Scott A. Thompson
Executive Director

OKLAHOMA Environmental Quality

Kevin Stitt
Governor

October 7, 2022

John Browne, Chairman
McAlester Public Works Authority
c/o Pete Stasiak, City Manager
P.O. Box 578
McAlester, Oklahoma 74502-0578

Re: General Permit Authorization No. OKLAS2200011- Approved
One-time Land Application of Biosolids
McAlester Northeast Wastewater Treatment Facility
Facility No. S-20635
OPDES Permit No. OK0026107

Dear Mr. Moore:

The Oklahoma Department of Environmental Quality (DEQ), Water Quality Division is enclosing the authorization to operate in compliance with General Permit No. OKLAS2200011, for a one-time application of biosolids from the McAlester Public Works Authority (Authority) Northeast Wastewater Treatment Facility's (NE WWTP's) Flow Equalization Basin (FEB) to complete a solids removal and liner replacement project. The Authority's application for this authorization was submitted to DEQ on September 19, 2022. The Authority submitted additional information on September 23 and 28, 2022.

This authorization is approved in accordance with requirements of Oklahoma Administrative Code 252:606, as adopted and promulgated pursuant to the Environmental Code, 27A Oklahoma Statute Supp. 2011.

The authorization is for a one-time application of biosolids from the Authority's NE WWTF's FEB to the following sites:

Site 1: 247.65 acres located within the NW ¼ and Part of the NW ¼ of the NE ¼ of Section 17, Township 6 North, Range 14 East of the Indian Meridian, Pittsburg County, Oklahoma.

Site 2: 180 acres located within Part of the NW ¼ and Part of the SW ¼ of Section 34, Township 6 North, Range 15 East of the Indian Meridian, Pittsburg County, Oklahoma.

Site 3: 35 acres located within Part of the NW ¼ of the NW ¼ of Section 34, Township 6 North, Range 15 East of the Indian Meridian, Pittsburg County, Oklahoma.

The sludge operation authorized by this permit should be maintained in accordance with the plan approved by DEQ on September 28, 2022. DEQ must approve any deviation from the approved plan in writing before changes can be made. I am returning a copy of the signed Permit for your records. Please feel free to contact me at (405) 702-8108 or write to me at the letterhead address if you have any questions or concerns.

Sincerely,

Shane Hacker

Shane Hacker, P.E., District Engineer
Municipal Wastewater Enforcement Section
Water Quality Division
Oklahoma Department of Environmental Quality

Enclosure: As stated

SH/MM/hb MH/TJB

cc: Aaron Gruenwald, Project Manager, Hodges Farm and Dredging
Jonathan Schulz, ECLS, McAlester DEQ Office
Jeff Brents, ECLS, Regional Manager, DEQ

OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY
AUTHORIZATION FOR ONE TIME LAND APPLICATION OF SEWAGE SLUDGE
UNDER GENERAL PERMIT NO. GP-OK65S
AUTHORIZATION NO. OKLAS2200011

In compliance with Oklahoma Statute, 27A § 2-14-305 (2011) as amended, and the Rules of the Oklahoma Department of Environmental Quality (DEQ) promulgated thereunder, and in reliance on the certified statement and representation heretofore made in its application:

McAlester Public Works Authority
P.O. Box 578
McAlester, Oklahoma 74502-0578
Facility No. S-20635

is hereby authorized for a one-time land application of biosolids from the McAlester Public Works Authority (Authority) Northeast Wastewater Treatment Facility's Flow Equalization Basin to the following sites:

Site 1: 247.65 acres located within the NW ¼ and Part of the NW ¼ of the NE ¼ of Section 17, Township 6 North, Range 14 East of the Indian Meridian, Pittsburg County, Oklahoma.

Site 2: 180 acres located within Part of the NW ¼ and Part of the SW ¼ of Section 34, Township 6 North, Range 15 East of the Indian Meridian, Pittsburg County, Oklahoma.

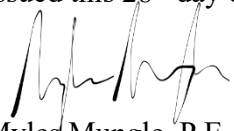
Site 3: 35 acres located within Part of the NW ¼ of the NW ¼ of Section 34, Township 6 North, Range 15 East of the Indian Meridian, Pittsburg County, Oklahoma.

whose site-specific and land application site conditions conform to/with requirements established under 40 Code of Federal Regulations (C.F.R.) Part 503, and in accordance with sewage sludge characteristics, monitoring requirements, and other conditions set forth in General Permit No. OK65S, and in Parts I and II, hereof.

Issuance of this Authorization in no way or in any respect affects the Permittee's civil or criminal responsibilities regarding beneficial reuse by land application of sewage sludge, except with respect to the Permittee's legal responsibility under the Environmental Code and Rules promulgated by the Board of Environmental Quality to obtain this permit.

This Authorization is non-transferable and is granted summarily by and at the discretion of the Executive Director in accordance with applicable DEQ Rules and provisions of the above-referenced Permit.

This is to certify that the proposed beneficial reuse by land application of biosolids set forth in this Authorization meets the requirements of DEQ Rules, provided the Permittee does not exceed the loading rates and/or metal concentrations set forth in this Authorization.
Issued this 28th day of September 2022.



Myles Mungle, P.E., Engineering Manager,
Municipal Wastewater Enforcement Section
Water Quality Division
Oklahoma Department of Environmental Quality

NOTE: Expiration date is upon completion of existing biosolids removal from the Flow Equalization Basin at the Northeast Wastewater Treatment Facility.

PART I: MONITORING, LOADING RATES, METAL CONCENTRATIONS AND OTHER REQUIREMENTS.

SECTION A - MONITORING REQUIREMENTS

During the period beginning on the effective date and lasting through the expiration date of this Authorization, the Permittee shall monitor all land application of sewage sludge in accordance with the following schedule.

Pollutants shall be monitored at the frequency schedule(s) shown below:

Amount of Sewage Sludge* (Metric tons/365 day period)	Frequency
0 ≥ Sludge ≤ 290	Once/Year
290 ≥ Sludge ≤ 1,500	Once/Quarter
1,500 ≥ Sludge ≤ 15,000	Once/Two Months
15,000 ≥ Sludge	Once/Month

*The amount of bulk sewage sludge applied to the land (dry weight basis).

Representative samples of sewage sludge shall be collected and analyzed in accordance with the methods referenced in 40 C.F.R. § 503.8 (b) (2011).

The required monitoring results shall be retained for the period of the Authorization. The results shall be submitted to the Department as follows:

SAMPLING FREQUENCY	REPORTING DEADLINE(S)
Yearly	
January	February 28
Quarterly	
January, February, and March	April 28
April, May, and June	July 28
July, August, and September	October 28
October, November, and December	January 28
Bi-monthly	
January-February	March 28
March-April	May 28
May-June	July 28
July-August	September 28
September-October	November 28
November-December	January 28
Monthly Sampling	Due the 28th of the following month

SECTION B - LOADING RATES AND METAL CONCENTRATIONS

In addition to all other requirements and conditions of this General Permit, the Permittee is authorized to land apply sewage sludge only upon the condition that the pollutant ceiling concentration and cumulative pollutant loading rate shall not exceed the listed numerical limits.
Metal concentrations of sewage sludge - Sewage sludge shall not be applied to the land if the concentration of any of the pollutants exceeds the following pollutant concentrations:

TABLE 1

Pollutant	Ceiling Concentrations (milligrams per kilogram) *
Arsenic	75
Cadmium	85
Copper	4300
Lead	840
Mercury	57
Molybdenum	75
Nickel	420
Selenium	100
Zinc	7500

*Dry Weight Basis

Cumulative Pollutant Loading Rate Limits:

TABLE 2

Pollutant	Cumulative Pollutant Loading Rate (kilograms per hectare)
Arsenic	41
Cadmium	39
Copper	1500
Lead	300
Mercury	17
Molybdenum	Monitor
Nickel	420
Selenium	100
Zinc	2800

All bulk sewage sludge which is applied to agricultural land, forest, or a reclamation site shall be treated by either Class A or Class B pathogen reduction requirements as defined in Part I Section 1.B.5 of the General Permit. The Permittee may land apply sewage sludge only during the effective date of this Authorization and shall immediately cease and desist any and all land application of sewage sludge made pursuant to such Authorization upon its expiration or at any time the required monitoring indicates that the cumulative loading rate is greater than the allowable rate set forth in this Authorization.

PART II: SPECIAL AND STANDARD CONDITIONS

SECTION A - SPECIAL CONDITIONS

1. There shall be no runoff or discharge from the land application site.

2. The commingling of sewage sludge with any other type of sludge or wastewater intended for land application is not allowed under this Authorization. Sludge which results from the commingling of sewage and any other additive shall not be land applied under this Authorization.

3. Special conditions and/or modification for specific land application sites will be included in the Authorization as necessary to protect the waters of the State.

4. When storage of sewage sludge is necessary, prior to land application, the sludge must be stored in a manner to prevent pollution to the waters of the State.

5. The Permittee is hereby given notice that this Authorization is in all respects subject to compliance with any and all applicable and relevant terms, conditions, provisions and requirements and any and all amendments of the laws of the State of Oklahoma and the Board of Environmental Quality's Rules. The absence of any express reference within this Authorization to any particular statutory requirement, rule(s) or standard(s) shall in no respect be deemed or construed to exempt or preclude the application of such requirement, rule(s) and standard(s) to this Authorization or the Permittee. By approval, grant and issuance of this Authorization, Permittee acknowledges receipt of true, correct, and current copies of the Board of Environmental Quality's rules (as amended) provided, however, that Permittee further acknowledges that any and all amendments thereto shall become part of this Authorization.

SECTION B - STANDARD CONDITIONS

1. Duty to reapply: If the Permittee wishes to continue an activity regulated by this Authorization after the expiration date of said Authorization, the Permittee must reapply for and obtain a new Authorization. Application for renewal shall be submitted at least ninety (90) days before the expiration date of the original Authorization. The Department may grant permission to submit a renewal application out of time but not later than the original Authorization expiration date.

2. Duty to provide information: The Permittee shall furnish to the Department, within reasonable time, any information which the Department may request to determine whether cause exists for modifying or revoking the Authorization, or to determine compliance with the Authorization.

3. Facilities operation: All facilities and equipment used by the Permittee shall be operated as efficiently as possible and be maintained in good working order so as to achieve compliance with the terms and conditions of this Authorization.

4. Right to entry: The Permittee shall allow any representative of the Department, upon presentation of credentials to a responsible person to:

    a. Enter upon the Permittee's premises where sewage sludge is being land applied or where any records are required to be kept under the terms and conditions of the permit.

    b. At reasonable times have access to and copy any records required to be kept under the terms and conditions of this Authorization; to inspect any equipment utilized in the

land application of the sewage sludge; to take photographs; and to sample the sewage sludge being land applied or the soil at the land application site.

c. Enter upon the Permittee's premises to examine and inspect any facilities and equipment covered under the terms of the permit.

5. Monitoring and reporting: All monitoring and reporting shall be in accordance with Part I, Section A of the Authorization.

6. Noncompliance notification: If, for any reason, the Permittee does not comply with or is unable to comply with any term(s) or condition(s) of the permit, the Permittee shall within five (5) days of becoming aware of such condition, provide the Department with the following information in writing:

   a. Description of the noncompliance and the cause; and

   b. the period of noncompliance, including exact dates and times; or, if not corrected the anticipated time the noncompliance is expected to continue, and steps being taken to reduce, eliminate and prevent recurrence of the noncompliance.

7. Sludge application limitations: Sewage sludge shall not be applied to any site which is flooded, frozen, snow covered or within 10 meters of any water of the U.S.

Fw: One Time Biosolids Application Request - McAlestser, OK

Shane Hacker <Shane.Hacker@deq.ok.gov>
Tue 9/20/2022 6:35 AM
To: Heather Bateman <Heather.Bateman@deq.ok.gov>

1 attachments (5 MB)
One Time Appication of Biosolids McAlester Northeast WWTF, McAlester OK 2022_0831 W EXHIBITS.pdf;

Heather,

I received a land application permit. Please file and assign it to whoever needs it.

Thank you.

Shane Hacker, P.E.
Municipal Wastewater Enforcement Section
Water Quality Division
Oklahoma Department of Environmental Quality
Phone: 405.702.8108
Fax: 405.702.8101

From: Aaron Gruenewald <agruenewald@hodgesfd.com>
Sent: Monday, September 19, 2022 8:28 AM
To: Shane Hacker <Shane.Hacker@deq.ok.gov>
Subject: [EXTERNAL] One Time Biosolids Application Request - McAlestser, OK

Shane -

Please find attached a one time biosolids application request for the City of McAlester, OK Northeast WWTF. This has been an interesting journey on landbase to this point... Had a very large landowner adjacent (North) of the plant backout last minute so put everything into rush mode! I've held off sending until I had all the pieces. This one required a lot of face time for whatever reason. Need a favor on this one if you can on the turn around. Schedule is being pushed forward so if there is anything I can do to help you push this one through as quickly as possible that would be greatly appreciated!

Thanks Shane!!

Aaron

Hodges Farms & Dredging, LLC

Request for One Time Application of Biosolids
McAlester Public Works Authority – McAlester Northeast WWTF
McAlester, OK
Facility ID #S-20635

Oklahoma Department of Environmental Quality
Water Quality Division

August 31, 2022

TABLE OF CONTENTS

SECTION A – BIOSOLIDS MANAGEMENT OPERATIONS PLAN

McAlester Public Works Authority Northeast Treatment Facility (McAlester NE WWTF) located at 1360 E Krebs Ave, McAlester, OK. The facility is biological treatment works (POTW) facility comprised of primarily domestic sewage by an extended aeration/activated sludge system with a design capacity average of 2.0 million gallons per day (mgd). This Biosolids Management Plan and request for one time application of biosolids is for the removal and disposal of approximately 3,000,000 million gallons / 1,000 dry tons of biosolids from the basin that is being cleaned as part of the East Wastewater Treatment Plant Flow Equalization Basin Solids Removal and Liner Replacement Project with Plummer Associates, Inc and Downey Contracting.

Biosolids will be loaded at the City of McAlester's NE WWTF equalization basin and trucked to the fields when field cropping schedules and weather permit. Trucks will be loaded at the facility and then transport the biosolids to a land application site.

Biosolids that are trucked offsite will field-loaded into liquid application equipment (pull tanks) for land application. The pull tanks will be equipped with toolbars used to subsurface inject or surface apply the biosolids.

A lagoon crawler and/or lagoon stick pump will be utilized to thoroughly mix the material. This will ensure a consistent mix of biosolids. A rubber wheeled tractor with a push blade will be utilized to move the biosolids to a lagoon pump and tractor. In order to limit disturbance of the lagoon liner, HFD will implement controls to limit the disturbance to existing geo liner. The installation of a blunt/round pipe mounted to the blade will be utilized. The liner will be removed and disposed of at a local landfill after solids removal.

The following conditions will be meet for land application:

- Soil type and texture are suitable for the type of waste that will be land-applied.
- Areas of application meet topography requirements as stated in 252:606-8-6 for having minimal slope to prevent ponding and soil erosion.
- Target land application rates are based upon soil crop need for nitrogen and phosphorus.
- Water drainage characteristics for the site are suitable to avoid migration and runoff of biosolids from the site. For example the following will be implemented:

    - ✓ Avoid seasonal high groundwater periods on poorly and somewhat poorly drained soil.
    - ✓ Avoid sites not intended to be vegetated.
    - ✓ Maintain at least a 100-foot setback for incorporated/injected material from drainage pathways or unsuitable soil and steep slopes when water is present (252:606-8-3 c 17).
    - ✓ Maintain at least a 33-foot setback for incorporated/injected applied material from drainage pathways or unsuitable soil and steep slopes when water is NOT present
    - ✓ Avoid areas subject to frequent flooding or ponding.
    - ✓ Maintain at least a 250-foot setback from private domestic water supply wells (252:606-8-3 c 18).

Fields will not be land-applied when runoff may result, during periods of high groundwater conditions or during periods of flooding.

Recommendations for crop nitrogen and phosphorus will guide application rates. We are limited to an approximate max hydraulic application rate of 30,000 gallons per acre. Rate is limited by percent solids. 1 dry tons per acre should provide ~7.5 lbs of nitrogen, 11 lbs of phosphorus, and 6 lbs of potassium based on testing. All sites receiving McAlester NE WWTF biosolids will be managed as grass hay/bermudagrass.

The following site conditions will be observed:

- Food, feed, and fiber crops will not be harvested for 30 days after application of biosolids.
- Livestock will not be allowed to graze on the land for 30 days after application.
- Public access to the land with a low potential for public exposure will be restricted for 30 days after application.

SECTION B – APPLICANT / FACILITY INFORMATION

Legal Name of Applicant: McAlester Public Works Authority – McAlester Northeast WWTF

Mailing Address of Applicant: PO Box 578, McAlester, OK 74502

Applicant Contact: David Andren

Applicant Phone: 918.423.9300 Email: dave.andren@cityofmcalester.com

Facility Name: McAlester Northeast Wastewater Treatment Facility

Facility Address: 1360 Krebs Ave, McAlester, OK 74501

Facility Phone Number: 918.423.9656 Email: wayne.russell@cityofmcalester.com

Facility Latitude: 34° 57’ 16.84” N Longitude: 95° 44’ 36.03” W

Facility Contact Name: Wayne Russell – Wastewater Treatment Superintendent

Facility Contact Phone: 918.423.9656

SECTION C – CONTRACTOR INFORMATION

Hodges Farms and Dredging
501 N West Street
Lebo, KS 66856

Jeff Hodges Owner: 620.343.0513
Aaron Gruenewald Managing Director: 920.373.8715

SECTION D – DISPOSAL SITES OWNER AND OPEARATOR INFORMATION

Site 1: Deeded Acres – 247.65 Ac

Site Owner:

Owner Address:

Operator:

Address: 8641 Tannehill Road, McAlester, OK 74501

Phone:

Site 2: Deeded Acres – 180 Ac

Site Owner:

Owner Address:

Operator:

Address:

Phone:

Site 3: Deeded Acres – 35 Ac

Site Owner:

Owner Address:

Operator: Sayer Brenner

Address: 600 Nelson Land, McAlester, OK 74501

Phone:

SECTION E – DOCUMENTATION OF SITE OWNER

Proof of ownership and supporting documentation is included in Exhibit A. Operator Agreements are included in Exhibit B.

SECTION F – ANALTICAL INFORMATION

A Residuals Sampling Summary Form and Residuals Field Loading Report are included as part of Exhibit C. All analytical results (Pace Analytical, Inc.) are also included in Exhibit C. All analytical results are below Table 1 Ceiling Metal Concentrations and 40 CFR 503 Low Metal Ceiling Concentrations as indicated on the Field Loading Report (Exhibit C).

SECTION G - ANALTICAL INFORMATION – PATHOGEN DESTRUCTION CRITERIA FOR CLASS B

Pathogen Reduction (40 CFR 503.32) for Class B Biosolids was met by Alternative 1 (Fecal Coliform Geometric Mean of 7 samples is < 2,000,000 MPN or CFU/gram dry weight basis) as shown in the following table. Exhibit D includes Pace Analytical results from August 11, 2022.

Sample ID	Results (cfu/g)
1-Fecal	1,239
2-Fecal	1,025
3-Fecal	1,961
4-Fecal	923

- Pace Analytical, Inc.

SECTION H - ANALTICAL INFORMATION – VECTOR ATTRACTION REDUCTION CRITERIA

City of McAlester biosolids will be incorporated per Title 252 Chapter 606 and to meet Vector Attraction Reduction (VAR) criteria. The material does also federally meet VAR criteria via volatile solids reduction testing of >28% VS reduction for surface application.

SECTION I – SITE(S) LEGAL DESCRIPTION (Includes the following 3 sites)

Site 1: NW ¼ and Part of the NW ¼ of the NE ¼ of Section 17, Town 6N, Range 14E, Pittsburg County
Location: 34° 59’ 45”N, 95° 51’ 13”W – Deeded Acres: 247.65

Site 2: Part of the NW ¼ and Part of the SW ¼ of Section 34, Town 6N, Range 15E, Pittsburg County
Location: 34° 57’ 01”N, 95° 42’ 56”W – Deeded Acres: 180

Site 3: Part of NW ¼ of the NW ¼ of Section 34, Town 6N, Range 15E, Pittsburg County
Location: 34° 57’ 14”N, 95° 42’ 60”W – Deeded Acres: 35

SECTION J - SITE(S) USGS TOPOGRAPHIC MAP

Plat maps/aerial photographs of the proposed sites indicating soil type, setbacks, and areas of no application are included in Exhibit H. The maps for each site show:

- ✓ Homes and buildings adjacent or near the proposed land application sites
- ✓ Lakes, ponds, wetlands, dry runs, and streams
- ✓ Section lines or other legal boundaries, generally as shown on a plat map
- ✓ Setbacks as it relates to injection application

SECTION K - SITE(S) SOIL TESTING

Soil samples and associated 252:606-8-3 required results are included in Exhibit F and G.

SECTION L - SITE(S) WEB SOIL SURVEY MAP

Web Soil Survey maps are included in Exhibit E. A complete Site Soil Report for Site 1, 2 and 3 is included in Exhibit H. Borings/field investigation will be completed to ensure saturated soil conditions do not exist at the time of application. Portions of the fields that have the presence of seasonal high groundwater (saturated soil conditions) at the time of application will NOT be applied.

SECTION M – SITE SOIL REPORTS

Depth to groundwater was analyzed by a review of the site soils. Parts of Site 1, 2 and 3 require setbacks from surface water. The fields have a depth to groundwater greater than 200 cm (>6.5'). A complete Site Soil Report for Site 1, 2 and 3 is included in Exhibit H which further describe the soil types found within each site.

SECTION N – SPILL PREVENTION, CONTROL PLAN, AND EMERGENCY RESPONSE

In the unlikely event of a spill, the following actions will be taken immediately.

Halt Source of Spill. Use of any leaking or damaged unit which is causing the spill will cease immediately. The unit will be repaired before resuming its use.

Contain Spill. In the event large quantities of biosolids have been spilled, appropriate barriers will be used to contain the spill and prevent motorists from driving through it.

Clean-Up. Depending on the type and amount of biosolids spilled, a variety of equipment may be used to remove the biosolids: front-end loader, shovels and brooms and vacuum equipment of a liquid biosolids applicator. Any biosolids removed from the spill site will be spread on an approved application site, returned to the lagoon, or disposed of in an approved landfill.

Final Clean-Up. Flush roadways with water or sweep as necessary to clean. Allow to dry and incorporate if spill occurs on non-paved and tillable area. In the event a spill occurs on private property, final clean-up should be completed immediately to the satisfaction of the owner.

Management of Clean-Up Efforts. The Project Manager will take immediate charge and initiate clean-up activities. Hodges Farms and Dredging labor will be used, with additional labor secured as needed. The Project Manager will also communicate with the public on the scene, answering questions and advising of clean-up activities.

Reporting. All spills will be reported immediately. State and local agencies will be notified in accordance with their notification requirements.

Within 72 hours of the spill, the Project Manager will send a written report detailing how the spill occurred and remedial action taken.

Spill Prevention. The Project Manager will implement the following spill prevention measures:
1) Ensure loader operators do not overload trucks/trailers/tanks;
2) Ensure trailer hatches are closed and latched while transporting;
3) Ensure trailer seals are inspected on a daily basis and replaced as necessary; and
4) Ensure unloading operations in the field are conducted to minimize any potential runoff or tracking.

Environmental Protection, Dust Control, Mud, and Noise Control

Hodges Farms and Dredging will provide adequate methods to minimize dust from the plant site. Such methods include, but are not limited to:

- Water.
- Selecting work and staging areas, based upon existing current conditions, which will not cause excessive dust generation.

Hodges Farms and Dredging will have tools and equipment for biosolids and mud removal from trucks and pavement.

Hodges Farms and Dredging will adjust procedures and hours of operation, as necessary, to mitigate excessive noise emanating from the site.

SECTION O – OTHER INFORMATION

All pertinent and applicable information is included in attached Exhibits A through K.

Anticipated 7.537 lbs of Nitrogen per dry ton. Bermudagrass at 6 tons per acre yield goal has application rate of 230-235 lbs of nitrogen per acre. Application rates will vary from 8.0 dry tons per acre to 10.0 dry tons per acre. Application rates will be limited hydrologically not by crop application rates for nitrogen or phosphorus. Bermudagrass utilizes nitrogen and phosphorus for growth.

At an application rate of 8% solids and ~10 dry tons per acre (75 lbs of N per acre) 100 acres will be needed for 1,000 dry tons. (1,000 total dry tons / 10.0 dry tons per acre = 100 acres.

Percent solids will be tested and tracked on a daily basis. Application rates will be adjusted accordingly to ensure the proper number of dry tons are applied per site. The above calculations assume an average percent solids result of 8%.

Soil sample results for Site 1 can be found in Section F and G. An average application rate will target 230 lbs of nitrogen per acre. Application rates will be limited hydrologically.

EXHIBIT A

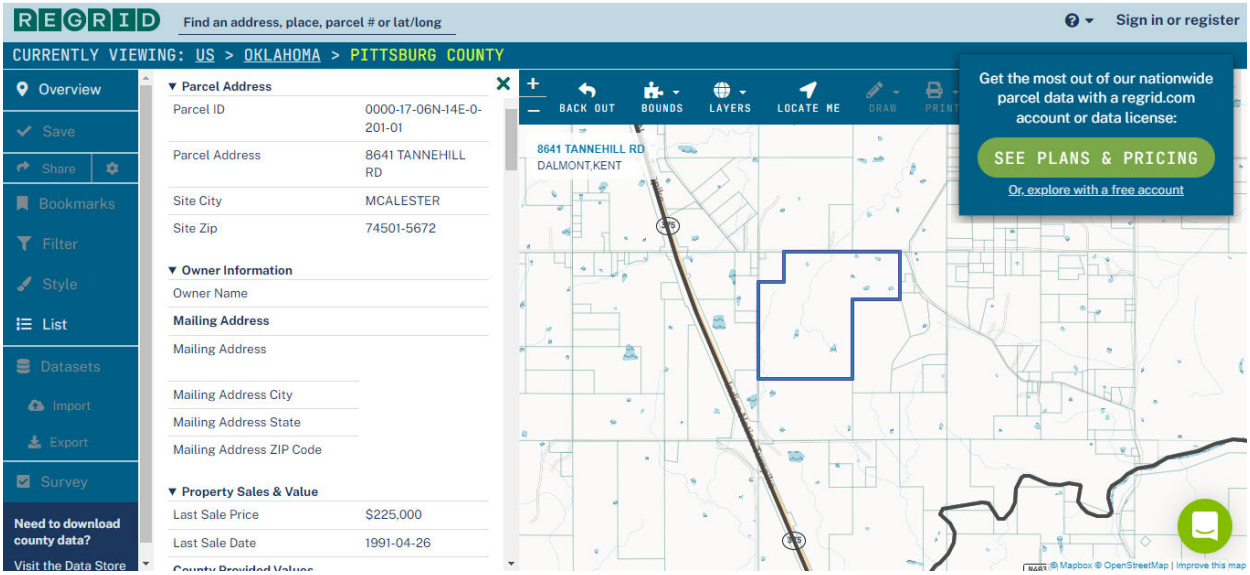
PROOF OF OWNERSHIP AND SUPORTING DOCUMENTATION

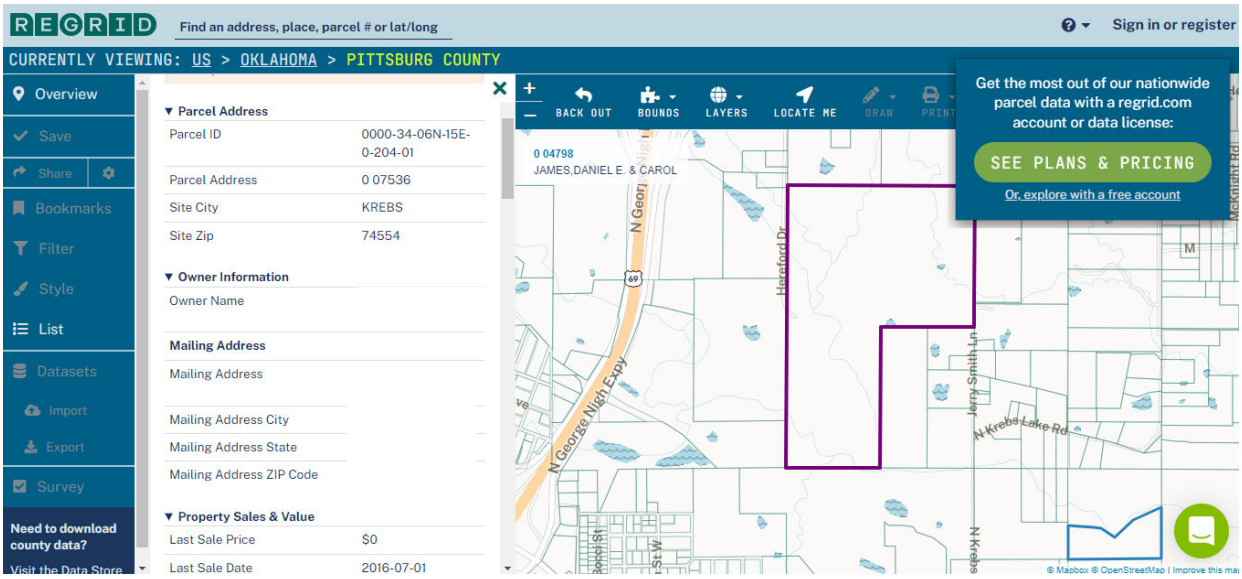
SITE 1 –

SITE 2 –

SITE 3 -

8641 Tannehill Road, McAlester, OK 74501




REGRID
Find an address, place, parcel # or lat/long
Sign in or register
CURRENTLY VIEWING: US > OKLAHOMA > PITTSBURG COUNTY
Overview
Save
Share
Bookmarks
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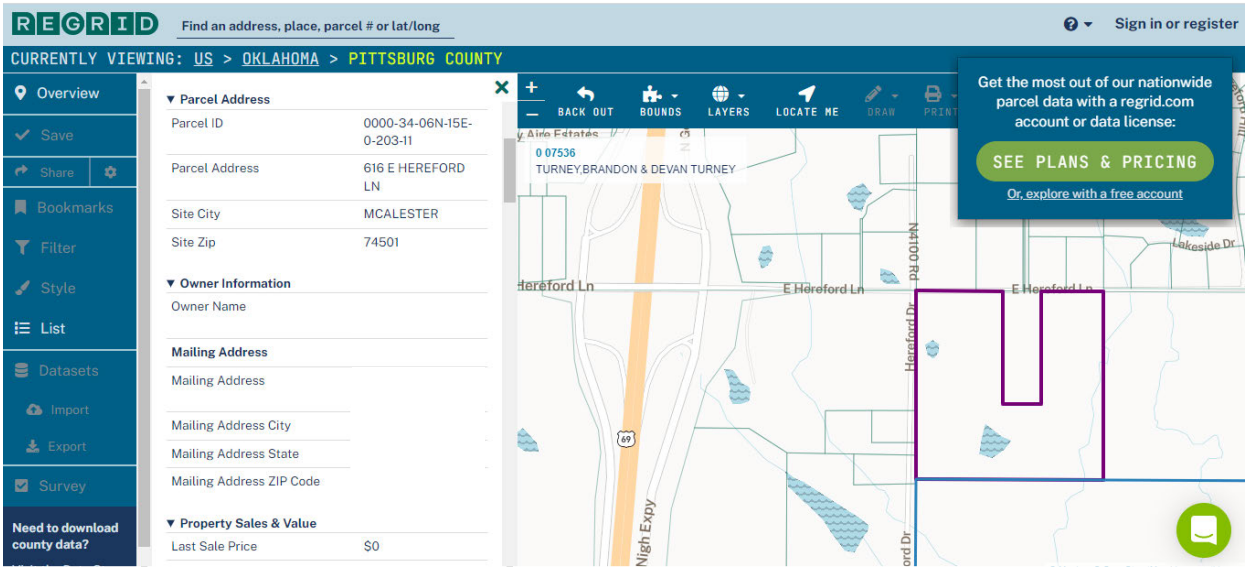
Style
List
Datasets
Import
Export
Survey
Need to download county data?
Visit the Data Store
Parcel Address
Parcel ID
0000-34-06N-15E-0-204-01
Parcel Address
0 07536
Site City
KREBS
Site Zip
74554
Owner Information
Owner Name
Mailing Address
Mailing Address
Mailing Address City
Mailing Address State
Mailing Address ZIP Code
Property Sales & Value
Last Sale Price
$0
Last Sale Date
2016-07-01
BACK OUT
BOUNDS
LAYERS
LOCATE ME
DRAW
PRINT
0 04798
JAMES,DANIEL E. & CAROL
N George Nigh Expy
Hereford Dr
Jerry Smith Ln
N Krebs Lake Rd
Get the most out of our nationwide parcel data with a regrid.com account or data license:
SEE PLANS & PRICING
Or, explore with a free account
© Mapbox © OpenStreetMap | Improve this ma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Overview
Save
Share
Bookmarks
Filter
Style
List
Datasets
Import
Export
Survey
Need to download county data?
Parcel Address
Parcel ID
0000-34-06N-15E-0-203-11
Parcel Address
616 E HEREFORD LN
Site City
MCALESTER
Site Zip
74501
Owner Information
Owner Name
Mailing Address
Mailing Address
Mailing Address City
Mailing Address State
Mailing Address ZIP Code
Property Sales & Value
Last Sale Price
$0
BACK OUT
BOUNDS
LAYERS
LOCATE ME
DRAW
PRINT
0 07536
TURNEY,BRANDON & DEVAN TURNEY
Hereford Ln
E Hereford Ln
N100 Rd
Hereford Dr
Lakeside Dr
69
Get the most out of our nationwide parcel data with a regrid.com account or data license:
SEE PLANS & PRICING
Or, explore with a free account

EXHIBIT B

OPERATOR AGREEMENTS

Hodges Farms and Dredging

501 N West Street Lebo, KS 66856 • 620-343-0513 • jeff@hodgesfd.com • www.hodgesfd.com

Landowner Consent Form

Date: 8-14-22

I, _____ give Hodges Farms and Dredging, LLC

permission to land apply biosolids on the following land:

Physical Address: 8641 Tannehill Rd McAlester, OK

Legal Address: 8641 Tannehill Rd, McAlester OK 74501

Crop Production: Pasture/Grass/Barn. Yield 6 Ton

Landowner/Tennant Contact Information

Please Print

Name: _____

Address: _____

Phone: _____ Email: _____

Signature: _____

Hodges Farms and Dredging, LLC. Signature: _____

Hodges Farms and Dredging

501 N West Street Lebo, KS 66856 • 620-343-0513 • jeff@hodgesfd.com • www.hodgesfd.com

Landowner Consent Form

Date: 9-14-2022

I, _____ give Hodges Farms and Dredging, LLC

permission to land apply biosolids on the following land:

Physical Address: 237 Bighorn Rd McAlester OK

Legal Address: Same

Crop Production: pasture / Grass Yield 6 to

Landowner/Tennant Contact Information

Please Print

Name: ___

Address: _

Phone: Email: ___

Signature: _____

Hodges Farms and Dredging, LLC. Signature: _____

EXHIBIT C

RESIDUALS SAMPLING DATA
FIELD LOADING REPORT – PAN CALCULATIONS
PACE ANALYTICAL, INC RESULTS –METALS, NUTRIENTS, TCLP AND PCB

Residuals Sampling Data

Project Name: **Biosolids Removal and Disposal - McAlester Northeast WWTF - McAlester, OK**

Sampling Date: **8/11/2022** **Sampling Date Range Start:** **8/11/2022** **Sampling Date Range End:** **12/31/2022**

