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March 18, 2019

Jason Koontz
Environmental Scientist
Bureau of Waste Management
Kansas Department of Health and Environment
1000 SW Jackson, Suite 320
Topeka, KS 66612

RE: Revised: RCRA Permit Modification Request
KSD007128507
Former Farmland Industries Nitrogen Plant
Lawrence, KS 66046

Dear Mr. Koontz:

This letter is in reference to the Resource Conservation and Recovery Act (RCRA) permit (the Permit, US EPA Permit I.D. KSD 007128507, Subpart H), jointly issued by the Kansas Department of Health and Environment (KDHE) and the United States Environmental Protection Agency (US EPA), dated 1993, which identifies post-closure care and monitoring requirements for the Chromium Reduction System (CRS) Unit at the former Farmland Nitrogen Facility located at 1608 North 1400 Road in Lawrence, Kansas. The permit consists of Part I, which pertains to the CRS Unit, overseen by the Kansas Department of Health and Environment (KDHE) Bureau of Waste Management (BWM), and Part II, which pertains to solid waste management units, jointly overseen by Region 7 of the Environmental Protection Agency (EPA) and the KDHE Bureau of Environmental Remediation (BER) under Consent Order No. 10-E-94 BER. The Permit was renewed by Farmland Industries, Inc. (FII) in 2002. In 2010, the Permit was transferred to the City of Lawrence. Post-closure care and monitoring activities followed the Post-Closure Care and Monitoring Plan, revised by FII in 2002 in their Post-Closure Care Permit renewal application

On November 16, 2018, the City of Lawrence and contracted environmental consultant, GHD Inc., submitted a Post Closure Care Completion Certification report based on completion of the post-closure care as prescribed by the monitoring plan, supplemental work plans, and applicable sections of Federal regulations. The Certification of Post



Closure Care Report, as prepared by GHD, is attached to this letter. In a letter dated January 16, 2019, also attached, KDHE BWM accepted this post closure care report and granted permission for the City to submit a permit modification request. As such, **the purpose of this letter is to submit a Class I permit modification to request a change in the permit expiration date to allow earlier permit termination in accordance with 40 CFR 270.42(a).**

The attached documentation, including the Post Closure Care Certification Report and approval letter, serves as the supporting documentation for this request.

In accordance with 40 CFR 270.42(a)(ii), following your approval of this request the City of Lawrence will notify the mailing list addresses as maintained by KDHE, publish notice in the Lawrence Journal World, and notify the City of Lawrence City Manager Tom Markus and the Douglas County Commission of the permit change.

We appreciate the collaborative efforts from GHD, KDHE BWM, KDHE BER, US EPA Region 7 in pursuing this permit modification. Please contact me if you have any questions regarding the request.

Sincerely,



Sarah Graves.
Project Engineer

cc: Cathryn Mallonee, KDHE
Ruby Crysler, US EPA
Tom Markus, City of Lawrence, Kansas

January 16, 2019

Sarah Graves
Project Manager
City of Lawrence
P.O. Box 708
Lawrence, KS 66044

RE: Post-Closure Care Completion Certification Report
Former Farmland Industries Nitrogen Plant
EPA ID Number KSD007128507

Dear Ms. Graves,

The Kansas Department of Health and Environment (KDHE) Bureau of Waste Management (BWM) reviewed the Post-Closure Care Completion Certification Report submitted on November 16, 2018 and revised Introduction Page submitted on January 11, 2019. KDHE has determined the certification report sufficiently demonstrates that the post-closure care period for the hazardous waste disposal unit was performed in accordance with the specifications in the approved post-closure plan as stipulated in 40 CFR 264.120. KDHE approves the certification of completion of post-closure care and hereby releases the City of Lawrence from the financial assurance requirements for post-closure care under 264.145(i).

Furthermore, the City of Lawrence may now submit a Class 1 permit modification to request a change in the permit expiration date to allow earlier permit termination, in accordance with 40 CFR 270.42(a) [Appendix I, A.6.]. The early permit termination modification request must be submitted to both the KDHE Secretary and the United States Environmental Protection Agency (EPA) Regional Administrator as the permit was administered jointly by the State of Kansas and EPA. Additionally, the mailing and notice requirements under 40 CFR 270.42(a)(ii) must also be performed.

Please submit the permit modification request and supporting documents by March 16, 2019. If you have any question or concerns regarding this letter, contact Jason Koontz at 785-296-6597 or jason.koontz@ks.gov.

Respectfully,



Jason Koontz

cc: USEPA Region 7 - Ruby Crysler
DEA NEDO – Tom Winn
BER – Maura O'Halloran
BWM – Julie Coleman→Everett Spellman→Jason Koontz→/ Former Farmland Nitrogen Plant Site File
(KSD007128507)



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November 16, 2018

Registered Mail

Mr. Jason Koontz
Bureau of Waste Management
Hazardous Waste Permits
1000 SW Jackson, Suite 320
Topeka, Kansas 66612-1366

Dear Mr. Koontz:

**Re: Post-Closure Completion Certification Report
RCRA CRS Unit - Farmland Nitrogen Plant Remediation
1608 North 1400 Road
Lawrence, Kansas 66046
KSD 007128507**

Please find enclosed the Post-Closure Completion Certification Report for the above referenced facility. Feel free to contact me with any questions concerning this report.

Sincerely,

Sarah Graves
Project Manager

Encl.

cc: Kurt Limesand, US EPA Region 7
David Hempleman, GHD

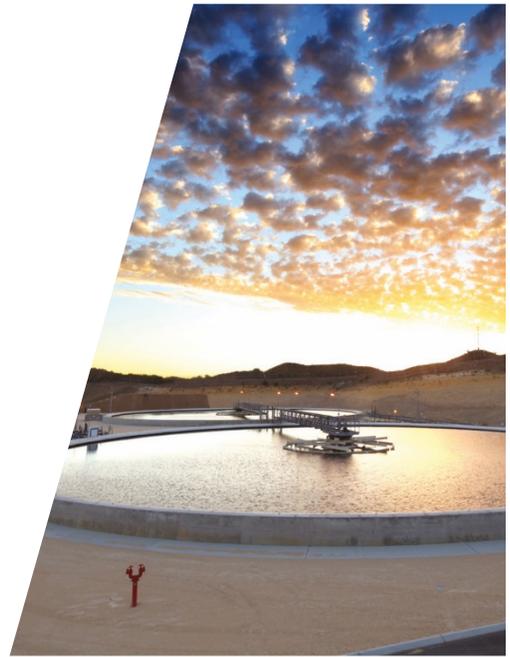




Chrome Reduction System Unit - Post-Closure Care Completion Certification Report

Former Farmland Industries Nitrogen Plant
1608 North 1400 Road
Lawrence, Kansas 66046

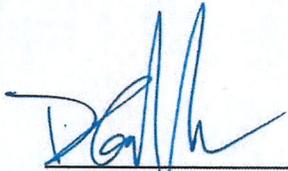
Prepared for:
City of Lawrence
EPA ID KSD007128507



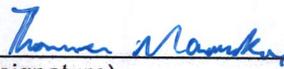


Certification of Completion of Post-Closure Care

In accordance with the RCRA Post Closure Care and Monitoring Plan (US EPA Permit I.D. KSD 007128507, Subpart H). Post-Closure Care Certification of Completion, I certify that I have reviewed the activities reportedly undertaken by others and that, based on that review, the activities as reported were performed in accordance with the approved closure plans, sampling and analysis plans, and correspondence concerning approved supplemental revisions to those plans. I have personally reviewed available field notes, maintenance logs, and analytical results, and performed a site visit to inspect and verify the current site conditions.

 11/16/2018
David Hempleman, P.E.
Kansas License #14215
Senior Environmental Engineer



 - BM
(signature)
Name: Thomas Markus
Title: City Manager
Owner Representative
City of Lawrence, Kansas

Date: 11-16-18

CRS Unit Post-Closure Completion Certification Report
Former Farmland Industries Nitrogen Plant
CRS Unit
Lawrence, Kansas

City of Lawrence
US EPA Permit I.D. KSD 007128507, Subpart H

GHD Project Number: 11152783



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Appendix B	Groundwater Monitoring Results, June 22, 2018



1. Introduction

On behalf of our client, the City of Lawrence, GHD has reviewed documentation of the activities performed by others during the Post-Closure Care period of the Farmland Nitrogen Plant's Chrome Reduction System (CRS) Unit (Site). In accordance with Part I of the Resource Conservation and Recovery Act (RCRA) permit (the Permit, US EPA Permit I.D. KSD 007128507, Subpart H), issued by the United States Environmental Protection Agency (US EPA), dated 1993, this Post-Closure Care Completion Certification report is based on completion of the post-closure care as prescribed by the monitoring plan, supplemental work plans, and applicable sections of Federal regulations. The Permit contains Part I which pertains to the CRS Unit and is overseen jointly by the US EPA and the Kansas Department of Health and Environment (KDHE) Bureau of Waste Management (BWM); and Part II which pertains to non-hazardous waste management units collaterally overseen by the KDHE Bureau of Environmental Remediation (BER) under Consent Order No. 10-E-94 BER.

The Permit identifies post-closure care and monitoring requirements for the CRS at the former Farmland Nitrogen Facility located at 1608 North 1400 Road in Lawrence, Kansas. The Permit was renewed by Farmland Industries, Inc. (FII) in 2002, and, in 2010, the Permit was transferred to the City of Lawrence. Post-closure care and monitoring activities followed the Post-Closure Care and Monitoring Plan, revised by FII in the 2002 in their Post-Closure Care Permit renewal application.

According to the application for renewal in 2002, monitoring of pH and chromium was continued; however, monitoring for nitrate-nitrogen, ammonia-nitrogen, and conductivity was removed from the required monitoring list.

The City of Lawrence is actively seeking redevelopment interests in the Site as a business and industrial park and intends to properly abandon all remaining monitoring wells and remediation infrastructure upon achieving final regulatory approval that all Permit-required activities are complete.

1.1 Site Background and History

The Former Farmland Industries Nitrogen Plant was a nitrogen fertilizer manufacturing plant located east of Lawrence, Kansas, on Highway 10 (Figure 1). The products manufactured at this plant were anhydrous ammonia, nitric acid, urea liquid, ammonium nitrate liquid and urea/ammonium nitrate (UAN) solution. On April 30, 2004, FII ceased to exist due to bankruptcy. Following approval of FII's Plan of Reorganization by the Bankruptcy Court and concurrence from US EPA and KDHE, the FI Kansas Remediation Trust (Trust) was formed and funded to address the remaining environmental impairments at the Site. In 2006, the Trust was funded to facilitate the sale and manage the administrative activities of the Site.

A useful comprehensive site history and recent compilation of site data is contained in the RCRA Post-Closure Care Permit 2017 Annual Report, (City of Lawrence, February 26, 2018), and is included as Appendix A. Information in this report was verified, and subsequently relied upon, by GHD in preparing this report on certifying the completion of post-closure care.

The Trust, through SELS Administrative Services, LLC as Trustee, managed the environmental and administrative functions of the Site. The Trust retained Shaw Environmental and Infrastructure, Inc.



Revision to introduction, as requested by Jason Koontz via email January 10, 2019 and re-submitted as red line copy January 11, 2019.

1. Introduction

On behalf of our client, the City of Lawrence, GHD has reviewed documentation of the activities performed by others during the Post-Closure Care period of the Farmland Nitrogen Plant's Chrome Reduction System (CRS) Unit (Site). In accordance with Part I of the Resource Conservation and Recovery Act (RCRA) permit (the Permit, US EPA Permit I.D. KSD 007128507, Subpart H), issued by the United States Environmental Protection Agency (US EPA), dated 1993, this Post-Closure Care Completion Certification report is based on completion of the post-closure care as prescribed by the monitoring plan, supplemental work plans, and applicable sections of Federal regulations.

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(Shaw) to help manage the mandated compliance and cleanup of the Site in close cooperation and supervision with KDHE and US EPA.

Prior to 1984, chromium was used as a cooling tower corrosion control chemical. During the time chromium compounds were used, the discharge from the cooling towers was treated in a pond to reduce the hexavalent chromium to trivalent chromium. This pond and associated supporting equipment was known as the chromium reduction system (CRS) (Figure 2). As the cooling tower water was blown down to control total dissolved solids, the blowdown was directed to the CRS, where the pH was lowered using the addition of sulfuric acid and sulfur dioxide. This treatment reduced the hexavalent chromium to trivalent chromium. When the pH was raised, the trivalent chromium precipitated as chromium hydroxide. Further groundwater studies were conducted, which included the installation of additional groundwater monitoring wells.

In 1984, the use of chromium as a cooling tower corrosion inhibitor was discontinued. A closure plan for the CRS was developed and implemented in late 1986. Closure certification was issued in January 1987.

Because the groundwater was not completely remediated during the closure period, FII was required to apply for a Post-Closure Care Permit for the facility. This permit application included a corrective action program for the cleanup of the contaminated groundwater. Monitoring of the groundwater comprises a portion of the corrective action program. Two chemical parameters in the groundwater, chromium and pH, are of interest and are the subject of the corrective action program.

On September 29, 2010, the ownership of the Former Farmland Nitrogen Plant was transferred to the City of Lawrence. As part of the ownership transfer, the City of Lawrence entered into a consent agreement with KDHE (Consent Order No. 10-E-94 BER) to accept responsibility for the environmental remediation and management of the Site. The existing Post-Closure Care and Monitoring Permit for the RCRA unit on the site was transferred to the City. Since the acquisition, the City of Lawrence has continued to monitor the groundwater and provide reports to KDHE as required by the Post-Closure Care Permit.

2. Closure Requirements

The Post-Closure Care and Monitoring Plan submitted as part of the facility's RCRA Permit application included the following closure requirements:

- The Action Level for chromium is 0.10 mg/L as reported at each monitoring well for a minimum time period of three consecutive years. The original permit (1993) set the action limit for chromium at 0.05 mg/L. This was changed to 0.10 mg/L in the 2002 permit renewal since the federal maximum contaminant level (MCL) for chromium was raised from 0.05 mg/L to 0.10 mg/L (40 CFR 141.62(b)).
- The pH Action Limit range is 6.0 to 9.0 standard units (s.u.) reported at each monitoring well for a minimum time period of three consecutive years.
- Monitoring of the wells and interceptor trench continued throughout the term of the post-closure care permit until such time that all wells and the trench come into compliance with (or within) the action limits (range).



3. Summary of Completed Activities

3.1 Remediation

During initial closure in 1986, an interceptor trench was installed at the CRS to intercept the migration of impacted groundwater. According to the 1987 closure report, approximately 496 cubic yards of impacted soil was removed from the CRS unit during initial closure activities; however, impacted groundwater remained on site. The soil was disposed at the Peoria Disposal Company RCRA Disposal Facility in Peoria, Illinois. An interception trench was installed immediately east of the former CRS Unit to accelerate the removal of impacted perched groundwater.

In 2006, an underground injection control (UIC) permit was issued to allow the injection of potable water upgradient from the affected area to flush the soil and groundwater. This remedial effort was unsuccessful in raising the pH. In 2007, the remediation injection strategy was modified to include supplementing the potable water with sodium bicarbonate to neutralize the pH of the groundwater. This modified approach took place between July 2007 and October 2007, after which time the process was discontinued for a period of re-evaluation.

Following approval from KDHE in 2014, affected soil was excavated and neutralized onsite with lime sludge then returned to its excavation of origin. This remediation is documented in the RCRA – CRS Unit Remediation Completion Report, Former Farmland Industries Nitrogen Plant, May 15, 2015, by the City of Lawrence. Figure 3 shows the approximate limits of the 2014 excavation. The excavation activities removed the interception trench.

No significant anomalies were identified in review of available field records related to remediation.

3.2 Monitoring

In 2008, FII requested and received approval to drop chromium from the ongoing monitoring requirements since this constituent had not been detected above its Action Limit of 0.10 mg/L in samples collected from all monitoring wells and the interceptor trench since March, 1992. Analytical results for chromium reported in monitoring well samples from June 2006 through September 2008 are summarized in Table 1.

