



January 18, 2017

Mr. Todd Davis
Site Assessment Manager
U.S. Environmental Protection Agency, Region 7
11201 Renner Blvd.
Lenexa, Kansas 66219

Subject: Targeted Brownfields Assessment, Revision 01
KCMO Municipal Farms, Kansas City, Missouri
EPA Region 7, START 4, Contract No. EP-S7-13-06, Task Order No. 0115.000
Task Monitor: Todd Davis, Site Assessment Team Leader

Dear Mr. Davis:

Tetra Tech, Inc. (Tetra Tech) is submitting the attached, revised Targeted Brownfields Assessment (TBA) report regarding KCMO Municipal Farms, Kansas City, Missouri.

If you have any questions or comments pertaining to this submittal, please call the Project Manager at (816) 412-1760.

Sincerely,

A handwritten signature in blue ink that reads 'Christina Engemann'.

Christina Engemann
START Project Manager

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

Ted Faile, PG, CHMM
START Program Manager

Enclosures

cc: Debra Dorsey, EPA Project Officer (cover letter only)

**TARGETED BROWNFIELDS ASSESSMENT REPORT
REVISION 01**

**KCMO MUNICIPAL FARMS
KANSAS CITY, MISSOURI**

Superfund Technical Assessment and Response Team (START) 4

Contract No. EP-S7-13-06, Task Order No. 0115.000

Prepared For:

U.S. Environmental Protection Agency
Region 7
11201 Renner Blvd.
Lenexa, Kansas 66219

January 18, 2017

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1.0 INTRODUCTION

The Tetra Tech, Inc. (Tetra Tech) Superfund Technical Assessment and Response Team (START) was tasked by the U.S. Environmental Protection Agency (EPA) Region 7 Superfund Division to conduct a Targeted Brownfields Assessment (TBA) of a portion of the KCMO Municipal Farms (site) in Kansas City, Jackson County, Missouri. The City of Kansas City, Missouri (City) requested assessment assistance under the TBA program from EPA Region 7 prior to redevelopment of the Municipal Farms site. Tetra Tech conducted this TBA in general 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

Purposes of this TBA were to perform an agricultural analysis of soils in areas proposed for agricultural use, and to conduct a groundwater resource study. To these ends, the City of Kansas City, Missouri requested support with the following two tasks:

- Soil coring and analyses at priority development sites where soil cultivation is recommended and/or anticipated, to determine specific soil characteristics, including an analysis of agronomic parameters and depths and qualities of available topsoil.
- Groundwater resource investigations at the site to estimate availability, quality, and potential rates of production of groundwater as a potentially economic source of irrigation for agricultural uses.

1.2 SPECIAL TERMS AND CONDITIONS

There were no special terms or conditions for the TBA.

2.0 BACKGROUND AND SITE HISTORY

This section briefly describes the site: the physical setting, including geology, hydrogeology, and hydrology; site history; and a summary of previous assessments.

2.1 SITE DESCRIPTION

The site encompasses approximately 441 acres of land owned by the City that includes multiple tracts of land separated by Interstate Highway 435 in Kansas City, Jackson County, Missouri. The site is depicted on the United States Geological Survey (USGS) 7.5-minute series Independence, Missouri topographic quadrangle map (USGS 1996) in northwest ¼, Section 30, Township 49 north, Range 32 west (see Figure 1, Appendix A). Coordinates at the approximate center of the western portion of the site are 39.040652 north latitude and 94.512526 west longitude (Google Earth 2012).

2.2 PHYSICAL SETTING

The subject property is part of a lightly developed area adjoining a residential neighborhood in Kansas City, Missouri. The subject property is bounded north and west by Coal Mine Road and the Blue River, east and northeast by Interstate-435, and south by woods with residential development beyond (see Figure 2, Appendix A).

Jackson County is within the west-central part of Missouri, in the Iowa and Missouri Deep Loess Hills Resource Area of the Central Feed Grains and Livestock Region of the United States. The Missouri River is the northern boundary of the County. The northern part of the County is the nearly level floodplain of the Missouri River. Adjacent to the floodplain and south are moderately sloping to steep, loess-covered bluffs and hills. The rest of the County consists of gently sloping to moderately sloping uplands and flood plains of the Blue River, Little Blue River, Sni-A-Bar Creek, and their tributaries (U.S. Department of Agriculture [USDA] 1984).

Elevations in Jackson County range from 1,105 feet above mean sea level (amsl) on the divide in the south-central part of the County to 690 feet amsl at normal water level on the Missouri River at the county line on the eastern side of the County (USDA 1984). Based on a review of the USGS 7.5-minute series Independence, Missouri, topographic quadrangle map (USGS 1996), the subject property ranges from approximately 771 to 924 feet amsl. The subject property appears flat to gently sloping. Area topography slopes north and northwest toward the Blue River. The site is located within the 100-year floodplain of the Blue River. In the southwest portion of the site is a spur of an upland ridge line where a

former underground limestone mine was developed prior to 1970. This mine was known as the Botsford Mine.

2.2.1 Geologic Setting

The following sections describe regional geology and site geology.

Regional Geology

The Municipal Farms site is within the Osage Plains and the Central Dissected Till Plains physiographic province. The Osage Plains area is characterized by rolling hills developed on layered sedimentary rock strata of uneven hardness and thickness. Pennsylvanian-age bedrock, covered with soil, underlies the site and can be seen in rock outcrops exposed by road cuts. The Central Dissected Till Plains area is characterized by moderately dissected glaciated, flat to rolling plains that slope gently toward the Missouri and Mississippi River Valleys. Average depth to bedrock in the province is 20 feet, and almost never exceeds 40 feet.

The upper bedrock formation in the vicinity of the subject property consists of the middle Kansas City Group, Missourian Series, Pennsylvania System. Underlying the Kansas City Group are the shales of the Pleasanton Group. Underlying the Pleasanton Group are predominantly shales of the Marmaton and Cherokee Groups of the Des Moines Series. Maximum thicknesses of these groups are as follows: Kansas City Group, 135 feet; Pleasanton Group, 150 feet; and Marmaton Group, 190 feet.

Bedrock in this part of the Kansas City area dips approximately 6 feet per mile to the northwest. A series of northwest-southeast anticlines and synclines are evident in western Jackson County, providing local undulation of the bedrock strata. The Blue Ridge Anticline is east of the site, and the Centerview-Kansas City Anticline is west of the site (Environmental Advisors and Engineers, Inc. [EAE] 2012).

Site Geology

West Side

Rock units in this portion of the Kansas City Metropolitan area consist of interbedded limestones and shales of the Kansas City Group of the Middle Pennsylvanian Period. Detailed geological information regarding the area of the Botsford mine, within the southwest portion of the west side of the site, is as follows:

Within the Botsford mine area, total thickness of the Bethany Falls Limestone Member of the Swope Formation unit appears to range between 16 feet and 21 feet. The Bethany Falls Limestone consists of

several distinct limestone strata separated by minor, interbedded, shales. The upper Bethany consists of a nodular algal limestone and an overlying, moderately cemented oolitic limestone. Where the roof of the Botsford mine consists of the Bethany Falls Limestone, the roof has a thickness of 15 to 20 feet; ceiling collapse was evident in several areas.

The Galesburg Shale Formation and the Stark Shale Member of the Dennis Formation occur above the Bethany Falls Limestone. The Galesburg is a calcareous clay-shale unit, while the Stark is a brittle, fissile, black shale unit. Where intact, the Galesburg and Stark shales can act as a barrier to downward infiltration of groundwater. At numerous locations in the Botsford mine, these shales are not intact, as evidenced by solution cavities or collapsed structures that penetrate the barrier shale zone. Together, the Galesburg Shale and the Stark Shale are typically 5 to 9 feet thick.

The Winterset Member of the Dennis Formation overlies the Galesburg-Stark units. The Winterset is a medium to thick bedded limestone with shale seams invariably and intricately jointed. Where the Winterset is weathered, it can act as an aquifer and carry water into the Galesburg-Stark Shales and the lower lying Bethany Falls Limestone through open joints. At the Botsford mine, full thickness of the Winterset appears to be present only over the extreme southern and eastern sections.

The Fontana Shale, Block Limestone, and Wea Shale Members of the Cherryvale Formation overlie the Winterset Limestone. Collectively, these lower Cherryvale units are between 24 and 28 feet thick. Based on surface elevations, full thickness of the Wea is not present within the Botsford mine. Probable maximum rock thickness overlying the Winterset is on the order of 10 to 15 feet. Apparently, the Wea is present at thicknesses approximating 10 feet only in the extreme southern and eastern sectors of the property.

The Kansas City Group is quarried and mined for manufacture of Portland cement, crushed stone, riprap, and dimension stone. The Botsford mine is room and pillar type, where rock pillars are left in place to support the roof. The mine is in the Bethany Falls Limestone.

The spur top and upper portions of the boundary slopes of the Botsford mine area are dotted with identifiable sinkholes, and potential or incipient sinks. Sinkholes have been identified on the site by failure zones, fracturing, and internal drainage. Incipient or potential sinks have been identified on aerial photographs and/or on the site as low areas or swales with some internal drainage. Minor slope failures consisting of rock falls and slumps were observed, but no large or major slide masses were noted, except in the vicinity of sinkholes. Past quarrying and dumping practices have altered the natural slopes at the western and northern boundaries of the Botsford mine area.

Generalized dips of rock units at the Botsford mine are to the northwest at less than 1/2 to 1 degree (°) (45 to 90 feet per mile). The apparent fall across the mine in a northwesterly direction appears to be on the order of 10 feet. Local variations due to irregularities in the rock, including thickening, thinning, and cross-bedding in the Bethany Falls Limestone, are prevalent.

At the Botsford mine, jointing, or natural rock fractures, occur in two prominent directions—northeast and northwest. The joints are pervasive and are found throughout the mine. As these joints fracture, the roof and pillars weaken, allowing conduits or paths for groundwater to enter the mine. The majority of fractures at the Botsford mine show a discoloration along the joints indicating past weathering and water entry. Numerous joints are open, and clay deposits, water inflow features (stalactites), and plant roots are evident, especially along the northern, northeastern, and western perimeters. Widening of joints and development of “wash-board” joint surfaces indicate long-term, probably pre-mining solutioning along the fractures (EAE 2012).

2.2.2 Hydrogeology

The following sections describe regional hydrogeology and site hydrogeology.

Regional Hydrogeology

This site is in the Saline Groundwater Province. Low permeability in the Pennsylvanian bedrock impedes groundwater movement laterally and vertically, so little groundwater discharge and recharge occur. Wells reportedly yield less than 50 gallons per minute (gpm). Groundwater is believed to move primarily along fractures and bedding planes; however, shale layers impede vertical groundwater movement.

Groundwater in the Osage Plains is limited in quantity and of poor quality. Water is supplied primarily from surface impoundments and stream-intake pipes. Surficial materials of uplands and slopes produce low yields from water perched on claypans and fragipans, and in residuum at the surficial material-bedrock contact. These perched water zones are seasonal, locally recharged by precipitation, and vary with local conditions and permeability.

Mississippian and Pennsylvanian formations form the bedrock aquifers in this region. The Pennsylvanian aquifers are characterized by water table conditions; however, because of the geologic structure in the region, artesian conditions may exist locally in shallow wells. Artesian conditions exist in deeper wells that were drilled to Ordovician bedrock. Water yields are low, 1 to 15 gpm, and the water is high in chlorides, sodium, iron, bicarbonates, and other dissolved solids. Water yields increase in deeper wells,

but quality decreases significantly with depth. Water table depths in the alluvium and terraces of the floodplains in the region are 20 to 30 feet.

The Warrensburg Sandstone Member of the Pleasanton Group may yield up to 50 gpm, but concentrations of dissolved solids may exceed 1000 milligrams per liter (mg/L). The channel-fill sandstone is locally recharged by precipitation, although recharge may also occur through upper reaches of the old channel.

Mississippian and older bedrock aquifers exhibit leaky artesian conditions; however, water table conditions exist near the border of the Ozark Plateaus. Water yields vary from 25 to a few hundred gpm. Water quality is highest near the eastern border of the Osage Plains, and decreases toward the northwest, with increasing concentrations of chlorides, sodium, and other dissolved solids. Recharge is by regional water movement from the Ozark Plateaus and by limited infiltration of precipitation. The Ozark Plateaus aquifer lies approximately 500 feet below a confining unit, and has multiple confining layers within it. To determine exact depth to the Ozark Plateaus at the site would require drilling for establishment of wells (EAE 2012).

Site Hydrogeology

Shallow groundwater is believed to flow northeast and northwest, and to surface at rock outcrops along steep slopes east and north of the site. Groundwater releases to the surface could drain to Round Grove or the Blue River. Confluence of the Blue River and the Missouri River is approximately 6 miles north-northeast of the site.

Local Pennsylvanian-age bedrock units generally yield low quantities of marginal quality groundwater. The groundwater is high in dissolved solids, particularly chlorides, iron, and bicarbonates. Non-potable water for the subject property is supplied by the City of Kansas City, Missouri, Water Department, and is obtained from the Missouri River and groundwater sources near the river.

Numerous drainageways dissect the bedrock in this area, and water flowing through these eventually enters the Blue River. Portions of the site are on a hilltop that slopes downward to the north-northeast. Shallow groundwater may perch seasonally at the top of the bedrock. Transient water also may be encountered within fracture zones and along bedding planes, and frequently discharges at bedrock outcrops. Groundwater flow is inferred to the north in the direction of the topographic gradient and surface water flow (EAE 2012).

2.2.3 Hydrology

There are three ponds, located north and south of the western part of the radio tower property and northeast of the eastern part of the radio tower property. The Botsford Mine underlies the southwest portion of the site. This portion is a westerly trending spur located on the upland ridgeline on the east side of Coal Mine Road and the current Blue River floodplain. This spur is bounded on the north and west by the Blue River floodplain and on the south by a westerly flowing tributary of the Blue. The central portion of the spur is gently rolling with steep, forming cliffs to the west, north, and south. Drainage is radial and intermittent (EAE 2012).

2.3 SITE HISTORY

The site formerly accommodated a working farm, men's reformatory, women's reformatory, and hospital. Currently, the site includes a police firing range, police helicopter and canine units, animal shelter, national guard armory, police bomb squad facility, communications towers, city-owned Public Works buildings, and a cemetery. The site also includes forestland, concrete spoil piles, concrete structures associated with the former concrete batch plant, and access roads. A small portion of the City-owned property is an abandoned limestone mine adjacent to the former concrete batch plant. Based on the Underground Development – Botsford Property report (Woodward-Clyde Consultants [Woodward-Clyde] 1984), the underground workings (abandoned mines) are composed of an approximately 35-acre room and pillar mines. Most of the mine is within the southwest portion of the site.

2.4 SUMMARY OF PREVIOUS ASSESSMENTS

Numerous environmental investigations have occurred at and near the City-owned parcels that constitute the site. Most of these previous investigations sought to characterize potentially present hazardous substances or petroleum products possibly released to the environment from spills or leaking tanks. Significant characterization investigations occurred at the Former Health Emergency HAZMAT site (HEHS) and the Round Grove Creek Landfill, both east of I-435. Under EPA's TBA program, Phase I and Phase II assessments occurred at the following subsites of the KC Municipal Farms site: the Former Municipal Corrections Institution (MCI) and Former Men's Reformatory site, the Animal Shelter site, the former LaFarge Readymix batch concrete plant, and the KCMO Public Works, East Garage site.

In May 2010, surface soil samples were collected within an area north and west of the former MCI facility that had been proposed for use as a community gardening site. Personnel from the Soil Chemistry Laboratory, Department of Agronomy, Kansas State University (KSU) field-screened the samples for

Resource Conservation and Recovery Act (RCRA) metals by use of an x-ray fluorescence (XRF) spectrometer. KSU concluded that no significant metals contamination had been identified at the site that would interfere with proposed use of the site as a community garden, but recommended follow-up testing for possible presence of pesticides. Within a portion of the site, KSU also tested soils for agronomic parameters (KSU 2012).

In March 2011, on behalf of the City, Tetra Tech EM Inc. conducted a Phase I Environmental Site Assessment (ESA) of the Municipal Garden Farm Community Garden project, within the boundaries of the site. In April 2011, Tetra Tech conducted a Limited Phase II ESA pertaining to the Municipal Garden Farm Community Garden project, with intent to sample soil and groundwater within the area of the proposed community garden and within adjacent properties. No groundwater was encountered. Collected soil samples were analyzed for volatile organic compounds (VOC), semivolatile organic compounds (SVOC), and total petroleum hydrocarbons (TPH)-gasoline-range organics (GRO), TPH-diesel-range organics (DRO), TPH-oil-range organics (ORO), RCRA metals, and pesticides. Results from the soil samples indicated no apparent impacts from historical activities within the area of the proposed community garden or within adjacent properties (Tetra Tech EM Inc. 2011).

In October 2012, EAE conducted an area-wide Brownfields assessment at KCMO Municipal Farms. The assessment report included a summary of existing site investigation reports and data, history of past land uses, identification of known or potential concerns associated with the Brownfields sites, and recommendations and strategies for assessment and cleanup of Municipal Farms Brownfields sites (EAE 2012).