Parameters	Sample	Comp 1	Comp 2	Comp 3	Comp 4	Average	Minimum	Maximum
% Solids		9.7	9.6	10.2	11.1	10.2	9.6	11.1
Total Kildahl Nitrogen (TKN)	mg/kg	15,600	12,700	14,600	15,400	14,575	12,700	15,600
Ammomia Nitrogen	mg/kg	995	1,120	918	1,180	1,053	918	1,180
Nitrate Nitrogen	mg/kg	<10.2	<10.0	<9.4	<8.7	<10.2	<8.7	<10.2
Nitrite Nitrogen	mg/kg	<10.2	<10.0	<9.4	<8.7	<10.2	<8.7	<10.2
Organic Nitrogen	mg/kg	14,600	11,600	13,700	14,200	13,525	11,600	14,600
Total Phosphorus (P)	mg/kg	9,080	10,600	9,550	9,230	9,615	9,080	10,600
Total Potassium (K)	mg/kg	2,550	2,480	2,570	2,240	2,460	2,240	2,570
Arsenic (As)	mg/kg	8.7	8.1	8.1	7.7	8.2	7.7	8.7
Cadmium (Cd)	mg/kg	2.0	2.7	2.0	2.0	2.2	2	2.7
Chromium (Cr)	mg/kg	113	137	119	115	121	113	137
Copper (Cu)	mg/kg	385	410	414	381	397.5	381	414
Lead (Pb)	mg/kg	84.6	88.1	77.2	76.8	81.7	77.2	88.1
Mercury (Hg)	mg/kg	0.77	0.91	1.2	0.78	0.9	0.77	1.2
Molybdenum (Mo)	mg/kg	15.7	18.0	17.3	18.5	17.4	15.7	18.5
Nickel (Ni)	mg/kg	35.5	36.3	35.0	32.2	34.8	32.2	36.3
Selenium (Se)	mg/kg	<4.8	<5.1	<4.8	<4.2	<5.1	<4.2	<5.1
Zinc (Zn)	mg/kg	945	992	912	869	930	869	992
Aluminum (Al)	mg/kg	NR	NR	NR	NR	NR	NR	NR
Calcium (Ca)	mg/kg	13,400	14,900	14,200	13,700	14,050	13,400	14,900
Iron (Fe)	mg/kg	NR	NR	NR	NR	NR	NR	NR
Magnesium (Mg)	mg/kg	3,090	3,140	3,040	2,820	3,023	2,820	3,090
Manganese (Mn)	mg/kg	NR	NR	NR	NR	NR	NR	NR
Silver (Ag)	mg/kg	26.6	35.3	32.3	30.5	31.2	26.6	35.3
Sodium (Na)	mg/kg	853	880	772	736	810	736	880
Sulfur (S)	mg/kg	NR	NR	NR	NR	NR	NR	NR
Chloride	mg/kg	NR	NR	NR	NR	NR	NR	NR
pH		7.2	7.2	7.1	7.2	7.2	7.1	7.2
Volatile Solids	%	29.2	29.7	30.2	30.0	29.8	29.2	30.2
Calcium Carbonate Equivalent		NR	NR	NR	NR	NR	NR	NR

NR: Not Reported
All reported values are on a "dry weight" basis or noted by *

Field Loading Report - Average Biosolids Concentrations

Project Name: **Biosolids Removal and Disposal - McAlester Northeast WWTF - McAlester, OK**

Sample Date: **8/11/2022** Report Start: **8/11/2022** Report End: **12/31/2022**

Parameter		PPM (mg/kg)	Lbs/Dry Ton	40 CFR 503 Table 1 Ceiling Concentrations (mg/kg)	40 CFR 503 Low Metals Ceiling Concentrations (mg/kg)
PAN (Injected)		3,768	7.537		
PAN (Surface with Incorporation)		3,768	7.537		
PAN (Dewatered Surface without Incorporation)		3,768	7.537		
PAN (Liquid Surface without Incorporation)		2,979	5.957		
Total Kildahl Nitrogen (TKN)		14,575			
Ammomia Nitrogen (NH3-N)		1,053			
Nitrate Nitrogen (NO3-N)	<	10.2			
Organic Nitrogen		13,525			
Total Phosphorus (P)		9,615	19.230		
Total Potassium (K)		2,460	4.920		
Arsenic (As)		8.2	0.016	75	41
Cadmium (Cd)		2.2	0.004	85	39
Chromium (Cr)		121	0.242	3,000	1,200
Copper (Cu)		397.5	0.795	4,300	1,500
Lead (Pb)		81.7	0.163	840	300
Mercury (Hg)		0.9	0.0018	57	17
Molybdenum (Mo)		17.4	0.035	75	N/A
Nickel (Ni)		34.8	0.070	420	420
Selenium (Se)	<	5.1	0.010	100	36
Zinc (Zn)		930	1.859	7,500	2,800
Calcium (Ca)		14,050	28.100		
Iron (Fe)		NR	NR		
Sulfur (S)		NR	NR		
Manganese (Mn)		NR	NR		
K_2O			5.9		
P_2O_5			11.0		

Percent Solids: 10.15 %

Formula:

PAN (ppm) = [(f1)(ppm Organic Nitrogen)]+[(V1)(ppm Ammonia)+(ppm Nitrate N)

lbs/dry ton = ppm or mg/kg x 0.002

Notes:

PAN = Plant Available Nitrogen

State of Application: Oklahoma

Organic Nitrogen Mineralization Rate (f1): 20 %

Anaerobically Digested: 20%

Aerobically Digested: 30%

Unstablized Primary and Waste: 40%

Lime Stablilized: 25%

Ammonia Nitrogen Non-Volatilized Fraction (V1):

For Injection:	1
For Surface with Incorporation:	1
For Dewatered Surface without Incorporation:	1
Liquid Surface without Incorporation:	0.25

NR = Not Reported

Sample Note: Results are of four (4) samples taken on 8/11/2022

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

August 24, 2022

Jeff Hodges
Hodges Farms & Dredging LLC
501 N. West Street
Lebo, KS 66856

RE: Project: MCALESTER, OK
Pace Project No.: 60407979

Dear Jeff Hodges:

Enclosed are the analytical results for sample(s) received by the laboratory on August 12, 2022. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:
- Pace Analytical Services - Kansas City

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

Sincerely,

Petra M. Craddock

Petra Craddock
petra.craddock@pacelabs.com
(785)827-1273
PM Lab Management

Enclosures

cc: Aaron Gruenwald, Hodges Farms and Dredging, LLC

Pace Analytical Services, LLC
9608 Loiret Blvd.
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(913)599-5665

CERTIFICATIONS

Project: MCALESTER, OK
Pace Project No.: 60407979

Pace Analytical Services Kansas
9608 Loiret Boulevard, Lenexa, KS 66219
Missouri Inorganic Drinking Water Certification #: 10090
Arkansas Drinking Water
Arkansas Certification #: 22-031-0
Arkansas Drinking Water
Illinois Certification #: 2000302021-3
Iowa Certification #: 118
Kansas/NELAP Certification #: E-10116
Louisiana Certification #: 03055
Nevada Certification #: KS000212020-2
Oklahoma Certification #: 9205/9935
Florida: Cert E871149 SEKS WET
Texas Certification #: T104704407-21-15
Utah Certification #: KS000212019-9
Illinois Certification #: 004592
Kansas Field Laboratory Accreditation: # E-92587
Missouri SEKS Micro Certification: 10070

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

SAMPLE SUMMARY

Project: MCALESTER, OK
Pace Project No.: 60407979

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60407979001	**COMP1**	Solid	08/11/22 12:55	08/12/22 08:15
60407979002	**COMP2**	Solid	08/11/22 12:55	08/12/22 08:15
60407979003	**COMP3**	Solid	08/11/22 12:55	08/12/22 08:15
60407979004	**COMP4**	Solid	08/11/22 12:55	08/12/22 08:15
60407979005	**SAMPLE1**	Solid	08/11/22 12:55	08/12/22 08:15
60407979006	**SAMPLE 2**	Solid	08/11/22 12:55	08/12/22 08:15

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Lenexa, KS 66219
(913)599-5665

SAMPLE ANALYTE COUNT

Project: MCALESTER, OK
Pace Project No.: 60407979

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60407979001	COMP1	EPA 6010	MRV	15	PASI-K
		EPA 7471	ALH	1	PASI-K
		ASTM D2974	BLA	1	PASI-K
		SM 2540G	TML	1	PASI-K
		SM 2540G	TML	1	PASI-K
		EPA 9045	BLA	1	PASI-K
		TKN-NH3 Calculation	LDB	1	PASI-K
		EPA 350.1	BLA	1	PASI-K
		EPA 351.2	CRN2	1	PASI-K
		EPA 365.4	CRN2	1	PASI-K
		EPA 9056	RKA	2	PASI-K
60407979002	COMP2	EPA 6010	MRV	15	PASI-K
		EPA 7471	ALH	1	PASI-K
		ASTM D2974	BLA	1	PASI-K
		SM 2540G	TML	1	PASI-K
		SM 2540G	TML	1	PASI-K
		EPA 9045	BLA	1	PASI-K
		TKN-NH3 Calculation	LDB	1	PASI-K
		EPA 350.1	BLA	1	PASI-K
		EPA 351.2	CRN2	1	PASI-K
		EPA 365.4	CRN2	1	PASI-K
		EPA 9056	RKA	2	PASI-K
60407979003	COMP3	EPA 6010	MRV	15	PASI-K
		EPA 7471	ALH	1	PASI-K
		ASTM D2974	BLA	1	PASI-K
		SM 2540G	TML	1	PASI-K
		SM 2540G	TML	1	PASI-K
		EPA 9045	BLA	1	PASI-K
		TKN-NH3 Calculation	LDB	1	PASI-K
		EPA 350.1	BLA	1	PASI-K
		EPA 351.2	CRN2	1	PASI-K
		EPA 365.4	CRN2	1	PASI-K
		EPA 9056	RKA	2	PASI-K
60407979004	COMP4	EPA 6010	MRV	15	PASI-K
		EPA 7471	ALH	1	PASI-K
		ASTM D2974	BLA	1	PASI-K
		SM 2540G	TML	1	PASI-K

Pace Analytical Services, LLC
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Lenexa, KS 66219
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SAMPLE ANALYTE COUNT

Project: MCALESTER, OK
Pace Project No.: 60407979

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
		SM 2540G	TML	1	PASI-K
		EPA 9045	BLA	1	PASI-K
		TKN-NH3 Calculation	LDB	1	PASI-K
		EPA 350.1	BLA	1	PASI-K
		EPA 351.2	CRN2	1	PASI-K
		EPA 365.4	CRN2	1	PASI-K
		EPA 9056	RKA	2	PASI-K
60407979005	**SAMPLE1**	EPA 6010	MA1	7	PASI-K
		EPA 7470	ALH	1	PASI-K
60407979006	**SAMPLE 2**	EPA 8082	CAA	8	PASI-K

PASI-K = Pace Analytical Services - Kansas City

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

ANALYTICAL RESULTS

Project: MCALESTER, OK
Pace Project No.: 60407979

Sample: COMP1 **Lab ID: 60407979001** Collected: 08/11/22 12:55 Received: 08/12/22 08:15 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
6010 MET ICP Red. Interference	Analytical Method: EPA 6010 Preparation Method: EPA 3050 Pace Analytical Services - Kansas City							
Aluminum	**23900**	mg/kg	24.2	1	08/23/22 17:15	08/24/22 12:06	7429-90-5	M1,R1
Arsenic	**8.7**	mg/kg	3.2	1	08/23/22 17:15	08/24/22 12:06	7440-38-2	
Cadmium	**2.0**	mg/kg	1.6	1	08/23/22 17:15	08/24/22 12:06	7440-43-9	
Calcium	**13400**	mg/kg	64.6	1	08/23/22 17:15	08/24/22 12:06	7440-70-2	M1,R1
Chromium	**113**	mg/kg	1.6	1	08/23/22 17:15	08/24/22 12:06	7440-47-3	R1
Copper	**385**	mg/kg	6.5	1	08/23/22 17:15	08/24/22 12:06	7440-50-8	M1,R1
Lead	**84.6**	mg/kg	3.2	1	08/23/22 17:15	08/24/22 12:06	7439-92-1	
Magnesium	**3090**	mg/kg	16.1	1	08/23/22 17:15	08/24/22 12:06	7439-95-4	M1,R1
Molybdenum	**15.7**	mg/kg	6.5	1	08/23/22 17:15	08/24/22 12:06	7439-98-7	
Nickel	**35.5**	mg/kg	1.6	1	08/23/22 17:15	08/24/22 12:06	7440-02-0	
Potassium	**2550**	mg/kg	161	1	08/23/22 17:15	08/24/22 12:06	7440-09-7	M1,R1
Selenium	ND	mg/kg	4.8	1	08/23/22 17:15	08/24/22 12:06	7782-49-2	M1
Silver	**26.6**	mg/kg	2.3	1	08/23/22 17:15	08/24/22 12:06	7440-22-4	
Sodium	**853**	mg/kg	161	1	08/23/22 17:15	08/24/22 12:06	7440-23-5	M1
Zinc	**945**	mg/kg	32.3	1	08/23/22 17:15	08/24/22 12:06	7440-66-6	M1,R1
7471 Mercury	Analytical Method: EPA 7471 Preparation Method: EPA 7471 Pace Analytical Services - Kansas City							
Mercury	**0.77**	mg/kg	0.15	1	08/18/22 15:38	08/19/22 13:57	7439-97-6	
Percent Moisture	Analytical Method: ASTM D2974 Pace Analytical Services - Kansas City							
Percent Moisture	**90.3**	%	0.50	1		08/23/22 13:16		
2540G Total Percent Solids	Analytical Method: SM 2540G Pace Analytical Services - Kansas City							
Total Solids	**9.7**	%	0.10	1		08/17/22 16:27		
2540G Total Volatile Solids	Analytical Method: SM 2540G Pace Analytical Services - Kansas City							
Total Volatile Solids	**29.2**	% (w/w)	0.10	1		08/17/22 16:27		
9045 pH Soil	Analytical Method: EPA 9045 Pace Analytical Services - Kansas City							
pH at 25 Degrees C	**7.2**	Std. Units	0.10	1		08/19/22 15:10		
Total Organic Nitrogen Soil	Analytical Method: TKN-NH3 Calculation Pace Analytical Services - Kansas City							
Total Organic Nitrogen	**14600**	mg/kg	50.0	1		08/24/22 13:03		
350.1 Ammonia	Analytical Method: EPA 350.1 Preparation Method: EPA 350.1 Pace Analytical Services - Kansas City							
Nitrogen, Ammonia	**995**	mg/kg	10.2	1	08/20/22 12:56	08/22/22 11:28	7664-41-7	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

ANALYTICAL RESULTS

Project: MCALESTER, OK
Pace Project No.: 60407979

Sample: COMP1 **Lab ID: 60407979001** Collected: 08/11/22 12:55 Received: 08/12/22 08:15 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
351.2 Total Kjeldahl Nitrogen	Analytical Method: EPA 351.2 Preparation Method: EPA 351.2 Pace Analytical Services - Kansas City							
Nitrogen, Kjeldahl, Total	**15600**	mg/kg	639	1	08/22/22 16:25	08/23/22 15:20	7727-37-9	
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4 Pace Analytical Services - Kansas City							
Phosphorus	**9080**	mg/kg	514	5	08/19/22 10:58	08/19/22 15:23	7723-14-0	
9056 IC Anions	Analytical Method: EPA 9056 Preparation Method: EPA 9056 Pace Analytical Services - Kansas City							
Nitrate as N	ND	mg/kg	10.2	1	08/22/22 11:26	08/22/22 16:52	14797-55-8	
Nitrite as N	ND	mg/kg	10.2	1	08/22/22 11:26	08/22/22 16:52	14797-65-0	

Sample: COMP2 **Lab ID: 60407979002** Collected: 08/11/22 12:55 Received: 08/12/22 08:15 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
6010 MET ICP Red. Interference	Analytical Method: EPA 6010 Preparation Method: EPA 3050 Pace Analytical Services - Kansas City							
Aluminum	**25300**	mg/kg	25.3	1	08/23/22 17:15	08/24/22 12:12	7429-90-5	
Arsenic	**8.1**	mg/kg	3.4	1	08/23/22 17:15	08/24/22 12:12	7440-38-2	
Cadmium	**2.7**	mg/kg	1.7	1	08/23/22 17:15	08/24/22 12:12	7440-43-9	
Calcium	**14900**	mg/kg	67.5	1	08/23/22 17:15	08/24/22 12:12	7440-70-2	
Chromium	**137**	mg/kg	1.7	1	08/23/22 17:15	08/24/22 12:12	7440-47-3	
Copper	**410**	mg/kg	6.8	1	08/23/22 17:15	08/24/22 12:12	7440-50-8	
Lead	**88.1**	mg/kg	3.4	1	08/23/22 17:15	08/24/22 12:12	7439-92-1	
Magnesium	**3140**	mg/kg	16.9	1	08/23/22 17:15	08/24/22 12:12	7439-95-4	
Molybdenum	**18.0**	mg/kg	6.8	1	08/23/22 17:15	08/24/22 12:12	7439-98-7	
Nickel	**36.3**	mg/kg	1.7	1	08/23/22 17:15	08/24/22 12:12	7440-02-0	
Potassium	**2480**	mg/kg	169	1	08/23/22 17:15	08/24/22 12:12	7440-09-7	
Selenium	ND	mg/kg	5.1	1	08/23/22 17:15	08/24/22 12:12	7782-49-2	
Silver	**35.3**	mg/kg	2.4	1	08/23/22 17:15	08/24/22 12:12	7440-22-4	
Sodium	**880**	mg/kg	169	1	08/23/22 17:15	08/24/22 12:12	7440-23-5	
Zinc	**992**	mg/kg	33.8	1	08/23/22 17:15	08/24/22 12:12	7440-66-6	
7471 Mercury	Analytical Method: EPA 7471 Preparation Method: EPA 7471 Pace Analytical Services - Kansas City							
Mercury	**0.91**	mg/kg	0.15	1	08/18/22 15:38	08/19/22 13:59	7439-97-6	
Percent Moisture	Analytical Method: ASTM D2974 Pace Analytical Services - Kansas City							
Percent Moisture	**90.4**	%	0.50	1		08/23/22 13:16		

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

ANALYTICAL RESULTS

Project: MCALESTER, OK
Pace Project No.: 60407979

Sample: COMP2 **Lab ID: 60407979002** Collected: 08/11/22 12:55 Received: 08/12/22 08:15 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
2540G Total Percent Solids	Analytical Method: SM 2540G Pace Analytical Services - Kansas City							
Total Solids	**9.6**	%	0.10	1		08/17/22 16:28		
2540G Total Volatile Solids	Analytical Method: SM 2540G Pace Analytical Services - Kansas City							
Total Volatile Solids	**29.7**	% (w/w)	0.10	1		08/17/22 16:28		
9045 pH Soil	Analytical Method: EPA 9045 Pace Analytical Services - Kansas City							
pH at 25 Degrees C	**7.2**	Std. Units	0.10	1		08/19/22 15:10		
Total Organic Nitrogen Soil	Analytical Method: TKN-NH3 Calculation Pace Analytical Services - Kansas City							
Total Organic Nitrogen	**11600**	mg/kg	50.0	1		08/24/22 13:03		
350.1 Ammonia	Analytical Method: EPA 350.1 Preparation Method: EPA 350.1 Pace Analytical Services - Kansas City							
Nitrogen, Ammonia	**1120**	mg/kg	10.4	1	08/20/22 12:56	08/22/22 11:29	7664-41-7	
351.2 Total Kjeldahl Nitrogen	Analytical Method: EPA 351.2 Preparation Method: EPA 351.2 Pace Analytical Services - Kansas City							
Nitrogen, Kjeldahl, Total	**12700**	mg/kg	647	1	08/22/22 16:25	08/23/22 15:23	7727-37-9	
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4 Pace Analytical Services - Kansas City							
Phosphorus	**10600**	mg/kg	520	5	08/19/22 10:58	08/19/22 15:24	7723-14-0	
9056 IC Anions	Analytical Method: EPA 9056 Preparation Method: EPA 9056 Pace Analytical Services - Kansas City							
Nitrate as N	ND	mg/kg	10	1	08/22/22 11:26	08/22/22 17:29	14797-55-8	
Nitrite as N	ND	mg/kg	10	1	08/22/22 11:26	08/22/22 17:29	14797-65-0	

Sample: COMP3 **Lab ID: 60407979003** Collected: 08/11/22 12:55 Received: 08/12/22 08:15 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
6010 MET ICP Red. Interference	Analytical Method: EPA 6010 Preparation Method: EPA 3050 Pace Analytical Services - Kansas City							
Aluminum	**23500**	mg/kg	23.8	1	08/23/22 17:15	08/24/22 12:20	7429-90-5	
Arsenic	**8.1**	mg/kg	3.2	1	08/23/22 17:15	08/24/22 12:20	7440-38-2	
Cadmium	**2.0**	mg/kg	1.6	1	08/23/22 17:15	08/24/22 12:20	7440-43-9	
Calcium	**14200**	mg/kg	63.6	1	08/23/22 17:15	08/24/22 12:20	7440-70-2	
Chromium	**119**	mg/kg	1.6	1	08/23/22 17:15	08/24/22 12:20	7440-47-3	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

ANALYTICAL RESULTS

Project: MCALESTER, OK
Pace Project No.: 60407979

Sample: COMP3 **Lab ID: 60407979003** Collected: 08/11/22 12:55 Received: 08/12/22 08:15 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
6010 MET ICP Red. Interference	Analytical Method: EPA 6010 Preparation Method: EPA 3050 Pace Analytical Services - Kansas City							
Copper	**414**	mg/kg	6.4	1	08/23/22 17:15	08/24/22 12:20	7440-50-8	
Lead	**77.2**	mg/kg	3.2	1	08/23/22 17:15	08/24/22 12:20	7439-92-1	
Magnesium	**3040**	mg/kg	15.9	1	08/23/22 17:15	08/24/22 12:20	7439-95-4	
Molybdenum	**17.3**	mg/kg	6.4	1	08/23/22 17:15	08/24/22 12:20	7439-98-7	
Nickel	**35.0**	mg/kg	1.6	1	08/23/22 17:15	08/24/22 12:20	7440-02-0	
Potassium	**2570**	mg/kg	159	1	08/23/22 17:15	08/24/22 12:20	7440-09-7	
Selenium	ND	mg/kg	4.8	1	08/23/22 17:15	08/24/22 12:20	7782-49-2	
Silver	**32.3**	mg/kg	2.2	1	08/23/22 17:15	08/24/22 12:20	7440-22-4	
Sodium	**772**	mg/kg	159	1	08/23/22 17:15	08/24/22 12:20	7440-23-5	
Zinc	**912**	mg/kg	31.8	1	08/23/22 17:15	08/24/22 12:20	7440-66-6	
7471 Mercury	Analytical Method: EPA 7471 Preparation Method: EPA 7471 Pace Analytical Services - Kansas City							
Mercury	**1.2**	mg/kg	0.14	1	08/18/22 15:38	08/19/22 14:01	7439-97-6	
Percent Moisture	Analytical Method: ASTM D2974 Pace Analytical Services - Kansas City							
Percent Moisture	**89.7**	%	0.50	1		08/23/22 13:17		
2540G Total Percent Solids	Analytical Method: SM 2540G Pace Analytical Services - Kansas City							
Total Solids	**10.2**	%	0.10	1		08/17/22 16:28		
2540G Total Volatile Solids	Analytical Method: SM 2540G Pace Analytical Services - Kansas City							
Total Volatile Solids	**30.2**	% (w/w)	0.10	1		08/17/22 16:28		
9045 pH Soil	Analytical Method: EPA 9045 Pace Analytical Services - Kansas City							
pH at 25 Degrees C	**7.1**	Std. Units	0.10	1		08/19/22 15:10		
Total Organic Nitrogen Soil	Analytical Method: TKN-NH3 Calculation Pace Analytical Services - Kansas City							
Total Organic Nitrogen	**13700**	mg/kg	50.0	1		08/24/22 13:03		
350.1 Ammonia	Analytical Method: EPA 350.1 Preparation Method: EPA 350.1 Pace Analytical Services - Kansas City							
Nitrogen, Ammonia	**918**	mg/kg	9.2	1	08/20/22 12:56	08/22/22 11:31	7664-41-7	
351.2 Total Kjeldahl Nitrogen	Analytical Method: EPA 351.2 Preparation Method: EPA 351.2 Pace Analytical Services - Kansas City							
Nitrogen, Kjeldahl, Total	**14600**	mg/kg	599	1	08/22/22 16:25	08/23/22 15:25	7727-37-9	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: MCALESTER, OK
Pace Project No.: 60407979

Sample: COMP3 **Lab ID: 60407979003** Collected: 08/11/22 12:55 Received: 08/12/22 08:15 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
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4 Pace Analytical Services - Kansas City							
Phosphorus	**9550**	mg/kg	486	5	08/19/22 10:58	08/19/22 15:25	7723-14-0	
9056 IC Anions	Analytical Method: EPA 9056 Preparation Method: EPA 9056 Pace Analytical Services - Kansas City							
Nitrate as N	ND	mg/kg	9.4	1	08/22/22 11:26	08/22/22 17:42	14797-55-8	
Nitrite as N	ND	mg/kg	9.4	1	08/22/22 11:26	08/22/22 17:42	14797-65-0	

Sample: COMP4 **Lab ID: 60407979004** Collected: 08/11/22 12:55 Received: 08/12/22 08:15 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
6010 MET ICP Red. Interference	Analytical Method: EPA 6010 Preparation Method: EPA 3050 Pace Analytical Services - Kansas City							
Aluminum	**21900**	mg/kg	21.2	1	08/23/22 17:15	08/24/22 12:22	7429-90-5	
Arsenic	**7.7**	mg/kg	2.8	1	08/23/22 17:15	08/24/22 12:22	7440-38-2	
Cadmium	**2.0**	mg/kg	1.4	1	08/23/22 17:15	08/24/22 12:22	7440-43-9	
Calcium	**13700**	mg/kg	56.6	1	08/23/22 17:15	08/24/22 12:22	7440-70-2	
Chromium	**115**	mg/kg	1.4	1	08/23/22 17:15	08/24/22 12:22	7440-47-3	
Copper	**381**	mg/kg	5.7	1	08/23/22 17:15	08/24/22 12:22	7440-50-8	
Lead	**76.8**	mg/kg	2.8	1	08/23/22 17:15	08/24/22 12:22	7439-92-1	
Magnesium	**2820**	mg/kg	14.2	1	08/23/22 17:15	08/24/22 12:22	7439-95-4	
Molybdenum	**18.5**	mg/kg	5.7	1	08/23/22 17:15	08/24/22 12:22	7439-98-7	
Nickel	**32.2**	mg/kg	1.4	1	08/23/22 17:15	08/24/22 12:22	7440-02-0	
Potassium	**2240**	mg/kg	142	1	08/23/22 17:15	08/24/22 12:22	7440-09-7	
Selenium	ND	mg/kg	4.2	1	08/23/22 17:15	08/24/22 12:22	7782-49-2	
Silver	**30.5**	mg/kg	2.0	1	08/23/22 17:15	08/24/22 12:22	7440-22-4	
Sodium	**736**	mg/kg	142	1	08/23/22 17:15	08/24/22 12:22	7440-23-5	
Zinc	**869**	mg/kg	28.3	1	08/23/22 17:15	08/24/22 12:22	7440-66-6	
7471 Mercury	Analytical Method: EPA 7471 Preparation Method: EPA 7471 Pace Analytical Services - Kansas City							
Mercury	**0.78**	mg/kg	0.13	1	08/18/22 15:38	08/19/22 14:04	7439-97-6	
Percent Moisture	Analytical Method: ASTM D2974 Pace Analytical Services - Kansas City							
Percent Moisture	**88.8**	%	0.50	1		08/23/22 13:17		
2540G Total Percent Solids	Analytical Method: SM 2540G Pace Analytical Services - Kansas City							
Total Solids	**11.1**	%	0.10	1		08/17/22 16:33		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: MCALESTER, OK
Pace Project No.: 60407979

Sample: COMP4 **Lab ID: 60407979004** Collected: 08/11/22 12:55 Received: 08/12/22 08:15 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
2540G Total Volatile Solids	Analytical Method: SM 2540G Pace Analytical Services - Kansas City							
Total Volatile Solids	**30.0**	% (w/w)	0.10	1		08/17/22 16:33		
9045 pH Soil	Analytical Method: EPA 9045 Pace Analytical Services - Kansas City							
pH at 25 Degrees C	**7.2**	Std. Units	0.10	1		08/19/22 15:10		
Total Organic Nitrogen Soil	Analytical Method: TKN-NH3 Calculation Pace Analytical Services - Kansas City							
Total Organic Nitrogen	**14200**	mg/kg	50.0	1		08/24/22 13:03		
350.1 Ammonia	Analytical Method: EPA 350.1 Preparation Method: EPA 350.1 Pace Analytical Services - Kansas City							
Nitrogen, Ammonia	**1180**	mg/kg	8.9	1	08/20/22 12:56	08/22/22 11:32	7664-41-7	
351.2 Total Kjeldahl Nitrogen	Analytical Method: EPA 351.2 Preparation Method: EPA 351.2 Pace Analytical Services - Kansas City							
Nitrogen, Kjeldahl, Total	**15400**	mg/kg	540	1	08/22/22 16:25	08/23/22 15:26	7727-37-9	
365.4 Total Phosphorus	Analytical Method: EPA 365.4 Preparation Method: EPA 365.4 Pace Analytical Services - Kansas City							
Phosphorus	**9230**	mg/kg	447	5	08/19/22 10:58	08/19/22 15:26	7723-14-0	
9056 IC Anions	Analytical Method: EPA 9056 Preparation Method: EPA 9056 Pace Analytical Services - Kansas City							
Nitrate as N	ND	mg/kg	8.7	1	08/22/22 11:26	08/22/22 17:55	14797-55-8	
Nitrite as N	ND	mg/kg	8.7	1	08/22/22 11:26	08/22/22 17:55	14797-65-0	

Sample: SAMPLE1 **Lab ID: 60407979005** Collected: 08/11/22 12:55 Received: 08/12/22 08:15 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, TCLP	Analytical Method: EPA 6010 Preparation Method: EPA 3010 Leachate Method/Date: EPA 1311; 08/22/22 13:39 Initial pH: 7.78; Final pH: 5.08 Pace Analytical Services - Kansas City							
Arsenic	ND	mg/L	0.50	1	08/23/22 10:20	08/24/22 08:55	7440-38-2	
Barium	ND	mg/L	2.5	1	08/23/22 10:20	08/24/22 08:55	7440-39-3	
Cadmium	ND	mg/L	0.050	1	08/23/22 10:20	08/24/22 08:55	7440-43-9	
Chromium	ND	mg/L	0.10	1	08/23/22 10:20	08/24/22 08:55	7440-47-3	
Lead	ND	mg/L	0.50	1	08/23/22 10:20	08/24/22 08:55	7439-92-1	
Selenium	ND	mg/L	0.50	1	08/23/22 10:20	08/24/22 08:55	7782-49-2	
Silver	ND	mg/L	0.10	1	08/23/22 10:20	08/24/22 08:55	7440-22-4	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: MCALESTER, OK
Pace Project No.: 60407979

Sample: SAMPLE1 **Lab ID: 60407979005** Collected: 08/11/22 12:55 Received: 08/12/22 08:15 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
7470 Mercury, TCLP	Analytical Method: EPA 7470 Preparation Method: EPA 7470 Leachate Method/Date: EPA 1311; 08/22/22 13:39 Initial pH: 7.78; Final pH: 5.08 Pace Analytical Services - Kansas City							
Mercury	ND	mg/L	0.0020	1	08/23/22 14:10	08/24/22 09:54	7439-97-6	

Sample: SAMPLE 2 **Lab ID: 60407979006** Collected: 08/11/22 12:55 Received: 08/12/22 08:15 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8082 GCS PCB SW	Analytical Method: EPA 8082 Preparation Method: EPA 3546 Pace Analytical Services - Kansas City							
PCB-1016 (Aroclor 1016)	ND	ug/kg	168	1	08/16/22 15:13	08/18/22 06:36	12674-11-2	
PCB-1221 (Aroclor 1221)	ND	ug/kg	168	1	08/16/22 15:13	08/18/22 06:36	11104-28-2	
PCB-1232 (Aroclor 1232)	ND	ug/kg	168	1	08/16/22 15:13	08/18/22 06:36	11141-16-5	
PCB-1242 (Aroclor 1242)	ND	ug/kg	168	1	08/16/22 15:13	08/18/22 06:36	53469-21-9	
PCB-1248 (Aroclor 1248)	ND	ug/kg	168	1	08/16/22 15:13	08/18/22 06:36	12672-29-6	
PCB-1254 (Aroclor 1254)	ND	ug/kg	168	1	08/16/22 15:13	08/18/22 06:36	11097-69-1	
PCB-1260 (Aroclor 1260)	ND	ug/kg	168	1	08/16/22 15:13	08/18/22 06:36	11096-82-5	
Surrogates								
Decachlorobiphenyl (S)	78	%	20-120	1	08/16/22 15:13	08/18/22 06:36	2051-24-3	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
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QUALITY CONTROL DATA

Project: MCALESTER, OK
Pace Project No.: 60407979

QC Batch: 804178
QC Batch Method: EPA 7470
Analysis Method: EPA 7470
Analysis Description: 7470 Mercury TCLP
Laboratory: Pace Analytical Services - Kansas City

Associated Lab Samples: 60407979005

METHOD BLANK: 3199639 Matrix: Water
Associated Lab Samples: 60407979005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	mg/L	ND	0.0020	08/24/22 09:35	

LABORATORY CONTROL SAMPLE: 3200505

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	mg/L	0.015	0.015	103	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3200506 3200507

Parameter	Units	60407843002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	mg/L	ND	0.015	0.015	0.015	0.012	101	79	75-125	25	20	R1

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: MCALESTER, OK
Pace Project No.: 60407979

QC Batch: 803517
QC Batch Method: EPA 7471
Analysis Method: EPA 7471
Analysis Description: 7471 Mercury
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60407979001, 60407979002, 60407979003, 60407979004

METHOD BLANK: 3198183 Matrix: Solid
Associated Lab Samples: 60407979001, 60407979002, 60407979003, 60407979004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	mg/kg	ND	0.050	08/19/22 13:18	

LABORATORY CONTROL SAMPLE: 3198184

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	mg/kg	0.5	0.47	93	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3198185 3198186

Parameter	Units	60407474002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	mg/kg	ND	0.42	0.43	0.35	0.28	80	61	75-125	23	20	M1,R1

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: MCALESTER, OK
Pace Project No.: 60407979

QC Batch: 804193
QC Batch Method: EPA 3050
Analysis Method: EPA 6010
Analysis Description: 6010 MET
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60407979001, 60407979002, 60407979003, 60407979004

METHOD BLANK: 3200627 Matrix: Solid
Associated Lab Samples: 60407979001, 60407979002, 60407979003, 60407979004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Aluminum	mg/kg	ND	7.4	08/24/22 12:04	
Arsenic	mg/kg	ND	0.98	08/24/22 12:04	
Cadmium	mg/kg	ND	0.49	08/24/22 12:04	
Calcium	mg/kg	ND	19.6	08/24/22 12:04	
Chromium	mg/kg	ND	0.49	08/24/22 12:04	
Copper	mg/kg	ND	2.0	08/24/22 12:04	
Lead	mg/kg	ND	0.98	08/24/22 12:04	
Magnesium	mg/kg	ND	4.9	08/24/22 12:04	
Molybdenum	mg/kg	ND	2.0	08/24/22 12:04	
Nickel	mg/kg	ND	0.49	08/24/22 12:04	
Potassium	mg/kg	ND	49.0	08/24/22 12:04	
Selenium	mg/kg	ND	1.5	08/24/22 12:04	
Silver	mg/kg	ND	0.69	08/24/22 12:04	
Sodium	mg/kg	ND	49.0	08/24/22 12:04	
Zinc	mg/kg	ND	9.8	08/24/22 12:04	

LABORATORY CONTROL SAMPLE: 3200628

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Aluminum	mg/kg	980	922	94	80-120	
Arsenic	mg/kg	98	83.7	85	80-120	
Cadmium	mg/kg	98	97.5	99	80-120	
Calcium	mg/kg	980	968	99	80-120	
Chromium	mg/kg	98	101	103	80-120	
Copper	mg/kg	98	99.9	102	80-120	
Lead	mg/kg	98	97.3	99	80-120	
Magnesium	mg/kg	980	905	92	80-120	
Molybdenum	mg/kg	98	102	104	80-120	
Nickel	mg/kg	98	102	104	80-120	
Potassium	mg/kg	980	930	95	80-120	
Selenium	mg/kg	98	81.2	83	80-120	
Silver	mg/kg	49	51.0	104	80-120	
Sodium	mg/kg	980	897	91	80-120	
Zinc	mg/kg	98	92.8	95	80-120	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: MCALESTER, OK
Pace Project No.: 60407979