Post-closure monitoring of groundwater at the CRS Unit was performed from 1993 until June 2018. Quarterly monitoring results were transmitted in semi-annual reports to the KDHE. In June 2018, pH in all wells was reportedly between the post-closure action limit range of 6.0 to 9.0 s.u. Analytical results for monitoring well samples analyzed for pH are summarized in Table 2. The laboratory's report for analysis of pH in monitoring well samples collected on June 22, 2018 are included as Appendix B.

All field activities were performed and documented following the procedures detailed in the project Sampling and Analysis Plans (SAP). Through several iterations as would be customary for a project with a duration of 30 plus years, the most recent SAP was approved by KDHE in 2018. No significant anomalies were identified in review of available field records related to sampling or routine monitoring activities.



4. Select Documentation Reviewed

The following is a partial list of select documents reviewed during the preparation of this Post-Closure Care Completion Certification Report. Other documents reviewed include correspondence (letters and emails), field notes, and state and federal regulations.

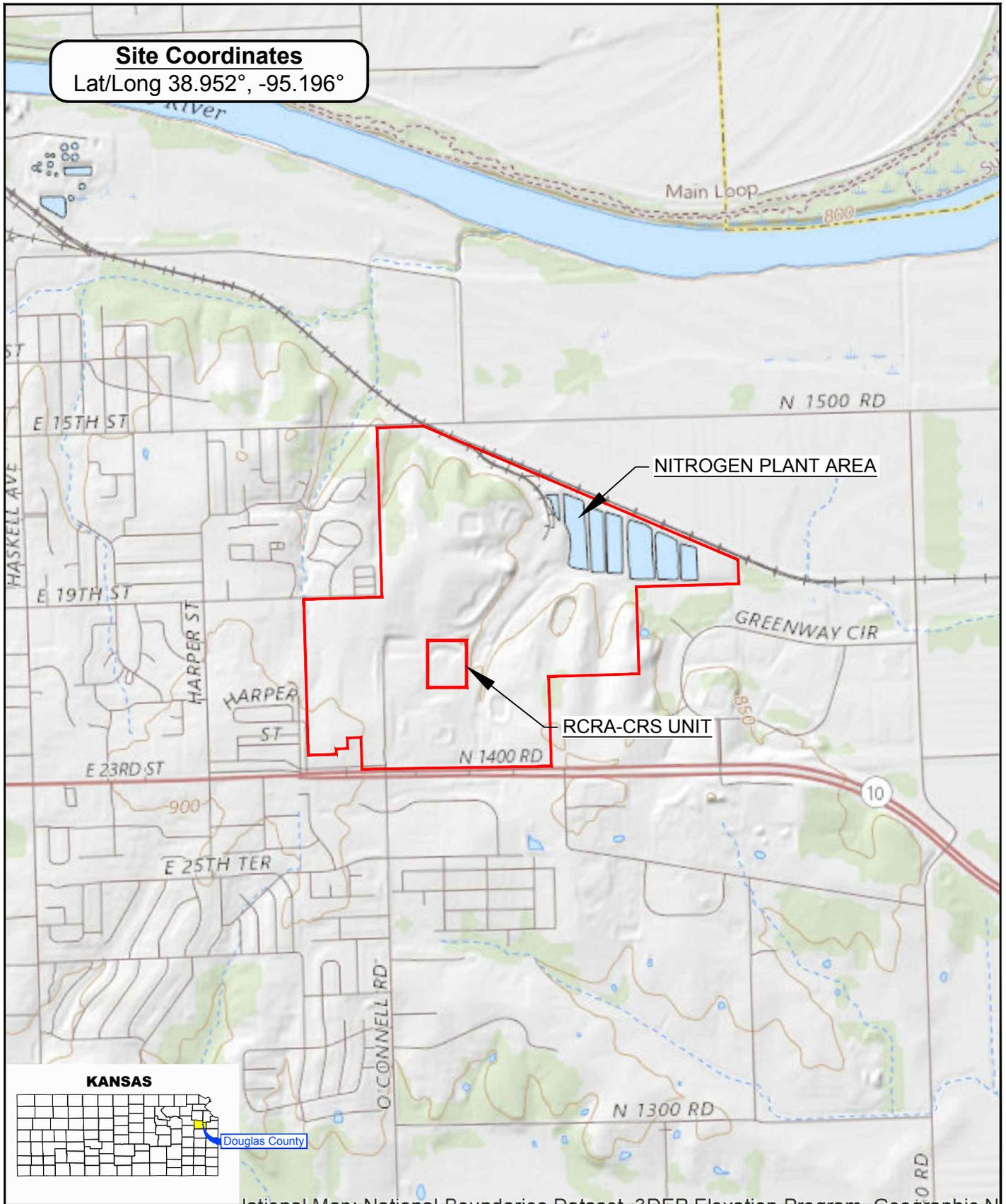
- Geraghty & Miller, Inc. "Surface Impoundment Facility, Closure Project Certification Report". January 14, 1987.
- US EPA. "Hazardous Waste Post-Closure Permit, KSD 007128507, Subpart H". January 12, 1993.
- Farmland Industries. "Post-Closure Permit Application". August 2002.
- Farmland Industries. "RCRA Post-Closure Sampling and Analysis Plan". 2002
- Shaw Environmental & Infrastructure, Inc. "Clean Closure Water Injection pH Study Report". November 17, 2005.
- KDHE. "Kansas Underground Injection Control Area Permit, Class V Injection Well, KS-05-041-001". April 20, 2007 through March 22, 2016.
- Shaw. "No Further Action Petition". March 14, 2008.
- KDHE. "Response to NFA Request for CRS Unit". October 17, 2008.
- "RCRA Permit Modification Approval – Change of Facility Owner/Operator". March 24, 2011.
- US EPA. "Memorandum "Facilities Meeting the GPRM Permitting Goal, Case-by-Case Determinations by Region 7"". August 15, 2011
- City of Lawrence. "RCRA Post-Closure Sampling and Analysis Plan". 2011, 2012 and 2017.
- City of Lawrence. "RCRA - CRS Unit Remediation Work Plan". August 1, 2014.
- City of Lawrence. "RCRA - CRS Unit Remediation Completion Report". May 15, 2015.
- City of Lawrence. "2017 Annual Groundwater Monitoring Report". February 26, 2018.
- KDHE. "2017 SAP approval letter". June 1, 2018.

5. Conclusions

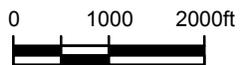
GHD has reviewed documents relevant to the activities reportedly undertaken by others and that, based on that review, the activities as reported were performed in general accordance with the approved closure plans, sampling and analysis plans, and correspondence concerning approved supplemental revisions to those plans. Furthermore, laboratory analytical data provided in reviewed reports indicate that chromium concentrations were less than 0.10 mg/L and pH was within 6.0 to 9.0 s.u. at each monitoring well for a minimum time period of three consecutive years.

Figures

Site Coordinates
Lat/Long 38.952°, -95.196°



Source: USGS 7.5 MINUTE QUAD "LAWRENCE EAST, KANSAS"



Coordinate System:
STATE PLANE -
KANSAS SOUTH



CRS UNIT POST-CLOSURE COMPLETION
CERTIFICATION REPORT - NOVEMBER 2018
LAWRENCE, KANSAS

SITE LOCATION MAP

11152783-03

Nov 8, 2018

FIGURE 1

Site Coordinates
Lat/Long 38.952°, -95.196°



Source: GOOGLE EARTH AERIAL IMAGE DATED JUNE 2018



Coordinate System:
STATE PLANE -
KANSAS SOUTH



CRS UNIT POST-CLOSURE COMPLETION
CERTIFICATION REPORT - NOVEMBER 2018
LAWRENCE, KANSAS

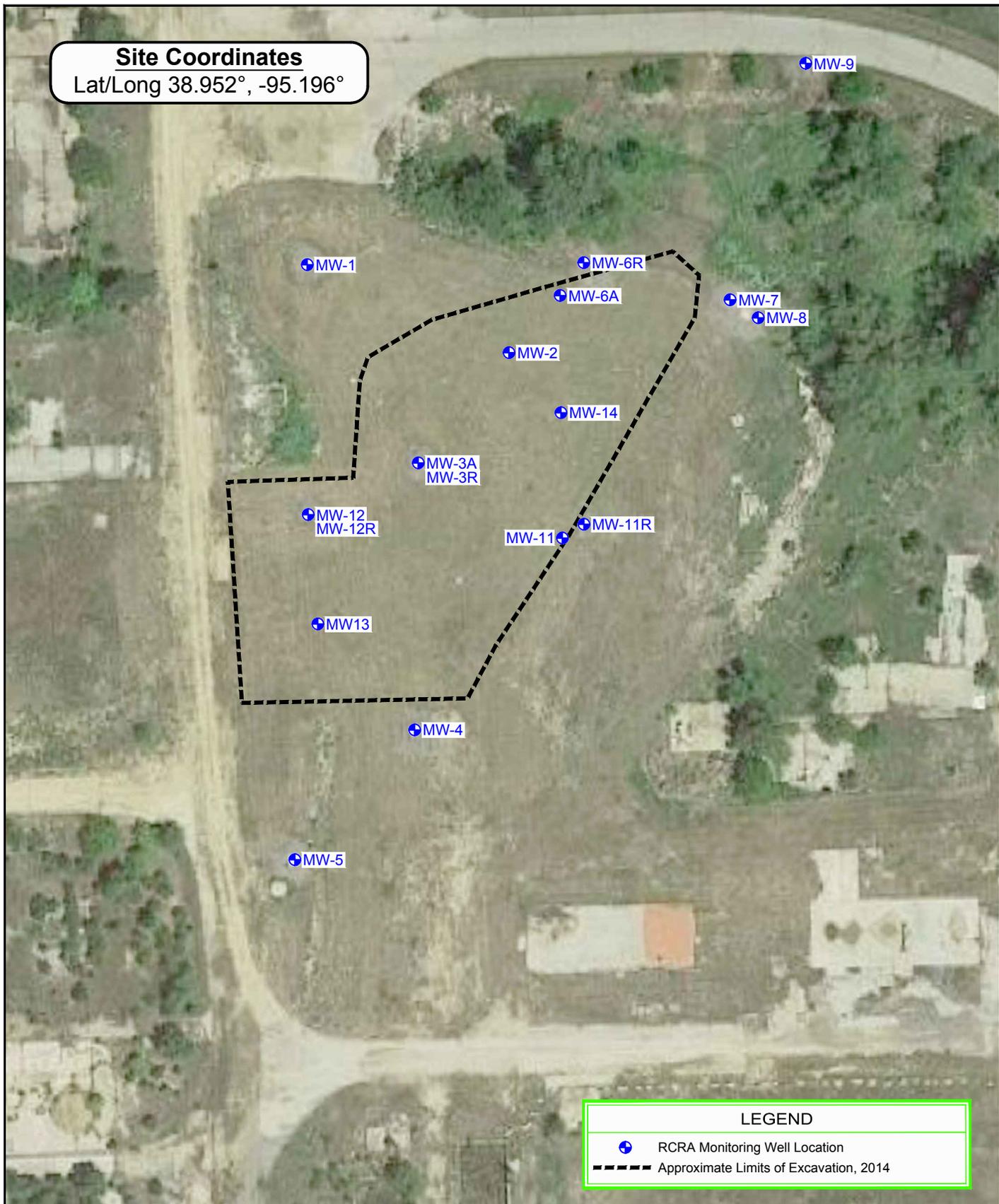
11152783-03

Nov 8, 2018

CRS UNIT, CURRENT CONDITIONS

FIGURE 2

Site Coordinates
 Lat/Long 38.952°, -95.196°



Source: GOOGLE EARTH AERIAL IMAGE DATED JUNE 2018



Coordinate System:
 STATE PLANE -
 KANSAS SOUTH



CRS UNIT POST-CLOSURE COMPLETION
 CERTIFICATION REPORT - NOVEMBER 2018
 LAWRENCE, KANSAS

**APPROXIMATE LIMITS
 OF EXCAVATION, 2014**

11152783-03

Nov 9, 2018

FIGURE 3

Tables

Table 1
Summary of Chromium in Monitoring Wells
Former Farmland Industries Nitrogen Plant
City of Lawrence

Action Level = 0.100 mg/L
Measurements in mg/L

Well ID	Sampling Date					
	6/15/2006	6/20/2007	12/18-19/2007	3/19/2008	6/18/2008	9/18/2008
MW-1	--	--	0.005	0.005	0.005	0.005
MW-2	--	--	0.008	0.005	0.008	0.008
MW-3A	--	--	0.032	0.039	0.024	0.017
MW-4	--	--	0.005	0.005	0.005	0.005
MW-5	--	--	0.005	0.005	0.005	0.005
MW-6A	--	--	0.008	0.005	0.005	0.005
MW-7	--	--	0.005	0.005	0.005	0.005
MW-8	--	--	0.005	0.005	0.005	0.005
MW-9	--	--	0.005	0.011	0.005	0.005
MW-11	0.005	0.005	DRY	0.005	0.005	--
MW-12	--	--	0.005	0.005	0.005	0.005
MW-13	--	--	0.005	0.018	0.013	0.005
MW-14	--	--	0.006	0.005	0.005	0.005
Trench	--	--	0.009	0.005	0.005	0.005

Notes:

ID - Identification

Results are milligrams per liter (mg/L)

2017 - RCRA Annual Groundwater Monitoring Report City of Lawrence Former Farmland Industries Nitrogen Plant

-- No data

Table 2
Summary of pH in Monitoring Wells
Former Farmland Industries Nitrogen Plant
City of Lawrence

Action Limit = 6.0 - 9.0 (S.U.)
Measurements in S.U.

Well ID	Sampling Date				
	3/14/2016	9/21/2017	3/8/2017	9/27/2017	6/22/2018*
MW-1	6.7	6.6	6.9	6.7	6.8
MW-3R	7.0	7.0	7.0	7.0	7.0
MW-4	7.0	6.9	7.0	7.0	6.9
MW-5	6.7	6.6	6.9	6.8	6.9
MW-6R	6.5	6.4	6.5	6.6	6.5
MW-7	6.6	6.6	6.7	6.7	6.7
MW-8	6.9	6.6	6.8	6.8	6.8
MW-9	6.7	6.6	6.8	6.8	6.6
MW-11R	6.5	6.5	6.6	6.6	6.5
MW-12R	7.4	7.3	7.3	7.3	7.3

Notes:

ID - Identification

S.U. - standard units

2017 - RCRA Annual Groundwater Monitoring Report City of Lawrence Former Farmland Industries Nitrogen Plant

*Data reported by City of Lawrence Water Quality Laboratory

Appendices

Appendix A
RCRA Post-Closure Care Permit 2017
Annual Report, City of Lawrence,
February 26, 2018



City of Lawrence

UTILITIES

THOMAS M. MARKUS
CITY MANAGER

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February 26, 2018

Carrie Ridley
Environmental Scientist
Bureau of Waste Management
Kansas Department of Health and Environment
1000 SW Jackson, Suite 320
Topeka, KS 66612

RE: RCRA Post Closure Care Permit 2017 Annual Report
KSD007128507
Former Farmland Industries Nitrogen Plant
Lawrence, KS 66046

Dear Ms. Ridley:

Enclosed is the RCRA Post Closure Care Permit 2017 Annual Report, KSD007128507, Former Farmland Industries Nitrogen Plant, Lawrence, Kansas.

If you have any comments or questions, please contact either Shawna Trarbach at (785) 423-5381 and strarbach@lawrenceks.org or me at (785) 832 7820 or via e-mail at sgraves@lawrenceks.org.