In June 2013, Tetra Tech EM Inc. conducted a Phase II TBA of the Former Lafarge site, within the boundaries of the site. The purpose of the Phase II TBA was to determine if historical activities at the subject property had impacted surface soil, surface water, sediment, subsurface soil, and/or groundwater at and around items posing recognized environmental conditions (REC). Based on sampling, elevated levels of arsenic, cadmium, chromium, lead, and selenium were present in the subsurface soils. One groundwater sample was collected during this investigation. Total concentrations of arsenic, barium, cadmium, chromium, and lead met or exceeded the respective Missouri Risk-based Corrective Action lowest default target levels (LDTLs). No dissolved metals concentration exceeded an LDTL. This groundwater location was on the western portion of the site near the former garage area. No dissolved metals concentrations exceeded the lowest default target levels (Tetra Tech EM Inc. 2013).

In May 2015, KSU collected additional soil samples for agronomic analysis at 11 locations, including 4 at the former HEHS site, 5 south of the existing community garden, and 2 north of Coal Mine Road and south of the Blue River. The intent of the KSU study was to determine suitability of unused land for community gardening. KSU concluded that soils fertility could be improved by current nitrate and phosphorous concentrations in soils available for plant uptake by addition of compost/manure and/or cover cropping or mulch. Moreover, soil pH was slightly basic (7.0 to 8.7 range), indicating presence of some free calcium carbonate in soils. Alkalinity of the soils could be lowered with addition of sulfur at a rate of 6-7 pounds per acre (KSU 2012).

3.0 TARGETED BROWNFIELDS ASSESSMENT ACTIVITIES

The following sections describe the scope of the TBA, and field exploration and methods. START members (SM) Christin Russell and Tommy Rebecchi sampled surface soil on March 2-3, 2016. SM Christin Russell sampled subsurface soil and groundwater on March 4, 2016.

3.1 SCOPE OF THE ASSESSMENT

SMs conducted environmental sampling to assess quality of soil and availability of groundwater. Photographs taken to document TBA field activities are in Appendix B. TBA activities were recorded in a site logbook, a copy of which is in Appendix C. Analytical data packages, boring logs, Hydraulic Profiling Tool (HPT) logs, and the chain of custody are in Appendix D. Analytical summary tables appear in Appendix E. Sampling accorded with an approved Quality Assurance Project Plan (QAPP) completed under Task Order 0115.000 (Tetra Tech 2015).

3.1.1 Conceptual Site Model and Sampling Plan

The proposed sampling scheme for collection of soil and groundwater samples was biased/judgmental, in accordance with the *Guidance for Performing Site Inspections under Comprehensive Environmental Response Compensation and Liability Act (CERCLA)*. Objectives were to analyze soil quality and groundwater availability in anticipation of future development of the property—to determine quality of soil and groundwater for agricultural purposes.

3.1.2 Deviations from the QAPP

Deviations from the QAPP and the rationale for these are as follows:

- START was unable to collect soil samples and operate the HPT for characterizing groundwater at a portion of the property currently used by the Kansas City Police Department (KCPD) as an open detonation ground. Soil samples were not collected at S-10 and S-11. Groundwater could not be characterized at HPT-6 and HPT-7.

3.2 FIELD EXPLORATION AND METHODS

Field activities at the subject property occurred on March 2-4, 2016. The sections below summarize soil sampling and groundwater characterization.

3.2.1 Surface Soil Sampling

Surface soil samples were collected at five locations at the subject property during the TBA (see Appendix A, Figure 2). At each location, a surface soil sample (0 to 18 inches bgs) was collected by use of a dedicated sampling hand auger. Collected soil was then placed in a disposable aluminum pie pan for homogenization, and then transferred to appropriate containers. These containers were submitted for analyses for nitrate, phosphorus, and potassium available for plant uptake; measurement of soil pH; and analyses for organic matter and for metals extractable by use of diethylenetriaminepentaacetic acid (DTPA) (arsenic, cadmium, chromium, lead, copper, mercury, molybdenum, nickel, selenium, and zinc). This extraction procedure is used by agronomists and soil scientists to more accurately identify macronutrients and micronutrients available for plant uptake.

Pertinent data were recorded in the field logbook for each sample. All soil samples were stored in coolers maintained at temperatures at or below 4 degrees Celsius (°C) pending submittal to a START-contracted laboratory. Table 1 summarizes collected surface soil samples.

TABLE 1
SURFACE SOIL SAMPLE SUMMARY
KCMO MUNICIPAL FARMS SITE

Sample Identification	Laboratory Identification	Sample Location		Sample Date	Sample Time
		Latitude	Longitude		
S-2 (0-18 in)	60214339002	39.03710812	-94.51656318	3/4/2016	11:30
S-3 (0-18 in)	60214339003	39.03869031	-94.51758247	3/4/2016	11:12
S-4 (0-18 in)	60214339004	39.03811669	-94.51465587	3/4/2016	10:44
S-5 (0-18 in)	60214339005	39.03947504	-94.51467821	3/4/2016	10:27
S-12 (0-18 in)	60214339010	39.04125606	-94.50413578	3/4/2016	09:50

Notes:

in Inches
S Soil

3.2.2 Subsurface Soil Sampling

Subsurface soil samples were collected at five boring locations (S-1, S-6, S-7, S-8, and S-9) at maximum depth of 4 feet bgs or refusal, whichever was encountered first (see Appendix A, Figure 2). Each borehole was advanced by use of a Geoprobe™ 4-foot-long Macro-Core® sampler fitted with a disposable polyvinyl chloride (PVC) liner. Soil samples were collected in accordance with Region 7 EPA Standard Operating Procedure (SOP) 4230.07 (Geoprobe™ Operations) and SOP 4231.2012 (Soil Sampling). The Geoprobe™ Macro-Core® sampler was decontaminated after work at each boring location by use of an

alconox/water solution, followed by a fresh water rinse. Decontamination rinse water was city-supplied water from Kansas City, Missouri.

Tetra Tech logged soil type and changes in lithology in the direct-push technology (DPT) soil borings (see Appendix D). The five samples were submitted for analyses for nitrate, phosphorus, and potassium available for plant uptake; measurement of soil pH; and analyses for organic matter and for metals extractable by use of DTPA (arsenic, cadmium, chromium, lead, copper, mercury, molybdenum, nickel, selenium, and zinc).

Pertinent data were recorded in the field logbook for each sample (see Appendix C). All soil samples were stored in coolers maintained at temperatures at or below 4 °C pending submittal to a START-contracted laboratory. Table 2 summarizes collected subsurface soil samples.

TABLE 2
SUBSURFACE SOIL SAMPLE SUMMARY
KCMO MUNICIPAL FARMS SITE

Sample Identification	Laboratory Identification	Sample Location		Sample Date	Sample Time
		Latitude	Longitude		
S-1 (0-4 ft.)	60214339001	39.0364193	-94.52019171	3/3/2016	10:50
S-6 (0-2 ft.)	60214339006	39.04150217	-94.51675048	3/2/2016	15:30
S-7 (0-4 ft.)	60214339007	39.04123954	-94.51483602	3/2/2016	15:10
S-8 (0-4 ft.)	60214339008	39.04297297	-94.51495992	3/2/2016	15:50
S-9 (0-4 ft.)	60214339009	39.04291889	-94.51362089	3/2/2016	16:20

Notes:

ft. Feet
S Soil

3.2.3 Groundwater Characterization

Tetra Tech determined hydraulic conductivity at five locations within the site by use of a Geoprobe HPT System (see Figure 2, Appendix A). At each location, the probe advanced to refusal. The HPT system has been developed by Geoprobe Systems for geohydrologic characterization of soils and indication of hydraulic conductivity. The HPT is a logging tool that measures pressure required to inject a flow of water into soil as the probe advances into the subsurface. This injection pressure log is an excellent indicator of formation permeability. An electrical conductivity (EC) measurement array is built into the HPT probe. This allows the user to acquire soil EC data for lithologic interpretation. In general, the higher the EC, the smaller the grain size, and vice-versa. HPT pressure response is independent of these mineralogical factors. The estimated hydraulic conductivity (K) value is calculated using the HPT

pressure and flow data. The graph for K on the HPT log shows where the most productive depth of water is encountered, as shown in Appendix D. The most productive depth of the water table is where you will have the most recoverable groundwater at that location within the site. Data acquisition occurred in real time via connection of the controller to the field instrument. The field instrument obtained, stored, and displayed (on a field laptop) the following data at various depths: transducer pressure, flow rate and EC, line pressure, probe rate, and diagnostic parameters (Geoprobe Systems 2015).

Post-run software developed by Geoprobe was used to derive approximations of hydraulic conductivity and saturated thicknesses of potentially productive aquifer materials. Table 3 summarizes the groundwater characterization.

TABLE 3
GROUNDWATER CHARACTERIZATION SUMMARY
KCMO MUNICIPAL FARMS SITE

Identification	Location		Date	Time
	Latitude	Longitude		
HPT-1 (0-58 ft.)	39.04189771	-94.51469273	3/2/2016	14:40
HPT-2 (0-55 ft.)	39.04339216	-94.51145913	3/3/2016	09:45
HPT-3 (0-61 ft.)	39.0417874	-94.50865489	3/2/2016	10:32
HPT-4 (0-57 ft.)	39.0441251	-94.50806224	3/2/2016	09:18
HPT-5 (0-58 ft.)	39.04230192	-94.50617676	3/2/2016	12:50

Notes:

ft. Feet
S Soil

The groundwater resource investigation evaluated whether groundwater at the site would be useful for agricultural purposes. At each HPT location, exact characterization points (depths and Global Positioning System [GPS] coordinates) and static water levels were recorded.

3.2.4 Quality Control Sampling

To evaluate sample quality control (QC), a method blank was analyzed in the laboratory.

3.2.5 Investigation-derived Waste

Investigation-derived waste (IDW), consisting primarily of used tubing, gloves, and other solid waste, was disposed of as uncontaminated solid waste. Soil cuttings were disposed of on site as nonhazardous waste. Issues pertaining to decontamination of personnel and sampling equipment were addressed in a site-specific Health and Safety Plan (HASP) prepared by START.

4.0 EVALUATION AND PRESENTATION OF RESULTS

The following sections summarize analytical data from surface and subsurface soil samples, as well as groundwater characterization during the TBA. Complete analytical data packages for soil samples and HPT logs are in Appendix D.

4.1 SOIL SURVEY

This section shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations of and test data from these and similar soils. Depths to upper and lower boundaries of each layer are indicated. Particle size is the effective diameter of a soil particle as measured by sedimentation, sieving, or micrometric methods. Particle sizes are expressed as classes with specific effective diameter class limits. The broad classes are sand, silt, and clay, ranging from the larger to the smaller. Sand as a soil separate consists of mineral soil particles 0.05 to 2 millimeters in diameter. Silt as a soil separate consists of mineral soil particles 0.002 to 0.05 millimeter in diameter. Clay as a soil separate consists of mineral soil particles less than 0.002 millimeter in diameter. Contents of sand, silt, and clay affect physical behavior of soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification. Amount and kind of clay affect fertility and physical condition of soil, ability of soil to absorb cations and to retain moisture, tillage, and earthmoving operations. Organic matter is plant and animal residue in soil at various stages of decomposition, positively affecting available water capacity, water infiltration, soil organism activity, and tillage. It is also a source of nitrogen and other nutrients for crops and soil organisms (USDA 2016). Data from the soil survey are listed below in Table 4.

TABLE 4
SOIL SURVEY
KCMO MUNICIPAL FARMS SITE

Map Symbol and Soil Name	Depth (in)	Sand (%)	Silt (%)	Clay (%)	Organic Matter (%)	Farmland Classification
10107 – Menfro silty clay loam, 9-14 percent slopes, severely eroded	0-6	7	64	29	0.8	Farmland of statewide importance
	6-40	7	62	31	0.3	
	40-80	14	72	14	0.3	
10141 – Snead-Rock outcrop complex, 14-30 percent slopes	0-3	19	48	34	3.0	Not prime farmland
	3-24	5	45	50	0.8	
10143 – Snead-Urban land complex, 9-30 percent slopes	0-12	18	52	30	3.0	Not prime farmland
	12-40	5	45	50	0.8	
12506 – Wiota silt loam, 0-2 percent slopes, rarely flooded	0-29	5	79	16	2.5	Prime farmland
	29-48	4	66	30	1.2	
	48-80	6	73	22	0.7	
13510 – Colo silty clay loam, 0-2 percent slopes, occasionally flooded	0-8	6	62	32	6.0	Prime farmland if drained
	8-40	6	61	33	3.5	
	40-46	6	61	33	3.5	
	46-52	7	63	30	1.5	
	52-79	7	67	26	1.5	
36007 – Bremer silt loam, 0-2 percent slopes, occasionally flooded	0-20	5	70	25	2.9	Prime farmland if drained
	20-41	4	57	40	2.8	
	41-60	5	56	40	0.7	
60025 – Harvester complex, 2-9 percent slopes	0-7	4	73	23	0.5	Not prime farmland
	7-31	3	67	30	0.5	
	31-80	24	46	30	0.4	
60125 – Harvester-, 9-14 percent slopes	0-5	8	69	23	0.5	Farmland of statewide importance
	5-80	5	68	27	0.3	
99033 – Udarents, 2-9 percent slopes	0-5	8	69	23	0.5	Not prime farmland
	5-80	5	68	27	0.3	

Notes:

in Inches
% Percent

4.2 SURFACE SOIL SAMPLES

This section discusses analytical results from surface soil samples collected at KCMO Municipal farms. Five surface soil samples were collected on site within the interval of 0-12 inches bgs (S-2, -3, -4, -5, and -12). The samples were submitted for analyses for nitrate, phosphorus, and potassium available for plant uptake; measurement of pH; and analyses for organic matter and for metals extractable by use of DTPA (arsenic, cadmium, chromium, lead, copper, mercury, molybdenum, nickel, selenium, and zinc). The complete laboratory data package is in Appendix D. Surface soil sample analytical data are listed in Table 5 below. Review of surface soil sample analytical data revealed the following:

- Available nitrate was reported as not detected in all surface soil samples.
- Available phosphorus was reported in four samples at levels ranging from 11.9 to 60.2 parts per million (ppm).
- Available potassium was reported in five samples at levels ranging from 265 to 375 ppm.
- pH of the five samples ranged from 5.5 to 8.0 standard units.
- Organic matter was reported in four samples at levels ranging from 1.3 to 2.0%.
- Extractable arsenic was reported as not detected in five samples.
- Extractable cadmium was reported in five samples at levels ranging from 0.04 to 0.22 ppm.
- Extractable chromium was reported in five samples at levels ranging from 0.03 to 0.06 ppm.
- Extractable lead was reported in five samples at levels ranging from 1.85 to 5.89 ppm.
- Extractable copper was reported in five samples at levels ranging from 2.15 to 3.02 ppm.
- Extractable mercury was reported in five samples as not detected.
- Extractable molybdenum was reported in two samples at 0.05 ppm.
- Extractable nickel was reported in five samples at levels ranging from 0.71 to 2.83 ppm.
- Extractable selenium was reported in five samples as not detected.
- Extractable zinc was reported in five samples at levels ranging from 0.55 to 3.93 ppm.

TABLE 5

**ANALYTICAL RESULTS FROM SURFACE SOIL SAMPLES
KCMO MUNICIPAL FARMS SITE**

Sample Identification	Available Nitrate	Available Phosphorus	Available Potassium	pH	Organic Matter	Arsenic (AB-DTPA)	Cadmium (AB-DTPA)	Chromium (AB-DTPA)	Lead (AB-DTPA)	Copper (AB-DTPA)	Mercury (AB-DTPA)	Molybdenum (AB-DTPA)	Nickel (AB-DTPA)	Selenium (AB-DTPA)	Zinc (AB-DTPA)
Units	ppm	ppm	ppm	Std. Units	Percent (%)	ppm	ppm	ppm	Ppm	Ppm	ppm	ppm	ppm	ppm	ppm
S-2 (0-12 in)	ND	11.9	307	8.0	2.0	ND	0.12	0.03	5.89	2.26	ND	ND	0.71	ND	0.55
S-3 (0-12 in)	ND	60.2	375	5.5	1.3	ND	0.04	0.03	2.57	3.02	ND	ND	1.13	ND	1.45
S-4 (0-12 in)	ND	39.6	293	6.8	2.0	ND	0.10	0.04	3.54	2.15	ND	ND	1.23	ND	3.93
S-5 (0-12 in)	ND	ND	278	6.7	1.6	ND	0.09	0.03	2.63	2.35	ND	0.05	0.85	ND	1.68
S-12 (0-12 in)	ND	20.3	265	6.3	ND	ND	0.22	0.06	1.85	3.01	ND	0.05	2.83	ND	2.41

Notes:

AB-DTPA Ammonium bicarbonate – diethylenetriaminepentaacetic acid
in Inches
ND Not detected

ppm Parts per million
Std. Standard
S Soil

No EPA health benchmarks have been established for available nitrate, available phosphorus, available potassium, pH, organic matter, or extractable metals in agriculture.

