

TPH-ORO

Total petroleum hydrocarbons – oil-range organics

VOCs

Volatile organic compounds

TABLE E-2  
SUMMARY OF ANALYTICAL RESULTS FROM SUBSURFACE SOIL SAMPLES

HILAND ROBERTS DAIRY ST. JOSEPH  
ST. JOSEPH, BUCHANAN COUNTY, MISSOURI

Sample ID	SB-1 (20-22)	SB-2 (18-20)	SB-3 (22-24)	SB-4 (22-24)	SB-5 (22-24)	SB-6 (22-24)	SB-7 (14-16)	SB-8 (22-24)	MRBCA Default Target Level (DTL)	MRBCA RBTL Tier 1	MRBCA RBTL Tier 1
Collection Depth (ft bgs)	20-22	18-20	22-24	22-24	22-24	22-24	14-16	22-24		Residential Subsurface	Non-Residential
Collection Date	4/18/2018	4/18/2018	4/18/2018	4/18/2018	4/18/2018	4/18/2018	4/18/2018	4/18/2018		Soil <sup>1</sup>	Subsurface Soil <sup>2</sup>
Volatiles (µg/kg)											
Benzene	4.5 J	<3.1	<2.7	<2.8	<3.0	<2.9	<2.6	<2.9	56.1	378	1,980
Toluene	<2.9	<3.1	<2.7	<2.8	<3.0	<2.9	<2.6	<2.9	29,800	499000	4,010,000
Ethylbenzene	10.8	<3.1	<2.7	<2.8	<3.0	<2.9	<2.6	<2.9	39,900	193000	1,550,000
Xylenes (total)	<5.8	<6.1	<5.4	<5.5	<5.9	<5.7	<5.2	<5.7	24,700	24700	199,000
1,2-Dibromoethane/Ethylene dibromide	<2.9	<3.1	<2.7	<2.8	<3.0	<2.9	<2.6	<2.9	0.473	86.1	452
1,2-Dichloroethane/Ethylene dichloride	<2.9	<3.1	<2.7	<2.8	<3.0	<2.9	<2.6	<2.9	20.6	132	691
Oxygenates (µg/kg)											
Methyl tertiary butyl ether (MTBE)	<2.9	<3.1	<2.7	<2.8	<3.0	<2.9	<2.6	<2.9	398	21600	113,000
Tertiary amyl methyl ether (TAME)	<2.9	<3.1	<2.7	<2.8	<3.0	<2.9	<2.6	<2.9	677	5860	47,100
Tertiary butyl alcohol (TBA)	<14.5	<15.3	<13.6	<13.8	<14.8	<14.3	<13.1	<14.3	558	1030000	8,260,000
Ethyl tertiary butyl ether (ETBE)	<2.9	<3.1	<2.7	<2.8	<3.0	<2.9	<2.6	<2.9	106	25800	207,000
Diisopropyl ether (DIPE)	<2.9	<3.1	<2.7	<2.8	<3.0	<2.9	<2.6	<2.9	4,120	33000	265,000
TPHs (mg/kg)											
TPH-GRO	2.5	<0.31	<0.27	<0.28	<0.30	<0.29	<0.26	<0.29	385	385	3,100
TPH-DRO	210	<1.5	<1.5	<1.5	1.5 J	<1.5	1.6 J	<7.8	4,150	4150	33,400
TPH-ORO	8.0 J	5.1 J	8.2 J	6.2 J	11.2 J	5.4 J	5.4 J	45.7 J	124,000	NE	NE
PAHs (µg/kg)											
Acenaphthene	21	<4.1	<4.1	<4.1	<4.2	<4.1	<4.3	<21.3	174,000	6.67E+07	5.38E+08
Anthracene	17.3	<4.1	<4.1	<4.1	<4.2	<4.1	<4.3	<21.3	3,060,000	3.90E+08	3.14E+09
Benzo(a)anthracene	23.2	<4.1	7.5 J	<4.1	<4.2	<4.1	<4.3	<21.3	6,120	2.60E+08	1.36E+09
Benzo(a)pyrene	14.8	<4.1	6.2 J	<4.1	<4.2	<4.1	<4.3	<21.3	620	2.25E+08	1.18E+09
Benzo(b)fluoranthene	23.8	<4.1	8.9	<4.1	<4.2	<4.1	<4.3	<21.3	6,190	5.56E+07	2.91E+08
Benzo(k)fluoranthene	12	<4.1	5.4 J	<4.1	<4.2	<4.1	<4.3	<21.3	62,000	6.83E+09	2.58E+10
Chrysene	22.5	<4.1	7.1 J	<4.1	<4.2	<4.1	<4.3	<21.3	599,000	1.92E+08	1.01E+09
Dibenzo(a,h)anthracene	<4.2	<4.1	<4.1	<4.1	<4.2	<4.1	<4.3	<21.3	620	2.22E+10	1.16E+11
Fluoranthene	81.9	<4.1	17.8	<4.1	<4.2	<4.1	<4.3	<21.3	2,280,000	9.01E+09	7.25E+10
Fluorene	33.8	<4.1	<4.1	<4.1	<4.2	<4.1	<4.3	<21.3	211,000	2.46E+08	1.98E+09
Naphthalene	197	<4.1	<4.1	<4.1	<4.2	4.4 J	<4.3	<21.3	325	2.59E+04	1.36E+05
Pyrene	66.8	<4.1	14.3	<4.1	<4.2	<4.1	<4.3	<21.3	1,500,000	1.07E+10	8.64E+10
Metals (mg/kg)											
Arsenic	8.4	8.4	8.1	7.7	7.5	8.7	6.8	8.7	3.89	NE	NE
Barium	544	126	246	210	313	174	105	285	2,040	NE	NE
Cadmium	0.44 J	0.25 J	0.31 J	0.41 J	0.41 J	0.34 J	0.40 J	0.41 J	9.31	NE	NE
Chromium	13.9	13.7	14.3	14.1	14.3	15.2	14	15.4	74,600	NE	NE
Lead	11.9	18.2	9.7	9.6	9.7	10.8	9.8	11.1	3.74	260	660
Selenium	<0.53	<0.69	<0.69	<0.64	<0.64	<0.67	<0.52	<0.65	6.27	NE	NE

Notes:

Bold font indicates concentration above detection limit.

Blue fill indicates concentration above Default Target Level

<sup>1</sup> MBRCA Tier 1 RBTL for residential land use, subsurface soil

<sup>2</sup> MBRCA Tier 1 RBTL for non-residential land use, subsurface soil

ft bgs	Feet below ground surface
J	Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.
µg/kg	Micrograms per kilogram
mg/kg	Milligrams per kilogram
MRBCA	Missouri Risk-Based Corrective Action
NA	Not analyzed
NE	Not established
PAHs	Polycyclic aromatic hydrocarbons
RBTL	Risk-Based Target Level
TPH-DRO	Total petroleum hydrocarbons – diesel-range organics
TPH-GRO	Total petroleum hydrocarbons – gasoline-range organics
TPH-ORO	Total petroleum hydrocarbons – oil-range organics
VOCs	Volatile organic compounds

**TABLE E-3**  
**SUMMARY OF ANALYTICAL RESULTS FROM GROUNDWATER SAMPLES**

**HILAND ROBERTS DAIRY ST. JOSEPH**  
**ST. JOSEPH, BUCHANAN COUNTY, MISSOURI**

Sample ID	SB-2-GW	MRBCA Default Target Level (DTL)	MRBCA Risk-Based Target Level (RBTL) Tier 1 Residential Groundwater <sup>1</sup>	MRBCA RBTL Tier 1 Non-Residential Groundwater <sup>2</sup>
Collection Depth (ft bgs)	23-25			
Collection Date	4/18/2018			
Dissolved Metals (µg/L)				
Arsenic	0.63 J	10	10	578
Barium	106	2000	2000	6,190,000
Cadmium	0.45 J	5	5	2,280
Chromium	16.7	100	100	46,500,000
Lead	1.5	15	15	NE
Selenium	1.2	50	50	155,000

Notes:

Bold font indicates concentration above detection limit.

<sup>1</sup> MBRCA Tier 1 RBTL for residential land use, groundwater, domestic water use

<sup>2</sup> MBRCA Tier 1 RBTL for non-residential land use, groundwater, dermal contact

µg/L	Micrograms per liter
ft bgs	Feet below ground surface
J	Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.
MRBCA	Missouri Risk-Based Corrective Action
NE	Not established

## **APPENDIX F**

### **CHAIN-OF-CUSTODY RECORDS, ANALYTICAL DATA PACKAGES, AND DATA VALIDATION REPORTS**

April 30, 2018

Kirk Mammoliti  
Tetra Tech  
415 Oak Street  
Kansas City, MO 64106

RE: Project: HILAND-ROBERTS DAIRY SITE  
Pace Project No.: 60268665

Dear Kirk Mammoliti:

Enclosed are the analytical results for sample(s) received by the laboratory on April 20, 2018. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Jeffrey Shopper  
jeff.shopper@pacelabs.com  
1(913)563-1408  
Project Manager

Enclosures

cc: Emily Fisher, TETRA TECH EMI



## REPORT OF LABORATORY ANALYSIS

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## CERTIFICATIONS

Project: HILAND-ROBERTS DAIRY SITE

Pace Project No.: 60268665

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### Kansas Certification IDs

9608 Loiret Boulevard, Lenexa, KS 66219

WY STR Certification #: 2456.01

Arkansas Certification #: 17-016-0

Illinois Certification #: 200030

Iowa Certification #: 118

Kansas/NELAP Certification #: E-10116

Louisiana Certification #: 03055

Nevada Certification #: KS000212018-1

Oklahoma Certification #: 9205/9935

Texas Certification #: T104704407

Utah Certification #: KS00021

Kansas Field Laboratory Accreditation: # E-92587

Missouri Certification: 10070

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## REPORT OF LABORATORY ANALYSIS

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## SAMPLE SUMMARY

Project: HILAND-ROBERTS DAIRY SITE

Pace Project No.: 60268665

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60268665001	SB-2 (0-3)	Solid	04/18/18 09:30	04/20/18 10:40
60268665002	SB-2 (18-20)	Solid	04/18/18 10:10	04/20/18 10:40
60268665003	SB-1 (0-3)	Solid	04/18/18 11:21	04/20/18 10:40
60268665004	SB-1 (20-22)	Solid	04/18/18 11:45	04/20/18 10:40
60268665005	SB-7 (0-3)	Solid	04/18/18 13:26	04/20/18 10:40
60268665006	SB-7 (14-16)	Solid	04/18/18 13:50	04/20/18 10:40
60268665007	SB-6 (0-3)	Solid	04/18/18 14:00	04/20/18 10:40
60268665008	SB-6 (22-24)	Solid	04/18/18 14:35	04/20/18 10:40
60268665009	SB-8 (0-3)	Solid	04/18/18 14:48	04/20/18 10:40
60268665010	SB-8 (22-24)	Solid	04/18/18 15:20	04/20/18 10:40
60268665011	SB-3 (0-3)	Solid	04/19/18 09:40	04/20/18 10:40
60268665012	SB-3 (22-24)	Solid	04/19/18 10:14	04/20/18 10:40
60268665013	SB-4 (0-3)	Solid	04/19/18 10:35	04/20/18 10:40
60268665014	SB-4 (22-24)	Solid	04/19/18 11:05	04/20/18 10:40
60268665015	SB-5 (0-3)	Solid	04/19/18 11:30	04/20/18 10:40
60268665016	SB-5 (22-24)	Solid	04/19/18 12:00	04/20/18 10:40
60268665017	SB-2-GW	Water	04/19/18 12:20	04/20/18 10:40
60268665019	EQUIPMENT RINSATE	Water	04/20/18 09:45	04/20/18 10:40

## REPORT OF LABORATORY ANALYSIS

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## SAMPLE ANALYTE COUNT

Project: HILAND-ROBERTS DAIRY SITE  
Pace Project No.: 60268665

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60268665001	SB-2 (0-3)	EPA 6010	TDS	6	PASI-K
		EPA 8270 by SIM	NAW	14	PASI-K
		EPA 8270	JMT	5	PASI-K
		EPA 5035A/8260	CJW, JKL	15	PASI-K
		ASTM D2974	DWC	1	PASI-K
60268665002	SB-2 (18-20)	EPA 6010	TDS	6	PASI-K
		EPA 8270 by SIM	NAW	14	PASI-K
		EPA 8270	JMT	5	PASI-K
		EPA 5035A/8260	CJW, JKL	15	PASI-K
		ASTM D2974	DWC	1	PASI-K
60268665003	SB-1 (0-3)	EPA 6010	TDS	6	PASI-K
		EPA 8270 by SIM	NAW	14	PASI-K
		EPA 8270	JMT	5	PASI-K
		EPA 5035A/8260	CJW, JKL	15	PASI-K
		ASTM D2974	DWC	1	PASI-K
60268665004	SB-1 (20-22)	EPA 6010	TDS	6	PASI-K
		EPA 8270 by SIM	NAW	14	PASI-K
		EPA 8270	JMT	5	PASI-K
		EPA 5035A/8260	CJW, JKL	15	PASI-K
		ASTM D2974	DWC	1	PASI-K
60268665005	SB-7 (0-3)	EPA 6010	TDS	6	PASI-K
		EPA 8270 by SIM	NAW	14	PASI-K
		EPA 8270	JMT	5	PASI-K
		EPA 5035A/8260	CJW, JKL	15	PASI-K
		ASTM D2974	DWC	1	PASI-K
60268665006	SB-7 (14-16)	EPA 6010	TDS	6	PASI-K
		EPA 8270 by SIM	NAW	14	PASI-K
		EPA 8270	JMT	5	PASI-K
		EPA 5035A/8260	CJW, JKL	15	PASI-K
		ASTM D2974	DWC	1	PASI-K
60268665007	SB-6 (0-3)	EPA 6010	TDS	6	PASI-K
		EPA 8270 by SIM	NAW	14	PASI-K
		EPA 8270	JMT	5	PASI-K
		EPA 5035A/8260	CJW, JKL	15	PASI-K
		ASTM D2974	DWC	1	PASI-K
60268665008	SB-6 (22-24)	EPA 6010	TDS	6	PASI-K
		EPA 8270 by SIM	NAW	14	PASI-K

## REPORT OF LABORATORY ANALYSIS

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## SAMPLE ANALYTE COUNT

Project: HILAND-ROBERTS DAIRY SITE

Pace Project No.: 60268665

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60268665009	SB-8 (0-3)	EPA 8270	JMT	5	PASI-K
		EPA 5035A/8260	CJW, JKL	15	PASI-K
		ASTM D2974	DWC	1	PASI-K
		EPA 6010	TDS	6	PASI-K
		EPA 8270 by SIM	NAW	14	PASI-K
		EPA 8270	JMT	5	PASI-K
60268665010	SB-8 (22-24)	EPA 5035A/8260	CJW, JKL	15	PASI-K
		ASTM D2974	DWC	1	PASI-K
		EPA 6010	TDS	6	PASI-K
		EPA 8270 by SIM	NAW	14	PASI-K
		EPA 8270	JMT	5	PASI-K
		EPA 5035A/8260	CJW, JKL	15	PASI-K
60268665011	SB-3 (0-3)	ASTM D2974	DWC	1	PASI-K
		EPA 6010	TDS	6	PASI-K
		EPA 8270 by SIM	NAW	14	PASI-K
		EPA 8270	JMT	5	PASI-K
		EPA 5035A/8260	CJW, JKL	15	PASI-K
		ASTM D2974	DWC	1	PASI-K
60268665012	SB-3 (22-24)	EPA 6010	TDS	6	PASI-K
		EPA 8270 by SIM	NAW	14	PASI-K
		EPA 8270	JMT	5	PASI-K
		EPA 5035A/8260	CJW, JKL	15	PASI-K
		ASTM D2974	DWC	1	PASI-K
		EPA 6010	TDS	6	PASI-K
60268665013	SB-4 (0-3)	EPA 8270 by SIM	NAW	14	PASI-K
		EPA 8270	JMT	5	PASI-K
		EPA 5035A/8260	CJW, JKL	15	PASI-K
		ASTM D2974	DWC	1	PASI-K
		EPA 6010	TDS	6	PASI-K
		EPA 8270 by SIM	NAW	14	PASI-K
60268665014	SB-4 (22-24)	EPA 8270	JMT	5	PASI-K
		EPA 5035A/8260	CJW, JKL	15	PASI-K
		ASTM D2974	DWC	1	PASI-K
		EPA 6010	TDS	6	PASI-K
		EPA 8270 by SIM	NAW	14	PASI-K
		EPA 8270	JMT	5	PASI-K
60268665015	SB-5 (0-3)	EPA 5035A/8260	CJW, JKL	15	PASI-K
		ASTM D2974	DWC	1	PASI-K
		EPA 6010	TDS	6	PASI-K
		EPA 8270 by SIM	NAW	14	PASI-K
		EPA 8270	JMT	5	PASI-K
		EPA 5035A/8260	CJW, JKL	15	PASI-K

## REPORT OF LABORATORY ANALYSIS

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## SAMPLE ANALYTE COUNT

Project: HILAND-ROBERTS DAIRY SITE

Pace Project No.: 60268665

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60268665016	SB-5 (22-24)	ASTM D2974	DWC	1	PASI-K
		EPA 6010	TDS	6	PASI-K
		EPA 8270 by SIM	NAW	14	PASI-K
		EPA 8270	JMT	5	PASI-K
		EPA 5035A/8260	CJW, JKL	15	PASI-K
60268665017	SB-2-GW	ASTM D2974	DWC	1	PASI-K
		EPA 6020	JGP	6	PASI-K
60268665019	EQUIPMENT RINSATE	EPA 6020	JGP	6	PASI-K

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## PROJECT NARRATIVE

Project: HILAND-ROBERTS DAIRY SITE  
Pace Project No.: 60268665

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**Method:** EPA 6010  
**Description:** 6010 MET ICP Red. Interference  
**Client:** TETRA TECH EMI  
**Date:** April 30, 2018

### General Information:

16 samples were analyzed for EPA 6010. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

### Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

### Sample Preparation:

The samples were prepared in accordance with EPA 3050 with any exceptions noted below.

### Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

### Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

### Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

### Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

### Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: 522928

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 60268665001

M1: Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

- MS (Lab ID: 2140765)
  - Barium
- MSD (Lab ID: 2140766)
  - Barium
  - Lead

R1: RPD value was outside control limits.

- MSD (Lab ID: 2140766)
  - Lead

### Additional Comments:

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## PROJECT NARRATIVE

Project: HILAND-ROBERTS DAIRY SITE

Pace Project No.: 60268665

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**Method:** EPA 6020

**Description:** 6020 MET ICPMS, Dissolved (LF)

**Client:** TETRA TECH EMI

**Date:** April 30, 2018

### General Information:

2 samples were analyzed for EPA 6020. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

### Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

### Sample Preparation:

The samples were prepared in accordance with EPA 3010 with any exceptions noted below.

### Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

### Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

### Internal Standards:

All internal standards were within QC limits with any exceptions noted below.

### Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

QC Batch: 523228

B: Analyte was detected in the associated method blank.

- BLANK for HBN 523228 [MPRP/446 (Lab ID: 2141897)]
  - Barium, Dissolved
  - Chromium, Dissolved

### Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

### Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

### Additional Comments:

## REPORT OF LABORATORY ANALYSIS

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## PROJECT NARRATIVE

Project: HILAND-ROBERTS DAIRY SITE

Pace Project No.: 60268665

**Method:** EPA 8270 by SIM

**Description:** 8270 MSSV PAH by SIM

**Client:** TETRA TECH EMI

**Date:** April 30, 2018

### General Information:

16 samples were analyzed for EPA 8270 by SIM. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

### Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

### Sample Preparation:

The samples were prepared in accordance with EPA 3546 with any exceptions noted below.

QC Batch: 522697

P3: Sample extract could not be concentrated to the routine final volume, resulting in elevated reporting limits.

- SB-1 (0-3) (Lab ID: 60268665003)
- SB-2 (0-3) (Lab ID: 60268665001)
- SB-3 (0-3) (Lab ID: 60268665011)
- SB-8 (22-24) (Lab ID: 60268665010)

### Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

### Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

### Internal Standards:

All internal standards were within QC limits with any exceptions noted below.

### Surrogates:

All surrogates were within QC limits with any exceptions noted below.

### Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

### Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

### Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

### Additional Comments:

## REPORT OF LABORATORY ANALYSIS

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## PROJECT NARRATIVE

Project: HILAND-ROBERTS DAIRY SITE

Pace Project No.: 60268665

**Method:** EPA 8270 by SIM

**Description:** 8270 MSSV PAH by SIM

**Client:** TETRA TECH EMI

**Date:** April 30, 2018

Analyte Comments:

QC Batch: 522697

2e: The methods baseline separation for isomers pairs in the Initial Calibration or Continuing Calibration Verification (CCV) was less than the expected 50% valley to baseline. No further action was taken for this method variation. The two compounds are still being reported as individual isomers and not a combined total, since there is separation between the two isomers.

- SB-1 (0-3) (Lab ID: 60268665003)
  - Benzo(b)fluoranthene
- SB-1 (20-22) (Lab ID: 60268665004)
  - Benzo(b)fluoranthene
- SB-2 (0-3) (Lab ID: 60268665001)
  - Benzo(b)fluoranthene
- SB-3 (0-3) (Lab ID: 60268665011)
  - Benzo(b)fluoranthene
- SB-3 (22-24) (Lab ID: 60268665012)
  - Benzo(b)fluoranthene
- SB-4 (0-3) (Lab ID: 60268665013)
  - Benzo(b)fluoranthene
- SB-5 (0-3) (Lab ID: 60268665015)
  - Benzo(b)fluoranthene
- SB-6 (0-3) (Lab ID: 60268665007)
  - Benzo(b)fluoranthene
- SB-7 (0-3) (Lab ID: 60268665005)
  - Benzo(b)fluoranthene

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## PROJECT NARRATIVE

Project: HILAND-ROBERTS DAIRY SITE

Pace Project No.: 60268665

**Method:** EPA 8270

**Description:** 8270 MSSV DRO/ORO

**Client:** TETRA TECH EMI

**Date:** April 30, 2018

### General Information:

16 samples were analyzed for EPA 8270. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

### Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

### Sample Preparation:

The samples were prepared in accordance with EPA 3546 with any exceptions noted below.

QC Batch: 522698

P3: Sample extract could not be concentrated to the routine final volume, resulting in elevated reporting limits.

- SB-1 (0-3) (Lab ID: 60268665003)
- SB-2 (0-3) (Lab ID: 60268665001)
- SB-3 (0-3) (Lab ID: 60268665011)
- SB-8 (22-24) (Lab ID: 60268665010)

### Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

### Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

### Internal Standards:

All internal standards were within QC limits with any exceptions noted below.

### Surrogates:

All surrogates were within QC limits with any exceptions noted below.

### Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

QC Batch: 522698

B: Analyte was detected in the associated method blank.

- BLANK for HBN 522698 [OEXT/642 (Lab ID: 2140220)
- TPH-ORO

### Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

### Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

### Additional Comments:

## REPORT OF LABORATORY ANALYSIS

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## PROJECT NARRATIVE

Project: HILAND-ROBERTS DAIRY SITE

Pace Project No.: 60268665

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**Method:** EPA 5035A/8260

**Description:** 8260 MSV GRO and Oxygenates

**Client:** TETRA TECH EMI

**Date:** April 30, 2018

### General Information:

16 samples were analyzed for EPA 5035A/8260. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

### Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

### Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

### Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

### Internal Standards:

All internal standards were within QC limits with any exceptions noted below.