Sincerely,

Sarah Graves.
Project Engineer
Enclosures

cc: Scott Williamson, KDHE
Kurt Limesand, USEPA



**2017
RCRA ANNUAL GROUNDWATER MONITORING REPORT
KSD007128507**

**FORMER FARMLAND INDUSTRIES NITROGEN PLANT
1608 N. 1400 RD.
LAWRENCE, KANSAS**



Prepared For: Kansas Department of Health and Environment

By: City of Lawrence

Prepared by:

Shawna Trarbach
Utilities Operator
City of Lawrence

Reviewed by:

Aurora Shields
Water Quality Manager
City of Lawrence

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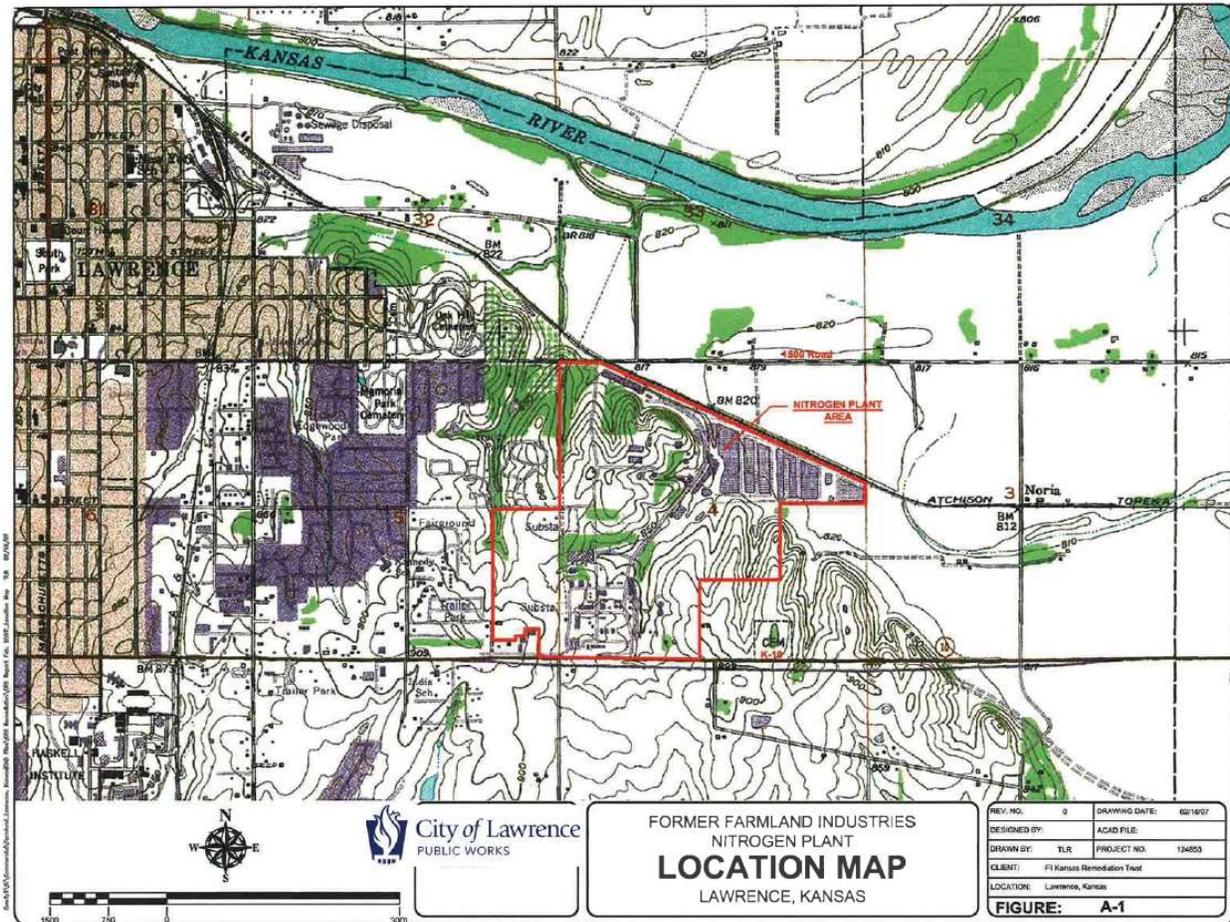
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ATTACHMENTS:

- A. Water Table Elevations (9/7/1988 to 9/27/2017)
- B. Field Data Sheets
- C. Laboratory Reports

1.0 Introduction

The Former Farmland Industries Nitrogen Plant was a nitrogen fertilizer manufacturing plant located east of Lawrence, Kansas, on Highway 10. The products manufactured at this plant were anhydrous ammonia, nitric acid, urea liquid, ammonium nitrate liquid and urea/ammonium nitrate (UAN) solution. **Figure A-1** shows the location of the facility.



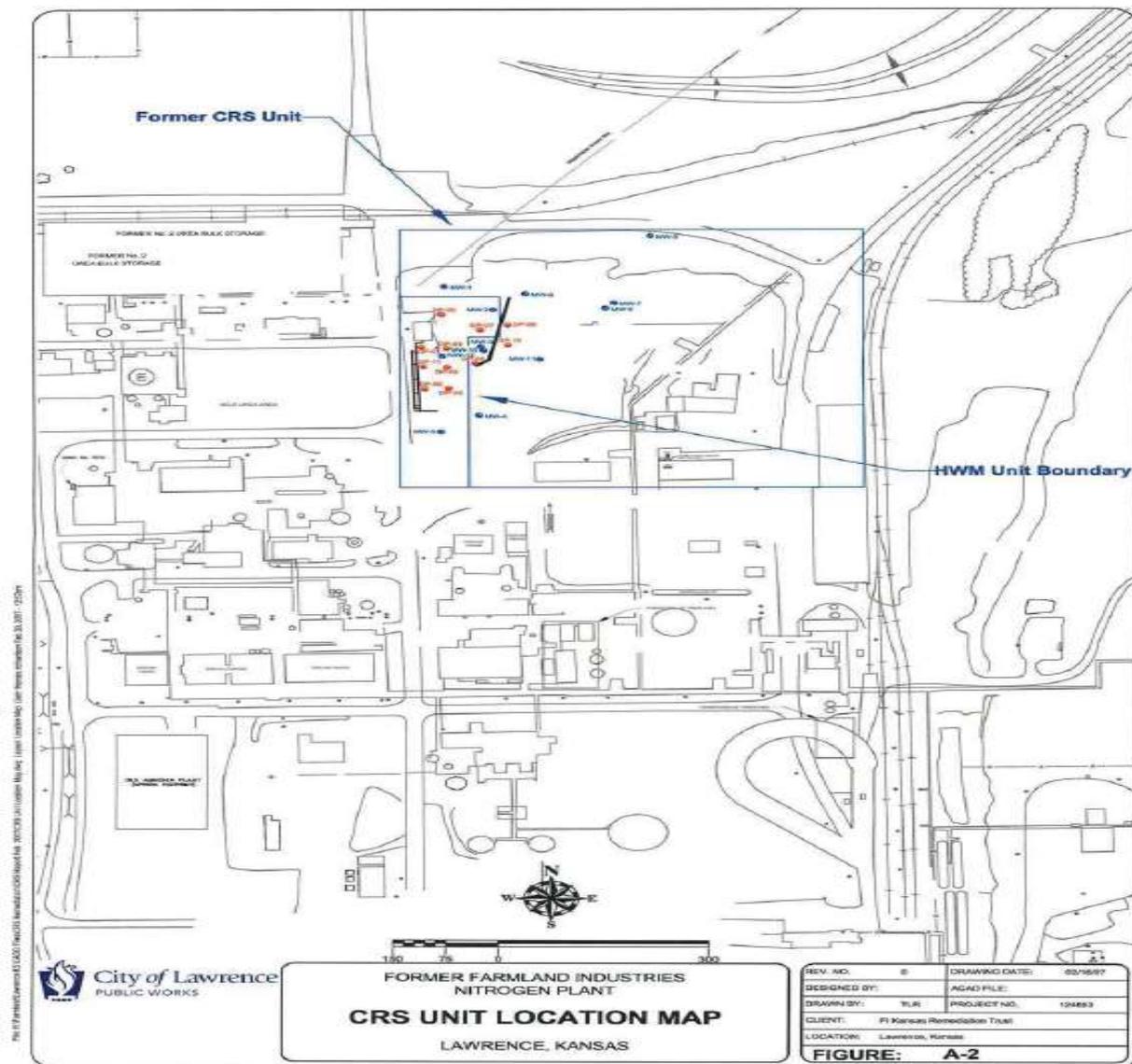
On April 30, 2004, Farmland Industries ceased to exist due to bankruptcy. As part of the debtor proceedings under Chapter 11 of the United States Bankruptcy Code, in the Western District of Missouri, Case Nos. 02-50557, 02-50561, 02-50562, 02-50564, and 02-50565 (collectively, the “Bankruptcy Cases”), and as a part of its plan of reorganization, the “FI Kansas Remediation Trust” (the “Trust”) was organized, all as described in the Remediation Trust Agreement dated April 30, 2004, by and between Farmland, the FI Liquidating Trust, and SELS Administrative Services, LLC (“SAS” or “Trustee”), as Trustee, all as approved in the Bankruptcy Cases. The Trust became owner of the property commonly known as the Former Farmland Nitrogen Plant in Lawrence, Kansas.

On September 29, 2010, the ownership of the former Farmland Nitrogen Plant was transferred to the City of Lawrence (City) from the Trust. As part of the ownership transfer, the City entered into Consent Order No. 10-E-94 BER with Kansas Department of Health and Environment (KDHE) to accept responsibility for the environmental remediation and management of the site. The existing Post Closure Care and Monitoring Permit for the RCRA unit for the site was transferred to the City.

This report summarizes the activities conducted and data collected during calendar year 2017 from the groundwater monitoring system.

2.0 History of RCRA Site

Prior to 1984, chromium was used as a cooling tower corrosion control chemical. During the time chromium compounds were used, the discharge from the cooling towers was treated in a pond to reduce the hexavalent chromium to trivalent chromium. This pond and associated supporting equipment was known as the chromium reduction system (CRS). As the cooling tower water was blown down to control total dissolved solids, the blowdown was directed to the CRS, where the pH was lowered using the addition of sulfuric acid and sulfur dioxide. This treatment reduced the hexavalent chromium to trivalent chromium. When the pH was raised, the trivalent chromium precipitated as chromium hydroxide. **Figure A-2** shows the locations of the regulated unit, monitoring wells, and the property boundary.



In the early 1980s, due to RCRA regulations, five monitoring wells were installed as a groundwater assessment monitoring system. Monitoring data indicates the groundwater in the perched zone directly under the CRS was impacted by dissolved chromium and low pH conditions. Further groundwater studies were conducted, which included the installation of additional groundwater monitoring wells.

In 1984, the use of chromium as a cooling tower corrosion inhibitor was discontinued. A closure plan for the CRS was developed and implemented in late 1986. Closure certification was issued by KDHE in January 1987. During closure, an interceptor trench was installed at the CRS to intercept the migration of impacted groundwater. Impacted soil in the CRS site was removed during closure activities; however, impacted groundwater remained on site.

Because the groundwater was not completely remediated during the closure period, Farmland obtained a Post-Closure Care Permit in 1993 from KDHE. This permit application included a corrective action program for the cleanup of the contaminated groundwater. Monitoring of the groundwater comprises a portion of the corrective action program. Two chemical parameters in the groundwater, chromium and pH, are of interest and are the subject of the corrective action program.

During the groundwater assessment phase and the closure plan, a total of eleven monitoring wells were installed. The groundwater monitoring wells have been categorized by their hydraulic position as indicated below.

Well Number	Well Type	Gradient Location
MW-1	GW	Down
MW-2	CP	Down
MW-3A	CP	Down
MW-4	GW	Up
MW-5	GW	Up
MW-6A	GW	Down
MW-7	GW	Down
MW-8	GW	Down
MW-9	GW	Down
MW-10	GW	Down
MW-11	GW	Down
Trench	CP	Down

*CP - Compliance Point Well
 GW - Supplemental Monitoring Well
 Trench - Groundwater Interceptor/Remedial Device*

The approved post-closure plan required analyses of groundwater from the monitoring system for chromium, pH, conductivity, nitrate-nitrogen, and ammonia-nitrogen. The Post-Closure Permit expired in February 2003. An application for the continuance of the Post-Closure Permit was submitted to the KDHE in August 2002. The facility continues to operate under the 1993 permit with changes to the monitoring program as requested by Farmland in the application submitted to KDHE in August 2002, approved by KDHE in a telephone conversation September 11, 2002, and documented in a letter from Farmland to KDHE dated October 2, 2002. The changes requested in the application were that the required analyses be limited to chromium and pH, the action level for chromium be increased to 0.10 mg/l, and the samples were to be field-filtered if gross sediment was present. The action level for chromium applicable at this site was set at 0.05 mg/l (50 ug/l) in the 1993 permit. This action level was based on the Primary Drinking Water Standards in place at the time of the original permit issuance. Because the Primary Drinking Water Standards had been increased to 0.10 mg/l (100 ug/l) during the term of the original Post-Closure Permit, the application for renewal in August 2002 requested that the action limit for chromium be raised to reflect the increased maximum concentration levels (MCL). KDHE agreed to this request, and has set the action limit at 0.10 mg/l (100 ug/l) chromium.

Because of the closure of the Former Farmland Nitrogen Plant and the requirement that the Trust conduct remediation activities at the site, the Trust initiated discussions with the Bureau of Waste Management (BWM) of the KDHE in 2005 concerning an accelerated remediation plan for the CRS site. These discussions centered around the need to more quickly remediate the perched zone groundwater with respect to the low pH. The Trust submitted a work plan in June 2005 to inject city potable water into the perched and shallow bedrock zone to flush the low pH groundwater more quickly through the system.

Approval for injection was received and an Underground Injection Permit (UIP) was issued in the spring of 2006. The construction and installation of the injection system took place in April 2006, with injection starting in May 2006. Also installed at this time was a new monitoring well designated MW-12. This well is located just downgradient of the injection system and on the edge of the closed acid pond, the "source" of the low pH.

Injection of potable water continued until late November 2006, when the lines froze and were broken. The lines were repaired and injection was restarted in March 2007. Injection was limited to the four injection wells installed in the bedrock.

In March 2007, wells MW-3 and MW-6 were plugged and abandoned, and new replacement wells were installed and designated MW-3A and MW-6A. MW-3 was replaced due to a severely plugged screen, and MW-6 was replaced due to a bend in the casing that prevented sampling equipment from reaching the bottom of the well. A third well, MW-10, was also abandoned because it was of insufficient depth to intersect the water table; no replacement well was installed. It was found that

injection of city water into the impacted zone produced little effect. This was evidenced by the data that shows the pH of the groundwater in wells with low pH did not show significant increases. It was determined that city water had insufficient alkalinity to adequately neutralize the low pH in the groundwater. Based on this conclusion, a proposal was made to KDHE to allow the Trust to design and include chemical addition to the injection system. This system was designed to use a sodium bicarbonate solution injection with the city water to raise the alkalinity available to neutralize the low pH in the groundwater.

This sodium bicarbonate system was installed in July 2007, with injection starting on July 13, 2007. In addition, another injection well (IW-8) was installed in the center of the plume north and slightly west of MW-3A. At that time, the injection rate was approximately 0.8 gallons per minute (gpm) of city water augmented with approximately 0.08 gpm of 6-7% sodium bicarbonate solution. The solution was injected into wells IW-3, IW-4, IW-5, and IW-8.

Injection of bicarbonate solution occurred from July 2007 until October 2007. Due to several factors, it was decided to stop the injection system for the winter and reevaluate the corrective action program. Factors that caused the decision to stop injection included the plugging of the injection equipment, apparent lack of progress in addressing the low pH in the site, and the coming of cold weather, which could cause freezing and equipment damage.

In November 2007, two additional monitoring wells (MW-13 and MW-14) and two borings (BH-01 and BH-02) were installed to better understand the geology of the site with the purpose of designing a more aggressive and rapid corrective action. The data from the soil and water samples collected from the new wells and boreholes as well as slug test data were provided to the KDHE in a report titled "*Supplemental Data Collection Report for the Chromium Reduction System Surface Impoundment*" in January 2008. This data indicates that the low pH is primarily in the sandstone unit below the site. Based on the available data, a more aggressive corrective action program consisting of an array of injection points evenly spaced throughout the low pH affected area was designed and submitted to the KDHE for approval.