4.3 SUBSURFACE SOIL SAMPLES

This section discusses analytical results from subsurface soil samples collected at KCMO Municipal farms. Five subsurface soil samples were collected on site within the interval of 0-4 feet bgs (S-1, -6, -7, -8, and -9). The samples were submitted for analyses for nitrate, phosphorus, and potassium available for plant uptake; measurement of pH; and analyses for organic matter and for metals extractable by use of DTPA (arsenic, cadmium, chromium, lead, copper, mercury, molybdenum, nickel, selenium, and zinc). The complete laboratory data package is in Appendix D. Surface soil sample analytical data are listed in Table 6 below. Review of subsurface soil sample analytical data revealed the following:

- Available nitrate was reported as not detected in all surface soil samples.
- Available phosphorus was reported in five samples at levels ranging from 4.1 to 37.3 ppm.
- Available potassium was reported in five samples at levels ranging from 212 to 283 ppm.
- pH of the five subsurface soil samples ranged from 7.2 to 8.2 standard units.
- Organic matter in the five subsurface soil samples ranged from 0.23 to 3.1%.
- Extractable arsenic was reported in one sample at a level of 0.23 ppm.
- Extractable cadmium was reported in five samples at levels ranging from 0.03 to 0.39 ppm.
- Extractable chromium was reported in five samples at levels ranging from 0.03 to 0.07 ppm.
- Extractable lead was reported in five samples at levels ranging from 1.10 to 9.82 ppm.
- Extractable copper was reported in five samples at levels ranging from 1.13 to 6.19 ppm.
- Extractable mercury was reported in five samples as not detected.
- Extractable molybdenum was reported in five samples at levels ranging from 0.05 to 0.17 ppm.
- Extractable nickel was reported in five samples at levels ranging from 0.03 to 1.68 ppm.
- Extractable selenium was reported in five samples as not detected.
- Extractable zinc was reported in five samples at levels ranging from 0.53 to 12.8 ppm.

TABLE 6

**ANALYTICAL RESULTS FROM SUBSURFACE SOIL SAMPLES
KCMO MUNICIPAL FARMS SITE**

Sample Identification	Available Nitrate	Available Phosphorus	Available Potassium	pH	Organic Matter	Arsenic (AB-DTPA)	Cadmium (AB-DTPA)	Chromium (AB-DTPA)	Lead (AB-DTPA)	Copper (AB-DTPA)	Mercury (AB-DTPA)	Molybdenum (AB-DTPA)	Nickel (AB-DTPA)	Selenium (AB-DTPA)	Zinc (AB-DTPA)
Units	ppm	ppm	Ppm	Std. Units	Percent (%)	ppm	ppm	ppm	Ppm	ppm	ppm	ppm	ppm	ppm	ppm
S-1 (0-4 ft.)	ND	13.6	230	8.2	3.1	0.23	0.15	0.07	9.82	6.19	ND	0.17	1.68	ND	9.79
S-6 (0-4 ft.)	ND	7.5	212	8.0	2.2	ND	0.39	0.04	8.19	3.19	ND	0.05	0.82	ND	12.8
S-7 (0-4 ft.)	ND	14.0	224	7.8	0.23	ND	0.14	0.04	3.80	2.99	ND	0.15	0.77	ND	3.09
S-8 (0-4 ft.)	ND	37.3	246	7.2	0.35	ND	0.04	0.03	1.34	2.08	ND	0.07	0.41	ND	0.69
S-9 (0-4 ft.)	ND	4.1	283	7.4	0.35	ND	0.03	0.03	1.10	1.13	ND	ND	0.30	ND	0.53

Notes:

AB-DTPA Ammonium bicarbonate – diethylenetriaminepentaacetic acid
ppm Parts per million
Std. Standard
S Soil
ft. Feet
ND Not detected

No EPA health benchmarks have been established for available nitrate, available phosphorus, available potassium, pH, organic matter, or extractable metals in agriculture.

4.4 GROUNDWATER CHARACTERIZATION

This section discusses groundwater characterization at KCMO Municipal farms. Five groundwater locations on site were investigated in real time by use of Geoprobe HPT. The complete data package is in Appendix D. Groundwater characterization data are listed in Table 7 below.

TABLE 7
GROUNDWATER CHARACTERIZATION DATA
KCMO MUNICIPAL FARMS SITE

Sample Identification	Groundwater Encountered (depth)	Productive Groundwater (depth)	Refusal Encountered (depth)
HPT-1	5 ft. bgs	52-55 ft. bgs	58 ft. bgs
HPT-2	19 ft. bgs	50-55 ft. bgs	55 ft. bgs
HPT-3	6 ft. bgs	54-59 ft. bgs	61 ft. bgs
HPT-4	19 ft. bgs	51-56 ft. bgs	57 ft. bgs
HPT-5	5 ft. bgs	51-57 ft. bgs	58 ft. bgs

Notes:

ft. bgs Feet below ground surface

Review of groundwater characterization data revealed the following:

- At HPT-1, the water table was encountered at 5 feet bgs. The most productive groundwater was encountered between 52 and 55 feet bgs. Refusal was encountered when Geoprobe HPT reached bedrock at 58 feet bgs. EC measurements revealed that soil within 0-5, 7-25 and 30-40 feet bgs consists of clay. Within 5-7 and 52-55 feet bgs the soil consists of a sandy silt. Within 25-30 feet bgs, the soil consists of silty clay, with some possible sand. Within 40-52 feet bgs, the soil transitions from a clay to a silty clay.
- At HPT-2, the water table was encountered at 19 feet bgs. The most productive groundwater was encountered between 50 and 55 feet bgs. Refusal was encountered when Geoprobe HPT reached bedrock at 55 feet bgs. EC measurements revealed that soil within 0-16 and 18-20 feet bgs consists of sandy silt. There are two clay layers within 16-18 and 20-50 feet bgs. Within 50-55 feet bgs, the soil consists of sand.
- At HPT-3, the water table was encountered at 6 feet bgs. The most productive groundwater was encountered between 54 and 59 feet bgs. Refusal was encountered when Geoprobe HPT reached bedrock at 61 feet bgs. EC measurements revealed the soil to be silty clay from 0-54 and 59-61 feet bgs. Within 54-59 feet bgs, the soil consists of sand.
- At HPT-4, the water table was encountered at 19 feet bgs. The most productive groundwater was encountered between 51 and 56 feet bgs. Refusal was encountered when Geoprobe HPT reached bedrock at 57 feet bgs. EC measurements revealed the soil to be silty clay within 0-28 feet bgs. There are two silt layers at 28-52 and 56-58 feet bgs. Within 52-56 feet bgs the soil consists of silty sand.
- At HPT-5, the water table was encountered at 5 feet bgs. The most productive groundwater was encountered between 51 and 57 feet bgs. Refusal was encountered when Geoprobe HPT reached bedrock at 58 feet bgs. EC measurements revealed the soil to be primarily silt with some clay within 0-51 feet bgs. Within 51-57 feet bgs, the soil consists of sand.

4.5 AGRONOMIST RECOMMENDATIONS

SM Jeff Mitchell, an agronomist, reviewed site data to determine the current soil status in relation to crop recommendations, production, and success. His recommendations are as follows:

- Because of the current landscape, further testing of the soil should occur after the site has been cleared and graded for agricultural production. Soil properties will likely change, and crop production recommendations based on current data would not be accurate.
- Assuming no additional soil brought on site, current analytical results indicate a wide range of available options for crop production based mainly on pH levels. However, additional nutrients would be needed because available concentrations are as follows: nitrogen (from nitrate), absent; phosphorus, low; and potassium, medium.
- Organic matter levels in the soil are low, which can result in lower nutrient and water holding capacity, and poor soil structure. Based on these levels, infusion of additional organic matter to the soil is recommended for optimum crop production. Ideally, 4-6% organic matter is preferred for optimum crop production.
- Recommendations, considering current conditions on site, are as follows:
 - Add organic matter (compost or manure).
 - Legumes (peas and beans), squash, cucumbers, pumpkins, asparagus, onions, carrots, tomatoes, peppers, lettuce, and sweet corn are a few crops that could be grown based on current soil conditions with application of nutrients at the following rates:

Crop	Nitrogen	Phosphorus (P ₂ O ₅)	Potassium (K ₂ O)
Legumes	1	1.5	1
Squash, cucumbers, and pumpkins	.33	1.5	.75
Asparagus	1.5	2	1
Onions and carrots	1	2	1.5
Tomatoes and peppers	1	3	1.5
Lettuce	1.5	1.5	0.75
Sweet corn	1	1.5	0.5

Note:

All rates are listed as pounds per 1,000 square feet of production area.

Some common types of fertilizers include:

- Nitrogen: urea and ammonium nitrate
- Phosphorus: tripe superphosphate-calcium
- Potassium: potassium nitrate and potassium hydroxide

Pre-mixed fertilizers can be used with varying percentages of nitrogen, phosphorus, and potassium. The following website provides an easy-to-use calculator to select commonly available grades of fertilizers to match fertilizer rates based on soil tests: <http://aesl.ces.uga.edu/soil/fertcalc/>

Soil testing should occur annually to determine application rates.

4.6 QUALITY CONTROL SAMPLES

No common laboratory contaminants were reported at concentrations above method detection limits in the method blank.

5.0 FINDINGS AND CONCLUSIONS

No available nitrate was reported within the site. Available nitrate concentration is considered low from 0 to 25 ppm, medium from 25 to 50 ppm, and high from 50 to 80 ppm, as listed in Table 7. Available phosphorus concentration at the site ranges from 4.1 to 60.2 ppm. Available phosphorus concentration is considered low from 0 to 25 ppm, medium from 25 to 100 ppm, and high at 100+ ppm. Available potassium concentration at the site ranges from 212 to 375 ppm. Available potassium concentration is considered low from 0 to 125 ppm, medium from 125 to 250 ppm, and high at 250+ ppm. Table 8 lists suggested fertilizer rates for various fruit, nut, and vegetable crops. Values of pH within the site were reported between 5.5 and 8.2 standard units. Table 9 lists the optimum pH range for various vegetables, fruit, and nut crops.

No EPA health benchmarks have been established for extractable metals in agriculture. Low levels of arsenic had been reported at the site during previous investigations; however, arsenic was not detected in nine of the samples collected during the TBA. In one sample, it was reported at 0.23 ppm. Extractable lead was reported throughout the site from 1.10 to 9.82 ppm. Extractable copper was reported throughout the site from 1.13 to 6.19 ppm. Extractable mercury was reported as not detected throughout the site. Extractable molybdenum was reported from 0.05 to 0.17 ppm. Extractable nickel was reported throughout the site from 0.03 to 1.68 ppm. Extractable selenium was reported as not detected throughout the site. Extractable zinc was reported from 0.53 to 12.8 ppm.

Note: Information in Tables 8, 9, and 10 derives from the report about soil testing and evaluation by KSU (2012).

TABLE 8
RECOMMENDATIONS FOR FERTILIZER ADDITIONS
KCMO MUNICIPAL FARMS SITE

Recommendations for Fertilizer Additions Based on K-State Soil Test Results	
	Soil test interpretation
Nitrogen* (Available nitrogen from lawn and garden soil test)	0–25 ppm – low 25–50 ppm – medium 50–80 ppm – high
Phosphorus* (P from soil test results)	0–25 ppm – low 25–100 ppm – medium 100+ ppm – high
Potassium* (K from soil test results)	0–125 ppm – low 125–250 ppm – medium 250+ ppm – high
pH	See the following tables for materials and amounts to correct pH.
*If you do not have soil test results, follow recommendations for a medium application level.	

TABLE 9

**SUGGESTED FERTILIZER RATES FOR CROPS
KCMO MUNICIPAL FARMS SITE**

Suggested Fertilizer Rates for Fruit and Nut Crops										
Crop	When to apply	N			P ₂ O ₅			K ₂ O		
		High	Med	Low	High	Med	Low	High	Med	Low
Strawberries (New planting)	<i>Before planting:</i> Broadcast over entire area during site preparation and incorporate before setting plants.	Pounds to apply per 1,000 sq ft								
		0	1	1.5	0	1	1.5	0	1	1.5
Strawberries (After harvest)	<i>After harvest:</i> Broadcast over row area immediately after harvest and in mid-August. Remove excess fertilizer from plants with water, broom or similar method.	Pounds to apply per 1,000 sq ft								
		0	1.5	3	0	1.5	3	0	1.5	3
Bush Fruits Blackberries, Currants, Raspberries, Gooseberries	Apply in early spring before growth begins. Broadcast or band around individual plants.	Ounces to apply per plant								
		0	0.75	1.25	0	1	1.75	0	1	1.75
Grapes	Apply in 4-foot diameter circle or 6- to 8-inch band around each vine; apply in early spring before growth begins.	Ounces to apply per vine								
		0	1	1.5	0	1	1.75	0	1	2
Apples and Pears	Band or broadcast in late winter under drip area of tree; keep at least a foot from trunk of mature trees.	Ounces to apply per tree								
		0	2*	3*	0	2	3	0	2	3
Apricots, Cherries, Peaches, Plums	Same as apples and pears.	Ounces to apply per tree								
		0	2*	3*	0	2	3	0	2	3
Pecans, Walnuts	Same as apples and pears.	Ounces to apply per tree								
		0	3*	4*	0	2	3	0	2	3

* Nitrogen rates listed are per tree for each year of tree age up to a maximum of 1 pound per tree for dwarf apples and other tree fruits, 2 pounds for mature standard size apple trees and 4 pounds for mature nut trees. If grass sod is growing under the trees, double the rate of nitrogen or apply in a 2- to 3-inch band.

TABLE 9 (Continued)

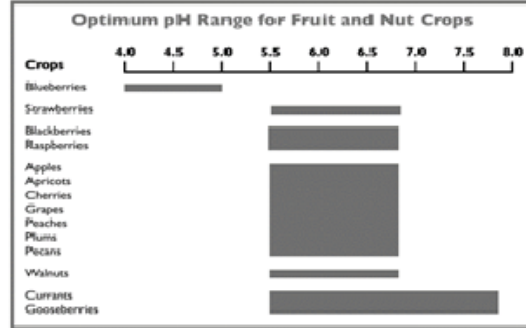
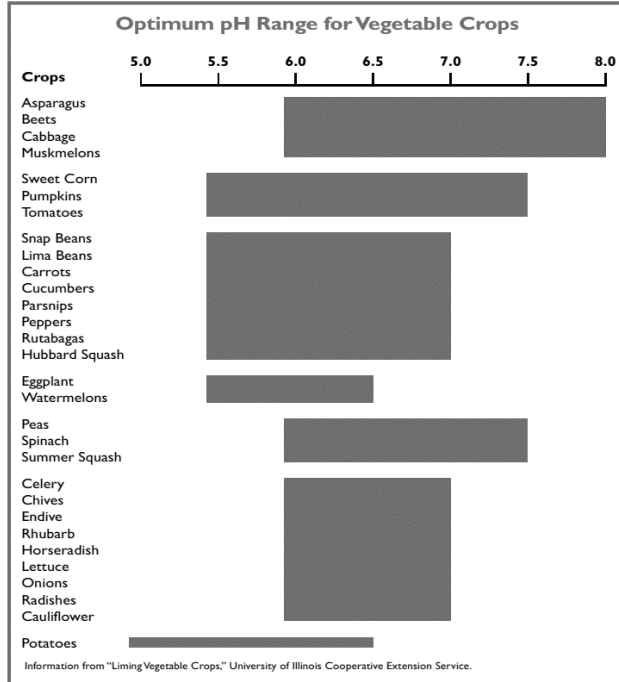
SUGGESTED FERTILIZER RATES FOR CROPS
KCMO MUNICIPAL FARMS SITE

Suggested Fertilizer Rates for Vegetable Crops										
Crop	When to apply	Pounds to apply per 1,000 sq ft								
		N			P ₂ O ₅			K ₂ O		
		High	Med	Low	High	Med	Low	High	Med	Low
Legumes Dry Beans, Snap Beans, Lima Beans, Peas	Before or at planting	0	0.75	1	0	1	1.5	0	1	1.5
	Notes: Use lower nitrogen on all crops if manure or other organic residues were used. Only peas are sidedressed. Apply 2 to 3 weeks after emergence (except in dry weather).									
Leafy Green Vegetables Lettuce, Endive, Mustard, Spinach, Collards, Kale	Broadcast before planting and incorporate	0	1	1.5	0	1	1.5	0	0.5	0.75
	Notes: These crops respond to nitrogen fertilizers. Only collards and kale are sidedressed. Apply when plants reach ½ size.									
Vine Crops Cantaloupes (or Musk- melons), Cucumbers, Watermelons, Squash, Pumpkins	Broadcast before planting and incorporate	0	0.25	0.33	0	0.5– 0.75	1.5	0	.75	1.5
	At planting (band)	0	0.5	0.75	0	0.5	1	0	0.5	1
	Notes: Reduce N if manure or other organic residue is used. Fertilizer should be broadcast and incorporated before planting for cantaloupes and cucumbers. Watermelons, squash and pumpkins should have fertilizer banded at planting. Pumpkins: Sidedress when vines begin to run.									
Perennial Vegetable Crops Asparagus, Rhubarb	On new plantings	0	1	1.5	0	2	2	0	1	1.5
	On established plantings	0	0.5	0.75	0	1	1.5	0	0.5	0.75
	Notes: Incorporate organic residue /compost in new plantings. Use more potash than listed for soils that are very sandy. Established plantings should be fertilized in before spears appear in the spring. Rhubarb should be sidedressed in June and asparagus should be sidedressed when harvest ends.									
Root Crops Carrots, Radish, Beets, Turnips, Rutabagas, Onions, Potatoes	Before or at planting	0	0.5	1	0	1	2	0	1.5	2.5
	Notes: Only onions and potatoes are sidedressed. Sidedress onions 2 to 3 weeks after plants emerge. Sidedress potatoes when plants are 6 to 8 inches tall.									
Root Crops Sweetpotatoes	Broadcast before planting or below the ridges	0	0.25	0.5	0	.5	1	0	0.75	1.5
	Notes: Use a starter solution at transplanting. Sidedress in July.									
Transplanted Crops Tomatoes, Peppers, Eggplant	At planting broadcast	0	0.5	1	0	1.5	3	0	1.5	3
	Notes: Use a starter solution at transplanting. Sidedress when first fruits are small (walnut size).									
Crucifers Cabbage, Broccoli, Cauliflower	Broadcast before planting	0	0.5	1	0	0.75	1.5	0	0.75	1.5
	Notes: Sidedress 1 to 2 weeks after planting and again 2 weeks before harvest.									
Sweet Corn	In bands at planting time	0	0.5	1	0	0.75	1.5	0	0.5	1
	Notes: Sidedress when corn is 8 to 12 inches tall. Double the normal rate. On sandy soils, a second sidedressing may be beneficial.									