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3200629 3200630

Parameter	Units	60407979001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Aluminum	mg/kg	23900	3250	3250	39900	3190	492	-638	75-125	170	20	M1,R1
Arsenic	mg/kg	8.7	325	325	263	291	78	87	75-125	10	20	
Cadmium	mg/kg	2.0	325	325	300	339	92	104	75-125	12	20	
Calcium	mg/kg	13400	3250	3250	16200	3540	88	-302	75-125	128	20	M1,R1
Chromium	mg/kg	113	325	325	442	357	101	75	75-125	21	20	R1
Copper	mg/kg	385	325	325	693	359	95	-8	75-125	63	20	M1,R1
Lead	mg/kg	84.6	325	325	371	338	88	78	75-125	9	20	
Magnesium	mg/kg	3090	3250	3250	6650	3160	110	2	75-125	71	20	M1,R1
Molybdenum	mg/kg	15.7	325	325	327	360	96	106	75-125	9	20	
Nickel	mg/kg	35.5	325	325	355	364	98	101	75-125	2	20	
Potassium	mg/kg	2550	3250	3250	7460	3370	151	25	75-125	76	20	M1,R1
Selenium	mg/kg	ND	325	325	231	281	70	85	75-125	20	20	M1
Silver	mg/kg	26.6	162	162	162	184	84	97	75-125	12	20	
Sodium	mg/kg	853	3250	3250	3740	3100	89	69	75-125	19	20	M1
Zinc	mg/kg	945	325	325	1210	318	82	-193	75-125	117	20	M1,R1

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: MCALESTER, OK
Pace Project No.: 60407979

QC Batch: 804162
QC Batch Method: EPA 3010
Analysis Method: EPA 6010
Analysis Description: 6010 MET TCLP
Laboratory: Pace Analytical Services - Kansas City

Associated Lab Samples: 60407979005

METHOD BLANK: 3199639 Matrix: Water
Associated Lab Samples: 60407979005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Arsenic	mg/L	ND	0.50	08/24/22 08:38	
Barium	mg/L	ND	2.5	08/24/22 08:38	
Cadmium	mg/L	ND	0.050	08/24/22 08:38	
Chromium	mg/L	ND	0.10	08/24/22 08:38	
Lead	mg/L	ND	0.50	08/24/22 08:38	
Selenium	mg/L	ND	0.50	08/24/22 08:38	
Silver	mg/L	ND	0.10	08/24/22 08:38	

LABORATORY CONTROL SAMPLE: 3200423

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Arsenic	mg/L	10	9.1	91	80-120	
Barium	mg/L	10	10.1	101	80-120	
Cadmium	mg/L	10	10	100	80-120	
Chromium	mg/L	10	9.9	99	80-120	
Lead	mg/L	10	10	100	80-120	
Selenium	mg/L	10	9.5	95	80-120	
Silver	mg/L	5	4.6	93	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3200424 3200425

Parameter	Units	60407843002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Arsenic	mg/L	ND	10	10	9.3	8.8	93	88	75-125	6	20	
Barium	mg/L	ND	10	10	10.1	9.6	101	96	75-125	5	20	
Cadmium	mg/L	ND	10	10	9.9	9.5	99	95	75-125	4	20	
Chromium	mg/L	ND	10	10	10.0	9.5	100	95	75-125	5	20	
Lead	mg/L	ND	10	10	10.0	9.6	100	96	75-125	4	20	
Selenium	mg/L	ND	10	10	9.7	9.2	97	92	75-125	5	20	
Silver	mg/L	ND	5	5	3.0	3.0	59	59	75-125	0	20	M1

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

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA

Project: MCALESTER, OK
Pace Project No.: 60407979

QC Batch: 803046
QC Batch Method: EPA 3546
Analysis Method: EPA 8082
Analysis Description: 8082 GCS PCB
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60407979006

METHOD BLANK: 3196574 Matrix: Solid
Associated Lab Samples: 60407979006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
PCB-1016 (Aroclor 1016)	ug/kg	ND	32.8	08/18/22 01:51	
PCB-1221 (Aroclor 1221)	ug/kg	ND	32.8	08/18/22 01:51	
PCB-1232 (Aroclor 1232)	ug/kg	ND	32.8	08/18/22 01:51	
PCB-1242 (Aroclor 1242)	ug/kg	ND	32.8	08/18/22 01:51	
PCB-1248 (Aroclor 1248)	ug/kg	ND	32.8	08/18/22 01:51	
PCB-1254 (Aroclor 1254)	ug/kg	ND	32.8	08/18/22 01:51	
PCB-1260 (Aroclor 1260)	ug/kg	ND	32.8	08/18/22 01:51	
Decachlorobiphenyl (S)	%	82	20-120	08/18/22 01:51	

LABORATORY CONTROL SAMPLE: 3196575

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
PCB-1016 (Aroclor 1016)	ug/kg	159	132	83	48-120	
PCB-1260 (Aroclor 1260)	ug/kg	159	139	87	55-120	
Decachlorobiphenyl (S)	%			82	20-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3196576 3196577

Parameter	Units	60407979006 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
PCB-1016 (Aroclor 1016)	ug/kg	ND	951	885	770	704	81	80	48-120	9	40	
PCB-1260 (Aroclor 1260)	ug/kg	ND	951	885	750	686	79	78	55-120	9	40	
Decachlorobiphenyl (S)	%						59	60	20-120		40	

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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
9608 Loiret Blvd.
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(913)599-5665

QUALITY CONTROL DATA

Project: MCALESTER, OK
Pace Project No.: 60407979

QC Batch: 803341
QC Batch Method: ASTM D2974
Analysis Method: ASTM D2974
Analysis Description: Dry Weight/Percent Moisture
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60407979001, 60407979002, 60407979003, 60407979004

SAMPLE DUPLICATE: 3200371

Parameter	Units	60407732003 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	80.6	80.6	0	20	

SAMPLE DUPLICATE: 3200372

Parameter	Units	60407746006 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	44.8	44.5	1	20	

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REPORT OF LABORATORY ANALYSIS

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(913)599-5665

QUALITY CONTROL DATA

Project: MCALESTER, OK
Pace Project No.: 60407979

QC Batch: 803331
QC Batch Method: SM 2540G
Analysis Method: SM 2540G
Analysis Description: 2540G Total Solids
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60407979001, 60407979002, 60407979003, 60407979004

METHOD BLANK: 3197492 Matrix: Solid
Associated Lab Samples: 60407979001, 60407979002, 60407979003, 60407979004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Solids	%	ND	0.10	08/17/22 16:21	

SAMPLE DUPLICATE: 3197494

Parameter	Units	60407746006 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Solids	%	55.1	55.4	0	8	

SAMPLE DUPLICATE: 3197504

Parameter	Units	60407732003 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Solids	%	19.3	19.4	0	8	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: MCALESTER, OK
Pace Project No.: 60407979

QC Batch: 803335
QC Batch Method: SM 2540G
Analysis Method: SM 2540G
Analysis Description: 2540G Total Volatile Solids
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60407979001, 60407979002, 60407979003, 60407979004

METHOD BLANK: 3197507 Matrix: Solid
Associated Lab Samples: 60407979001, 60407979002, 60407979003, 60407979004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Volatile Solids	% (w/w)	10.0	0.10	08/17/22 16:21	

SAMPLE DUPLICATE: 3197508

Parameter	Units	60407732003 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Volatile Solids	% (w/w)	70.6	70.9	0	8	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: MCALESTER, OK
Pace Project No.: 60407979

QC Batch: 803224
QC Batch Method: EPA 9045
Analysis Method: EPA 9045
Analysis Description: 9045 pH
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60407979001, 60407979002, 60407979003, 60407979004

SAMPLE DUPLICATE: 3197265

Parameter	Units	60408111001 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	6.6	6.8	2	3	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: MCALESTER, OK
Pace Project No.: 60407979

QC Batch: 803800
QC Batch Method: EPA 350.1
Analysis Method: EPA 350.1
Analysis Description: 350.1 Ammonia
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60407979001, 60407979002, 60407979003, 60407979004

METHOD BLANK: 3199218 Matrix: Solid
Associated Lab Samples: 60407979001, 60407979002, 60407979003, 60407979004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Nitrogen, Ammonia	mg/kg	ND	0.95	08/22/22 11:03	

LABORATORY CONTROL SAMPLE: 3199219

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Nitrogen, Ammonia	mg/kg	46.9	47.3	101	90-110	

MATRIX SPIKE SAMPLE: 3199220

Parameter	Units	60407546008 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Nitrogen, Ammonia	mg/kg	16800	1840	17300	25	80-120	M1

MATRIX SPIKE SAMPLE: 3199222

Parameter	Units	60407819001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Nitrogen, Ammonia	mg/kg	2900	1130	3810	80	80-120	

SAMPLE DUPLICATE: 3199221

Parameter	Units	60407011010 Result	Dup Result	RPD	Max RPD	Qualifiers
Nitrogen, Ammonia	mg/kg	1380	1430	3	20	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: MCALESTER, OK
Pace Project No.: 60407979

QC Batch: 804020
QC Batch Method: EPA 351.2
Analysis Method: EPA 351.2
Analysis Description: 351.2 TKN
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60407979001, 60407979002, 60407979003, 60407979004

METHOD BLANK: 3200089 Matrix: Solid
Associated Lab Samples: 60407979001, 60407979002, 60407979003, 60407979004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Nitrogen, Kjeldahl, Total	mg/kg	ND	62.5	08/23/22 15:15	

LABORATORY CONTROL SAMPLE: 3200090

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Nitrogen, Kjeldahl, Total	mg/kg	625	619	99	90-110	

MATRIX SPIKE SAMPLE: 3200091

Parameter	Units	60407546008 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Nitrogen, Kjeldahl, Total	mg/kg	67100	20700	72400	25	90-110	M1

SAMPLE DUPLICATE: 3200092

Parameter	Units	60407979002 Result	Dup Result	RPD	Max RPD	Qualifiers
Nitrogen, Kjeldahl, Total	mg/kg	12700	12600	0	10	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: MCALESTER, OK
Pace Project No.: 60407979

QC Batch: 803548
QC Batch Method: EPA 365.4
Analysis Method: EPA 365.4
Analysis Description: 365.4 Total Phosphorus
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60407979001, 60407979002, 60407979003, 60407979004

METHOD BLANK: 3198268 Matrix: Solid
Associated Lab Samples: 60407979001, 60407979002, 60407979003, 60407979004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Phosphorus	mg/kg	ND	10.0	08/19/22 14:05	

LABORATORY CONTROL SAMPLE: 3198269

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Phosphorus	mg/kg	200	195	97	90-110	

MATRIX SPIKE SAMPLE: 3198270

Parameter	Units	60407233004 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Phosphorus	mg/kg	16400	3880	20400	102	90-110	

SAMPLE DUPLICATE: 3198271

Parameter	Units	60407272001 Result	Dup Result	RPD	Max RPD	Qualifiers
Phosphorus	mg/kg	5080	4990	2	10	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: MCALESTER, OK
Pace Project No.: 60407979

QC Batch: 803930
QC Batch Method: EPA 9056
Analysis Method: EPA 9056
Analysis Description: 9056 IC Anions
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60407979001, 60407979002, 60407979003, 60407979004

METHOD BLANK: 3199807 Matrix: Solid
Associated Lab Samples: 60407979001, 60407979002, 60407979003, 60407979004

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Nitrate as N	mg/kg	ND	9.2	08/22/22 12:27	
Nitrite as N	mg/kg	ND	9.2	08/22/22 12:27	

LABORATORY CONTROL SAMPLE: 3199808

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Nitrate as N	mg/kg	192	184	96	80-120	
Nitrite as N	mg/kg	192	183	96	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3199809 3199810

Parameter	Units	60407546008 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Nitrate as N	mg/kg	66.7	6610	6580	7710	7610	116	115	80-120	1	15	E
Nitrite as N	mg/kg	<33.1	6610	6580	7140	7120	108	108	80-120	0	15	E

SAMPLE DUPLICATE: 3199811

Parameter	Units	60407703001 Result	Dup Result	RPD	Max RPD	Qualifiers
Nitrate as N	mg/kg	ND	ND		15	
Nitrite as N	mg/kg	ND	ND		15	

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REPORT OF LABORATORY ANALYSIS

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Lenexa, KS 66219
(913)599-5665

QUALIFIERS

Project: MCALESTER, OK
Pace Project No.: 60407979

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

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

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

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.

Reported results are not rounded until the final step prior to reporting. Therefore, calculated parameters that are typically reported as "Total" may vary slightly from the sum of the reported component parameters.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

E	Analyte concentration exceeded the calibration range. The reported result is estimated.
M1	Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.
R1	RPD value was outside control limits.

Pace Analytical Services, LLC
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(913)599-5665

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: MCALESTER, OK
Pace Project No.: 60407979

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60407979006	**SAMPLE 2**	EPA 3546	803046	EPA 8082	803358
60407979001	**COMP1**	EPA 3050	804193	EPA 6010	804378
60407979002	**COMP2**	EPA 3050	804193	EPA 6010	804378
60407979003	**COMP3**	EPA 3050	804193	EPA 6010	804378
60407979004	**COMP4**	EPA 3050	804193	EPA 6010	804378
60407979005	**SAMPLE1**	EPA 3010	804162	EPA 6010	804176
60407979005	**SAMPLE1**	EPA 7470	804178	EPA 7470	804332
60407979001	**COMP1**	EPA 7471	803517	EPA 7471	803649
60407979002	**COMP2**	EPA 7471	803517	EPA 7471	803649
60407979003	**COMP3**	EPA 7471	803517	EPA 7471	803649
60407979004	**COMP4**	EPA 7471	803517	EPA 7471	803649
60407979001	**COMP1**	ASTM D2974	803341		
60407979002	**COMP2**	ASTM D2974	803341		
60407979003	**COMP3**	ASTM D2974	803341		
60407979004	**COMP4**	ASTM D2974	803341		
60407979001	**COMP1**	SM 2540G	803331		
60407979002	**COMP2**	SM 2540G	803331		
60407979003	**COMP3**	SM 2540G	803331		
60407979004	**COMP4**	SM 2540G	803331		
60407979001	**COMP1**	SM 2540G	803335		
60407979002	**COMP2**	SM 2540G	803335		
60407979003	**COMP3**	SM 2540G	803335		
60407979004	**COMP4**	SM 2540G	803335		
60407979001	**COMP1**	EPA 9045	803224		
60407979002	**COMP2**	EPA 9045	803224		
60407979003	**COMP3**	EPA 9045	803224		
60407979004	**COMP4**	EPA 9045	803224		
60407979001	**COMP1**	TKN-NH3 Calculation	804449		
60407979002	**COMP2**	TKN-NH3 Calculation	804449		
60407979003	**COMP3**	TKN-NH3 Calculation	804449		
60407979004	**COMP4**	TKN-NH3 Calculation	804449		
60407979001	**COMP1**	EPA 350.1	803800	EPA 350.1	803971
60407979002	**COMP2**	EPA 350.1	803800	EPA 350.1	803971
60407979003	**COMP3**	EPA 350.1	803800	EPA 350.1	803971
60407979004	**COMP4**	EPA 350.1	803800	EPA 350.1	803971
60407979001	**COMP1**	EPA 351.2	804020	EPA 351.2	804278
60407979002	**COMP2**	EPA 351.2	804020	EPA 351.2	804278
60407979003	**COMP3**	EPA 351.2	804020	EPA 351.2	804278
60407979004	**COMP4**	EPA 351.2	804020	EPA 351.2	804278
60407979001	**COMP1**	EPA 365.4	803548	EPA 365.4	803772
60407979002	**COMP2**	EPA 365.4	803548	EPA 365.4	803772
60407979003	**COMP3**	EPA 365.4	803548	EPA 365.4	803772
60407979004	**COMP4**	EPA 365.4	803548	EPA 365.4	803772

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: MCALESTER, OK
Pace Project No.: 60407979

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60407979001	**COMP1**	EPA 9056	803930	EPA 9056	804187
60407979002	**COMP2**	EPA 9056	803930	EPA 9056	804187
60407979003	**COMP3**	EPA 9056	803930	EPA 9056	804187
60407979004	**COMP4**	EPA 9056	803930	EPA 9056	804187

WO# : 60407979

60407979

Pace ANALYTICAL SERVICES	DC#_Title: ENV-FRM-LENE-0009_Sample C		
	Revision: 2	Effective Date: 01/12/2022	Issued By: Lenexa

Client Name: Hodges Farms

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

Tracking #: 5645 8494 1278 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: T299 **Type of Ice:** Wet Blue None

Cooler Temperature (°C): **As-read** 0.5 **Corr. Factor** 0.0 **Corrected** 0.5

Temperature should be above freezing to 6°C

Date and initials of person examining contents: PV 8/15/22

Chain of Custody present:	☑Yes ☐No ☐N/A	
Chain of Custody relinquished:	☑Yes ☐No ☐N/A	
Samples arrived within holding time:	☑Yes ☐No ☐N/A	
Short Hold Time analyses (<72hr):	☐Yes ☑No ☐N/A	
Rush Turn Around Time requested:	☐Yes ☑No ☐N/A	
Sufficient volume:	☑Yes ☐No ☐N/A	
Correct containers used:	☑Yes ☐No ☐N/A	
Pace containers used:	☑Yes ☐No ☐N/A	
Containers intact:	☑Yes ☐No ☐N/A	
Unpreserved 5035A / TX1005/1006 soils frozen in 48hrs?	☐Yes ☐No ☑N/A	
Filtered volume received for dissolved tests?	☐Yes ☐No ☑N/A	
Sample labels match COC: Date / time / ID / analyses	☑Yes ☐No ☐N/A	
Samples contain multiple phases? Matrix: SL	☐Yes ☑No ☐N/A	
Containers requiring pH preservation in compliance? (HNO_3, H_2SO_4, HCl<2; NaOH>9 Sulfide, NaOH>10 Cyanide) (Exceptions: VOA, Micro, O&G, KS TPH, OK-DRO) **LOT#:**	☐Yes ☐No ☑N/A	List sample IDs, volumes, lot #'s of preservative and the date/time added.
Cyanide water sample checks: Lead acetate strip turns dark? (Record only)	☐Yes ☐No	
Potassium iodide test strip turns blue/purple? (Preserve)	☐Yes ☐No	
Trip Blank present:	☐Yes ☐No ☑N/A	
Headspace in VOA vials (>6mm):	☐Yes ☐No ☑N/A	
Samples from USDA Regulated Area: State: OK	☐Yes ☑No ☐N/A	
Additional labels attached to 5035A / TX1005 vials in the field?	☐Yes ☐No ☑N/A	

Client Notification/ Resolution: Copy COC to Client? Y / N Field Data Required? Y / N

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: _____ Date: _____

Qualtrax Document ID: 30468

CHAIN-OF-CUSTODY / Analytical Request Document

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

Page : 1 Of 1

Section A Required Client Information:		Section B Required Project Information:		Section C Invoice Information:	
Company:	Hodges Farms & Dredging LLC	Report To:	Jeff Hodges	Attention:	
Address:	501 N. West Street	Copy To:		Company Name:	
	Lebo, KS 66856			Address:	
Email:	jhodges@ewrllc.com	Purchase Order #:		Pace Quote:	
Phone:	620-343-0513 Fax:	Project Name:		Pace Project Manager:	alice.spiller@pacelabs.com
Requested Due Date:	8/19/22	Project #:	McAlester, OK	Pace Profile #:	2421, line 1

Regulatory Agency: OPEC

State / Location: OK

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID (One Character per box. (A-Z, 0-9 / , -) Sample Ids must be unique)	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED START DATE	COLLECTED START TIME	COLLECTED END DATE	COLLECTED END TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Methanol	Other	Analyses Test Y/N	Fecal Coliform	% solids	Geometric Mean	TCLP (8)	Metals 6010/7471	SOUR	Phos, Ammonia, TKN	pH	NO2/NO3	Total Organic Nitrogen	TVS, Total % Solids	PCB	Residual Chlorine (Y/N)	60407979
1	Comp 1		C	8-11-22	1200	8-11-22	1255		1	X													X		X	X	X	X		N	
2	Comp 2		C						1	X													X		X	X	X	X			
3	Comp 3		C						1	X													X		X	X	X	X			
4	Comp 4		C						1	X													X		X	X	X	X			
5	Sample 1		C						1	X											X										
6	Sample 2		C						1	X																			X		
7																															
8																															
9																															
10																															
11																															
12																															

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
		8-11-22	1600		8/11/22	1600				
		8/11/22	1630		8/12	0815	0.5	Y	Y	Y

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Aaron Groeneweg

SIGNATURE of SAMPLER: [signature] DATE Signed: 8-11-22

TEMP in C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

EXHIBIT D

ANALYTICAL RESULTS – PACE ANALYITICAL, INC FECAL RESULTS

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

August 23, 2022

Jeff Hodges
Hodges Farms & Dredging LLC
501 N. West Street
Lebo, KS 66856

RE: Project: 503 Sludge
Pace Project No.: 60407913

Dear Jeff Hodges:

Enclosed are the analytical results for sample(s) received by the laboratory on August 12, 2022. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:

- Pace Analytical Services - Kansas City
- Pace Analytical Services - SE Kansas

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

Sincerely,

Petra M. Craddock

Petra Craddock
petra.craddock@pacelabs.com
(785)827-1273
PM Lab Management

Enclosures

cc: Aaron Gruenwald, Hodges Farms and Dredging, LLC

Pace Analytical Services, LLC
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CERTIFICATIONS

Project: 503 Sludge
Pace Project No.: 60407913

Pace Analytical Services Kansas
9608 Loiret Boulevard, Lenexa, KS 66219
Missouri Inorganic Drinking Water Certification #: 10090
Arkansas Drinking Water
Arkansas Certification #: 22-031-0
Arkansas Drinking Water
Illinois Certification #: 2000302021-3
Iowa Certification #: 118
Kansas/NELAP Certification #: E-10116
Louisiana Certification #: 03055
Nevada Certification #: KS000212020-2
Oklahoma Certification #: 9205/9935
Florida: Cert E871149 SEKS WET
Texas Certification #: T104704407-21-15
Utah Certification #: KS000212019-9
Illinois Certification #: 004592
Kansas Field Laboratory Accreditation: # E-92587
Missouri SEKS Micro Certification: 10070

Pace Analytical Services Southeast Kansas
808 West McKay, Frontenac, KS 66763
Arkansas Certification #: 22-031-0
Iowa Certification #: 431
Kansas/NELAP Certification #: E-10426
Louisiana Certification #: 05115
Oklahoma Certification #: 9935
Texas Certification #: T104704558-21-3
Utah Certification #: KS00021

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

SAMPLE SUMMARY

Project: 503 Sludge
Pace Project No.: 60407913

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60407913001	1-1	Solid	08/11/22 12:55	08/12/22 11:20
60407913002	1-2	Solid	08/11/22 12:55	08/12/22 11:20
60407913003	1-3	Solid	08/11/22 12:55	08/12/22 11:20
60407913004	1-4	Solid	08/11/22 12:55	08/12/22 11:20
60407913005	1-5	Solid	08/11/22 12:55	08/12/22 11:20
60407913006	1-6	Solid	08/11/22 12:55	08/12/22 11:20
60407913007	1-7	Solid	08/11/22 12:55	08/12/22 11:20
60407913008	2-1	Solid	08/11/22 12:55	08/12/22 11:20
60407913009	2-2	Solid	08/11/22 12:55	08/12/22 11:20
60407913010	2-3	Solid	08/11/22 12:55	08/12/22 11:20
60407913011	2-4	Solid	08/11/22 12:55	08/12/22 11:20
60407913012	2-5	Solid	08/11/22 12:55	08/12/22 11:20
60407913013	2-6	Solid	08/11/22 12:55	08/12/22 11:20
60407913014	2-7	Solid	08/11/22 12:55	08/12/22 11:20
60407913015	3-1	Solid	08/11/22 12:55	08/12/22 11:20
60407913016	3-2	Solid	08/11/22 12:55	08/12/22 11:20
60407913017	3-3	Solid	08/11/22 12:55	08/12/22 11:20
60407913018	3-4	Solid	08/11/22 12:55	08/12/22 11:20
60407913019	3-5	Solid	08/11/22 12:55	08/12/22 11:20
60407913020	3-6	Solid	08/11/22 12:55	08/12/22 11:20
60407913021	3-7	Solid	08/11/22 12:55	08/12/22 11:20
60407913022	4-1	Solid	08/11/22 12:55	08/12/22 11:20
60407913023	4-2	Solid	08/11/22 12:55	08/12/22 11:20
60407913024	4-3	Solid	08/11/22 12:55	08/12/22 11:20
60407913025	4-4	Solid	08/11/22 12:55	08/12/22 11:20
60407913026	4-5	Solid	08/11/22 12:55	08/12/22 11:20
60407913027	4-6	Solid	08/11/22 12:55	08/12/22 11:20
60407913028	4-7	Solid	08/11/22 12:55	08/12/22 11:20

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SAMPLE ANALYTE COUNT

Project: 503 Sludge
Pace Project No.: 60407913

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60407913001	1-1	SM 9222D	EMP	1	PASI-SE
		ASTM D2974	BLA	1	PASI-K
		SM 2540G	TML	1	PASI-K
60407913002	1-2	SM 9222D	EMP	1	PASI-SE
		ASTM D2974	BLA	1	PASI-K
		SM 2540G	TML	1	PASI-K
60407913003	1-3	SM 9222D	EMP	1	PASI-SE
		ASTM D2974	BLA	1	PASI-K
		SM 2540G	TML	1	PASI-K
60407913004	1-4	SM 9222D	EMP	1	PASI-SE
		ASTM D2974	BLA	1	PASI-K
		SM 2540G	TML	1	PASI-K
60407913005	1-5	SM 9222D	EMP	1	PASI-SE
		ASTM D2974	BLA	1	PASI-K
		SM 2540G	TML	1	PASI-K
60407913006	1-6	SM 9222D	EMP	1	PASI-SE
		ASTM D2974	BLA	1	PASI-K
		SM 2540G	TML	1	PASI-K
60407913007	1-7	SM 9222D	EMP	1	PASI-SE
		CALC A	EMP	1	PASI-SE
		ASTM D2974	BLA	1	PASI-K
		SM 2540G	TML	1	PASI-K
60407913008	2-1	SM 9222D	EMP	1	PASI-SE
		ASTM D2974	BLA	1	PASI-K
		SM 2540G	TML	1	PASI-K
60407913009	2-2	SM 9222D	EMP	1	PASI-SE
		ASTM D2974	BLA	1	PASI-K
		SM 2540G	TML	1	PASI-K
60407913010	2-3	SM 9222D	EMP	1	PASI-SE
		ASTM D2974	BLA	1	PASI-K
		SM 2540G	TML	1	PASI-K
60407913011	2-4	SM 9222D	EMP	1	PASI-SE
		ASTM D2974	BLA	1	PASI-K
		SM 2540G	TML	1	PASI-K
60407913012	2-5	SM 9222D	EMP	1	PASI-SE
		ASTM D2974	BLA	1	PASI-K
		SM 2540G	TML	1	PASI-K

Pace Analytical Services, LLC
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SAMPLE ANALYTE COUNT

Project: 503 Sludge
Pace Project No.: 60407913

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60407913013	**2-6**	SM 9222D	EMP	1	PASI-SE
		ASTM D2974	BLA	1	PASI-K
		SM 2540G	TML	1	PASI-K
60407913014	**2-7**	SM 9222D	EMP	1	PASI-SE
		CALC A	EMP	1	PASI-SE
		ASTM D2974	BLA	1	PASI-K
		SM 2540G	TML	1	PASI-K
60407913015	**3-1**	SM 9222D	EMP	1	PASI-SE
		ASTM D2974	BLA	1	PASI-K
		SM 2540G	TML	1	PASI-K
60407913016	**3-2**	SM 9222D	EMP	1	PASI-SE
		ASTM D2974	BLA	1	PASI-K
		SM 2540G	TML	1	PASI-K
60407913017	**3-3**	SM 9222D	EMP	1	PASI-SE
		ASTM D2974	BLA	1	PASI-K
		SM 2540G	TML	1	PASI-K
60407913018	**3-4**	SM 9222D	EMP	1	PASI-SE
		ASTM D2974	BLA	1	PASI-K
		SM 2540G	TML	1	PASI-K
60407913019	**3-5**	SM 9222D	EMP	1	PASI-SE
		ASTM D2974	BLA	1	PASI-K
		SM 2540G	TML	1	PASI-K
60407913020	**3-6**	SM 9222D	EMP	1	PASI-SE
		ASTM D2974	BLA	1	PASI-K
		SM 2540G	TML	1	PASI-K
60407913021	**3-7**	SM 9222D	EMP	1	PASI-SE
		CALC A	EMP	1	PASI-SE
		ASTM D2974	BLA	1	PASI-K
		SM 2540G	TML	1	PASI-K
60407913022	**4-1**	SM 9222D	EMP	1	PASI-SE
		ASTM D2974	BLA	1	PASI-K
		SM 2540G	TML	1	PASI-K
60407913023	**4-2**	SM 9222D	EMP	1	PASI-SE
		ASTM D2974	BLA	1	PASI-K
		SM 2540G	TML	1	PASI-K
60407913024	**4-3**	SM 9222D	EMP	1	PASI-SE
		ASTM D2974	BLA	1	PASI-K

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SAMPLE ANALYTE COUNT

Project: 503 Sludge
Pace Project No.: 60407913

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
		SM 2540G	TML	1	PASI-K
60407913025	**4-4**	SM 9222D	EMP	1	PASI-SE
		ASTM D2974	BLA	1	PASI-K
		SM 2540G	TML	1	PASI-K
60407913026	**4-5**	SM 9222D	EMP	1	PASI-SE
		ASTM D2974	BLA	1	PASI-K
		SM 2540G	TML	1	PASI-K
60407913027	**4-6**	SM 9222D	EMP	1	PASI-SE
		ASTM D2974	BLA	1	PASI-K
		SM 2540G	TML	1	PASI-K
60407913028	**4-7**	SM 9222D	EMP	1	PASI-SE
		CALC A	EMP	1	PASI-SE
		ASTM D2974	BLA	1	PASI-K
		SM 2540G	TML	1	PASI-K

PASI-K = Pace Analytical Services - Kansas City
PASI-SE = Pace Analytical Services - SE Kansas

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Lenexa, KS 66219
(913)599-5665

ANALYTICAL RESULTS

Project: 503 Sludge
Pace Project No.: 60407913

Sample: 1-1 **Lab ID: 60407913001** Collected: 08/11/22 12:55 Received: 08/12/22 11:20 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
MBIO 9222DS Fecal Coliform	Analytical Method: SM 9222D Preparation Method: SM 9222D Pace Analytical Services - SE Kansas							
Fecal Coliforms	**1006**	CFU/g	10.1	1	08/12/22 12:15	08/13/22 12:30		H3,u3
Percent Moisture	Analytical Method: ASTM D2974 Pace Analytical Services - Kansas City							
Percent Moisture	**90.1**	%	0.50	1		08/23/22 11:33		
2540G Total Percent Solids	Analytical Method: SM 2540G Pace Analytical Services - Kansas City							
Total Solids	**9.9**	%	0.10	1		08/18/22 16:14		

Sample: 1-2 **Lab ID: 60407913002** Collected: 08/11/22 12:55 Received: 08/12/22 11:20 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
MBIO 9222DS Fecal Coliform	Analytical Method: SM 9222D Preparation Method: SM 9222D Pace Analytical Services - SE Kansas							
Fecal Coliforms	**990**	CFU/g	9.9	1	08/12/22 12:15	08/13/22 12:30		H3,u3
Percent Moisture	Analytical Method: ASTM D2974 Pace Analytical Services - Kansas City							
Percent Moisture	**89.9**	%	0.50	1		08/23/22 11:33		
2540G Total Percent Solids	Analytical Method: SM 2540G Pace Analytical Services - Kansas City							
Total Solids	**10.1**	%	0.10	1		08/18/22 16:15		

Sample: 1-3 **Lab ID: 60407913003** Collected: 08/11/22 12:55 Received: 08/12/22 11:20 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
MBIO 9222DS Fecal Coliform	Analytical Method: SM 9222D Preparation Method: SM 9222D Pace Analytical Services - SE Kansas							
Fecal Coliforms	**833**	CFU/g	8.4	1	08/12/22 12:15	08/13/22 12:30		H3,u3
Percent Moisture	Analytical Method: ASTM D2974 Pace Analytical Services - Kansas City							
Percent Moisture	**88.1**	%	0.50	1		08/23/22 11:33		

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
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(913)599-5665

ANALYTICAL RESULTS

Project: 503 Sludge
Pace Project No.: 60407913

Sample: 1-3 **Lab ID: 60407913003** Collected: 08/11/22 12:55 Received: 08/12/22 11:20 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
2540G Total Percent Solids	Analytical Method: SM 2540G Pace Analytical Services - Kansas City							
Total Solids	**12.0**	%	0.10	1		08/18/22 16:15		

Sample: 1-4 **Lab ID: 60407913004** Collected: 08/11/22 12:55 Received: 08/12/22 11:20 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
MBIO 9222DS Fecal Coliform	Analytical Method: SM 9222D Preparation Method: SM 9222D Pace Analytical Services - SE Kansas							
Fecal Coliforms	**2830**	CFU/g	9.5	1	08/12/22 12:15	08/13/22 12:30		H3,u3
Percent Moisture	Analytical Method: ASTM D2974 Pace Analytical Services - Kansas City							
Percent Moisture	**89.4**	%	0.50	1		08/23/22 11:33		
2540G Total Percent Solids	Analytical Method: SM 2540G Pace Analytical Services - Kansas City							
Total Solids	**10.6**	%	0.10	1		08/18/22 16:15		

Sample: 1-5 **Lab ID: 60407913005** Collected: 08/11/22 12:55 Received: 08/12/22 11:20 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
MBIO 9222DS Fecal Coliform	Analytical Method: SM 9222D Preparation Method: SM 9222D Pace Analytical Services - SE Kansas							
Fecal Coliforms	**1980**	CFU/g	9.9	1	08/12/22 12:15	08/13/22 12:30		H3,u3
Percent Moisture	Analytical Method: ASTM D2974 Pace Analytical Services - Kansas City							
Percent Moisture	**89.9**	%	0.50	1		08/23/22 11:33		
2540G Total Percent Solids	Analytical Method: SM 2540G Pace Analytical Services - Kansas City							
Total Solids	**10.1**	%	0.10	1		08/18/22 16:15		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 503 Sludge
Pace Project No.: 60407913

Sample: 1-6 **Lab ID: 60407913006** Collected: 08/11/22 12:55 Received: 08/12/22 11:20 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
MBIO 9222DS Fecal Coliform	Analytical Method: SM 9222D Preparation Method: SM 9222D Pace Analytical Services - SE Kansas							
Fecal Coliforms	**971**	CFU/g	9.8	1	08/12/22 12:15	08/13/22 12:30		H3,u3
Percent Moisture	Analytical Method: ASTM D2974 Pace Analytical Services - Kansas City							
Percent Moisture	**89.7**	%	0.50	1		08/23/22 11:33		
2540G Total Percent Solids	Analytical Method: SM 2540G Pace Analytical Services - Kansas City							
Total Solids	**10.3**	%	0.10	1		08/18/22 16:16		

Sample: 1-7 **Lab ID: 60407913007** Collected: 08/11/22 12:55 Received: 08/12/22 11:20 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
MBIO 9222DS Fecal Coliform	Analytical Method: SM 9222D Preparation Method: SM 9222D Pace Analytical Services - SE Kansas							
Fecal Coliforms	**990**	CFU/g	10	1	08/12/22 12:15	08/13/22 12:30		H3,u3
Geometric Mean	Analytical Method: CALC A Pace Analytical Services - SE Kansas							
Fecal Coliforms	**1239**	CFU/g	10	1		08/13/22 12:30		
Percent Moisture	Analytical Method: ASTM D2974 Pace Analytical Services - Kansas City							
Percent Moisture	**90.0**	%	0.50	1		08/23/22 11:33		
2540G Total Percent Solids	Analytical Method: SM 2540G Pace Analytical Services - Kansas City							
Total Solids	**10.1**	%	0.10	1		08/18/22 16:16		

Sample: 2-1 **Lab ID: 60407913008** Collected: 08/11/22 12:55 Received: 08/12/22 11:20 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
MBIO 9222DS Fecal Coliform	Analytical Method: SM 9222D Preparation Method: SM 9222D Pace Analytical Services - SE Kansas							
Fecal Coliforms	**1020**	CFU/g	10.2	1	08/12/22 12:15	08/13/22 12:30		H3,u3

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
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(913)599-5665