Discussions with KDHE continued in 2008 concerning the operation and remediation of the CRS site. In March 2008, Shaw presented a letter to KDHE requesting a No Further Action (NFA) status determination from KDHE for the CRS unit. KDHE determined that a NFA determination was not appropriate because of the persistence of low pH conditions in the groundwater. Shaw then submitted a letter to KDHE in October 2008 requesting a reduced sampling and monitoring schedule to semi-annual for the CRS site, modified corrective action in the form of discontinued pumping of groundwater, discontinued injection, and suspension of the analyses for chromium. In a letter dated October 17, 2008, KDHE approved these modifications to the CRS management program.

As noted in the previous section, further modifications to the monitoring program were proposed and accepted by KDHE. These changes include eliminating chromium from the monitoring program and reducing the monitoring schedule to semi-annually instead of quarterly. The revised monitoring program was put into place in late 2008.

In August 2014, a work plan was submitted to KDHE detailing the excavation and neutralization of low pH impacted soils in the sandstone layer to help address the low pH levels measured in groundwater samples. The work plan was approved in November 2014, and work was started in January 2015 and was completed in February 2015. A completion report was submitted to KDHE in May of 2015. As stated in the approved work plan, groundwater monitoring was conducted on a quarterly basis for twelve months following the completion of the remediation work and installation of new monitoring wells. Since the pH tested in the range of 6.0-9.0 S.U. for four consecutive quarters, groundwater monitoring was reduced to a frequency of semi-annual for the next two years. The March 2016 sampling event marked the fourth consecutive quarterly event since the installation of the new monitoring wells, and all ten (10) wells were within the acceptable range for all four events. The September 2016 sampling event marked the first of the two years of semi-annual sampling events.

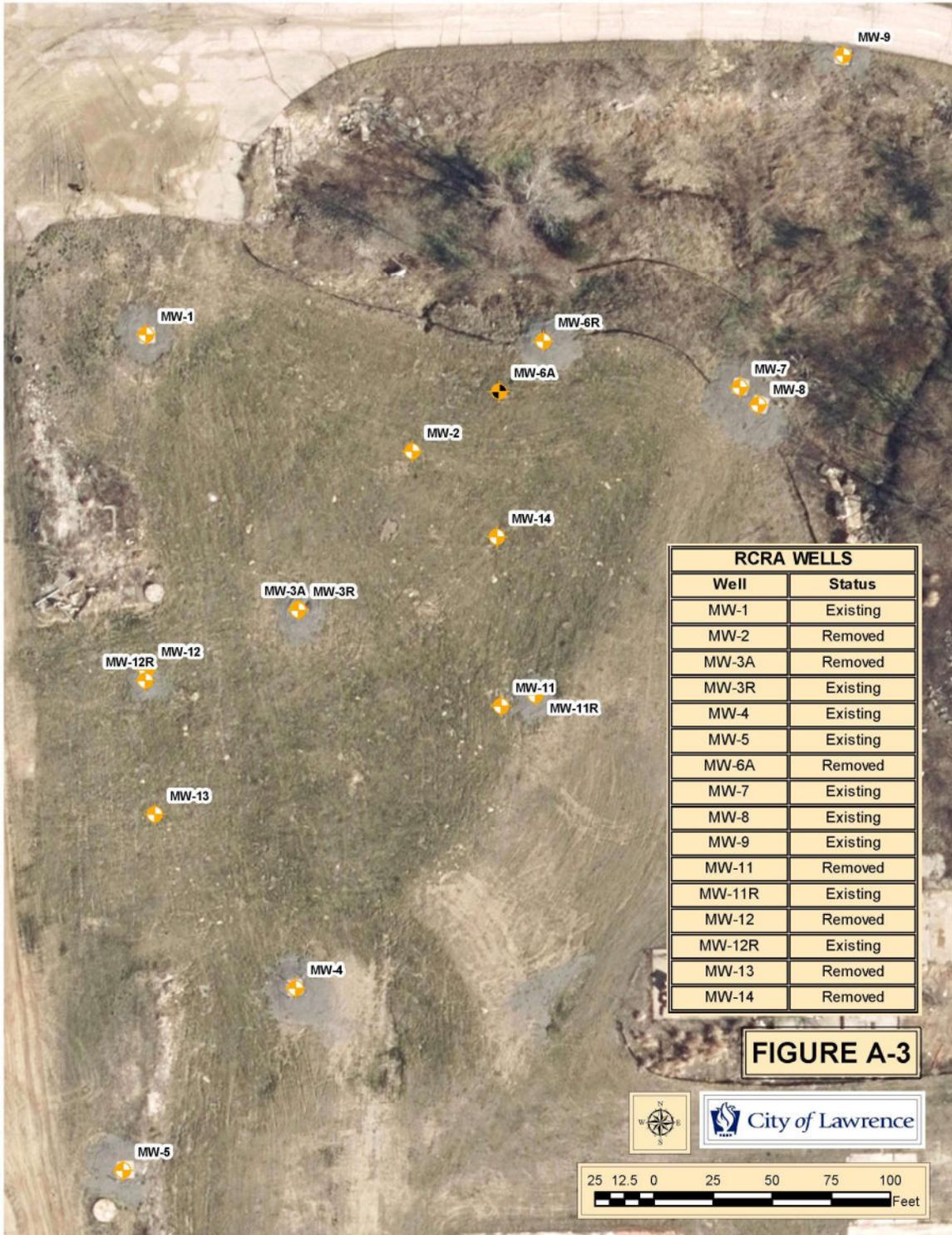
Monitoring events in 2017 occurred on March 8th and September 27th.

3.0 Monitoring Program

In accordance with 40 CFR 265.94 and the approved Post-closure Plan for the CRS, the groundwater is being monitored. This report summarizes the data collected during calendar year 2017 from the groundwater monitoring system.

Prior to 2002, samples for chromium were acidified in the laboratory after the sampling event. Per KDHE's request, the Trust initiated acidifying the samples in the field. Also, the KDHE laboratory accreditation program required that the samples be digested prior to analysis for total chromium. All data after June 2002 was generated using the described techniques.

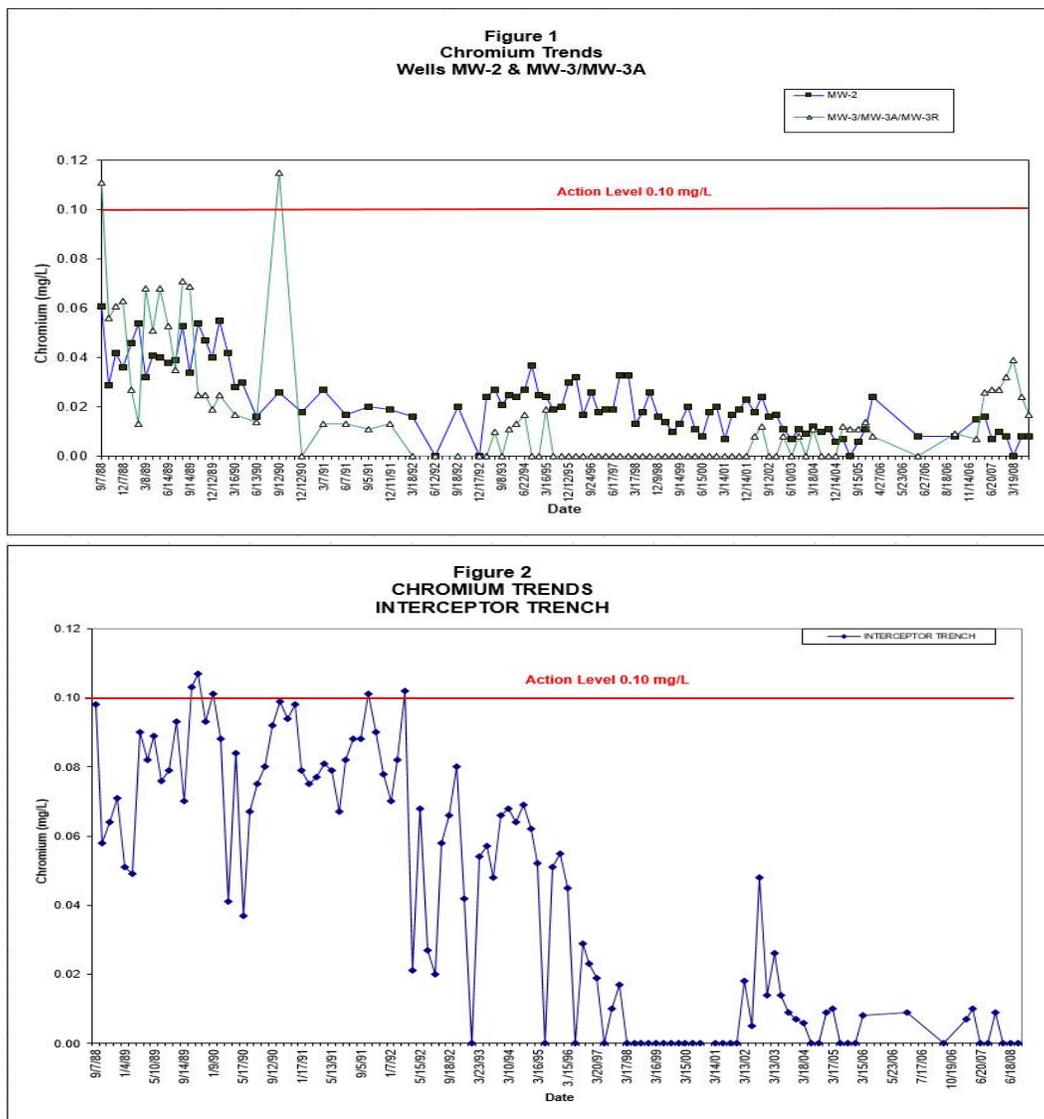
During the excavation work completed in 2015, wells MW-2, MW-13, MW-14 and the interceptor trench were all removed. Wells MW-3A, MW-6A, MW-11, and MW-12 were all removed, and replacement wells MW-3R, MW-6R, MW-11R, and MW-12R were installed. **Figure A-3** shows the well locations.



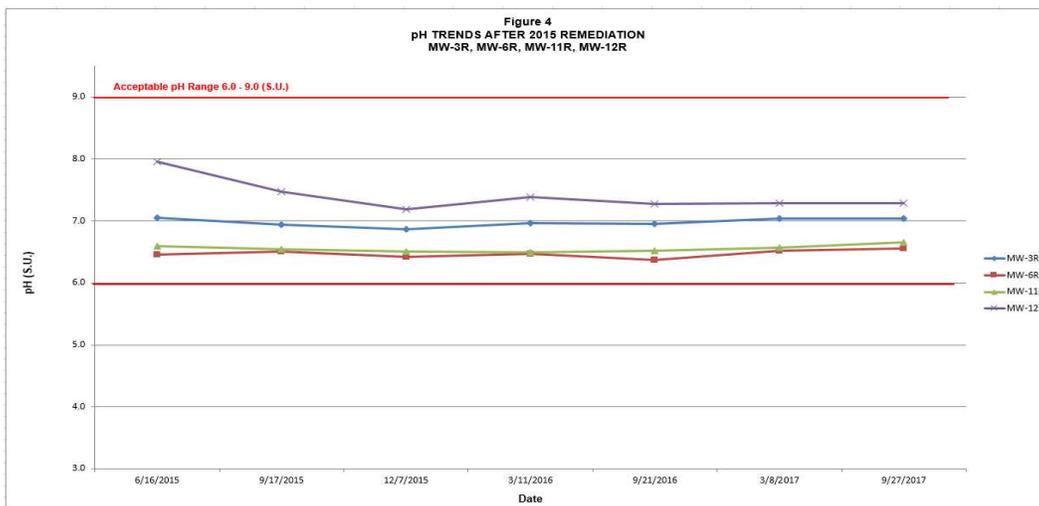
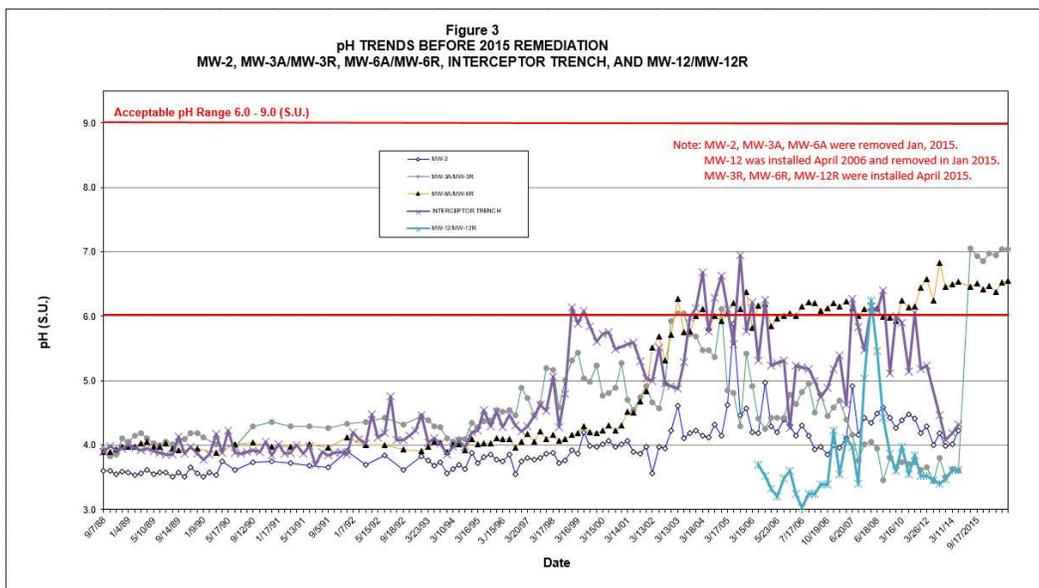
Attachment A contains copies of the field notes taken during the March 8, 2017 and September 27, 2017 events. **Attachment B** contains laboratory reports for the March 8, 2017 and September 27, 2017 sampling events.

4.0 Monitoring Data Evaluation

The last sampling event for chromium analysis was conducted September 18, 2008. **Figure 1** and **Figure 2** illustrate the chromium concentrations trends in the Compliance Points (CP) MW-2 and MW-3/MW-3A and the Interceptor Trench from September 7, 1988 to March 19, 2008.



The pH trends for MW-2, MW-3A/MW-3R, MW-6A/MW-6R, Interceptor Trench, and MW-12/MW-12R before 2015 remediation are illustrated in **Figure 3**. The pH trends from June 16, 2015 to September 27, 2017 for MW-3R, MW-6R, MW-11R, and MW-12R are illustrated in **Figure 4**.



According to the RCRA Post-Closure Care Permit Application of 2002, the groundwater data is statistically compared to the action level using confidence intervals construction for a normal distribution for the latest four data points with a 99% confidence interval. The statistical method described in "Statistical Analysis of Ground Water Monitoring Data at RCRA Facilities" USEPA, pp 6-1 to 6-15, sections 6.2.1.1 on pp 6-3 to 6-5 are used.

Table 1 provides the chromium analytical results and the Lower and Upper Confidence Levels from the last four sampling events from December 18, 2007 to September 18, 2008. All individual results are below the Action level for chromium. The confidence interval for all wells are below the Action Level. There is no statistically significant evidence that the mean concentration in any of the wells exceeds the Action Level.