Sidedressing is done by applying fertilizer near the plants and watering in. Use a high nitrogen fertilizer such as a 27-3-3, 30-3-4, 29-5-4 or something similar at the rate of 1 pound (1 cup) per 100 feet of row. Many of these fertilizers are lawn fertilizers but will work well as long as they contain no weed killers or weed preventers. If using nitrate of soda (16-0-0), double the rate.

TABLE 10

OPTIMUM PH RANGE FOR CROPS
KCMO MUNICIPAL FARMS SITE



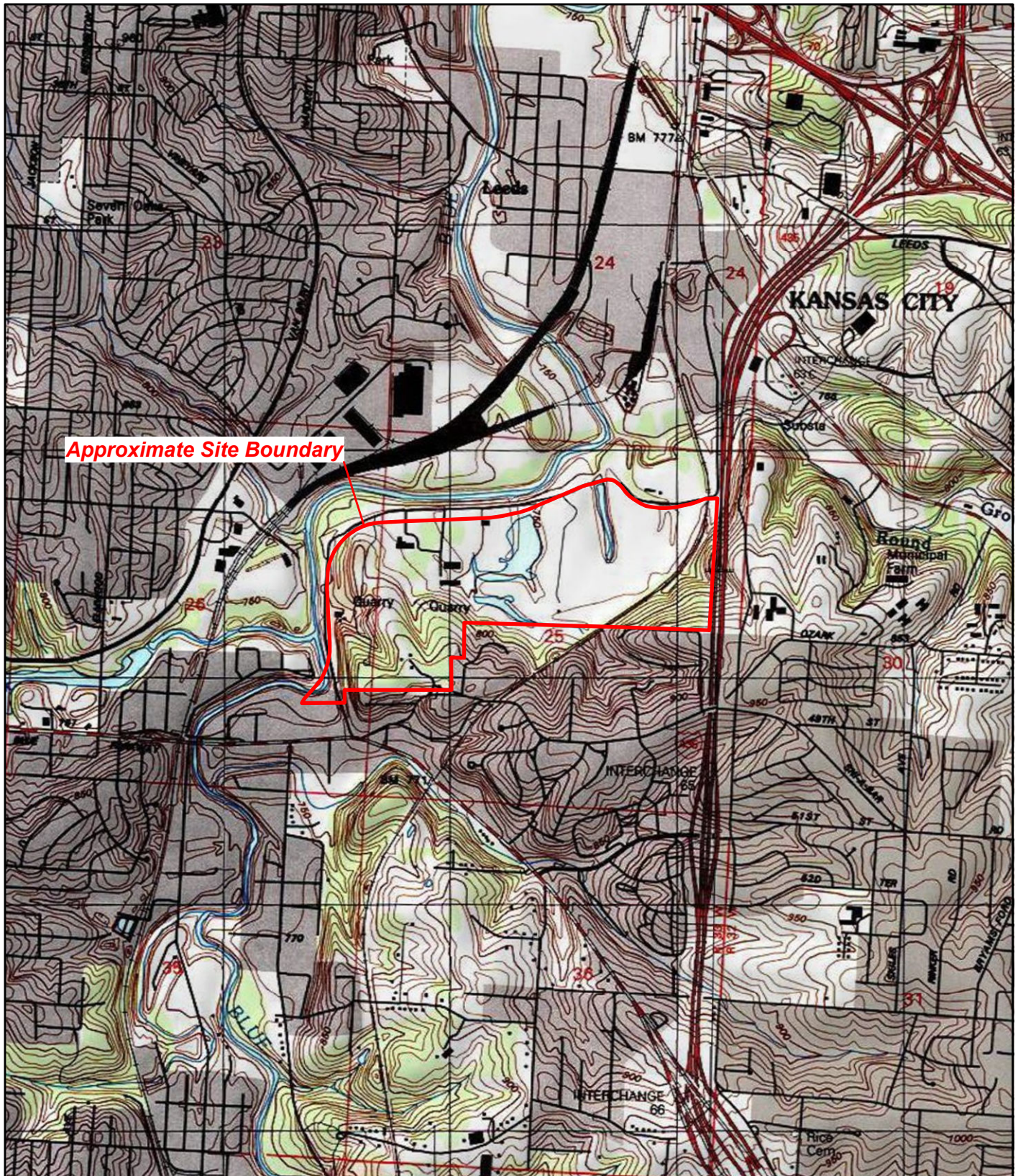
Nitrogen provides dark green color in plants and promotes rapid crop growth.
Phosphorus promotes early root development, which quickens the maturity of the plant.
Potassium assists in ripening the fruit and decreases the risk for plant disease.
pH measures the acidity or alkalinity of a plant. Most plants have better production in soils with a neutral pH.

6.0 REFERENCES

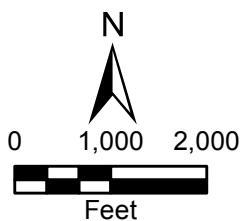
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APPENDIX A

FIGURES



Approximate Site Boundary



KCMO Municipal Farms
Kansas City, Missouri

Figure 1
Site Location Map



Source: USGS Independence, MO 7.5 Minute Topo Quad, 1975;
USGS Kansas City, MO 7.5 Minute Topo Quad, 1975

Date: 10/5/2015

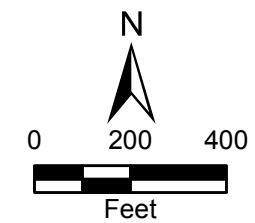
Drawn By: Nick Wiederholt

Project No: X9025.16.0115.000

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- Legend
- Hydraulic profiling tool (HPT) location
 - Surface and subsurface soil sample location
 - Surface soil sample location
 - Approximate site boundary
 - Conceptual reuse area



KCMO Municipal Farms
Kansas City, Missouri

Figure 2
Sample Location Map



APPENDIX B
PHOTOGRAPHIC DOCUMENTATION

**KCMO Municipal Farms
Kansas City, MO**



TETRA TECH PROJECT NO. X9025.16.0115.000 DIRECTION: West	DESCRIPTION	This photograph shows Geoprobe Hydraulic Profiling Tool (HPT) sampling at HPT-3.	1
	CLIENT	Environmental Protection Agency - Region 7	DATE 3/2/16
	PHOTOGRAPHER	Christin Russell	



TETRA TECH PROJECT NO. X9025.16.0115.000 DIRECTION: West	DESCRIPTION	This photograph shows the Geoprobe HPT probe.	2
	CLIENT	Environmental Protection Agency - Region 7	DATE 3/2/16
	PHOTOGRAPHER	Todd Davis	

**KCMO Municipal Farms
Kansas City, MO**



<p>TETRA TECH PROJECT NO. X9025.16.0115.000 DIRECTION: Northeast</p>	DESCRIPTION	This photograph shows the Geoprobe HPT field instrument with HPT flow module, and lap top computer (with acquisition software).	3
	CLIENT	Environmental Protection Agency - Region 7	DATE 3/2/16
	PHOTOGRAPHER	Todd Davis	



<p>TETRA TECH PROJECT NO. X9025.16.0115.000 DIRECTION: West</p>	DESCRIPTION	This photograph shows the soil boring at S-7.	4
	CLIENT	Environmental Protection Agency - Region 7	DATE 3/2/16
	PHOTOGRAPHER	Christin Russell	

**KCMO Municipal Farms
Kansas City, MO**



TETRA TECH PROJECT NO. X9025.16.0115.000 DIRECTION: West	DESCRIPTION	This photograph shows a soil boring at S-8.	5
	CLIENT	Environmental Protection Agency - Region 7	DATE 3/2/16
	PHOTOGRAPHER	Christin Russell	



TETRA TECH PROJECT NO. X9025.16.0115.000 DIRECTION: West	DESCRIPTION	This photograph shows Geoprobe HPT in operation at HPT-2.	6
	CLIENT	Environmental Protection Agency - Region 7	DATE 3/2/16
	PHOTOGRAPHER	Christin Russell	

**KCMO Municipal Farms
Kansas City, MO**



TETRA TECH PROJECT NO. X9025.16.0115.000 DIRECTION: North	DESCRIPTION	This photograph shows Geoprobe direct-push technology (DPT) instrumentation.	7
	CLIENT	Environmental Protection Agency - Region 7	DATE 3/3/16
	PHOTOGRAPHER	Christin Russell	



TETRA TECH PROJECT NO. X9025.16.0115.000 DIRECTION: Northeast	DESCRIPTION	This photograph shows a Superfund Technical Assessment and Response Team (START) member collecting a surface soil sample at S-4.	8
	CLIENT	Environmental Protection Agency - Region 7	DATE 3/4/16
	PHOTOGRAPHER	Christin Russell	

APPENDIX C
SITE LOGBOOK

KS 1535



Rite in the Rain

ALL-WEATHER

LEVEL

Nº 311FX

KCMO Municipal Farms
103X 9025160115.000

3-2-16 KCMO Municipal Farms

0730 Arrive at site
 0815 Set up HPT-4
 0850 Begin drilling at HPT-4
 0918 Refusal at 56.25 ft bgs
 1000 Set up HPT-3
 1010 Begin drilling at HPT-3
 1032 Refusal at 59.5 bgs
 1200 Set up HPT-5
 1220 Begin drilling at HPT-5
 1250 Refusal at 57 ft
 1330 Set up HPT-1
 1400 Begin drilling at HPT-1
 1440 Refusal at 56.8 ft bgs
 1505 Begin drilling at S-7
 1510 Collect sample at S-7, 0-4 ft bgs
 1524 Begin drilling at S-6
 1530 Collect sample at S-6
 Refusal at 2 ft bgs
 1540 Begin drilling at S-8
 1550 Collect sample at S-8
 1600 Begin drilling at S-9
 1620 Collect sample at S-9
 1700 Leave site

C. Russell II
 3-2-16

3-3-16 KCMO Municipal Farms

0800 Arrive at site
 0845 Set up at HPT-2
 0855 Begin drilling HPT-2
 0945 Refusal at 53.5 ft bgs
 1040 Set up at S-1
 1045 Begin Drilling at S-1
 1050 Collect sample at S-1
 1200 End field activities

C. Russell II
 3-3-16

Rite in the Rain

3-4-16 KCMO Municipal Farms
0920 Depart Tetra Tech Office
0940 Arrive at site
0950 Collect sample S-12
1027 Collect sample S-5
1044 Collect sample S-4
1112 Collect sample S-3
1130 Collect sample S-2
1230 Depart site
1300 Arrive at Tetra Tech

C. Rusk II
3-4-16

APPENDIX D

CHAIN-OF-CUSTODY RECORDS AND ANALYTICAL DATA PACKAGES

March 21, 2016

Emily Fisher
TETRA TECH EMI
415 Oak
Kansas City, MO 64106

RE: Project: KCMO Municipal Farms
Pace Project No.: 60214339

Dear Emily Fisher:

Enclosed are the analytical results for sample(s) received by the laboratory on March 04, 2016. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

Some analyses have been subcontracted outside of the Pace Network. The subcontracted laboratory report has been attached.

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

Sincerely,



Sherri Rosenstangle
sherri.rosenstangle@pacelabs.com
Project Manager

Enclosures

cc: Danny O'Connor, Tetra Tech EMI



REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: KCMO Municipal Farms

Pace Project No.: 60214339

Montana Certification IDs

150 N. 9th Street, Billings, MT 59101

Colorado Asbestos #: 17119

A2LA Certification #: 3590.01

EPA Region 8 Certification #: 8TMS-L

Idaho Certification #: MT00012

Minnesota Dept of Health Certification #: 030-999-442

Montana Certification #: MT CERT0040

North Dakota Dept. Of Health #: R-209

NVLAP Certification #: 101292-0

Washington Department of Ecology #: C993

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: KCMO Municipal Farms

Pace Project No.: 60214339

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60214339001	S-1	Solid	03/03/16 10:50	03/04/16 16:30
60214339002	S-2	Solid	03/04/16 11:30	03/04/16 16:30
60214339003	S-3	Solid	03/04/16 11:12	03/04/16 16:30
60214339004	S-4	Solid	03/04/16 10:44	03/04/16 16:30
60214339005	S-5	Solid	03/04/16 10:27	03/04/16 16:30
60214339006	S-6	Solid	03/02/16 15:30	03/04/16 16:30
60214339007	S-7	Solid	03/02/16 15:10	03/04/16 16:30
60214339008	S-8	Solid	03/02/16 15:50	03/04/16 16:30
60214339009	S-9	Solid	03/02/16 16:20	03/04/16 16:30
60214339010	S-12	Solid	03/04/16 09:50	03/04/16 16:30

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SAMPLE ANALYTE COUNT

Project: KCMO Municipal Farms

Pace Project No.: 60214339

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60214339001	S-1	ASA 33-3.2/EPA 353.2	CH2	1	
		ASA 24-5.4/SM4500	CAC	1	
		EPA 6010B	JME	1	
		EPA 9045D	SC1	1	
		ASA 29-3.5.2	CAC	1	
60214339002	S-2	ASA 33-3.2/EPA 353.2	CH2	1	
		ASA 24-5.4/SM4500	CAC	1	
		EPA 6010B	JME	1	
		EPA 9045D	SC1	1	
		ASA 29-3.5.2	CAC	1	
60214339003	S-3	ASA 33-3.2/EPA 353.2	CH2	1	
		ASA 24-5.4/SM4500	CAC	1	
		EPA 6010B	JME	1	
		EPA 9045D	SC1	1	
		ASA 29-3.5.2	CAC	1	
60214339004	S-4	ASA 33-3.2/EPA 353.2	CH2	1	
		ASA 24-5.4/SM4500	CAC	1	
		EPA 6010B	JME	1	
		EPA 9045D	SC1	1	
		ASA 29-3.5.2	CAC	1	
60214339005	S-5	ASA 33-3.2/EPA 353.2	CH2	1	
		ASA 24-5.4/SM4500	CAC	1	
		EPA 6010B	JME	1	
		EPA 9045D	SC1	1	
		ASA 29-3.5.2	CAC	1	
60214339006	S-6	ASA 33-3.2/EPA 353.2	CH2	1	
		ASA 24-5.4/SM4500	CAC	1	
		EPA 6010B	JME	1	
		EPA 9045D	SC1	1	
		ASA 29-3.5.2	CAC	1	
60214339007	S-7	ASA 33-3.2/EPA 353.2	CH2	1	
		ASA 24-5.4/SM4500	CAC	1	
		EPA 6010B	JME	1	
		EPA 9045D	SC1	1	
		ASA 29-3.5.2	CAC	1	
60214339008	S-8	ASA 33-3.2/EPA 353.2	CH2	1	
		ASA 24-5.4/SM4500	CAC	1	

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SAMPLE ANALYTE COUNT

Project: KCMO Municipal Farms

Pace Project No.: 60214339

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60214339009	S-9	EPA 6010B	JME	1	
		EPA 9045D	SC1	1	
		ASA 29-3.5.2	CAC	1	
		ASA 33-3.2/EPA 353.2	CH2	1	
		ASA 24-5.4/SM4500	CAC	1	
		EPA 6010B	JME	1	
60214339010	S-12	EPA 9045D	SC1	1	
		ASA 29-3.5.2	CAC	1	
		ASA 33-3.2/EPA 353.2	CH2	1	
		ASA 24-5.4/SM4500	CAC	1	
		EPA 6010B	JME	1	
		EPA 9045D	SC1	1	
		ASA 29-3.5.2	CAC	1	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: KCMO Municipal Farms

Pace Project No.: 60214339

Sample: S-1 **Lab ID: 60214339001** Collected: 03/03/16 10:50 Received: 03/04/16 16:30 Matrix: Solid

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

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
353.2 Nitrate + Nitrite pres.								
Analytical Method: ASA 33-3.2/EPA 353.2 Preparation Method: ASA 33-3.2/EPA 353.2								
Available Nitrate	ND	mg/kg	5.0	1	03/16/16 08:57	03/16/16 14:00		
SM4500P-E, Avail. Phosphorus								
Analytical Method: ASA 24-5.4/SM4500 Preparation Method: ASA 24-5.4/SM4500								
Available Phosphorus	13.6	mg/kg	4.0	4	03/16/16 10:31	03/18/16 12:51	7723-14-0	
6010 ICP, Available Potassium								
Analytical Method: EPA 6010B Preparation Method: ASA 13-3.5.2.2								
Potassium	230	mg/kg	100	10	03/11/16 13:47	03/11/16 16:00	7440-09-7	
9045 pH								
Analytical Method: EPA 9045D								
pH at 25 Degrees C	8.2	Std. Units	0.10	1		03/10/16 11:01		
Organic Matter MT ASA 29								
Analytical Method: ASA 29-3.5.2								
Organic Matter	3.1	%	0.11	1		03/17/16 12:44		N2

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: KCMO Municipal Farms

Pace Project No.: 60214339

Sample: S-2 **Lab ID: 60214339002** Collected: 03/04/16 11:30 Received: 03/04/16 16:30 Matrix: Solid