ANALYTICAL RESULTS

Project: 503 Sludge
Pace Project No.: 60407913

Sample: 2-1 **Lab ID: 60407913008** Collected: 08/11/22 12:55 Received: 08/12/22 11:20 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
Percent Moisture	Analytical Method: ASTM D2974 Pace Analytical Services - Kansas City							
Percent Moisture	**90.2**	%	0.50	1		08/23/22 11:33		
2540G Total Percent Solids	Analytical Method: SM 2540G Pace Analytical Services - Kansas City							
Total Solids	**9.8**	%	0.10	1		08/18/22 16:17		

Sample: 2-2 **Lab ID: 60407913009** Collected: 08/11/22 12:55 Received: 08/12/22 11:20 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
MBIO 9222DS Fecal Coliform	Analytical Method: SM 9222D Preparation Method: SM 9222D Pace Analytical Services - SE Kansas							
Fecal Coliforms	**1068**	CFU/g	10.7	1	08/12/22 12:15	08/13/22 12:30		H3,u3
Percent Moisture	Analytical Method: ASTM D2974 Pace Analytical Services - Kansas City							
Percent Moisture	**90.7**	%	0.50	1		08/23/22 11:34		
2540G Total Percent Solids	Analytical Method: SM 2540G Pace Analytical Services - Kansas City							
Total Solids	**9.4**	%	0.10	1		08/18/22 16:21		

Sample: 2-3 **Lab ID: 60407913010** Collected: 08/11/22 12:55 Received: 08/12/22 11:20 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
MBIO 9222DS Fecal Coliform	Analytical Method: SM 9222D Preparation Method: SM 9222D Pace Analytical Services - SE Kansas							
Fecal Coliforms	**962**	CFU/g	9.6	1	08/12/22 12:15	08/13/22 12:30		H3,u3
Percent Moisture	Analytical Method: ASTM D2974 Pace Analytical Services - Kansas City							
Percent Moisture	**89.6**	%	0.50	1		08/23/22 11:34		
2540G Total Percent Solids	Analytical Method: SM 2540G Pace Analytical Services - Kansas City							
Total Solids	**10.4**	%	0.10	1		08/18/22 16:21		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 503 Sludge
Pace Project No.: 60407913

Sample: 2-4 **Lab ID: 60407913011** Collected: 08/11/22 12:55 Received: 08/12/22 11:20 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
MBIO 9222DS Fecal Coliform	Analytical Method: SM 9222D Preparation Method: SM 9222D Pace Analytical Services - SE Kansas							
Fecal Coliforms	**1040**	CFU/g	10.4	1	08/12/22 12:15	08/13/22 12:30		H3,u3
Percent Moisture	Analytical Method: ASTM D2974 Pace Analytical Services - Kansas City							
Percent Moisture	**90.4**	%	0.50	1		08/23/22 11:34		
2540G Total Percent Solids	Analytical Method: SM 2540G Pace Analytical Services - Kansas City							
Total Solids	**9.6**	%	0.10	1		08/18/22 16:23		

Sample: 2-5 **Lab ID: 60407913012** Collected: 08/11/22 12:55 Received: 08/12/22 11:20 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
MBIO 9222DS Fecal Coliform	Analytical Method: SM 9222D Preparation Method: SM 9222D Pace Analytical Services - SE Kansas							
Fecal Coliforms	**1040**	CFU/g	10.4	1	08/12/22 12:15	08/13/22 12:30		H3,u3
Percent Moisture	Analytical Method: ASTM D2974 Pace Analytical Services - Kansas City							
Percent Moisture	**90.4**	%	0.50	1		08/23/22 11:34		
2540G Total Percent Solids	Analytical Method: SM 2540G Pace Analytical Services - Kansas City							
Total Solids	**9.6**	%	0.10	1		08/18/22 16:23		

Sample: 2-6 **Lab ID: 60407913013** Collected: 08/11/22 12:55 Received: 08/12/22 11:20 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
MBIO 9222DS Fecal Coliform	Analytical Method: SM 9222D Preparation Method: SM 9222D Pace Analytical Services - SE Kansas							
Fecal Coliforms	**980**	CFU/g	9.8	1	08/12/22 12:15	08/13/22 12:30		H3,u3
Percent Moisture	Analytical Method: ASTM D2974 Pace Analytical Services - Kansas City							
Percent Moisture	**89.8**	%	0.50	1		08/23/22 11:34		

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
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ANALYTICAL RESULTS

Project: 503 Sludge
Pace Project No.: 60407913

Sample: 2-6 **Lab ID: 60407913013** Collected: 08/11/22 12:55 Received: 08/12/22 11:20 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
2540G Total Percent Solids	Analytical Method: SM 2540G Pace Analytical Services - Kansas City							
Total Solids	**10.2**	%	0.10	1		08/18/22 16:23		

Sample: 2-7 **Lab ID: 60407913014** Collected: 08/11/22 12:55 Received: 08/12/22 11:20 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
MBIO 9222DS Fecal Coliform	Analytical Method: SM 9222D Preparation Method: SM 9222D Pace Analytical Services - SE Kansas							
Fecal Coliforms	**1067**	CFU/g	10.7	1	08/12/22 12:15	08/13/22 12:30		H3,u3
Geometric Mean	Analytical Method: CALC A Pace Analytical Services - SE Kansas							
Fecal Coliforms	**1025**	CFU/g	10.7	1		08/13/22 12:30		
Percent Moisture	Analytical Method: ASTM D2974 Pace Analytical Services - Kansas City							
Percent Moisture	**90.6**	%	0.50	1		08/23/22 11:34		
2540G Total Percent Solids	Analytical Method: SM 2540G Pace Analytical Services - Kansas City							
Total Solids	**9.4**	%	0.10	1		08/18/22 16:24		

Sample: 3-1 **Lab ID: 60407913015** Collected: 08/11/22 12:55 Received: 08/12/22 11:20 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
MBIO 9222DS Fecal Coliform	Analytical Method: SM 9222D Preparation Method: SM 9222D Pace Analytical Services - SE Kansas							
Fecal Coliforms	**<952**	CFU/g	9.5	1	08/12/22 12:15	08/13/22 13:30		H3,u3
Percent Moisture	Analytical Method: ASTM D2974 Pace Analytical Services - Kansas City							
Percent Moisture	**89.5**	%	0.50	1		08/23/22 11:34		
2540G Total Percent Solids	Analytical Method: SM 2540G Pace Analytical Services - Kansas City							
Total Solids	**10.5**	%	0.10	1		08/18/22 16:24		

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ANALYTICAL RESULTS

Project: 503 Sludge
Pace Project No.: 60407913

Sample: 3-2 **Lab ID: 60407913016** Collected: 08/11/22 12:55 Received: 08/12/22 11:20 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
MBIO 9222DS Fecal Coliform	Analytical Method: SM 9222D Preparation Method: SM 9222D Pace Analytical Services - SE Kansas							
Fecal Coliforms	**<971**	CFU/g	9.7	1	08/12/22 12:15	08/13/22 13:30		H3,u3
Percent Moisture	Analytical Method: ASTM D2974 Pace Analytical Services - Kansas City							
Percent Moisture	**89.7**	%	0.50	1		08/23/22 11:34		
2540G Total Percent Solids	Analytical Method: SM 2540G Pace Analytical Services - Kansas City							
Total Solids	**10.3**	%	0.10	1		08/18/22 16:24		

Sample: 3-3 **Lab ID: 60407913017** Collected: 08/11/22 12:55 Received: 08/12/22 11:20 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
MBIO 9222DS Fecal Coliform	Analytical Method: SM 9222D Preparation Method: SM 9222D Pace Analytical Services - SE Kansas							
Fecal Coliforms	**<935**	CFU/g	9.4	1	08/12/22 12:15	08/13/22 13:30		H3,u3
Percent Moisture	Analytical Method: ASTM D2974 Pace Analytical Services - Kansas City							
Percent Moisture	**89.3**	%	0.50	1		08/23/22 11:34		
2540G Total Percent Solids	Analytical Method: SM 2540G Pace Analytical Services - Kansas City							
Total Solids	**10.7**	%	0.10	1		08/18/22 16:25		

Sample: 3-4 **Lab ID: 60407913018** Collected: 08/11/22 12:55 Received: 08/12/22 11:20 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
MBIO 9222DS Fecal Coliform	Analytical Method: SM 9222D Preparation Method: SM 9222D Pace Analytical Services - SE Kansas							
Fecal Coliforms	**<962**	CFU/g	9.6	1	08/12/22 12:15	08/13/22 13:30		H3,u3
Percent Moisture	Analytical Method: ASTM D2974 Pace Analytical Services - Kansas City							
Percent Moisture	**89.6**	%	0.50	1		08/23/22 11:34		

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ANALYTICAL RESULTS

Project: 503 Sludge
Pace Project No.: 60407913

Sample: 3-4 **Lab ID: 60407913018** Collected: 08/11/22 12:55 Received: 08/12/22 11:20 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
2540G Total Percent Solids	Analytical Method: SM 2540G Pace Analytical Services - Kansas City							
Total Solids	**10.4**	%	0.10	1		08/18/22 16:25		

Sample: 3-5 **Lab ID: 60407913019** Collected: 08/11/22 12:55 Received: 08/12/22 11:20 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
MBIO 9222DS Fecal Coliform	Analytical Method: SM 9222D Preparation Method: SM 9222D Pace Analytical Services - SE Kansas							
Fecal Coliforms	**1961**	CFU/g	9.8	1	08/12/22 12:15	08/13/22 13:30		H3,u3
Percent Moisture	Analytical Method: ASTM D2974 Pace Analytical Services - Kansas City							
Percent Moisture	**89.8**	%	0.50	1		08/23/22 11:34		
2540G Total Percent Solids	Analytical Method: SM 2540G Pace Analytical Services - Kansas City							
Total Solids	**10.2**	%	0.10	1		08/18/22 16:25		

Sample: 3-6 **Lab ID: 60407913020** Collected: 08/11/22 12:55 Received: 08/12/22 11:20 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
MBIO 9222DS Fecal Coliform	Analytical Method: SM 9222D Preparation Method: SM 9222D Pace Analytical Services - SE Kansas							
Fecal Coliforms	**<943**	CFU/g	9.5	1	08/12/22 12:15	08/13/22 13:30		H3,u3
Percent Moisture	Analytical Method: ASTM D2974 Pace Analytical Services - Kansas City							
Percent Moisture	**89.4**	%	0.50	1		08/23/22 11:34		
2540G Total Percent Solids	Analytical Method: SM 2540G Pace Analytical Services - Kansas City							
Total Solids	**10.6**	%	0.10	1		08/18/22 16:25		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 503 Sludge
Pace Project No.: 60407913

Sample: 3-7 **Lab ID: 60407913021** Collected: 08/11/22 12:55 Received: 08/12/22 11:20 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
MBIO 9222DS Fecal Coliform	Analytical Method: SM 9222D Preparation Method: SM 9222D Pace Analytical Services - SE Kansas							
Fecal Coliforms	**<943**	CFU/g	9.5	1	08/12/22 12:15	08/13/22 13:30		H3,u3
Geometric Mean	Analytical Method: CALC A Pace Analytical Services - SE Kansas							
Fecal Coliforms	**1961**	CFU/g	9.5	1		08/13/22 12:30		
Percent Moisture	Analytical Method: ASTM D2974 Pace Analytical Services - Kansas City							
Percent Moisture	**89.4**	%	0.50	1		08/23/22 11:34		
2540G Total Percent Solids	Analytical Method: SM 2540G Pace Analytical Services - Kansas City							
Total Solids	**10.6**	%	0.10	1		08/18/22 16:26		

Sample: 4-1 **Lab ID: 60407913022** Collected: 08/11/22 12:55 Received: 08/12/22 11:20 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
MBIO 9222DS Fecal Coliform	Analytical Method: SM 9222D Preparation Method: SM 9222D Pace Analytical Services - SE Kansas							
Fecal Coliforms	**952**	CFU/g	9.5	1	08/12/22 12:15	08/13/22 12:30		H3,u3
Percent Moisture	Analytical Method: ASTM D2974 Pace Analytical Services - Kansas City							
Percent Moisture	**89.4**	%	0.50	1		08/23/22 11:34		
2540G Total Percent Solids	Analytical Method: SM 2540G Pace Analytical Services - Kansas City							
Total Solids	**10.5**	%	0.10	1		08/18/22 16:27		

Sample: 4-2 **Lab ID: 60407913023** Collected: 08/11/22 12:55 Received: 08/12/22 11:20 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
MBIO 9222DS Fecal Coliform	Analytical Method: SM 9222D Preparation Method: SM 9222D Pace Analytical Services - SE Kansas							
Fecal Coliforms	**952**	CFU/g	9.5	1	08/12/22 12:15	08/13/22 12:30		H3,u3

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 503 Sludge
Pace Project No.: 60407913

Sample: 4-2 **Lab ID: 60407913023** Collected: 08/11/22 12:55 Received: 08/12/22 11:20 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
Percent Moisture	Analytical Method: ASTM D2974 Pace Analytical Services - Kansas City							
Percent Moisture	**89.5**	%	0.50	1		08/23/22 11:34		
2540G Total Percent Solids	Analytical Method: SM 2540G Pace Analytical Services - Kansas City							
Total Solids	**10.5**	%	0.10	1		08/18/22 16:27		

Sample: 4-3 **Lab ID: 60407913024** Collected: 08/11/22 12:55 Received: 08/12/22 11:20 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
MBIO 9222DS Fecal Coliform	Analytical Method: SM 9222D Preparation Method: SM 9222D Pace Analytical Services - SE Kansas							
Fecal Coliforms	**1045**	CFU/g	10.4	1	08/12/22 12:15	08/13/22 12:30		H3,u3
Percent Moisture	Analytical Method: ASTM D2974 Pace Analytical Services - Kansas City							
Percent Moisture	**90.4**	%	0.50	1		08/23/22 11:36		
2540G Total Percent Solids	Analytical Method: SM 2540G Pace Analytical Services - Kansas City							
Total Solids	**9.6**	%	0.10	1		08/18/22 16:27		

Sample: 4-4 **Lab ID: 60407913025** Collected: 08/11/22 12:55 Received: 08/12/22 11:20 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
MBIO 9222DS Fecal Coliform	Analytical Method: SM 9222D Preparation Method: SM 9222D Pace Analytical Services - SE Kansas							
Fecal Coliforms	**990**	CFU/g	9.8	1	08/12/22 12:15	08/13/22 12:30		H3,u3
Percent Moisture	Analytical Method: ASTM D2974 Pace Analytical Services - Kansas City							
Percent Moisture	**89.8**	%	0.50	1		08/23/22 11:36		
2540G Total Percent Solids	Analytical Method: SM 2540G Pace Analytical Services - Kansas City							
Total Solids	**10.1**	%	0.10	1		08/18/22 16:28		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: 503 Sludge
Pace Project No.: 60407913

Sample: 4-5 **Lab ID: 60407913026** Collected: 08/11/22 12:55 Received: 08/12/22 11:20 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
MBIO 9222DS Fecal Coliform	Analytical Method: SM 9222D Preparation Method: SM 9222D Pace Analytical Services - SE Kansas							
Fecal Coliforms	**787**	CFU/g	7.9	1	08/12/22 12:15	08/13/22 12:30		H3,u3
Percent Moisture	Analytical Method: ASTM D2974 Pace Analytical Services - Kansas City							
Percent Moisture	**87.3**	%	0.50	1		08/23/22 11:36		
2540G Total Percent Solids	Analytical Method: SM 2540G Pace Analytical Services - Kansas City							
Total Solids	**12.7**	%	0.10	1		08/18/22 16:28		

Sample: 4-6 **Lab ID: 60407913027** Collected: 08/11/22 12:55 Received: 08/12/22 11:20 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
MBIO 9222DS Fecal Coliform	Analytical Method: SM 9222D Preparation Method: SM 9222D Pace Analytical Services - SE Kansas							
Fecal Coliforms	**935**	CFU/g	9.3	1	08/12/22 12:15	08/13/22 12:30		H3,u3
Percent Moisture	Analytical Method: ASTM D2974 Pace Analytical Services - Kansas City							
Percent Moisture	**89.2**	%	0.50	1		08/23/22 11:37		
2540G Total Percent Solids	Analytical Method: SM 2540G Pace Analytical Services - Kansas City							
Total Solids	**10.7**	%	0.10	1		08/18/22 16:28		

Sample: 4-7 **Lab ID: 60407913028** Collected: 08/11/22 12:55 Received: 08/12/22 11:20 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
MBIO 9222DS Fecal Coliform	Analytical Method: SM 9222D Preparation Method: SM 9222D Pace Analytical Services - SE Kansas							
Fecal Coliforms	**826**	CFU/g	8.3	1	08/12/22 12:15	08/13/22 12:30		H3,u3
Geometric Mean	Analytical Method: CALC A Pace Analytical Services - SE Kansas							
Fecal Coliforms	**923**	CFU/g	8.3	1		08/13/22 12:30		

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ANALYTICAL RESULTS

Project: 503 Sludge
Pace Project No.: 60407913

Sample: 4-7 **Lab ID: 60407913028** Collected: 08/11/22 12:55 Received: 08/12/22 11:20 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
Percent Moisture	Analytical Method: ASTM D2974 Pace Analytical Services - Kansas City							
Percent Moisture	**88.0**	%	0.50	1		08/23/22 11:37		
2540G Total Percent Solids	Analytical Method: SM 2540G Pace Analytical Services - Kansas City							
Total Solids	**12.1**	%	0.10	1		08/18/22 16:28		

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 503 Sludge
Pace Project No.: 60407913

QC Batch: 804302 | Analysis Method: SM 9222D
QC Batch Method: SM 9222D | Analysis Description: 9222DS MBIO Fecal Coliform
Laboratory: Pace Analytical Services - SE Kansas
Associated Lab Samples: 60407913001, 60407913002, 60407913003, 60407913004, 60407913005, 60407913006, 60407913007

METHOD BLANK: 3200922 Matrix: Water
Associated Lab Samples: 60407913001, 60407913002, 60407913003, 60407913004, 60407913005, 60407913006, 60407913007

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Fecal Coliforms	CFU/g	<1	1.0	08/13/22 12:30	

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QUALITY CONTROL DATA

Project: 503 Sludge
Pace Project No.: 60407913

QC Batch: 804304
QC Batch Method: SM 9222D
Analysis Method: SM 9222D
Analysis Description: 9222DS MBIO Fecal Coliform
Laboratory: Pace Analytical Services - SE Kansas
Associated Lab Samples: 60407913008, 60407913009, 60407913010, 60407913011, 60407913012, 60407913013, 60407913014

METHOD BLANK: 3200923 Matrix: Water
Associated Lab Samples: 60407913008, 60407913009, 60407913010, 60407913011, 60407913012, 60407913013, 60407913014

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Fecal Coliforms	CFU/g	<1	1.0	08/13/22 12:30	

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QUALITY CONTROL DATA

Project: 503 Sludge
Pace Project No.: 60407913

QC Batch: 804307
QC Batch Method: SM 9222D
Analysis Method: SM 9222D
Analysis Description: 9222DS MBIO Fecal Coliform
Laboratory: Pace Analytical Services - SE Kansas
Associated Lab Samples: 60407913015, 60407913016, 60407913017, 60407913018, 60407913019, 60407913020, 60407913021

METHOD BLANK: 3200924 Matrix: Water
Associated Lab Samples: 60407913015, 60407913016, 60407913017, 60407913018, 60407913019, 60407913020, 60407913021

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Fecal Coliforms	CFU/g	<1	1.0	08/13/22 13:30	

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QUALITY CONTROL DATA

Project: 503 Sludge
Pace Project No.: 60407913

QC Batch: 804309 | Analysis Method: SM 9222D
QC Batch Method: SM 9222D | Analysis Description: 9222DS MBIO Fecal Coliform
Laboratory: Pace Analytical Services - SE Kansas
Associated Lab Samples: 60407913022, 60407913023, 60407913024, 60407913025, 60407913026, 60407913027, 60407913028

METHOD BLANK: 3200931 Matrix: Water
Associated Lab Samples: 60407913022, 60407913023, 60407913024, 60407913025, 60407913026, 60407913027, 60407913028

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Fecal Coliforms	CFU/g	<1	1.0	08/13/22 12:30	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 503 Sludge
Pace Project No.: 60407913

QC Batch: 803598
QC Batch Method: ASTM D2974
Analysis Method: ASTM D2974
Analysis Description: Dry Weight/Percent Moisture
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60407913021, 60407913022, 60407913023, 60407913024, 60407913025, 60407913026, 60407913027, 60407913028

SAMPLE DUPLICATE: 3198497

Parameter	Units	60407913021 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	89.4	89.8	0	20	

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QUALITY CONTROL DATA

Project: 503 Sludge
Pace Project No.: 60407913

QC Batch: 803599
QC Batch Method: ASTM D2974
Analysis Method: ASTM D2974
Analysis Description: Dry Weight/Percent Moisture
Laboratory: Pace Analytical Services - Kansas City

Associated Lab Samples: 60407913001, 60407913002, 60407913003, 60407913004, 60407913005, 60407913006, 60407913007, 60407913008, 60407913009, 60407913010, 60407913011, 60407913012, 60407913013, 60407913014, 60407913015, 60407913016, 60407913017, 60407913018, 60407913019, 60407913020

SAMPLE DUPLICATE: 3198498

Parameter	Units	60407913001 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	90.1	90.1	0	20	

SAMPLE DUPLICATE: 3198499

Parameter	Units	60407913011 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	90.4	90.3	0	20	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: 503 Sludge
Pace Project No.: 60407913

QC Batch: 803594
QC Batch Method: SM 2540G
Analysis Method: SM 2540G
Analysis Description: 2540G Total Solids
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60407913001, 60407913002, 60407913003, 60407913004, 60407913005, 60407913006, 60407913007, 60407913008, 60407913009, 60407913010, 60407913011, 60407913012, 60407913013, 60407913014, 60407913015, 60407913016, 60407913017, 60407913018, 60407913019, 60407913020

METHOD BLANK: 3198484
Matrix: Solid
Associated Lab Samples: 60407913001, 60407913002, 60407913003, 60407913004, 60407913005, 60407913006, 60407913007, 60407913008, 60407913009, 60407913010, 60407913011, 60407913012, 60407913013, 60407913014, 60407913015, 60407913016, 60407913017, 60407913018, 60407913019, 60407913020

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Solids	%	ND	0.10	08/18/22 16:14	

SAMPLE DUPLICATE: 3198485

Parameter	Units	60407913001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Solids	%	9.9	9.9	0	8	

SAMPLE DUPLICATE: 3198486

Parameter	Units	60407913011 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Solids	%	9.6	9.6	0	8	

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

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA

Project: 503 Sludge
Pace Project No.: 60407913

QC Batch: 803595
QC Batch Method: SM 2540G
Analysis Method: SM 2540G
Analysis Description: 2540G Total Solids
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60407913021, 60407913022, 60407913023, 60407913024, 60407913025, 60407913026, 60407913027, 60407913028

METHOD BLANK: 3198487 Matrix: Solid
Associated Lab Samples: 60407913021, 60407913022, 60407913023, 60407913024, 60407913025, 60407913026, 60407913027, 60407913028

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Solids	%	ND	0.10	08/18/22 16:26	

SAMPLE DUPLICATE: 3198488

Parameter	Units	60407913021 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Solids	%	10.6	10.2	4	8	

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

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALIFIERS

Project: 503 Sludge
Pace Project No.: 60407913

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

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

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

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.

Reported results are not rounded until the final step prior to reporting. Therefore, calculated parameters that are typically reported as "Total" may vary slightly from the sum of the reported component parameters.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

H3	Sample was received or analysis requested beyond the recognized method holding time.
u3	Analysis initiated more than 8 hours but less than 24 hours after sample collection.

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 503 Sludge
Pace Project No.: 60407913

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60407913001	**1-1**	SM 9222D	804302	SM 9222D	804303
60407913002	**1-2**	SM 9222D	804302	SM 9222D	804303
60407913003	**1-3**	SM 9222D	804302	SM 9222D	804303
60407913004	**1-4**	SM 9222D	804302	SM 9222D	804303
60407913005	**1-5**	SM 9222D	804302	SM 9222D	804303
60407913006	**1-6**	SM 9222D	804302	SM 9222D	804303
60407913007	**1-7**	SM 9222D	804302	SM 9222D	804303
60407913008	**2-1**	SM 9222D	804304	SM 9222D	804306
60407913009	**2-2**	SM 9222D	804304	SM 9222D	804306
60407913010	**2-3**	SM 9222D	804304	SM 9222D	804306
60407913011	**2-4**	SM 9222D	804304	SM 9222D	804306
60407913012	**2-5**	SM 9222D	804304	SM 9222D	804306
60407913013	**2-6**	SM 9222D	804304	SM 9222D	804306
60407913014	**2-7**	SM 9222D	804304	SM 9222D	804306
60407913015	**3-1**	SM 9222D	804307	SM 9222D	804308
60407913016	**3-2**	SM 9222D	804307	SM 9222D	804308
60407913017	**3-3**	SM 9222D	804307	SM 9222D	804308
60407913018	**3-4**	SM 9222D	804307	SM 9222D	804308
60407913019	**3-5**	SM 9222D	804307	SM 9222D	804308
60407913020	**3-6**	SM 9222D	804307	SM 9222D	804308
60407913021	**3-7**	SM 9222D	804307	SM 9222D	804308
60407913022	**4-1**	SM 9222D	804309	SM 9222D	804310
60407913023	**4-2**	SM 9222D	804309	SM 9222D	804310
60407913024	**4-3**	SM 9222D	804309	SM 9222D	804310
60407913025	**4-4**	SM 9222D	804309	SM 9222D	804310
60407913026	**4-5**	SM 9222D	804309	SM 9222D	804310
60407913027	**4-6**	SM 9222D	804309	SM 9222D	804310
60407913028	**4-7**	SM 9222D	804309	SM 9222D	804310
60407913007	**1-7**	CALC A	804312		
60407913014	**2-7**	CALC A	804312		
60407913021	**3-7**	CALC A	804312		
60407913028	**4-7**	CALC A	804312		
60407913001	**1-1**	ASTM D2974	803599		
60407913002	**1-2**	ASTM D2974	803599		
60407913003	**1-3**	ASTM D2974	803599		
60407913004	**1-4**	ASTM D2974	803599		
60407913005	**1-5**	ASTM D2974	803599		
60407913006	**1-6**	ASTM D2974	803599		
60407913007	**1-7**	ASTM D2974	803599		
60407913008	**2-1**	ASTM D2974	803599		
60407913009	**2-2**	ASTM D2974	803599		
60407913010	**2-3**	ASTM D2974	803599		
60407913011	**2-4**	ASTM D2974	803599		
60407913012	**2-5**	ASTM D2974	803599		
60407913013	**2-6**	ASTM D2974	803599		
60407913014	**2-7**	ASTM D2974	803599		

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 503 Sludge
Pace Project No.: 60407913

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60407913015	3-1	ASTM D2974	803599		
60407913016	3-2	ASTM D2974	803599		
60407913017	3-3	ASTM D2974	803599		
60407913018	3-4	ASTM D2974	803599		
60407913019	3-5	ASTM D2974	803599		
60407913020	3-6	ASTM D2974	803599		
60407913021	3-7	ASTM D2974	803598		
60407913022	4-1	ASTM D2974	803598		
60407913023	4-2	ASTM D2974	803598		
60407913024	4-3	ASTM D2974	803598		
60407913025	4-4	ASTM D2974	803598		
60407913026	4-5	ASTM D2974	803598		
60407913027	4-6	ASTM D2974	803598		
60407913028	4-7	ASTM D2974	803598		
60407913001	1-1	SM 2540G	803594		
60407913002	1-2	SM 2540G	803594		
60407913003	1-3	SM 2540G	803594		
60407913004	1-4	SM 2540G	803594		
60407913005	1-5	SM 2540G	803594		
60407913006	1-6	SM 2540G	803594		
60407913007	1-7	SM 2540G	803594		
60407913008	2-1	SM 2540G	803594		
60407913009	2-2	SM 2540G	803594		
60407913010	2-3	SM 2540G	803594		
60407913011	2-4	SM 2540G	803594		
60407913012	2-5	SM 2540G	803594		
60407913013	2-6	SM 2540G	803594		
60407913014	2-7	SM 2540G	803594		
60407913015	3-1	SM 2540G	803594		
60407913016	3-2	SM 2540G	803594		
60407913017	3-3	SM 2540G	803594		
60407913018	3-4	SM 2540G	803594		
60407913019	3-5	SM 2540G	803594		
60407913020	3-6	SM 2540G	803594		
60407913021	3-7	SM 2540G	803595		
60407913022	4-1	SM 2540G	803595		
60407913023	4-2	SM 2540G	803595		
60407913024	4-3	SM 2540G	803595		
60407913025	4-4	SM 2540G	803595		
60407913026	4-5	SM 2540G	803595		
60407913027	4-6	SM 2540G	803595		
60407913028	4-7	SM 2540G	803595		

Pace	DC#_Title: ENV-FRM-LENE-0009_Sample Condition Upon Receipt (SCUR)	
	Revision: 2	Effective Date: 01/12/2022

WO# : 60407913

60407913

Client Name: Hodges Farm

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

Tracking #: _____ Pace Shipping Label Used? Yes ☐ No ☐

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

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

Thermometer Used: T-111 **Type of Ice:** Wet Blue None

Cooler Temperature (°C): As-read 4.0 Corr. Factor -0.8 **Corrected** 3.2

Date and initials of person examining contents: TH 8/12/22 11:2c

Temperature should be above freezing to 6°C

Chain of Custody present:	X Yes ☐ No ☐ N/A	
Chain of Custody relinquished:	☒ Yes ☐ No ☐ N/A	
Samples arrived within holding time:	☐ Yes ☒ No ☐ N/A	
Short Hold Time analyses (<72hr):	X Yes ☐ No ☐ N/A	
Rush Turn Around Time requested:	☐ Yes X No ☐ N/A	
Sufficient volume:	X Yes ☐ No ☐ N/A	
Correct containers used:	X Yes ☐ No ☐ N/A	
Pace containers used:	X Yes ☐ No ☐ N/A	
Containers intact:	X Yes ☐ No ☐ N/A	
Unpreserved 5035A / TX1005/1006 soils frozen in 48hrs?	☐ Yes ☐ No X N/A	
Filtered volume received for dissolved tests?	☐ Yes ☐ No X N/A	
Sample labels match COC: Date / time / ID / analyses	X Yes ☐ No ☐ N/A	
Samples contain multiple phases? Matrix:	☐ Yes X No ☐ N/A	
Containers requiring pH preservation in compliance? (HNO_3, H_2SO_4, HCl<2; NaOH>9 Sulfide, NaOH>10 Cyanide) (Exceptions: VOA, Micro, O&G, KS TPH, OK-DRO) LOT#:	☐ Yes ☐ No X N/A	List sample IDs, volumes, lot #'s of preservative and the date/time added.
Cyanide water sample checks: Lead acetate strip turns dark? (Record only)	☐ Yes ☐ No	
Potassium iodide test strip turns blue/purple? (Preserve)	☐ Yes ☐ No	
Trip Blank present:	☐ Yes ☐ No X N/A	
Headspace in VOA vials (>6mm):	☐ Yes ☐ No X N/A	
Samples from USDA Regulated Area: State:	☐ Yes ☐ No X N/A	
Additional labels attached to 5035A / TX1005 vials in the field?	☐ Yes ☐ No X N/A	

Client Notification/ Resolution: Copy COC to Client? Y / N Field Data Required? Y / N

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: _____ Date: _____

Qualtrax Document ID: 30468

Page 1 of 1

Pace Analytical

CHAIN-OF-CUSTODY / Analytical Request Document

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

Page : 1 Of 1

Section A Required Client Information:		Section B Required Project Information:		Section C Invoice Information:	
Company:	Hodges Farms & Dredging LLC	Report To:	Jeff Hodges	Attention:	
Address:	501 N. West Street	Copy To:		Company Name:	
	Lebo, KS 66856			Address:	
Email:	jhodges@ewrllc.com	Purchase Order #:		Pace Quote:	
Phone:	620-343-0513 Fax:	Project Name:		Pace Project Manager:	alice.spiller@pacelabs.com
Requested Due Date:	8/19/22	Project #:	McAlester, OK	Pace Profile #:	2421, line 1

Regulatory Agency: ODEQ

State / Location: OK

ITEM #	SAMPLE ID (One Character per box. (A-Z, 0-9 / , -) Sample Ids must be unique)	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED START DATE	COLLECTED START TIME	COLLECTED END DATE	COLLECTED END TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Methanol	Other	Analyses Test Y/N	Fecal Coliform	% solids	Geometric Mean	Metals 6010/7471	SOUR	Phos, Ammonia, TKN	pH	NO2/NO3	Total Organic Nitrogen	TVS, Total % Solids	Residual Chlorine (Y/N)	6040f913
1	1-1 → 1-7		C	8-11-22	12:00	8-11-22	12:55		7	X									X		X								1S1St 1-7
2	2-1 → 2-7		C	↓	↓	↓	↓		7	X									X		X								1/ 1-7
3	3-1 → 3-7		C						7	X									X		X								1/ 1-7
4	4-1 → 4-7		C						7	X									X		X								4 1-7
5																													
6																													
7																													
8																													
9																													
10																													
11																													
12																													

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
	[signature]	8-11-22	1600	[signature]	8/11/22	1600				
	Jon Hamill 8/12/22	16:00		Jon Hamill Pace	8/12/22	11:20	3.2	Y	X	Y

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Aaron Groeneweld

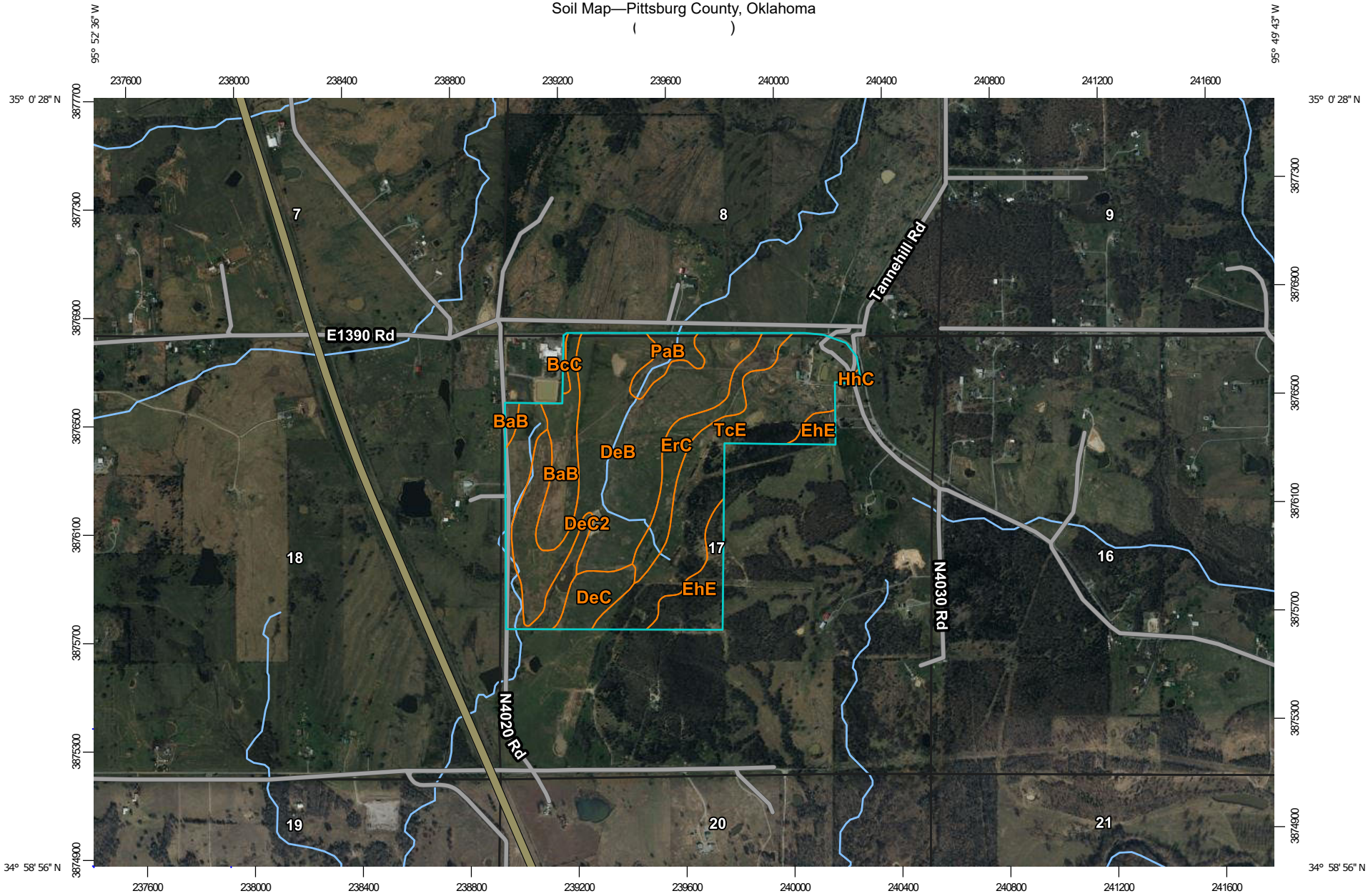
SIGNATURE of SAMPLER: [signature] DATE Signed: 8-11-22