TABLE 1								
CHROMIUM								
Action Level = 0.100 mg/L								
	Sampling Date 12/18- 19/2007	Sampling Date 3/19/2008	Sampling Date 6/18/2008	Sampling Date 9/18/2008	Average	Standard Deviation	Lower Confidence Level	Upper Confidence Level
MW-1	0.005	0.005	0.005	0.005	0.005	0.000	0.005	0.005
MW-2	0.008	0.005	0.008	0.008	0.007	0.002	0.004	0.011
MW-3A	0.032	0.039	0.024	0.017	0.028	0.010	0.006	0.050
MW-4	0.005	0.005	0.005	0.005	0.005	0.000	0.005	0.005
MW-5	0.005	0.005	0.005	0.005	0.005	0.000	0.005	0.005
MW-6A	0.008	0.005	0.005	0.005	0.006	0.002	0.002	0.009
MW-7	0.005	0.005	0.005	0.005	0.005	0.000	0.005	0.005
MW-8	0.005	0.005	0.005	0.005	0.005	0.000	0.005	0.005
MW-9	0.005	0.011	0.005	0.005	0.007	0.003	0	0.013
MW-11	Dry	0.005	0.005	No data	0.005	NA	NA	NA
MW-12	0.005	0.005	0.005	0.005	0.005	0.000	0.005	0.005
MW-13	0.005	0.018	0.013	0.005	0.010	0.006	0	0.025
MW-14	0.006	0.005	0.005	0.005	0.005	0.001	0.004	0.006
Trench	0.009	0.005	0.005	0.005	0.006	0.002	0.001	0.011
	Sampling Date	Sampling Date	Sampling Date	Sampling Date	Average	Standard Deviation	Lower Confidence Level	Upper Confidence Level
	6/15/2006	6/20/2007	3/19/2008	6/18/2008				
MW-11	0.005	0.005	0.005	0.005	0.005	0.000	0.005	0.005

NOTE: For statistical analysis purposes, Non-Detect values have been replaced by the reporting limit 0.005 mg/L

Table 2 provides the pH analytical results and the Lower and Upper Confidence Levels from the last four sampling events from March 2016 to September 2017. All individual results are below the Action Range for pH. The confidence interval for all wells are below the Action Range. There is no statistically significant evidence that the mean concentration in any of the wells exceeds the Action Range.

TABLE 2

pH
 Action Limits 6.0 - 9.0 (S.U.)

	Sampling Date 3/14/2016	Sampling Date 9/21/2017	Sampling Date 3/8/2017	Sampling Date 9/27/2017	Average	Standard Deviation	Lower Confidence Level	Upper Confidence Level
MW-1	6.7	6.6	6.9	6.7	6.8	0.11	6.5	7.0
MW-3R	7.0	7.0	7.0	7.0	7.0	0.03	7.0	7.1
MW-4	7.0	6.9	7.0	7.0	7.0	0.02	7.0	7.1
MW-5	6.7	6.6	6.9	6.8	6.8	0.05	6.7	6.9
MW-6R	6.5	6.4	6.5	6.6	6.6	0.06	6.4	6.7
MW-7	6.6	6.6	6.7	6.7	6.7	0.02	6.6	6.7
MW-8	6.9	6.6	6.8	6.8	6.8	0.04	6.7	6.9
MW-9	6.7	6.6	6.8	6.8	6.8	0.01	6.8	6.8
MW-11R	6.5	6.5	6.6	6.6	6.6	0.02	6.5	6.6
MW-12R	7.4	7.3	7.3	7.3	7.3	0.01	7.3	7.3

5.0 Groundwater Flow Evaluation

Groundwater elevations were measured at the time the wells were sampled during the September monitoring event. These elevations are tabulated in the tables in **Attachment A** which contains data for the wells since 1988.

Potentiometric surface contours derived from the two sampling events conducted during 2017 continue to indicate that the groundwater flow is generally to the northeast. This is consistent with previous reports and interpretations.

Figure 9 is the potentiometric surface contour map for the sampling event conducted March 8, 2017.

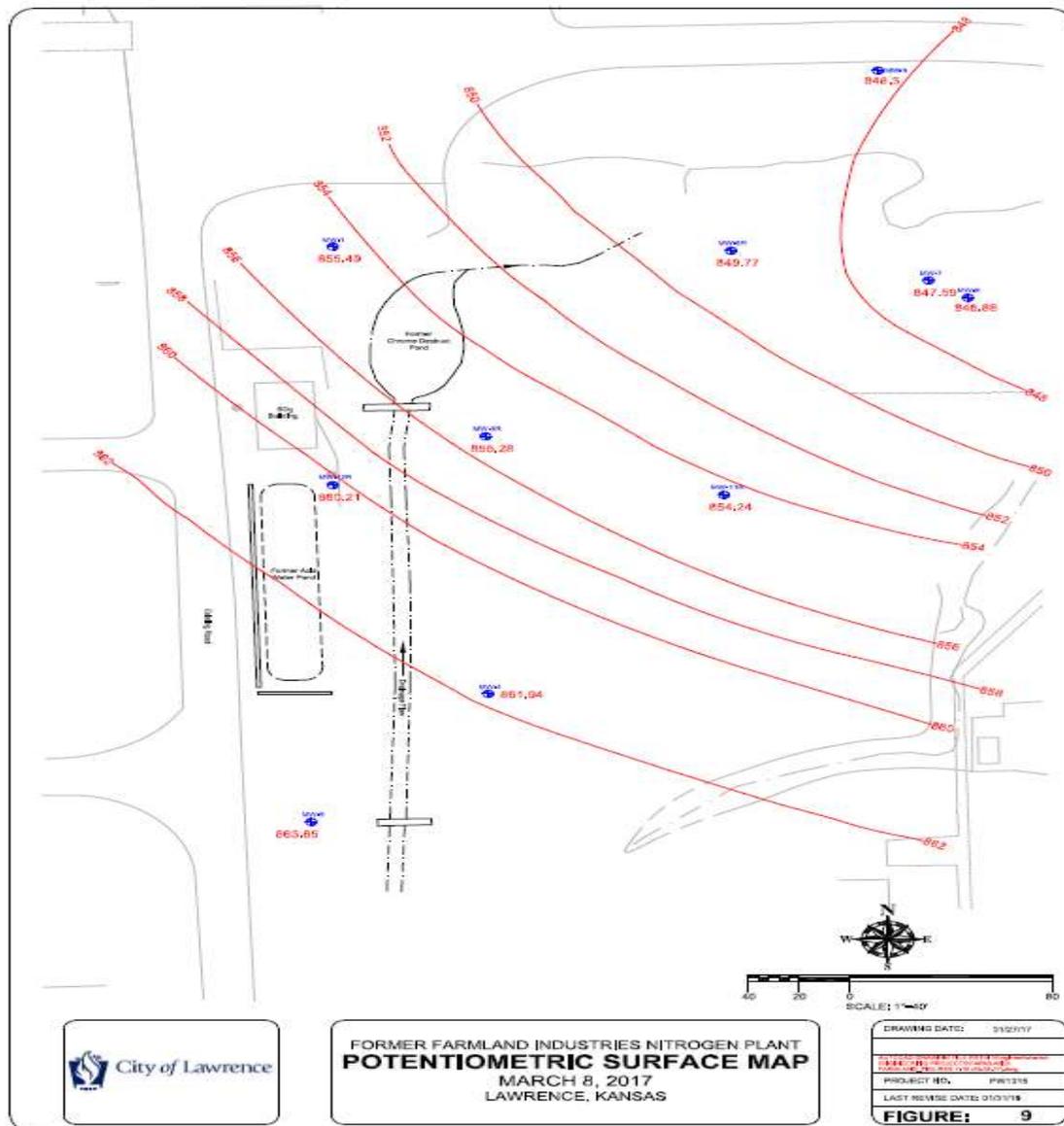
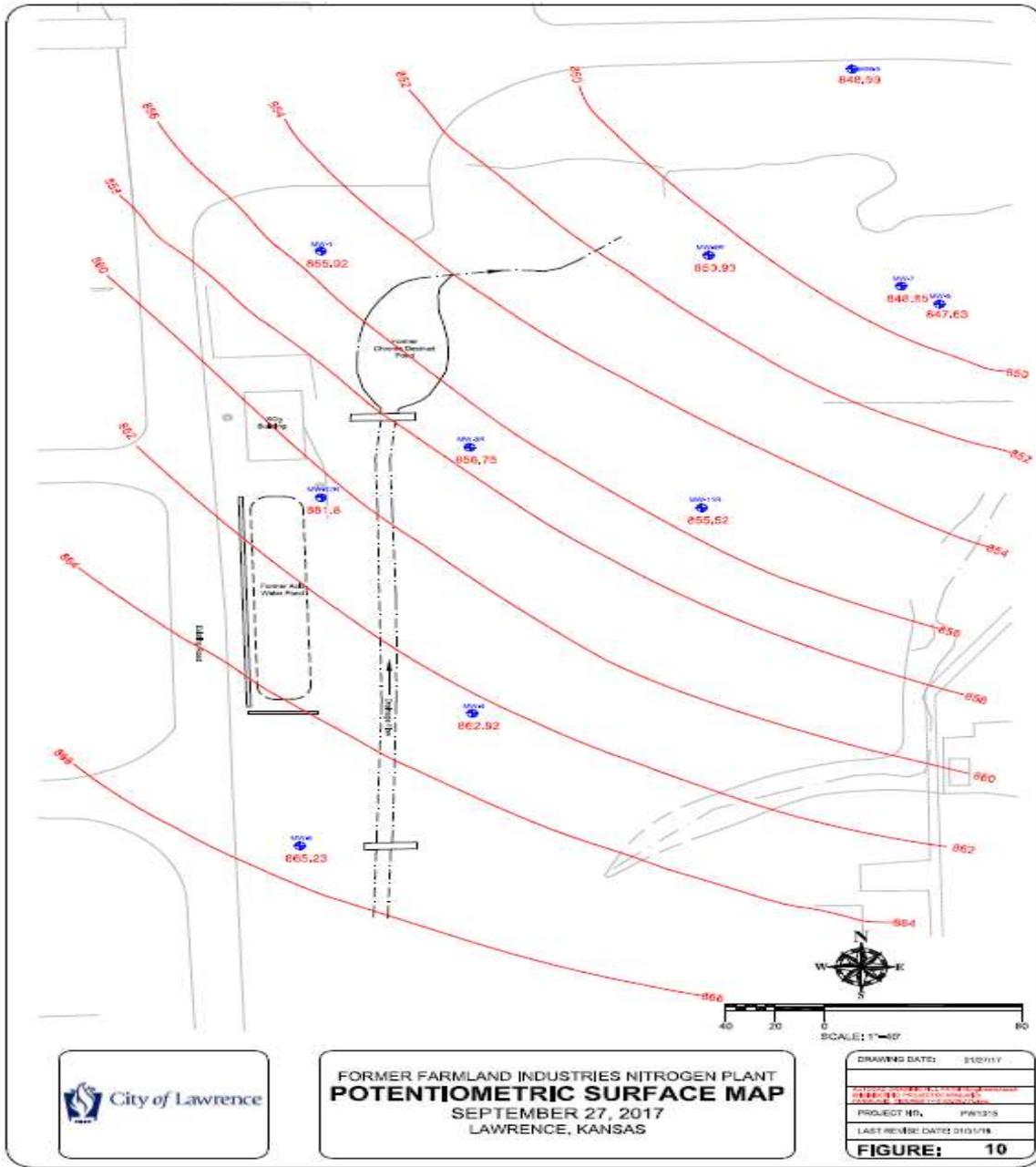


Figure 10 is the potentiometric surface contour map for the sampling event conducted September 27, 2017.



Groundwater flow velocity has been previously estimated to be approximately 0.03 ft/day. This rate was determined by using the average conductivity value determined from slug tests performed by ESSI on wells MW-1 through MW-9 in 1993 and using an estimated porosity of 40%. Other

estimated ranges of hydraulic conductivity data obtained from between 1985 and 2007 during several phases of investigation are summarized in the following table:

Estimated Ranges of Hydraulic Conductivity				
Well #	Woodward-Clyde 1985 (cm/sec)	ESSI 1993 (cm/sec)	Shaw E & I 2007 (cm/sec)	Alpha-Omega Geotech 2016 (cm/sec)
MW-1	14x10 ⁻⁴ to 18x10 ⁻⁴	7x10 ⁻⁵		
MW-2	7x10 ⁻⁴ to 9x10 ⁻⁴	1x10 ⁻⁴	Removed	Removed
MW-3A	2x10 ⁻⁹ to 3x10 ⁻⁹	9x10 ⁻⁶	Removed	Removed
MW-3R				1.7x10 ⁻⁶
MW-4	2x10 ⁻⁴ to 3x10 ⁻⁴	2x10 ⁻⁴		
MW-5	3x10 ⁻⁴ to 4x10 ⁻⁴	1x10 ⁻⁴		
MW-6A		6x10 ⁻⁶	Removed	Removed
MW-6R				1.6x10 ⁻⁸
MW-7		1x10 ⁻⁴		
MW-8		7x10 ⁻⁵		
MW-9		4x10 ⁻⁵		
MW-11R				3.1x10 ⁻⁸
MW-12R				8.0x10 ⁻⁶
MW-13			10x10 ⁻⁵	Removed
MW-14			2.5x10 ⁻⁵	Removed

Well depth measurements are made annually. The data for the last 29 years are presented in **Table 3**.

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Table 3														
BOTTOM OF WELL ELEVATIONS (ft)														
Replacement Wells MW-3A and MW-6A installed March 2007														
Replacement Wells MW-3R, MW-6R, MW-11R, and MW-12R installed April 2015														
Well #	MW-1	MW-2	MW-3/ MW-3A/ MW-3R	MW-4	MW-5	MW-6/ MW-6A/ MW-6R	MW-7	MW-8	MW-9	MW-10	MW-11/ MW-11R	MW-12/ MW-12R	MW-13	MW-14
Oct-88	839.85	834.86	836.93	838.18	839.75	840.17	833.36	815.26	823.82	857.96	853.80			
Oct-89	839.93	835.84	836.71	838.21	840.12	840.31	833.52	815.12	823.83	857.99	853.81			
Nov-90	839.97	835.59	836.49	838.25	840.08	840.20	833.42	815.26	823.87	857.96	853.81			
Dec-91	840.14	835.74	836.84	838.17	840.27	840.32	833.48	815.37	823.99	858.01	853.85			
Apr-92	839.67	835.47	837.01	838.27	840.25	840.21	833.49	815.36	823.87	858.01	853.86			
Jun-93	840.09	835.79	837.00	838.22	840.22	840.36	833.40	815.32	823.85	858.03	853.87			
Sep-94	840.21	835.88	837.15	838.34	840.34	840.44	833.43	815.40	823.92					
May-95	840.19	835.83	837.14	838.31	840.30	840.45	833.39	815.38	823.91	858.11	853.90			
Jun-96	840.17	835.86	837.12	838.29	840.31	840.57	833.38	815.39	823.97	858.07	853.89			
Jan-98	840.19	835.86	837.10	838.29	840.32	840.77	833.43	815.38	824.12	858.07	853.88			
Apr-98	840.19	835.85	837.18	838.26	840.29	840.53	833.50	815.37	824.08	858.07	853.89			
Jan-00	840.15	835.82	837.20	838.29	840.31	840.79	833.43	815.36	824.12	858.07	853.88			
Sep-00	840.19	835.85	837.15	838.32	840.39	841.14	833.48	815.37	824.20	858.08	853.90			
Mar-01	840.19	837.86*	837.20	838.31	840.34	841.17	833.49	815.39	824.27	858.08	853.88			
Nov-01	840.15	835.84	837.18	838.26	840.33	840.40	833.47	815.37	824.78	858.08	853.89			
Mar-02	840.18	835.86	837.20	838.29	840.34	840.39	833.47	815.38	824.81	858.07	853.90			
Jun-03	840.25	835.85	837.20	838.32	840.37	840.42	833.44	815.34	825.92		853.90			
Jun-04	840.22	834.88*	837.20	838.33	840.38	840.42	833.51	815.46	825.90	858.08	853.91			
Jun-05	840.16	835.89	837.24	838.29	840.36	840.44	833.50	815.46	825.64	860.08	853.49			
Jun-06	840.18	835.88	837.22	838.31	840.35	840.46	832.46	814.22	825.90	858.08	853.88	845.74		
6/1/07***	840.93	836.59	837.29	839.31	841.14	841.52	834.20	814.95	827.31	Removed	854.69	846.05		
06/18/08	840.90	836.59	837.60	839.29	841.11	841.52	834.20	815.08	827.31		854.66	846.16	847.02	845.52
11/24/09	840.93	836.62	837.60	839.32	841.08	841.52	834.25	815.08	827.29		854.69	846.22	847.04	845.52
09/16/10	840.85	836.63	837.60	839.36	841.09	841.74	834.48	815.10	827.21		854.69	846.22	847.04	845.51
9/20/11	840.83	836.64	837.59	839.35	841.11	841.70	834.51	815.10	827.22		854.68	846.21	847.05	845.53
9/20/12	840.97	836.59	837.60	839.31	841.11	841.73	834.54	815.07	824.55		854.69	846.16	847.04	845.48
9/10/13	840.97	836.62	837.60	839.35	841.08	841.72	834.32	815.25	824.59		854.68	846.01	847.04	845.50
9/16/14	841.06	836.57	837.57	839.27	841.06	841.70	834.28	815.18	824.68		854.67	845.98	847.03	845.46
6/16/15	840.91	Removed	841.53	838.23	841.09	833.78	834.20	814.10	824.61		836.56	845.75	Removed	Removed
9/21/16	841.28		841.74	839.44	841.32	834.06	834.51	815.44	824.91		836.85	845.69		
9/27/17	841.28		841.71	839.36	841.29	834.08	834.51	815.48	824.92		836.79	845.71		

*Possible measurement error.