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

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
353.2 Nitrate + Nitrite pres.								
Analytical Method: ASA 33-3.2/EPA 353.2 Preparation Method: ASA 33-3.2/EPA 353.2								
Available Nitrate	ND	mg/kg	5.0	1	03/16/16 08:57	03/16/16 14:03		
SM4500P-E, Avail. Phosphorus								
Analytical Method: ASA 24-5.4/SM4500 Preparation Method: ASA 24-5.4/SM4500								
Available Phosphorus	11.9	mg/kg	4.0	4	03/16/16 10:31	03/18/16 12:51	7723-14-0	
6010 ICP, Available Potassium								
Analytical Method: EPA 6010B Preparation Method: ASA 13-3.5.2.2								
Potassium	307	mg/kg	99.5	10	03/11/16 13:47	03/11/16 16:02	7440-09-7	
9045 pH								
Analytical Method: EPA 9045D								
pH at 25 Degrees C	8.0	Std. Units	0.10	1		03/10/16 11:06		
Organic Matter MT ASA 29								
Analytical Method: ASA 29-3.5.2								
Organic Matter	2.0	%	0.10	1		03/17/16 12:44		N2

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: KCMO Municipal Farms

Pace Project No.: 60214339

Sample: S-3 **Lab ID: 60214339003** Collected: 03/04/16 11:12 Received: 03/04/16 16:30 Matrix: Solid

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

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
353.2 Nitrate + Nitrite pres.								
Analytical Method: ASA 33-3.2/EPA 353.2 Preparation Method: ASA 33-3.2/EPA 353.2								
Available Nitrate	ND	mg/kg	5.0	1	03/16/16 08:57	03/16/16 14:05		
SM4500P-E, Avail. Phosphorus								
Analytical Method: ASA 24-5.4/SM4500 Preparation Method: ASA 24-5.4/SM4500								
Available Phosphorus	60.2	mg/kg	4.0	4	03/16/16 10:31	03/18/16 12:51	7723-14-0	
6010 ICP, Available Potassium								
Analytical Method: EPA 6010B Preparation Method: ASA 13-3.5.2.2								
Potassium	375	mg/kg	99.3	10	03/11/16 13:47	03/11/16 16:04	7440-09-7	
9045 pH								
Analytical Method: EPA 9045D								
pH at 25 Degrees C	5.5	Std. Units	0.10	1		03/10/16 11:05		
Organic Matter MT ASA 29								
Analytical Method: ASA 29-3.5.2								
Organic Matter	1.3	%	0.098	1		03/17/16 12:44		N2

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ANALYTICAL RESULTS

Project: KCMO Municipal Farms

Pace Project No.: 60214339

Sample: S-4 **Lab ID: 60214339004** Collected: 03/04/16 10:44 Received: 03/04/16 16:30 Matrix: Solid

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

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
353.2 Nitrate + Nitrite pres.								
Analytical Method: ASA 33-3.2/EPA 353.2 Preparation Method: ASA 33-3.2/EPA 353.2								
Available Nitrate	ND	mg/kg	5.0	1	03/16/16 08:57	03/16/16 14:06		
SM4500P-E, Avail. Phosphorus								
Analytical Method: ASA 24-5.4/SM4500 Preparation Method: ASA 24-5.4/SM4500								
Available Phosphorus	39.6	mg/kg	4.0	4	03/16/16 10:31	03/18/16 12:52	7723-14-0	
6010 ICP, Available Potassium								
Analytical Method: EPA 6010B Preparation Method: ASA 13-3.5.2.2								
Potassium	293	mg/kg	100	10	03/11/16 13:47	03/11/16 16:08	7440-09-7	
9045 pH								
Analytical Method: EPA 9045D								
pH at 25 Degrees C	6.8	Std. Units	0.10	1		03/10/16 11:04		
Organic Matter MT ASA 29								
Analytical Method: ASA 29-3.5.2								
Organic Matter	2.0	%	0.097	1		03/17/16 12:44		N2

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ANALYTICAL RESULTS

Project: KCMO Municipal Farms

Pace Project No.: 60214339

Sample: S-5 **Lab ID: 60214339005** Collected: 03/04/16 10:27 Received: 03/04/16 16:30 Matrix: Solid

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

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
353.2 Nitrate + Nitrite pres.								
Analytical Method: ASA 33-3.2/EPA 353.2 Preparation Method: ASA 33-3.2/EPA 353.2								
Available Nitrate	ND	mg/kg	5.0	1	03/16/16 08:57	03/16/16 14:38		
SM4500P-E, Avail. Phosphorus								
Analytical Method: ASA 24-5.4/SM4500 Preparation Method: ASA 24-5.4/SM4500								
Available Phosphorus	ND	mg/kg	4.0	4	03/16/16 10:31	03/18/16 12:52	7723-14-0	
6010 ICP, Available Potassium								
Analytical Method: EPA 6010B Preparation Method: ASA 13-3.5.2.2								
Potassium	278	mg/kg	100	10	03/11/16 13:47	03/11/16 16:11	7440-09-7	
9045 pH								
Analytical Method: EPA 9045D								
pH at 25 Degrees C	6.7	Std. Units	0.10	1		03/10/16 11:03		
Organic Matter MT ASA 29								
Analytical Method: ASA 29-3.5.2								
Organic Matter	1.6	%	0.091	1		03/17/16 12:44		N2

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: KCMO Municipal Farms

Pace Project No.: 60214339

Sample: S-6 **Lab ID: 60214339006** Collected: 03/02/16 15:30 Received: 03/04/16 16:30 Matrix: Solid

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

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
353.2 Nitrate + Nitrite pres.								
Analytical Method: ASA 33-3.2/EPA 353.2 Preparation Method: ASA 33-3.2/EPA 353.2								
Available Nitrate	ND	mg/kg	5.0	1	03/16/16 08:57	03/16/16 14:14		
SM4500P-E, Avail. Phosphorus								
Analytical Method: ASA 24-5.4/SM4500 Preparation Method: ASA 24-5.4/SM4500								
Available Phosphorus	7.5	mg/kg	4.0	4	03/16/16 10:31	03/18/16 13:15	7723-14-0	
6010 ICP, Available Potassium								
Analytical Method: EPA 6010B Preparation Method: ASA 13-3.5.2.2								
Potassium	212	mg/kg	100	10	03/11/16 13:47	03/11/16 16:13	7440-09-7	
9045 pH								
Analytical Method: EPA 9045D								
pH at 25 Degrees C	8.0	Std. Units	0.10	1		03/10/16 10:59		
Organic Matter MT ASA 29								
Analytical Method: ASA 29-3.5.2								
Organic Matter	2.2	%	0.089	1		03/17/16 12:44		N2

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ANALYTICAL RESULTS

Project: KCMO Municipal Farms

Pace Project No.: 60214339

Sample: S-7 **Lab ID: 60214339007** Collected: 03/02/16 15:10 Received: 03/04/16 16:30 Matrix: Solid

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

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
353.2 Nitrate + Nitrite pres.								
Analytical Method: ASA 33-3.2/EPA 353.2 Preparation Method: ASA 33-3.2/EPA 353.2								
Available Nitrate	ND	mg/kg	5.0	1	03/16/16 08:57	03/16/16 14:16		
SM4500P-E, Avail. Phosphorus								
Analytical Method: ASA 24-5.4/SM4500 Preparation Method: ASA 24-5.4/SM4500								
Available Phosphorus	14.0	mg/kg	4.0	4	03/16/16 10:31	03/18/16 13:15	7723-14-0	
6010 ICP, Available Potassium								
Analytical Method: EPA 6010B Preparation Method: ASA 13-3.5.2.2								
Potassium	224	mg/kg	100	10	03/11/16 13:47	03/11/16 16:21	7440-09-7	
9045 pH								
Analytical Method: EPA 9045D								
pH at 25 Degrees C	7.8	Std. Units	0.10	1		03/10/16 10:56		
Organic Matter MT ASA 29								
Analytical Method: ASA 29-3.5.2								
Organic Matter	0.23	%	0.096	1		03/17/16 12:44		N2

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ANALYTICAL RESULTS

Project: KCMO Municipal Farms

Pace Project No.: 60214339

Sample: S-8 **Lab ID: 60214339008** Collected: 03/02/16 15:50 Received: 03/04/16 16:30 Matrix: Solid

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

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
353.2 Nitrate + Nitrite pres.								
Analytical Method: ASA 33-3.2/EPA 353.2 Preparation Method: ASA 33-3.2/EPA 353.2								
Available Nitrate	ND	mg/kg	5.0	1	03/16/16 08:57	03/16/16 14:36		
SM4500P-E, Avail. Phosphorus								
Analytical Method: ASA 24-5.4/SM4500 Preparation Method: ASA 24-5.4/SM4500								
Available Phosphorus	37.3	mg/kg	4.0	4	03/16/16 10:31	03/18/16 13:15	7723-14-0	
6010 ICP, Available Potassium								
Analytical Method: EPA 6010B Preparation Method: ASA 13-3.5.2.2								
Potassium	246	mg/kg	99.3	10	03/11/16 13:47	03/11/16 16:23	7440-09-7	
9045 pH								
Analytical Method: EPA 9045D								
pH at 25 Degrees C	7.2	Std. Units	0.10	1		03/10/16 10:59		
Organic Matter MT ASA 29								
Analytical Method: ASA 29-3.5.2								
Organic Matter	0.35	%	0.096	1		03/17/16 12:44		N2

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: KCMO Municipal Farms

Pace Project No.: 60214339

Sample: S-9 **Lab ID: 60214339009** Collected: 03/02/16 16:20 Received: 03/04/16 16:30 Matrix: Solid

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

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
353.2 Nitrate + Nitrite pres.								
Analytical Method: ASA 33-3.2/EPA 353.2 Preparation Method: ASA 33-3.2/EPA 353.2								
Available Nitrate	ND	mg/kg	5.1	1	03/16/16 08:57	03/16/16 14:19		
SM4500P-E, Avail. Phosphorus								
Analytical Method: ASA 24-5.4/SM4500 Preparation Method: ASA 24-5.4/SM4500								
Available Phosphorus	4.1	mg/kg	4.0	4	03/16/16 10:31	03/18/16 13:18	7723-14-0	
6010 ICP, Available Potassium								
Analytical Method: EPA 6010B Preparation Method: ASA 13-3.5.2.2								
Potassium	283	mg/kg	100	10	03/11/16 13:47	03/11/16 16:25	7440-09-7	
9045 pH								
Analytical Method: EPA 9045D								
pH at 25 Degrees C	7.4	Std. Units	0.10	1		03/10/16 11:00		
Organic Matter MT ASA 29								
Analytical Method: ASA 29-3.5.2								
Organic Matter	0.35	%	0.090	1		03/17/16 12:44		N2

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: KCMO Municipal Farms

Pace Project No.: 60214339

Sample: S-12 **Lab ID: 60214339010** Collected: 03/04/16 09:50 Received: 03/04/16 16:30 Matrix: Solid

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

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
353.2 Nitrate + Nitrite pres.								
Analytical Method: ASA 33-3.2/EPA 353.2 Preparation Method: ASA 33-3.2/EPA 353.2								
Available Nitrate	ND	mg/kg	5.0	1	03/16/16 08:57	03/16/16 14:35		
SM4500P-E, Avail. Phosphorus								
Analytical Method: ASA 24-5.4/SM4500 Preparation Method: ASA 24-5.4/SM4500								
Available Phosphorus	20.3	mg/kg	4.0	4	03/16/16 10:31	03/18/16 13:25	7723-14-0	
6010 ICP, Available Potassium								
Analytical Method: EPA 6010B Preparation Method: ASA 13-3.5.2.2								
Potassium	265	mg/kg	100	10	03/11/16 13:47	03/11/16 16:27	7440-09-7	
9045 pH								
Analytical Method: EPA 9045D								
pH at 25 Degrees C	6.3	Std. Units	0.10	1		03/10/16 11:02		
Organic Matter MT ASA 29								
Analytical Method: ASA 29-3.5.2								
Organic Matter	ND	%	0.095	1		03/17/16 12:44		N2

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: KCMO Municipal Farms

Pace Project No.: 60214339

QC Batch: MT/22810 Analysis Method: ASA 33-3.2/EPA 353.2
QC Batch Method: ASA 33-3.2/EPA 353.2 Analysis Description: 353.2 Nitrate + Nitrite
Associated Lab Samples: 60214339001, 60214339002, 60214339003, 60214339004, 60214339005, 60214339006, 60214339007, 60214339008, 60214339009, 60214339010

METHOD BLANK: 2209734 Matrix: Solid
Associated Lab Samples: 60214339001, 60214339002, 60214339003, 60214339004, 60214339005, 60214339006, 60214339007, 60214339008, 60214339009, 60214339010

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Available Nitrate	mg/kg	ND	5.0	03/16/16 13:57	

LABORATORY CONTROL SAMPLE: 2209735

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Available Nitrate	mg/kg	25.1	27.0	108	75-125	

SAMPLE DUPLICATE: 2209736

Parameter	Units	60214339001 Result	Dup Result	RPD	Max RPD	Qualifiers
Available Nitrate	mg/kg	ND	2.9J		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.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: KCMO Municipal Farms

Pace Project No.: 60214339

QC Batch:	MT/22824	Analysis Method:	ASA 24-5.4/SM4500
QC Batch Method:	ASA 24-5.4/SM4500	Analysis Description:	SM4500P-E, Available Phosphorus
Associated Lab Samples:	60214339001, 60214339002, 60214339003, 60214339004, 60214339005, 60214339006, 60214339007, 60214339008, 60214339009, 60214339010		

METHOD BLANK:	2210209	Matrix:	Solid
Associated Lab Samples:	60214339001, 60214339002, 60214339003, 60214339004, 60214339005, 60214339006, 60214339007, 60214339008, 60214339009, 60214339010		

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Available Phosphorus	mg/kg	ND	4.0	03/18/16 13:36	

LABORATORY CONTROL SAMPLE: 2210210

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Available Phosphorus	mg/kg	40.2	36.3	90	68-134	

SAMPLE DUPLICATE: 2210211

Parameter	Units	60214339009 Result	Dup Result	RPD	Max RPD	Qualifiers
Available Phosphorus	mg/kg	4.1	4.5	10	20	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: KCMO Municipal Farms

Pace Project No.: 60214339

QC Batch: MT/22751

Analysis Method: EPA 9045D

QC Batch Method: EPA 9045D

Analysis Description: 9045 pH

Associated Lab Samples: 60214339001, 60214339002, 60214339003, 60214339004, 60214339005, 60214339006, 60214339007, 60214339008, 60214339009, 60214339010

LABORATORY CONTROL SAMPLE: 2206233

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
pH at 25 Degrees C	Std. Units	7.9	7.9	100	94-106	

SAMPLE DUPLICATE: 2206234

Parameter	Units	60214339007 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	7.8	7.8	1	10	

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QUALITY CONTROL DATA

Project: KCMO Municipal Farms

Pace Project No.: 60214339

QC Batch:	MT/22844	Analysis Method:	ASA 29-3.5.2
QC Batch Method:	ASA 29-3.5.2	Analysis Description:	Organic Matter ASA 29
Associated Lab Samples:	60214339001, 60214339002, 60214339003, 60214339004, 60214339005, 60214339006, 60214339007, 60214339008, 60214339009, 60214339010		

METHOD BLANK:	2211379	Matrix:	Solid
Associated Lab Samples:	60214339001, 60214339002, 60214339003, 60214339004, 60214339005, 60214339006, 60214339007, 60214339008, 60214339009, 60214339010		

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Organic Matter	%	ND	0.092	03/17/16 12:44	N2

LABORATORY CONTROL SAMPLE: 2211380

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Organic Matter	%	1.9	2.0	105	79-121	N2

SAMPLE DUPLICATE: 2211381

Parameter	Units	60214339010 Result	Dup Result	RPD	Max RPD	Qualifiers
Organic Matter	%	ND	ND		20	N2

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QUALITY CONTROL DATA

Project: KCMO Municipal Farms

Pace Project No.: 60214339

QC Batch: MTPR/4065 Analysis Method: EPA 6010B
QC Batch Method: ASA 13-3.5.2.2 Analysis Description: 6010 SK11
Associated Lab Samples: 60214339001, 60214339002, 60214339003, 60214339004, 60214339005, 60214339006, 60214339007, 60214339008, 60214339009, 60214339010

METHOD BLANK: 2208053 Matrix: Solid
Associated Lab Samples: 60214339001, 60214339002, 60214339003, 60214339004, 60214339005, 60214339006, 60214339007, 60214339008, 60214339009, 60214339010

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Potassium	mg/kg	ND	99.5	03/11/16 15:50	

LABORATORY CONTROL SAMPLE: 2208054

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Potassium	mg/kg	886	923	104	81-119	

SAMPLE DUPLICATE: 2208055

Parameter	Units	60214339003 Result	Dup Result	RPD	Max RPD	Qualifiers
Potassium	mg/kg	375	361	4	20	

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QUALIFIERS

Project: KCMO Municipal Farms

Pace Project No.: 60214339

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.

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.