### Surrogates:

All surrogates were within QC limits with any exceptions noted below.

### Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

### Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

### Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: 522797

A matrix spike/matrix spike duplicate was not performed due to insufficient sample volume.

### Additional Comments:

Analyte Comments:

QC Batch: 522988

1e: The internal standard response was outside the laboratory acceptance limits confirmed by reanalysis.

- SB-2 (0-3) (Lab ID: 60268665001)
- Toluene-d8 (S)

This data package has been reviewed for quality and completeness and is approved for release.

## REPORT OF LABORATORY ANALYSIS

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## ANALYTICAL RESULTS

Project: HILAND-ROBERTS DAIRY SITE

Pace Project No.: 60268665

Sample: SB-2 (0-3) Lab ID: 60268665001 Collected: 04/18/18 09:30 Received: 04/20/18 10:40 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual	
<b>6010 MET ICP Red. Interference</b> Analytical Method: EPA 6010 Preparation Method: EPA 3050										
Arsenic	4.4	mg/kg	0.94	0.41	1	04/24/18 09:20	04/24/18 14:53	7440-38-2	M1	
Barium	56.0	mg/kg	0.47	0.066	1	04/24/18 09:20	04/24/18 14:53	7440-39-3		
Cadmium	0.39J	mg/kg	0.47	0.064	1	04/24/18 09:20	04/24/18 14:53	7440-43-9		
Chromium	3.2	mg/kg	0.47	0.13	1	04/24/18 09:20	04/24/18 14:53	7440-47-3		
Lead	59.9	mg/kg	0.47	0.37	1	04/24/18 09:20	04/24/18 14:53	7439-92-1	M1, R1	
Selenium	<0.52	mg/kg	1.4	0.52	1	04/24/18 09:20	04/26/18 15:42	7782-49-2		
<b>8270 MSSV PAH by SIM</b> Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3546										
Acenaphthene	29.4J	ug/kg	35.2	17.6	1	04/23/18 23:00	04/26/18 19:43	83-32-9	2e	
Anthracene	95.2	ug/kg	35.2	17.6	1	04/23/18 23:00	04/26/18 19:43	120-12-7		
Benzo(a)anthracene	269	ug/kg	35.2	17.6	1	04/23/18 23:00	04/26/18 19:43	56-55-3		
Benzo(a)pyrene	195	ug/kg	35.2	17.6	1	04/23/18 23:00	04/26/18 19:43	50-32-8		
Benzo(b)fluoranthene	322	ug/kg	35.2	17.6	1	04/23/18 23:00	04/26/18 19:43	205-99-2		
Benzo(k)fluoranthene	179	ug/kg	35.2	17.6	1	04/23/18 23:00	04/26/18 19:43	207-08-9		
Chrysene	255	ug/kg	35.2	17.6	1	04/23/18 23:00	04/26/18 19:43	218-01-9		
Dibenz(a,h)anthracene	28.0J	ug/kg	35.2	17.6	1	04/23/18 23:00	04/26/18 19:43	53-70-3		
Fluoranthene	684	ug/kg	35.2	17.6	1	04/23/18 23:00	04/26/18 19:43	206-44-0		
Fluorene	20.9J	ug/kg	35.2	17.6	1	04/23/18 23:00	04/26/18 19:43	86-73-7		
Naphthalene	<17.6	ug/kg	35.2	17.6	1	04/23/18 23:00	04/26/18 19:43	91-20-3		
Pyrene	520	ug/kg	35.2	17.6	1	04/23/18 23:00	04/26/18 19:43	129-00-0		
<b>Surrogates</b>										
2-Fluorobiphenyl (S)	77	%	45-116		1	04/23/18 23:00	04/26/18 19:43	321-60-8	P3	
Terphenyl-d14 (S)	77	%	39-126		1	04/23/18 23:00	04/26/18 19:43	1718-51-0		
<b>8270 MSSV DRO/ORO</b> Analytical Method: EPA 8270 Preparation Method: EPA 3546										
TPH-ORO	746	mg/kg	80.1	6.4	1	04/23/18 23:00	04/26/18 19:20		P3	
TPH-DRO	104	mg/kg	80.1	6.4	1	04/23/18 23:00	04/26/18 19:20			
<b>Surrogates</b>										
Nitrobenzene-d5 (S)	80	%	35-119		1	04/23/18 23:00	04/26/18 19:20	4165-60-0		
2-Fluorobiphenyl (S)	75	%	55-110		1	04/23/18 23:00	04/26/18 19:20	321-60-8		
Terphenyl-d14 (S)	69	%	45-114		1	04/23/18 23:00	04/26/18 19:20	1718-51-0		
<b>8260 MSV GRO and Oxygenates</b> Analytical Method: EPA 5035A/8260										
tert-Amylmethyl ether	<3.0	ug/kg	5.9	3.0	1		04/24/18 11:34	994-05-8		
Benzene	<3.0	ug/kg	5.9	3.0	1		04/24/18 11:34	71-43-2		
tert-Butyl Alcohol	<14.8	ug/kg	29.7	14.8	1		04/24/18 11:34	75-65-0		
1,2-Dibromoethane (EDB)	<3.0	ug/kg	5.9	3.0	1		04/24/18 11:34	106-93-4		
1,2-Dichloroethane	<3.0	ug/kg	5.9	3.0	1		04/24/18 11:34	107-06-2		
Diisopropyl ether	<3.0	ug/kg	5.9	3.0	1		04/24/18 11:34	108-20-3		
Ethylbenzene	<3.0	ug/kg	5.9	3.0	1		04/24/18 11:34	100-41-4		
Ethyl-tert-butyl ether	<3.0	ug/kg	5.9	3.0	1		04/24/18 11:34	637-92-3		
Methyl-tert-butyl ether	<3.0	ug/kg	5.9	3.0	1		04/24/18 11:34	1634-04-4		
Toluene	<3.0	ug/kg	5.9	3.0	1		04/24/18 11:34	108-88-3		
TPH-GRO	<0.30	mg/kg	0.59	0.30	1		04/24/18 11:34			
Xylene (Total)	<5.9	ug/kg	11.9	5.9	1		04/24/18 11:34	1330-20-7		

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## ANALYTICAL RESULTS

Project: HILAND-ROBERTS DAIRY SITE

Pace Project No.: 60268665

**Sample: SB-2 (0-3)** **Lab ID: 60268665001** Collected: 04/18/18 09:30 Received: 04/20/18 10:40 Matrix: Solid

*Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.*

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV GRO and Oxygenates</b> Analytical Method: EPA 5035A/8260									
<b>Surrogates</b>									
Toluene-d8 (S)	103	%	78-122		1		04/24/18 11:34	2037-26-5	1e
4-Bromofluorobenzene (S)	112	%	69-133		1		04/24/18 11:34	460-00-4	
1,2-Dichloroethane-d4 (S)	112	%	80-123		1		04/24/18 11:34	17060-07-0	
<b>Percent Moisture</b> Analytical Method: ASTM D2974									
Percent Moisture	8.0	%	0.50	0.50	1		04/23/18 00:00		

**Sample: SB-2 (18-20)** **Lab ID: 60268665002** Collected: 04/18/18 10:10 Received: 04/20/18 10:40 Matrix: Solid

*Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.*

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
<b>6010 MET ICP Red. Interference</b> Analytical Method: EPA 6010 Preparation Method: EPA 3050									
Arsenic	8.4	mg/kg	1.2	0.55	1	04/24/18 09:20	04/26/18 15:49	7440-38-2	
Barium	126	mg/kg	0.62	0.088	1	04/24/18 09:20	04/26/18 15:49	7440-39-3	
Cadmium	0.25J	mg/kg	0.62	0.084	1	04/24/18 09:20	04/26/18 15:49	7440-43-9	
Chromium	13.7	mg/kg	0.62	0.18	1	04/24/18 09:20	04/26/18 15:49	7440-47-3	
Lead	18.2	mg/kg	0.62	0.49	1	04/24/18 09:20	04/26/18 15:49	7439-92-1	
Selenium	<0.69	mg/kg	1.9	0.69	1	04/24/18 09:20	04/26/18 15:49	7782-49-2	
<b>8270 MSSV PAH by SIM</b> Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3546									
Acenaphthene	<4.1	ug/kg	8.3	4.1	1	04/23/18 23:00	04/26/18 14:56	83-32-9	
Anthracene	<4.1	ug/kg	8.3	4.1	1	04/23/18 23:00	04/26/18 14:56	120-12-7	
Benzo(a)anthracene	<4.1	ug/kg	8.3	4.1	1	04/23/18 23:00	04/26/18 14:56	56-55-3	
Benzo(a)pyrene	<4.1	ug/kg	8.3	4.1	1	04/23/18 23:00	04/26/18 14:56	50-32-8	
Benzo(b)fluoranthene	<4.1	ug/kg	8.3	4.1	1	04/23/18 23:00	04/26/18 14:56	205-99-2	
Benzo(k)fluoranthene	<4.1	ug/kg	8.3	4.1	1	04/23/18 23:00	04/26/18 14:56	207-08-9	
Chrysene	<4.1	ug/kg	8.3	4.1	1	04/23/18 23:00	04/26/18 14:56	218-01-9	
Dibenz(a,h)anthracene	<4.1	ug/kg	8.3	4.1	1	04/23/18 23:00	04/26/18 14:56	53-70-3	
Fluoranthene	<4.1	ug/kg	8.3	4.1	1	04/23/18 23:00	04/26/18 14:56	206-44-0	
Fluorene	<4.1	ug/kg	8.3	4.1	1	04/23/18 23:00	04/26/18 14:56	86-73-7	
Naphthalene	<4.1	ug/kg	8.3	4.1	1	04/23/18 23:00	04/26/18 14:56	91-20-3	
Pyrene	<4.1	ug/kg	8.3	4.1	1	04/23/18 23:00	04/26/18 14:56	129-00-0	
<b>Surrogates</b>									
2-Fluorobiphenyl (S)	69	%	45-116		1	04/23/18 23:00	04/26/18 14:56	321-60-8	
Terphenyl-d14 (S)	67	%	39-126		1	04/23/18 23:00	04/26/18 14:56	1718-51-0	
<b>8270 MSSV DRO/ORO</b> Analytical Method: EPA 8270 Preparation Method: EPA 3546									
TPH-ORO	5.1J	mg/kg	18.8	1.5	1	04/23/18 23:00	04/26/18 12:50		B
TPH-DRO	<1.5	mg/kg	18.8	1.5	1	04/23/18 23:00	04/26/18 12:50		
<b>Surrogates</b>									
Nitrobenzene-d5 (S)	72	%	35-119		1	04/23/18 23:00	04/26/18 12:50	4165-60-0	

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## ANALYTICAL RESULTS

Project: HILAND-ROBERTS DAIRY SITE  
Pace Project No.: 60268665

**Sample: SB-2 (18-20)**      **Lab ID: 60268665002**      Collected: 04/18/18 10:10      Received: 04/20/18 10:40      Matrix: Solid

*Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.*

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV DRO/ORO</b> Analytical Method: EPA 8270      Preparation Method: EPA 3546									
<b>Surrogates</b>									
2-Fluorobiphenyl (S)	79	%	55-110		1	04/23/18 23:00	04/26/18 12:50	321-60-8	
Terphenyl-d14 (S)	64	%	45-114		1	04/23/18 23:00	04/26/18 12:50	1718-51-0	
<b>8260 MSV GRO and Oxygenates</b> Analytical Method: EPA 5035A/8260									
tert-Amylmethyl ether	<3.1	ug/kg	6.1	3.1	1		04/23/18 18:16	994-05-8	
Benzene	<3.1	ug/kg	6.1	3.1	1		04/23/18 18:16	71-43-2	
tert-Butyl Alcohol	<15.3	ug/kg	30.5	15.3	1		04/23/18 18:16	75-65-0	
1,2-Dibromoethane (EDB)	<3.1	ug/kg	6.1	3.1	1		04/23/18 18:16	106-93-4	
1,2-Dichloroethane	<3.1	ug/kg	6.1	3.1	1		04/23/18 18:16	107-06-2	
Diisopropyl ether	<3.1	ug/kg	6.1	3.1	1		04/23/18 18:16	108-20-3	
Ethylbenzene	<3.1	ug/kg	6.1	3.1	1		04/23/18 18:16	100-41-4	
Ethyl-tert-butyl ether	<3.1	ug/kg	6.1	3.1	1		04/23/18 18:16	637-92-3	
Methyl-tert-butyl ether	<3.1	ug/kg	6.1	3.1	1		04/23/18 18:16	1634-04-4	
Toluene	<3.1	ug/kg	6.1	3.1	1		04/23/18 18:16	108-88-3	
TPH-GRO	<0.31	mg/kg	0.61	0.31	1		04/23/18 18:16		
Xylene (Total)	<6.1	ug/kg	12.2	6.1	1		04/23/18 18:16	1330-20-7	
<b>Surrogates</b>									
Toluene-d8 (S)	96	%	78-122		1		04/23/18 18:16	2037-26-5	
4-Bromofluorobenzene (S)	100	%	69-133		1		04/23/18 18:16	460-00-4	
1,2-Dichloroethane-d4 (S)	113	%	80-123		1		04/23/18 18:16	17060-07-0	
<b>Percent Moisture</b> Analytical Method: ASTM D2974									
Percent Moisture	22.4	%	0.50	0.50	1		04/23/18 00:00		

**Sample: SB-1 (0-3)**      **Lab ID: 60268665003**      Collected: 04/18/18 11:21      Received: 04/20/18 10:40      Matrix: Solid

*Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.*

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
<b>6010 MET ICP Red. Interference</b> Analytical Method: EPA 6010      Preparation Method: EPA 3050									
Arsenic	5.2	mg/kg	0.81	0.36	1	04/24/18 09:20	04/26/18 15:51	7440-38-2	
Barium	29.3	mg/kg	0.41	0.058	1	04/24/18 09:20	04/26/18 15:51	7440-39-3	
Cadmium	7.4	mg/kg	0.41	0.055	1	04/24/18 09:20	04/26/18 15:51	7440-43-9	
Chromium	4.8	mg/kg	0.41	0.12	1	04/24/18 09:20	04/26/18 15:51	7440-47-3	
Lead	22.7	mg/kg	0.41	0.32	1	04/24/18 09:20	04/26/18 15:51	7439-92-1	
Selenium	<0.45	mg/kg	1.2	0.45	1	04/24/18 09:20	04/26/18 15:51	7782-49-2	
<b>8270 MSSV PAH by SIM</b> Analytical Method: EPA 8270 by SIM      Preparation Method: EPA 3546									
Acenaphthene	25.5J	ug/kg	35.3	17.7	1	04/23/18 23:00	04/26/18 20:02	83-32-9	
Anthracene	75.5	ug/kg	35.3	17.7	1	04/23/18 23:00	04/26/18 20:02	120-12-7	
Benzo(a)anthracene	303	ug/kg	35.3	17.7	1	04/23/18 23:00	04/26/18 20:02	56-55-3	
Benzo(a)pyrene	254	ug/kg	35.3	17.7	1	04/23/18 23:00	04/26/18 20:02	50-32-8	

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## ANALYTICAL RESULTS

Project: HILAND-ROBERTS DAIRY SITE

Pace Project No.: 60268665

Sample: SB-1 (0-3) Lab ID: 60268665003 Collected: 04/18/18 11:21 Received: 04/20/18 10:40 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV PAH by SIM</b> Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3546									
Benzo(b)fluoranthene	436	ug/kg	35.3	17.7	1	04/23/18 23:00	04/26/18 20:02	205-99-2	2e
Benzo(k)fluoranthene	208	ug/kg	35.3	17.7	1	04/23/18 23:00	04/26/18 20:02	207-08-9	
Chrysene	313	ug/kg	35.3	17.7	1	04/23/18 23:00	04/26/18 20:02	218-01-9	
Dibenz(a,h)anthracene	37.4	ug/kg	35.3	17.7	1	04/23/18 23:00	04/26/18 20:02	53-70-3	
Fluoranthene	676	ug/kg	35.3	17.7	1	04/23/18 23:00	04/26/18 20:02	206-44-0	
Fluorene	<17.7	ug/kg	35.3	17.7	1	04/23/18 23:00	04/26/18 20:02	86-73-7	
Naphthalene	46.3	ug/kg	35.3	17.7	1	04/23/18 23:00	04/26/18 20:02	91-20-3	
Pyrene	534	ug/kg	35.3	17.7	1	04/23/18 23:00	04/26/18 20:02	129-00-0	
<b>Surrogates</b>									
2-Fluorobiphenyl (S)	80	%	45-116		1	04/23/18 23:00	04/26/18 20:02	321-60-8	P3
Terphenyl-d14 (S)	78	%	39-126		1	04/23/18 23:00	04/26/18 20:02	1718-51-0	
<b>8270 MSSV DRO/ORO</b> Analytical Method: EPA 8270 Preparation Method: EPA 3546									
TPH-ORO	395	mg/kg	80.2	6.4	1	04/23/18 23:00	04/26/18 19:41		
TPH-DRO	58.5J	mg/kg	80.2	6.4	1	04/23/18 23:00	04/26/18 19:41		
<b>Surrogates</b>									
Nitrobenzene-d5 (S)	69	%	35-119		1	04/23/18 23:00	04/26/18 19:41	4165-60-0	P3
2-Fluorobiphenyl (S)	87	%	55-110		1	04/23/18 23:00	04/26/18 19:41	321-60-8	
Terphenyl-d14 (S)	83	%	45-114		1	04/23/18 23:00	04/26/18 19:41	1718-51-0	
<b>8260 MSV GRO and Oxygenates</b> Analytical Method: EPA 5035A/8260									
tert-Amylmethyl ether	<3.4	ug/kg	6.8	3.4	1		04/23/18 18:31	994-05-8	
Benzene	<3.4	ug/kg	6.8	3.4	1		04/23/18 18:31	71-43-2	
tert-Butyl Alcohol	<17.1	ug/kg	34.1	17.1	1		04/23/18 18:31	75-65-0	
1,2-Dibromoethane (EDB)	<3.4	ug/kg	6.8	3.4	1		04/23/18 18:31	106-93-4	
1,2-Dichloroethane	<3.4	ug/kg	6.8	3.4	1		04/23/18 18:31	107-06-2	
Diisopropyl ether	<3.4	ug/kg	6.8	3.4	1		04/23/18 18:31	108-20-3	
Ethylbenzene	<3.4	ug/kg	6.8	3.4	1		04/23/18 18:31	100-41-4	
Ethyl-tert-butyl ether	<3.4	ug/kg	6.8	3.4	1		04/23/18 18:31	637-92-3	
Methyl-tert-butyl ether	<3.4	ug/kg	6.8	3.4	1		04/23/18 18:31	1634-04-4	
Toluene	<3.4	ug/kg	6.8	3.4	1		04/23/18 18:31	108-88-3	
TPH-GRO	<0.34	mg/kg	0.68	0.34	1		04/23/18 18:31		
Xylene (Total)	<6.8	ug/kg	13.6	6.8	1		04/23/18 18:31	1330-20-7	
<b>Surrogates</b>									
Toluene-d8 (S)	98	%	78-122		1		04/23/18 18:31	2037-26-5	
4-Bromofluorobenzene (S)	110	%	69-133		1		04/23/18 18:31	460-00-4	
1,2-Dichloroethane-d4 (S)	112	%	80-123		1		04/23/18 18:31	17060-07-0	
<b>Percent Moisture</b> Analytical Method: ASTM D2974									
Percent Moisture	8.1	%	0.50	0.50	1		04/23/18 00:00		

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## ANALYTICAL RESULTS

Project: HILAND-ROBERTS DAIRY SITE

Pace Project No.: 60268665

Sample: SB-1 (20-22) Lab ID: 60268665004 Collected: 04/18/18 11:45 Received: 04/20/18 10:40 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
<b>6010 MET ICP Red. Interference</b> Analytical Method: EPA 6010 Preparation Method: EPA 3050									
Arsenic	8.4	mg/kg	0.95	0.42	1	04/24/18 09:20	04/26/18 15:53	7440-38-2	
Barium	544	mg/kg	0.48	0.067	1	04/24/18 09:20	04/26/18 15:53	7440-39-3	
Cadmium	0.44J	mg/kg	0.48	0.065	1	04/24/18 09:20	04/26/18 15:53	7440-43-9	
Chromium	13.9	mg/kg	0.48	0.14	1	04/24/18 09:20	04/26/18 15:53	7440-47-3	
Lead	11.9	mg/kg	0.48	0.37	1	04/24/18 09:20	04/26/18 15:53	7439-92-1	
Selenium	<0.53	mg/kg	1.4	0.53	1	04/24/18 09:20	04/26/18 15:53	7782-49-2	
<b>8270 MSSV PAH by SIM</b> Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3546									
Acenaphthene	21.0	ug/kg	8.4	4.2	1	04/23/18 23:00	04/26/18 15:35	83-32-9	
Anthracene	17.3	ug/kg	8.4	4.2	1	04/23/18 23:00	04/26/18 15:35	120-12-7	
Benzo(a)anthracene	23.2	ug/kg	8.4	4.2	1	04/23/18 23:00	04/26/18 15:35	56-55-3	
Benzo(a)pyrene	14.8	ug/kg	8.4	4.2	1	04/23/18 23:00	04/26/18 15:35	50-32-8	
Benzo(b)fluoranthene	23.8	ug/kg	8.4	4.2	1	04/23/18 23:00	04/26/18 15:35	205-99-2	2e
Benzo(k)fluoranthene	12.0	ug/kg	8.4	4.2	1	04/23/18 23:00	04/26/18 15:35	207-08-9	
Chrysene	22.5	ug/kg	8.4	4.2	1	04/23/18 23:00	04/26/18 15:35	218-01-9	
Dibenz(a,h)anthracene	<4.2	ug/kg	8.4	4.2	1	04/23/18 23:00	04/26/18 15:35	53-70-3	
Fluoranthene	81.9	ug/kg	8.4	4.2	1	04/23/18 23:00	04/26/18 15:35	206-44-0	
Fluorene	33.8	ug/kg	8.4	4.2	1	04/23/18 23:00	04/26/18 15:35	86-73-7	
Naphthalene	197	ug/kg	8.4	4.2	1	04/23/18 23:00	04/26/18 15:35	91-20-3	
Pyrene	66.8	ug/kg	8.4	4.2	1	04/23/18 23:00	04/26/18 15:35	129-00-0	
<b>Surrogates</b>									
2-Fluorobiphenyl (S)	71	%	45-116		1	04/23/18 23:00	04/26/18 15:35	321-60-8	
Terphenyl-d14 (S)	70	%	39-126		1	04/23/18 23:00	04/26/18 15:35	1718-51-0	
<b>8270 MSSV DRO/ORO</b> Analytical Method: EPA 8270 Preparation Method: EPA 3546									
TPH-ORO	8.0J	mg/kg	19.0	1.5	1	04/23/18 23:00	04/26/18 13:31		B
TPH-DRO	210	mg/kg	19.0	1.5	1	04/23/18 23:00	04/26/18 13:31		
<b>Surrogates</b>									
Nitrobenzene-d5 (S)	72	%	35-119		1	04/23/18 23:00	04/26/18 13:31	4165-60-0	
2-Fluorobiphenyl (S)	79	%	55-110		1	04/23/18 23:00	04/26/18 13:31	321-60-8	
Terphenyl-d14 (S)	77	%	45-114		1	04/23/18 23:00	04/26/18 13:31	1718-51-0	
<b>8260 MSV GRO and Oxygenates</b> Analytical Method: EPA 5035A/8260									
tert-Amylmethyl ether	<2.9	ug/kg	5.8	2.9	1		04/23/18 18:47	994-05-8	
Benzene	4.5J	ug/kg	5.8	2.9	1		04/23/18 18:47	71-43-2	
tert-Butyl Alcohol	<14.5	ug/kg	29.1	14.5	1		04/23/18 18:47	75-65-0	
1,2-Dibromoethane (EDB)	<2.9	ug/kg	5.8	2.9	1		04/23/18 18:47	106-93-4	
1,2-Dichloroethane	<2.9	ug/kg	5.8	2.9	1		04/23/18 18:47	107-06-2	
Diisopropyl ether	<2.9	ug/kg	5.8	2.9	1		04/23/18 18:47	108-20-3	
Ethylbenzene	10.8	ug/kg	5.8	2.9	1		04/23/18 18:47	100-41-4	
Ethyl-tert-butyl ether	<2.9	ug/kg	5.8	2.9	1		04/23/18 18:47	637-92-3	
Methyl-tert-butyl ether	<2.9	ug/kg	5.8	2.9	1		04/23/18 18:47	1634-04-4	
Toluene	<2.9	ug/kg	5.8	2.9	1		04/23/18 18:47	108-88-3	
TPH-GRO	2.5	mg/kg	0.58	0.29	1		04/23/18 18:47		
Xylene (Total)	<5.8	ug/kg	11.6	5.8	1		04/23/18 18:47	1330-20-7	