**Referenced to 12/27/96 Top of Casing elevation measurements

***Referenced to new elevation measurements taken in March 2007

****Referenced to new elevation measurements taken in April 2015

The interceptor trench was removed during the remediation work done at the CRS site. The historical flow data available for the trench are 0.12 gpm (3/11/2014) and 0.14 gpm (9/16/2014).

6.0 Operation and Maintenance Activities

Well depths measurements are used to calculate well screen occlusions to help determine the condition of the wells. Original well construction data is not well documented so the well depths used as the “original” depth are data points that could be documented as early as possible after well construction. Well depths were measured during the September sampling event. The following measured depths were used to determine the screen occlusions. The calculated well screen occlusion percentages ranged from 6 in well MW-6R and -6.4 in well MW-8. Well maintenance will be conducted when percent occlusion reaches 15%.

Percent Screen Occlusion					
Well Identification	Initial Well Depth TOC (ft)	Footnote	Screen Length (ft)	Well Depth (ft) 9/27/2017	Percent Screen Occlusion
MW-1	26.80	*	10	26.71	0.9
MW-2	29.03	*	10	Removed	
MW-3A	29.41	**	10	Removed	
MW-3R	25.38	**	5	25.20	3.6
MW-4	28.83	*	10	28.79	0.4
MW-5	31.97	*	10	31.73	2.4
MW-6A	22.35	**	10	Removed	
MW-6R	25.47	**	5	25.17	6
MW-7	26.09	*	10	25.65	4.4
MW-8	44.21	*	10	44.85	-6.4
MW-9	38.26	*	10	38.09	1.7
MW-11	10.23	*	2	Removed	
MW-11R	27.73	**	5	27.5	4.6
MW-12	26.87	**	10	Removed	
MW-12R	25.08	**	5	25.12	-0.8
MW-13	25.57	**	3	Removed	
MW-14	20.05	**	3	Removed	

* 1995 Data Points Used as Baseline
 ** First Data Point after Installation Used as Baseline

Maintenance activities included vegetation control through physical means, including the placement of asphalt millings around the concrete pads of all 10 monitoring wells and routine mowing.

7.0 Future Plans

The next scheduled sampling event for 2018 will be in March. This will be the fourth semi-annual sampling collection since the remediation work was completed and the four new wells (MW-3R, MW-6R, MW-11R, and MW-12R) were installed. The City plans to petition KDHE and EPA to terminate Post-Closure Care and issue a No Further Action determination for the CRS site after all monitoring data indicates wells are within accepted pH range of 6.0 - 9.0 S.U.

Other future maintenance plans include maintenance done to the wells locks, seals, bailer lines, and casings on an as needed basis. Vegetation control will be accomplished through physical means.

Semi-annual data-only reports will be generated and sent to the KDHE in April 2018 following the March 2018 sampling events.

ATTACHMENT A - Water Table Elevations (ft) (9/7/1988 to 9/27/2017)

Water Table Elevations (ft)

Date	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-11
9/7/88	855.2	851.8	851.5	859.1	861.5	850.4	842.2	845.4	847.5	Dry
10/5/88	855.4	852.1	851.8	859.2	861.5	850.9	848.0	846.1	842.8	Dry
11/3/88	855.3	852.2	852.3	859.4	861.7	851.2	848.2	846.0	848.0	Dry
12/7/88	855.2	852.0	851.0	859.2	861.5	850.8	848.2	846.2	847.9	Dry
1/4/89	855.2	851.9	851.0	859.0	861.4	850.5	847.9	846.2	847.8	Dry
2/14/89	855.3	852.0	850.0	858.9	861.3	850.2	847.8	845.9	847.9	Dry
3/8/89	855.2	852.0	854.2	859.1	861.6	850.4	848.2	846.1	847.9	Dry
4/12/89	855.3	852.3	851.6	859.4	862.0	850.9	848.0	846.5	848.6	Dry
5/10/89	855.7	852.2	854.6	859.3	861.7	850.7	847.9	845.9	848.1	Dry
6/14/89	855.2	852.0	850.1	859.3	861.9	850.6	848.0	846.1	848.2	Dry
7/6/89	855.1	851.9	850.2	859.4	862.0	850.7	847.9	846.1	848.2	Dry
8/9/89	855.1	851.9	850.8	859.3	861.7	850.6	847.3	845.4	847.4	Dry
9/14/89	854.8	853.0	850.8	859.9	862.5	851.6	849.4	847.2	849.5	854.5
10/5/89	NS	852.2	851.8	NS						
11/14/89	NS	852.1	850.6	NS						
12/12/89	854.3	852.0	852.4	859.1	861.4	850.6	847.7	846.2	847.9	Dry
1/9/90	NS	851.9	850.6	NS						
2/8/90	NS	852.0	NS							
3/16/90	854.9	851.3	854.7	859.9	862.2	851.2	848.9	846.9	849.2	854.8
4/18/90	NS	851.9	NS							
6/13/90	853.4	852.1	850.3	859.6	862.2	851.2	848.1	846.7	849.2	854.9
9/12/90	852.0	851.9	849.8	859.4	861.9	850.5	847.5	845.7	847.8	Dry
12/12/90	852.7	852.1	850.5	859.3	861.6	850.6	847.9	846.4	848.3	Dry
3/7/91	852.2	851.80	849.3	859.0	861.4	849.9	847.5	846.1	847.9	Dry
6/7/91	852.2	852.10	849.4	859.5	861.9	850.9	848.1	846.6	848.9	854.9
9/5/91	850.7	852.2	849.7	859.4	861.9	850.7	847.8	845.8	847.9	Dry
12/11/91	851.1	852.0	848.8	859.2	861.6	850.3	847.7	843.0	848.2	Dry
3/18/92	852.3	852.1	848.2	859.3	861.8	850.9	847.7	846.4	848.6	854.7
6/12/92	853.9	853.1	852.2	859.6	862.2	851.2	848.3	846.4	848.8	855.0
9/18/92	853.9	852.4	852.3	859.4	862.0	850.9	848.1	846.5	848.6	Dry
12/17/92	850.6	852.9	849.3	859.8	862.3	851.6	848.1	847.1	849.3	855.6
3/23/93	854.04	852.13	851.55	859.46	862.08	850.68	847.84	846.48	848.40	855.30
6/16/93	849.56	852.23	846.52	859.61	862.28	851.04	848.15	846.61	848.68	855.47
9/8/93	850.27	852.14	847.81	859.52	862.13	850.74	848.19	846.45	848.46	854.56
12/15/93	850.80	852.13	847.46	859.52	862.17	850.34	848.00	846.85	848.64	854.21
3/10/94	851.02	851.98	847.18	859.38	862.07	850.33	847.43	846.51	848.20	854.40
6/22/94	851.20	852.03	846.72	859.49	862.16	850.69	847.88	846.49	848.59	854.55
9/13/94	850.48	852.25	846.57	859.52	862.10	850.97	848.01	846.65	848.67	Dry
12/13/94	851.53	852.51	846.93	859.46	861.99	850.97	848.02	847.12	848.95	Dry
3/16/95	853.35	852.13	846.55	859.43	861.97	850.90	847.79	846.76	848.68	854.79
6/13/95	851.50	852.81	847.04	859.94	862.67	852.07	848.59	847.33	847.33	855.92
9/13/95	850.34	852.45	846.55	859.60	862.10	851.24	848.03	846.91	846.91	855.45
12/12/95	853.93	852.21	852.12	859.22	861.48	850.62	847.56	846.29	848.03	Dry
3./15/96	853.56	852.29	850.15	859.29	861.81	850.75	847.67	846.16	847.99	Dry
6/12/96	853.50	852.76	847.12	859.84	862.47	852.04	848.58	847.14	849.32	855.84
9/24/96	852.15	852.60	856.82	859.57	862.00	851.35	846.18	846.98	848.98	854.30

ATTACHMENT A - Water Table Elevations (ft) (9/7/1988 to 9/27/2017)

Date	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-11
12/10/96	851.88	852.63	846.43	859.47	862.07	852.02	848.09	847.32	849.23	854.50
3/20/97	852.76	852.26	846.10	859.39	861.99	851.62	847.97	846.83	848.91	854.90
6/17/97	853.17	852.82	846.85	859.84	862.96	852.13	848.42	846.86	848.91	855.18
9/10/97	849.99	852.55	847.17	859.44	862.08	851.85	848.09	846.42	848.25	854.44
12/16/97	850.10	853.05	846.54	859.49	862.09	852.52	848.38	847.26	849.22	855.07
3/17/98	849.62	853.23	846.19	859.96	862.92	852.62	849.64	847.00	849.06	855.07
6/18/98	853.42	852.59	846.43	859.53	862.33	852.12	848.19	846.79	848.84	854.85
9/17/98	849.93	853.19	846.85	859.70	862.95	852.20	848.42	846.69	848.71	854.58
12/9/98	849.13	853.10	845.86	859.57	862.26	852.32	848.30	847.49	849.29	Dry
3/16/99	850.28	852.88	846.22	859.47	862.16	852.37	848.16	847.11	848.98	855.09
7/9/99	853.80	853.05	849.37	859.61	862.37	852.70	848.37	847.03	848.97	855.31
9/14/99	849.75	852.92	846.83	859.48	862.23	852.27	847.89	846.55	848.27	Dry
12/8/99	849.35	852.95	846.85	859.37	861.99	852.14	848.09	847.03	848.79	Dry
3/15/00	853.61	852.97	850.43	859.43	862.13	852.45	848.12	846.92	848.71	854.79
6/15/00	854.97	853.38	852.46	859.77	862.99	852.77	848.46	846.61	848.71	854.72

ATTACHMENT A - Water Table Elevations (ft) (9/7/1988 to 9/27/2017)

Date	MW-1	MW-2	MW-3/ MW-3A	MW-4	MW-5	MW-6/ MW-6A	MW-7	MW-8	MW-9	MW-11	MW-12	MW-13	MW-14
9/14/00	852.36	852.92	846.88	859.29	861.34	852.31	847.40	845.43	847.24	Dry			
12/20/00	855.03	852.66	853.39	858.66	861.55	852.04	847.94	846.52	848.21	Dry			
3/14/01	849.80	853.34	851.03	859.41	862.05	852.74	848.34	847.07	848.93	855.58			
6/12/01	850.30	853.23	847.09	859.50	862.18	852.50	848.36	845.88	849.08	855.23			
9/13/01	849.67	852.86	846.89	859.32	861.96	852.19	848.19	846.23	848.07	853.92			
12/14/01	850.56	852.12	846.83	858.69	861.47	851.39	847.63	848.00	847.71	Dry			
3/13/02	851.55	852.97	846.65	859.23	861.37	852.22	848.27	846.59	848.63	854.85			
6/14/02	851.84	853.19	845.61	859.45	862.16	852.66	848.40	846.67	848.97	855.05			
9/12/02	851.89	852.59	846.51	858.99	861.42	851.94	847.64	845.36	847.23	Dry			
12/11/02	847.46	852.39	845.99	858.90	861.14	851.57	847.55	845.53	847.39	Dry			
3/13/03	847.51	852.17	845.26	858.99	861.38	851.25	847.62	845.29	847.35	Dry			
6/10/03	849.17	853.22	844.27	859.37	862.09	852.44	848.13	846.11	848.42	854.60			
9/9/03	849.88	853.06	845.23	859.35	861.93	852.32	848.37	845.72	847.87	854.79			
12/19/03	853.02	852.87	851.66	859.24	861.86	851.85	848.93	846.50	848.25	Dry			
3/18/04	854.09	853.11	851.78	858.97	861.57	852.24	848.22	846.48	848.50	854.75			
6/16/04	852.79	853.11	848.84	859.26	862.14	852.30	848.11	845.97	848.07	854.70			
9/18/04	849.31	853.16	845.36	859.31	862.03	852.50	848.19	846.55	848.44	854.60			
12/14/04	848.63	853.18	845.70	859.11	861.60	852.44	848.20	846.90	848.62	854.89			
3/17/05	852.40	853.34	852.61	859.11	861.67	852.81	847.96	846.54	848.30	855.01			
6/16/05	851.32	855.86	849.51	859.93	862.49	854.87	849.44	847.49	849.44	857.05			
9/15/05	849.53	853.04	849.31	859.33	861.31	853.17	848.51	846.69	848.55	855.65			
12/13/05	848.12	852.18	847.65	859.02	861.50	851.97	847.70	846.60	848.11	Dry			
3/15/06	852.90	852.35	852.69	858.83	861.33	851.52	847.30	846.20	847.81	Dry			
6/15/06	849.03	852.95	848.97	859.63	862.28	852.32	847.62	845.91	847.66	854.49			
9/19/06	849.39	852.58	848.36	859.63	862.12	852.29	847.64	845.38	847.34	854.15	862.28		
12/19/06	847.51	852.34	847.80	858.99	861.45	851.82	847.57	845.81	847.67	Dry	860.09		
3/28/07	848.80	852.74	856.87	859.30	862.14	852.09	847.55	846.25	848.18	Dry	862.68		
6/20/07	850.08	855.07	857.49	860.89	863.62	853.74	849.61	847.66	949.94	856.12	862.93		
9/12/07	849.05	852.33	856.67	860.33	861.56	852.08	848.16	845.92	847.94	Dry	861.79		

ATTACHMENT A - Water Table Elevations (ft) (9/7/1988 to 9/27/2017)