ANALYTE QUALIFIERS

N2 The lab does not hold TNI accreditation for this parameter.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: KCMO Municipal Farms

Pace Project No.: 60214339

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60214339001	S-1	ASA 33-3.2/EPA 353.2	MT/22810	ASA 33-3.2/EPA 353.2	MT/22840
60214339002	S-2	ASA 33-3.2/EPA 353.2	MT/22810	ASA 33-3.2/EPA 353.2	MT/22840
60214339003	S-3	ASA 33-3.2/EPA 353.2	MT/22810	ASA 33-3.2/EPA 353.2	MT/22840
60214339004	S-4	ASA 33-3.2/EPA 353.2	MT/22810	ASA 33-3.2/EPA 353.2	MT/22840
60214339005	S-5	ASA 33-3.2/EPA 353.2	MT/22810	ASA 33-3.2/EPA 353.2	MT/22840
60214339006	S-6	ASA 33-3.2/EPA 353.2	MT/22810	ASA 33-3.2/EPA 353.2	MT/22840
60214339007	S-7	ASA 33-3.2/EPA 353.2	MT/22810	ASA 33-3.2/EPA 353.2	MT/22840
60214339008	S-8	ASA 33-3.2/EPA 353.2	MT/22810	ASA 33-3.2/EPA 353.2	MT/22840
60214339009	S-9	ASA 33-3.2/EPA 353.2	MT/22810	ASA 33-3.2/EPA 353.2	MT/22840
60214339010	S-12	ASA 33-3.2/EPA 353.2	MT/22810	ASA 33-3.2/EPA 353.2	MT/22840
60214339001	S-1	ASA 24-5.4/SM4500	MT/22824	ASA 24-5.4/SM4500	MT/22854
60214339002	S-2	ASA 24-5.4/SM4500	MT/22824	ASA 24-5.4/SM4500	MT/22854
60214339003	S-3	ASA 24-5.4/SM4500	MT/22824	ASA 24-5.4/SM4500	MT/22854
60214339004	S-4	ASA 24-5.4/SM4500	MT/22824	ASA 24-5.4/SM4500	MT/22854
60214339005	S-5	ASA 24-5.4/SM4500	MT/22824	ASA 24-5.4/SM4500	MT/22854
60214339006	S-6	ASA 24-5.4/SM4500	MT/22824	ASA 24-5.4/SM4500	MT/22854
60214339007	S-7	ASA 24-5.4/SM4500	MT/22824	ASA 24-5.4/SM4500	MT/22854
60214339008	S-8	ASA 24-5.4/SM4500	MT/22824	ASA 24-5.4/SM4500	MT/22854
60214339009	S-9	ASA 24-5.4/SM4500	MT/22824	ASA 24-5.4/SM4500	MT/22854
60214339010	S-12	ASA 24-5.4/SM4500	MT/22824	ASA 24-5.4/SM4500	MT/22854
60214339001	S-1	ASA 13-3.5.2.2	MT/22788	EPA 6010B	MT/22788
60214339002	S-2	ASA 13-3.5.2.2	MT/22788	EPA 6010B	MT/22788
60214339003	S-3	ASA 13-3.5.2.2	MT/22788	EPA 6010B	MT/22788
60214339004	S-4	ASA 13-3.5.2.2	MT/22788	EPA 6010B	MT/22788
60214339005	S-5	ASA 13-3.5.2.2	MT/22788	EPA 6010B	MT/22788
60214339006	S-6	ASA 13-3.5.2.2	MT/22788	EPA 6010B	MT/22788
60214339007	S-7	ASA 13-3.5.2.2	MT/22788	EPA 6010B	MT/22788
60214339008	S-8	ASA 13-3.5.2.2	MT/22788	EPA 6010B	MT/22788
60214339009	S-9	ASA 13-3.5.2.2	MT/22788	EPA 6010B	MT/22788
60214339010	S-12	ASA 13-3.5.2.2	MT/22788	EPA 6010B	MT/22788
60214339001	S-1	EPA 9045D	MT/22751		
60214339002	S-2	EPA 9045D	MT/22751		
60214339003	S-3	EPA 9045D	MT/22751		
60214339004	S-4	EPA 9045D	MT/22751		
60214339005	S-5	EPA 9045D	MT/22751		
60214339006	S-6	EPA 9045D	MT/22751		
60214339007	S-7	EPA 9045D	MT/22751		
60214339008	S-8	EPA 9045D	MT/22751		
60214339009	S-9	EPA 9045D	MT/22751		
60214339010	S-12	EPA 9045D	MT/22751		
60214339001	S-1	ASA 29-3.5.2	MT/22844		
60214339002	S-2	ASA 29-3.5.2	MT/22844		
60214339003	S-3	ASA 29-3.5.2	MT/22844		
60214339004	S-4	ASA 29-3.5.2	MT/22844		
60214339005	S-5	ASA 29-3.5.2	MT/22844		
60214339006	S-6	ASA 29-3.5.2	MT/22844		
60214339007	S-7	ASA 29-3.5.2	MT/22844		

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: KCMO Municipal Farms

Pace Project No.: 60214339

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60214339008	S-8	ASA 29-3.5.2	MT/22844		
60214339009	S-9	ASA 29-3.5.2	MT/22844		
60214339010	S-12	ASA 29-3.5.2	MT/22844		

REPORT OF LABORATORY ANALYSIS

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Sample Condition Upon Receipt

WO#: 60214339



Client Name: TetraTech EMI

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

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: CF +1.0 T-239 CF 0.0 T-262 Type of Ice: Wet Blue ☐ None ☐ Samples received on ice, cooling process has begun.

Cooler Temperature: 4.8

Date and initials of person examining contents: JB 7/4

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	1.
Chain of Custody filled out:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	2.
Chain of Custody relinquished:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	3.
Sampler name & signature on COC:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	4.
Samples arrived within holding time:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	5.
Short Hold Time analyses (<72hr):	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	6.
Rush Turn Around Time requested:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	7.
Sufficient volume:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	8.
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	9.
Containers intact:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	10.
Unpreserved 5035A soils frozen w/in 48hrs?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	11.
Filtered volume received for dissolved tests?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	12.
Sample labels match COC:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Includes date/time/ID/analyses Matrix: <u>SL</u>		13.
All containers needing preservation have been checked.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
All containers needing preservation are found to be in compliance with EPA recommendation.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	14.
Exceptions: VOA, Coliform, O&G, WI-DRO (water)	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Initial when completed
Trip Blank present:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	Lot # of added preservative
Pace Trip Blank lot # (if purchased):		15.
Headspace in VOA vials (>6mm):	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	16.
Project sampled in USDA Regulated Area:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	17. List State: <u>MO</u>
Additional labels attached to 5035A vials in the field?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	18.

Client Notification/ Resolution:

Copy COC to Client? Y / N

Field Data Required? Y / N

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: A

Date: 3/7/14

Section A

Required Client Information:

Section B

Required Project Information:

Section C

Invoice Information:

Page:

of

Page 25 of 34

Company:	Tetra Tech EMI	Report To:	Emily Fisher	Attention:	
Address:	415 Oak	Copy To:		Company Name:	
	Kansas City, MO 64106			Address:	
Email To:	Emily.Fisher@tetratech.com	Purchase Order No.:		Pace Quote Reference:	
Phone:	(816) 412-1755	Fax:		Pace Project Manager:	Sherri Rosenstangle
Requested Due Date/TAT:	3/12/16	Project Name:	KCMO Municipal Farms	Pace Profile #:	970
		Project Number:			
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					
STATE:		MO			

[illegible]

16-076-4071REPORT DATE
Mar 16, 2016RECEIVED DATE
Mar 08, 2016SEND TO
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www.midwestlabs.com**PAGE 1/10**ISSUE DATE
Mar 16, 2016**PACE ANALYTICAL SERVICES
9608 LOIRET BLVD
LENEXA KS 66219-****REPORT OF ANALYSIS****For: (12352) PACE ANALYTICAL SERVICES
KCMO MUNICIPAL FARMS**

Analysis	Level Found			Reporting		Analyst- Date	Verified- Date
	As Received	Dry Weight	Units	Limit	Method		
Sample ID: S-9	Lab Number: 2503618	Date Sampled: 2016-03-03 1050					
Arsenic (AB-DTPA)		0.23	ppm	0.20	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Cadmium (AB-DTPA)		0.15	ppm	0.01	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Chromium (AB-DTPA)		0.07	ppm	0.02	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Lead (AB-DTPA)		9.82	ppm	0.10	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Copper (AB-DTPA)		6.19	ppm	0.02	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Mercury (AB-DTPA)		n.d.	ppm	0.01	EPA 7471 *	ccm2-2016/03/14	bab2-2016/03/16
Molybdenum (AB-DTPA)		0.17	ppm	0.05	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Nickel (AB-DTPA)		1.68	ppm	0.02	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Selenium (AB-DTPA)		n.d.	ppm	0.20	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Zinc (AB-DTPA)		9.79	ppm	0.05	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Sample ID: S-2	Lab Number: 2503619	Date Sampled: 2016-03-03 1130					
Arsenic (AB-DTPA)		n.d.	ppm	0.20	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Cadmium (AB-DTPA)		0.12	ppm	0.01	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Chromium (AB-DTPA)		0.03	ppm	0.02	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Lead (AB-DTPA)		5.89	ppm	0.10	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Copper (AB-DTPA)		2.26	ppm	0.02	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Mercury (AB-DTPA)		n.d.	ppm	0.01	EPA 7471 *	ccm2-2016/03/14	bab2-2016/03/16
Molybdenum (AB-DTPA)		n.d.	ppm	0.05	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Nickel (AB-DTPA)		0.71	ppm	0.02	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16

The result(s) issued on this report only reflect the analysis of the sample(s) submitted.

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Mar 16, 2016RECEIVED DATE
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www.midwestlabs.com**PAGE 2/10**ISSUE DATE
Mar 16, 2016**PACE ANALYTICAL SERVICES
9608 LOIRET BLVD
LENEXA KS 66219-****REPORT OF ANALYSIS**For: (12352) PACE ANALYTICAL SERVICES
KCMO MUNICIPAL FARMS

Analysis	Level Found		Units	Reporting		Analyst- Date	Verified- Date
	As Received	Dry Weight		Limit	Method		
Sample ID: S-2 Lab Number: 2503619 (con't)							
Selenium (AB-DTPA)		n.d.	ppm	0.20	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Zinc (AB-DTPA)		0.55	ppm	0.05	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Sample ID: S-3	Lab Number: 2503620	Date Sampled: 2016-03-03 1112					
Arsenic (AB-DTPA)		n.d.	ppm	0.20	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Cadmium (AB-DTPA)		0.04	ppm	0.01	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Chromium (AB-DTPA)		0.03	ppm	0.02	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Lead (AB-DTPA)		2.57	ppm	0.10	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Copper (AB-DTPA)		3.02	ppm	0.02	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Mercury (AB-DTPA)		n.d.	ppm	0.01	EPA 7471 *	ccm2-2016/03/14	bab2-2016/03/16
Molybdenum (AB-DTPA)		n.d.	ppm	0.05	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Nickel (AB-DTPA)		1.13	ppm	0.02	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Selenium (AB-DTPA)		n.d.	ppm	0.20	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Zinc (AB-DTPA)		1.45	ppm	0.05	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Sample ID: S-4	Lab Number: 2503621	Date Sampled: 2016-03-03 1044					
Arsenic (AB-DTPA)		n.d.	ppm	0.20	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Cadmium (AB-DTPA)		0.10	ppm	0.01	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Chromium (AB-DTPA)		0.04	ppm	0.02	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Lead (AB-DTPA)		3.54	ppm	0.10	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Copper (AB-DTPA)		2.15	ppm	0.02	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16

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9608 LOIRET BLVD
LENEXA KS 66219-****REPORT OF ANALYSIS**For: (12352) PACE ANALYTICAL SERVICES
KCMO MUNICIPAL FARMS

Analysis	Level Found		Units	Reporting		Analyst- Date	Verified- Date
	As Received	Dry Weight		Limit	Method		
Sample ID: S-4 Lab Number: 2503621 (con't)							
Mercury (AB-DTPA)		n.d.	ppm	0.01	EPA 7471 *	ccm2-2016/03/14	bab2-2016/03/16
Molybdenum (AB-DTPA)		n.d.	ppm	0.05	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Nickel (AB-DTPA)		1.23	ppm	0.02	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Selenium (AB-DTPA)		n.d.	ppm	0.20	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Zinc (AB-DTPA)		3.93	ppm	0.05	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Sample ID: S-5 Lab Number: 2503622 Date Sampled: 2016-03-03 1027							
Arsenic (AB-DTPA)		n.d.	ppm	0.20	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Cadmium (AB-DTPA)		0.09	ppm	0.01	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Chromium (AB-DTPA)		0.03	ppm	0.02	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Lead (AB-DTPA)		2.63	ppm	0.10	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Copper (AB-DTPA)		2.35	ppm	0.02	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Mercury (AB-DTPA)		n.d.	ppm	0.01	EPA 7471 *	ccm2-2016/03/14	bab2-2016/03/16
Molybdenum (AB-DTPA)		0.05	ppm	0.05	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Nickel (AB-DTPA)		0.85	ppm	0.02	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Selenium (AB-DTPA)		n.d.	ppm	0.20	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Zinc (AB-DTPA)		1.68	ppm	0.05	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Sample ID: S-6 Lab Number: 2503623 Date Sampled: 2016-03-03 1530							
Arsenic (AB-DTPA)		n.d.	ppm	0.20	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Cadmium (AB-DTPA)		0.39	ppm	0.01	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16

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LENEXA KS 66219-****REPORT OF ANALYSIS**For: (12352) PACE ANALYTICAL SERVICES
KCMO MUNICIPAL FARMS

Analysis	Level Found		Units	Reporting		Analyst- Date	Verified- Date
	As Received	Dry Weight		Limit	Method		
Sample ID: S-6 Lab Number: 2503623 (con't)							
Chromium (AB-DTPA)		0.04	ppm	0.02	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Lead (AB-DTPA)		8.19	ppm	0.10	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Copper (AB-DTPA)		3.19	ppm	0.02	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Mercury (AB-DTPA)		n.d.	ppm	0.01	EPA 7471 *	ccm2-2016/03/14	bab2-2016/03/16
Molybdenum (AB-DTPA)		0.05	ppm	0.05	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Nickel (AB-DTPA)		0.82	ppm	0.02	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Selenium (AB-DTPA)		n.d.	ppm	0.20	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Zinc (AB-DTPA)		12.8	ppm	0.05	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Sample ID: S-7 Lab Number: 2503624 Date Sampled: 2016-03-03 1510							
Arsenic (AB-DTPA)		n.d.	ppm	0.20	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Cadmium (AB-DTPA)		0.14	ppm	0.01	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Chromium (AB-DTPA)		0.04	ppm	0.02	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Lead (AB-DTPA)		3.80	ppm	0.10	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Copper (AB-DTPA)		2.99	ppm	0.02	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Mercury (AB-DTPA)		n.d.	ppm	0.01	EPA 7471 *	ccm2-2016/03/14	bab2-2016/03/16
Molybdenum (AB-DTPA)		0.15	ppm	0.05	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Nickel (AB-DTPA)		0.77	ppm	0.02	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Selenium (AB-DTPA)		n.d.	ppm	0.20	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Zinc (AB-DTPA)		3.09	ppm	0.05	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16

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KCMO MUNICIPAL FARMS

Analysis	Level Found		Units	Reporting		Analyst- Date	Verified- Date
	As Received	Dry Weight		Limit	Method		
Sample ID: S-8	Lab Number: 2503625	Date Sampled: 2016-03-03 1550					
Arsenic (AB-DTPA)		n.d.	ppm	0.20	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Cadmium (AB-DTPA)		0.04	ppm	0.01	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Chromium (AB-DTPA)		0.03	ppm	0.02	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Lead (AB-DTPA)		1.34	ppm	0.10	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Copper (AB-DTPA)		2.08	ppm	0.02	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Mercury (AB-DTPA)		n.d.	ppm	0.01	EPA 7471 *	ccm2-2016/03/14	bab2-2016/03/16
Molybdenum (AB-DTPA)		0.07	ppm	0.05	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Nickel (AB-DTPA)		0.41	ppm	0.02	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Selenium (AB-DTPA)		n.d.	ppm	0.20	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Zinc (AB-DTPA)		0.69	ppm	0.05	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Sample ID: S-9	Lab Number: 2503626	Date Sampled: 2016-03-03 1620					
Arsenic (AB-DTPA)		n.d.	ppm	0.20	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Cadmium (AB-DTPA)		0.03	ppm	0.01	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Chromium (AB-DTPA)		0.03	ppm	0.02	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Lead (AB-DTPA)		1.10	ppm	0.10	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Copper (AB-DTPA)		1.13	ppm	0.02	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Mercury (AB-DTPA)		n.d.	ppm	0.01	EPA 7471 *	ccm2-2016/03/14	bab2-2016/03/16
Molybdenum (AB-DTPA)		n.d.	ppm	0.05	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Nickel (AB-DTPA)		0.30	ppm	0.02	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16

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KCMO MUNICIPAL FARMS

Analysis	Level Found		Units	Reporting		Analyst- Date	Verified- Date
	As Received	Dry Weight		Limit	Method		
Sample ID: S-9 Lab Number: 2503626 (con't)							
Selenium (AB-DTPA)		n.d.	ppm	0.20	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Zinc (AB-DTPA)		0.53	ppm	0.05	EPA 6010 *	trh1-2016/03/11	bab2-2016/03/16
Sample ID: S-12 Lab Number: 2503627 Date Sampled: 2016-03-03 0950							
Arsenic (AB-DTPA)		n.d.	ppm	0.20	EPA 6010 *	trh1-2016/03/14	bab2-2016/03/16
Cadmium (AB-DTPA)		0.22	ppm	0.01	EPA 6010 *	trh1-2016/03/14	bab2-2016/03/16
Chromium (AB-DTPA)		0.06	ppm	0.02	EPA 6010 *	trh1-2016/03/14	bab2-2016/03/16
Lead (AB-DTPA)		1.85	ppm	0.10	EPA 6010 *	trh1-2016/03/14	bab2-2016/03/16
Copper (AB-DTPA)		3.01	ppm	0.02	EPA 6010 *	trh1-2016/03/14	bab2-2016/03/16
Mercury (AB-DTPA)		n.d.	ppm	0.01	EPA 7471 *	ccm2-2016/03/14	bab2-2016/03/16
Molybdenum (AB-DTPA)		0.05	ppm	0.05	EPA 6010 *	trh1-2016/03/14	bab2-2016/03/16
Nickel (AB-DTPA)		2.83	ppm	0.02	EPA 6010 *	trh1-2016/03/14	bab2-2016/03/16
Selenium (AB-DTPA)		n.d.	ppm	0.20	EPA 6010 *	trh1-2016/03/14	bab2-2016/03/16
Zinc (AB-DTPA)		2.41	ppm	0.05	EPA 6010 *	trh1-2016/03/14	bab2-2016/03/16

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KCMO MUNICIPAL FARMS

Analysis	Level Found		Units	Reporting		Analyst- Date	Verified- Date
	As Received	Dry Weight		Limit	Method		

n.d. = not detected , ppm = parts per million, ppm = mg/kg

For questions please contact:

Heather Ramig
Account Manager
heather.ramig@midwestlabs.com (402)829-9891

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KCMO MUNICIPAL FARMS****Detailed Method Description(s)****ME 042**

Analysis follows MWL ME 042 which is based on EPA 6010b, Inductively Coupled Plasma (ICP).