TEMP in C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

EXHIBIT E

SOIL AND APPLICATION MAP

Soil Map—Pittsburg County, Oklahoma
( )



Map Scale: 1:20,000 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 250 500 1000 1500

Feet
0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

USDA **Natural Resources Conservation Service**

Web Soil Survey
National Cooperative Soil Survey

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Political Features
- PLSS Township and Range
- PLSS Section

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Pittsburg County, Oklahoma
Survey Area Data: Version 15, Aug 27, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

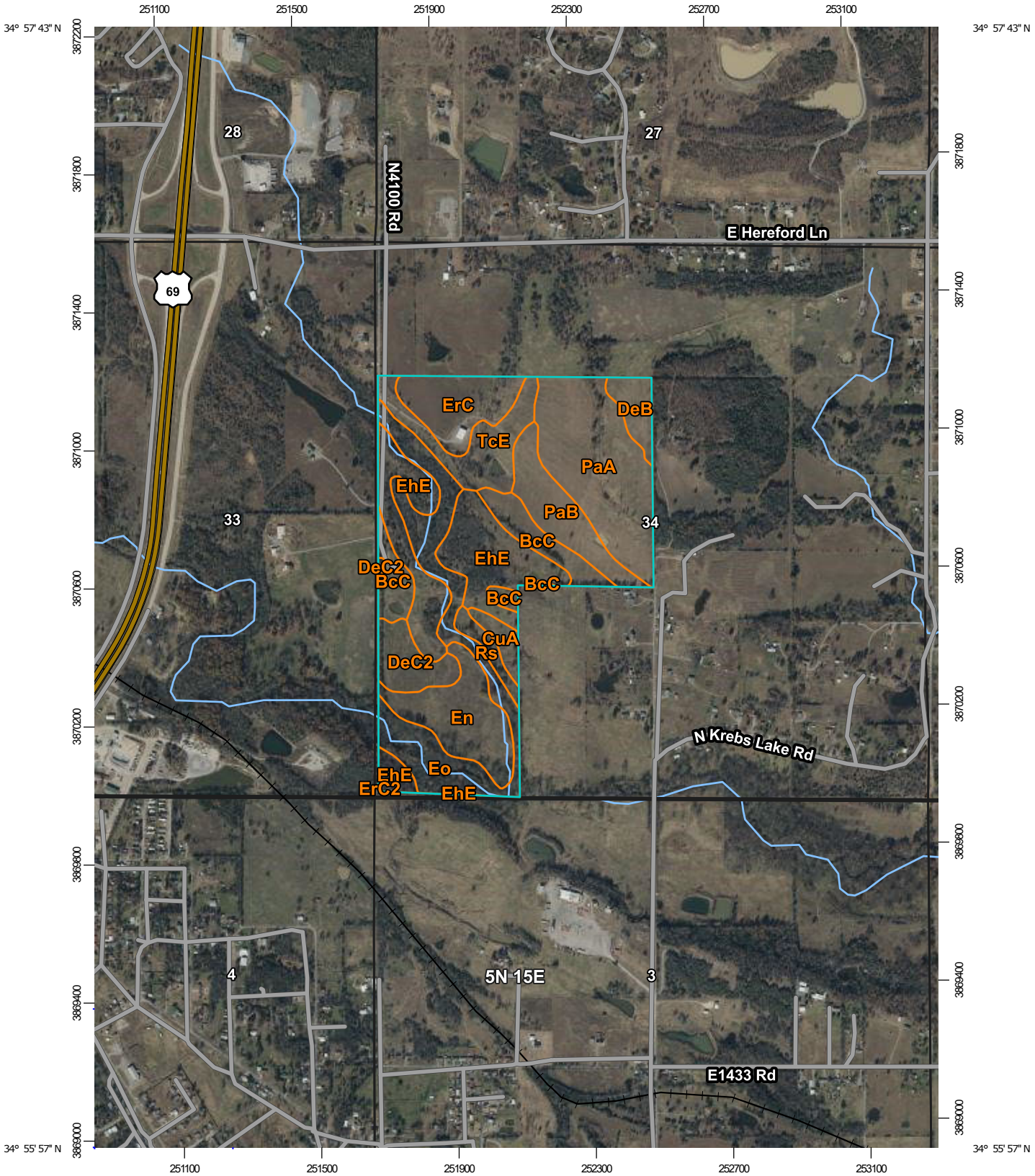
Date(s) aerial images were photographed: Mar 29, 2021—Apr 1, 2021

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BaB	Bates fine sandy loam, 1 to 3 percent slopes	19.2	7.7%
BcC	Bates-Coweta complex, 3 to 5 percent slopes	0.9	0.3%
DeB	Dennis loam, 1 to 3 percent slopes	94.5	37.7%
DeC	Dennis loam, 3 to 5 percent slopes	10.2	4.1%
DeC2	Dennis loam, 3 to 5 percent slopes, eroded	20.0	8.0%
EhE	Bengal-Clebit-Clearview complex, 5 to 30 percent slopes	18.0	7.2%
ErC	Eram clay loam, 3 to 5 percent slopes	18.8	7.5%
HhC	Clebit-Clearview complex, 3 to 5 percent slopes	0.4	0.2%
PaB	Parsons silt loam, 1 to 3 percent slopes	7.2	2.9%
TcE	Talihina-Eram-Collinsville complex, 5 to 20 percent slopes	61.3	24.5%
Totals for Area of Interest		**250.3**	**100.0%**

Soil Map—Pittsburg County, Oklahoma
Site 2)



Map Scale: 1:15,800 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 200 400 800 1200

Feet: 0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

USDA **Natural Resources Conservation Service**

Web Soil Survey
National Cooperative Soil Survey

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Political Features
- PLSS Township and Range
- PLSS Section

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Pittsburg County, Oklahoma
Survey Area Data: Version 15, Aug 27, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

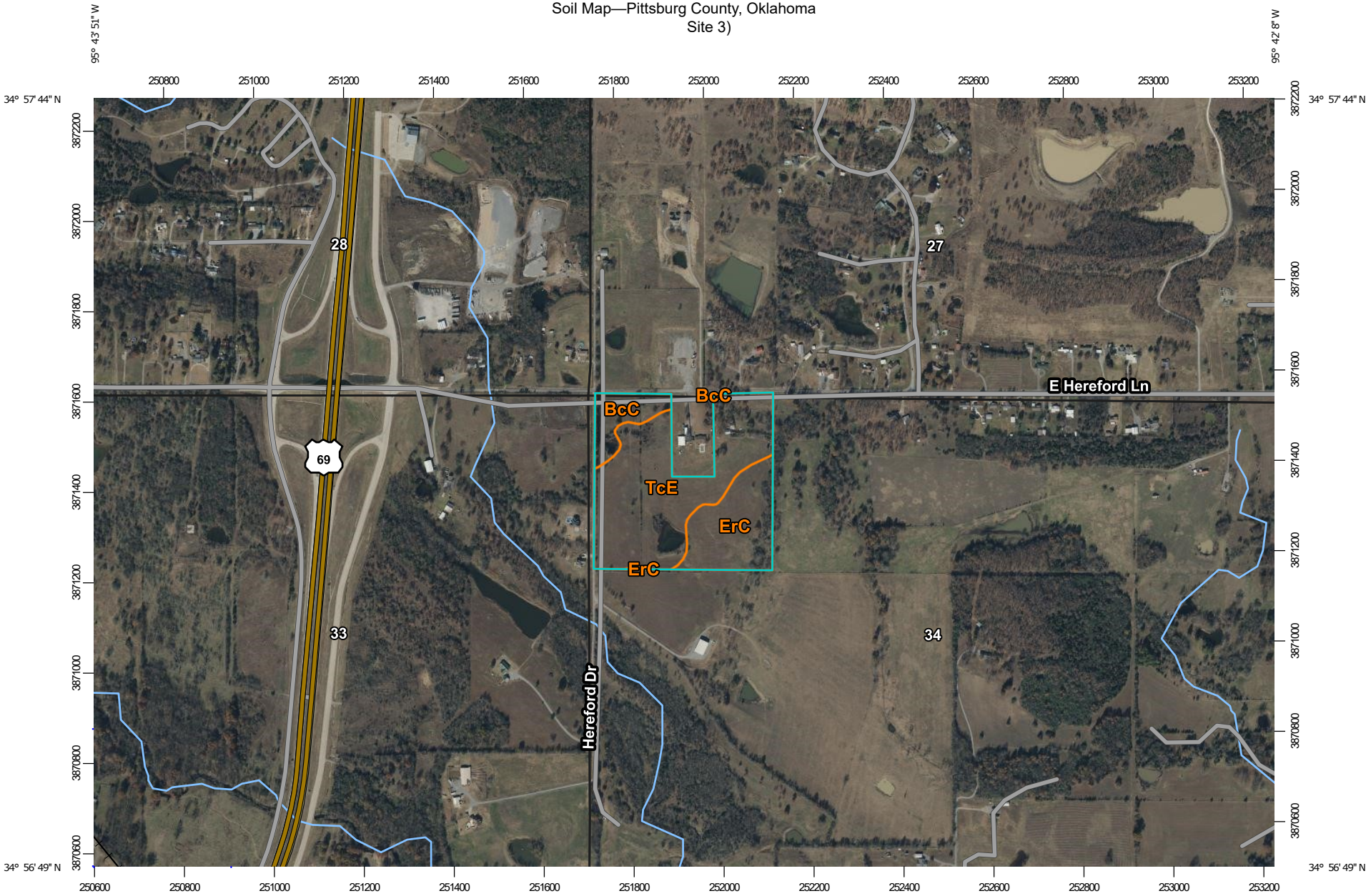
Date(s) aerial images were photographed: Nov 30, 2021—Dec 6, 2021

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BcC	Bates-Coweta complex, 3 to 5 percent slopes	13.5	7.5%
CuA	Counts loam, 0 to 1 percent slopes	3.0	1.6%
DeB	Dennis loam, 1 to 3 percent slopes	4.9	2.7%
DeC2	Dennis loam, 3 to 5 percent slopes, eroded	8.1	4.5%
EhE	Bengal-Clebit-Clearview complex, 5 to 30 percent slopes	33.2	18.3%
En	Rexor silt loam, 0 to 1 percent slopes, occasionally flooded	17.2	9.5%
Eo	Rexor and Verdigris soils, 0 to 1 percent slopes, frequently flooded	27.7	15.3%
ErC	Eram clay loam, 3 to 5 percent slopes	13.2	7.2%
ErC2	Eram clay loam, 3 to 5 percent slopes, eroded	0.0	0.0%
PaA	Parsons silt loam, 0 to 1 percent slopes	31.7	17.5%
PaB	Parsons silt loam, 1 to 3 percent slopes	12.8	7.0%
Rs	Cupco silt loam, 0 to 1 percent slopes, occasionally flooded	3.0	1.7%
TcE	Talihina-Eram-Collinsville complex, 5 to 20 percent slopes	13.2	7.3%
Totals for Area of Interest		**181.5**	**100.0%**

Soil Map—Pittsburg County, Oklahoma
Site 3)



Map Scale: 1:12,000 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 150 300 600 900

Feet
0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

USDA **Natural Resources Conservation Service**

Web Soil Survey
National Cooperative Soil Survey

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
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Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Political Features
- PLSS Township and Range
- PLSS Section

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Pittsburg County, Oklahoma
Survey Area Data: Version 15, Aug 27, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Nov 30, 2021—Dec 6, 2021

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BcC	Bates-Coweta complex, 3 to 5 percent slopes	3.6	10.5%
ErC	Eram clay loam, 3 to 5 percent slopes	9.0	26.5%
TcE	Talihina-Eram-Collinsville complex, 5 to 20 percent slopes	21.5	63.0%
Totals for Area of Interest		**34.1**	**100.0%**

EXHIBIT F

SOIL SAMPLE RESULTS – NUTRIENTS

SOIL ANALYSIS REPORT

CLIENT: 25842	HODGES FARMS & DREDGING 501 NW STREET LEBO, KS 66856

servi tech
www.servitech.com
1816 E. Wyatt Earp
PO Box 1397
Dodge City, KS 67801
800.557.7509
620.227.7123
Fax 620.227.2047

LAB NO:	90633 - 90634
INVOICE NO:	891010
DATE RECEIVED:	08/12/2022
DATE REPORTED:	08/16/2022

SOIL ANALYSIS RESULTS FOR: PHILLIP FLEMING **FIELD IDENTIFICATION:** MCALESTER

METHOD USED:

Lab Number	Sample ID	Sample Depth	1:1 (c) Water-Soil: Soil pH	Buffer pH		XSL(i): Excess Lime	LOI(r): % Organic Matter	Cd Reduction: Nitrate-Nitrogen ppm	Cd Reduction: Nitrate-Nitrogen lb. N/A	Mehlich 3: Phosphorus ppm P	Mehlich 3 ICP: Potassium ppm K			Calcium ppm Ca	Magnesium ppm Mg	Sodium ppm Na	Zinc ppm Zn	Iron ppm Fe	Manganese ppm Mn	Copper ppm Cu	Boron ppm B
90633	DALMONT	0 - 8	6.7			No	3.7	5.0	12	19	320										
90634	DALMONT	0 - 8	6.7			No	2.5	4.1	10	11	299										

FERTILIZER RECOMMENDATIONS: POUNDS ACTUAL NUTRIENT PER ACRE

Lab Number	Sample ID	Crop To Be Grown	Yield Goal	Lime, ECC Tons/A to raise pH to: 6.0	6.5	7.0	N	P_2O_5	K_2O	Zn	S	Mn	Cu	MgO	B	Ca	Cl
90633	DALMONT	BERMUDAGRASS HAY	6 tons				230	60	0								
90634	DALMONT	BERMUDAGRASS HAY	6 tons				230	65	0								

Cation Exchange Capacity

CEC	%H	%K	%Ca	%Mg	%Na

SPECIAL COMMENTS AND SUGGESTIONS:

Lab Number(s): 90633, 90634

IMPROVED BERMUDAGRASS: Split the nitrogen (N) applications through the summer growing season according to hay harvest or grazing schedule. Make the first nitrogen application prior to vigorous growth (April or early May) to help avoid weed competition. Make other applications after each cutting or grazing period. The required phosphate (P2O5) or potash (K2O) may be blended with one of the early nitrogen applications to be topdressed on established stands.

PASTURE: Use fertilizer recommendations that have been developed for hay production. In an improved grazing system, the equivalent of one ton of hay yield should provide about 30 days grazing for a cow-calf pair or about 40 days grazing for a weaned calf or about 25 to 30 days grazing for a yearling calf.

Analyses are representative of the samples submitted | Samples are retained 30 days after report of analysis | Explanations of soil analysis terms are available upon request

Reviewed and Approved By: Michele Pacheco, Data Review Coordinator

SOIL ANALYSIS REPORT

CLIENT: 25842	HODGES FARMS & DREDGING 501 NW STREET LEBO, KS 66856

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620.227.7123
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LAB NO:	90637 - 90638
INVOICE NO:	891010
DATE RECEIVED:	08/12/2022
DATE REPORTED:	08/16/2022

SOIL ANALYSIS RESULTS FOR: PHILLIP FLEMING **FIELD IDENTIFICATION:** MCALESTER

METHOD USED:

Lab Number	Sample ID	Sample Depth	1:1 (c) Water-Soil: Soil pH	Buffer pH		XSL(i): Excess Lime	LOI(r): % Organic Matter	Cd Reduction: Nitrate-Nitrogen ppm	lb. N/A	Mehlich 3: Phosphorus ppm P	Mehlich 3 ICP: Potassium ppm K			Calcium ppm Ca	Magnesium ppm Mg	Sodium ppm Na	Zinc ppm Zn	Iron ppm Fe	Manganese ppm Mn	Copper ppm Cu	Boron ppm B
90637	TURNEY 1	0 - 8	7.5			Lo	2.8	<1.0	2	11	429										
90638	TURNEY 2	0 - 8	7.5			Lo	2.5	<1.0	2	9	430										

FERTILIZER RECOMMENDATIONS: POUNDS ACTUAL NUTRIENT PER ACRE

Lab Number	Sample ID	Crop To Be Grown	Yield Goal	Lime, ECC Tons/A to raise pH to: 6.0	6.5	7.0	N	P_2O_5	K_2O	Zn	S	Mn	Cu	MgO	B	Ca	Cl
90637	TURNEY 1	BERMUDAGRASS HAY	6 tons				240	65	0								
90638	TURNEY 2	BERMUDAGRASS HAY	6 tons				240	70	0								

Cation Exchange Capacity

CEC	%H	%K	%Ca	%Mg	%Na

SPECIAL COMMENTS AND SUGGESTIONS:

Lab Number(s): 90637, 90638

IMPROVED BERMUDAGRASS: Split the nitrogen (N) applications through the summer growing season according to hay harvest or grazing schedule. Make the first nitrogen application prior to vigorous growth (April or early May) to help avoid weed competition. Make other applications after each cutting or grazing period. The required phosphate (P2O5) or potash (K2O) may be blended with one of the early nitrogen applications to be topdressed on established stands.

PASTURE: Use fertilizer recommendations that have been developed for hay production. In an improved grazing system, the equivalent of one ton of hay yield should provide about 30 days grazing for a cow-calf pair or about 40 days grazing for a weaned calf or about 25 to 30 days grazing for a yearling calf.

Analyses are representative of the samples submitted | Samples are retained 30 days after report of analysis | Explanations of soil analysis terms are available upon request

Reviewed and Approved By: Michele Pacheco, Data Review Coordinator

SOIL ANALYSIS REPORT

CLIENT: 25842	HODGES FARMS & DREDGING 501 NW STREET LEBO, KS 66856

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800.557.7509
620.227.7123
Fax 620.227.2047

LAB NO:	90631 - 90632
INVOICE NO:	891010
DATE RECEIVED:	08/12/2022
DATE REPORTED:	08/16/2022

SOIL ANALYSIS RESULTS FOR: PHILLIP FLEMING **FIELD IDENTIFICATION:** MCALESTER

METHOD USED:

			1:1 (c) Water-Soil	Sikora 2		XSL(i)	LOI(r)	Cd Reduction		Mehlich 3	Mehlich 3 ICP									
Lab Number	Sample ID	Sample Depth	Soil pH	Buffer pH		Excess Lime	% Organic Matter	Nitrate-Nitrogen ppm	lb. N/A	Phosphorus ppm P	Potassium ppm K			Calcium ppm Ca	Magnesium ppm Mg	Sodium ppm Na	Zinc ppm Zn	Iron ppm Fe	Manganese ppm Mn	Copper ppm Cu	Boron ppm B
90631	DERSH 1	0 - 8	6.3			No	1.5	3.2	8	14	240										
90632	DERSH 2	0 - 8	5.6	7.0		No	1.3	10.5	25	11	189										

FERTILIZER RECOMMENDATIONS: POUNDS ACTUAL NUTRIENT PER ACRE

Lab Number	Sample ID	Crop To Be Grown	Yield Goal	Lime, ECC Tons/A to raise pH to:			N	P_2O_5	K_2O	Zn	S	Mn	Cu	MgO	B	Ca	Cl
				6.0	6.5	7.0											
90631	DERSH 1	BERMUDAGRASS HAY	6 tons				230	65	0								
90632	DERSH 2	BERMUDAGRASS HAY	6 tons	0.6	1.3	2.0	215	65	0								

Cation Exchange Capacity

CEC	%H	%K	%Ca	%Mg	%Na

SPECIAL COMMENTS AND SUGGESTIONS:

Lab Number(s): 90631, 90632

IMPROVED BERMUDAGRASS: Split the nitrogen (N) applications through the summer growing season according to hay harvest or grazing schedule. Make the first nitrogen application prior to vigorous growth (April or early May) to help avoid weed competition. Make other applications after each cutting or grazing period. The required phosphate (P2O5) or potash (K2O) may be blended with one of the early nitrogen applications to be topdressed on established stands.

PASTURE: Use fertilizer recommendations that have been developed for hay production. In an improved grazing system, the equivalent of one ton of hay yield should provide about 30 days grazing for a cow-calf pair or about 40 days grazing for a weaned calf or about 25 to 30 days grazing for a yearling calf.

Analyses are representative of the samples submitted | Samples are retained 30 days after report of analysis | Explanations of soil analysis terms are available upon request

Reviewed and Approved By: Michele Pacheco, Data Review Coordinator

EXHIBIT G

SOIL SAMPLE RESULTS – METALS

SITE 1 –

SITE 2 –

SITE 3 -

SITE 4 THROUGH SITE 6 – OTHER SITES NOT SUMBITTED AT THIS TIME

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

August 20, 2022

Jeff Hodges
Hodges Farms & Dredging LLC
501 N. West Street
Lebo, KS 66856

RE: Project: MCALESTER, OK
Pace Project No.: 60377403

Dear Jeff Hodges:

Enclosed are the analytical results for sample(s) received by the laboratory on August 11, 2022. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:
- Pace Analytical Services - Kansas City

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

Sincerely,

Nolie Wood
nolie.wood@pacelabs.com
1(913)563-1401
Project Manager

Enclosures

cc: Aaron Gruenwald, Hodges Farms and Dredging, LLC

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

CERTIFICATIONS

Project: MCALESTER, OK
Pace Project No.: 60377403

Pace Analytical Services Kansas
9608 Loiret Boulevard, Lenexa, KS 66219
Missouri Inorganic Drinking Water Certification #: 10090
Arkansas Drinking Water
Arkansas Certification #: 20-020-0
Arkansas Drinking Water
Illinois Certification #: 2000302021-3
Iowa Certification #: 118
Kansas/NELAP Certification #: E-10116
Louisiana Certification #: 03055
Nevada Certification #: KS000212020-2
Oklahoma Certification #: 9205/9935
Florida: Cert E871149 SEKS WET
Texas Certification #: T104704407-19-12
Utah Certification #: KS000212019-9
Illinois Certification #: 004592
Kansas Field Laboratory Accreditation: # E-92587
Missouri SEKS Micro Certification: 10070

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

SAMPLE SUMMARY

Project: MCALESTER, OK
Pace Project No.: 60377403

Lab ID	Sample ID	Matrix	Date Collected	Date Received
60377403001	**SITE 1**	Solid	07/26/22 11:30	08/11/22 10:00
60377403002	**SITE 2**	Solid	07/26/22 11:30	08/11/22 10:00
60377403003	**SITE 3**	Solid	07/26/22 11:30	08/11/22 10:00
60377403004	**SITE 4**	Solid	07/26/22 11:30	08/11/22 10:00
60377403005	**SITE 5**	Solid	07/26/22 11:30	08/11/22 10:00
60377403006	**SITE 6**	Solid	07/26/22 11:30	08/11/22 10:00

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

SAMPLE ANALYTE COUNT

Project: MCALESTER, OK
Pace Project No.: 60377403

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
60377403001	**SITE 1**	EPA 6010	JGP, MRV	14	PASI-K
		EPA 7471	VRB	1	PASI-K
		ASTM D2974	DWC	1	PASI-K
60377403002	**SITE 2**	EPA 6010	JGP, MRV	14	PASI-K
		EPA 7471	VRB	1	PASI-K
		ASTM D2974	DWC	1	PASI-K
60377403003	**SITE 3**	EPA 6010	JGP, MRV	14	PASI-K
		EPA 7471	VRB	1	PASI-K
		ASTM D2974	DWC	1	PASI-K
60377403004	**SITE 4**	EPA 6010	JGP, MRV	14	PASI-K
		EPA 7471	VRB	1	PASI-K
		ASTM D2974	DWC	1	PASI-K
60377403005	**SITE 5**	EPA 6010	JGP, MRV	14	PASI-K
		EPA 7471	VRB	1	PASI-K
		ASTM D2974	DWC	1	PASI-K
60377403006	**SITE 6**	EPA 6010	JGP, MRV	14	PASI-K
		EPA 7471	VRB	1	PASI-K
		ASTM D2974	DWC	1	PASI-K

PASI-K = Pace Analytical Services - Kansas City

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

ANALYTICAL RESULTS

Project: MCALESTER, OK
Pace Project No.: 60377403

Sample: SITE 1 **Lab ID: 60377403001** Collected: 07/26/22 11:30 Received: 08/11/22 10:00 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
6010 MET ICP Red. Interference	Analytical Method: EPA 6010 Preparation Method: EPA 3050 Pace Analytical Services - Kansas City							
Arsenic	**2.6**	mg/kg	0.97	1	08/16/22 09:57	08/19/22 19:45	7440-38-2	
Cadmium	ND	mg/kg	0.49	1	08/16/22 09:57	08/19/22 19:45	7440-43-9	
Calcium	**4800**	mg/kg	9.7	1	08/16/22 09:57	08/19/22 19:45	7440-70-2	
Chromium	**11.7**	mg/kg	0.49	1	08/16/22 09:57	08/19/22 19:45	7440-47-3	
Copper	**8.6**	mg/kg	1.9	1	08/16/22 09:57	08/19/22 19:45	7440-50-8	
Lead	**9.6**	mg/kg	0.97	1	08/16/22 09:57	08/19/22 19:45	7439-92-1	
Magnesium	**2820**	mg/kg	4.9	1	08/16/22 09:57	08/19/22 19:45	7439-95-4	
Molybdenum	ND	mg/kg	1.9	1	08/16/22 09:57	08/19/22 19:45	7439-98-7	
Nickel	**10.7**	mg/kg	0.49	1	08/16/22 09:57	08/19/22 19:45	7440-02-0	
Potassium	**2910**	mg/kg	48.5	1	08/16/22 09:57	08/20/22 14:57	7440-09-7	
Selenium	ND	mg/kg	1.5	1	08/16/22 09:57	08/19/22 19:45	7782-49-2	
Silver	ND	mg/kg	0.68	1	08/16/22 09:57	08/19/22 19:45	7440-22-4	
Sodium	**61.8**	mg/kg	48.5	1	08/16/22 09:57	08/19/22 19:45	7440-23-5	
Zinc	**31.3**	mg/kg	9.7	1	08/16/22 09:57	08/19/22 19:45	7440-66-6	
7471 Mercury	Analytical Method: EPA 7471 Preparation Method: EPA 7471 Pace Analytical Services - Kansas City							
Mercury	ND	mg/kg	0.049	1	08/13/22 12:12	08/16/22 14:31	7439-97-6	
Percent Moisture	Analytical Method: ASTM D2974 Pace Analytical Services - Kansas City							
Percent Moisture	**12.7**	%	0.50	1		08/16/22 14:39		

Sample: SITE 2 **Lab ID: 60377403002** Collected: 07/26/22 11:30 Received: 08/11/22 10:00 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
6010 MET ICP Red. Interference	Analytical Method: EPA 6010 Preparation Method: EPA 3050 Pace Analytical Services - Kansas City							
Arsenic	**2.5**	mg/kg	0.81	1	08/16/22 09:57	08/19/22 20:00	7440-38-2	
Cadmium	ND	mg/kg	0.40	1	08/16/22 09:57	08/19/22 20:00	7440-43-9	
Calcium	**2180**	mg/kg	8.1	1	08/16/22 09:57	08/19/22 20:00	7440-70-2	
Chromium	**11.6**	mg/kg	0.40	1	08/16/22 09:57	08/19/22 20:00	7440-47-3	
Copper	**8.0**	mg/kg	1.6	1	08/16/22 09:57	08/19/22 20:00	7440-50-8	
Lead	**10.1**	mg/kg	0.81	1	08/16/22 09:57	08/19/22 20:00	7439-92-1	
Magnesium	**2420**	mg/kg	4.0	1	08/16/22 09:57	08/19/22 20:00	7439-95-4	
Molybdenum	ND	mg/kg	1.6	1	08/16/22 09:57	08/19/22 20:00	7439-98-7	
Nickel	**10.3**	mg/kg	0.40	1	08/16/22 09:57	08/19/22 20:00	7440-02-0	
Potassium	**2030**	mg/kg	40.4	1	08/16/22 09:57	08/20/22 14:59	7440-09-7	
Selenium	ND	mg/kg	1.2	1	08/16/22 09:57	08/19/22 20:00	7782-49-2	
Silver	ND	mg/kg	0.57	1	08/16/22 09:57	08/19/22 20:00	7440-22-4	
Sodium	**53.6**	mg/kg	40.4	1	08/16/22 09:57	08/19/22 20:00	7440-23-5	
Zinc	**28.3**	mg/kg	8.1	1	08/16/22 09:57	08/19/22 20:00	7440-66-6	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

ANALYTICAL RESULTS

Project: MCALESTER, OK
Pace Project No.: 60377403

Sample: SITE 2 **Lab ID: 60377403002** Collected: 07/26/22 11:30 Received: 08/11/22 10:00 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
7471 Mercury	Analytical Method: EPA 7471 Preparation Method: EPA 7471							
	Pace Analytical Services - Kansas City							
Mercury	ND	mg/kg	0.049	1	08/13/22 12:12	08/16/22 14:38	7439-97-6	
Percent Moisture	Analytical Method: ASTM D2974							
	Pace Analytical Services - Kansas City							
Percent Moisture	**12.8**	%	0.50	1		08/16/22 14:39		

Sample: SITE 3 **Lab ID: 60377403003** Collected: 07/26/22 11:30 Received: 08/11/22 10:00 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
6010 MET ICP Red. Interference	Analytical Method: EPA 6010 Preparation Method: EPA 3050							
	Pace Analytical Services - Kansas City							
Arsenic	**3.2**	mg/kg	1.0	1	08/16/22 09:57	08/19/22 20:02	7440-38-2	
Cadmium	ND	mg/kg	0.50	1	08/16/22 09:57	08/19/22 20:02	7440-43-9	
Calcium	**2240**	mg/kg	10	1	08/16/22 09:57	08/19/22 20:02	7440-70-2	
Chromium	**11.6**	mg/kg	0.50	1	08/16/22 09:57	08/19/22 20:02	7440-47-3	
Copper	**7.3**	mg/kg	2.0	1	08/16/22 09:57	08/19/22 20:02	7440-50-8	
Lead	**9.1**	mg/kg	1.0	1	08/16/22 09:57	08/19/22 20:02	7439-92-1	
Magnesium	**2340**	mg/kg	5.0	1	08/16/22 09:57	08/19/22 20:02	7439-95-4	
Molybdenum	ND	mg/kg	2.0	1	08/16/22 09:57	08/19/22 20:02	7439-98-7	
Nickel	**10.3**	mg/kg	0.50	1	08/16/22 09:57	08/19/22 20:02	7440-02-0	
Potassium	**1890**	mg/kg	49.8	1	08/16/22 09:57	08/20/22 15:02	7440-09-7	
Selenium	ND	mg/kg	1.5	1	08/16/22 09:57	08/19/22 20:02	7782-49-2	
Silver	ND	mg/kg	0.70	1	08/16/22 09:57	08/19/22 20:02	7440-22-4	
Sodium	ND	mg/kg	49.8	1	08/16/22 09:57	08/19/22 20:02	7440-23-5	
Zinc	**25.7**	mg/kg	10	1	08/16/22 09:57	08/19/22 20:02	7440-66-6	
7471 Mercury	Analytical Method: EPA 7471 Preparation Method: EPA 7471							
	Pace Analytical Services - Kansas City							
Mercury	ND	mg/kg	0.043	1	08/13/22 12:12	08/16/22 14:40	7439-97-6	
Percent Moisture	Analytical Method: ASTM D2974							
	Pace Analytical Services - Kansas City							
Percent Moisture	**12.0**	%	0.50	1		08/16/22 14:39		

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

ANALYTICAL RESULTS

Project: MCALESTER, OK
Pace Project No.: 60377403

Sample: SITE 4 **Lab ID: 60377403004** Collected: 07/26/22 11:30 Received: 08/11/22 10:00 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
6010 MET ICP Red. Interference	Analytical Method: EPA 6010 Preparation Method: EPA 3050 Pace Analytical Services - Kansas City							
Arsenic	**4.2**	mg/kg	1.0	1	08/16/22 09:57	08/19/22 20:05	7440-38-2	
Cadmium	ND	mg/kg	0.51	1	08/16/22 09:57	08/19/22 20:05	7440-43-9	
Calcium	**3090**	mg/kg	10.1	1	08/16/22 09:57	08/19/22 20:05	7440-70-2	
Chromium	**14.1**	mg/kg	0.51	1	08/16/22 09:57	08/19/22 20:05	7440-47-3	
Copper	**10.1**	mg/kg	2.0	1	08/16/22 09:57	08/19/22 20:05	7440-50-8	
Lead	**10.9**	mg/kg	1.0	1	08/16/22 09:57	08/19/22 20:05	7439-92-1	
Magnesium	**2990**	mg/kg	5.1	1	08/16/22 09:57	08/19/22 20:05	7439-95-4	
Molybdenum	ND	mg/kg	2.0	1	08/16/22 09:57	08/19/22 20:05	7439-98-7	
Nickel	**13.0**	mg/kg	0.51	1	08/16/22 09:57	08/19/22 20:05	7440-02-0	
Potassium	**3390**	mg/kg	50.5	1	08/16/22 09:57	08/20/22 15:04	7440-09-7	
Selenium	ND	mg/kg	1.5	1	08/16/22 09:57	08/19/22 20:05	7782-49-2	
Silver	ND	mg/kg	0.71	1	08/16/22 09:57	08/19/22 20:05	7440-22-4	
Sodium	**63.9**	mg/kg	50.5	1	08/16/22 09:57	08/19/22 20:05	7440-23-5	
Zinc	**34.2**	mg/kg	10.1	1	08/16/22 09:57	08/19/22 20:05	7440-66-6	
7471 Mercury	Analytical Method: EPA 7471 Preparation Method: EPA 7471 Pace Analytical Services - Kansas City							
Mercury	ND	mg/kg	0.049	1	08/13/22 12:12	08/16/22 14:47	7439-97-6	
Percent Moisture	Analytical Method: ASTM D2974 Pace Analytical Services - Kansas City							
Percent Moisture	**14.7**	%	0.50	1		08/16/22 14:39		

Sample: SITE 5 **Lab ID: 60377403005** Collected: 07/26/22 11:30 Received: 08/11/22 10:00 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
6010 MET ICP Red. Interference	Analytical Method: EPA 6010 Preparation Method: EPA 3050 Pace Analytical Services - Kansas City							
Arsenic	**3.4**	mg/kg	1.1	1	08/16/22 09:57	08/19/22 20:07	7440-38-2	
Cadmium	ND	mg/kg	0.57	1	08/16/22 09:57	08/19/22 20:07	7440-43-9	
Calcium	**2590**	mg/kg	11.4	1	08/16/22 09:57	08/19/22 20:07	7440-70-2	
Chromium	**12.7**	mg/kg	0.57	1	08/16/22 09:57	08/19/22 20:07	7440-47-3	
Copper	**8.2**	mg/kg	2.3	1	08/16/22 09:57	08/19/22 20:07	7440-50-8	
Lead	**9.0**	mg/kg	1.1	1	08/16/22 09:57	08/19/22 20:07	7439-92-1	
Magnesium	**2680**	mg/kg	5.7	1	08/16/22 09:57	08/19/22 20:07	7439-95-4	
Molybdenum	ND	mg/kg	2.3	1	08/16/22 09:57	08/19/22 20:07	7439-98-7	
Nickel	**11.4**	mg/kg	0.57	1	08/16/22 09:57	08/19/22 20:07	7440-02-0	
Potassium	**2490**	mg/kg	56.9	1	08/16/22 09:57	08/20/22 15:07	7440-09-7	
Selenium	ND	mg/kg	1.7	1	08/16/22 09:57	08/19/22 20:07	7782-49-2	
Silver	ND	mg/kg	0.80	1	08/16/22 09:57	08/19/22 20:07	7440-22-4	
Sodium	**116**	mg/kg	56.9	1	08/16/22 09:57	08/19/22 20:07	7440-23-5	
Zinc	**28.6**	mg/kg	11.4	1	08/16/22 09:57	08/19/22 20:07	7440-66-6	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