Date	MW-1	MW-2	MW-3/ MW-3A	MW-4	MW-5	MW-6/ MW-6A	MW-7	MW-8	MW-9	MW-11	MW-12	MW-13	MW-14
12/18-19/07	855.43	853.71	857.02	860.18	862.72	852.40	848.96	847.44	849.46	Dry	860.68	861.22	853.95
3/17/05	852.40	853.34	852.61	859.11	861.67	852.81	847.96	846.54	848.30	855.01			
6/16/05	851.32	855.86	849.51	859.93	862.49	854.87	849.44	847.49	849.44	857.05			
9/15/05	849.53	853.04	849.31	859.33	861.31	853.17	848.51	846.69	848.55	855.65			
12/13/05	848.12	852.18	847.65	859.02	861.50	851.97	847.70	846.60	848.11	Dry			
3/15/06	852.90	852.35	852.69	858.83	861.33	851.52	847.30	846.20	847.81	Dry			
6/15/06	849.03	852.95	848.97	859.63	862.28	852.32	847.62	845.91	847.66	854.49			
9/19/06	849.39	852.58	848.36	859.63	862.12	852.29	847.64	845.38	847.34	854.15	862.28		
12/19/06	847.51	852.34	847.80	858.99	861.45	851.82	847.57	845.81	847.67	Dry	860.09		
3/28/07	848.80	852.74	856.87	859.30	862.14	852.09	847.55	846.25	848.18	Dry	862.68		
6/20/07	850.08	855.07	857.49	860.89	863.62	853.74	849.61	847.66	949.94	856.12	862.93		
9/12/07	849.05	852.33	856.67	860.33	861.56	852.08	848.16	845.92	847.94	Dry	861.79		
12/18-19/07	855.43	853.71	857.02	860.18	862.72	852.40	848.96	847.44	849.46	Dry	860.68	861.22	853.95
3/19/08	855.41	854.85	857.52	860.55	863.28	853.54	849.73	847.78	850.00	855.64	861.69	862.17	855.04
6/18/08	849.92	854.01	857.22	860.59	863.09	853.19	849.22	847.85	849.94	856.26	861.43	861.94	855.07
9/18/08	849.47	854.11	857.40	860.53	862.98	853.22	849.32	847.25	849.46	855.33	861.27	861.74	854.83
3/17/09	855.32	855.47	855.36	860.09	862.58	852.58	848.93	847.58	849.70	Dry	860.70	861.22	854.41
9/16/09	855.69	853.93	856.88	860.40	862.79	852.78	848.94	847.64	849.36	855.60	860.75	861.36	854.50
3/16/10	855.35	854.15	857.41	860.53	862.93	853.30	849.15	847.87	849.77	856.16	861.51	862.01	854.94
9/16/10	855.42	853.25	856.97	860.53	863.29	852.21	849.01	846.72	848.51	Dry	860.77	860.97	853.58
3/17/11	855.46	854.12	857.50	860.65	863.16	853.35	849.53	847.71	849.89	855.92	861.73	862.26	854.74
9/20/11	854.79	852.79	856.32	860.27	862.54	851.61	847.28	845.43	847.33	Dry	859.87	860.67	853.03
3/26/12	855.50	854.65	857.66	860.75	863.24	853.85	850.01	847.85	849.86	856.41	862.26	862.75	855.16
9/20/12	854.74	852.52	856.11	859.92	861.78	851.32	846.30	844.52	846.40	Dry	859.19	859.96	852.78
3/12/13	855.51	853.81	857.44	860.56	862.91	852.52	848.30	846.06	848.39	Dry	861.56	862.14	853.12
9/10/13	854.62	848.25	850.78	859.53	861.68	847.48	843.01	841.34	846.92	Dry	853.82	855.29	849.09
3/11/14	851.61	852.87	856.62	856.40	862.20	851.61	847.83	846.32	848.61	Dry	860.07	860.69	853.13
9/16/14	855.43	852.94	856.57	860.30	862.07	851.93	847.61	845.79	848.08	Dry	859.74	860.46	853.29
3/23/2015	855.37	Removed	Removed	862.05	863.67	Removed	847.79	846.78	848.75	Removed	Removed	Removed	Removed

ATTACHMENT A - Water Table Elevations (ft) (9/7/1988 to 9/27/2017)

Date	MW-1	MW-2	MW-3/ MW-3A	MW-4	MW-5	MW-6/ MW-6A	MW-7	MW-8	MW-9	MW-11	MW-12	MW-13	MW-14
6/16/2015	855.97		861.46	864.4	866.64	851.22	849.82	847.78	849.97	857	864.11		
9/17/2015	855.59		859.98	863.4	865.6	850.98	849.03	847.07	849.01	856.41	862.77		
12/7/2015	855.53		857.92	862.74	865.87	850.98	848.84	847.53	849.57	855.32	861.97		
3/14/2016	855.47		856.66	862.50	864.56	850.30	847.89	847.00	848.75	855.14	861.25		
9/21/2016	856.08		857.58	863.30	865.69	851.10	849.41	847.76	849.73	856.15	862.50		
3/8/2017	855.49		855.28	861.94	863.85	849.77	847.59	846.88	848.3	854.24	860.21		
9/27/2017	855.92		856.75	862.92	865.23	850.93	848.85	847.63	848.99	855.52	861.80		

Replacement Wells MW-3R, MW-6R, MW-11R, and MW-12R installed April 2015

Attachement B
Field Data Sheets

FORMER FARMLAND NITROGEN PLANT
LAWRENCE, KANSAS

11/04/15
Revision

RCRA MONITORING WELL NETWORK

WELL SAMPLING LOG

DATE 3-8-17

SAMPLED BY Shawna Trumbach

WELL ID	TOC MSL	H2O DEPTH TOC	WATER DEPTH MSL	DEPTH MEASURE MENT TIME	PUMP TIME	SAMPLE TIME	SAMPLE METHOD	FIELD OBSERVATIONS PROCEDURES NOTES
1	867.84	12.35	855.49	1024	1025	1357 ¹⁴¹⁵	Grab	6.52 6.86
3R	866.91	11.63	855.28	1013	1014	1341 ¹³⁴¹	Grab	6.67 7.04
4	868.15	6.21	861.94	0957	0959	1404	Grab	7.03
5	873.02	9.17	863.85	0949	0951	1400	Grab	6.87
6R	859.25	9.48	849.77	0839	0840	1337	Grab	6.52
7	860.16	12.57	847.59	0846	0847	1341	Grab	6.67
8	860.33	13.45	846.88	0854	0855	1343	Grab	6.75
9	863.01	14.71	848.3	1032	1033	1419	Grab	6.81
11R	864.29	10.05	844.24	0911	0912	1349	Grab	6.57
12R	870.83	10.62	860.21	0926	0927	1352	Grab	7.29

FORMER FARMLAND NITROGEN PLANT
LAWRENCE, KANSAS

10/16/17
Revision

RCRA MONITORING WELL NETWORK
WELL SAMPLING LOG

DATE 9-27-17

SAMPLED BY

Shauna Trarback

WELL ID	TOC MSL (feet)	H2O DEPTH TOC (feet)	WATER DEPTH MSL (feet)	DEPTH MEASUREMENT TIME	PUMP TIME	SAMPLE COLLECTION TIME	SAMPLE ANALYSIS TIME	SAMPLE METHOD	FIELD OBSERVATIONS		Notes
									pH (SU)	TD (feet)	
MW-1	867.99	12.07	855.92	0734	0735	1201	1251	Grab	6.72	26.71	DUP pH = 6.71
MW-3R	866.91	10.16	856.75	0824	0825	1212	1212	Grab	7.04	25.20	
MW-4	868.15	5.23	862.92	0713	0715	1156	1157	Grab	6.97	28.79	
MW-5	873.02	7.79	865.23	0705	0707	1152	1153	Grab	6.80	31.73	
MW-6R	859.25	8.32	850.93	0727	0730	1207	1208	Grab	6.55	25.17	
MW-7	860.16	11.31	848.85	0637	0638	1139	1140	Grab	6.70	25.65	
MW-8	860.33	12.70	847.63	0748	0750	0813	0815	Grab	6.81	44.85	
MW-9	863.01	14.02	848.99	0836	0838	1216	1217	Grab	6.75	38.09	
MW-11R	864.29	8.77	855.52	0648	0649	1145	1146	Grab	6.65	27.50	
MW-12R	870.83	9.03	861.8	0622	0623	1133	1134	Grab	7.29	25.12	

Footnote:

TOC = Top of Casing
MSL = Mean Sea Level
TD = Total Depth

Attachement C
Laboratory Reports



City of Lawrence Laboratories - Utilities
PO Box 708
Lawrence, KS 66044
785-832-7817

March 10, 2017

Matt Bond
City of Lawrence - Public Works
P.O. Box 708
Lawrence, KS 66044

RE: Farmland - RCRA

Enclosed are the results of analyses for samples received at the laboratory on 03/08/17. The results herein unless otherwise noted, conform to the TNI standards and the laboratory's procedures. The quantitative results in this report relate only to the samples tested.

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

A handwritten signature in cursive script that reads "Aurora Shields".

Karen Zimmerly For Aurora Shields
Water Quality Manager
(785) 423-0699

Your feedback for the laboratory services we provide will be greatly appreciated. If you have any input, both positive or negative, let us know by contacting us at ashields@lawrenceks.org. Your feedback will be used to improve our management system, testing, and services.

Reported: 03/10/17 13:47

NELAP Laboratory Accreditation: E-60665

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
RCRA MW 1	W7C0207-01	Water	03/08/17 14:15	03/08/17 15:12
RCRA MW 3R	W7C0207-02	Water	03/08/17 14:10	03/08/17 15:12
RCRA MW 4	W7C0207-03	Water	03/08/17 14:04	03/08/17 15:12
RCRA MW 5	W7C0207-04	Water	03/08/17 14:00	03/08/17 15:12
RCRA MW 6R	W7C0207-05	Water	03/08/17 13:37	03/08/17 15:12
RCRA MW 7	W7C0207-06	Water	03/08/17 13:41	03/08/17 15:12
RCRA MW 8	W7C0207-07	Water	03/08/17 13:43	03/08/17 15:12
RCRA MW 9	W7C0207-08	Water	03/08/17 14:19	03/08/17 15:12
RCRA MW 11R	W7C0207-09	Water	03/08/17 13:49	03/08/17 15:12
RCRA MW 12R	W7C0207-10	Water	03/08/17 13:52	03/08/17 15:12

Reported: 03/10/17 13:47

NELAP Laboratory Accreditation: E-60665

RCRA MW 1

Collected: 3/8/17 14:15

W7C0207-01 (Water)

Analyte	Result	Reporting			Batch	Analyzed	Analyst	Method	Qualifiers
		Limit	Units						
pH	6.86		pH Units		7030815	03/08/17 14:16	SCT	9040	
Field Temperature	17.4		°C				Shawna Trarbach	SM 2550 B	

RCRA MW 3R

Collected: 3/8/17 14:10

W7C0207-02 (Water)

Analyte	Result	Reporting			Batch	Analyzed	Analyst	Method	Qualifiers
		Limit	Units						
pH	7.04		pH Units		7030815	03/08/17 14:11	SCT	9040	
Field Temperature	15.6		°C				Shawna Trarbach	SM 2550 B	

RCRA MW 4

Collected: 3/8/17 14:04

W7C0207-03 (Water)

Analyte	Result	Reporting			Batch	Analyzed	Analyst	Method	Qualifiers
		Limit	Units						
pH	7.03		pH Units		7030815	03/08/17 14:05	SCT	9040	
Field Temperature	15.6		°C				Shawna Trarbach	SM 2550 B	

RCRA MW 5

Reported: 03/10/17 13:47

NELAP Laboratory Accreditation: E-60665

Collected: 3/8/17 14:00
W7C0207-04 (Water)

Analyte	Result	Reporting Limit	Units	Batch	Analyzed	Analyst	Method	Qualifiers
pH	6.87		pH Units	7030815	03/08/17 14:01	SCT	9040	
Field Temperature	17.0		°C			Shawna Trarbach	SM 2550 B	

RCRA MW 6R

Collected: 3/8/17 13:37
W7C0207-05 (Water)

Analyte	Result	Reporting Limit	Units	Batch	Analyzed	Analyst	Method	Qualifiers
pH	6.52		pH Units	7030815	03/08/17 13:38	SCT	9040	
Field Temperature	15.3		°C			Shawna Trarbach	SM 2550 B	

RCRA MW 7

Collected: 3/8/17 13:41
W7C0207-06 (Water)

Analyte	Result	Reporting Limit	Units	Batch	Analyzed	Analyst	Method	Qualifiers
pH	6.67		pH Units	7030815	03/08/17 13:42	SCT	9040	
Field Temperature	18.9		°C			Shawna Trarbach	SM 2550 B	

RCRA MW 8

Reported: 03/10/17 13:47

NELAP Laboratory Accreditation: E-60665

Collected: 3/8/17 13:43
W7C0207-07 (Water)

Analyte	Result	Reporting Limit	Units	Batch	Analyzed	Analyst	Method	Qualifiers
pH	6.75		pH Units	7030815	03/08/17 13:44	SCT	9040	
Field Temperature	16.0		°C			Shawna Trarbach	SM 2550 B	

RCRA MW 9

Collected: 3/8/17 14:19
W7C0207-08 (Water)

Analyte	Result	Reporting Limit	Units	Batch	Analyzed	Analyst	Method	Qualifiers
pH	6.81		pH Units	7030815	03/08/17 14:20	SCT	9040	
Field Temperature	17.1		°C			Shawna Trarbach	SM 2550 B	

RCRA MW 11R

Collected: 3/8/17 13:49
W7C0207-09 (Water)

Analyte	Result	Reporting Limit	Units	Batch	Analyzed	Analyst	Method	Qualifiers
pH	6.57		pH Units	7030815	03/08/17 13:49	SCT	9040	
Field Temperature	15.8		°C			Shawna Trarbach	SM 2550 B	

RCRA MW 12R

Reported: 03/10/17 13:47

NELAP Laboratory Accreditation: E-60665

Collected: 3/8/17 13:52
W7C0207-10 (Water)

Analyte	Result	Reporting Limit	Units	Batch	Analyzed	Analyst	Method	Qualifiers
pH	7.29		pH Units	7030815	03/08/17 13:54	SCT	9040	
Field Temperature	17.0		°C			Shawna Trarbach	SM 2550 B	

Reported: 03/10/17 13:47

NELAP Laboratory Accreditation: E-60665

General Chemistry Parameters - Quality Control
City of Lawrence

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
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Batch 7030815 - General Chemistry Preparation

LCS (7030815-BS1)				Prepared & Analyzed: 03/08/17						
pH	9.04		pH Units	9.000		100	97-103			
LCS (7030815-BS2)				Prepared & Analyzed: 03/08/17						
pH	9.06		pH Units	9.000		101	97-103			
Duplicate (7030815-DUP1)		Source: W7C0207-10		Prepared & Analyzed: 03/08/17						
pH	7.32		pH Units		7.29			0.411	15	

Reported: 03/10/17 13:47

NELAP Laboratory Accreditation: E-60665

Notes and Definitions

DET Analyte DETECTED
ND Analyte NOT DETECTED at or above the reporting limit
NR Not Reported
dry Sample results reported on a dry weight basis
RPD Relative Percent Difference

Reported: 03/10/17 13:47

NELAP Laboratory Accreditation: E-60665



City of Lawrence Laboratories - Utilities
PO Box 708
Lawrence, KS 66044
785-832-7817

October 10, 2017

Matt Bond
City of Lawrence - Public Works
P.O. Box 708
Lawrence, KS 66044

RE: Farmland - RCRA

Enclosed are the results of analyses for samples received at the laboratory on 09/27/17. The results herein unless otherwise noted, conform to the TNI standards and the laboratory's procedures. The quantitative results in this report relate only to the samples tested.

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

A handwritten signature in cursive script that reads "Aurora Shields".

Jay Lovett For Aurora Shields
Water Quality Manager
(785) 423-0699

Your feedback for the laboratory services we provide will be greatly appreciated. If you have any input, both positive or negative, let us know by contacting us at ashields@lawrenceks.org. Your feedback will be used to improve our management system, testing, and services.