A light emission technique where prepared samples are injected into a high energy plasma that forces the elements in the injected sample to emit light energies which are proportional to the level of minerals and metals present. The light is then detected and correlated to the levels of minerals and metals in the original sample.

ME 067

Samples are analyzed for mercury using MWL ME 067 which is based upon EPA 7471, cold vapor atomic absorption (CVAA).

Samples are prepared via MWL ME 037 that uses a series of digestion steps involving hot mineral acids and oxidizers so as to destroy organic matter and solubilize mercury. The mercury is reduced by use of stannous chloride to elemental mercury that is then aerated to the light path of a mercury light of an atomic absorption spectrometer (AAS). The absorption of the mercury light at 253.7 nm is then correlated to the level of mercury present in the original sample.

ME 015 (AB-DTPA)

Samples of dried and ground soil are extracted with an

AB-DTPA solution for analysis by ICP of plant available minerals and metals.

Chain of Custody


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Pace Analytical
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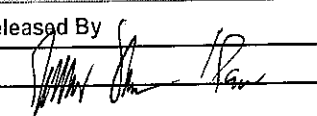
Workorder: 60214339

Workorder Name: KCMO Municipal Farms

Results Requested 3/18/2016

Report / Invoice To	Subcontract To	Requested Analysis
Sherri Rosenstangle Pace Analytical Kansas 9608 Loiret Blvd. Lenexa, KS 66219 Phone (913)599-5665 Email: sherri.rosenstangle@pacelabs.com	SUB-8050 P.O.	
 2503618-627 Samples: Page: 10 1/2 Lara L. Mikels 2016 03 08 17:05		

Item	Sample ID	Collect Date/Time	Lab ID	Matrix	Preserved Containers						Metals (As, Cd, Cr)											LAB USE ONLY																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
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					Comments
Transfers	Released By	Date/Time	Received	Date/Time	
1		3/7/16 1:00	Antony D. Mauro	3/8/16	
2					
3					
Cooler Temperature on Receipt °C		Custody Seal Y or N	Received on Ice Y or N	Samples Intact Y or N	

Boring Log Form

Site Name: KCMO Municipal Farms Boring Number: S-1

Date Drilled (Start/Finish): 3-3-16

Drilling Method: Geoprobe DPT

Drilling Company: Plains Environmental

Elevation: _____

Total Depth: 4 ft bgl

Coordinates: Lat: 39.0364193 Lon: -94.52019171

Depth to Water: NA

Geologist: Christin Russell

Project Number: 102X902516915-000

Weather: 70°F, sunny

Sample Interval	Interval	Soil Recv.	PID Reading (ppm or ppb)	Depth (Feet)	Color (Munsell or Rock)	Lithology	Graphic Log	Description and Remarks
S-1		60%	0					topsoil
								dark brown clay
								low moisture content
				5				
				10				
				15				
				20				
				25				
				30				

Boring Log Form

Site Name: KCMD Municipal Farms Boring Number: S-6

Date Drilled (Start/Finish): 3-2-16

Drilling Method: Geoprobe DPT

Drilling Company: Plains Environmental

Elevation: _____

Total Depth: 40' 2 ft bgs

Coordinates: Lat: 39.04150217 Lon: -94.51676048

Depth to Water: NA

Geologist: Christin Russell

Project Number: 103X9025160115.000

Weather: Sunny, 60°F

Sample Interval	Interval	Soil Recv.	PID Reading (ppm or ppb)	Depth (Feet)	Color (Munsell or Rock)	Lithology	Graphic Log	Description and Remarks
S-6		40'	0					topsoil
								dark brown clay, low moisture
				5				
				10				
				15				
				20				
				25				
				30				

Boring Log Form

Site Name: KCMO Municipal Farms Boring Number: S-7

Date Drilled (Start/Finish): 3-2-16

Drilling Method: Geoprobe DPT

Drilling Company: Plains Environmental

Elevation: _____

Total Depth: 4 ft bgs

Coordinates: Lat: 39.04123954 Lon: -94.51483602

Depth to Water: NA

Geologist: Christin Russell

Project Number: 103X9025160115.000

Weather: Sunny, 60°F

Sample Interval	Interval	Soil Recv.	PID Reading (ppm or ppb)	Depth (Feet)	Color (Munsell or Rock)	Lithology	Graphic Log	Description and Remarks
S-7		80%	0					topsoil
								dark brown clay
								low moisture content
				5				
				10				
				15				
				20				
				25				
				30				

Boring Log Form

Site Name: KCMD Municipal Farms Boring Number: S-8

Date Drilled (Start/Finish): 3-2-16

Drilling Method: Geoprobe DPT

Drilling Company: Plains Environmental

Elevation: _____

Total Depth: 4 ft bgs

Coordinates: Lat: 39.04297297 Lon: -94.51495992

Depth to Water: ND

Geologist: Christin Russell

Project Number: 103X9025160115.000

Weather: 65°F, Sunny

Sample Interval	Interval	Soil Recv.	PID Reading (ppm or ppb)	Depth (Feet)	Color (Munsell or Rock)	Lithology	Graphic Log	Description and Remarks
S-8		80b	0					topsoil
								medium brown clay, low moisture
								dark brown clay, low moisture
				5				
				10				
				15				
				20				
				25				
				30				

Boring Log Form

Site Name: KCMO Municipal Farms Boring Number: S-9

Date Drilled (Start/Finish): 3-2-11

Drilling Method: Geoprobe DPT

Drilling Company: Plains Environmental

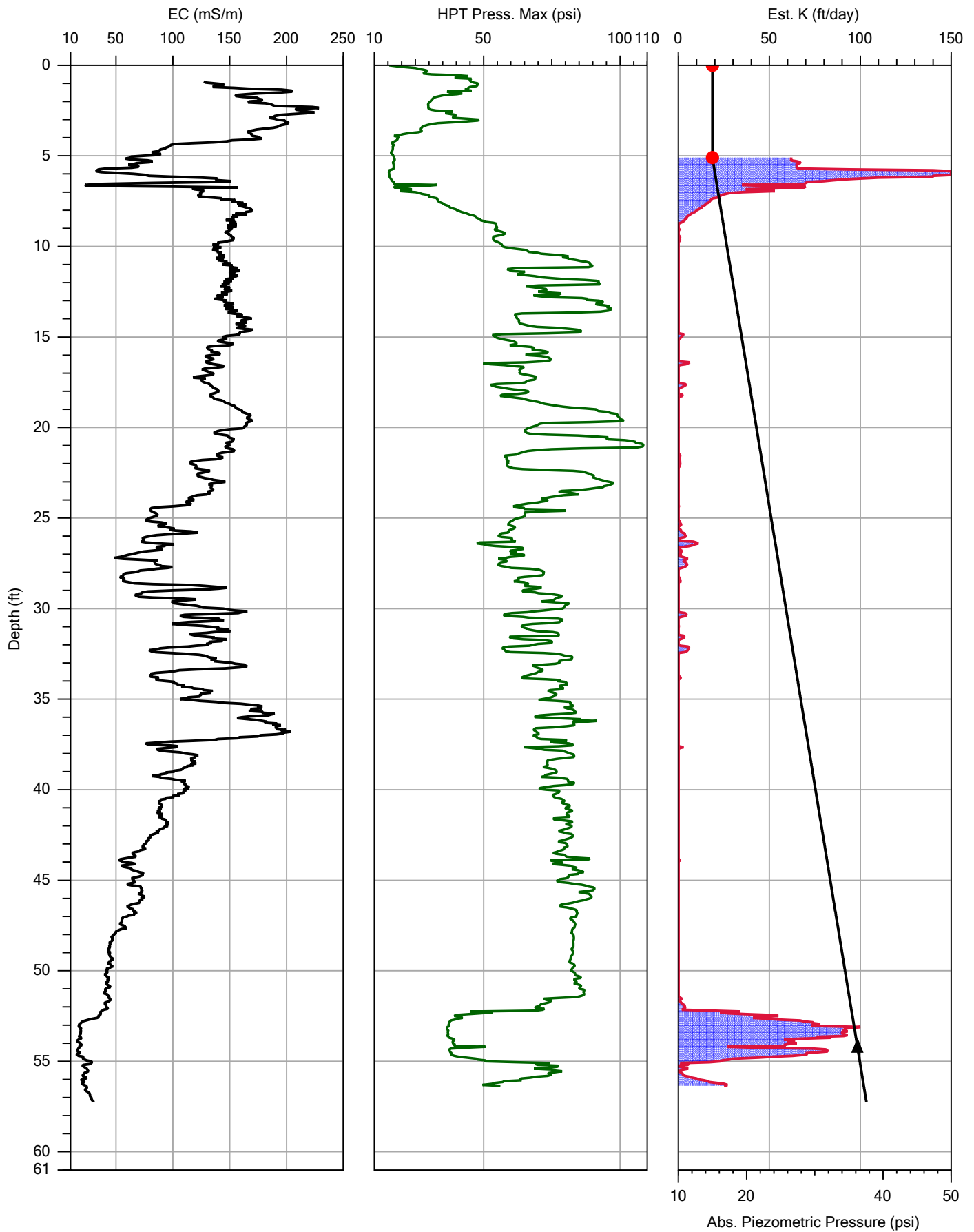
Elevation: _____ Total Depth: 4 ft bgs

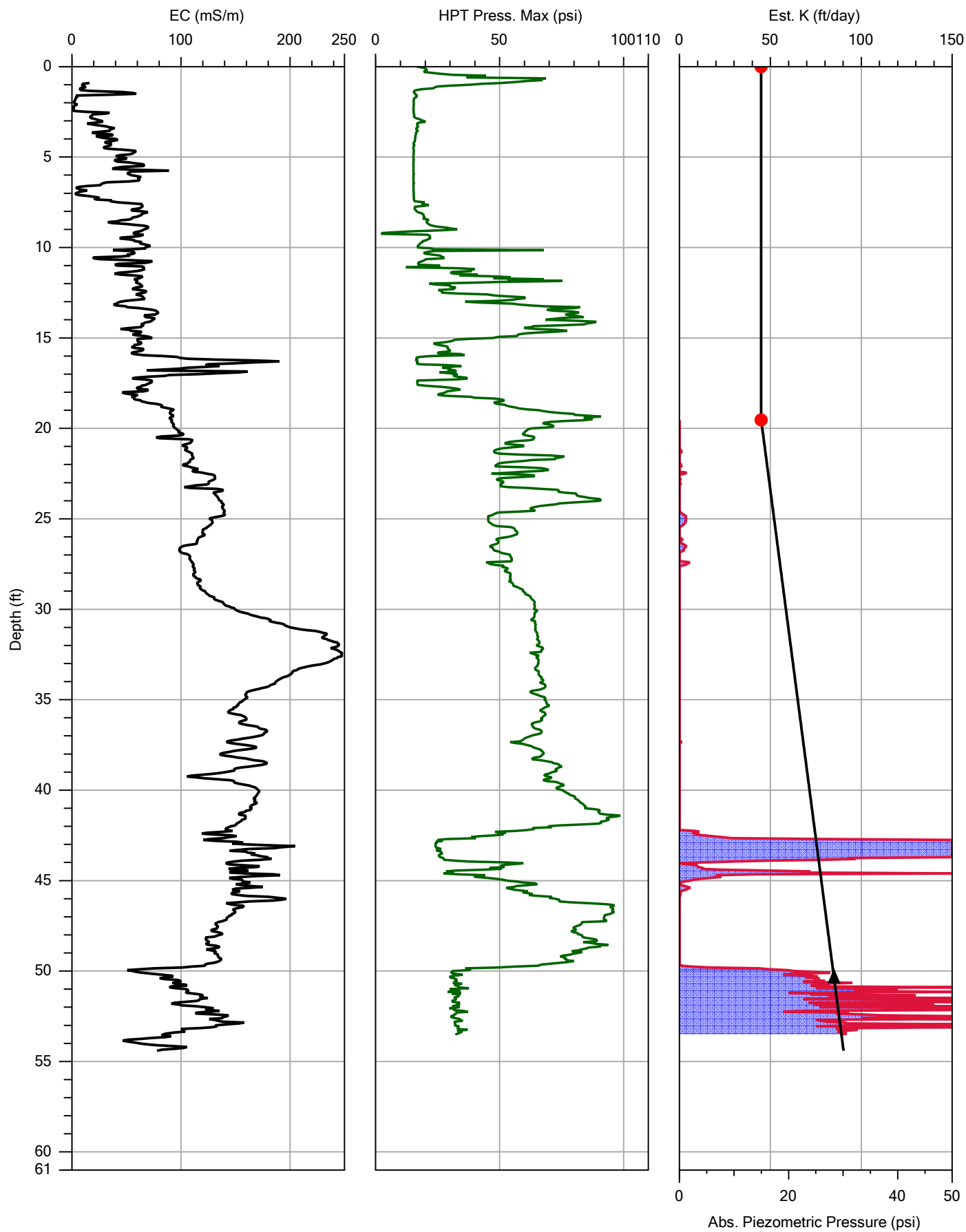
Coordinates: Lat: 39.04291889 Lon: -94.51362089

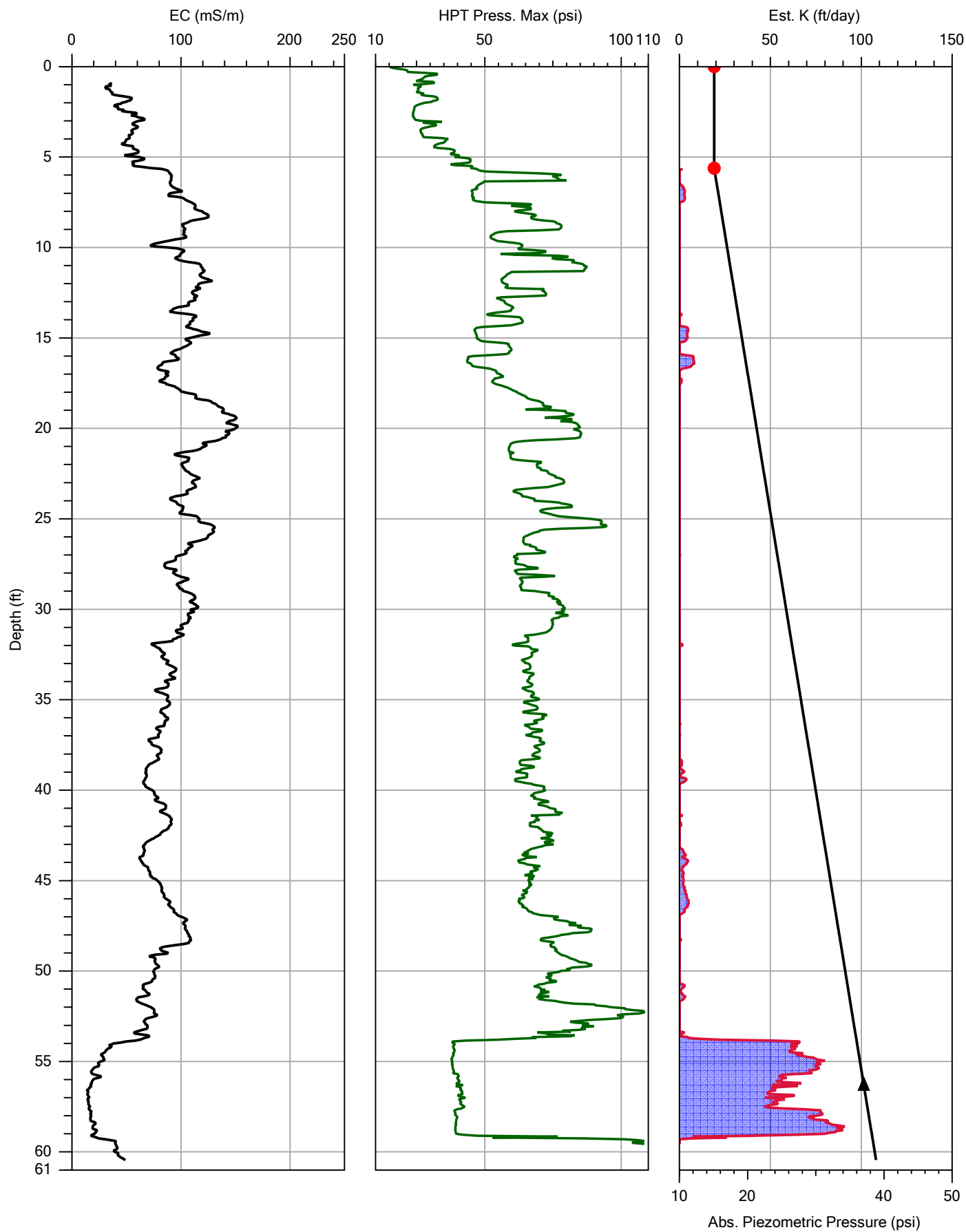
Depth to Water: NA Geologist: Christin Russell