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## ANALYTICAL RESULTS

Project: HILAND-ROBERTS DAIRY SITE

Pace Project No.: 60268665

**Sample: SB-1 (20-22)**      **Lab ID: 60268665004**      Collected: 04/18/18 11:45      Received: 04/20/18 10:40      Matrix: Solid

*Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.*

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260 MSV GRO and Oxygenates	Analytical Method: EPA 5035A/8260								
Surrogates									
Toluene-d8 (S)	96	%	78-122		1		04/23/18 18:47	2037-26-5	
4-Bromofluorobenzene (S)	100	%	69-133		1		04/23/18 18:47	460-00-4	
1,2-Dichloroethane-d4 (S)	115	%	80-123		1		04/23/18 18:47	17060-07-0	
Percent Moisture	Analytical Method: ASTM D2974								
Percent Moisture	22.9	%	0.50	0.50	1		04/23/18 00:00		

**Sample: SB-7 (0-3)**      **Lab ID: 60268665005**      Collected: 04/18/18 13:26      Received: 04/20/18 10:40      Matrix: Solid

*Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.*

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
<b>6010 MET ICP Red. Interference</b>		Analytical Method: EPA 6010      Preparation Method: EPA 3050							
Arsenic	<b>7.3</b>	mg/kg	0.77	0.34	1	04/24/18 09:20	04/26/18 15:55	7440-38-2	
Barium	<b>18.5</b>	mg/kg	0.39	0.055	1	04/24/18 09:20	04/26/18 15:55	7440-39-3	
Cadmium	<b>0.30J</b>	mg/kg	0.39	0.053	1	04/24/18 09:20	04/26/18 15:55	7440-43-9	
Chromium	<b>9.7</b>	mg/kg	0.39	0.11	1	04/24/18 09:20	04/26/18 15:55	7440-47-3	
Lead	<b>10.7</b>	mg/kg	0.39	0.30	1	04/24/18 09:20	04/26/18 15:55	7439-92-1	
Selenium	<b>&lt;0.43</b>	mg/kg	1.2	0.43	1	04/24/18 09:20	04/26/18 15:55	7782-49-2	
<b>8270 MSSV PAH by SIM</b>		Analytical Method: EPA 8270 by SIM      Preparation Method: EPA 3546							
Acenaphthene	<b>&lt;3.5</b>	ug/kg	7.0	3.5	1	04/23/18 23:00	04/26/18 15:54	83-32-9	
Anthracene	<b>&lt;3.5</b>	ug/kg	7.0	3.5	1	04/23/18 23:00	04/26/18 15:54	120-12-7	
Benzo(a)anthracene	<b>&lt;3.5</b>	ug/kg	7.0	3.5	1	04/23/18 23:00	04/26/18 15:54	56-55-3	
Benzo(a)pyrene	<b>&lt;3.5</b>	ug/kg	7.0	3.5	1	04/23/18 23:00	04/26/18 15:54	50-32-8	
Benzo(b)fluoranthene	<b>4.5J</b>	ug/kg	7.0	3.5	1	04/23/18 23:00	04/26/18 15:54	205-99-2	2e
Benzo(k)fluoranthene	<b>&lt;3.5</b>	ug/kg	7.0	3.5	1	04/23/18 23:00	04/26/18 15:54	207-08-9	
Chrysene	<b>&lt;3.5</b>	ug/kg	7.0	3.5	1	04/23/18 23:00	04/26/18 15:54	218-01-9	
Dibenz(a,h)anthracene	<b>&lt;3.5</b>	ug/kg	7.0	3.5	1	04/23/18 23:00	04/26/18 15:54	53-70-3	
Fluoranthene	<b>3.8J</b>	ug/kg	7.0	3.5	1	04/23/18 23:00	04/26/18 15:54	206-44-0	
Fluorene	<b>&lt;3.5</b>	ug/kg	7.0	3.5	1	04/23/18 23:00	04/26/18 15:54	86-73-7	
Naphthalene	<b>&lt;3.5</b>	ug/kg	7.0	3.5	1	04/23/18 23:00	04/26/18 15:54	91-20-3	
Pyrene	<b>7.1</b>	ug/kg	7.0	3.5	1	04/23/18 23:00	04/26/18 15:54	129-00-0	
<b>Surrogates</b>									
2-Fluorobiphenyl (S)	66	%	45-116		1	04/23/18 23:00	04/26/18 15:54	321-60-8	
Terphenyl-d14 (S)	65	%	39-126		1	04/23/18 23:00	04/26/18 15:54	1718-51-0	

**8270 MSSV DRO/ORO**      Analytical Method: EPA 8270      Preparation Method: EPA 3546

TPH-ORO	<b>25.8</b>	mg/kg	15.8	1.3	1	04/23/18 23:00	04/26/18 13:52		
TPH-DRO	<b>12.8J</b>	mg/kg	15.8	1.3	1	04/23/18 23:00	04/26/18 13:52		
<b>Surrogates</b>									
Nitrobenzene-d5 (S)	76	%	35-119		1	04/23/18 23:00	04/26/18 13:52	4165-60-0	

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## ANALYTICAL RESULTS

Project: HILAND-ROBERTS DAIRY SITE

Pace Project No.: 60268665

Sample: SB-7 (0-3) Lab ID: 60268665005 Collected: 04/18/18 13:26 Received: 04/20/18 10:40 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV DRO/ORO</b> Analytical Method: EPA 8270 Preparation Method: EPA 3546									
<b>Surrogates</b>									
2-Fluorobiphenyl (S)	76	%	55-110		1	04/23/18 23:00	04/26/18 13:52	321-60-8	
Terphenyl-d14 (S)	68	%	45-114		1	04/23/18 23:00	04/26/18 13:52	1718-51-0	
<b>8260 MSV GRO and Oxygenates</b> Analytical Method: EPA 5035A/8260									
tert-Amylmethyl ether	<2.9	ug/kg	5.8	2.9	1		04/23/18 19:02	994-05-8	
Benzene	<2.9	ug/kg	5.8	2.9	1		04/23/18 19:02	71-43-2	
tert-Butyl Alcohol	<14.5	ug/kg	29.0	14.5	1		04/23/18 19:02	75-65-0	
1,2-Dibromoethane (EDB)	<2.9	ug/kg	5.8	2.9	1		04/23/18 19:02	106-93-4	
1,2-Dichloroethane	<2.9	ug/kg	5.8	2.9	1		04/23/18 19:02	107-06-2	
Diisopropyl ether	<2.9	ug/kg	5.8	2.9	1		04/23/18 19:02	108-20-3	
Ethylbenzene	<2.9	ug/kg	5.8	2.9	1		04/23/18 19:02	100-41-4	
Ethyl-tert-butyl ether	<2.9	ug/kg	5.8	2.9	1		04/23/18 19:02	637-92-3	
Methyl-tert-butyl ether	<2.9	ug/kg	5.8	2.9	1		04/23/18 19:02	1634-04-4	
Toluene	<2.9	ug/kg	5.8	2.9	1		04/23/18 19:02	108-88-3	
TPH-GRO	<0.29	mg/kg	0.58	0.29	1		04/23/18 19:02		
Xylene (Total)	<5.8	ug/kg	11.6	5.8	1		04/23/18 19:02	1330-20-7	
<b>Surrogates</b>									
Toluene-d8 (S)	97	%	78-122		1		04/23/18 19:02	2037-26-5	
4-Bromofluorobenzene (S)	104	%	69-133		1		04/23/18 19:02	460-00-4	
1,2-Dichloroethane-d4 (S)	115	%	80-123		1		04/23/18 19:02	17060-07-0	
<b>Percent Moisture</b> Analytical Method: ASTM D2974									
Percent Moisture	6.4	%	0.50	0.50	1		04/23/18 00:00		

Sample: SB-7 (14-16) Lab ID: 60268665006 Collected: 04/18/18 13:50 Received: 04/20/18 10:40 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
<b>6010 MET ICP Red. Interference</b> Analytical Method: EPA 6010 Preparation Method: EPA 3050									
Arsenic	6.8	mg/kg	0.94	0.41	1	04/24/18 09:20	04/26/18 15:58	7440-38-2	
Barium	105	mg/kg	0.47	0.066	1	04/24/18 09:20	04/26/18 15:58	7440-39-3	
Cadmium	0.40J	mg/kg	0.47	0.064	1	04/24/18 09:20	04/26/18 15:58	7440-43-9	
Chromium	14.0	mg/kg	0.47	0.13	1	04/24/18 09:20	04/26/18 15:58	7440-47-3	
Lead	9.8	mg/kg	0.47	0.37	1	04/24/18 09:20	04/26/18 15:58	7439-92-1	
Selenium	<0.52	mg/kg	1.4	0.52	1	04/24/18 09:20	04/26/18 15:58	7782-49-2	
<b>8270 MSSV PAH by SIM</b> Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3546									
Acenaphthene	<4.3	ug/kg	8.5	4.3	1	04/23/18 23:00	04/26/18 16:13	83-32-9	
Anthracene	<4.3	ug/kg	8.5	4.3	1	04/23/18 23:00	04/26/18 16:13	120-12-7	
Benzo(a)anthracene	<4.3	ug/kg	8.5	4.3	1	04/23/18 23:00	04/26/18 16:13	56-55-3	
Benzo(a)pyrene	<4.3	ug/kg	8.5	4.3	1	04/23/18 23:00	04/26/18 16:13	50-32-8	

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## ANALYTICAL RESULTS

Project: HILAND-ROBERTS DAIRY SITE

Pace Project No.: 60268665

Sample: SB-7 (14-16) Lab ID: 60268665006 Collected: 04/18/18 13:50 Received: 04/20/18 10:40 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV PAH by SIM</b> Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3546									
Benzo(b)fluoranthene	<4.3	ug/kg	8.5	4.3	1	04/23/18 23:00	04/26/18 16:13	205-99-2	
Benzo(k)fluoranthene	<4.3	ug/kg	8.5	4.3	1	04/23/18 23:00	04/26/18 16:13	207-08-9	
Chrysene	<4.3	ug/kg	8.5	4.3	1	04/23/18 23:00	04/26/18 16:13	218-01-9	
Dibenz(a,h)anthracene	<4.3	ug/kg	8.5	4.3	1	04/23/18 23:00	04/26/18 16:13	53-70-3	
Fluoranthene	<4.3	ug/kg	8.5	4.3	1	04/23/18 23:00	04/26/18 16:13	206-44-0	
Fluorene	<4.3	ug/kg	8.5	4.3	1	04/23/18 23:00	04/26/18 16:13	86-73-7	
Naphthalene	<4.3	ug/kg	8.5	4.3	1	04/23/18 23:00	04/26/18 16:13	91-20-3	
Pyrene	<4.3	ug/kg	8.5	4.3	1	04/23/18 23:00	04/26/18 16:13	129-00-0	
<b>Surrogates</b>									
2-Fluorobiphenyl (S)	73	%	45-116		1	04/23/18 23:00	04/26/18 16:13	321-60-8	
Terphenyl-d14 (S)	68	%	39-126		1	04/23/18 23:00	04/26/18 16:13	1718-51-0	
<b>8270 MSSV DRO/ORO</b> Analytical Method: EPA 8270 Preparation Method: EPA 3546									
TPH-ORO	5.4J	mg/kg	19.4	1.5	1	04/23/18 23:00	04/26/18 14:12		B
TPH-DRO	1.6J	mg/kg	19.4	1.5	1	04/23/18 23:00	04/26/18 14:12		
<b>Surrogates</b>									
Nitrobenzene-d5 (S)	72	%	35-119		1	04/23/18 23:00	04/26/18 14:12	4165-60-0	
2-Fluorobiphenyl (S)	71	%	55-110		1	04/23/18 23:00	04/26/18 14:12	321-60-8	
Terphenyl-d14 (S)	70	%	45-114		1	04/23/18 23:00	04/26/18 14:12	1718-51-0	
<b>8260 MSV GRO and Oxygenates</b> Analytical Method: EPA 5035A/8260									
tert-Amylmethyl ether	<2.6	ug/kg	5.2	2.6	1		04/23/18 19:18	994-05-8	
Benzene	<2.6	ug/kg	5.2	2.6	1		04/23/18 19:18	71-43-2	
tert-Butyl Alcohol	<13.1	ug/kg	26.2	13.1	1		04/23/18 19:18	75-65-0	
1,2-Dibromoethane (EDB)	<2.6	ug/kg	5.2	2.6	1		04/23/18 19:18	106-93-4	
1,2-Dichloroethane	<2.6	ug/kg	5.2	2.6	1		04/23/18 19:18	107-06-2	
Diisopropyl ether	<2.6	ug/kg	5.2	2.6	1		04/23/18 19:18	108-20-3	
Ethylbenzene	<2.6	ug/kg	5.2	2.6	1		04/23/18 19:18	100-41-4	
Ethyl-tert-butyl ether	<2.6	ug/kg	5.2	2.6	1		04/23/18 19:18	637-92-3	
Methyl-tert-butyl ether	<2.6	ug/kg	5.2	2.6	1		04/23/18 19:18	1634-04-4	
Toluene	<2.6	ug/kg	5.2	2.6	1		04/23/18 19:18	108-88-3	
TPH-GRO	<0.26	mg/kg	0.52	0.26	1		04/23/18 19:18		
Xylene (Total)	<5.2	ug/kg	10.5	5.2	1		04/23/18 19:18	1330-20-7	
<b>Surrogates</b>									
Toluene-d8 (S)	96	%	78-122		1		04/23/18 19:18	2037-26-5	
4-Bromofluorobenzene (S)	100	%	69-133		1		04/23/18 19:18	460-00-4	
1,2-Dichloroethane-d4 (S)	111	%	80-123		1		04/23/18 19:18	17060-07-0	
<b>Percent Moisture</b> Analytical Method: ASTM D2974									
Percent Moisture	22.7	%	0.50	0.50	1		04/23/18 00:00		

## REPORT OF LABORATORY ANALYSIS

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## ANALYTICAL RESULTS

Project: HILAND-ROBERTS DAIRY SITE

Pace Project No.: 60268665

Sample: SB-6 (0-3) Lab ID: 60268665007 Collected: 04/18/18 14:00 Received: 04/20/18 10:40 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
<b>6010 MET ICP Red. Interference</b> Analytical Method: EPA 6010 Preparation Method: EPA 3050									
Arsenic	6.9	mg/kg	0.97	0.43	1	04/24/18 09:20	04/26/18 16:04	7440-38-2	
Barium	221	mg/kg	0.49	0.069	1	04/24/18 09:20	04/26/18 16:04	7440-39-3	
Cadmium	0.60	mg/kg	0.49	0.066	1	04/24/18 09:20	04/26/18 16:04	7440-43-9	
Chromium	12.6	mg/kg	0.49	0.14	1	04/24/18 09:20	04/27/18 13:40	7440-47-3	
Lead	40.7	mg/kg	0.49	0.38	1	04/24/18 09:20	04/26/18 16:04	7439-92-1	
Selenium	<0.54	mg/kg	1.5	0.54	1	04/24/18 09:20	04/26/18 16:04	7782-49-2	
<b>8270 MSSV PAH by SIM</b> Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3546									
Acenaphthene	<3.8	ug/kg	7.6	3.8	1	04/23/18 23:00	04/26/18 16:32	83-32-9	
Anthracene	<3.8	ug/kg	7.6	3.8	1	04/23/18 23:00	04/26/18 16:32	120-12-7	
Benzo(a)anthracene	8.7	ug/kg	7.6	3.8	1	04/23/18 23:00	04/26/18 16:32	56-55-3	
Benzo(a)pyrene	6.3J	ug/kg	7.6	3.8	1	04/23/18 23:00	04/26/18 16:32	50-32-8	
Benzo(b)fluoranthene	21.5	ug/kg	7.6	3.8	1	04/23/18 23:00	04/26/18 16:32	205-99-2	2e
Benzo(k)fluoranthene	4.8J	ug/kg	7.6	3.8	1	04/23/18 23:00	04/26/18 16:32	207-08-9	
Chrysene	25.9	ug/kg	7.6	3.8	1	04/23/18 23:00	04/26/18 16:32	218-01-9	
Dibenz(a,h)anthracene	<3.8	ug/kg	7.6	3.8	1	04/23/18 23:00	04/26/18 16:32	53-70-3	
Fluoranthene	14.0	ug/kg	7.6	3.8	1	04/23/18 23:00	04/26/18 16:32	206-44-0	
Fluorene	<3.8	ug/kg	7.6	3.8	1	04/23/18 23:00	04/26/18 16:32	86-73-7	
Naphthalene	8.0	ug/kg	7.6	3.8	1	04/23/18 23:00	04/26/18 16:32	91-20-3	
Pyrene	13.5	ug/kg	7.6	3.8	1	04/23/18 23:00	04/26/18 16:32	129-00-0	
<b>Surrogates</b>									
2-Fluorobiphenyl (S)	67	%	45-116		1	04/23/18 23:00	04/26/18 16:32	321-60-8	
Terphenyl-d14 (S)	65	%	39-126		1	04/23/18 23:00	04/26/18 16:32	1718-51-0	
<b>8270 MSSV DRO/ORO</b> Analytical Method: EPA 8270 Preparation Method: EPA 3546									
TPH-ORO	24.9	mg/kg	17.4	1.4	1	04/23/18 23:00	04/26/18 14:32		
TPH-DRO	11.7J	mg/kg	17.4	1.4	1	04/23/18 23:00	04/26/18 14:32		
<b>Surrogates</b>									
Nitrobenzene-d5 (S)	71	%	35-119		1	04/23/18 23:00	04/26/18 14:32	4165-60-0	
2-Fluorobiphenyl (S)	76	%	55-110		1	04/23/18 23:00	04/26/18 14:32	321-60-8	
Terphenyl-d14 (S)	65	%	45-114		1	04/23/18 23:00	04/26/18 14:32	1718-51-0	
<b>8260 MSV GRO and Oxygenates</b> Analytical Method: EPA 5035A/8260									
tert-Amylmethyl ether	<2.9	ug/kg	5.7	2.9	1		04/23/18 19:34	994-05-8	
Benzene	<2.9	ug/kg	5.7	2.9	1		04/23/18 19:34	71-43-2	
tert-Butyl Alcohol	<14.3	ug/kg	28.5	14.3	1		04/23/18 19:34	75-65-0	
1,2-Dibromoethane (EDB)	<2.9	ug/kg	5.7	2.9	1		04/23/18 19:34	106-93-4	
1,2-Dichloroethane	<2.9	ug/kg	5.7	2.9	1		04/23/18 19:34	107-06-2	
Diisopropyl ether	<2.9	ug/kg	5.7	2.9	1		04/23/18 19:34	108-20-3	
Ethylbenzene	<2.9	ug/kg	5.7	2.9	1		04/23/18 19:34	100-41-4	
Ethyl-tert-butyl ether	<2.9	ug/kg	5.7	2.9	1		04/23/18 19:34	637-92-3	
Methyl-tert-butyl ether	<2.9	ug/kg	5.7	2.9	1		04/23/18 19:34	1634-04-4	
Toluene	<2.9	ug/kg	5.7	2.9	1		04/23/18 19:34	108-88-3	
TPH-GRO	<0.29	mg/kg	0.57	0.29	1		04/23/18 19:34		
Xylene (Total)	<5.7	ug/kg	11.4	5.7	1		04/23/18 19:34	1330-20-7	

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## ANALYTICAL RESULTS

Project: HILAND-ROBERTS DAIRY SITE

Pace Project No.: 60268665

**Sample: SB-6 (0-3)**      **Lab ID: 60268665007**      Collected: 04/18/18 14:00      Received: 04/20/18 10:40      Matrix: Solid

*Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.*

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV GRO and Oxygenates</b> Analytical Method: EPA 5035A/8260									
<b>Surrogates</b>									
Toluene-d8 (S)	98	%	78-122		1		04/23/18 19:34	2037-26-5	
4-Bromofluorobenzene (S)	102	%	69-133		1		04/23/18 19:34	460-00-4	
1,2-Dichloroethane-d4 (S)	108	%	80-123		1		04/23/18 19:34	17060-07-0	
<b>Percent Moisture</b> Analytical Method: ASTM D2974									
Percent Moisture	<b>18.2</b>	%	0.50	0.50	1		04/23/18 00:00		

**Sample: SB-6 (22-24)**      **Lab ID: 60268665008**      Collected: 04/18/18 14:35      Received: 04/20/18 10:40      Matrix: Solid

*Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.*

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
<b>6010 MET ICP Red. Interference</b> Analytical Method: EPA 6010      Preparation Method: EPA 3050									
Arsenic	<b>8.7</b>	mg/kg	1.2	0.53	1	04/24/18 09:20	04/26/18 16:06	7440-38-2	
Barium	<b>174</b>	mg/kg	0.60	0.085	1	04/24/18 09:20	04/26/18 16:06	7440-39-3	
Cadmium	<b>0.34J</b>	mg/kg	0.60	0.081	1	04/24/18 09:20	04/26/18 16:06	7440-43-9	
Chromium	<b>15.2</b>	mg/kg	0.60	0.17	1	04/24/18 09:20	04/27/18 13:42	7440-47-3	
Lead	<b>10.8</b>	mg/kg	0.60	0.47	1	04/24/18 09:20	04/26/18 16:06	7439-92-1	
Selenium	<b>&lt;0.67</b>	mg/kg	1.8	0.67	1	04/24/18 09:20	04/26/18 16:06	7782-49-2	
<b>8270 MSSV PAH by SIM</b> Analytical Method: EPA 8270 by SIM      Preparation Method: EPA 3546									
Acenaphthene	<b>&lt;4.1</b>	ug/kg	8.2	4.1	1	04/23/18 23:00	04/26/18 16:51	83-32-9	
Anthracene	<b>&lt;4.1</b>	ug/kg	8.2	4.1	1	04/23/18 23:00	04/26/18 16:51	120-12-7	
Benzo(a)anthracene	<b>&lt;4.1</b>	ug/kg	8.2	4.1	1	04/23/18 23:00	04/26/18 16:51	56-55-3	
Benzo(a)pyrene	<b>&lt;4.1</b>	ug/kg	8.2	4.1	1	04/23/18 23:00	04/26/18 16:51	50-32-8	
Benzo(b)fluoranthene	<b>&lt;4.1</b>	ug/kg	8.2	4.1	1	04/23/18 23:00	04/26/18 16:51	205-99-2	
Benzo(k)fluoranthene	<b>&lt;4.1</b>	ug/kg	8.2	4.1	1	04/23/18 23:00	04/26/18 16:51	207-08-9	
Chrysene	<b>&lt;4.1</b>	ug/kg	8.2	4.1	1	04/23/18 23:00	04/26/18 16:51	218-01-9	
Dibenz(a,h)anthracene	<b>&lt;4.1</b>	ug/kg	8.2	4.1	1	04/23/18 23:00	04/26/18 16:51	53-70-3	
Fluoranthene	<b>&lt;4.1</b>	ug/kg	8.2	4.1	1	04/23/18 23:00	04/26/18 16:51	206-44-0	
Fluorene	<b>&lt;4.1</b>	ug/kg	8.2	4.1	1	04/23/18 23:00	04/26/18 16:51	86-73-7	
Naphthalene	<b>4.4J</b>	ug/kg	8.2	4.1	1	04/23/18 23:00	04/26/18 16:51	91-20-3	
Pyrene	<b>&lt;4.1</b>	ug/kg	8.2	4.1	1	04/23/18 23:00	04/26/18 16:51	129-00-0	
<b>Surrogates</b>									
2-Fluorobiphenyl (S)	71	%	45-116		1	04/23/18 23:00	04/26/18 16:51	321-60-8	
Terphenyl-d14 (S)	69	%	39-126		1	04/23/18 23:00	04/26/18 16:51	1718-51-0	

**8270 MSSV DRO/ORO**      Analytical Method: EPA 8270      Preparation Method: EPA 3546

TPH-ORO	<b>5.4J</b>	mg/kg	18.7	1.5	1	04/23/18 23:00	04/26/18 14:53		B
TPH-DRO	<b>&lt;1.5</b>	mg/kg	18.7	1.5	1	04/23/18 23:00	04/26/18 14:53		
<b>Surrogates</b>									
Nitrobenzene-d5 (S)	88	%	35-119		1	04/23/18 23:00	04/26/18 14:53	4165-60-0	

## REPORT OF LABORATORY ANALYSIS

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## ANALYTICAL RESULTS

Project: HILAND-ROBERTS DAIRY SITE

Pace Project No.: 60268665

**Sample: SB-6 (22-24)** **Lab ID: 60268665008** Collected: 04/18/18 14:35 Received: 04/20/18 10:40 Matrix: Solid

*Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.*

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV DRO/ORO</b> Analytical Method: EPA 8270 Preparation Method: EPA 3546									
<b>Surrogates</b>									
2-Fluorobiphenyl (S)	83	%	55-110		1	04/23/18 23:00	04/26/18 14:53	321-60-8	
Terphenyl-d14 (S)	73	%	45-114		1	04/23/18 23:00	04/26/18 14:53	1718-51-0	
<b>8260 MSV GRO and Oxygenates</b> Analytical Method: EPA 5035A/8260									
tert-Amylmethyl ether	<2.9	ug/kg	5.7	2.9	1		04/23/18 19:49	994-05-8	
Benzene	<2.9	ug/kg	5.7	2.9	1		04/23/18 19:49	71-43-2	
tert-Butyl Alcohol	<14.3	ug/kg	28.7	14.3	1		04/23/18 19:49	75-65-0	
1,2-Dibromoethane (EDB)	<2.9	ug/kg	5.7	2.9	1		04/23/18 19:49	106-93-4	
1,2-Dichloroethane	<2.9	ug/kg	5.7	2.9	1		04/23/18 19:49	107-06-2	
Diisopropyl ether	<2.9	ug/kg	5.7	2.9	1		04/23/18 19:49	108-20-3	
Ethylbenzene	<2.9	ug/kg	5.7	2.9	1		04/23/18 19:49	100-41-4	
Ethyl-tert-butyl ether	<2.9	ug/kg	5.7	2.9	1		04/23/18 19:49	637-92-3	
Methyl-tert-butyl ether	<2.9	ug/kg	5.7	2.9	1		04/23/18 19:49	1634-04-4	
Toluene	<2.9	ug/kg	5.7	2.9	1		04/23/18 19:49	108-88-3	
TPH-GRO	<0.29	mg/kg	0.57	0.29	1		04/23/18 19:49		
Xylene (Total)	<5.7	ug/kg	11.5	5.7	1		04/23/18 19:49	1330-20-7	
<b>Surrogates</b>									
Toluene-d8 (S)	95	%	78-122		1		04/23/18 19:49	2037-26-5	
4-Bromofluorobenzene (S)	101	%	69-133		1		04/23/18 19:49	460-00-4	
1,2-Dichloroethane-d4 (S)	108	%	80-123		1		04/23/18 19:49	17060-07-0	
<b>Percent Moisture</b> Analytical Method: ASTM D2974									
Percent Moisture	22.7	%	0.50	0.50	1		04/23/18 00:00		

**Sample: SB-8 (0-3)** **Lab ID: 60268665009** Collected: 04/18/18 14:48 Received: 04/20/18 10:40 Matrix: Solid

*Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.*

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
<b>6010 MET ICP Red. Interference</b> Analytical Method: EPA 6010 Preparation Method: EPA 3050									
Arsenic	5.3	mg/kg	1.1	0.47	1	04/24/18 09:20	04/26/18 16:08	7440-38-2	
Barium	144	mg/kg	0.53	0.075	1	04/24/18 09:20	04/26/18 16:08	7440-39-3	
Cadmium	0.29J	mg/kg	0.53	0.072	1	04/24/18 09:20	04/26/18 16:08	7440-43-9	
Chromium	9.1	mg/kg	0.53	0.15	1	04/24/18 09:20	04/27/18 13:49	7440-47-3	
Lead	30.0	mg/kg	0.53	0.42	1	04/24/18 09:20	04/26/18 16:08	7439-92-1	
Selenium	<0.59	mg/kg	1.6	0.59	1	04/24/18 09:20	04/26/18 16:08	7782-49-2	
<b>8270 MSSV PAH by SIM</b> Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3546									
Acenaphthene	<11.8	ug/kg	23.6	11.8	1	04/23/18 23:00	04/26/18 17:10	83-32-9	
Anthracene	<11.8	ug/kg	23.6	11.8	1	04/23/18 23:00	04/26/18 17:10	120-12-7	
Benzo(a)anthracene	<11.8	ug/kg	23.6	11.8	1	04/23/18 23:00	04/26/18 17:10	56-55-3	
Benzo(a)pyrene	<11.8	ug/kg	23.6	11.8	1	04/23/18 23:00	04/26/18 17:10	50-32-8	

## REPORT OF LABORATORY ANALYSIS

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## ANALYTICAL RESULTS

Project: HILAND-ROBERTS DAIRY SITE

Pace Project No.: 60268665

**Sample: SB-8 (0-3)**      **Lab ID: 60268665009**      Collected: 04/18/18 14:48      Received: 04/20/18 10:40      Matrix: Solid

*Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.*

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV PAH by SIM</b> Analytical Method: EPA 8270 by SIM      Preparation Method: EPA 3546									
Benzo(b)fluoranthene	<11.8	ug/kg	23.6	11.8	1	04/23/18 23:00	04/26/18 17:10	205-99-2	
Benzo(k)fluoranthene	<11.8	ug/kg	23.6	11.8	1	04/23/18 23:00	04/26/18 17:10	207-08-9	
Chrysene	<11.8	ug/kg	23.6	11.8	1	04/23/18 23:00	04/26/18 17:10	218-01-9	
Dibenz(a,h)anthracene	<11.8	ug/kg	23.6	11.8	1	04/23/18 23:00	04/26/18 17:10	53-70-3	
Fluoranthene	17.1J	ug/kg	23.6	11.8	1	04/23/18 23:00	04/26/18 17:10	206-44-0	
Fluorene	<11.8	ug/kg	23.6	11.8	1	04/23/18 23:00	04/26/18 17:10	86-73-7	
Naphthalene	<11.8	ug/kg	23.6	11.8	1	04/23/18 23:00	04/26/18 17:10	91-20-3	
Pyrene	13.9J	ug/kg	23.6	11.8	1	04/23/18 23:00	04/26/18 17:10	129-00-0	
<b>Surrogates</b>									
2-Fluorobiphenyl (S)	70	%	45-116		1	04/23/18 23:00	04/26/18 17:10	321-60-8	
Terphenyl-d14 (S)	71	%	39-126		1	04/23/18 23:00	04/26/18 17:10	1718-51-0	
<b>8270 MSSV DRO/ORO</b> Analytical Method: EPA 8270      Preparation Method: EPA 3546									
TPH-ORO	19.3J	mg/kg	53.5	4.3	1	04/23/18 23:00	04/26/18 15:13		
TPH-DRO	4.9J	mg/kg	53.5	4.3	1	04/23/18 23:00	04/26/18 15:13		
<b>Surrogates</b>									
Nitrobenzene-d5 (S)	84	%	35-119		1	04/23/18 23:00	04/26/18 15:13	4165-60-0	
2-Fluorobiphenyl (S)	79	%	55-110		1	04/23/18 23:00	04/26/18 15:13	321-60-8	
Terphenyl-d14 (S)	70	%	45-114		1	04/23/18 23:00	04/26/18 15:13	1718-51-0	
<b>8260 MSV GRO and Oxygenates</b> Analytical Method: EPA 5035A/8260									
tert-Amylmethyl ether	<2.8	ug/kg	5.5	2.8	1		04/23/18 20:05	994-05-8	
Benzene	<2.8	ug/kg	5.5	2.8	1		04/23/18 20:05	71-43-2	
tert-Butyl Alcohol	<13.8	ug/kg	27.6	13.8	1		04/23/18 20:05	75-65-0	
1,2-Dibromoethane (EDB)	<2.8	ug/kg	5.5	2.8	1		04/23/18 20:05	106-93-4	
1,2-Dichloroethane	<2.8	ug/kg	5.5	2.8	1		04/23/18 20:05	107-06-2	
Diisopropyl ether	<2.8	ug/kg	5.5	2.8	1		04/23/18 20:05	108-20-3	
Ethylbenzene	<2.8	ug/kg	5.5	2.8	1		04/23/18 20:05	100-41-4	
Ethyl-tert-butyl ether	<2.8	ug/kg	5.5	2.8	1		04/23/18 20:05	637-92-3	
Methyl-tert-butyl ether	<2.8	ug/kg	5.5	2.8	1		04/23/18 20:05	1634-04-4	
Toluene	<2.8	ug/kg	5.5	2.8	1		04/23/18 20:05	108-88-3	
TPH-GRO	<0.28	mg/kg	0.55	0.28	1		04/23/18 20:05		
Xylene (Total)	<5.5	ug/kg	11.0	5.5	1		04/23/18 20:05	1330-20-7	
<b>Surrogates</b>									
Toluene-d8 (S)	98	%	78-122		1		04/23/18 20:05	2037-26-5	
4-Bromofluorobenzene (S)	104	%	69-133		1		04/23/18 20:05	460-00-4	
1,2-Dichloroethane-d4 (S)	110	%	80-123		1		04/23/18 20:05	17060-07-0	
<b>Percent Moisture</b> Analytical Method: ASTM D2974									
Percent Moisture	24.4	%	0.50	0.50	1		04/23/18 00:00		

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## ANALYTICAL RESULTS

Project: HILAND-ROBERTS DAIRY SITE

Pace Project No.: 60268665

Sample: SB-8 (22-24) Lab ID: 60268665010 Collected: 04/18/18 15:20 Received: 04/20/18 10:40 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
<b>6010 MET ICP Red. Interference</b> Analytical Method: EPA 6010 Preparation Method: EPA 3050									
Arsenic	8.7	mg/kg	1.2	0.51	1	04/24/18 09:20	04/26/18 16:11	7440-38-2	
Barium	285	mg/kg	0.58	0.083	1	04/24/18 09:20	04/26/18 16:11	7440-39-3	
Cadmium	0.41J	mg/kg	0.58	0.079	1	04/24/18 09:20	04/26/18 16:11	7440-43-9	
Chromium	15.4	mg/kg	0.58	0.17	1	04/24/18 09:20	04/27/18 13:51	7440-47-3	
Lead	11.1	mg/kg	0.58	0.46	1	04/24/18 09:20	04/26/18 16:11	7439-92-1	
Selenium	<0.65	mg/kg	1.7	0.65	1	04/24/18 09:20	04/26/18 16:11	7782-49-2	
<b>8270 MSSV PAH by SIM</b> Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3546									
Acenaphthene	<21.3	ug/kg	42.6	21.3	1	04/23/18 23:00	04/26/18 17:29	83-32-9	
Anthracene	<21.3	ug/kg	42.6	21.3	1	04/23/18 23:00	04/26/18 17:29	120-12-7	
Benzo(a)anthracene	<21.3	ug/kg	42.6	21.3	1	04/23/18 23:00	04/26/18 17:29	56-55-3	
Benzo(a)pyrene	<21.3	ug/kg	42.6	21.3	1	04/23/18 23:00	04/26/18 17:29	50-32-8	
Benzo(b)fluoranthene	<21.3	ug/kg	42.6	21.3	1	04/23/18 23:00	04/26/18 17:29	205-99-2	
Benzo(k)fluoranthene	<21.3	ug/kg	42.6	21.3	1	04/23/18 23:00	04/26/18 17:29	207-08-9	
Chrysene	<21.3	ug/kg	42.6	21.3	1	04/23/18 23:00	04/26/18 17:29	218-01-9	
Dibenz(a,h)anthracene	<21.3	ug/kg	42.6	21.3	1	04/23/18 23:00	04/26/18 17:29	53-70-3	
Fluoranthene	<21.3	ug/kg	42.6	21.3	1	04/23/18 23:00	04/26/18 17:29	206-44-0	
Fluorene	<21.3	ug/kg	42.6	21.3	1	04/23/18 23:00	04/26/18 17:29	86-73-7	
Naphthalene	<21.3	ug/kg	42.6	21.3	1	04/23/18 23:00	04/26/18 17:29	91-20-3	
Pyrene	<21.3	ug/kg	42.6	21.3	1	04/23/18 23:00	04/26/18 17:29	129-00-0	
<b>Surrogates</b>									
2-Fluorobiphenyl (S)	78	%	45-116		1	04/23/18 23:00	04/26/18 17:29	321-60-8	P3
Terphenyl-d14 (S)	70	%	39-126		1	04/23/18 23:00	04/26/18 17:29	1718-51-0	
<b>8270 MSSV DRO/ORO</b> Analytical Method: EPA 8270 Preparation Method: EPA 3546									
TPH-ORO	45.7J	mg/kg	96.9	7.8	1	04/23/18 23:00	04/26/18 16:15		
TPH-DRO	<7.8	mg/kg	96.9	7.8	1	04/23/18 23:00	04/26/18 16:15		
<b>Surrogates</b>									
Nitrobenzene-d5 (S)	74	%	35-119		1	04/23/18 23:00	04/26/18 16:15	4165-60-0	P3
2-Fluorobiphenyl (S)	69	%	55-110		1	04/23/18 23:00	04/26/18 16:15	321-60-8	
Terphenyl-d14 (S)	61	%	45-114		1	04/23/18 23:00	04/26/18 16:15	1718-51-0	
<b>8260 MSV GRO and Oxygenates</b> Analytical Method: EPA 5035A/8260									
tert-Amylmethyl ether	<2.9	ug/kg	5.7	2.9	1		04/23/18 20:20	994-05-8	
Benzene	<2.9	ug/kg	5.7	2.9	1		04/23/18 20:20	71-43-2	
tert-Butyl Alcohol	<14.3	ug/kg	28.6	14.3	1		04/23/18 20:20	75-65-0	
1,2-Dibromoethane (EDB)	<2.9	ug/kg	5.7	2.9	1		04/23/18 20:20	106-93-4	
1,2-Dichloroethane	<2.9	ug/kg	5.7	2.9	1		04/23/18 20:20	107-06-2	
Diisopropyl ether	<2.9	ug/kg	5.7	2.9	1		04/23/18 20:20	108-20-3	
Ethylbenzene	<2.9	ug/kg	5.7	2.9	1		04/23/18 20:20	100-41-4	
Ethyl-tert-butyl ether	<2.9	ug/kg	5.7	2.9	1		04/23/18 20:20	637-92-3	
Methyl-tert-butyl ether	<2.9	ug/kg	5.7	2.9	1		04/23/18 20:20	1634-04-4	
Toluene	<2.9	ug/kg	5.7	2.9	1		04/23/18 20:20	108-88-3	
TPH-GRO	<0.29	mg/kg	0.57	0.29	1		04/23/18 20:20		
Xylene (Total)	<5.7	ug/kg	11.4	5.7	1		04/23/18 20:20	1330-20-7	

## REPORT OF LABORATORY ANALYSIS

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## ANALYTICAL RESULTS

Project: HILAND-ROBERTS DAIRY SITE

Pace Project No.: 60268665

**Sample: SB-8 (22-24)**      **Lab ID: 60268665010**      Collected: 04/18/18 15:20      Received: 04/20/18 10:40      Matrix: Solid

*Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.*

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260 MSV GRO and Oxygenates	Analytical Method: EPA 5035A/8260								
Surrogates									
Toluene-d8 (S)	95	%	78-122		1		04/23/18 20:20	2037-26-5	
4-Bromofluorobenzene (S)	98	%	69-133		1		04/23/18 20:20	460-00-4	
1,2-Dichloroethane-d4 (S)	111	%	80-123		1		04/23/18 20:20	17060-07-0	
Percent Moisture	Analytical Method: ASTM D2974								
Percent Moisture	23.5	%	0.50	0.50	1		04/23/18 00:00		

**Sample: SB-3 (0-3)**      **Lab ID: 60268665011**      Collected: 04/19/18 09:40      Received: 04/20/18 10:40      Matrix: Solid

*Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.*

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
<b>6010 MET ICP Red. Interference</b>		Analytical Method: EPA 6010      Preparation Method: EPA 3050							
Arsenic	6.4	mg/kg	0.92	0.41	1	04/24/18 09:20	04/26/18 16:13	7440-38-2	
Barium	203	mg/kg	0.46	0.065	1	04/24/18 09:20	04/26/18 16:13	7440-39-3	
Cadmium	0.97	mg/kg	0.46	0.063	1	04/24/18 09:20	04/26/18 16:13	7440-43-9	
Chromium	14.7	mg/kg	0.46	0.13	1	04/24/18 09:20	04/27/18 13:53	7440-47-3	
Lead	51.8	mg/kg	0.46	0.36	1	04/24/18 09:20	04/26/18 16:13	7439-92-1	
Selenium	<0.51	mg/kg	1.4	0.51	1	04/24/18 09:20	04/26/18 16:13	7782-49-2	
<b>8270 MSSV PAH by SIM</b>		Analytical Method: EPA 8270 by SIM      Preparation Method: EPA 3546							
Acenaphthene	205	ug/kg	35.9	18.0	1	04/23/18 23:00	04/26/18 17:48	83-32-9	
Anthracene	665	ug/kg	35.9	18.0	1	04/23/18 23:00	04/26/18 17:48	120-12-7	
Benzo(a)anthracene	2620	ug/kg	35.9	18.0	1	04/23/18 23:00	04/26/18 17:48	56-55-3	
Benzo(a)pyrene	2470	ug/kg	35.9	18.0	1	04/23/18 23:00	04/26/18 17:48	50-32-8	
Benzo(b)fluoranthene	3460	ug/kg	35.9	18.0	1	04/23/18 23:00	04/26/18 17:48	205-99-2	2e
Benzo(k)fluoranthene	2040	ug/kg	35.9	18.0	1	04/23/18 23:00	04/26/18 17:48	207-08-9	
Chrysene	2820	ug/kg	35.9	18.0	1	04/23/18 23:00	04/26/18 17:48	218-01-9	
Dibenz(a,h)anthracene	373	ug/kg	35.9	18.0	1	04/23/18 23:00	04/26/18 17:48	53-70-3	
Fluoranthene	5420	ug/kg	35.9	18.0	1	04/23/18 23:00	04/26/18 17:48	206-44-0	
Fluorene	206	ug/kg	35.9	18.0	1	04/23/18 23:00	04/26/18 17:48	86-73-7	
Naphthalene	121	ug/kg	35.9	18.0	1	04/23/18 23:00	04/26/18 17:48	91-20-3	
Pyrene	4500	ug/kg	35.9	18.0	1	04/23/18 23:00	04/26/18 17:48	129-00-0	
<b>Surrogates</b>									
2-Fluorobiphenyl (S)	80	%	45-116		1	04/23/18 23:00	04/26/18 17:48	321-60-8	P3
Terphenyl-d14 (S)	75	%	39-126		1	04/23/18 23:00	04/26/18 17:48	1718-51-0	
<b>8270 MSSV DRO/ORO</b>		Analytical Method: EPA 8270      Preparation Method: EPA 3546							
TPH-ORO	642	mg/kg	81.6	6.5	1	04/23/18 23:00	04/26/18 16:56		
TPH-DRO	104	mg/kg	81.6	6.5	1	04/23/18 23:00	04/26/18 16:56		
<b>Surrogates</b>									
Nitrobenzene-d5 (S)	75	%	35-119		1	04/23/18 23:00	04/26/18 16:56	4165-60-0	P3