ANALYTICAL RESULTS

Project: MCALESTER, OK
Pace Project No.: 60377403

Sample: SITE 5 **Lab ID: 60377403005** Collected: 07/26/22 11:30 Received: 08/11/22 10:00 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
7471 Mercury	Analytical Method: EPA 7471 Preparation Method: EPA 7471 Pace Analytical Services - Kansas City							
Mercury	ND	mg/kg	0.050	1	08/13/22 12:12	08/16/22 14:49	7439-97-6	
Percent Moisture	Analytical Method: ASTM D2974 Pace Analytical Services - Kansas City							
Percent Moisture	**13.9**	%	0.50	1		08/16/22 14:39		

Sample: SITE 6 **Lab ID: 60377403006** Collected: 07/26/22 11:30 Received: 08/11/22 10:00 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
6010 MET ICP Red. Interference	Analytical Method: EPA 6010 Preparation Method: EPA 3050 Pace Analytical Services - Kansas City							
Arsenic	**3.7**	mg/kg	0.98	1	08/16/22 09:57	08/19/22 20:10	7440-38-2	
Cadmium	ND	mg/kg	0.49	1	08/16/22 09:57	08/19/22 20:10	7440-43-9	
Calcium	**2920**	mg/kg	9.8	1	08/16/22 09:57	08/19/22 20:10	7440-70-2	
Chromium	**14.3**	mg/kg	0.49	1	08/16/22 09:57	08/19/22 20:10	7440-47-3	
Copper	**10.2**	mg/kg	2.0	1	08/16/22 09:57	08/19/22 20:10	7440-50-8	
Lead	**11.1**	mg/kg	0.98	1	08/16/22 09:57	08/19/22 20:10	7439-92-1	
Magnesium	**3040**	mg/kg	4.9	1	08/16/22 09:57	08/19/22 20:10	7439-95-4	
Molybdenum	ND	mg/kg	2.0	1	08/16/22 09:57	08/19/22 20:10	7439-98-7	
Nickel	**13.5**	mg/kg	0.49	1	08/16/22 09:57	08/19/22 20:10	7440-02-0	
Potassium	**2940**	mg/kg	48.8	1	08/16/22 09:57	08/20/22 15:10	7440-09-7	
Selenium	ND	mg/kg	1.5	1	08/16/22 09:57	08/19/22 20:10	7782-49-2	
Silver	ND	mg/kg	0.68	1	08/16/22 09:57	08/19/22 20:10	7440-22-4	
Sodium	**70.5**	mg/kg	48.8	1	08/16/22 09:57	08/19/22 20:10	7440-23-5	
Zinc	**32.0**	mg/kg	9.8	1	08/16/22 09:57	08/19/22 20:10	7440-66-6	
7471 Mercury	Analytical Method: EPA 7471 Preparation Method: EPA 7471 Pace Analytical Services - Kansas City							
Mercury	ND	mg/kg	0.051	1	08/13/22 12:12	08/16/22 15:07	7439-97-6	
Percent Moisture	Analytical Method: ASTM D2974 Pace Analytical Services - Kansas City							
Percent Moisture	**11.6**	%	0.50	1		08/16/22 14:39		

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA

Project: MCALESTER, OK
Pace Project No.: 60377403

QC Batch: 737870
QC Batch Method: EPA 7471
Analysis Method: EPA 7471
Analysis Description: 7471 Mercury
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60377403001, 60377403002, 60377403003, 60377403004, 60377403005, 60377403006

METHOD BLANK: 2958398 Matrix: Solid
Associated Lab Samples: 60377403001, 60377403002, 60377403003, 60377403004, 60377403005, 60377403006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	mg/kg	ND	0.050	08/16/22 14:26	

LABORATORY CONTROL SAMPLE: 2958399

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	mg/kg	0.5	0.60	120	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2958400 2958401

Parameter	Units	60377403001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	mg/kg	ND	0.49	0.5	0.49	0.51	98	99	75-125	5	20	

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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
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Lenexa, KS 66219
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QUALITY CONTROL DATA

Project: MCALESTER, OK
Pace Project No.: 60377403

QC Batch: 738131
QC Batch Method: EPA 3050
Analysis Method: EPA 6010
Analysis Description: 6010 MET
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60377403001, 60377403002, 60377403003, 60377403004, 60377403005, 60377403006

METHOD BLANK: 2959396 Matrix: Solid
Associated Lab Samples: 60377403001, 60377403002, 60377403003, 60377403004, 60377403005, 60377403006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Arsenic	mg/kg	ND	1.0	08/19/22 19:22	
Cadmium	mg/kg	ND	0.50	08/19/22 19:22	
Calcium	mg/kg	ND	10.0	08/19/22 19:22	
Chromium	mg/kg	ND	0.50	08/19/22 19:22	
Copper	mg/kg	ND	2.0	08/19/22 19:22	
Lead	mg/kg	ND	1.0	08/19/22 19:22	
Magnesium	mg/kg	ND	5.0	08/19/22 19:22	
Molybdenum	mg/kg	ND	2.0	08/19/22 19:22	
Nickel	mg/kg	ND	0.50	08/19/22 19:22	
Potassium	mg/kg	ND	50.0	08/20/22 14:27	
Selenium	mg/kg	ND	1.5	08/19/22 19:22	
Silver	mg/kg	ND	0.70	08/19/22 19:22	
Sodium	mg/kg	ND	50.0	08/19/22 19:22	
Zinc	mg/kg	ND	10.0	08/19/22 19:22	

LABORATORY CONTROL SAMPLE: 2959397

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Arsenic	mg/kg	100	93.5	94	80-120	
Cadmium	mg/kg	100	101	101	80-120	
Calcium	mg/kg	1000	932	93	80-120	
Chromium	mg/kg	100	96.7	97	80-120	
Copper	mg/kg	100	101	101	80-120	
Lead	mg/kg	100	96.3	96	80-120	
Magnesium	mg/kg	1000	943	94	80-120	
Molybdenum	mg/kg	100	104	104	80-120	
Nickel	mg/kg	100	104	104	80-120	
Potassium	mg/kg	1000	1110	111	80-120	
Selenium	mg/kg	100	98.0	98	80-120	
Silver	mg/kg	50	46.4	93	80-120	
Sodium	mg/kg	1000	970	97	80-120	
Zinc	mg/kg	100	100	100	80-120	

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

Pace Analytical Services, LLC
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QUALITY CONTROL DATA

Project: MCALESTER, OK
Pace Project No.: 60377403

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2959398 2959399

Parameter	Units	60377403001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Arsenic	mg/kg	2.6	83.1	84.2	76.8	77.4	89	89	75-125	1	20	
Cadmium	mg/kg	ND	83.1	84.2	81.5	82.0	98	97	75-125	1	20	
Calcium	mg/kg	4800	831	842	3980	4640	-99	-19	75-125	15	20	
Chromium	mg/kg	11.7	83.1	84.2	89.7	91.3	94	95	75-125	2	20	
Copper	mg/kg	8.6	83.1	84.2	91.1	93.2	99	100	75-125	2	20	
Lead	mg/kg	9.6	83.1	84.2	80.5	81.0	85	85	75-125	1	20	
Magnesium	mg/kg	2820	831	842	3580	3860	92	123	75-125	7	20	
Molybdenum	mg/kg	ND	83.1	84.2	78.6	78.9	95	93	75-125	0	20	
Nickel	mg/kg	10.7	83.1	84.2	88.2	89.3	93	93	75-125	1	20	
Potassium	mg/kg	2910	831	842	4520	4840	195	230	75-125	7	20	
Selenium	mg/kg	ND	83.1	84.2	77.4	78.6	93	93	75-125	2	20	
Silver	mg/kg	ND	41.5	42.2	37.8	38.4	91	91	75-125	2	20	
Sodium	mg/kg	61.8	831	842	849	867	95	96	75-125	2	20	
Zinc	mg/kg	31.3	83.1	84.2	108	112	93	96	75-125	4	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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Lenexa, KS 66219
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QUALITY CONTROL DATA

Project: MCALESTER, OK
Pace Project No.: 60377403

QC Batch: 738197
QC Batch Method: ASTM D2974
Analysis Method: ASTM D2974
Analysis Description: Dry Weight/Percent Moisture
Laboratory: Pace Analytical Services - Kansas City
Associated Lab Samples: 60377403001, 60377403002, 60377403003, 60377403004, 60377403005, 60377403006

METHOD BLANK: 2959659 Matrix: Solid
Associated Lab Samples: 60377403001, 60377403002, 60377403003, 60377403004, 60377403005, 60377403006

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Percent Moisture	%	ND	0.50	08/16/22 14:39	

SAMPLE DUPLICATE: 2959660

Parameter	Units	60377403001 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	12.7	12.9	2	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

Pace Analytical Services, LLC
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Lenexa, KS 66219
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QUALIFIERS

Project: MCALESTER, OK
Pace Project No.: 60377403

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

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

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

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

Pace Analytical Services, LLC
9608 Loiret Blvd.
Lenexa, KS 66219
(913)599-5665

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: MCALESTER, OK
Pace Project No.: 60377403

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
60377403001	**SITE 1**	EPA 3050	738131	EPA 6010	738298
60377403002	**SITE 2**	EPA 3050	738131	EPA 6010	738298
60377403003	**SITE 3**	EPA 3050	738131	EPA 6010	738298
60377403004	**SITE 4**	EPA 3050	738131	EPA 6010	738298
60377403005	**SITE 5**	EPA 3050	738131	EPA 6010	738298
60377403006	**SITE 6**	EPA 3050	738131	EPA 6010	738298
60377403001	**SITE 1**	EPA 7471	737870	EPA 7471	738022
60377403002	**SITE 2**	EPA 7471	737870	EPA 7471	738022
60377403003	**SITE 3**	EPA 7471	737870	EPA 7471	738022
60377403004	**SITE 4**	EPA 7471	737870	EPA 7471	738022
60377403005	**SITE 5**	EPA 7471	737870	EPA 7471	738022
60377403006	**SITE 6**	EPA 7471	737870	EPA 7471	738022
60377403001	**SITE 1**	ASTM D2974	738197		
60377403002	**SITE 2**	ASTM D2974	738197		
60377403003	**SITE 3**	ASTM D2974	738197		
60377403004	**SITE 4**	ASTM D2974	738197		
60377403005	**SITE 5**	ASTM D2974	738197		
60377403006	**SITE 6**	ASTM D2974	738197		

EXHIBIT H

NRCS SITE SOIL REPORTS

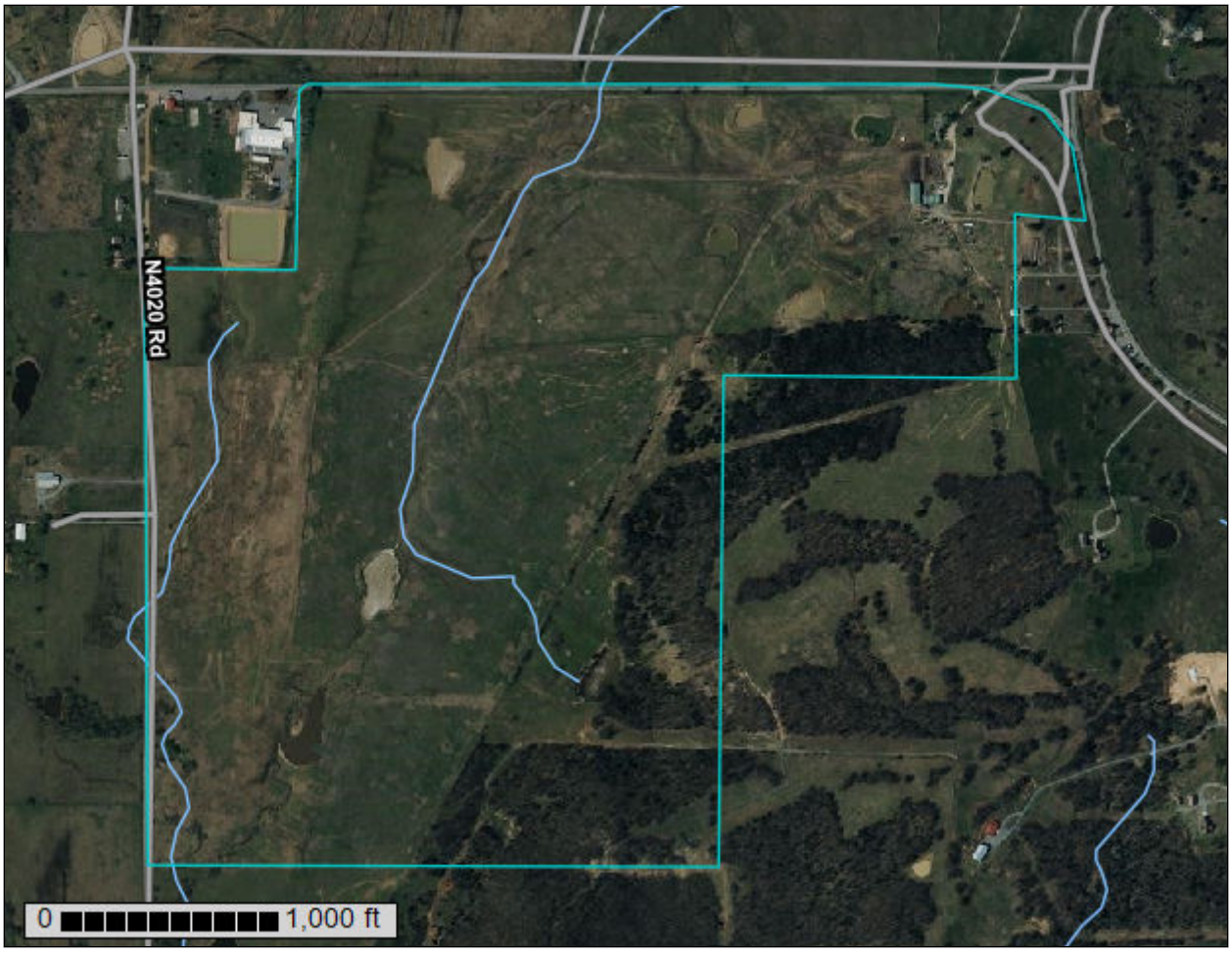
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Pittsburg County, Oklahoma



Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

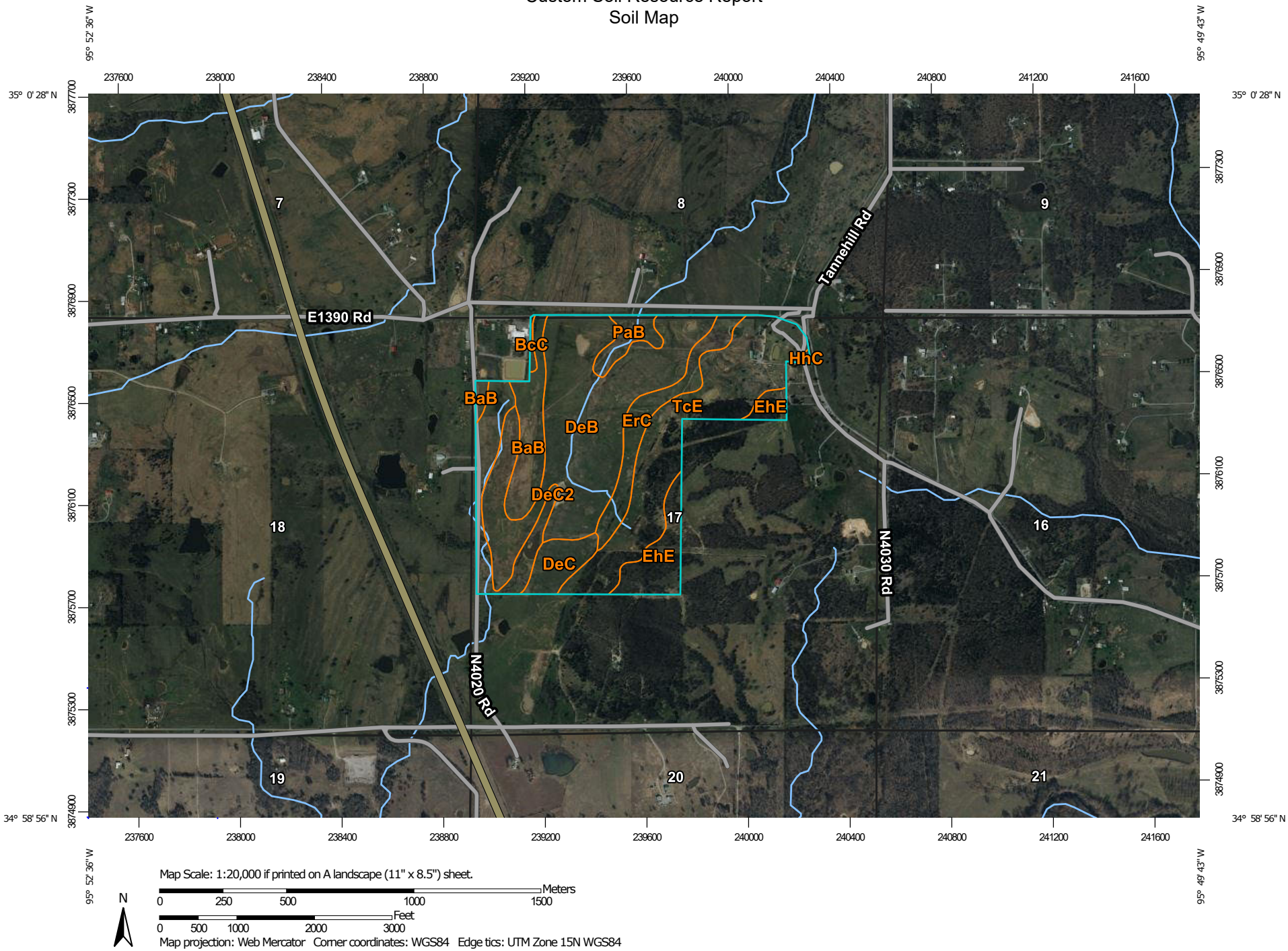
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Political Features

- PLSS Township and Range
- PLSS Section

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Pittsburg County, Oklahoma
Survey Area Data: Version 15, Aug 27, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 29, 2021—Apr 1, 2021

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BaB	Bates fine sandy loam, 1 to 3 percent slopes	19.2	7.7%
BcC	Bates-Coweta complex, 3 to 5 percent slopes	0.9	0.3%
DeB	Dennis loam, 1 to 3 percent slopes	94.5	37.7%
DeC	Dennis loam, 3 to 5 percent slopes	10.2	4.1%
DeC2	Dennis loam, 3 to 5 percent slopes, eroded	20.0	8.0%
EhE	Bengal-Clebit-Clearview complex, 5 to 30 percent slopes	18.0	7.2%
ErC	Eram clay loam, 3 to 5 percent slopes	18.8	7.5%
HhC	Clebit-Clearview complex, 3 to 5 percent slopes	0.4	0.2%
PaB	Parsons silt loam, 1 to 3 percent slopes	7.2	2.9%
TcE	Talihina-Eram-Collinsville complex, 5 to 20 percent slopes	61.3	24.5%
Totals for Area of Interest		**250.3**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a

particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Pittsburg County, Oklahoma

BaB—Bates fine sandy loam, 1 to 3 percent slopes

Map Unit Setting

National map unit symbol: m5qf
Elevation: 500 to 1,360 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 170 to 235 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Bates and similar soils: 97 percent
Minor components: 3 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bates

Setting

Landform: Hillslopes
Landform position (two-dimensional): Shoulder
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy residuum weathered from sandstone and shale

Typical profile

A - 0 to 9 inches: fine sandy loam
BA - 9 to 25 inches: loam
Bt - 25 to 39 inches: clay loam
Cr - 39 to 50 inches: bedrock

Properties and qualities

Slope: 1 to 3 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R112XY060OK - Loamy prairie (Southeast) PE 62-80
Forage suitability group: Unnamed (G112XY019OK)
Other vegetative classification: Unnamed (G112XY019OK)
Hydric soil rating: No

Minor Components

Dennis

Percent of map unit: 3 percent
Landform: Hillslopes on hills
Landform position (two-dimensional): Shoulder
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R112XY060OK - Loamy prairie (Southeast) PE 62-80
Other vegetative classification: Unnamed (G112XY091OK)
Hydric soil rating: No

BcC—Bates-Coweta complex, 3 to 5 percent slopes

Map Unit Setting

National map unit symbol: m5qj
Elevation: 500 to 1,360 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 170 to 235 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Bates and similar soils: 50 percent
Coweta and similar soils: 40 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bates

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy residuum weathered from sandstone and shale

Typical profile

A - 0 to 5 inches: fine sandy loam
BA - 5 to 15 inches: loam
Bt - 15 to 25 inches: clay loam
Cr - 25 to 50 inches: bedrock

Properties and qualities

Slope: 3 to 5 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)

Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R112XY060OK - Loamy prairie (Southeast) PE 62-80
Forage suitability group: Unnamed (G112XY073OK)
Other vegetative classification: Unnamed (G112XY073OK)
Hydric soil rating: No

Description of Coweta

Setting

Landform: Hillslopes on hills
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy residuum weathered from sandstone and shale

Typical profile

A - 0 to 10 inches: fine sandy loam
Bw - 10 to 25 inches: gravelly fine sandy loam
Cr - 25 to 40 inches: bedrock

Properties and qualities

Slope: 3 to 5 percent
Depth to restrictive feature: 10 to 25 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R112XY087OK - Shallow prairie PE 62-80
Forage suitability group: Unnamed (G112XY018OK)
Other vegetative classification: Unnamed (G112XY018OK)
Hydric soil rating: No

Minor Components

Dennis

Percent of map unit: 6 percent
Landform: Hillslopes on hills
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex

Ecological site: R112XY060OK - Loamy prairie (Southeast) PE 62-80
Other vegetative classification: Unnamed (G112XY091OK)
Hydric soil rating: No

Eram

Percent of map unit: 4 percent
Landform: Hillslopes on hills
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R112XY060OK - Loamy prairie (Southeast) PE 62-80
Other vegetative classification: Unnamed (G112XY069OK)
Hydric soil rating: No

DeB—Dennis loam, 1 to 3 percent slopes

Map Unit Setting

National map unit symbol: m5qq
Elevation: 500 to 1,360 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 57 to 65 degrees F
Frost-free period: 170 to 235 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Dennis and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dennis

Setting

Landform: Hillslopes on hills
Landform position (two-dimensional): Shoulder
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Clayey residuum weathered from shale

Typical profile

A - 0 to 13 inches: loam
BE - 13 to 19 inches: silty clay loam
Bt - 19 to 64 inches: clay

Properties and qualities

Slope: 1 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)

Depth to water table: About 12 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D
Ecological site: R112XY060OK - Loamy prairie (Southeast) PE 62-80
Forage suitability group: Unnamed (G112XY091OK)
Other vegetative classification: Unnamed (G112XY091OK)
Hydric soil rating: No

Minor Components

Parsons

Percent of map unit: 3 percent
Landform: Paleoterraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R112XY010OK - Claypan prairie PE 62-80
Other vegetative classification: Unnamed (G112XY078OK)
Hydric soil rating: No

Bates

Percent of map unit: 2 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R112XY059OK - Loamy prairie (Northeast) PE 62-80
Other vegetative classification: Unnamed (G112XY073OK)
Hydric soil rating: No

DeC—Dennis loam, 3 to 5 percent slopes

Map Unit Setting

National map unit symbol: m5qr
Elevation: 500 to 1,360 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 170 to 235 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Dennis and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dennis

Setting

Landform: Hillslopes on hills
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Clayey residuum weathered from shale

Typical profile

A - 0 to 13 inches: loam
BE - 13 to 19 inches: silty clay loam
Bt - 19 to 64 inches: clay

Properties and qualities

Slope: 3 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 12 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C/D
Ecological site: R112XY060OK - Loamy prairie (Southeast) PE 62-80
Forage suitability group: Unnamed (G112XY091OK)
Other vegetative classification: Unnamed (G112XY091OK)
Hydric soil rating: No

Minor Components

Eram

Percent of map unit: 3 percent
Landform: Hillslopes on hills
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R112XY060OK - Loamy prairie (Southeast) PE 62-80
Other vegetative classification: Unnamed (G112XY069OK)
Hydric soil rating: No

Bates

Percent of map unit: 2 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R112XY059OK - Loamy prairie (Northeast) PE 62-80
Other vegetative classification: Unnamed (G112XY026OK)
Hydric soil rating: No

DeC2—Dennis loam, 3 to 5 percent slopes, eroded

Map Unit Setting

National map unit symbol: m5qs
Elevation: 500 to 1,360 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 170 to 235 days
Farmland classification: Not prime farmland

Map Unit Composition

Dennis, eroded, and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dennis, Eroded

Setting

Landform: Hillslopes on hills
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Clayey residuum weathered from shale

Typical profile

A - 0 to 10 inches: loam
BE - 10 to 16 inches: silty clay loam
Bt - 16 to 64 inches: clay

Properties and qualities

Slope: 3 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 12 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C/D
Ecological site: R112XY856OK - Eroded Loamy Prairie PE 62-80
Forage suitability group: Unnamed (G112XY091OK)
Other vegetative classification: Unnamed (G112XY091OK)
Hydric soil rating: No

Minor Components

Eram, eroded

Percent of map unit: 3 percent
Landform: Hillslopes on hills
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R112XY856OK - Eroded Loamy Prairie PE 62-80
Other vegetative classification: Unnamed (G112XY069OK)
Hydric soil rating: No

Bates, eroded

Percent of map unit: 2 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R112XY856OK - Eroded Loamy Prairie PE 62-80
Other vegetative classification: Unnamed (G112XY026OK)
Hydric soil rating: No

EhE—Bengal-Clebit-Clearview complex, 5 to 30 percent slopes

Map Unit Setting

National map unit symbol: m5qx
Elevation: 500 to 1,800 feet
Mean annual precipitation: 35 to 56 inches
Mean annual air temperature: 59 to 64 degrees F
Frost-free period: 190 to 220 days
Farmland classification: Not prime farmland

Map Unit Composition

Bengal and similar soils: 50 percent
Clebit and similar soils: 30 percent
Clearview and similar soils: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bengal

Setting

Landform: Hillslopes on hills
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Colluvium over clayey residuum weathered from shale

Typical profile

A - 0 to 4 inches: stony fine sandy loam
AB - 4 to 9 inches: stony sandy clay loam

Bt - 9 to 24 inches: clay
Cr - 24 to 40 inches: bedrock

Properties and qualities

Slope: 20 to 30 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: R119XY075OK - Sandy Savannah, F119XY026AR - Clayey Backslope
Forage suitability group: Unnamed (G119XY096OK)
Other vegetative classification: Unnamed (G119XY096OK)
Hydric soil rating: No

Description of Clebit

Setting

Landform: Mountain slopes
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Gravelly residuum weathered from sandstone

Typical profile

A - 0 to 15 inches: stony fine sandy loam
R - 15 to 30 inches: bedrock

Properties and qualities

Slope: 12 to 30 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 0.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: R119XY088OK - Shallow Savannah, F119XY023AR - Loamy Shallow Backslope
Forage suitability group: Unnamed (G119XY196OK)

Other vegetative classification: Unnamed (G119XY196OK)
Hydric soil rating: No

Description of Clearview

Setting

Landform: Hillslopes on hills
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy residuum weathered from sandstone and shale

Typical profile

A - 0 to 5 inches: fine sandy loam
E - 5 to 12 inches: fine sandy loam
BE - 12 to 16 inches: loam
Bt1 - 16 to 24 inches: sandy clay loam
Bt2 - 24 to 34 inches: sandy clay loam
BC - 34 to 39 inches: sandy clay loam
R - 39 to 41 inches: bedrock

Properties and qualities

Slope: 8 to 12 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Somewhat poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: About 24 to 40 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 6.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: R119XY075OK - Sandy Savannah
Forage suitability group: Unnamed (G118BY194OK)
Other vegetative classification: Unnamed (G118BY194OK)
Hydric soil rating: No

ErC—Eram clay loam, 3 to 5 percent slopes

Map Unit Setting

National map unit symbol: m5r1
Elevation: 500 to 1,200 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 57 to 63 degrees F

Frost-free period: 190 to 220 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Eram and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Eram

Setting

Landform: Hillslopes on hills
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Clayey residuum weathered from sandstone and shale

Typical profile

A - 0 to 8 inches: clay loam
Bt - 8 to 32 inches: clay
Cr - 32 to 40 inches: bedrock

Properties and qualities

Slope: 3 to 5 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 12 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D
Ecological site: R112XY060OK - Loamy prairie (Southeast) PE 62-80
Forage suitability group: Unnamed (G112XY069OK)
Other vegetative classification: Unnamed (G112XY069OK)
Hydric soil rating: No

Minor Components

Talihina

Percent of map unit: 3 percent
Landform: Hillslopes on hills
Landform position (two-dimensional): Shoulder
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R112XY086OK - Shallow prairie (Eastern) PE 62-80
Other vegetative classification: Unnamed (G112XY000OK)
Hydric soil rating: No

Dennis

Percent of map unit: 2 percent

Landform: Hillslopes on hills
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R112XY060OK - Loamy prairie (Southeast) PE 62-80
Other vegetative classification: Unnamed (G112XY091OK)
Hydric soil rating: No

HhC—Clebit-Clearview complex, 3 to 5 percent slopes

Map Unit Setting

National map unit symbol: m5r8
Elevation: 500 to 1,800 feet
Mean annual precipitation: 35 to 56 inches
Mean annual air temperature: 59 to 64 degrees F
Frost-free period: 190 to 220 days
Farmland classification: Not prime farmland

Map Unit Composition

Clebit and similar soils: 60 percent
Clearview and similar soils: 35 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Clebit

Setting

Landform: Mountain slopes
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Gravelly residuum weathered from sandstone

Typical profile

A - 0 to 8 inches: very gravelly fine sandy loam
Bw - 8 to 15 inches: very gravelly fine sandy loam
R - 15 to 20 inches: bedrock

Properties and qualities

Slope: 3 to 5 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: D
Ecological site: R119XY088OK - Shallow Savannah
Forage suitability group: Unnamed (G119XY098OK)
Other vegetative classification: Unnamed (G119XY098OK)
Hydric soil rating: No

Description of Clearview

Setting

Landform: Hillslopes on hills
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy residuum weathered from sandstone and shale

Typical profile

A - 0 to 5 inches: fine sandy loam
E - 5 to 12 inches: fine sandy loam
BE - 12 to 16 inches: loam
Bt1 - 16 to 24 inches: sandy clay loam
Bt2 - 24 to 34 inches: sandy clay loam
BC - 34 to 39 inches: sandy clay loam
R - 39 to 50 inches: bedrock

Properties and qualities

Slope: 3 to 5 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Somewhat poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: About 24 to 40 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 6.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R119XY075OK - Sandy Savannah
Forage suitability group: Unnamed (G118BY158OK)
Other vegetative classification: Unnamed (G118BY158OK)
Hydric soil rating: No

Minor Components

Bengal

Percent of map unit: 5 percent
Landform: Hillslopes on hills
Landform position (two-dimensional): Backslope
Down-slope shape: Convex

Across-slope shape: Convex
Ecological site: R119XY075OK - Sandy Savannah
Other vegetative classification: Unnamed (G119XY146OK)
Hydric soil rating: No

PaB—Parsons silt loam, 1 to 3 percent slopes

Map Unit Setting

National map unit symbol: m5rh
Elevation: 500 to 1,200 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 57 to 65 degrees F
Frost-free period: 190 to 220 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Parsons and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Parsons

Setting

Landform: Paleoterraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Clayey alluvium and/or residuum weathered from shale

Typical profile

A - 0 to 7 inches: silt loam
E - 7 to 12 inches: silt loam
Btg1 - 12 to 24 inches: clay
Btg2 - 24 to 62 inches: clay

Properties and qualities

Slope: 1 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s

Hydrologic Soil Group: D
Ecological site: R112XY010OK - Claypan prairie PE 62-80
Forage suitability group: Unnamed (G112XY078OK)
Other vegetative classification: Unnamed (G112XY078OK)
Hydric soil rating: No

Minor Components

Dennis
Percent of map unit: 2 percent
Landform: Hillslopes on hills
Landform position (two-dimensional): Shoulder
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R112XY060OK - Loamy prairie (Southeast) PE 62-80
Other vegetative classification: Unnamed (G112XY091OK)
Hydric soil rating: No

Taloka
Percent of map unit: 2 percent
Landform: Paleoterraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: R112XY060OK - Loamy prairie (Southeast) PE 62-80
Other vegetative classification: Unnamed (G112XY078OK)
Hydric soil rating: No

Eram
Percent of map unit: 1 percent
Landform: Hillslopes on hills
Landform position (two-dimensional): Shoulder
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R112XY060OK - Loamy prairie (Southeast) PE 62-80
Other vegetative classification: Unnamed (G112XY069OK)
Hydric soil rating: No

TcE—Talihina-Eram-Collinsville complex, 5 to 20 percent slopes

Map Unit Setting
National map unit symbol: m5rn
Elevation: 500 to 1,100 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 57 to 63 degrees F
Frost-free period: 200 to 220 days
Farmland classification: Not prime farmland

Map Unit Composition
Talihina and similar soils: 45 percent

Eram and similar soils: 35 percent
Collinsville and similar soils: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Talihina

Setting

Landform: Hillslopes on hills
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Clayey residuum weathered from shale

Typical profile

A - 0 to 6 inches: very stony clay loam
Bw - 6 to 15 inches: clay
Cr - 15 to 25 inches: bedrock

Properties and qualities

Slope: 5 to 20 percent
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 6 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: R112XY083OK - Shallow prairie (Central) PE 62-80
Forage suitability group: Unnamed (G112XY000OK)
Other vegetative classification: Unnamed (G112XY000OK)
Hydric soil rating: No

Description of Eram

Setting

Landform: Hillslopes on hills
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Clayey residuum weathered from sandstone and shale

Typical profile

A - 0 to 10 inches: clay loam
Bt - 10 to 30 inches: clay
Cr - 30 to 40 inches: bedrock

Properties and qualities

Slope: 5 to 20 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Moderately well drained
Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 12 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: R112XY060OK - Loamy prairie (Southeast) PE 62-80
Forage suitability group: Unnamed (G112XY232OK)
Other vegetative classification: Unnamed (G112XY232OK)
Hydric soil rating: No

Description of Collinsville

Setting

Landform: Hillslopes on hills
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy residuum weathered from sandstone

Typical profile

A - 0 to 11 inches: stony fine sandy loam
R - 11 to 20 inches: bedrock

Properties and qualities

Slope: 5 to 20 percent
Depth to restrictive feature: 4 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: R112XY083OK - Shallow prairie (Central) PE 62-80
Forage suitability group: Unnamed (G112XY072OK)
Other vegetative classification: Unnamed (G112XY072OK)
Hydric soil rating: No

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United States Department of Agriculture