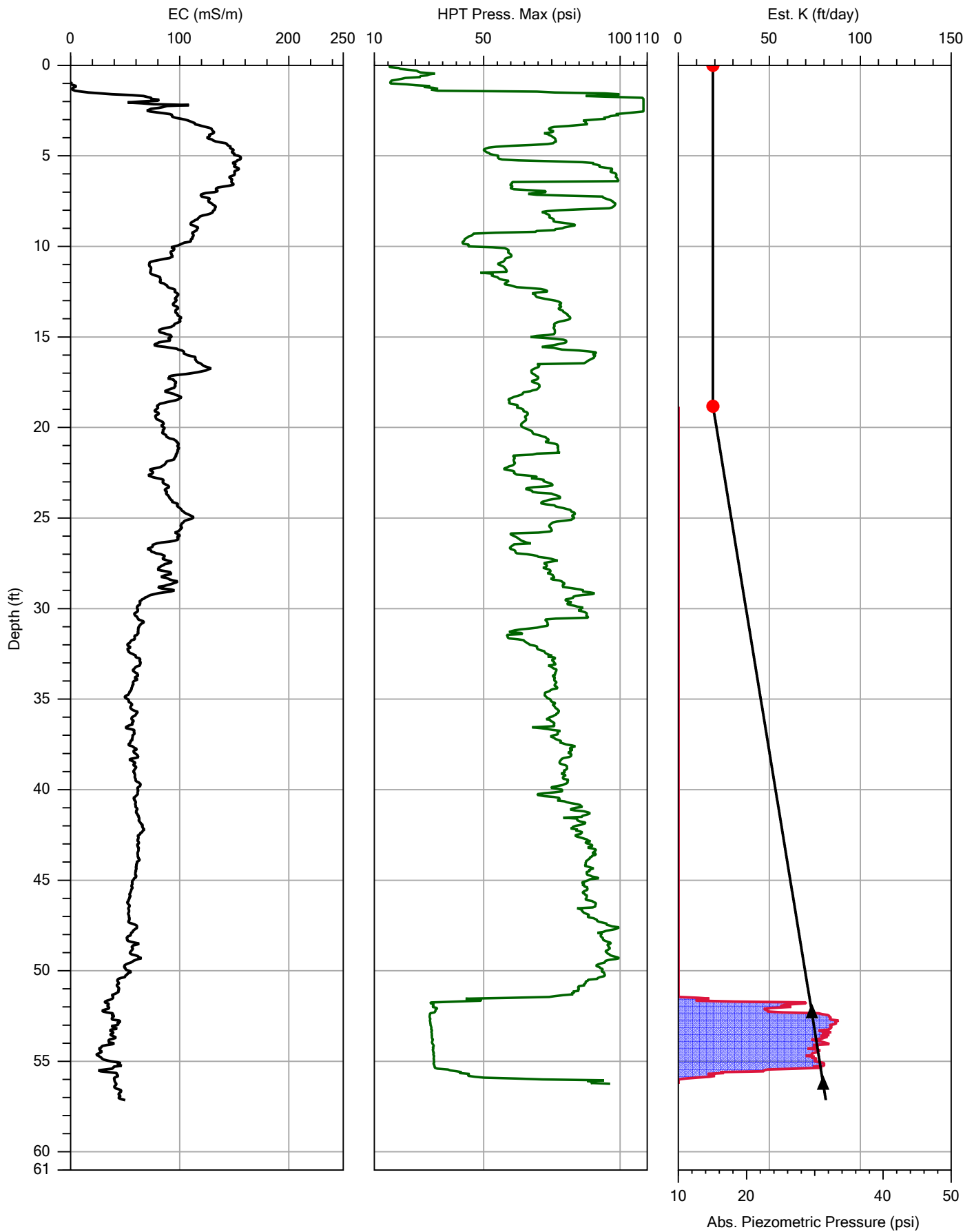
Project Number: 103X9025160115.000 Weather: 70°F, Sunny

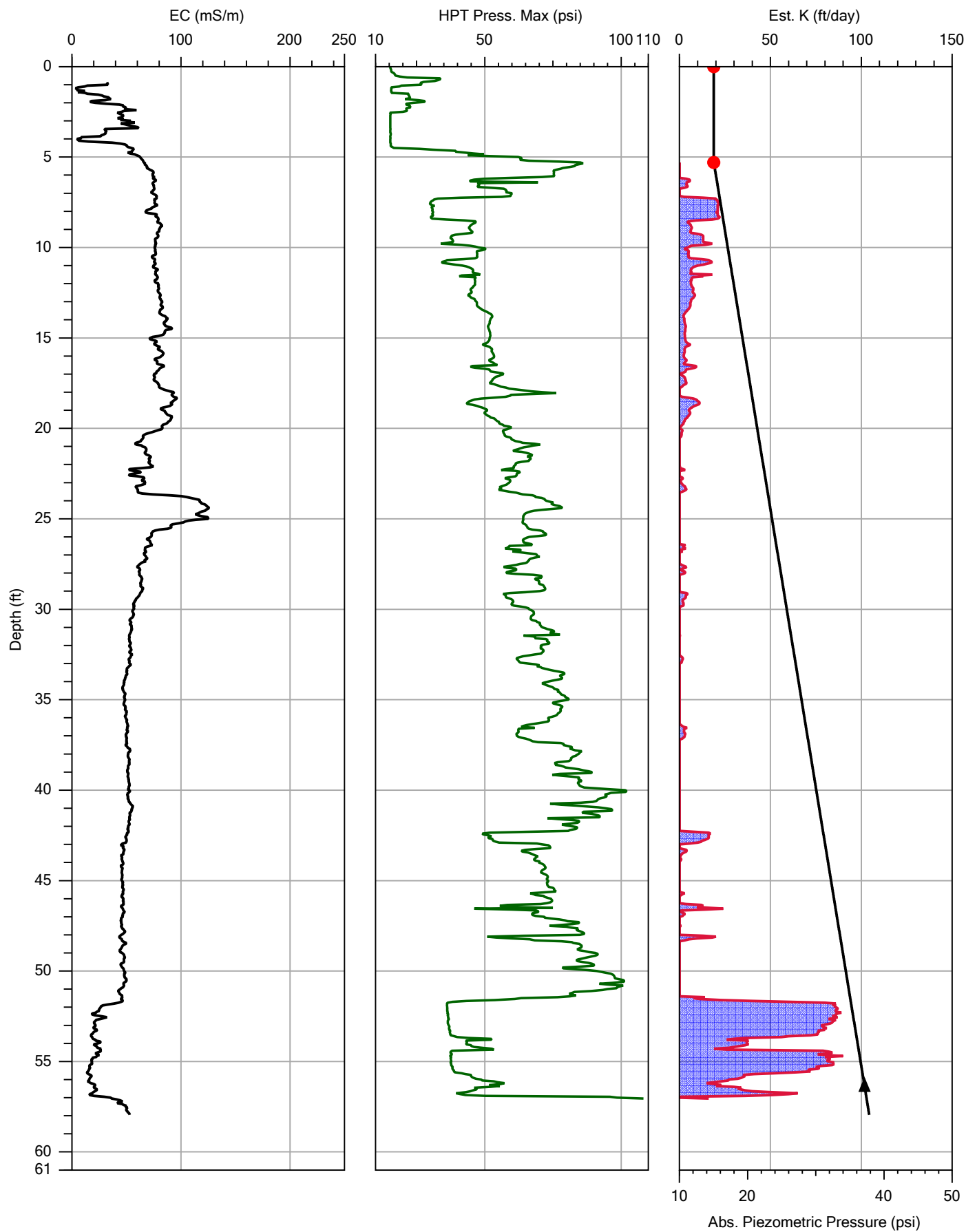
Sample Interval	Interval	Soil Recv.	PID Reading (ppm or ppb)	Depth (Feet)	Color (Munsell or Rock)	Lithology	Graphic Log	Description and Remarks
5-9		80%	0					topsoil
								medium brown clay, low moisture
								dark brown clay, low moisture
				5				
				10				
				15				
				20				
				25				
				30				











Section A

Required Client Information:

Company: **Tetra Tech EMI**
Address: **415 Oak**
Kansas City, MO 64106
Email To: **Emily.Fisher@tetratech.com**
Phone: **(816) 412-1755** Fax: _____
Requested Due Date/TAT: **3/14/16**

Section B

Required Project Information:

Report To: **Emily Fisher**
Copy To: _____
Purchase Order No.: _____
Project Name: **KCMO Municipal Farms**
Project Number: _____

Section C

Invoice Information:

Attention: _____
Company Name: _____
Address: _____
Pace Quote Reference: _____
Pace Project Manager: **Sherri Rosenstangle**
Pace Profile #: **970**

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER _____

Site Location

MO

STATE: _____

Requested Analysis Filtered (Y/N)

ITEM #	Section D Required Client Information	Valid Matrix Codes MATRIX CODE DRINKING WATER DW WATER WT WASTE WATER WW PRODUCT P SOIL/SOLID SL OIL OL WIPE WP AIR AR OTHER OT TISSUE TS	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED				SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives										Analysis Test ↓ Y/N											Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
					COMPOSITE START		COMPOSITE END/GRAB				Unpreserved	H ₂ SO ₄	HNO ₃	HCl	NaOH	Na ₂ S ₂ O ₃	Methanol	Other	Available Nitrogen	Ext./Available Phosphorus		Ext./Available Potassium	pH	Organic Matter - Walkley B	DTPA ext. metals 6020																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS
	Christina Kinsler	3/4/16	1500	Autht Jan	3-4	15:00	

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: **Christina Kinsler**

SIGNATURE of SAMPLER: **Christina Kinsler**

DATE Signed
(MM/DD/YY): **03/04/16**

Temp in °C

Received on
Ice (Y/N)

Custody Sealed
Cooler (Y/N)

Samples Intact
(Y/N)

APPENDIX E

TABLES

TABLE 1

**SURFACE SOIL SAMPLE SUMMARY
KCMO MUNICIPAL FARMS SITE**

Sample Identification	Laboratory Identification	Sample Location		Sample Date	Sample Time
		Latitude	Longitude		
S-2 (0-18 in)	60214339002	39.03710812	-94.51656318	3/4/2016	11:30
S-3 (0-18 in)	60214339003	39.03869031	-94.51758247	3/4/2016	11:12
S-4 (0-18 in)	60214339004	39.03811669	-94.51465587	3/4/2016	10:44
S-5 (0-18 in)	60214339005	39.03947504	-94.51467821	3/4/2016	10:27
S-12 (0-18 in)	60214339010	39.04125606	-94.50413578	3/4/2016	09:50

Notes:

in Inches
S Soil

TABLE 2

**SUBSURFACE SOIL SAMPLE SUMMARY
KCMO MUNICIPAL FARMS SITE**

Sample Identification	Laboratory Identification	Sample Location		Sample Date	Sample Time
		Latitude	Longitude		
S-1 (0-4 ft.)	60214339001	39.0364193	-94.52019171	3/3/2016	10:50
S-6 (0-2 ft.)	60214339006	39.04150217	-94.51675048	3/2/2016	15:30
S-7 (0-4 ft.)	60214339007	39.04123954	-94.51483602	3/2/2016	15:10
S-8 (0-4 ft.)	60214339008	39.04297297	-94.51495992	3/2/2016	15:50
S-9 (0-4 ft.)	60214339009	39.04291889	-94.51362089	3/2/2016	16:20

Notes:

ft. Feet
S Soil

TABLE 3

**GROUNDWATER CHARACTERIZATION SUMMARY
KCMO MUNICIPAL FARMS SITE**

Identification	Location		Date	Time
	Latitude	Longitude		
HPT-1 (0-58 ft.)	39.04189771	-94.51469273	3/2/2016	14:40
HPT-2 (0-55 ft.)	39.04339216	-94.51145913	3/3/2016	09:45
HPT-3 (0-61 ft.)	39.0417874	-94.50865489	3/2/2016	10:32
HPT-4 (0-57 ft.)	39.0441251	-94.50806224	3/2/2016	09:18
HPT-5 (0-58 ft.)	39.04230192	-94.50617676	3/2/2016	12:50

Notes:

ft. Feet
S Soil

TABLE 4

**ANALYTICAL RESULTS FROM SURFACE SOIL SAMPLES
KCMO MUNICIPAL FARMS SITE**

Sample Identification	Available Nitrate	Available Phosphorus	Available Potassium	pH	Organic Matter	Arsenic (AB-DTPA)	Cadmium (AB-DTPA)	Chromium (AB-DTPA)	Lead (AB-DTPA)	Copper (AB-DTPA)	Mercury (AB-DTPA)	Molybdenum (AB-DTPA)	Nickel (AB-DTPA)	Selenium (AB-DTPA)	Zinc (AB-DTPA)
Units	ppm	ppm	ppm	Std. Units	Percent (%)	ppm	ppm	ppm	Ppm	Ppm	ppm	ppm	ppm	ppm	ppm
S-2 (0-12 in)	ND	11.9	307	8.0	2.0	ND	0.12	0.03	5.89	2.26	ND	ND	0.71	ND	0.55
S-3 (0-12 in)	ND	60.2	375	5.5	1.3	ND	0.04	0.03	2.57	3.02	ND	ND	1.13	ND	1.45
S-4 (0-12 in)	ND	39.6	293	6.8	2.0	ND	0.10	0.04	3.54	2.15	ND	ND	1.23	ND	3.93
S-5 (0-12 in)	ND	ND	278	6.7	1.6	ND	0.09	0.03	2.63	2.35	ND	0.05	0.85	ND	1.68
S-12 (0-12 in)	ND	20.3	265	6.3	ND	ND	0.22	0.06	1.85	3.01	ND	0.05	2.83	ND	2.41

Notes:

AB-DTPA Ammonium bicarbonate – diethylenetriaminepentaacetic acid
 ppm Parts per million
 Std. Standard
 S Soil
 in inches
 ND Not detected

TABLE 5

**ANALYTICAL RESULTS FROM SUBSURFACE SOIL SAMPLES
KCMO MUNICIPAL FARMS SITE**

Sample Identification	Available Nitrate	Available Phosphorus	Available Potassium	pH	Organic Matter	Arsenic (AB-DTPA)	Cadmium (AB-DTPA)	Chromium (AB-DTPA)	Lead (AB-DTPA)	Copper (AB-DTPA)	Mercury (AB-DTPA)	Molybdenum (AB-DTPA)	Nickel (AB-DTPA)	Selenium (AB-DTPA)	Zinc (AB-DTPA)
Units	ppm	ppm	Ppm	Std. Units	Percent (%)	ppm	ppm	ppm	Ppm	ppm	ppm	ppm	ppm	ppm	ppm
S-1 (0-4 ft.)	ND	13.6	230	8.2	3.1	0.23	0.15	0.07	9.82	6.19	ND	0.17	1.68	ND	9.79
S-6 (0-4 ft.)	ND	7.5	212	8.0	2.2	ND	0.39	0.04	8.19	3.19	ND	0.05	0.82	ND	12.8
S-7 (0-4 ft.)	ND	14.0	224	7.8	0.23	ND	0.14	0.04	3.80	2.99	ND	0.15	0.77	ND	3.09
S-8 (0-4 ft.)	ND	37.3	246	7.2	0.35	ND	0.04	0.03	1.34	2.08	ND	0.07	0.41	ND	0.69
S-9 (0-4 ft.)	ND	4.1	283	7.4	0.35	ND	0.03	0.03	1.10	1.13	ND	ND	0.30	ND	0.53

Notes:

AB-DTPA Ammonium bicarbonate – diethylenetriaminepentaacetic acid
ppm Parts per million
Std. Standard
S Soil
ft. Feet
ND Not detected

TABLE 6

GROUNDWATER CHARACTERIZATION DATA

KCMO MUNICIPAL FARMS SITE

Sample Identification	Groundwater Encountered (depth)	Productive Groundwater (depth)	Refusal Encountered (depth)
HPT-1	5 ft. bgs	52-55 ft. bgs	58 ft. bgs
HPT-2	19 ft. bgs	50-55 ft. bgs	55 ft. bgs
HPT-3	6 ft. bgs	54-59 ft. bgs	61 ft. bgs
HPT-4	19 ft. bgs	51-56 ft. bgs	57 ft. bgs
HPT-5	5 ft. bgs	51-57 ft. bgs	58 ft. bgs

Notes:

ft. bgs Feet below ground surface