## REPORT OF LABORATORY ANALYSIS

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## ANALYTICAL RESULTS

Project: HILAND-ROBERTS DAIRY SITE

Pace Project No.: 60268665

Sample: SB-3 (0-3) Lab ID: 60268665011 Collected: 04/19/18 09:40 Received: 04/20/18 10:40 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV DRO/ORO</b> Analytical Method: EPA 8270 Preparation Method: EPA 3546									
<b>Surrogates</b>									
2-Fluorobiphenyl (S)	74	%	55-110		1	04/23/18 23:00	04/26/18 16:56	321-60-8	
Terphenyl-d14 (S)	66	%	45-114		1	04/23/18 23:00	04/26/18 16:56	1718-51-0	
<b>8260 MSV GRO and Oxygenates</b> Analytical Method: EPA 5035A/8260									
tert-Amylmethyl ether	<3.7	ug/kg	7.4	3.7	1		04/24/18 11:50	994-05-8	
Benzene	<3.7	ug/kg	7.4	3.7	1		04/24/18 11:50	71-43-2	
tert-Butyl Alcohol	<18.5	ug/kg	36.9	18.5	1		04/24/18 11:50	75-65-0	
1,2-Dibromoethane (EDB)	<3.7	ug/kg	7.4	3.7	1		04/24/18 11:50	106-93-4	
1,2-Dichloroethane	<3.7	ug/kg	7.4	3.7	1		04/24/18 11:50	107-06-2	
Diisopropyl ether	<3.7	ug/kg	7.4	3.7	1		04/24/18 11:50	108-20-3	
Ethylbenzene	<3.7	ug/kg	7.4	3.7	1		04/24/18 11:50	100-41-4	
Ethyl-tert-butyl ether	<3.7	ug/kg	7.4	3.7	1		04/24/18 11:50	637-92-3	
Methyl-tert-butyl ether	<3.7	ug/kg	7.4	3.7	1		04/24/18 11:50	1634-04-4	
Toluene	<3.7	ug/kg	7.4	3.7	1		04/24/18 11:50	108-88-3	
TPH-GRO	<0.37	mg/kg	0.74	0.37	1		04/24/18 11:50		
Xylene (Total)	<7.4	ug/kg	14.8	7.4	1		04/24/18 11:50	1330-20-7	
<b>Surrogates</b>									
Toluene-d8 (S)	102	%	78-122		1		04/24/18 11:50	2037-26-5	
4-Bromofluorobenzene (S)	110	%	69-133		1		04/24/18 11:50	460-00-4	
1,2-Dichloroethane-d4 (S)	102	%	80-123		1		04/24/18 11:50	17060-07-0	
<b>Percent Moisture</b> Analytical Method: ASTM D2974									
Percent Moisture	9.5	%	0.50	0.50	1		04/23/18 00:00		

Sample: SB-3 (22-24) Lab ID: 60268665012 Collected: 04/19/18 10:14 Received: 04/20/18 10:40 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
<b>6010 MET ICP Red. Interference</b> Analytical Method: EPA 6010 Preparation Method: EPA 3050									
Arsenic	8.1	mg/kg	1.2	0.55	1	04/24/18 09:20	04/26/18 16:15	7440-38-2	
Barium	246	mg/kg	0.62	0.088	1	04/24/18 09:20	04/26/18 16:15	7440-39-3	
Cadmium	0.31J	mg/kg	0.62	0.084	1	04/24/18 09:20	04/26/18 16:15	7440-43-9	
Chromium	14.3	mg/kg	0.62	0.18	1	04/24/18 09:20	04/27/18 13:55	7440-47-3	
Lead	9.7	mg/kg	0.62	0.49	1	04/24/18 09:20	04/26/18 16:15	7439-92-1	
Selenium	<0.69	mg/kg	1.9	0.69	1	04/24/18 09:20	04/26/18 16:15	7782-49-2	
<b>8270 MSSV PAH by SIM</b> Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3546									
Acenaphthene	<4.1	ug/kg	8.2	4.1	1	04/23/18 23:00	04/26/18 18:07	83-32-9	
Anthracene	<4.1	ug/kg	8.2	4.1	1	04/23/18 23:00	04/26/18 18:07	120-12-7	
Benzo(a)anthracene	7.5J	ug/kg	8.2	4.1	1	04/23/18 23:00	04/26/18 18:07	56-55-3	
Benzo(a)pyrene	6.2J	ug/kg	8.2	4.1	1	04/23/18 23:00	04/26/18 18:07	50-32-8	

## REPORT OF LABORATORY ANALYSIS

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## ANALYTICAL RESULTS

Project: HILAND-ROBERTS DAIRY SITE

Pace Project No.: 60268665

Sample: SB-3 (22-24) Lab ID: 60268665012 Collected: 04/19/18 10:14 Received: 04/20/18 10:40 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV PAH by SIM</b> Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3546									
Benzo(b)fluoranthene	8.9	ug/kg	8.2	4.1	1	04/23/18 23:00	04/26/18 18:07	205-99-2	2e
Benzo(k)fluoranthene	5.4J	ug/kg	8.2	4.1	1	04/23/18 23:00	04/26/18 18:07	207-08-9	
Chrysene	7.1J	ug/kg	8.2	4.1	1	04/23/18 23:00	04/26/18 18:07	218-01-9	
Dibenz(a,h)anthracene	<4.1	ug/kg	8.2	4.1	1	04/23/18 23:00	04/26/18 18:07	53-70-3	
Fluoranthene	17.8	ug/kg	8.2	4.1	1	04/23/18 23:00	04/26/18 18:07	206-44-0	
Fluorene	<4.1	ug/kg	8.2	4.1	1	04/23/18 23:00	04/26/18 18:07	86-73-7	
Naphthalene	<4.1	ug/kg	8.2	4.1	1	04/23/18 23:00	04/26/18 18:07	91-20-3	
Pyrene	14.3	ug/kg	8.2	4.1	1	04/23/18 23:00	04/26/18 18:07	129-00-0	
<b>Surrogates</b>									
2-Fluorobiphenyl (S)	64	%	45-116		1	04/23/18 23:00	04/26/18 18:07	321-60-8	
Terphenyl-d14 (S)	62	%	39-126		1	04/23/18 23:00	04/26/18 18:07	1718-51-0	
<b>8270 MSSV DRO/ORO</b> Analytical Method: EPA 8270 Preparation Method: EPA 3546									
TPH-ORO	8.2J	mg/kg	18.7	1.5	1	04/23/18 23:00	04/26/18 17:37		B
TPH-DRO	<1.5	mg/kg	18.7	1.5	1	04/23/18 23:00	04/26/18 17:37		
<b>Surrogates</b>									
Nitrobenzene-d5 (S)	70	%	35-119		1	04/23/18 23:00	04/26/18 17:37	4165-60-0	
2-Fluorobiphenyl (S)	65	%	55-110		1	04/23/18 23:00	04/26/18 17:37	321-60-8	
Terphenyl-d14 (S)	66	%	45-114		1	04/23/18 23:00	04/26/18 17:37	1718-51-0	
<b>8260 MSV GRO and Oxygenates</b> Analytical Method: EPA 5035A/8260									
tert-Amylmethyl ether	<2.7	ug/kg	5.4	2.7	1		04/23/18 20:51	994-05-8	
Benzene	<2.7	ug/kg	5.4	2.7	1		04/23/18 20:51	71-43-2	
tert-Butyl Alcohol	<13.6	ug/kg	27.1	13.6	1		04/23/18 20:51	75-65-0	
1,2-Dibromoethane (EDB)	<2.7	ug/kg	5.4	2.7	1		04/23/18 20:51	106-93-4	
1,2-Dichloroethane	<2.7	ug/kg	5.4	2.7	1		04/23/18 20:51	107-06-2	
Diisopropyl ether	<2.7	ug/kg	5.4	2.7	1		04/23/18 20:51	108-20-3	
Ethylbenzene	<2.7	ug/kg	5.4	2.7	1		04/23/18 20:51	100-41-4	
Ethyl-tert-butyl ether	<2.7	ug/kg	5.4	2.7	1		04/23/18 20:51	637-92-3	
Methyl-tert-butyl ether	<2.7	ug/kg	5.4	2.7	1		04/23/18 20:51	1634-04-4	
Toluene	<2.7	ug/kg	5.4	2.7	1		04/23/18 20:51	108-88-3	
TPH-GRO	<0.27	mg/kg	0.54	0.27	1		04/23/18 20:51		
Xylene (Total)	<5.4	ug/kg	10.8	5.4	1		04/23/18 20:51	1330-20-7	
<b>Surrogates</b>									
Toluene-d8 (S)	96	%	78-122		1		04/23/18 20:51	2037-26-5	
4-Bromofluorobenzene (S)	98	%	69-133		1		04/23/18 20:51	460-00-4	
1,2-Dichloroethane-d4 (S)	105	%	80-123		1		04/23/18 20:51	17060-07-0	
<b>Percent Moisture</b> Analytical Method: ASTM D2974									
Percent Moisture	22.5	%	0.50	0.50	1		04/23/18 00:00		

## REPORT OF LABORATORY ANALYSIS

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## ANALYTICAL RESULTS

Project: HILAND-ROBERTS DAIRY SITE

Pace Project No.: 60268665

Sample: SB-4 (0-3) Lab ID: 60268665013 Collected: 04/19/18 10:35 Received: 04/20/18 10:40 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
<b>6010 MET ICP Red. Interference</b> Analytical Method: EPA 6010 Preparation Method: EPA 3050									
Arsenic	3.4	mg/kg	1.1	0.48	1	04/24/18 09:20	04/26/18 16:17	7440-38-2	
Barium	137	mg/kg	0.54	0.077	1	04/24/18 09:20	04/26/18 16:17	7440-39-3	
Cadmium	0.27J	mg/kg	0.54	0.073	1	04/24/18 09:20	04/26/18 16:17	7440-43-9	
Chromium	6.6	mg/kg	0.54	0.16	1	04/24/18 09:20	04/27/18 13:58	7440-47-3	
Lead	19.5	mg/kg	0.54	0.43	1	04/24/18 09:20	04/26/18 16:17	7439-92-1	
Selenium	<0.60	mg/kg	1.6	0.60	1	04/24/18 09:20	04/26/18 16:17	7782-49-2	
<b>8270 MSSV PAH by SIM</b> Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3546									
Acenaphthene	<4.0	ug/kg	8.1	4.0	1	04/23/18 23:00	04/26/18 18:26	83-32-9	
Anthracene	<4.0	ug/kg	8.1	4.0	1	04/23/18 23:00	04/26/18 18:26	120-12-7	
Benzo(a)anthracene	5.7J	ug/kg	8.1	4.0	1	04/23/18 23:00	04/26/18 18:26	56-55-3	
Benzo(a)pyrene	4.4J	ug/kg	8.1	4.0	1	04/23/18 23:00	04/26/18 18:26	50-32-8	
Benzo(b)fluoranthene	9.3	ug/kg	8.1	4.0	1	04/23/18 23:00	04/26/18 18:26	205-99-2	2e
Benzo(k)fluoranthene	<4.0	ug/kg	8.1	4.0	1	04/23/18 23:00	04/26/18 18:26	207-08-9	
Chrysene	7.6J	ug/kg	8.1	4.0	1	04/23/18 23:00	04/26/18 18:26	218-01-9	
Dibenz(a,h)anthracene	<4.0	ug/kg	8.1	4.0	1	04/23/18 23:00	04/26/18 18:26	53-70-3	
Fluoranthene	10.9	ug/kg	8.1	4.0	1	04/23/18 23:00	04/26/18 18:26	206-44-0	
Fluorene	<4.0	ug/kg	8.1	4.0	1	04/23/18 23:00	04/26/18 18:26	86-73-7	
Naphthalene	<4.0	ug/kg	8.1	4.0	1	04/23/18 23:00	04/26/18 18:26	91-20-3	
Pyrene	9.0	ug/kg	8.1	4.0	1	04/23/18 23:00	04/26/18 18:26	129-00-0	
<b>Surrogates</b>									
2-Fluorobiphenyl (S)	66	%	45-116		1	04/23/18 23:00	04/26/18 18:26	321-60-8	
Terphenyl-d14 (S)	63	%	39-126		1	04/23/18 23:00	04/26/18 18:26	1718-51-0	
<b>8270 MSSV DRO/ORO</b> Analytical Method: EPA 8270 Preparation Method: EPA 3546									
TPH-ORO	31.7	mg/kg	18.4	1.5	1	04/23/18 23:00	04/26/18 17:58		
TPH-DRO	8.3J	mg/kg	18.4	1.5	1	04/23/18 23:00	04/26/18 17:58		
<b>Surrogates</b>									
Nitrobenzene-d5 (S)	69	%	35-119		1	04/23/18 23:00	04/26/18 17:58	4165-60-0	
2-Fluorobiphenyl (S)	75	%	55-110		1	04/23/18 23:00	04/26/18 17:58	321-60-8	
Terphenyl-d14 (S)	68	%	45-114		1	04/23/18 23:00	04/26/18 17:58	1718-51-0	
<b>8260 MSV GRO and Oxygenates</b> Analytical Method: EPA 5035A/8260									
tert-Amylmethyl ether	<3.0	ug/kg	6.0	3.0	1		04/23/18 21:07	994-05-8	
Benzene	<3.0	ug/kg	6.0	3.0	1		04/23/18 21:07	71-43-2	
tert-Butyl Alcohol	<15.1	ug/kg	30.2	15.1	1		04/23/18 21:07	75-65-0	
1,2-Dibromoethane (EDB)	<3.0	ug/kg	6.0	3.0	1		04/23/18 21:07	106-93-4	
1,2-Dichloroethane	<3.0	ug/kg	6.0	3.0	1		04/23/18 21:07	107-06-2	
Diisopropyl ether	<3.0	ug/kg	6.0	3.0	1		04/23/18 21:07	108-20-3	
Ethylbenzene	<3.0	ug/kg	6.0	3.0	1		04/23/18 21:07	100-41-4	
Ethyl-tert-butyl ether	<3.0	ug/kg	6.0	3.0	1		04/23/18 21:07	637-92-3	
Methyl-tert-butyl ether	<3.0	ug/kg	6.0	3.0	1		04/23/18 21:07	1634-04-4	
Toluene	<3.0	ug/kg	6.0	3.0	1		04/23/18 21:07	108-88-3	
TPH-GRO	<0.30	mg/kg	0.60	0.30	1		04/23/18 21:07		
Xylene (Total)	<6.0	ug/kg	12.1	6.0	1		04/23/18 21:07	1330-20-7	

## REPORT OF LABORATORY ANALYSIS

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## ANALYTICAL RESULTS

Project: HILAND-ROBERTS DAIRY SITE

Pace Project No.: 60268665

**Sample: SB-4 (0-3)**      **Lab ID: 60268665013**      Collected: 04/19/18 10:35      Received: 04/20/18 10:40      Matrix: Solid

*Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.*

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
<b>8260 MSV GRO and Oxygenates</b> Analytical Method: EPA 5035A/8260									
<b>Surrogates</b>									
Toluene-d8 (S)	95	%	78-122		1		04/23/18 21:07	2037-26-5	
4-Bromofluorobenzene (S)	100	%	69-133		1		04/23/18 21:07	460-00-4	
1,2-Dichloroethane-d4 (S)	112	%	80-123		1		04/23/18 21:07	17060-07-0	
<b>Percent Moisture</b> Analytical Method: ASTM D2974									
Percent Moisture	<b>18.9</b>	%	0.50	0.50	1		04/23/18 00:00		

**Sample: SB-4 (22-24)**      **Lab ID: 60268665014**      Collected: 04/19/18 11:05      Received: 04/20/18 10:40      Matrix: Solid

*Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.*

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
<b>6010 MET ICP Red. Interference</b> Analytical Method: EPA 6010      Preparation Method: EPA 3050									
Arsenic	<b>7.7</b>	mg/kg	1.1	0.50	1	04/24/18 09:20	04/26/18 16:19	7440-38-2	
Barium	<b>210</b>	mg/kg	0.57	0.081	1	04/24/18 09:20	04/26/18 16:19	7440-39-3	
Cadmium	<b>0.41J</b>	mg/kg	0.57	0.078	1	04/24/18 09:20	04/26/18 16:19	7440-43-9	
Chromium	<b>14.1</b>	mg/kg	0.57	0.16	1	04/24/18 09:20	04/27/18 14:00	7440-47-3	
Lead	<b>9.6</b>	mg/kg	0.57	0.45	1	04/24/18 09:20	04/26/18 16:19	7439-92-1	
Selenium	<b>&lt;0.64</b>	mg/kg	1.7	0.64	1	04/24/18 09:20	04/26/18 16:19	7782-49-2	
<b>8270 MSSV PAH by SIM</b> Analytical Method: EPA 8270 by SIM      Preparation Method: EPA 3546									
Acenaphthene	<b>&lt;4.1</b>	ug/kg	8.1	4.1	1	04/23/18 23:00	04/26/18 18:45	83-32-9	
Anthracene	<b>&lt;4.1</b>	ug/kg	8.1	4.1	1	04/23/18 23:00	04/26/18 18:45	120-12-7	
Benzo(a)anthracene	<b>&lt;4.1</b>	ug/kg	8.1	4.1	1	04/23/18 23:00	04/26/18 18:45	56-55-3	
Benzo(a)pyrene	<b>&lt;4.1</b>	ug/kg	8.1	4.1	1	04/23/18 23:00	04/26/18 18:45	50-32-8	
Benzo(b)fluoranthene	<b>&lt;4.1</b>	ug/kg	8.1	4.1	1	04/23/18 23:00	04/26/18 18:45	205-99-2	
Benzo(k)fluoranthene	<b>&lt;4.1</b>	ug/kg	8.1	4.1	1	04/23/18 23:00	04/26/18 18:45	207-08-9	
Chrysene	<b>&lt;4.1</b>	ug/kg	8.1	4.1	1	04/23/18 23:00	04/26/18 18:45	218-01-9	
Dibenz(a,h)anthracene	<b>&lt;4.1</b>	ug/kg	8.1	4.1	1	04/23/18 23:00	04/26/18 18:45	53-70-3	
Fluoranthene	<b>&lt;4.1</b>	ug/kg	8.1	4.1	1	04/23/18 23:00	04/26/18 18:45	206-44-0	
Fluorene	<b>&lt;4.1</b>	ug/kg	8.1	4.1	1	04/23/18 23:00	04/26/18 18:45	86-73-7	
Naphthalene	<b>&lt;4.1</b>	ug/kg	8.1	4.1	1	04/23/18 23:00	04/26/18 18:45	91-20-3	
Pyrene	<b>&lt;4.1</b>	ug/kg	8.1	4.1	1	04/23/18 23:00	04/26/18 18:45	129-00-0	
<b>Surrogates</b>									
2-Fluorobiphenyl (S)	68	%	45-116		1	04/23/18 23:00	04/26/18 18:45	321-60-8	
Terphenyl-d14 (S)	65	%	39-126		1	04/23/18 23:00	04/26/18 18:45	1718-51-0	

**8270 MSSV DRO/ORO**      Analytical Method: EPA 8270      Preparation Method: EPA 3546

TPH-ORO	<b>6.2J</b>	mg/kg	18.4	1.5	1	04/23/18 23:00	04/26/18 18:18		B
TPH-DRO	<b>&lt;1.5</b>	mg/kg	18.4	1.5	1	04/23/18 23:00	04/26/18 18:18		
<b>Surrogates</b>									
Nitrobenzene-d5 (S)	70	%	35-119		1	04/23/18 23:00	04/26/18 18:18	4165-60-0	

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## ANALYTICAL RESULTS

Project: HILAND-ROBERTS DAIRY SITE

Pace Project No.: 60268665

**Sample: SB-4 (22-24)**      **Lab ID: 60268665014**      Collected: 04/19/18 11:05      Received: 04/20/18 10:40      Matrix: Solid

*Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.*

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV DRO/ORO</b> Analytical Method: EPA 8270      Preparation Method: EPA 3546									
<b>Surrogates</b>									
2-Fluorobiphenyl (S)	64	%	55-110		1	04/23/18 23:00	04/26/18 18:18	321-60-8	
Terphenyl-d14 (S)	53	%	45-114		1	04/23/18 23:00	04/26/18 18:18	1718-51-0	
<b>8260 MSV GRO and Oxygenates</b> Analytical Method: EPA 5035A/8260									
tert-Amylmethyl ether	<2.8	ug/kg	5.5	2.8	1		04/23/18 21:22	994-05-8	
Benzene	<2.8	ug/kg	5.5	2.8	1		04/23/18 21:22	71-43-2	
tert-Butyl Alcohol	<13.8	ug/kg	27.5	13.8	1		04/23/18 21:22	75-65-0	
1,2-Dibromoethane (EDB)	<2.8	ug/kg	5.5	2.8	1		04/23/18 21:22	106-93-4	
1,2-Dichloroethane	<2.8	ug/kg	5.5	2.8	1		04/23/18 21:22	107-06-2	
Diisopropyl ether	<2.8	ug/kg	5.5	2.8	1		04/23/18 21:22	108-20-3	
Ethylbenzene	<2.8	ug/kg	5.5	2.8	1		04/23/18 21:22	100-41-4	
Ethyl-tert-butyl ether	<2.8	ug/kg	5.5	2.8	1		04/23/18 21:22	637-92-3	
Methyl-tert-butyl ether	<2.8	ug/kg	5.5	2.8	1		04/23/18 21:22	1634-04-4	
Toluene	<2.8	ug/kg	5.5	2.8	1		04/23/18 21:22	108-88-3	
TPH-GRO	<0.28	mg/kg	0.55	0.28	1		04/23/18 21:22		
Xylene (Total)	<5.5	ug/kg	11.0	5.5	1		04/23/18 21:22	1330-20-7	
<b>Surrogates</b>									
Toluene-d8 (S)	97	%	78-122		1		04/23/18 21:22	2037-26-5	
4-Bromofluorobenzene (S)	100	%	69-133		1		04/23/18 21:22	460-00-4	
1,2-Dichloroethane-d4 (S)	110	%	80-123		1		04/23/18 21:22	17060-07-0	
<b>Percent Moisture</b> Analytical Method: ASTM D2974									
Percent Moisture	22.1	%	0.50	0.50	1		04/23/18 00:00		

**Sample: SB-5 (0-3)**      **Lab ID: 60268665015**      Collected: 04/19/18 11:30      Received: 04/20/18 10:40      Matrix: Solid

*Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.*

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
<b>6010 MET ICP Red. Interference</b> Analytical Method: EPA 6010      Preparation Method: EPA 3050									
Arsenic	11.0	mg/kg	0.96	0.42	1	04/24/18 09:20	04/26/18 16:21	7440-38-2	
Barium	319	mg/kg	0.48	0.068	1	04/24/18 09:20	04/26/18 16:21	7440-39-3	
Cadmium	9.4	mg/kg	0.48	0.065	1	04/24/18 09:20	04/26/18 16:21	7440-43-9	
Chromium	16.4	mg/kg	0.48	0.14	1	04/24/18 09:20	04/27/18 14:02	7440-47-3	
Lead	1080	mg/kg	0.48	0.38	1	04/24/18 09:20	04/26/18 16:21	7439-92-1	
Selenium	<0.53	mg/kg	1.4	0.53	1	04/24/18 09:20	04/26/18 16:21	7782-49-2	
<b>8270 MSSV PAH by SIM</b> Analytical Method: EPA 8270 by SIM      Preparation Method: EPA 3546									
Acenaphthene	48.8	ug/kg	7.7	3.8	1	04/23/18 23:00	04/26/18 19:04	83-32-9	
Anthracene	88.6	ug/kg	7.7	3.8	1	04/23/18 23:00	04/26/18 19:04	120-12-7	
Benzo(a)anthracene	359	ug/kg	7.7	3.8	1	04/23/18 23:00	04/26/18 19:04	56-55-3	
Benzo(a)pyrene	385	ug/kg	7.7	3.8	1	04/23/18 23:00	04/26/18 19:04	50-32-8	