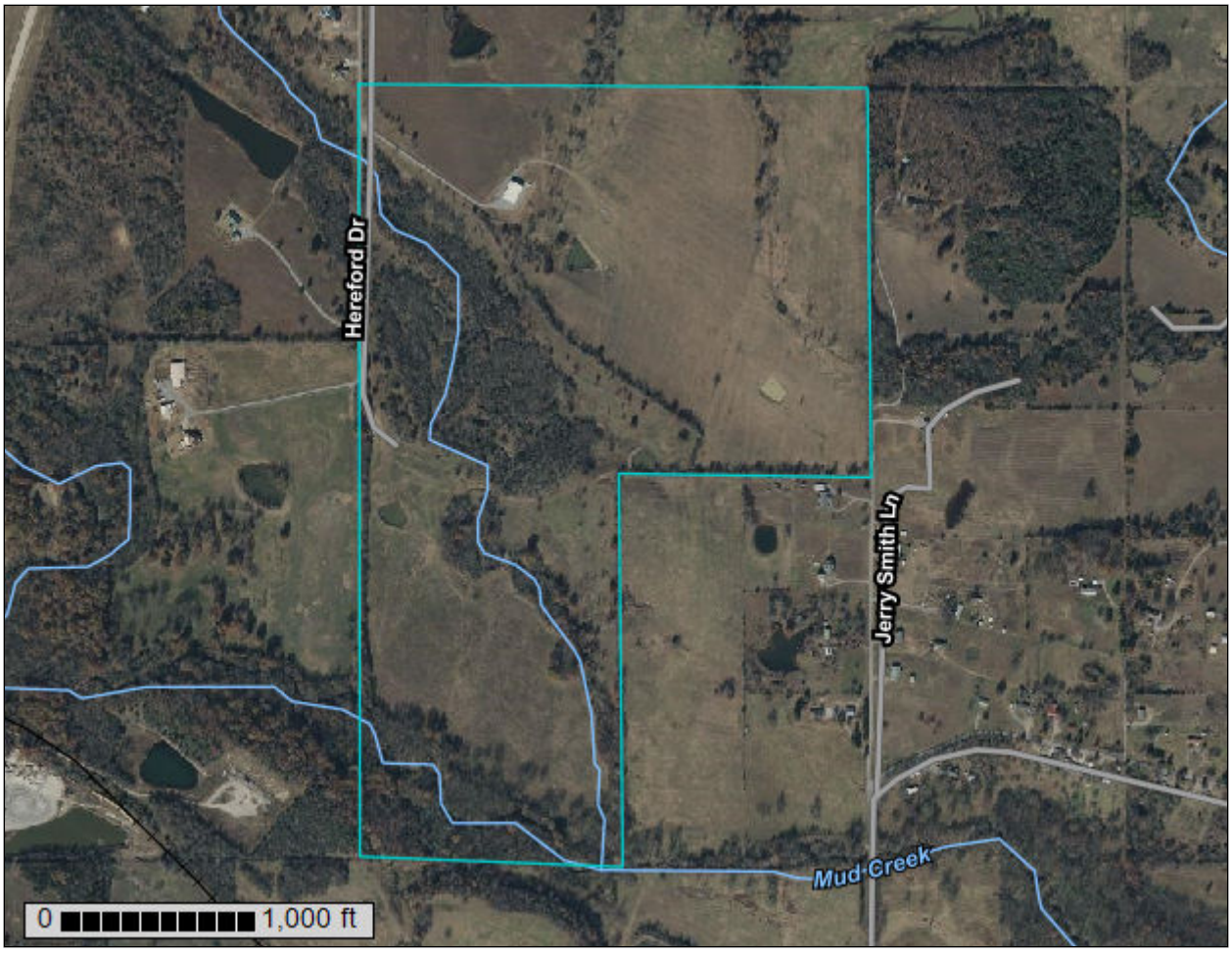
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Pittsburg County, Oklahoma

Site 2



Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

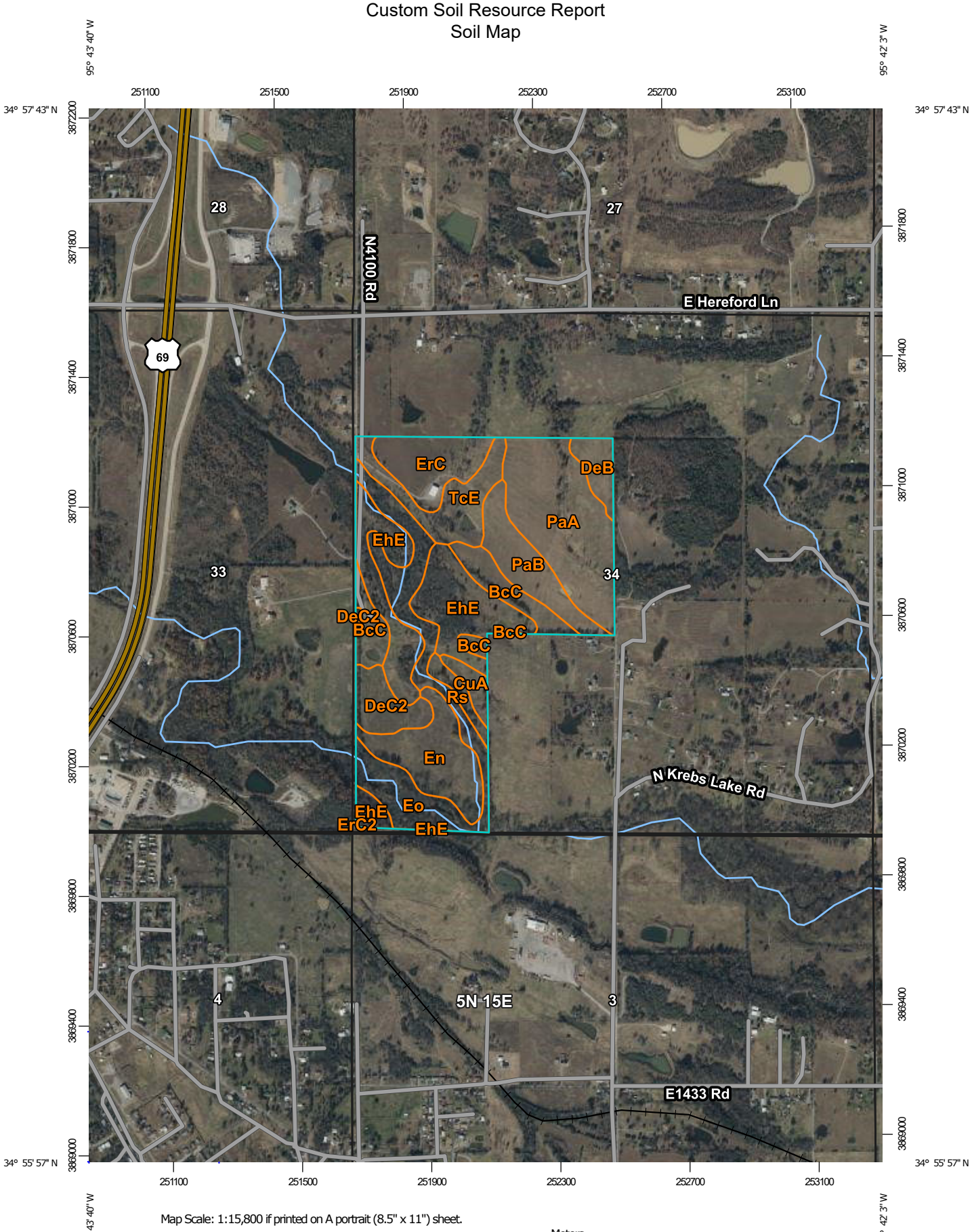
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Political Features

- PLSS Township and Range
- PLSS Section

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Pittsburg County, Oklahoma
Survey Area Data: Version 15, Aug 27, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Nov 30, 2021—Dec 6, 2021

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BcC	Bates-Coweta complex, 3 to 5 percent slopes	13.5	7.5%
CuA	Counts loam, 0 to 1 percent slopes	3.0	1.6%
DeB	Dennis loam, 1 to 3 percent slopes	4.9	2.7%
DeC2	Dennis loam, 3 to 5 percent slopes, eroded	8.1	4.5%
EhE	Bengal-Clebit-Clearview complex, 5 to 30 percent slopes	33.2	18.3%
En	Rexor silt loam, 0 to 1 percent slopes, occasionally flooded	17.2	9.5%
Eo	Rexor and Verdigris soils, 0 to 1 percent slopes, frequently flooded	27.7	15.3%
ErC	Eram clay loam, 3 to 5 percent slopes	13.2	7.2%
ErC2	Eram clay loam, 3 to 5 percent slopes, eroded	0.0	0.0%
PaA	Parsons silt loam, 0 to 1 percent slopes	31.7	17.5%
PaB	Parsons silt loam, 1 to 3 percent slopes	12.8	7.0%
Rs	Cupco silt loam, 0 to 1 percent slopes, occasionally flooded	3.0	1.7%
TcE	Talihina-Eram-Collinsville complex, 5 to 20 percent slopes	13.2	7.3%
Totals for Area of Interest		**181.5**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class.

Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The

pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Pittsburg County, Oklahoma

BcC—Bates-Coweta complex, 3 to 5 percent slopes

Map Unit Setting

National map unit symbol: m5qj
Elevation: 500 to 1,360 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 170 to 235 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Bates and similar soils: 50 percent
Coweta and similar soils: 40 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bates

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy residuum weathered from sandstone and shale

Typical profile

A - 0 to 5 inches: fine sandy loam
BA - 5 to 15 inches: loam
Bt - 15 to 25 inches: clay loam
Cr - 25 to 50 inches: bedrock

Properties and qualities

Slope: 3 to 5 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R112XY060OK - Loamy prairie (Southeast) PE 62-80
Forage suitability group: Unnamed (G112XY073OK)
Other vegetative classification: Unnamed (G112XY073OK)
Hydric soil rating: No

Description of Coweta

Setting

Landform: Hillslopes on hills
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy residuum weathered from sandstone and shale

Typical profile

A - 0 to 10 inches: fine sandy loam
Bw - 10 to 25 inches: gravelly fine sandy loam
Cr - 25 to 40 inches: bedrock

Properties and qualities

Slope: 3 to 5 percent
Depth to restrictive feature: 10 to 25 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R112XY087OK - Shallow prairie PE 62-80
Forage suitability group: Unnamed (G112XY018OK)
Other vegetative classification: Unnamed (G112XY018OK)
Hydric soil rating: No

Minor Components

Dennis

Percent of map unit: 6 percent
Landform: Hillslopes on hills
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R112XY060OK - Loamy prairie (Southeast) PE 62-80
Other vegetative classification: Unnamed (G112XY091OK)
Hydric soil rating: No

Eram

Percent of map unit: 4 percent
Landform: Hillslopes on hills
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R112XY060OK - Loamy prairie (Southeast) PE 62-80
Other vegetative classification: Unnamed (G112XY069OK)
Hydric soil rating: No

CuA—Counts loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: m5qp
Elevation: 120 to 750 feet
Mean annual precipitation: 40 to 54 inches
Mean annual air temperature: 60 to 64 degrees F
Frost-free period: 200 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Counts and similar soils: 97 percent
Minor components: 3 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Counts

Setting

Landform: Paleoterraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy alluvium and/or loamy colluvium over sandstone and shale

Typical profile

A - 0 to 10 inches: loam
Bt1 - 10 to 30 inches: clay
Bt2 - 30 to 46 inches: clay
BC - 46 to 64 inches: clay

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 12 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Slightly saline to strongly saline (4.0 to 16.0 mmhos/cm)
Sodium adsorption ratio, maximum: 13.0
Available water supply, 0 to 60 inches: High (about 10.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: D
Ecological site: R118BY062OK - Loamy Savannah - Legacy

Forage suitability group: Unnamed (G118BY091OK)
Other vegetative classification: Unnamed (G118BY091OK)
Hydric soil rating: No

Minor Components

Wrightsville
Percent of map unit: 3 percent
Landform: Paleoterraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R118BY062OK - Loamy Savannah - Legacy
Other vegetative classification: Unnamed (G118BY110OK)
Hydric soil rating: Yes

DeB—Dennis loam, 1 to 3 percent slopes

Map Unit Setting
National map unit symbol: m5qq
Elevation: 500 to 1,360 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 57 to 65 degrees F
Frost-free period: 170 to 235 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Dennis and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dennis

Setting
Landform: Hillslopes on hills
Landform position (two-dimensional): Shoulder
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Clayey residuum weathered from shale

Typical profile
A - 0 to 13 inches: loam
BE - 13 to 19 inches: silty clay loam
Bt - 19 to 64 inches: clay

Properties and qualities
Slope: 1 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 12 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D
Ecological site: R112XY060OK - Loamy prairie (Southeast) PE 62-80
Forage suitability group: Unnamed (G112XY091OK)
Other vegetative classification: Unnamed (G112XY091OK)
Hydric soil rating: No

Minor Components

Parsons

Percent of map unit: 3 percent
Landform: Paleoterraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R112XY010OK - Claypan prairie PE 62-80
Other vegetative classification: Unnamed (G112XY078OK)
Hydric soil rating: No

Bates

Percent of map unit: 2 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R112XY059OK - Loamy prairie (Northeast) PE 62-80
Other vegetative classification: Unnamed (G112XY073OK)
Hydric soil rating: No

DeC2—Dennis loam, 3 to 5 percent slopes, eroded

Map Unit Setting

National map unit symbol: m5qs
Elevation: 500 to 1,360 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 170 to 235 days
Farmland classification: Not prime farmland

Map Unit Composition

Dennis, eroded, and similar soils: 95 percent

Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dennis, Eroded

Setting

Landform: Hillslopes on hills
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Clayey residuum weathered from shale

Typical profile

A - 0 to 10 inches: loam
BE - 10 to 16 inches: silty clay loam
Bt - 16 to 64 inches: clay

Properties and qualities

Slope: 3 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 12 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C/D
Ecological site: R112XY856OK - Eroded Loamy Prairie PE 62-80
Forage suitability group: Unnamed (G112XY091OK)
Other vegetative classification: Unnamed (G112XY091OK)
Hydric soil rating: No

Minor Components

Eram, eroded

Percent of map unit: 3 percent
Landform: Hillslopes on hills
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R112XY856OK - Eroded Loamy Prairie PE 62-80
Other vegetative classification: Unnamed (G112XY069OK)
Hydric soil rating: No

Bates, eroded

Percent of map unit: 2 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R112XY856OK - Eroded Loamy Prairie PE 62-80

Other vegetative classification: Unnamed (G112XY026OK)
Hydric soil rating: No

EhE—Bengal-Clebit-Clearview complex, 5 to 30 percent slopes

Map Unit Setting

National map unit symbol: m5qx
Elevation: 500 to 1,800 feet
Mean annual precipitation: 35 to 56 inches
Mean annual air temperature: 59 to 64 degrees F
Frost-free period: 190 to 220 days
Farmland classification: Not prime farmland

Map Unit Composition

Bengal and similar soils: 50 percent
Clebit and similar soils: 30 percent
Clearview and similar soils: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bengal

Setting

Landform: Hillslopes on hills
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Colluvium over clayey residuum weathered from shale

Typical profile

A - 0 to 4 inches: stony fine sandy loam
AB - 4 to 9 inches: stony sandy clay loam
Bt - 9 to 24 inches: clay
Cr - 24 to 40 inches: bedrock

Properties and qualities

Slope: 20 to 30 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D

Ecological site: R119XY075OK - Sandy Savannah, F119XY026AR - Clayey Backslope
Forage suitability group: Unnamed (G119XY096OK)
Other vegetative classification: Unnamed (G119XY096OK)
Hydric soil rating: No

Description of Clebit

Setting

Landform: Mountain slopes
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Gravelly residuum weathered from sandstone

Typical profile

A - 0 to 15 inches: stony fine sandy loam
R - 15 to 30 inches: bedrock

Properties and qualities

Slope: 12 to 30 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 0.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: R119XY088OK - Shallow Savannah, F119XY023AR - Loamy Shallow Backslope
Forage suitability group: Unnamed (G119XY196OK)
Other vegetative classification: Unnamed (G119XY196OK)
Hydric soil rating: No

Description of Clearview

Setting

Landform: Hillslopes on hills
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy residuum weathered from sandstone and shale

Typical profile

A - 0 to 5 inches: fine sandy loam
E - 5 to 12 inches: fine sandy loam
BE - 12 to 16 inches: loam
Bt1 - 16 to 24 inches: sandy clay loam
Bt2 - 24 to 34 inches: sandy clay loam
BC - 34 to 39 inches: sandy clay loam

R - 39 to 41 inches: bedrock

Properties and qualities

Slope: 8 to 12 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Somewhat poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: About 24 to 40 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 6.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: R119XY075OK - Sandy Savannah
Forage suitability group: Unnamed (G118BY194OK)
Other vegetative classification: Unnamed (G118BY194OK)
Hydric soil rating: No

En—Rexor silt loam, 0 to 1 percent slopes, occasionally flooded

Map Unit Setting

National map unit symbol: m5qz
Elevation: 300 to 1,500 feet
Mean annual precipitation: 39 to 56 inches
Mean annual air temperature: 60 to 65 degrees F
Frost-free period: 200 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Rexor and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rexor

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium

Typical profile

A - 0 to 9 inches: silt loam
Bw - 9 to 43 inches: silt loam

C - 43 to 70 inches: silt loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 36 to 60 inches
Frequency of flooding: OccasionalNone
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 12.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B
Ecological site: R119XY050OK - Loamy Bottomland
Forage suitability group: Unnamed (G118BY107OK)
Other vegetative classification: Unnamed (G118BY107OK)
Hydric soil rating: No

Minor Components

Verdigris

Percent of map unit: 10 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R112XY050OK - Loamy bottomland PE 62-80
Other vegetative classification: Unnamed (G112XY017OK)
Hydric soil rating: No

Cupco

Percent of map unit: 5 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F118BY005OK - Loamy Bottomland Formerly R118BY050OK - Legacy
Other vegetative classification: Unnamed (G119XY070OK)
Hydric soil rating: Yes

Eo—Rexor and Verdigris soils, 0 to 1 percent slopes, frequently flooded

Map Unit Setting

National map unit symbol: m5r0
Elevation: 300 to 1,500 feet
Mean annual precipitation: 36 to 56 inches
Mean annual air temperature: 57 to 65 degrees F

Frost-free period: 190 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Rexor and similar soils: 45 percent
Verdigris and similar soils: 35 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rexor

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium

Typical profile

A - 0 to 9 inches: silt loam
Bw - 9 to 43 inches: silt loam
C - 43 to 70 inches: silt loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 36 to 60 inches
Frequency of flooding: FrequentNone
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 12.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: B
Ecological site: R119XY050OK - Loamy Bottomland, F119XY013AR - Loamy Floodplain
Forage suitability group: Unnamed (G118BY107OK)
Other vegetative classification: Unnamed (G118BY107OK)
Hydric soil rating: No

Description of Verdigris

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty alluvium

Typical profile

A - 0 to 15 inches: silt loam
C - 15 to 90 inches: silt loam

Properties and qualities

Slope: 0 to 1 percent

Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 12.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: B
Ecological site: R112XY050OK - Loamy bottomland PE 62-80
Forage suitability group: Unnamed (G112XY057OK)
Other vegetative classification: Unnamed (G112XY057OK)
Hydric soil rating: No

Minor Components

Cupco

Percent of map unit: 10 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F118BY005OK - Loamy Bottomland Formerly R118BY050OK - Legacy
Other vegetative classification: Unnamed (G119XY070OK)
Hydric soil rating: Yes

Dela

Percent of map unit: 5 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R119XY062OK - Loamy Savannah
Other vegetative classification: Unnamed (G119XY092OK)
Hydric soil rating: No

Lightning

Percent of map unit: 5 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R112XY045OK - Heavy bottomland PE 62-80
Other vegetative classification: Unnamed (G112XY288OK)
Hydric soil rating: Yes

ErC—Eram clay loam, 3 to 5 percent slopes

Map Unit Setting

National map unit symbol: m5r1
Elevation: 500 to 1,200 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 57 to 63 degrees F
Frost-free period: 190 to 220 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Eram and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Eram

Setting

Landform: Hillslopes on hills
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Clayey residuum weathered from sandstone and shale

Typical profile

A - 0 to 8 inches: clay loam
Bt - 8 to 32 inches: clay
Cr - 32 to 40 inches: bedrock

Properties and qualities

Slope: 3 to 5 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 12 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D
Ecological site: R112XY060OK - Loamy prairie (Southeast) PE 62-80
Forage suitability group: Unnamed (G112XY069OK)
Other vegetative classification: Unnamed (G112XY069OK)
Hydric soil rating: No

Minor Components

Talihina

Percent of map unit: 3 percent
Landform: Hillslopes on hills
Landform position (two-dimensional): Shoulder
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R112XY086OK - Shallow prairie (Eastern) PE 62-80
Other vegetative classification: Unnamed (G112XY000OK)
Hydric soil rating: No

Dennis

Percent of map unit: 2 percent
Landform: Hillslopes on hills
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R112XY060OK - Loamy prairie (Southeast) PE 62-80
Other vegetative classification: Unnamed (G112XY091OK)
Hydric soil rating: No

ErC2—Eram clay loam, 3 to 5 percent slopes, eroded

Map Unit Setting

National map unit symbol: m5r2
Elevation: 500 to 1,200 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 57 to 62 degrees F
Frost-free period: 190 to 220 days
Farmland classification: Not prime farmland

Map Unit Composition

Eram, eroded, and similar soils: 97 percent
Minor components: 3 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Eram, Eroded

Setting

Landform: Hillslopes on hills
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Clayey residuum weathered from sandstone and shale

Typical profile

A - 0 to 8 inches: clay loam
Bt - 8 to 32 inches: clay
Cr - 32 to 40 inches: bedrock

Properties and qualities

Slope: 3 to 5 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 12 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D
Ecological site: R112XY856OK - Eroded Loamy Prairie PE 62-80
Forage suitability group: Unnamed (G112XY069OK)
Other vegetative classification: Unnamed (G112XY069OK)
Hydric soil rating: No

Minor Components

Dennis, eroded

Percent of map unit: 3 percent
Landform: Hillslopes on hills
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R112XY856OK - Eroded Loamy Prairie PE 62-80
Other vegetative classification: Unnamed (G112XY091OK)
Hydric soil rating: No

PaA—Parsons silt loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: m5rg
Elevation: 500 to 1,500 feet
Mean annual precipitation: 37 to 56 inches
Mean annual air temperature: 57 to 65 degrees F
Frost-free period: 190 to 220 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Parsons and similar soils: 92 percent
Minor components: 8 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Parsons

Setting

Landform: Paleoterraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Clayey alluvium and/or residuum weathered from shale

Typical profile

A - 0 to 7 inches: silt loam
E - 7 to 12 inches: silt loam
Btg1 - 12 to 24 inches: clay
Btg2 - 24 to 62 inches: clay

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: D
Ecological site: R112XY010OK - Claypan prairie PE 62-80
Forage suitability group: Unnamed (G112XY078OK)
Other vegetative classification: Unnamed (G112XY078OK)
Hydric soil rating: No

Minor Components

Taloka

Percent of map unit: 5 percent
Landform: Paleoterraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: R112XY060OK - Loamy prairie (Southeast) PE 62-80
Other vegetative classification: Unnamed (G112XY078OK)
Hydric soil rating: No

Woodson

Percent of map unit: 3 percent
Landform: Paleoterraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R112XY010OK - Claypan prairie PE 62-80
Other vegetative classification: Unnamed (G112XY078OK)

Hydric soil rating: No

PaB—Parsons silt loam, 1 to 3 percent slopes

Map Unit Setting

National map unit symbol: m5rh
Elevation: 500 to 1,200 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 57 to 65 degrees F
Frost-free period: 190 to 220 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Parsons and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Parsons

Setting

Landform: Paleoterraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Clayey alluvium and/or residuum weathered from shale

Typical profile

A - 0 to 7 inches: silt loam
E - 7 to 12 inches: silt loam
Btg1 - 12 to 24 inches: clay
Btg2 - 24 to 62 inches: clay

Properties and qualities

Slope: 1 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: D
Ecological site: R112XY010OK - Claypan prairie PE 62-80
Forage suitability group: Unnamed (G112XY078OK)
Other vegetative classification: Unnamed (G112XY078OK)

Hydric soil rating: No

Minor Components

Dennis

Percent of map unit: 2 percent
Landform: Hillslopes on hills
Landform position (two-dimensional): Shoulder
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R112XY060OK - Loamy prairie (Southeast) PE 62-80
Other vegetative classification: Unnamed (G112XY091OK)
Hydric soil rating: No

Taloka

Percent of map unit: 2 percent
Landform: Paleoterraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: R112XY060OK - Loamy prairie (Southeast) PE 62-80
Other vegetative classification: Unnamed (G112XY078OK)
Hydric soil rating: No

Eram

Percent of map unit: 1 percent
Landform: Hillslopes on hills
Landform position (two-dimensional): Shoulder
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R112XY060OK - Loamy prairie (Southeast) PE 62-80
Other vegetative classification: Unnamed (G112XY069OK)
Hydric soil rating: No

Rs—Cupco silt loam, 0 to 1 percent slopes, occasionally flooded

Map Unit Setting

National map unit symbol: 2y1kr
Elevation: 500 to 1,000 feet
Mean annual precipitation: 40 to 56 inches
Mean annual air temperature: 61 to 64 degrees F
Frost-free period: 200 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Cupco and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cupco

Setting

Landform: Flood-plain steps
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium

Typical profile

A - 0 to 14 inches: silt loam
Bt1 - 14 to 24 inches: silty clay loam
Bt2 - 24 to 45 inches: silty clay loam
BC - 45 to 79 inches: silty clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: OccasionalNone
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 11.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: F118AY010AR - Calcareous Bottomland
Forage suitability group: Unnamed (G118AY070OK)
Other vegetative classification: Unnamed (G118AY070OK)
Hydric soil rating: Yes

Minor Components

Rexor

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Unnamed (G135BY108OK)
Hydric soil rating: No

Neff

Percent of map unit: 5 percent
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Unnamed (G118AY070OK)
Hydric soil rating: No

TcE—Talihina-Eram-Collinsville complex, 5 to 20 percent slopes

Map Unit Setting

National map unit symbol: m5rn
Elevation: 500 to 1,100 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 57 to 63 degrees F
Frost-free period: 200 to 220 days
Farmland classification: Not prime farmland

Map Unit Composition

Talihina and similar soils: 45 percent
Eram and similar soils: 35 percent
Collinsville and similar soils: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Talihina

Setting

Landform: Hillslopes on hills
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Clayey residuum weathered from shale

Typical profile

A - 0 to 6 inches: very stony clay loam
Bw - 6 to 15 inches: clay
Cr - 15 to 25 inches: bedrock

Properties and qualities

Slope: 5 to 20 percent
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 6 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: R112XY083OK - Shallow prairie (Central) PE 62-80
Forage suitability group: Unnamed (G112XY000OK)
Other vegetative classification: Unnamed (G112XY000OK)
Hydric soil rating: No

Description of Eram

Setting

Landform: Hillslopes on hills
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Clayey residuum weathered from sandstone and shale

Typical profile

A - 0 to 10 inches: clay loam
Bt - 10 to 30 inches: clay
Cr - 30 to 40 inches: bedrock

Properties and qualities

Slope: 5 to 20 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 12 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: R112XY060OK - Loamy prairie (Southeast) PE 62-80
Forage suitability group: Unnamed (G112XY232OK)
Other vegetative classification: Unnamed (G112XY232OK)
Hydric soil rating: No

Description of Collinsville

Setting

Landform: Hillslopes on hills
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy residuum weathered from sandstone

Typical profile

A - 0 to 11 inches: stony fine sandy loam
R - 11 to 20 inches: bedrock

Properties and qualities

Slope: 5 to 20 percent
Depth to restrictive feature: 4 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None

Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: R112XY083OK - Shallow prairie (Central) PE 62-80
Forage suitability group: Unnamed (G112XY072OK)
Other vegetative classification: Unnamed (G112XY072OK)
Hydric soil rating: No

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United States Department of Agriculture

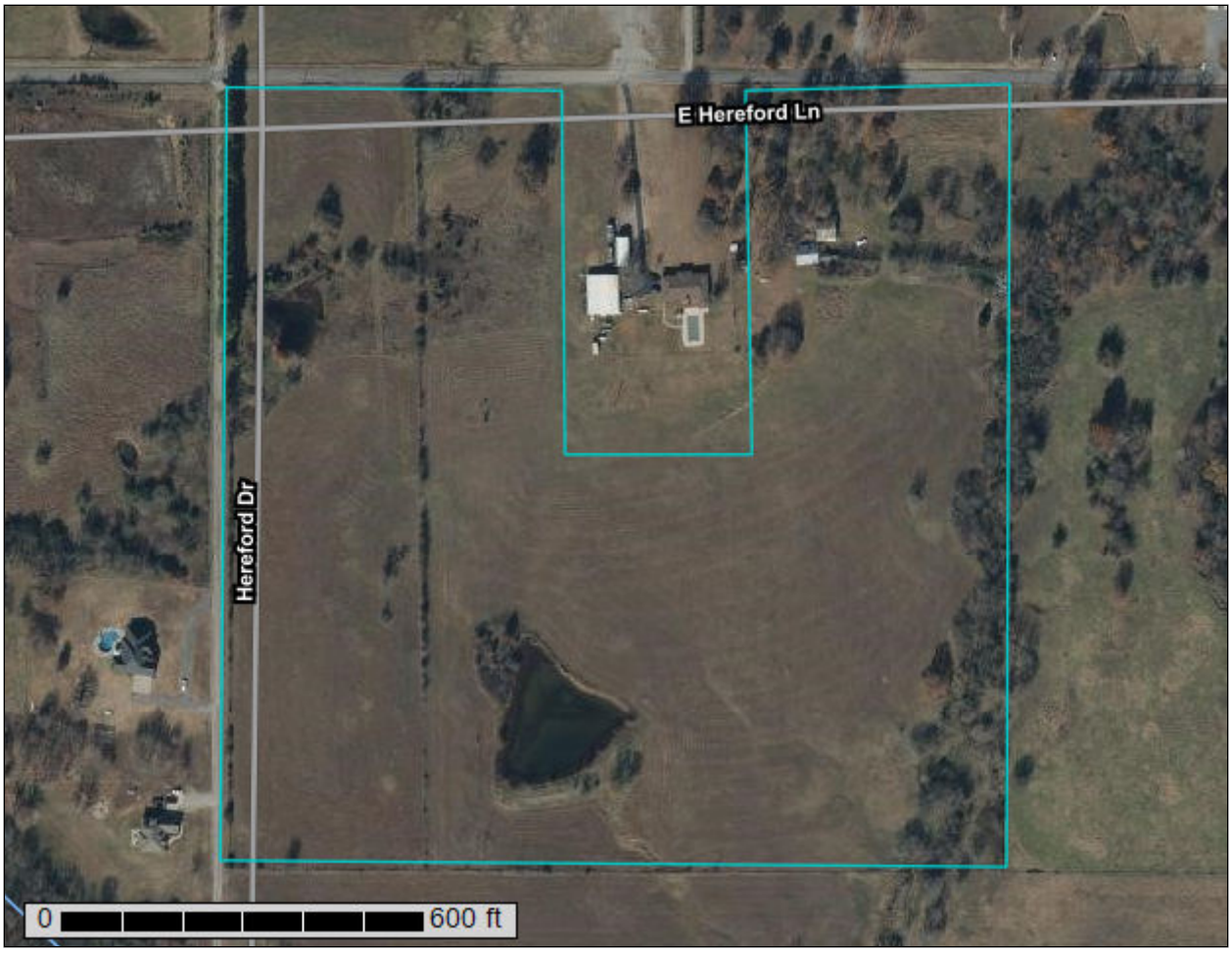
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Pittsburg County, Oklahoma

Site 3



Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

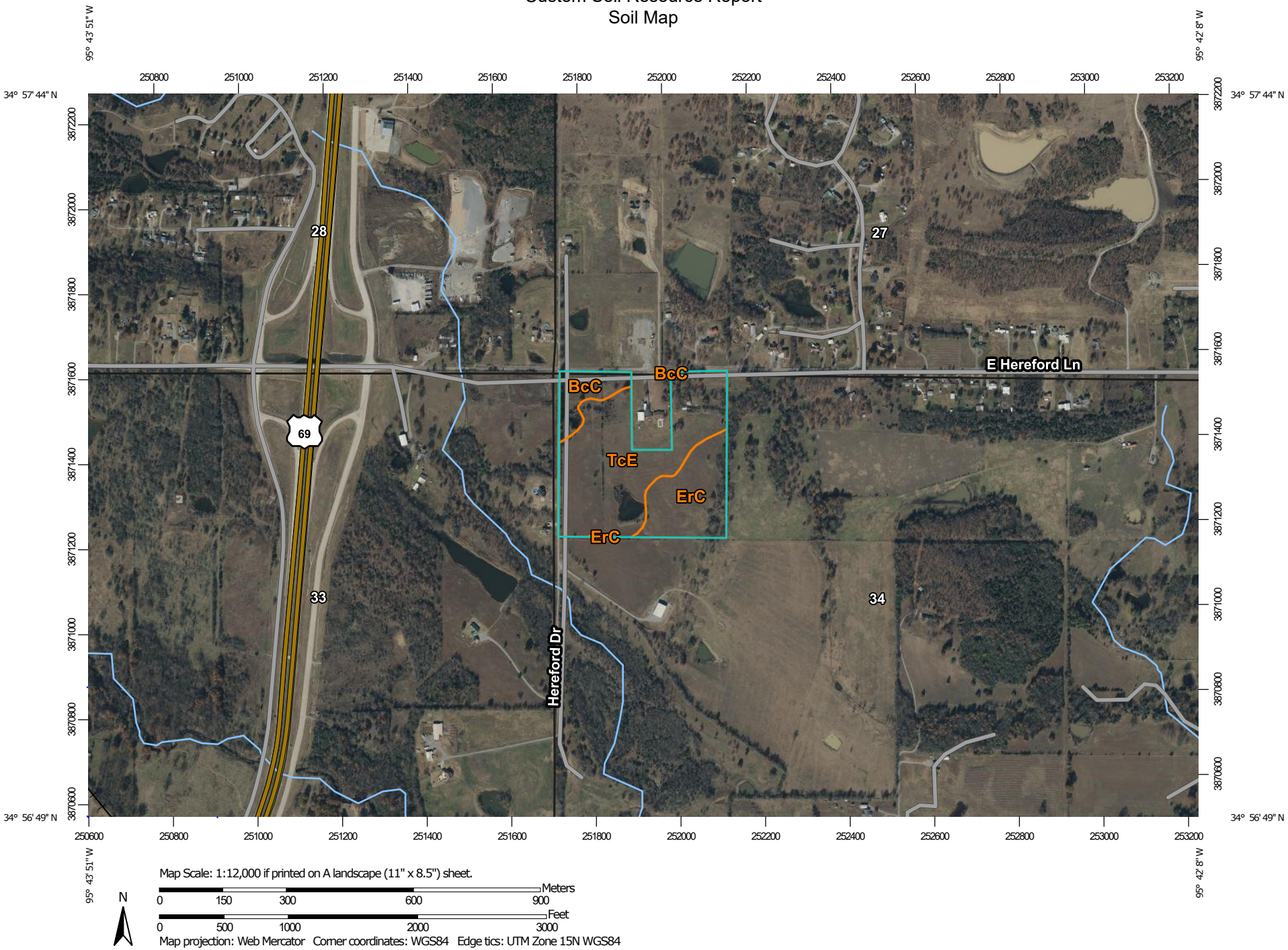
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Political Features

- PLSS Township and Range
- PLSS Section

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Pittsburg County, Oklahoma
Survey Area Data: Version 15, Aug 27, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Nov 30, 2021—Dec 6, 2021

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BcC	Bates-Coweta complex, 3 to 5 percent slopes	3.6	10.5%
ErC	Eram clay loam, 3 to 5 percent slopes	9.0	26.5%
TcE	Talihina-Eram-Collinsville complex, 5 to 20 percent slopes	21.5	63.0%
Totals for Area of Interest		**34.1**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or

landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Pittsburg County, Oklahoma

BcC—Bates-Coweta complex, 3 to 5 percent slopes

Map Unit Setting

National map unit symbol: m5qj
Elevation: 500 to 1,360 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 57 to 64 degrees F
Frost-free period: 170 to 235 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Bates and similar soils: 50 percent
Coweta and similar soils: 40 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bates

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy residuum weathered from sandstone and shale

Typical profile

A - 0 to 5 inches: fine sandy loam
BA - 5 to 15 inches: loam
Bt - 15 to 25 inches: clay loam
Cr - 25 to 50 inches: bedrock

Properties and qualities

Slope: 3 to 5 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R112XY060OK - Loamy prairie (Southeast) PE 62-80
Forage suitability group: Unnamed (G112XY073OK)
Other vegetative classification: Unnamed (G112XY073OK)
Hydric soil rating: No

Description of Coweta

Setting

Landform: Hillslopes on hills
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy residuum weathered from sandstone and shale

Typical profile

A - 0 to 10 inches: fine sandy loam
Bw - 10 to 25 inches: gravelly fine sandy loam
Cr - 25 to 40 inches: bedrock

Properties and qualities

Slope: 3 to 5 percent
Depth to restrictive feature: 10 to 25 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: R112XY087OK - Shallow prairie PE 62-80
Forage suitability group: Unnamed (G112XY018OK)
Other vegetative classification: Unnamed (G112XY018OK)
Hydric soil rating: No

Minor Components

Dennis

Percent of map unit: 6 percent
Landform: Hillslopes on hills
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R112XY060OK - Loamy prairie (Southeast) PE 62-80
Other vegetative classification: Unnamed (G112XY091OK)
Hydric soil rating: No

Eram

Percent of map unit: 4 percent
Landform: Hillslopes on hills
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R112XY060OK - Loamy prairie (Southeast) PE 62-80
Other vegetative classification: Unnamed (G112XY069OK)
Hydric soil rating: No

ErC—Eram clay loam, 3 to 5 percent slopes

Map Unit Setting

National map unit symbol: m5r1
Elevation: 500 to 1,200 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 57 to 63 degrees F
Frost-free period: 190 to 220 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Eram and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Eram

Setting

Landform: Hillslopes on hills
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Clayey residuum weathered from sandstone and shale

Typical profile

A - 0 to 8 inches: clay loam
Bt - 8 to 32 inches: clay
Cr - 32 to 40 inches: bedrock

Properties and qualities

Slope: 3 to 5 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 12 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D
Ecological site: R112XY060OK - Loamy prairie (Southeast) PE 62-80
Forage suitability group: Unnamed (G112XY069OK)
Other vegetative classification: Unnamed (G112XY069OK)
Hydric soil rating: No

Minor Components

Talihina

Percent of map unit: 3 percent
Landform: Hillslopes on hills
Landform position (two-dimensional): Shoulder
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R112XY086OK - Shallow prairie (Eastern) PE 62-80
Other vegetative classification: Unnamed (G112XY000OK)
Hydric soil rating: No

Dennis

Percent of map unit: 2 percent
Landform: Hillslopes on hills
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R112XY060OK - Loamy prairie (Southeast) PE 62-80
Other vegetative classification: Unnamed (G112XY091OK)
Hydric soil rating: No

TcE—Talihina-Eram-Collinsville complex, 5 to 20 percent slopes

Map Unit Setting

National map unit symbol: m5rn
Elevation: 500 to 1,100 feet
Mean annual precipitation: 35 to 46 inches
Mean annual air temperature: 57 to 63 degrees F
Frost-free period: 200 to 220 days
Farmland classification: Not prime farmland

Map Unit Composition

Talihina and similar soils: 45 percent
Eram and similar soils: 35 percent
Collinsville and similar soils: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Talihina

Setting

Landform: Hillslopes on hills
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Clayey residuum weathered from shale

Typical profile

A - 0 to 6 inches: very stony clay loam
Bw - 6 to 15 inches: clay

Cr - 15 to 25 inches: bedrock

Properties and qualities

Slope: 5 to 20 percent
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 6 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: R112XY083OK - Shallow prairie (Central) PE 62-80
Forage suitability group: Unnamed (G112XY000OK)
Other vegetative classification: Unnamed (G112XY000OK)
Hydric soil rating: No

Description of Eram

Setting

Landform: Hillslopes on hills
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Clayey residuum weathered from sandstone and shale

Typical profile

A - 0 to 10 inches: clay loam
Bt - 10 to 30 inches: clay
Cr - 30 to 40 inches: bedrock

Properties and qualities

Slope: 5 to 20 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 12 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: R112XY060OK - Loamy prairie (Southeast) PE 62-80
Forage suitability group: Unnamed (G112XY232OK)
Other vegetative classification: Unnamed (G112XY232OK)
Hydric soil rating: No

Description of Collinsville

Setting

Landform: Hillslopes on hills
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy residuum weathered from sandstone

Typical profile

A - 0 to 11 inches: stony fine sandy loam
R - 11 to 20 inches: bedrock

Properties and qualities

Slope: 5 to 20 percent
Depth to restrictive feature: 4 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: R112XY083OK - Shallow prairie (Central) PE 62-80
Forage suitability group: Unnamed (G112XY072OK)
Other vegetative classification: Unnamed (G112XY072OK)
Hydric soil rating: No

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EXHIBIT I

OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY FORM 850SMP

OKLAHOMA
DEPARTMENT OF ENVIRONMENTAL QUALITY

Oklahoma Department of Environmental Quality
707 N. Robinson, OKC OK 73102-6010

Application for
Municipal Sludge Land Application Permit

As required by the Oklahoma Environmental Quality Code

This application is to be submitted to obtain a Municipal Sludge Land Application Permit.
Application, plans, and specifications submitted in triplicate through the County DEQ personnel.