Reported: 10/10/17 13:54

NELAP Laboratory Accreditation: E-60665

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
RCRA MW 1	W7I0646-01	Water	09/27/17 12:01	09/27/17 12:44
RCRA MW 3R	W7I0646-02	Water	09/27/17 12:12	09/27/17 12:44
RCRA MW 4	W7I0646-03	Water	09/27/17 11:56	09/27/17 12:44
RCRA MW 5	W7I0646-04	Water	09/27/17 11:52	09/27/17 12:44
RCRA MW 6R	W7I0646-05	Water	09/27/17 12:07	09/27/17 12:44
RCRA MW 7	W7I0646-06	Water	09/27/17 11:39	09/27/17 12:44
RCRA MW 8	W7I0646-07	Water	09/27/17 08:13	09/27/17 12:44
RCRA MW 9	W7I0646-08	Water	09/27/17 12:16	09/27/17 12:44
RCRA MW 11R	W7I0646-09	Water	09/27/17 11:45	09/27/17 12:44
RCRA MW 12R	W7I0646-10	Water	09/27/17 00:00	09/27/17 12:44

Reported: 10/10/17 13:54

NELAP Laboratory Accreditation: E-60665

RCRA MW 1

Collected: 9/27/17 12:01

W710646-01 (Water)

Analyte	Result	Reporting		Batch	Analyzed	Analyst	Method	Qualifiers
		Limit	Units					
pH	6.7		pH Units	7092713	09/27/17 12:01	SCT	9040	
Field Temperature	16.9		°C			Shawna Trarbach	SM 2550 B	

RCRA MW 3R

Collected: 9/27/17 12:12

W710646-02 (Water)

Analyte	Result	Reporting		Batch	Analyzed	Analyst	Method	Qualifiers
		Limit	Units					
pH	7.0		pH Units	7092713	09/27/17 12:12	SCT	9040	
Field Temperature	18.2		°C			Shawna Trarbach	SM 2550 B	

RCRA MW 4

Collected: 9/27/17 11:56

W710646-03 (Water)

Analyte	Result	Reporting		Batch	Analyzed	Analyst	Method	Qualifiers
		Limit	Units					
pH	7.0		pH Units	7092713	09/27/17 11:56	SCT	9040	
Field Temperature	20.8		°C			Shawna Trarbach	SM 2550 B	

RCRA MW 5

Reported: 10/10/17 13:54

NELAP Laboratory Accreditation: E-60665

Collected: 9/27/17 11:52
W710646-04 (Water)

Analyte	Result	Reporting		Batch	Analyzed	Analyst	Method	Qualifiers
		Limit	Units					
pH	6.8		pH Units	7092713	09/27/17 11:52	SCT	9040	
Field Temperature	20.5		°C			Shawna Trarbach	SM 2550 B	

RCRA MW 6R

Collected: 9/27/17 12:07
W710646-05 (Water)

Analyte	Result	Reporting		Batch	Analyzed	Analyst	Method	Qualifiers
		Limit	Units					
pH	6.6		pH Units	7092713	09/27/17 12:07	SCT	9040	
Field Temperature	20.7		°C			Shawna Trarbach	SM 2550 B	

RCRA MW 7

Collected: 9/27/17 11:39
W710646-06 (Water)

Analyte	Result	Reporting		Batch	Analyzed	Analyst	Method	Qualifiers
		Limit	Units					
pH	6.7		pH Units	7092713	09/27/17 11:39	SCT	9040	
Field Temperature	18.6		°C			Shawna Trarbach	SM 2550 B	

RCRA MW 8

Reported: 10/10/17 13:54

NELAP Laboratory Accreditation: E-60665

Collected: 9/27/17 8:13
W710646-07 (Water)

Analyte	Result	Reporting		Batch	Analyzed	Analyst	Method	Qualifiers
		Limit	Units					
pH	6.8		pH Units	7092713	09/27/17 08:13	SMG	9040	
Field Temperature	16.3		°C			Sarah Graves	SM 2550 B	

RCRA MW 9

Collected: 9/27/17 12:16
W710646-08 (Water)

Analyte	Result	Reporting		Batch	Analyzed	Analyst	Method	Qualifiers
		Limit	Units					
pH	6.8		pH Units	7092713	09/27/17 12:16	SCT	9040	
Field Temperature	18.9		°C			Shawna Trarbach	SM 2550 B	

RCRA MW 11R

Collected: 9/27/17 11:45
W710646-09 (Water)

Analyte	Result	Reporting		Batch	Analyzed	Analyst	Method	Qualifiers
		Limit	Units					
pH	6.6		pH Units	7092713	09/27/17 11:45	SCT	9040	
Field Temperature	18.5		°C			Shawna Trarbach	SM 2550 B	

RCRA MW 12R

Reported: 10/10/17 13:54

NELAP Laboratory Accreditation: E-60665

Collected: 9/27/17 0:00
W710646-10 (Water)

Analyte	Result	Reporting Limit	Units	Batch	Analyzed	Analyst	Method	Qualifiers
pH	7.3		pH Units	7092713	09/27/17 11:33	SCT	9040	
Field Temperature	19.2		°C			Shawna Trarbach	SM 2550 B	

Reported: 10/10/17 13:54

NELAP Laboratory Accreditation: E-60665

General Chemistry Parameters - Quality Control
City of Lawrence

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
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Batch 7092713 - General Chemistry Preparation

LCS (7092713-BS1)				Prepared & Analyzed: 09/27/17						
pH	9.1		pH Units	9.00		101	97-103			
LCS (7092713-BS2)				Prepared & Analyzed: 09/27/17						
pH	9.0		pH Units	9.00		100	97-103			
Duplicate (7092713-DUP1)		Source: W7I0646-01		Prepared & Analyzed: 09/27/17						
pH	6.7		pH Units		6.7			0.149	15	



Reported: 10/10/17 13:54

NELAP Laboratory Accreditation: E-60665

Notes and Definitions

DET Analyte DETECTED
ND Analyte NOT DETECTED at or above the reporting limit
NR Not Reported
dry Sample results reported on a dry weight basis
RPD Relative Percent Difference

Appendix B
Groundwater Monitoring Results,
June 22, 2018



City of Lawrence Laboratories - Utilities
PO Box 708
Lawrence, KS 66044
785-832-7817

June 28, 2018

Sarah Graves
City of Lawrence - Utilities
P.O. Box 708
Lawrence, KS. 66044

RE: Farmland - RCRA

Enclosed are the results of analyses for samples received at the laboratory on 06/22/18. The results herein unless otherwise noted, conform to the TNI standards and the laboratory's procedures. The quantitative results in this report relate only to the samples tested.

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

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Josh Toevs For Aurora Shields
Water Quality Manager
(785) 423-0699

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Reported: 06/28/18 08:36

NELAP Laboratory Accreditation: E-60665

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
RCRA MW 1	W8F0711-01	Water	06/22/18 13:12	06/22/18 15:42
RCRA MW 3R	W8F0711-02	Water	06/22/18 13:23	06/22/18 15:42
RCRA MW 4	W8F0711-03	Water	06/22/18 14:00	06/22/18 15:42
RCRA MW 5	W8F0711-04	Water	06/22/18 13:41	06/22/18 15:42
RCRA MW 6R	W8F0711-05	Water	06/22/18 15:20	06/22/18 15:42
RCRA MW 7	W8F0711-06	Water	06/22/18 14:44	06/22/18 15:42
RCRA MW 8	W8F0711-07	Water	06/22/18 11:22	06/22/18 15:42
RCRA MW 9	W8F0711-08	Water	06/22/18 13:04	06/22/18 15:42
RCRA MW 11R	W8F0711-09	Water	06/22/18 14:19	06/22/18 15:42
RCRA MW 12R	W8F0711-10	Water	06/22/18 13:29	06/22/18 15:42



Reported: 06/28/18 08:36

NELAP Laboratory Accreditation: E-60665

RCRA MW 1

Collected: 6/22/18 13:12

W8F0711-01 (Water)

Analyte	Result	Reporting			Batch	Analyzed	Analyst	Method	Qualifiers
		Limit	Units						
pH	6.8		pH Units		8062706	06/22/18 13:14	SCT	9040	
Field Temperature	16.0		°C				Shawna Trarbach	SM 2550 B	

RCRA MW 3R

Collected: 6/22/18 13:23

W8F0711-02 (Water)

Analyte	Result	Reporting			Batch	Analyzed	Analyst	Method	Qualifiers
		Limit	Units						
pH	7.0		pH Units		8062706	06/22/18 13:24	SCT	9040	
Field Temperature	16.9		°C				Shawna Trarbach	SM 2550 B	

RCRA MW 4

Collected: 6/22/18 14:00

W8F0711-03 (Water)

Analyte	Result	Reporting			Batch	Analyzed	Analyst	Method	Qualifiers
		Limit	Units						
pH	6.9		pH Units		8062706	06/22/18 14:03	SCT	9040	
Field Temperature	21.4		°C				Shawna Trarbach	SM 2550 B	

RCRA MW 5

Reported: 06/28/18 08:36

NELAP Laboratory Accreditation: E-60665

Collected: 6/22/18 13:41
W8F0711-04 (Water)

Analyte	Result	Reporting Limit	Units	Batch	Analyzed	Analyst	Method	Qualifiers
pH	6.9		pH Units	8062706	06/22/18 13:43	SCT	9040	
Field Temperature	18.5		°C			Shawna Trarbach	SM 2550 B	

RCRA MW 6R

Collected: 6/22/18 15:20
W8F0711-05 (Water)

Analyte	Result	Reporting Limit	Units	Batch	Analyzed	Analyst	Method	Qualifiers
pH	6.5		pH Units	8062706	06/22/18 15:22	SCT	9040	
Field Temperature	17.4		°C			Shawna Trarbach	SM 2550 B	

RCRA MW 7

Collected: 6/22/18 14:44
W8F0711-06 (Water)

Analyte	Result	Reporting Limit	Units	Batch	Analyzed	Analyst	Method	Qualifiers
pH	6.7		pH Units	8062706	06/22/18 14:46	SCT	9040	
Field Temperature	18.2		°C			Shawna Trarbach	SM 2550 B	

RCRA MW 8

Reported: 06/28/18 08:36

NELAP Laboratory Accreditation: E-60665

Collected: 6/22/18 11:22
W8F0711-07 (Water)

Analyte	Result	Reporting Limit	Units	Batch	Analyzed	Analyst	Method	Qualifiers
pH	6.8		pH Units	8062706	06/22/18 11:22	SCT	9040	
Field Temperature	15.6		°C			Shawna Trarbach	SM 2550 B	

RCRA MW 9

Collected: 6/22/18 13:04
W8F0711-08 (Water)

Analyte	Result	Reporting Limit	Units	Batch	Analyzed	Analyst	Method	Qualifiers
pH	6.6		pH Units	8062706	06/22/18 13:05	SCT	9040	
Field Temperature	16.1		°C			Shawna Trarbach	SM 2550 B	

RCRA MW 11R

Collected: 6/22/18 14:19
W8F0711-09 (Water)

Analyte	Result	Reporting Limit	Units	Batch	Analyzed	Analyst	Method	Qualifiers
pH	6.5		pH Units	8062706	06/22/18 14:23	SCT	9040	
Field Temperature	18.9		°C			Shawna Trarbach	SM 2550 B	

RCRA MW 12R

Reported: 06/28/18 08:36

NELAP Laboratory Accreditation: E-60665

Collected: 6/22/18 13:29
W8F0711-10 (Water)

Analyte	Result	Reporting Limit	Units	Batch	Analyzed	Analyst	Method	Qualifiers
pH	7.3		pH Units	8062706	06/22/18 13:30	SCT	9040	
Field Temperature	17.0		°C			Shawna Trarbach	SM 2550 B	

Reported: 06/28/18 08:36

NELAP Laboratory Accreditation: E-60665

General Chemistry Parameters - Quality Control
City of Lawrence

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
Batch 8062706 - General Chemistry Preparation										
LCS (8062706-BS1)										
Prepared & Analyzed: 06/22/18										
pH	9.0		pH Units	9.00		100	97-103			
LCS (8062706-BS2)										
Prepared & Analyzed: 06/22/18										
pH	6.0		pH Units	6.00		99.7	97-103			
Duplicate (8062706-DUP1)										
Source: W8F0711-08										
Prepared & Analyzed: 06/22/18										
pH	6.7		pH Units		6.6			1.34	15	

Reported: 06/28/18 08:36

NELAP Laboratory Accreditation: E-60665

Notes and Definitions

DET Analyte DETECTED
ND Analyte NOT DETECTED at or above the reporting limit
NR Not Reported
dry Sample results reported on a dry weight basis
RPD Relative Percent Difference

(SM 4500-H B; EPA 9040 C)

Temperature (SM 2550B)

Analyzed By: Shawna Tarback

Analysis Date: 6-22-18

Element Sample ID	Sample Description	Date of Collection	Time of Collection	Time of Analysis	Volume of Sample (mL)	Temperature °C	pH S.U.
8062706-BS1	LCS	6-22-18	N/A	0737	50	20.7	9.04
W8F0711-01	MW-1	6-22-18	1312	1314	50	16.0	6.77
W8F0711-02	MW-3R	6-22-18	1323	1324	50	16.9	7.04
W8F0711-03	MW-4	6-22-18	1400	1403	50	21.4	6.93
W8F0711-04	MW-5	6-22-18	1341	1343	50	18.5	6.88
W8F0711-05	MW-6R	6-22-18	1320	1322	50	17.4	6.53
W8F0711-06	MW-7	6-22-18	1444	1446	50	18.2	6.66
W8F0711-07	MW-8	6-22-18	1122	1122	50	15.6	6.83
W8F0711-08	MW-9	6-22-18	1304	1305	50	16.1	6.65
W8F0711-09	MW-11R	6-22-18	1419	1423	50	18.9	6.54
W8F0711-10	MW-12R	6-22-18	1329	1330	50	17.0	7.26
8062706-H	MW-9 DUP	6-22-18	1305	1306	50	15.7	6.74
8062706-BSZ	LCS	6-22-18	N/A	1542	50	20.3	5.98
	8062706-DUP						

- Pb/Cu Biweekly
- Stage 2
- pH
- S.U.

Equipment:

- HACH Senion156 pH Meter
- Thermo Orion pH meter
- HACH HQd pH Meter

Chemical Lot #s:

- HACH 4.00 pH Buffer: A7355 Expiration Date: Dec-21
 - HACH 7.00 pH Buffer: A8095 Expiration Date: Apr-20
 - HACH 10.00 pH Buffer: A8033 Expiration Date: Feb-19
 - Fisher 6.00 pH Buffer: 4704199 Expiration Date: Apr-19
 - Fisher 9.00 pH Buffer: 2712458 Expiration Date: Nov-19
- Read back value acceptance range: 5.9-6.1 SU
Read back value acceptance range: 8.9-9.1 SU

Quality Control:

- | | | | |
|--------------|---|--------------------------|--|
| | yes | no | |
| Holding Time | <input checked="" type="checkbox"/> | <input type="checkbox"/> | Analysis started within 15 minutes of collection time for all samples? |
| pH Slope | <u>57.54</u> mV % <input checked="" type="checkbox"/> | <input type="checkbox"/> | is pH meter Slope between -55 and -61 mV (Hach) or 92-102% (Thermo)? |
| LCS/CCC | <u>9.04</u> <input checked="" type="checkbox"/> | <input type="checkbox"/> | Is LCS/CCC measured result +/- 0.1 S.U. of true value? |
| Duplicate | <u>1.34</u> % <input checked="" type="checkbox"/> | <input type="checkbox"/> | Is Duplicate Difference < 5%? |
| LCS/CCC | <u>99.7</u> <u>5.98</u> <input checked="" type="checkbox"/> | <input type="checkbox"/> | Is Ending LCS/CCC measured result +/- 0.1 S.U. of true value? |

QC Review
1: JGT Date: 6/27/18
2: ES Date: 6/27/18

FORMER FARMLAND NITROGEN PLANT
LAWRENCE, KANSAS

RCRA MONITORING WELL NETWORK
WELL SAMPLING LOG

DATE 6-22-18

SAMPLED BY

Shawn Trarback / Nicholas Bartley

10/16/17
Revision

WELL ID	TOC MSL (feet)	H2O DEPTH TOC (feet)	WATER DEPTH MSL (feet)	DEPTH MEASUREMENT TIME	PUMP TIME	SAMPLE COLLECTION TIME	SAMPLE ANALYSIS TIME	SAMPLE METHOD	FIELD OBSERVATIONS		Notes
									pH (SU)	TD (feet)	
MW-1	867.99	12.37 13.49	855.62 852.5	08:59 08:13	08:53	13:12	1314	Grab	6.77		
MW-3R	866.91	10.77	856.12	09:07	09:08	1323	1324	Grab	7.04		
MW-4	868.15	5.97	862.18	10:00	10:03	14:00	1403	Grab	6.93		25.44' TD
MW-5	873.02	8.98	864.04	09:46	09:50	1341	1343	Grab	6.88		
MW-6R	859.25	2.95	849.3	11:30	11:31	13:20 13:28	13:26 13:28	Grab	6.53		
MW-7	860.16	12.83	847.33	10:41	10:48	14:44	14:46	Grab	6.66		
MW-8	860.33	14.54	845.79	10:42	10:44	1122	1122	Grab	6.83		
MW-9	863.01	15.49	843.52	08:13	08:17	1304	1305	Grab	6.65		DWP-6.74
MW-11R	864.29	9.79	854.5	10:19	10:20	14:19	1423	Grab	6.54		
MW-12R	870.83	9.54	861.28	07:30	07:31	1329	1330	Grab	7.26		

1306

Footnote:

TOC = Top of Casing
MSL = Mean Sea Level
TD = Total Depth

Reported: 06/28/18 08:36

NELAP Laboratory Accreditation: E-60665





about GHD

GHD is one of the world's leading professional services companies operating in the global markets of water, energy and resources, environment, property and buildings, and transportation. We provide engineering, environmental, and construction services to private and public sector clients.

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