## REPORT OF LABORATORY ANALYSIS

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## ANALYTICAL RESULTS

Project: HILAND-ROBERTS DAIRY SITE

Pace Project No.: 60268665

Sample: SB-5 (0-3) Lab ID: 60268665015 Collected: 04/19/18 11:30 Received: 04/20/18 10:40 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
<b>8270 MSSV PAH by SIM</b> Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3546									
Benzo(b)fluoranthene	550	ug/kg	7.7	3.8	1	04/23/18 23:00	04/26/18 19:04	205-99-2	2e
Benzo(k)fluoranthene	253	ug/kg	7.7	3.8	1	04/23/18 23:00	04/26/18 19:04	207-08-9	
Chrysene	386	ug/kg	7.7	3.8	1	04/23/18 23:00	04/26/18 19:04	218-01-9	
Dibenz(a,h)anthracene	57.1	ug/kg	7.7	3.8	1	04/23/18 23:00	04/26/18 19:04	53-70-3	
Fluoranthene	742	ug/kg	7.7	3.8	1	04/23/18 23:00	04/26/18 19:04	206-44-0	
Fluorene	35.3	ug/kg	7.7	3.8	1	04/23/18 23:00	04/26/18 19:04	86-73-7	
Naphthalene	101	ug/kg	7.7	3.8	1	04/23/18 23:00	04/26/18 19:04	91-20-3	
Pyrene	666	ug/kg	7.7	3.8	1	04/23/18 23:00	04/26/18 19:04	129-00-0	
<b>Surrogates</b>									
2-Fluorobiphenyl (S)	63	%	45-116		1	04/23/18 23:00	04/26/18 19:04	321-60-8	
Terphenyl-d14 (S)	63	%	39-126		1	04/23/18 23:00	04/26/18 19:04	1718-51-0	
<b>8270 MSSV DRO/ORO</b> Analytical Method: EPA 8270 Preparation Method: EPA 3546									
TPH-ORO	145	mg/kg	17.4	1.4	1	04/23/18 23:00	04/26/18 18:39		
TPH-DRO	68.0	mg/kg	17.4	1.4	1	04/23/18 23:00	04/26/18 18:39		
<b>Surrogates</b>									
Nitrobenzene-d5 (S)	77	%	35-119		1	04/23/18 23:00	04/26/18 18:39	4165-60-0	
2-Fluorobiphenyl (S)	71	%	55-110		1	04/23/18 23:00	04/26/18 18:39	321-60-8	
Terphenyl-d14 (S)	64	%	45-114		1	04/23/18 23:00	04/26/18 18:39	1718-51-0	
<b>8260 MSV GRO and Oxygenates</b> Analytical Method: EPA 5035A/8260									
tert-Amylmethyl ether	<4.0	ug/kg	7.9	4.0	1		04/23/18 21:38	994-05-8	
Benzene	<4.0	ug/kg	7.9	4.0	1		04/23/18 21:38	71-43-2	
tert-Butyl Alcohol	<19.8	ug/kg	39.6	19.8	1		04/23/18 21:38	75-65-0	
1,2-Dibromoethane (EDB)	<4.0	ug/kg	7.9	4.0	1		04/23/18 21:38	106-93-4	
1,2-Dichloroethane	<4.0	ug/kg	7.9	4.0	1		04/23/18 21:38	107-06-2	
Diisopropyl ether	<4.0	ug/kg	7.9	4.0	1		04/23/18 21:38	108-20-3	
Ethylbenzene	<4.0	ug/kg	7.9	4.0	1		04/23/18 21:38	100-41-4	
Ethyl-tert-butyl ether	<4.0	ug/kg	7.9	4.0	1		04/23/18 21:38	637-92-3	
Methyl-tert-butyl ether	<4.0	ug/kg	7.9	4.0	1		04/23/18 21:38	1634-04-4	
Toluene	<4.0	ug/kg	7.9	4.0	1		04/23/18 21:38	108-88-3	
TPH-GRO	<0.40	mg/kg	0.79	0.40	1		04/23/18 21:38		
Xylene (Total)	<7.9	ug/kg	15.9	7.9	1		04/23/18 21:38	1330-20-7	
<b>Surrogates</b>									
Toluene-d8 (S)	97	%	78-122		1		04/23/18 21:38	2037-26-5	
4-Bromofluorobenzene (S)	101	%	69-133		1		04/23/18 21:38	460-00-4	
1,2-Dichloroethane-d4 (S)	110	%	80-123		1		04/23/18 21:38	17060-07-0	
<b>Percent Moisture</b> Analytical Method: ASTM D2974									
Percent Moisture	16.1	%	0.50	0.50	1		04/23/18 00:00		

## REPORT OF LABORATORY ANALYSIS

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## ANALYTICAL RESULTS

Project: HILAND-ROBERTS DAIRY SITE

Pace Project No.: 60268665

Sample: SB-5 (22-24) Lab ID: 60268665016 Collected: 04/19/18 12:00 Received: 04/20/18 10:40 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
<b>6010 MET ICP Red. Interference</b> Analytical Method: EPA 6010 Preparation Method: EPA 3050									
Arsenic	7.5	mg/kg	1.2	0.51	1	04/24/18 09:20	04/26/18 16:24	7440-38-2	
Barium	313	mg/kg	0.58	0.082	1	04/24/18 09:20	04/26/18 16:24	7440-39-3	
Cadmium	0.41J	mg/kg	0.58	0.078	1	04/24/18 09:20	04/26/18 16:24	7440-43-9	
Chromium	14.3	mg/kg	0.58	0.17	1	04/24/18 09:20	04/27/18 14:04	7440-47-3	
Lead	9.7	mg/kg	0.58	0.45	1	04/24/18 09:20	04/26/18 16:24	7439-92-1	
Selenium	<0.64	mg/kg	1.7	0.64	1	04/24/18 09:20	04/26/18 16:24	7782-49-2	
<b>8270 MSSV PAH by SIM</b> Analytical Method: EPA 8270 by SIM Preparation Method: EPA 3546									
Acenaphthene	<4.2	ug/kg	8.4	4.2	1	04/23/18 23:00	04/26/18 19:23	83-32-9	
Anthracene	<4.2	ug/kg	8.4	4.2	1	04/23/18 23:00	04/26/18 19:23	120-12-7	
Benzo(a)anthracene	<4.2	ug/kg	8.4	4.2	1	04/23/18 23:00	04/26/18 19:23	56-55-3	
Benzo(a)pyrene	<4.2	ug/kg	8.4	4.2	1	04/23/18 23:00	04/26/18 19:23	50-32-8	
Benzo(b)fluoranthene	<4.2	ug/kg	8.4	4.2	1	04/23/18 23:00	04/26/18 19:23	205-99-2	
Benzo(k)fluoranthene	<4.2	ug/kg	8.4	4.2	1	04/23/18 23:00	04/26/18 19:23	207-08-9	
Chrysene	<4.2	ug/kg	8.4	4.2	1	04/23/18 23:00	04/26/18 19:23	218-01-9	
Dibenz(a,h)anthracene	<4.2	ug/kg	8.4	4.2	1	04/23/18 23:00	04/26/18 19:23	53-70-3	
Fluoranthene	<4.2	ug/kg	8.4	4.2	1	04/23/18 23:00	04/26/18 19:23	206-44-0	
Fluorene	<4.2	ug/kg	8.4	4.2	1	04/23/18 23:00	04/26/18 19:23	86-73-7	
Naphthalene	<4.2	ug/kg	8.4	4.2	1	04/23/18 23:00	04/26/18 19:23	91-20-3	
Pyrene	<4.2	ug/kg	8.4	4.2	1	04/23/18 23:00	04/26/18 19:23	129-00-0	
<b>Surrogates</b>									
2-Fluorobiphenyl (S)	65	%	45-116		1	04/23/18 23:00	04/26/18 19:23	321-60-8	
Terphenyl-d14 (S)	64	%	39-126		1	04/23/18 23:00	04/26/18 19:23	1718-51-0	
<b>8270 MSSV DRO/ORO</b> Analytical Method: EPA 8270 Preparation Method: EPA 3546									
TPH-ORO	11.2J	mg/kg	19.0	1.5	1	04/23/18 23:00	04/26/18 18:59		B
TPH-DRO	1.5J	mg/kg	19.0	1.5	1	04/23/18 23:00	04/26/18 18:59		
<b>Surrogates</b>									
Nitrobenzene-d5 (S)	79	%	35-119		1	04/23/18 23:00	04/26/18 18:59	4165-60-0	
2-Fluorobiphenyl (S)	78	%	55-110		1	04/23/18 23:00	04/26/18 18:59	321-60-8	
Terphenyl-d14 (S)	67	%	45-114		1	04/23/18 23:00	04/26/18 18:59	1718-51-0	
<b>8260 MSV GRO and Oxygenates</b> Analytical Method: EPA 5035A/8260									
tert-Amylmethyl ether	<3.0	ug/kg	5.9	3.0	1		04/23/18 21:53	994-05-8	
Benzene	<3.0	ug/kg	5.9	3.0	1		04/23/18 21:53	71-43-2	
tert-Butyl Alcohol	<14.8	ug/kg	29.6	14.8	1		04/23/18 21:53	75-65-0	
1,2-Dibromoethane (EDB)	<3.0	ug/kg	5.9	3.0	1		04/23/18 21:53	106-93-4	
1,2-Dichloroethane	<3.0	ug/kg	5.9	3.0	1		04/23/18 21:53	107-06-2	
Diisopropyl ether	<3.0	ug/kg	5.9	3.0	1		04/23/18 21:53	108-20-3	
Ethylbenzene	<3.0	ug/kg	5.9	3.0	1		04/23/18 21:53	100-41-4	
Ethyl-tert-butyl ether	<3.0	ug/kg	5.9	3.0	1		04/23/18 21:53	637-92-3	
Methyl-tert-butyl ether	<3.0	ug/kg	5.9	3.0	1		04/23/18 21:53	1634-04-4	
Toluene	<3.0	ug/kg	5.9	3.0	1		04/23/18 21:53	108-88-3	
TPH-GRO	<0.30	mg/kg	0.59	0.30	1		04/23/18 21:53		
Xylene (Total)	<5.9	ug/kg	11.8	5.9	1		04/23/18 21:53	1330-20-7	

## REPORT OF LABORATORY ANALYSIS

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## ANALYTICAL RESULTS

Project: HILAND-ROBERTS DAIRY SITE

Pace Project No.: 60268665

**Sample: SB-5 (22-24)** **Lab ID: 60268665016** Collected: 04/19/18 12:00 Received: 04/20/18 10:40 Matrix: Solid

*Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.*

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
8260 MSV GRO and Oxygenates	Analytical Method: EPA 5035A/8260								
Surrogates									
Toluene-d8 (S)	97	%	78-122		1		04/23/18 21:53	2037-26-5	
4-Bromofluorobenzene (S)	100	%	69-133		1		04/23/18 21:53	460-00-4	
1,2-Dichloroethane-d4 (S)	110	%	80-123		1		04/23/18 21:53	17060-07-0	
Percent Moisture	Analytical Method: ASTM D2974								
Percent Moisture	22.7	%	0.50	0.50	1		04/23/18 00:00		

**Sample: SB-2-GW** **Lab ID: 60268665017** Collected: 04/19/18 12:20 Received: 04/20/18 10:40 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
<b>6020 MET ICPMS, Dissolved (LF)</b>		Analytical Method: EPA 6020 Preparation Method: EPA 3010							
Arsenic, Dissolved	<b>0.63J</b>	ug/L	1.0	0.052	1	04/25/17 17:00	04/27/18 13:53	7440-38-2	
Barium, Dissolved	<b>106</b>	ug/L	1.0	0.095	1	04/25/17 17:00	04/27/18 13:53	7440-39-3	
Cadmium, Dissolved	<b>0.45J</b>	ug/L	0.50	0.018	1	04/25/17 17:00	04/27/18 13:53	7440-43-9	
Chromium, Dissolved	<b>16.7</b>	ug/L	1.0	0.054	1	04/25/17 17:00	04/27/18 13:53	7440-47-3	
Lead, Dissolved	<b>1.5</b>	ug/L	1.0	0.033	1	04/25/17 17:00	04/27/18 13:53	7439-92-1	
Selenium, Dissolved	<b>1.2</b>	ug/L	1.0	0.086	1	04/25/17 17:00	04/27/18 13:53	7782-49-2	

**Sample: EQUIPMENT RINSATE** **Lab ID: 60268665019** Collected: 04/20/18 09:45 Received: 04/20/18 10:40 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
<b>6020 MET ICPMS, Dissolved (LF)</b>		Analytical Method: EPA 6020 Preparation Method: EPA 3010							
Arsenic, Dissolved	<b>&lt;0.052</b>	ug/L	1.0	0.052	1	04/25/17 17:00	04/27/18 13:57	7440-38-2	
Barium, Dissolved	<b>0.24J</b>	ug/L	1.0	0.095	1	04/25/17 17:00	04/27/18 13:57	7440-39-3	B
Cadmium, Dissolved	<b>0.024J</b>	ug/L	0.50	0.018	1	04/25/17 17:00	04/27/18 13:57	7440-43-9	
Chromium, Dissolved	<b>0.11J</b>	ug/L	1.0	0.054	1	04/25/17 17:00	04/27/18 13:57	7440-47-3	B
Lead, Dissolved	<b>0.033J</b>	ug/L	1.0	0.033	1	04/25/17 17:00	04/27/18 13:57	7439-92-1	
Selenium, Dissolved	<b>&lt;0.086</b>	ug/L	1.0	0.086	1	04/25/17 17:00	04/27/18 13:57	7782-49-2	

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## QUALITY CONTROL DATA

Project: HILAND-ROBERTS DAIRY SITE

QC Project No.: 60268665

QC Batch:	522928	Analysis Method:	EPA 6010
QC Batch Method:	EPA 3050	Analysis Description:	6010 MET
Associated Lab Samples:	60268665001, 60268665002, 60268665003, 60268665004, 60268665005, 60268665006, 60268665007, 60268665008, 60268665009, 60268665010, 60268665011, 60268665012, 60268665013, 60268665014, 60268665015, 60268665016		

METHOD BLANK: 2140763

Matrix: Solid

Associated Lab Samples: 60268665001, 60268665002, 60268665003, 60268665004, 60268665005, 60268665006, 60268665007, 60268665008, 60268665009, 60268665010, 60268665011, 60268665012, 60268665013, 60268665014, 60268665015, 60268665016

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Arsenic	mg/kg	<0.44	1.0	0.44	04/24/18 14:49	
Barium	mg/kg	<0.071	0.50	0.071	04/24/18 14:49	
Cadmium	mg/kg	<0.068	0.50	0.068	04/24/18 14:49	
Chromium	mg/kg	<0.14	0.50	0.14	04/24/18 14:49	
Lead	mg/kg	<0.39	0.50	0.39	04/24/18 14:49	
Selenium	mg/kg	<0.56	1.5	0.56	04/26/18 15:38	

LABORATORY CONTROL SAMPLE: 2140764

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Arsenic	mg/kg	100	84.5	84	80-120	
Barium	mg/kg	100	92.2	92	80-120	
Cadmium	mg/kg	100	88.1	88	80-120	
Chromium	mg/kg	100	90.2	90	80-120	
Lead	mg/kg	100	91.4	91	80-120	
Selenium	mg/kg	100	86.2	86	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2140765 2140766

Parameter	Units	60268665001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Arsenic	mg/kg	4.4	89.1	93.7	83.7	84.6	89	86	75-125	1	20	
Barium	mg/kg	56.0	89.1	93.7	122	114	74	62	75-125	6	20	M1
Cadmium	mg/kg	0.39J	89.1	93.7	82.0	83.0	92	88	75-125	1	20	
Chromium	mg/kg	3.2	89.1	93.7	82.1	83.6	89	86	75-125	2	20	
Lead	mg/kg	59.9	89.1	93.7	169	105	122	48	75-125	46	20	M1, R1
Selenium	mg/kg	<0.52	89.1	93.7	83.4	83.6	94	89	75-125	0	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

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## QUALITY CONTROL DATA

Project: HILAND-ROBERTS DAIRY SITE

Pace Project No.: 60268665

QC Batch: 523228

Analysis Method: EPA 6020

QC Batch Method: EPA 3010

Analysis Description: 6020 MET Dissolved

Associated Lab Samples: 60268665017, 60268665019

METHOD BLANK: 2141897

Matrix: Water

Associated Lab Samples: 60268665017, 60268665019

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Arsenic, Dissolved	ug/L	<0.052	1.0	0.052	04/27/18 13:44	
Barium, Dissolved	ug/L	0.60J	1.0	0.095	04/27/18 13:44	
Cadmium, Dissolved	ug/L	<0.018	0.50	0.018	04/27/18 13:44	
Chromium, Dissolved	ug/L	0.16J	1.0	0.054	04/27/18 13:44	
Lead, Dissolved	ug/L	<0.033	1.0	0.033	04/27/18 13:44	
Selenium, Dissolved	ug/L	<0.086	1.0	0.086	04/27/18 13:44	

LABORATORY CONTROL SAMPLE: 2141898

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Arsenic, Dissolved	ug/L	40	41.8	105	80-120	
Barium, Dissolved	ug/L	40	40.7	102	80-120	
Cadmium, Dissolved	ug/L	40	39.7	99	80-120	
Chromium, Dissolved	ug/L	40	40.7	102	80-120	
Lead, Dissolved	ug/L	40	39.1	98	80-120	
Selenium, Dissolved	ug/L	40	38.5	96	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2141899

2141900

Parameter	Units	60268665019 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Arsenic, Dissolved	ug/L	<0.052	40	40	40.0	40.1	100	100	75-125	0	20	
Barium, Dissolved	ug/L	0.24J	40	40	40.7	40.3	101	100	75-125	1	20	
Cadmium, Dissolved	ug/L	0.024J	40	40	39.0	38.7	97	97	75-125	1	20	
Chromium, Dissolved	ug/L	0.11J	40	40	40.2	39.9	100	100	75-125	1	20	
Lead, Dissolved	ug/L	0.033J	40	40	38.6	38.2	96	96	75-125	1	20	
Selenium, Dissolved	ug/L	<0.086	40	40	36.9	37.7	92	94	75-125	2	20	

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## QUALITY CONTROL DATA

Project: HILAND-ROBERTS DAIRY SITE

Pace Project No.: 60268665

QC Batch:	522797	Analysis Method:	EPA 5035A/8260
QC Batch Method:	EPA 5035A/8260	Analysis Description:	8260 MSV GRO and Oxygenates
Associated Lab Samples:	60268665002, 60268665003, 60268665004, 60268665005, 60268665006, 60268665007, 60268665008, 60268665009, 60268665010, 60268665012, 60268665013, 60268665014, 60268665015, 60268665016		

METHOD BLANK: 2140403

Matrix: Solid

Associated Lab Samples: 60268665002, 60268665003, 60268665004, 60268665005, 60268665006, 60268665007, 60268665008, 60268665009, 60268665010, 60268665012, 60268665013, 60268665014, 60268665015, 60268665016

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
1,2-Dibromoethane (EDB)	ug/kg	<2.5	5.0	2.5	04/23/18 16:42	
1,2-Dichloroethane	ug/kg	<2.5	5.0	2.5	04/23/18 16:42	
Benzene	ug/kg	<2.5	5.0	2.5	04/23/18 16:42	
Diisopropyl ether	ug/kg	<2.5	5.0	2.5	04/23/18 16:42	
Ethyl-tert-butyl ether	ug/kg	<2.5	5.0	2.5	04/23/18 16:42	
Ethylbenzene	ug/kg	<2.5	5.0	2.5	04/23/18 16:42	
Methyl-tert-butyl ether	ug/kg	<2.5	5.0	2.5	04/23/18 16:42	
tert-Amylmethyl ether	ug/kg	<2.5	5.0	2.5	04/23/18 16:42	
tert-Butyl Alcohol	ug/kg	<12.5	25.0	12.5	04/23/18 16:42	
Toluene	ug/kg	<2.5	5.0	2.5	04/23/18 16:42	
TPH-GRO	mg/kg	<0.25	0.50	0.25	04/23/18 16:42	
Xylene (Total)	ug/kg	<5.0	10.0	5.0	04/23/18 16:42	
1,2-Dichloroethane-d4 (S)	%	101	80-123		04/23/18 16:42	
4-Bromofluorobenzene (S)	%	99	69-133		04/23/18 16:42	
Toluene-d8 (S)	%	98	78-122		04/23/18 16:42	

LABORATORY CONTROL SAMPLE: 2140404

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,2-Dibromoethane (EDB)	ug/kg	100	92.7	93	80-122	
1,2-Dichloroethane	ug/kg	100	89.3	89	74-117	
Benzene	ug/kg	100	81.9	82	77-122	
Diisopropyl ether	ug/kg	100	88.4	88	72-122	
Ethyl-tert-butyl ether	ug/kg	100	87.0	87	68-128	
Ethylbenzene	ug/kg	100	89.0	89	74-126	
Methyl-tert-butyl ether	ug/kg	100	90.8	91	65-128	
tert-Amylmethyl ether	ug/kg	100	96.1	96	62-132	
tert-Butyl Alcohol	ug/kg	500	396	79	57-132	
Toluene	ug/kg	100	81.8	82	76-122	
TPH-GRO	mg/kg	4	4.1	102	61-140	
Xylene (Total)	ug/kg	300	266	89	75-123	
1,2-Dichloroethane-d4 (S)	%			102	80-123	
4-Bromofluorobenzene (S)	%			99	69-133	
Toluene-d8 (S)	%			98	78-122	

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## QUALITY CONTROL DATA

Project: HILAND-ROBERTS DAIRY SITE

Pace Project No.: 60268665

QC Batch: 522988

Analysis Method: EPA 5035A/8260

QC Batch Method: EPA 5035A/8260

Analysis Description: 8260 MSV GRO and Oxygenates

Associated Lab Samples: 60268665001, 60268665011

METHOD BLANK: 2140935

Matrix: Solid

Associated Lab Samples: 60268665001, 60268665011

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
1,2-Dibromoethane (EDB)	ug/kg	<2.5	5.0	2.5	04/24/18 11:03	
1,2-Dichloroethane	ug/kg	<2.5	5.0	2.5	04/24/18 11:03	
Benzene	ug/kg	<2.5	5.0	2.5	04/24/18 11:03	
Diisopropyl ether	ug/kg	<2.5	5.0	2.5	04/24/18 11:03	
Ethyl-tert-butyl ether	ug/kg	<2.5	5.0	2.5	04/24/18 11:03	
Ethylbenzene	ug/kg	<2.5	5.0	2.5	04/24/18 11:03	
Methyl-tert-butyl ether	ug/kg	<2.5	5.0	2.5	04/24/18 11:03	
tert-Amylmethyl ether	ug/kg	<2.5	5.0	2.5	04/24/18 11:03	
tert-Butyl Alcohol	ug/kg	<12.5	25.0	12.5	04/24/18 11:03	
Toluene	ug/kg	<2.5	5.0	2.5	04/24/18 11:03	
TPH-GRO	mg/kg	<0.25	0.50	0.25	04/24/18 11:03	
Xylene (Total)	ug/kg	<5.0	10.0	5.0	04/24/18 11:03	
1,2-Dichloroethane-d4 (S)	%	102	80-123		04/24/18 11:03	
4-Bromofluorobenzene (S)	%	101	69-133		04/24/18 11:03	
Toluene-d8 (S)	%	98	78-122		04/24/18 11:03	