To the Executive Director of The Department of Environmental Quality
Department of Environmental Quality
Water Quality Division
P.O. Box 1677
Oklahoma City, OK 73101-1677

Date: 8-31-2022

Application

The applicant, McAlester Public Works Auth (Name of Applicant (Print or Type)), proposes to land apply sludge generated at Northeast WWTF (Name of Treatment Plant (Print or Type)), facility ID No. S-20635, located at Sec 32, T6N, R15E, Indian Meridian, Pittsburg County (Legal Description)

McAlester Public Works Auth (Name of Applicant), hereby makes application for a permit to land apply sludge as required by OAC 252:606 of the Oklahoma Environmental Quality Code, 27A O.S. Supp. 2000, Section 2-1-2-101 et seq., the Solid Waste Management Act, 27A:2-10-101 et siq., Article VI of the Code [Water Quality], 27A:2-6-101 et siq., the Oklahoma Pollutant Discharge Elimination System Act, 27A:2-6-201 et sig. And any rules and regulations pursuant thereto.

Applicant Signature

Note: Application must be signed by the authorized chief elective or executive officer of the applicant. Information must be legible.

Signature	McAlester Public Works Authority (Name of Organization (Print or Type))
J. David Andren (Name of Authorized Signature (Print or Type))	28 E. Washington Ave (Street Address (Print or Type))
City Manager (Title)	McAlester, OK 74501 (City/State/Zip Code)

COUNTY DEQ PERSONNEL ONLY	**DO NOT USE THIS SPACE - ODEQ ONLY**
I have had the opportunity to review this application and comment on it. Signature: _____ Title: _____ County: _____ Date: _____	

SITE NAME/ DESIGNATION	STREET NAME (if applicable)	LEGAL DESCRIPTION (including county)	LONGITUDE LATITUDE
Site 1 - NW 1/4 and Part of the NW 1/4 of the NE 1/4 of Sec 17, T6N, R14E of East-Indian Meridian, Pittsburg County, 34 59'45"N, 95 51'13"W			
Site 2 - Part of NW 1/4 and Part of the SW 1/4 of Sec 34, T6N, R14E of East-Indian Meridian, Pittsburg County, 34 57'01"N, 95 42'56"W			
Site 1 - Part of NW 1/4 of NW 1/4 of Sec 34, T6N, R14E of East-Indian Meridian, Pittsburg County, 34 57'14"N, 95 42'60"W			

EXHIBIT J

OKLAHOMA DEQ APPLICATION FOR LAND APPLICATION

OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY
APPLICATION FOR AUTHORIZATION TO BE COVERED UNDER GENERAL PERMIT GP NO ____
FOR LAND APPLICATION OF SEWAGE SLUDGE

FORM_____

FOR DEQ USE ONLY	**Application/Permit Number GP** _____ **Date Received** _____ **One Time Land Application** _____, **Minor Facility** _____ **DEQ Biosolids Coordinator** _____

SECTION I

1. **Legal name of applicant:**
   McAlester Public Works Authority - McAlester Northeast WWTF
2. **Mailing address of applicant:**
   Street address or PO Box PO Box 578
   City McAlester County Pittsburg State OK Zip 74502
   Telephone (____) 918.423.9300
3. **Name and address of facility:**
   Facility Name McAlester Northeast WWTF
   City McAlester County Pittsburg State OK Zip 74502
4. **Location of land application site:**
   Legal Description: SE ¼, NW¼, NE¼, Sec 32, T 6N, R 15E. (X) IM ( ) CM.
   Entry Point: Longitude 34 57'17"N Latitude 95 44'36"W
5. **Type Ownership** Public (X) Private ( ) Federal ( ) State ( )
6. **Contact Person:**
   Name & Title Wayne Russell - Wastewater Treatment Superintendent
   Street address or PO Box 1360 E Krebs Street, McAlester, OK 74501
   City _____ County _____ State _____ Zip _____
   Telephone (918) 423.9656
7. **Type of Treatment:**
   Minor Facility: Design Capacity 2.0 Estimated Sludge Production varies Dry Tons/Year
   Lagoon: Estimated sludge quantity 1,000 Dry Tons
   Other sludge storage facility: Estimated sludge quantity N/A (Dry Tons)
8. **Does Facility Receive Industrial Wastes?** Yes (X) No ( )
   If "yes", What is the average daily industrial waste flow Varies GPD See Permit OK0026107 Fact Sheet
   If the facility receives wastewater from a categorical industry, you must submit Section II of this form (attached) for each categorical industrial facility discharging to the sewer system.
9. **Are industrial discharge(s) to the system controlled by ordinance?** Yes ( ) No (X)

10. Sludge generated by the facility:

A. When was the last time sludge was removed from the facility (date) Drying beds annually

B. Was removal authorized by DEQ? Yes (X) No ( )

C. How was it disposed of (describe the disposal method) Landfill

D. Location(s) of the disposal site(s) (legal description to the nearest 10 acres) McAlester Municipal Landfill

E. Sludge Management Plan, if any:
Sludge Plan ID Number One Time Cleanout approved by the Department of Environmental Quality

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I also certify that I will provide for the operation of this facility in accordance with the Oklahoma Discharge Permits and Pollution Control Regulations and will provide certified operators as required by the Oklahoma Water and Wastewater Operations Certification Act. I further certify that I shall acquire or possess a right to the use of the property or properties on which the land application activities are located as well as the access route thereto. I understand I shall maintain such right of use and access for the duration of the permit term. I am aware that there are significant penalties for submitting false information, including revocation of the permit and the possibility of fine and imprisonment.

Note: Application must be signed by the authorized chief elective or executive officer of the applicant, or by the applicant, if an individual.

Name (print) X JOEL DAVID ANDREW

Title CITY MANAGER

Date 12 SEP 22

Signature [signature]

Subscribed and sworn to before me this 12th *day of* September 2022

Sophia Collins West *My commission expires* 10-14-2025

This application shall be filed in duplicate with the original and one copy to be submitted to the DEQ, and one copy to be submitted to the local DEQ office.

Please return completed form with attachments to:

Water Quality Division
Department of Environmental Quality
707 N. Robinson, P>O. Box 1677
Oklahoma City, Oklahoma 73102-1677

SOPHIA COLLINS WEST NOTARY PUBLIC # 21013533 EXP. 10-14-2025 IN AND FOR STATE OF OKLAHOMA PITTSBURG COUNTY

EXHIBIT K

MASTER SITE LIST – FIELD 1

CITY OF MCALESTER NORTHEAST WWTP, OK APPLICATION
MASTER SITE LIST 2022

TOTALS:	275.0						8,524.61		20,459,069
Field ID	Total Acres	2022 Crop	Anticipated Crop	Nitrogen Rate lbs per Acre *	Plant Available Nitrogen (Lbs / Dry Ton)	Application Rate Dry Tons per Acre	Total Dry Tons to be Applied	Application Rate Gallons per Acre (@10% Solids)**	Total Gallons (@ 10% Solids)
1	150.0	Berm	Bermudagrass	230.0	7.537	30.5	4,577.42	73,239	10,985,803
2	100.0	Berm	Bermudagrass	240.0	7.537	31.8	3,184.29	76,423	7,642,298
3	25.0	Berm	Bermudagrass	230.0	7.537	30.5	762.90	73,239	1,830,967

*** Per Servi-Tech Laboratories Soil Analysis Report Recommendation (4 Dry Tons / Ac)**

**** Agronomic Application Rate (dt/ac) / % Total Solids (as a decimal) x 240**

From: Shane Hacker
Sent: Friday, September 23, 2022 8:56 AM
To: Aaron Gruenewald <agruenewald@hodgesfd.com>
Subject: McAlester 1x permit

Hey Aaron,

Below is the check list I use when reviewing these permits. The highlighted portions are things I have questions about. Please either resubmit the report or email me the specific parts that need revision.

- 850SMP
  - Good
- Application for a 1-time app general permit (attached)
  - Good
- Land owner agreement
  - Missing Dersh; requested 9/21/2022
- Percent solids of sludge
  - Good, 4 composites – Av 10.2; min 9.6; max 11.1
- Estimated volume or weight to be disposed
  - Good, 1000 dry tons
- Site map showing buffer zone requirements
  - The soil maps do not show buffer zones.
- Application rate (mass per area)
  - The application states that they will be limited to an approximate max hydraulic application rate of 30,000 gallons per acre. Rate is limited by percent solids. 1 dry tons per acre should provide ~7.5 lbs of nitrogen.
  - **DEQ's regulations forbid the applicant from exceeding 27,000 gallons per acre per daily application (~1" per acre).**

CITY OF MCALESTER NORTHEAST WWTP, OK APPLICATION
MASTER SITE LIST 2022

TOTALS:	275.0						8,524.61		20,459,069
Field ID	Total Acres	2022 Crop	Anticipated Crop	Nitrogen Rate lbs per Acre *	Plant Available Nitrogen (Lbs / Dry Ton)	Application Rate Dry Tons per Acre	Total Dry Tons to be Applied	Application Rate Gallons per Acre (@10% Solids) **	Total Gallons (@ 10% Solids)
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2	100.0	Berm	Bermudagrass	240.0	7.537	31.8	3,184.29	76,423	7,642,296
3	25.0	Berm	Bermudagrass	230.0	7.537	30.5	762.90	73,239	1,830,967

* Per Servi-Tech Laboratories Soil Analysis Report Recommendation (4 Dry Tons / Ac)

** Agronomic Application Rate (dt/ac) / % Total Solids (as a decimal) x 240

- I am confused by this Master Site List, featured on the last page of the report –
  - The Master shows 8524.61 dry tons and 20.4M gallons?
  - Section A states: 3,000,000 million gallons / 1,000 dry tons of biosolids
  - I may need you to walk me through this information assuming these values don't need revision
- Application method/Vector reduction method
  - Pull tanks will be equipped with toolbars used to subsurface inject or surface apply the biosolids – This should be okay, because it says it will be incorporated in another part of the report.
- Agronomic rate calculations (NPK for soil, nutrients for sludge)
  - Master Site List
- TCLP

    - Exhibit C
- 503 metals for both site and sludge
    - Good, Exhibit G for sites; Exhibit C for sludge
- Pathogen reduction method
    - Exhibit D – Fecal Results of sludge

Sample ID	Results (cfu/g)
1-Fecal	1,239
2-Fecal	1,025
3-Fecal	1,961
4-Fecal	923

- PCBs for sludge
    - Exhibit C

Thank you.

Shane Hacker, P.E.
Municipal Wastewater Enforcement Section
Water Quality Division
Oklahoma Department of Environmental Quality
Phone: 405.702.8108
Fax: 405.702.8101

From: Aaron Gruenewald <agruenewald@hodgesfd.com>
Sent: Friday, September 23, 2022 11:36 PM
To: Shane Hacker <Shane.Hacker@deq.ok.gov>
Subject: [EXTERNAL] Re: McAlester 1x permit

Answers in red... and attached maps and consent form.

From: Shane Hacker <Shane.Hacker@deq.ok.gov>
Sent: Friday, September 23, 2022 8:56 AM
To: Aaron Gruenewald <agruenewald@hodgesfd.com>
Subject: McAlester 1x permit

Hey Aaron,

Below is the check list I use when reviewing these permits. The highlighted portions are things I have questions about. Please either resubmit the report or email me the specific parts that need revision.

- 850SMP
  - Good
- Application for a 1-time app general permit (attached)
  - Good
- Land owner agreement
  - Missing Dersh; requested 9/21/2022 - Attached! Sayer part of Trust...
- Percent solids of sludge
  - Good, 4 composites – Av 10.2; min 9.6; max 11.1
- Estimated volume or weight to be disposed
  - Good, 1000 dry tons
- Site map showing buffer zone requirements
  - The soil maps do not show buffer zones. - Attached! More importantly everything is field verified as well so nothing is missed. Maps are just guidance. Additional comments/setback/information did not come through on final document for some reason. Maps attached.
- Application rate (mass per area)
  - The application states that they will be limited to an approximate max hydraulic application rate of 30,000 gallons per acre. Rate is limited by percent solids. 1 dry tons per acre should provide ~7.5 lbs of nitrogen.
  - **DEQ's regulations forbid the applicant from exceeding 27,000 gallons per acre per daily application (~1" per acre).** - We are not able to put that much down typically per acre (1" of water) so we are limited to a max of 27,000 gallons per acre in a daily application. Typically around 20,000 to 25,000 based on site conditions.

CITY OF MCALESTER NORTHEAST WWTP, OK APPLICATION
MASTER SITE LIST 2022

Field ID	Total Acres	2022 Crop	Anticipated Crop	Nitrogen Rate lbs per Acre *	Plant Available Nitrogen (Lbs / Dry Ton)	Application Rate Dry Tons per Acre	Total Dry Tons to be Applied	Application Rate Gallons per Acre (@10% Solids) **	Total Gallons (@ 10% Solids)
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2	100.0	Berm	Bermudagrass	240.0	7.537	31.8	3,184.29	76,423	7,642,298
3	25.0	Berm	Bermudagrass	230.0	7.537	30.5	762.90	73,239	1,830,967

* Per Servi-Tech Laboratories Soil Analysis Report Recommendation (4 Dry Tons / Ac)

** Agronomic Application Rate (dt/ac) / % Total Solids (as a decimal) x 240

- I am confused by this Master Site List, featured on the last page of the report –
  - The Master shows 8524.61 dry tons and 20.4M gallons? This Master Site List shows the maximum allowed for the fields based on a crop need for nitrogen/soil tests and lab analytical results showing lbs of N per dry ton. It just shows we can not apply enough to meet the maximum application rate is all. Never able to apply ~30 dry tons...
  - Section A states: 3,000,000 million gallons / 1,000 dry tons of biosolids - The project should entail approx 3,000,000 million gallons total or approx 1,000 dry tons based on solids testing. All dependent on lagoon level when we start and solids content. Good estimate though.
  - I may need you to walk me through this information assuming these values don't need revision
- Application method/Vector reduction method
  - Pull tanks will be equipped with toolbars used to subsurface inject or surface apply the biosolids – This should be okay, because it says it will be incorporated in another part of the report.
- Agronomic rate calculations (NPK for soil, nutrients for sludge)
  - Master Site List - Again Master Site List just shows maximus allowed based on biosolids and soil testing.
- TCLP
  - Exhibit C
- 503 metals for both site and sludge
  - Good, Exhibit G for sites; Exhibit C for sludge
- Pathogen reduction method
  - Exhibit D – Fecal Results of sludge

Sample ID	Results (cfu/g)
1-Fecal	1,239
2-Fecal	1,025
3-Fecal	1,961
4-Fecal	923

- PCBs for sludge
  - Exhibit C

Thank you.
Shane Hacker, P.E.
Municipal Wastewater Enforcement Section
Water Quality Division
Oklahoma Department of Environmental Quality
Phone: 405.702.8108
Fax: 405.702.8101

Hodges Farms and Dredging

501 N West Street Lebo, KS 66856 • 620-343-0513 • [illegible]@hodgesfd.com • www.hodgesfd.com

Landowner Consent Form

Date: 7-14-2022

I, ______________________ give Hodges Farms and Dredging, LLC

permission to land apply biosolids on the following land:

Physical Address: 616 E Hubbard Lane, McAlester, OK

Legal Address: 616 E Hubbard Lane, McAlester, OK

Sec 24 T6N R15E

Crop Production: Hay/Grass ______ Yield 6 Ton

Landowner/Tennant Contact Information

Please Print

Name: ______________________

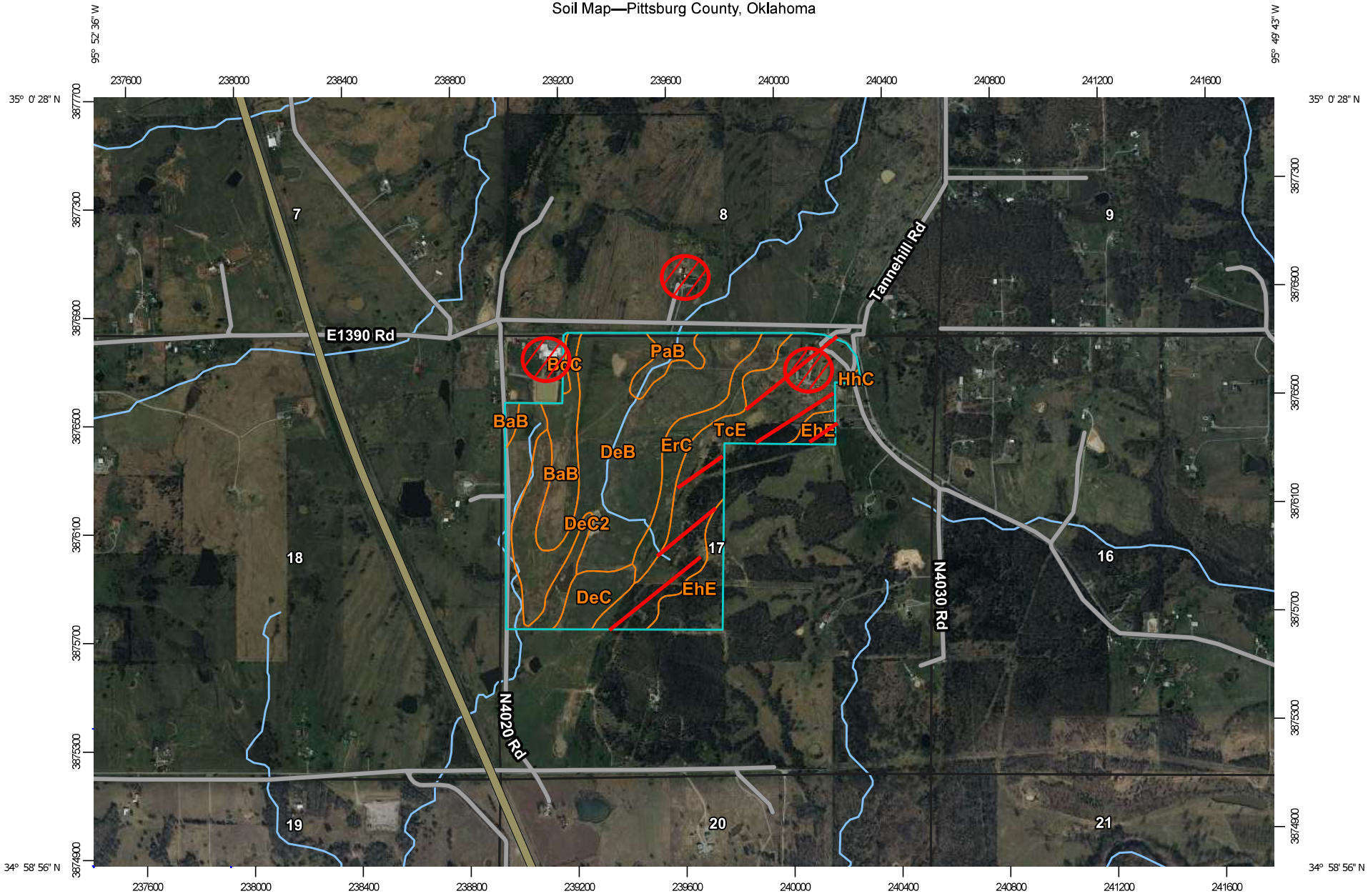
Address: ______________________

Phone: ____________ Email: ____________

Signature: ______________________

Hodges Farms and Dredging, LLC Signature: ______________________

Soil Map—Pittsburg County, Oklahoma



Map Scale: 1:20,000 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 250 500 1000 1500

Feet: 0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

Residence/Private Domestic Water Supply - 250'

Surface Water (Incorporation/Injection) - 100'

Unsuitable Soil Type for Application or No App.

USDA **Natural Resources Conservation Service**

Web Soil Survey
National Cooperative Soil Survey

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Political Features
- PLSS Township and Range
- PLSS Section

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Pittsburg County, Oklahoma
Survey Area Data: Version 15, Aug 27, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

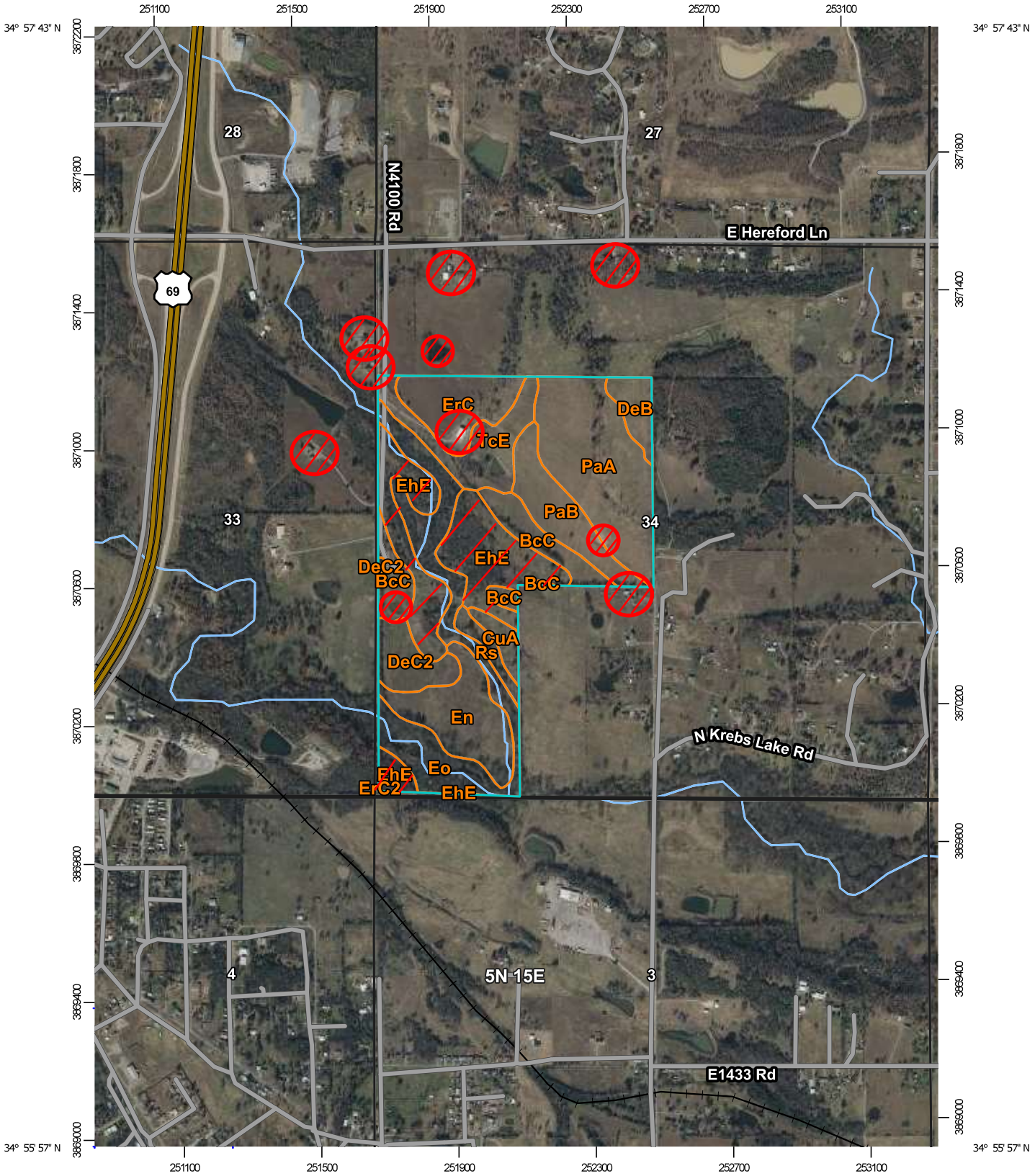
Date(s) aerial images were photographed: Mar 29, 2021—Apr 1, 2021

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BaB	Bates fine sandy loam, 1 to 3 percent slopes	19.2	7.7%
BcC	Bates-Coweta complex, 3 to 5 percent slopes	0.9	0.3%
DeB	Dennis loam, 1 to 3 percent slopes	94.5	37.7%
DeC	Dennis loam, 3 to 5 percent slopes	10.2	4.1%
DeC2	Dennis loam, 3 to 5 percent slopes, eroded	20.0	8.0%
EhE	Bengal-Clebit-Clearview complex, 5 to 30 percent slopes	18.0	7.2%
ErC	Eram clay loam, 3 to 5 percent slopes	18.8	7.5%
HhC	Clebit-Clearview complex, 3 to 5 percent slopes	0.4	0.2%
PaB	Parsons silt loam, 1 to 3 percent slopes	7.2	2.9%
TcE	Talihina-Eram-Collinsville complex, 5 to 20 percent slopes	61.3	24.5%
Totals for Area of Interest		**250.3**	**100.0%**

Soil Map—Pittsburg County, Oklahoma
(Site 2)



Map Scale: 1:15,800 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 200 400 800 1200

Feet: 0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

Residence/Private Domestic Water Supply - 250'

Surface Water (Incorporation/Injection) - 100'

Unsuitable Soil Type for Application or No App

USDA **Natural Resources Conservation Service**

Web Soil Survey
National Cooperative Soil Survey

MAP LEGEND

Area of Interest (AOI)
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MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Pittsburg County, Oklahoma
Survey Area Data: Version 15, Aug 27, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

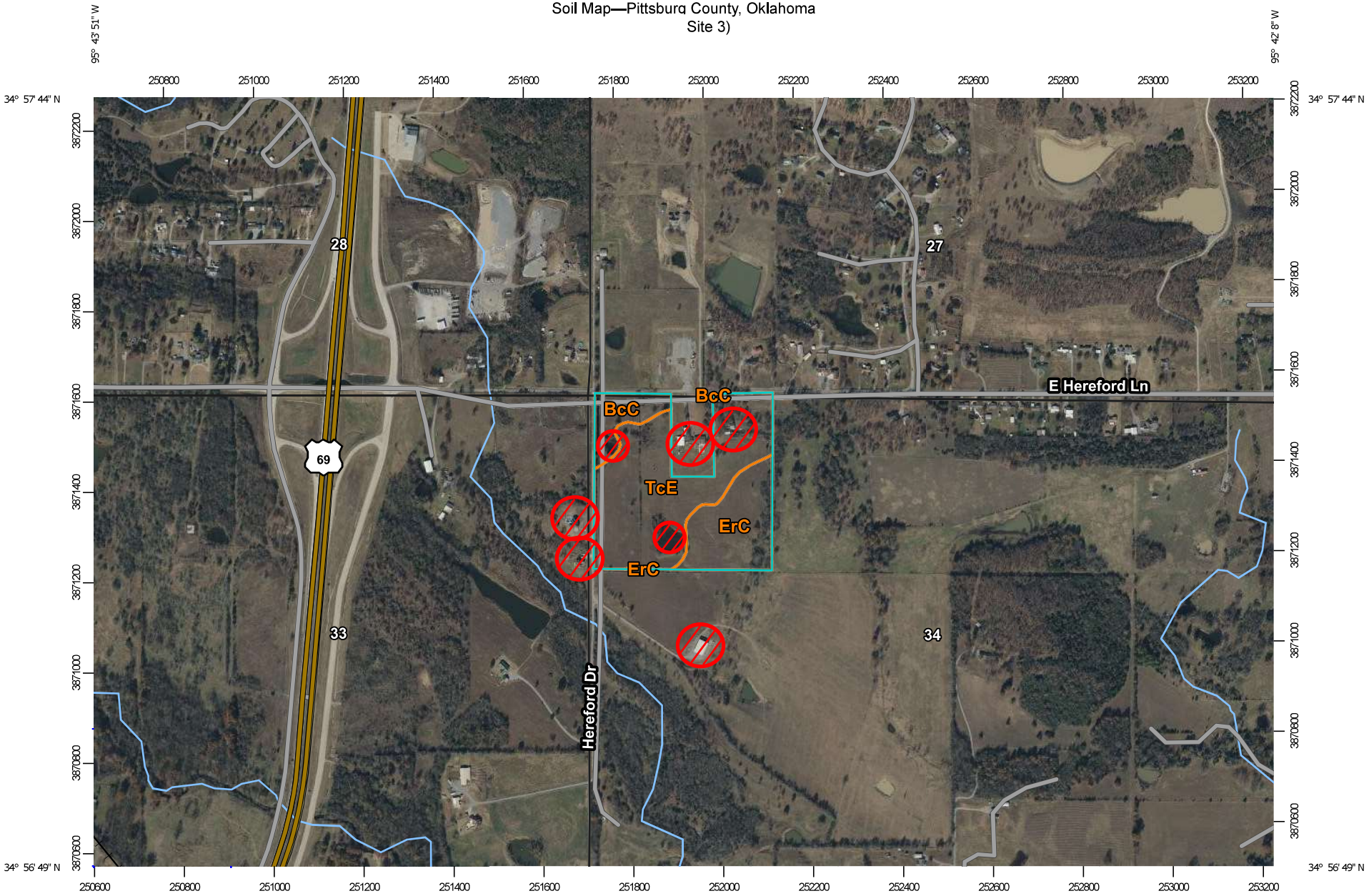
Date(s) aerial images were photographed: Nov 30, 2021—Dec 6, 2021

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BcC	Bates-Coweta complex, 3 to 5 percent slopes	13.5	7.5%
CuA	Counts loam, 0 to 1 percent slopes	3.0	1.6%
DeB	Dennis loam, 1 to 3 percent slopes	4.9	2.7%
DeC2	Dennis loam, 3 to 5 percent slopes, eroded	8.1	4.5%
EhE	Bengal-Clebit-Clearview complex, 5 to 30 percent slopes	33.2	18.3%
En	Rexor silt loam, 0 to 1 percent slopes, occasionally flooded	17.2	9.5%
Eo	Rexor and Verdigris soils, 0 to 1 percent slopes, frequently flooded	27.7	15.3%
ErC	Eram clay loam, 3 to 5 percent slopes	13.2	7.2%
ErC2	Eram clay loam, 3 to 5 percent slopes, eroded	0.0	0.0%
PaA	Parsons silt loam, 0 to 1 percent slopes	31.7	17.5%
PaB	Parsons silt loam, 1 to 3 percent slopes	12.8	7.0%
Rs	Cupco silt loam, 0 to 1 percent slopes, occasionally flooded	3.0	1.7%
TcE	Talihina-Eram-Collinsville complex, 5 to 20 percent slopes	13.2	7.3%
Totals for Area of Interest		**181.5**	**100.0%**

Soil Map—Pittsburg County, Oklahoma
Site 3)



Map Scale: 1:12,000 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 150 300 600 900

Feet
0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

Residence/Private Domestic Water Supply - 250'

Surface Water (Incorporation/Injection) - 100'

Unsuitable Soil Type for Application or No App

USDA **Natural Resources Conservation Service**

Web Soil Survey
National Cooperative Soil Survey

MAP LEGEND

Area of Interest (AOI)
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MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BcC	Bates-Coweta complex, 3 to 5 percent slopes	3.6	10.5%
ErC	Eram clay loam, 3 to 5 percent slopes	9.0	26.5%
TcE	Talihina-Eram-Collinsville complex, 5 to 20 percent slopes	21.5	63.0%
Totals for Area of Interest		**34.1**	**100.0%**

HODGES FARMS
AND DREDGING, L.L.C.

RECEIVED
Sep 28 2022
WATER QUALITY DIVISION

September 28, 2022

Shane Hacker, P.E.
Municipal Wastewater Enforcement Section
Water Quality Division
Oklahoma Department of Environmental Quality
707 N. Robinson Street
Oklahoma City, OK 73102

Re: <u>One Time Application of Biosolids McAlester OK – Northeast WWTF</u>
Permit Request Section A - Biosolids Management Operations Plan Clarification

Dear Shane:

As discussed Hodges Farms and Dredging (HFD) is providing additional requested information and clarification regarding the submitted One Time Application of Biosolids for McAlester, OK Northeast WWTF Section A – Biosolids Management Operations Plan regarding the following statement, specifically the bold and underlined sentence:

Recommendations for crop nitrogen and phosphorus will guide application rates. **<u>We are limited to an approximate max hydraulic application rate of 30,000 gallons per acre.</u>** Rate is limited by percent solids. 1 dry tons per acre should provide ~7.5 lbs of nitrogen, 11 lbs of phosphorus, and 6 lbs of potassium based on testing. All sites receiving McAlester NE WWTF biosolids will be managed as grass hay/bermudagrass.

This letter provided further clarification and commitment that HFD will not exceed the ODEQ max application rate of 27,000 gallons per acre in a daily application. By revising this statement it should have read the following:

Recommendations for crop nitrogen and phosphorus will guide application rates. **<u>Application rates will be limited to a max application rate of 27,000 gallons per acre in a daily application. The daily application will not allow runoff or surface ponding to occur.</u>** Rate is limited by percent solids. 1 dry tons per acre should provide ~7.5 lbs of nitrogen, 11 lbs of phosphorus, and 6 lbs of potassium based on testing. All sites receiving McAlester NE WWTF biosolids will be managed as grass hay/bermudagrass.

If you have further questions or need additional information please let me know.

Aaron C. Gruenewald

Aaron Gruenewald
Hodges Farms and Dredging, LLC