LABORATORY CONTROL SAMPLE: 2140936

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,2-Dibromoethane (EDB)	ug/kg	100	96.6	97	80-122	
1,2-Dichloroethane	ug/kg	100	92.7	93	74-117	
Benzene	ug/kg	100	88.1	88	77-122	
Diisopropyl ether	ug/kg	100	99.6	100	72-122	
Ethyl-tert-butyl ether	ug/kg	100	91.3	91	68-128	
Ethylbenzene	ug/kg	100	99.2	99	74-126	
Methyl-tert-butyl ether	ug/kg	100	93.0	93	65-128	
tert-Amylmethyl ether	ug/kg	100	102	102	62-132	
tert-Butyl Alcohol	ug/kg	500	489	98	57-132	
Toluene	ug/kg	100	90.0	90	76-122	
TPH-GRO	mg/kg	4	3.6	91	61-140	
Xylene (Total)	ug/kg	300	289	96	75-123	
1,2-Dichloroethane-d4 (S)	%			101	80-123	
4-Bromofluorobenzene (S)	%			98	69-133	
Toluene-d8 (S)	%			98	78-122	

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## QUALITY CONTROL DATA

Project: HILAND-ROBERTS DAIRY SITE

Pace Project No.: 60268665

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2140937 2140938											
Parameter	Units	60268666001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	Max RPD	Qual
1,2-Dibromoethane (EDB)	ug/kg	ND	125	124	95.3	101	77	82	33-130	6	39
1,2-Dichloroethane	ug/kg	ND	125	124	94.2	99.2	76	80	46-117	5	32
Benzene	ug/kg	ND	125	124	88.1	90.3	71	73	45-130	2	32
Diisopropyl ether	ug/kg	ND	125	124	102	101	82	81	36-130	1	22
Ethyl-tert-butyl ether	ug/kg	ND	125	124	92.3	97.1	74	79	39-127	5	22
Ethylbenzene	ug/kg	0.013 mg/kg	125	124	92.3	100	64	71	30-135	9	35
Methyl-tert-butyl ether	ug/kg	ND	125	124	92.9	99.1	75	80	52-122	6	33
tert-Amylmethyl ether	ug/kg	ND	125	124	103	107	82	86	26-139	4	26
tert-Butyl Alcohol	ug/kg	ND	623	618	514	585	82	95	18-157	13	40
Toluene	ug/kg	0.048 mg/kg	125	124	113	159	52	90	42-130	34	34
Xylene (Total)	ug/kg	0.72 mg/kg	373	371	579	863	-39	37	25-139	39	36 MS,RS
1,2-Dichloroethane-d4 (S)	%						101	106	80-123		
4-Bromofluorobenzene (S)	%						98	99	69-133		
Toluene-d8 (S)	%						99	97	78-122		

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## QUALITY CONTROL DATA

Project: HILAND-ROBERTS DAIRY SITE

Pace Project No.: 60268665

QC Batch:	522697	Analysis Method:	EPA 8270 by SIM
QC Batch Method:	EPA 3546	Analysis Description:	8270/3546 MSSV PAH by SIM
Associated Lab Samples:	60268665001, 60268665002, 60268665003, 60268665004, 60268665005, 60268665006, 60268665007, 60268665008, 60268665009, 60268665010, 60268665011, 60268665012, 60268665013, 60268665014, 60268665015, 60268665016		

METHOD BLANK: 2140216 Matrix: Solid

Associated Lab Samples: 60268665001, 60268665002, 60268665003, 60268665004, 60268665005, 60268665006, 60268665007, 60268665008, 60268665009, 60268665010, 60268665011, 60268665012, 60268665013, 60268665014, 60268665015, 60268665016

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Acenaphthene	ug/kg	<3.3	6.6	3.3	04/26/18 13:59	
Anthracene	ug/kg	<3.3	6.6	3.3	04/26/18 13:59	
Benzo(a)anthracene	ug/kg	<3.3	6.6	3.3	04/26/18 13:59	
Benzo(a)pyrene	ug/kg	<3.3	6.6	3.3	04/26/18 13:59	
Benzo(b)fluoranthene	ug/kg	<3.3	6.6	3.3	04/26/18 13:59	
Benzo(k)fluoranthene	ug/kg	<3.3	6.6	3.3	04/26/18 13:59	
Chrysene	ug/kg	<3.3	6.6	3.3	04/26/18 13:59	
Dibenz(a,h)anthracene	ug/kg	<3.3	6.6	3.3	04/26/18 13:59	
Fluoranthene	ug/kg	<3.3	6.6	3.3	04/26/18 13:59	
Fluorene	ug/kg	<3.3	6.6	3.3	04/26/18 13:59	
Naphthalene	ug/kg	<3.3	6.6	3.3	04/26/18 13:59	
Pyrene	ug/kg	<3.3	6.6	3.3	04/26/18 13:59	
2-Fluorobiphenyl (S)	%	75	45-116		04/26/18 13:59	
Terphenyl-d14 (S)	%	77	39-126		04/26/18 13:59	

LABORATORY CONTROL SAMPLE: 2140217

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Acenaphthene	ug/kg	32.7	30.3	93	63-116	
Anthracene	ug/kg	32.7	27.8	85	60-111	
Benzo(a)anthracene	ug/kg	32.7	26.9	82	57-124	
Benzo(a)pyrene	ug/kg	32.7	26.8	82	58-115	
Benzo(b)fluoranthene	ug/kg	32.7	29.3	89	59-121	
Benzo(k)fluoranthene	ug/kg	32.7	27.2	83	53-124	
Chrysene	ug/kg	32.7	28.5	87	62-124	
Dibenz(a,h)anthracene	ug/kg	32.7	27.1	83	51-121	
Fluoranthene	ug/kg	32.7	28.1	86	58-121	
Fluorene	ug/kg	32.7	28.9	88	61-116	
Naphthalene	ug/kg	32.7	29.7	91	63-117	
Pyrene	ug/kg	32.7	27.9	85	58-129	
2-Fluorobiphenyl (S)	%			85	45-116 M4	
Terphenyl-d14 (S)	%			81	39-126	

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## QUALITY CONTROL DATA

Project: HILAND-ROBERTS DAIRY SITE  
Pace Project No.: 60268665

QC Batch:	522698	Analysis Method:	EPA 8270
QC Batch Method:	EPA 3546	Analysis Description:	8270 MSSV TPH ORO
Associated Lab Samples:	60268665001, 60268665002, 60268665003, 60268665004, 60268665005, 60268665006, 60268665007, 60268665008, 60268665009, 60268665010, 60268665011, 60268665012, 60268665013, 60268665014, 60268665015, 60268665016		

METHOD BLANK:	2140220	Matrix:	Solid
Associated Lab Samples:	60268665001, 60268665002, 60268665003, 60268665004, 60268665005, 60268665006, 60268665007, 60268665008, 60268665009, 60268665010, 60268665011, 60268665012, 60268665013, 60268665014, 60268665015, 60268665016		

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
TPH-DRO	mg/kg	<1.2	14.9	1.2	04/26/18 11:49	
TPH-ORO	mg/kg	1.7J	14.9	1.2	04/26/18 11:49	
2-Fluorobiphenyl (S)	%	82	55-110		04/26/18 11:49	
Nitrobenzene-d5 (S)	%	77	35-119		04/26/18 11:49	
Terphenyl-d14 (S)	%	74	45-114		04/26/18 11:49	

### LABORATORY CONTROL SAMPLE: 2140221

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
TPH-DRO	mg/kg	329	244	74	52-130	
2-Fluorobiphenyl (S)	%			70	55-110	
Nitrobenzene-d5 (S)	%			72	35-119	
Terphenyl-d14 (S)	%			62	45-114	

### MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2140222 2140223

Parameter	Units	60268665009 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
TPH-DRO	mg/kg	4.9J	1310	1260	1160	1190	88	94	18-165	3	35	
2-Fluorobiphenyl (S)	%						78	78	55-110		44	
Nitrobenzene-d5 (S)	%						85	87	35-119		43	
Terphenyl-d14 (S)	%						77	76	45-114		50	

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## QUALITY CONTROL DATA

Project: HILAND-ROBERTS DAIRY SITE

Pace Project No.: 60268665

QC Batch:	522720	Analysis Method:	ASTM D2974
QC Batch Method:	ASTM D2974	Analysis Description:	Dry Weight/Percent Moisture
Associated Lab Samples:	60268665001, 60268665002, 60268665003, 60268665004, 60268665005, 60268665006, 60268665007, 60268665008, 60268665009, 60268665010, 60268665011, 60268665012, 60268665013, 60268665014, 60268665015, 60268665016		

METHOD BLANK:	2140281	Matrix:	Solid
Associated Lab Samples:	60268665001, 60268665002, 60268665003, 60268665004, 60268665005, 60268665006, 60268665007, 60268665008, 60268665009, 60268665010, 60268665011, 60268665012, 60268665013, 60268665014, 60268665015, 60268665016		

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Percent Moisture	%	<0.50	0.50	0.50	04/23/18 00:00	

SAMPLE DUPLICATE:	2140282	10427793001	Dup Result	RPD	Max RPD	Qualifiers
Parameter	Units	Result				
Percent Moisture	%	ND	<0.50		20	

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## QUALIFIERS

Project: HILAND-ROBERTS DAIRY SITE  
Pace Project No.: 60268665

### DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.  
 ND - Not Detected at or above adjusted reporting limit.  
 TNTC - Too Numerous To Count  
 J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.  
 MDL - Adjusted Method Detection Limit.  
 PQL - Practical Quantitation Limit.  
 RL - Reporting Limit.  
 S - Surrogate  
 1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.  
 Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.  
 LCS(D) - Laboratory Control Sample (Duplicate)  
 MS(D) - Matrix Spike (Duplicate)  
 DUP - Sample Duplicate  
 RPD - Relative Percent Difference  
 NC - Not Calculable.  
 SG - Silica Gel - Clean-Up  
 U - Indicates the compound was analyzed for, but not detected.  
 N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.  
 Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.  
 TNI - The NELAC Institute.

### LABORATORIES

PASI-K Pace Analytical Services - Kansas City

### BATCH QUALIFIERS

Batch: 522797

[M5] A matrix spike/matrix spike duplicate was not performed for this batch due to insufficient sample volume.

### ANALYTE QUALIFIERS

1e The internal standard response was outside the laboratory acceptance limits confirmed by reanalysis.  
 2e The methods baseline separation for isomers pairs in the Initial Calibration or Continuing Calibration Verification (CCV) was less than the expected 50% valley to baseline. No further action was taken for this method variation. The two compounds are still being reported as individual isomers and not a combined total, since there is separation between the two isomers.  
 B Analyte was detected in the associated method blank.  
 M1 Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.  
 M4 A matrix spike/matrix spike duplicate was not performed for this batch due to sample dilution.  
 MS Analyte recovery in the matrix spike was outside QC limits for one or more of the constituent analytes used in the calculated result.  
 P3 Sample extract could not be concentrated to the routine final volume, resulting in elevated reporting limits.  
 R1 RPD value was outside control limits.  
 RS The RPD value in one of the constituent analytes was outside the control limits.

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## QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: HILAND-ROBERTS DAIRY SITE

Pace Project No.: 60268665

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60268665001	SB-2 (0-3)	EPA 3050	522928	EPA 6010	523030
60268665002	SB-2 (18-20)	EPA 3050	522928	EPA 6010	523030
60268665003	SB-1 (0-3)	EPA 3050	522928	EPA 6010	523030
60268665004	SB-1 (20-22)	EPA 3050	522928	EPA 6010	523030
60268665005	SB-7 (0-3)	EPA 3050	522928	EPA 6010	523030
60268665006	SB-7 (14-16)	EPA 3050	522928	EPA 6010	523030
60268665007	SB-6 (0-3)	EPA 3050	522928	EPA 6010	523030
60268665008	SB-6 (22-24)	EPA 3050	522928	EPA 6010	523030
60268665009	SB-8 (0-3)	EPA 3050	522928	EPA 6010	523030
60268665010	SB-8 (22-24)	EPA 3050	522928	EPA 6010	523030
60268665011	SB-3 (0-3)	EPA 3050	522928	EPA 6010	523030
60268665012	SB-3 (22-24)	EPA 3050	522928	EPA 6010	523030
60268665013	SB-4 (0-3)	EPA 3050	522928	EPA 6010	523030
60268665014	SB-4 (22-24)	EPA 3050	522928	EPA 6010	523030
60268665015	SB-5 (0-3)	EPA 3050	522928	EPA 6010	523030
60268665016	SB-5 (22-24)	EPA 3050	522928	EPA 6010	523030
60268665017	SB-2-GW	EPA 3010	523228	EPA 6020	523283
60268665019	EQUIPMENT RINSATE	EPA 3010	523228	EPA 6020	523283
60268665001	SB-2 (0-3)	EPA 3546	522697	EPA 8270 by SIM	523351
60268665002	SB-2 (18-20)	EPA 3546	522697	EPA 8270 by SIM	523351
60268665003	SB-1 (0-3)	EPA 3546	522697	EPA 8270 by SIM	523351
60268665004	SB-1 (20-22)	EPA 3546	522697	EPA 8270 by SIM	523351
60268665005	SB-7 (0-3)	EPA 3546	522697	EPA 8270 by SIM	523351
60268665006	SB-7 (14-16)	EPA 3546	522697	EPA 8270 by SIM	523351
60268665007	SB-6 (0-3)	EPA 3546	522697	EPA 8270 by SIM	523351
60268665008	SB-6 (22-24)	EPA 3546	522697	EPA 8270 by SIM	523351
60268665009	SB-8 (0-3)	EPA 3546	522697	EPA 8270 by SIM	523351
60268665010	SB-8 (22-24)	EPA 3546	522697	EPA 8270 by SIM	523351
60268665011	SB-3 (0-3)	EPA 3546	522697	EPA 8270 by SIM	523351
60268665012	SB-3 (22-24)	EPA 3546	522697	EPA 8270 by SIM	523351
60268665013	SB-4 (0-3)	EPA 3546	522697	EPA 8270 by SIM	523351
60268665014	SB-4 (22-24)	EPA 3546	522697	EPA 8270 by SIM	523351
60268665015	SB-5 (0-3)	EPA 3546	522697	EPA 8270 by SIM	523351
60268665016	SB-5 (22-24)	EPA 3546	522697	EPA 8270 by SIM	523351
60268665001	SB-2 (0-3)	EPA 3546	522698	EPA 8270	523289
60268665002	SB-2 (18-20)	EPA 3546	522698	EPA 8270	523289
60268665003	SB-1 (0-3)	EPA 3546	522698	EPA 8270	523289
60268665004	SB-1 (20-22)	EPA 3546	522698	EPA 8270	523289
60268665005	SB-7 (0-3)	EPA 3546	522698	EPA 8270	523289
60268665006	SB-7 (14-16)	EPA 3546	522698	EPA 8270	523289
60268665007	SB-6 (0-3)	EPA 3546	522698	EPA 8270	523289
60268665008	SB-6 (22-24)	EPA 3546	522698	EPA 8270	523289
60268665009	SB-8 (0-3)	EPA 3546	522698	EPA 8270	523289
60268665010	SB-8 (22-24)	EPA 3546	522698	EPA 8270	523289
60268665011	SB-3 (0-3)	EPA 3546	522698	EPA 8270	523289
60268665012	SB-3 (22-24)	EPA 3546	522698	EPA 8270	523289
60268665013	SB-4 (0-3)	EPA 3546	522698	EPA 8270	523289

## REPORT OF LABORATORY ANALYSIS

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## QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: HILAND-ROBERTS DAIRY SITE

Pace Project No.: 60268665

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60268665014	SB-4 (22-24)	EPA 3546	522698	EPA 8270	523289
60268665015	SB-5 (0-3)	EPA 3546	522698	EPA 8270	523289
60268665016	SB-5 (22-24)	EPA 3546	522698	EPA 8270	523289
60268665001	SB-2 (0-3)	EPA 5035A/8260	522988		
60268665002	SB-2 (18-20)	EPA 5035A/8260	522797		
60268665003	SB-1 (0-3)	EPA 5035A/8260	522797		
60268665004	SB-1 (20-22)	EPA 5035A/8260	522797		
60268665005	SB-7 (0-3)	EPA 5035A/8260	522797		
60268665006	SB-7 (14-16)	EPA 5035A/8260	522797		
60268665007	SB-6 (0-3)	EPA 5035A/8260	522797		
60268665008	SB-6 (22-24)	EPA 5035A/8260	522797		
60268665009	SB-8 (0-3)	EPA 5035A/8260	522797		
60268665010	SB-8 (22-24)	EPA 5035A/8260	522797		
60268665011	SB-3 (0-3)	EPA 5035A/8260	522988		
60268665012	SB-3 (22-24)	EPA 5035A/8260	522797		
60268665013	SB-4 (0-3)	EPA 5035A/8260	522797		
60268665014	SB-4 (22-24)	EPA 5035A/8260	522797		
60268665015	SB-5 (0-3)	EPA 5035A/8260	522797		
60268665016	SB-5 (22-24)	EPA 5035A/8260	522797		
60268665001	SB-2 (0-3)	ASTM D2974	522720		
60268665002	SB-2 (18-20)	ASTM D2974	522720		
60268665003	SB-1 (0-3)	ASTM D2974	522720		
60268665004	SB-1 (20-22)	ASTM D2974	522720		
60268665005	SB-7 (0-3)	ASTM D2974	522720		
60268665006	SB-7 (14-16)	ASTM D2974	522720		
60268665007	SB-6 (0-3)	ASTM D2974	522720		
60268665008	SB-6 (22-24)	ASTM D2974	522720		
60268665009	SB-8 (0-3)	ASTM D2974	522720		
60268665010	SB-8 (22-24)	ASTM D2974	522720		
60268665011	SB-3 (0-3)	ASTM D2974	522720		
60268665012	SB-3 (22-24)	ASTM D2974	522720		
60268665013	SB-4 (0-3)	ASTM D2974	522720		
60268665014	SB-4 (22-24)	ASTM D2974	522720		
60268665015	SB-5 (0-3)	ASTM D2974	522720		
60268665016	SB-5 (22-24)	ASTM D2974	522720		

## REPORT OF LABORATORY ANALYSIS

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# Sample Condition Upon Receipt

WO#: 60268665



60268665

Client Name: Tebra Tech EMI

Courier: FedEx ☐ UPS ☐ VIA ☐ Clay ☐ PEX ☐ ECI ☐ Pace ☒ Xroads ☐ Client ☐ Other ☐

Tracking #: \_\_\_\_\_ Pace Shipping Label Used? Yes ☐ No ☐

Custody Seal on Cooler/Box Present: Yes ☒ No ☐ Seals intact: Yes ☒ No ☐

Packing Material: Bubble Wrap ☐ Bubble Bags ☒ Foam ☐ None ☐ Other ☐

Thermometer Used: 301 Type of Ice: Wet Blue ☐ None ☐

Cooler Temperature (°C): As-read 2.8 3.2 Corr. Factor 1.0 Corrected 3.8 4.2

Date and initials of person examining contents: JB 4/20

Temperature should be above freezing to 6°C

Chain of Custody present:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Chain of Custody relinquished:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Samples arrived within holding time:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	<u>SB-2, SB-1 not frozen within 48 hr</u>
Short Hold Time analyses (<72hr):	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<u>Kits</u>
Rush Turn Around Time requested:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	
Sufficient volume:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Correct containers used:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Pace containers used:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Containers intact:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Unpreserved 5035A / TX1005/1006 soils frozen in 48hrs?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Filtered volume received for dissolved tests?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Sample labels match COC: Date / time / ID / analyses	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Samples contain multiple phases? Matrix: <u>SL</u>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	
Containers requiring pH preservation in compliance? (HNO <sub>3</sub> , H <sub>2</sub> SO <sub>4</sub> , HCl<2; NaOH>9 Sulfide, NaOH>10 Cyanide) (Exceptions: VOA, Micro, O&G, KS TPH, OK-DRO)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	List sample IDs, volumes, lot #'s of preservative and the date/time added.
Cyanide water sample checks:		
Lead acetate strip turns dark? (Record only)	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Potassium iodide test strip turns blue/purple? (Preserve)	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Trip Blank present:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<u>Wrong container for soil TR, (3) HCL water vials</u>
Headspace in VOA vials (>6mm):	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Samples from USDA Regulated Area: State: <u>MO</u>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	
Additional labels attached to 5035A / TX1005 vials in the field?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	

Client Notification/ Resolution:

Copy COC to Client? Y / N

Field Data Required? Y / N

Person Contacted: \_\_\_\_\_ Date/Time: \_\_\_\_\_

Comments/ Resolution: \_\_\_\_\_

Project Manager Review: JMS

Date: 4/20/18

# CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page: 1 of 2

## Section B

Invoice Information:

## Section C

Required Project Information:

## Section A

Required Client Information:

Company: Tetra Tech EMI		Report To: Kirk Mammoliti		Attention: Kirk Mammoliti	
Address: 415 Oak		Copy To: Emily Fisher		Company Name: Tetra Tech EMI	
Kansas City, MO 64106		Purchase Order No.:		Address:	
Email To: kirk.mammoliti@tetratech.com		Project Name: Hiland-Roberts Dairy Site		Pace Quote Reference:	
Phone: 816-412-1745		Project Number: 103X9025140002-049		Pace Project Manager: Jeffrey Shopper	
Requested Due Date/TAT: Standard		Pace Profile #: 10808 - 2/3		Site Location: MO	

ITEM #	Valid Matrix Codes MATRIX CODE DW WATER WASTE WATER F SOLID SL CL WIP AIR AS OT TS	SAMPLE ID (A-Z, 0-9 / -)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED		# OF CONTAINERS	Preservatives	Analysis Test ↑	Y/N ↓	Requested Analysis Filtered (Y/N)				Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
				COMPOSITE START	COMPOSITE END/GRAB										
1		SB-2 (0-3)	G	4-18-18	0930		X	X	X	X	X	X	X		6020 Dissolved Metals**
2		SB-2 (18-20)			1010										6010 Metals**
3		SB-1 (0-3)			1121										8270 PAH SIM
4		SB-1 (20-22)			1145										8270 DRO/ORO
5		SB-7 (0-3)			1326										8260 Oxygenates*
6		SB-7 (14-16)			1350										8260 BTEX, EDC, EDB
7		SB-6 (0-3)			1400										8260 GRO
8		SB-6 (22-24)			1435										
9		SB-8 (0-3)			1448										
10		SB-8 (22-24)			1520										
11		SB-3 (0-3)		4-19-18	0940										
12		SB-3 (22-24)			1014										

REINQUISHED BY / AFFILIATION		DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS	
L. Mammoliti / TE		4-20-18	9:55	Kirk Mammoliti	4-20-18	10:00	Y	Y
SAMPLER NAME AND SIGNATURE		PRINT Name of SAMPLER: Kirk Mammoliti		DATE Signed (MM/DD/YY): 4-20-18		Received on		Samples Intact (Y/N)
SIGNATURE of SAMPLER: [Signature]						Cooler (Y/N)		

# CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.



<b>Section A</b> Required Client Information: Company: <b>Tetra Tech EMI</b> Address: <b>415 Oak</b> Kansas City, MO 64106 Email To: <b>kirk.mammoliti@tetratech.com</b> Phone: <b>816-412-1745</b> Fax: Requested Due Date/TAT: <b>Standard</b>		<b>Section B</b> Required Project Information: Report To: <b>Kirk Mammoliti</b> Copy To: <b>Emily Fisher</b> Purchase Order No.: Project Name: <b>Hiland-Roberts Dairy Site</b> Project Number: <b>103X9025140002.049</b>		<b>Section C</b> Invoice Information: Attention: <b>Kirk Mammoliti</b> Company Name: <b>Tetra Tech EMI</b> Address: Pace Quote Reference: Pace Project Manager: <b>Jeffrey Shopper</b> Pace Profile #: <b>10808 - 2/3</b>	
Regulatory Agency: <input type="checkbox"/> NPDES <input type="checkbox"/> GROUND WATER <input type="checkbox"/> DRINKING WATER <input type="checkbox"/> UST <input type="checkbox"/> RCRA <input type="checkbox"/> OTHER		Site Location: <b>MO</b> STATE:		Page: <b>2</b> of <b>2</b>	

ITEM #	Section D Required Client Information	Valid Matrix Codes										COLLECTED				SAMPLE TYPE (G=GRAB C=COMP)	MATRIX CODE (see valid codes to left)	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives								Analysis Test ↑	Y/N ↑	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
		MATRIX	DRINKING WATER	DW	WATER	WT	WASTE WATER	WW	PRODUCT	P	SOIL/SOLID	S	CL	WP	WP					AR	OT	TS	COMPOSITE START	COMPOSITE END/GRAB	DATE	TIME	Unpreserved					H <sub>2</sub> SO <sub>4</sub>	HNO <sub>3</sub>	HCl	NaOH	Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub>	Methanol	Other																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
1	SB-4(0-3)																				4-19-18	1055	X			X																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	

<b>ADDITIONAL COMMENTS</b> *Oxygenates - Mibc, Ebe, DiPE, TAME TBA **As, Ba, Cd, Cr, Pb, Se		RELINQUISHED BY / AFFILIATION <b>K. Mammoliti</b>	DATE <b>4-20-19</b>	TIME <b>9:55</b>	ACCEPTED BY / AFFILIATION <i>[Signature]</i>	DATE <b>4-20-19</b>	TIME <b>1040</b>	SAMPLE CONDITIONS Received on Ice (Y/N) <b>Y</b> Cooler (Y/N) <b>Y</b> Samples Intact (Y/N) <b>Y</b>
SAMPLER NAME AND SIGNATURE PRINT Name of SAMPLER: <b>Kirk Mammoliti</b> SIGNATURE of SAMPLER: <i>[Signature]</i>		DATE Signed (MM/DD/YY): <b>4-20-18</b>		Temp in °C <b>42</b>		Pace Project No./ Lab I.D. <b>6020808</b>		

**Tetra Tech, Inc.**  
**DATA VALIDATION REPORT**  
**LEVEL II**

Site: Hiland Roberts Dairy Site

Laboratory: Pace Analytical (Lenexa, Kansas)

Data Reviewer: Harry Ellis, Tetra Tech, Inc. (Tetra Tech)

Review Date: May 2, 2018

Sample Delivery Group (SDG): 60268665

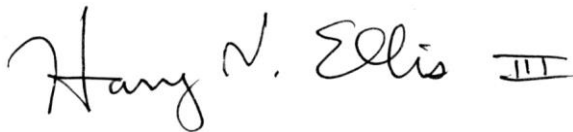
Sample Numbers: SB-1 (0-3), SB-1 (20-22), SB-2 (0-3), SB-2 (18-20), SB-3 (0-3), SB-3 (22-24), SB-4 (0-3), SB-4 (22-24), SB-5 (0-3), SB-5 (22-24), SB-6 (0-3), SB-6 (2224), SB-7 (0-3), SB-7 (14-16), SB-8 (0-3), SB-8 (22-24), SB-2-GW, and EQUIPMENT RINSATE

Matrix / Number of Samples: Sixteen Soil Samples, One Groundwater Sample, and One Blank Sample

The data were qualified according to the U.S. Environmental Protection Agency (EPA) Region 7 documents entitled "Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review", dated January 2017, and "Contract Laboratory Program National Functional Guidelines for Superfund Inorganic Methods Data Review", also dated January 2017. In addition, the Tetra Tech document "Review of Data Packages from Subcontracted Laboratories" (February 2002) was used along with other criteria specified in the applicable methods.

The review was intended to identify problems and quality control (QC) deficiencies that were readily apparent from the summary data package. The following sections discuss any problems or deficiencies that were found, and data qualifications applied because of non-compliant QC. The data review was limited to the available field and laboratory QC information submitted with the project-specific data package.

I, Harry Ellis, certify that all data validation criteria outlined in the above-referenced documents were assessed, and any qualifications made to the data accorded with those documents.



2 May 2018

---

Certified by Harry Ellis, Chemist

---

Date

## DATA VALIDATION QUALIFIERS

- U** — The analyte was not detected above the reported sample quantitation limit.
- J** — The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- UJ** — The analyte was not detected above the reported sample quantitation limit, which is estimated.
- R** — The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. Presence or absence of the analyte cannot be verified.

## **DATA ASSESSMENT**

Sample delivery group (SDG) 60268665 included sixteen (16) environmental soil samples, one (1) environmental groundwater sample, and one (1) quality control (QC) sample (an equipment rinsate). Samples were analyzed for selected volatile organic compounds (VOC) by EPA SW-846 Method 8260, polynuclear aromatic hydrocarbons (PAH) by EPA SW-846 Method 8270, total petroleum hydrocarbons (TPH) as gasoline range organics (GRO), diesel range organics (DRO, and oil range organics (ORO) by EPA SW-846 Methods 8260 and 8270, and metals by EPA SW-846 Methods 6010 and 6020. The following summarizes the data validation that was performed.

### **VOLATILE ORGANIC COMPOUND ANALYSES**

#### **I. Holding Time and Chain of Custody (COC) Requirements**

The samples were received by the laboratory and analyzed within the established holding time of 14 days from sample collection to analysis. No data were qualified.

#### **II. Matrix Spike/Matrix Spike Duplicate (MS/MSD)**

In the soil MS/MSD analyses performed on sample SB-2 (0-3), total xylenes yielded high recoveries and an excessive relative percent difference (RPD), apparently due to matrix interference. No xylenes were detected in the unspiked sample, so no qualifications were applied.

#### **III. Blanks**

The laboratory (method) blanks yielded no detectable concentrations of analytes. No qualifications were applied.

#### **IV. Laboratory Control Sample (LCS)**

All percent recoveries from the LCS analyses were within established control limits. No qualifications were applied.

#### **V. Surrogates**

All surrogate recoveries were within their QC limits. No qualifications were applied.

#### **VI. Comments**

Some detected concentrations were less than their reporting limits ("RL"). These low-concentration results were qualified as estimated (flagged "J").

#### **VII. Overall Assessment of Data**

Overall data quality is acceptable, with no qualifications applied. All data are usable as reported for their intended purposes.

## **POLYNUCLEAR AROMATIC HYDROCARBON ANALYSES**

### **I. Holding Time and Chain of Custody (COC) Requirements**

The samples were received by the laboratory and analyzed within the established holding time of 14 days from sample collection to extraction and 40 days to analysis. No data were qualified.

### **II. Matrix Spike/Matrix Spike Duplicate (MS/MSD)**

No MS/MSD analyses were included in the data package. No qualifications were applied for the data gap.

### **III. Blanks**

The laboratory (method) blank yielded no detectable analyte concentrations. No qualifications were applied.

### **IV. Laboratory Control Sample (LCS)**

All percent recoveries from the LCS analyses were within established control limits. No qualifications were applied.

### **V. Surrogates**

All surrogate recoveries were within QC limits so no qualifications were applied.

### **VI. Comments**

Some detected concentrations were less than their RLs. These low-concentration results were qualified as estimated (flagged "J"). Due to their high content of extractable organics, the extracts of samples SB-1 (0-3), SB-2 (0-3), SB-3 (0-3), SB-8 (0-3), and SB-8 (22-26) could not be fully concentrated. Therefore these samples have elevated RLs and their nondetected results are not comparable to those of the other samples.

### **VII. Overall Assessment of Data**

Overall data quality is acceptable, with no qualifications applied. All data are usable as qualified for their intended purposes.

## **TOTAL PETROLEUM HYDROCARBON ANALYSES**

### **I. Holding Time and Chain of Custody (COC) Requirements**

The samples were received by the laboratory and analyzed within the established holding times. No data were qualified.



## II. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

All MS/MSD results were within limits. No qualifications were applied.

## III. Blanks

The laboratory (method) blanks yielded no detectable analytes. No qualifications were applied.

## IV. Laboratory Control Sample (LCS)

All percent recoveries from the LCS analyses were within established control limits. No qualifications were applied.

## V. Surrogates

All surrogate recoveries were within QC limits so no qualifications were applied.

## VI. Comments

Some detected concentrations were less than their RLs. These low-concentration results were qualified as estimated (flagged "J"). Due to their high content of extractable organics, the DRO/ORO extracts of samples SB-1 (0-3), SB-2 (0-3), SB-3 (0-3), SB-8 (0-3), and SB-8 (22-26) could not be fully concentrated. Therefore these samples have elevated RLs and their nondetected results are not comparable to those of the other samples.

## VII. Overall Assessment of Data

Overall data quality is acceptable, with few qualifications applied. All data are usable as qualified for their intended purposes.

# METALS ANALYSES

## I. Holding Time and Chain of Custody (COC) Requirements

The samples were received by the laboratory and analyzed within the established holding time of 6 months from sample collection to analysis. No data were qualified.

## II. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

In the MS/MSD analyses performed on sample SB-2 (0-3), recoveries of barium were 74 and 67 percent, and those of lead were 122 and 48 percent, versus limits of 75 to 125 percent. Unspiked sample concentrations of barium and lead were somewhat lower than the amount of the spikes, so these results probably result from heterogeneities in the distribution of those metals in the soil. Therefore the results for barium and lead in sample SB-2 (0-3) were qualified as estimated and flagged “J”. Similar irregularities may exist at other locations.

## III. Blanks

No analytes were detected in the soil laboratory blank but the aqueous one yielded low concentrations of barium and chromium. The similar concentrations in the equipment rinsate sample were qualified as laboratory artifacts and flagged “U”. After these qualifications, that rinsate yielded low concentrations of cadmium and lead. The similar concentration of cadmium in the groundwater sample was qualified as a handling artifact and flagged “UJ”. The groundwater concentration of lead was more than 10 times the rinsate concentration, so it was not qualified.

## IV. Laboratory Control Sample (LCS)

All percent recoveries from the LCS analyses were within established control limits. No qualifications were applied.

## V. Comments

Some detected concentrations were less than their RLs. These low-concentration results were qualified as estimated (flagged “J”).

## VI. Overall Assessment of Data

Overall data quality is acceptable, with no major qualifications applied. All data are usable as qualified for their intended purposes.

**APPENDIX G**  
**PROPERTY PROFILE FORM**



United States  
ENVIRONMENTAL PROTECTION AGENCY  
Washington, DC 20460

Draft For Approval  
OMB Number No. 2050-0192  
Expires 05/31/2016

PROPERTY PROFILE FORM—Brownfields

Public reporting burden for this collection of information is estimated to average x.xx hours per response, including the time for reviewing instructions, searching data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate, or any other aspect of this collection of information, including suggestions for reducing this burden, to the Environmental Protection Agency, Office of Environmental Information, Code 2822T, Washington, DC 20460; and to the Paperwork Reduction Project, Office of Management and Budget, Washington, DC 20503. DO NOT RETURN your form to either of these addresses. Send your completed form to the address provided by the issuing office.

PART I- PROPERTY INFORMATION

COOPERATIVE AGREEMENT RECIPIENT INFORMATION

1. Cooperative Agreement Recipient Name (State/Tribe for Section 128(a) Cooperative Agreements; requestor/contractor for TBAs):

Hiland Roberts St. Joseph

2. Cooperative Agreement Number (Contract number for TBAs):

EP-S7-06-01

3. What type of cooperative agreement funding is being used for this property?

- |  |   |
|--|---|
| <input type="checkbox"/> Assessment          | <input type="checkbox"/> Section 128(a) – State and Tribal Response |
| <input type="checkbox"/> Revolving Loan Fund | <input type="checkbox"/> Multi-Purpose Grant                        |
| <input type="checkbox"/> Cleanup             | <input checked="" type="checkbox"/> TBA (EPA Regions Only)          |
| <input type="checkbox"/> Area Wide Planning  |   |

4. For Assessment, Cleanup, and Revolving Loan Fund cooperative agreements, what type of funding is being used at this property?

- |  |                                    |  |
|--|------------------------------------|--|
| <input type="checkbox"/> Hazardous Substance | <input type="checkbox"/> Petroleum | <input checked="" type="checkbox"/> Both |
|--|------------------------------------|--|

5a. Indicate if this form is the initial or Updated Form:

- ☒ Initial Form ☐ Updated Form

5b. If "Updated Form," what's the ACRES Property ID?

PROPERTY BACKGROUND INFORMATION

6. Property Name: Hiland Roberts Dairy

7a. Street Address: 218, 221, & 302 S. 5th Street

7b. City: Saint Joseph

7c. County: Buchanan

7d. State: MO

7e. ZIP Code: 64501

8. Size (in acres): 1.29

9. Parcel Number(s): 06-3.0-08-003-002-036.000, 06-3.0-08-003-002-037.000, 06-3.0-08-003-002-056.000

STATE & TRIBAL BROWNFIELDS/VOLUNTARY RESPONSE PROGRAM INFORMATION

10. State & Tribal Program Enrollment (If the property is not enrolled in a state program, check the Property Not Enrolled check box):

Date of Enrollment: ID Number (if applicable): ☒ This Property Is Not Enrolled in a State or Tribal Program

PROPERTY GEOGRAPHIC INFORMATION (EPA Brownfields Program, or its contractors, will provide complete latitude/longitude information if cooperative agreement recipients are unable)

11a. Latitude  
(Use 00.000000 decimal degree format):

37.765166

11b. Longitude  
(Use -000.000000 decimal degree format):

-94.854491

11c. Horizontal Collection Method:

Global Positioning Method- Unspecified Parameters

11d. Source Map Scale Number (Only if a map/photo was used):

11e. Reference Point (e.g., Center of Facility or Station):

Other Point

11f. Horizontal Reference Datum (Choose one):

☐ NAD27-North American Datum of 1927

☒ WGS84-World Geodetic System of 1984

☐ NAD83-North American Datum of 1983

## PART II- ENVIRONMENTAL ACTIVITIES

**ENVIRONMENTAL ASSESSMENT INFORMATION** (Mandatory for Assessment Cooperative Agreements, State and Tribal Property-Specific Assessments, and TBAs; and, if information is available, for Cleanup and RLF cooperative agreement recipients. CA = Cooperative Agreement)

**Table A – Environmental Assessment Activity** (If there are multiple assessments, please use a separate line for each assessment)

Environmental Assessment Detail			Source of Funding (enter one source of funding per line; do not include funding received prior to the award of this EPA CA)					Name of Entity Providing Funds	Amount of Funding Expended on this Activity
Activity	Start Date	Completion Date	This US EPA CA	Other Federal	State/Tribal (exclude §128(a) funds)	Local Gov't	Private/Other		
Phase I		4/19/2010	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	U.S. EPA Region 7	
Phase II		4/21/2010	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	U.S. EPA Region 7	
Phase I		10/27/2016	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	MDNR	
Phase II		10/2/2017	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	MDNR	
Phase II	1/8/2018		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	U.S. EPA Region 7	\$36,944.01
Cleanup Planning	1/8/2018		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	U.S. EPA Region 7	

**12a.** Indicate Whether Cleanup is Necessary: ☐ Yes ☐ No ☐ Unknown

**12b.** If Unknown, Select Reason:

If Other \_\_\_\_\_

### CONTAMINANTS & MEDIA AFFECTED INFORMATION (Mandatory for all cooperative agreement types)

**Table B - Contaminants and Media Affected** (check all that apply):

Contaminants			
Class of Contaminant	REC*	Found	Cleaned Up
Petroleum/Petroleum Products	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Controlled Substances	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Asbestos	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Lead-Based Paint	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Pesticides	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SVOCS	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
VOCs	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lead	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Other Metals	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
PAHs	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Other Contaminants	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
No Contaminants	<input type="checkbox"/>		
Unknown	<input type="checkbox"/>		

Media		
Media	Affected	Cleaned Up
Soil	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Air	<input type="checkbox"/>	<input type="checkbox"/>
Surface Water	<input type="checkbox"/>	<input type="checkbox"/>
Ground Water	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Drinking Water	<input type="checkbox"/>	<input type="checkbox"/>
Sediments	<input type="checkbox"/>	<input type="checkbox"/>
Building Materials	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Indoor Air	<input type="checkbox"/>	<input type="checkbox"/>
No Media Affected	<input type="checkbox"/>	
Unknown	<input type="checkbox"/>	

\*REC = Recognized Environmental Conditions

**ENVIRONMENTAL CLEANUP INFORMATION** (Mandatory for Cleanup and RLF Cooperative Agreements and State & Tribal Property-Specific Cleanups; and, if information is available, for Assessment Cooperative Agreements and TBAs)

**13.** Cleanup Activity Start Date: \_\_\_\_\_

**14a.** Cleanup Activity Completion Date: \_\_\_\_\_

**15.** Acres Cleaned Up: \_\_\_\_\_

**14b.** Cleanup Completion Documentation

☐ NFA ☐ Environmental Professional Certified

**16.** Date No Further Action/Cleanup Completion Document Issued

(If the property was not enrolled in a state or tribal program, leave blank):

Date: \_\_\_\_\_

**17.** Number of Cleanup Jobs Leveraged: \_\_\_\_\_

**18.** If EPA Brownfields funding was used, indicate the type and amount (If any non-EPA funding was used, fill out Table C):

Type	Amount
<input type="checkbox"/> Cleanup	
<input type="checkbox"/> Cooperative Agreement	
<input type="checkbox"/> RLF Loan	

Type	Amount
<input type="checkbox"/> RLF Subgrant	Date RLF Subgrant Signed _____
<input type="checkbox"/> Section 128(a) State/Tribal	

**Table C - Environmental Cleanup Leveraged Funding Detail**

Source of Funding (Enter one source of funding per line; do not include funding received prior to the award of this EPA Cooperative Agreement)					Name of Entity Providing Funds	Activity Funded	Amount of Funding Expended on this Activity
Other Federal	State/Tribal (exclude §128(a) funds)	Local Gov't	Private/Other	Cost Share			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			

## PART II- ENVIRONMENTAL ACTIVITIES (continued)

### INSTITUTIONAL & ENGINEERING CONTROLS INFORMATION *(Mandatory for all cooperative agreement types)*

19a. Indicate whether Institutional Controls are required: ☐ Yes ☐ No ☒ Unknown

19b. If Institutional Controls were required, indicate the category (check all that apply):

- ☐ Proprietary Controls (e.g., easements, covenants) ☐ Governmental Controls (e.g., zoning, building codes)
- ☐ Informational Devices (e.g., state registries, deed notices) ☐ Enforcement/Permit Tools (e.g., permits, consent decrees)

Additional Institutional Controls Information:

Address of Data Source (URL if available): \_\_\_\_\_

19c. Indicate whether Institutional Controls in place: ☐ Yes ☒ No Date: \_\_\_\_\_

20a. Indicate whether Engineering Controls are required: ☐ Yes ☐ No ☒ Unknown

20b. If Engineering Controls were required, indicate the category (check all that apply):

- ☐ Cover Technologies (e.g., Capping) ☐ Immobilization Process (e.g., Encapsulation, In-Situ Solidification) ☐ Engineered Barriers (e.g., Slurry Walls, Sheet)
- ☐ Security (e.g., Guard, Fences) ☐ Other \_\_\_\_\_

Additional Engineering Controls Information:

Address of Data Source (URL if available): \_\_\_\_\_

20c. Indicate whether Engineering Controls in place: ☐ Yes ☐ No Date: \_\_\_\_\_

### REDEVELOPMENT AND OTHER LEVERAGED ACCOMPLISHMENTS *(Mandatory for Assessment, Cleanup and RLF Cooperative Agreements; and, if information is available, for State and Tribal Property Specific Activities and TBAs)*

21. Redevelopment Start Date: \_\_\_\_\_ 22. Redevelopment Completion Date: \_\_\_\_\_

**Table D- Redevelopment Leveraged Funding Detail**

Source of Funding (Enter one source of funding per line; do not include funding received prior to the award of this EPA Cooperative Agreement)				Name of Entity Providing Funds	Activity Funded	Amount of Funding Expended on this Activity
Other Federal	State/Tribal	Local Gov't	Private/ Other			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			

23. Number of Redevelopment Jobs Leveraged: \_\_\_\_\_

24. Future Use, Planned and Actual Acreage (Check all that apply. For properties with multi-story buildings only, please indicate both the entire square footage and the square footage for each type of reuse (e.g., a three-story building with first floor commercial and remaining floors residential).

	Planned		Actual	
	Acres	Sq. Ft.	Acres	Sq. Ft.
<input type="checkbox"/> Residential	_____	_____	_____	_____
<input type="checkbox"/> Greenspace	_____	_____	_____	_____
<input checked="" type="checkbox"/> Industrial	1.29	_____	1.29	_____
<input type="checkbox"/> Commercial	_____	_____	_____	_____
<input type="checkbox"/> Multi-story	_____	_____	_____	_____

## PART II- ENVIRONMENTAL ACTIVITIES (continued)

### ANECDOTAL PROPERTY INFORMATION *(If information is available for all cooperative agreement types)*

25. Property Highlights:

### PROPERTY PHOTOGRAPH INFORMATION

26. Indicate whether photographs are available: ☒ Yes ☐ No 27. Indicate whether video is available: ☐ Yes ☒ No

## PART III- ADDITIONAL PROPERTY INFORMATION

### PROPERTY HISTORY INFORMATION

28. Property Description / History / Past Ownership:

See above anecdotal property information

29. Predominant Past Use(s) (Check all that apply. For properties with multi-story buildings only, please indicate both entire square footage and the square footage for each type of past use (e.g., a three-story building with first floor commercial and remaining floors residential.)

	Acres	Actual Square Feet
<input type="checkbox"/> Residential	_____	_____
<input type="checkbox"/> Greenspace	_____	_____
<input checked="" type="checkbox"/> Industrial	1.29	_____
<input type="checkbox"/> Commercial	_____	_____
<input type="checkbox"/> Multi-story building	_____	_____

### OWNERSHIP & SUPERFUND LIABILITY *(Mandatory for Cleanup and RLF Cooperative Agreements)*

30a. Ownership Entity:

☐ Government (Tribal, State, Local) ☒ Private

31a. During the life of the cooperative agreement, did ownership change?

☐ Yes ☐ No

30b. Current Owner:

Hiland Roberts Dairy

31b. If "yes," did Superfund federal landowner liability protections factor into the ownership change?

☐ Yes ☐ No ☐ Unknown

## PART IV- APPROVALS

32. Cooperative Agreement Recipient Project Manager

Name (please print):

Signature

Date:

Kathy Hahn, Mo-Kan Regional Council

33. US EPA Regional Representative

Name (please print):

Signature

Date:

Todd Davis, Project Manager