Koch Nitrogen Company, LLC Dodge City Draft Groundwater Sampling and Analysis Plan (GWSAP)
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1 Attachment

RCRA

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DRAFT-RCRA Groundwater SAP_KDC 9 13 12.pdf

All,

Attached is the draft Groundwater Sampling and Analysis Plan (GWSAP) we have developed as part of our permit renewal submission. We are proposing to sample 90 monitoring and recovery wells semiannually with private well sampling on a quarterly basis. The tables and figures associated with the GWSAP are also attached. Table 1 identifies the wells proposed for semiannual groundwater sampling, the proposed analytical program, and sampling method. Table 2 identifies the private wells. Due to file size, the appendices have not been included.

KNC greatly appreciates KDHE and EPA providing comments and suggestions to the GWSAP

prior to the permit renewal submission and we look forward to discussing the GWSAP with you.

Thank you

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Groundwater Sampling and Analysis Plan

September 2012

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1 INTRODUCTION

This Groundwater Sampling and Analysis Plan (SAP) has been prepared to fulfill the requirements, set forth in 40 CFR Part 264, Subpart F, Section 264.92, for the owner/operator of a Facility regulated under a Resource Conservation and Recovery Act (RCRA) Permit. The SAP provides groundwater monitoring well information, sampling procedures and frequency, analyses to be performed, and the basic laboratory requirements for obtaining valid, defensible data.

1.1 Site Description

The Koch Nitrogen Company, LLC (KNC) facility (Facility) manufactures anhydrous ammonia and urea ammonium nitrate fertilizers. The Facility began operation in 1968 and was owned and operated by Farmland Industries until the Facility was purchased by a predecessor to KNC in May 2003. The Facility is located in the north half of Section 22, Township 26 South, Range 24 West, in Ford County, Kansas. The Facility is located approximately 3 miles east of Dodge City, Kansas and is located in a rural agricultural area. A map of the site location can be found on Figure 1.

The former owners of the Facility operated one hazardous waste management unit within this Facility subject to provisions of RCRA, which require facilities to monitor the groundwater beneath, and assess the potential for releases to the environment from the subject unit. The Facility RCRA unit, the former Chrome Destruct Unit (CDU), was operated from 1968 to 1984 to reduce hexavalent chromium contained in cooling tower blowdown water to less soluble trivalent chromium. When Farmland eliminated usage of chromate corrosion inhibitors, the CDU was utilized to treat recovered groundwater. In 1991, the CDU was removed from service and replaced with an electrochemical chromium reduction system. This electrochemical treatment system was located in the Chromium Treatment Building and adjacent settling tank. In 2006, a new reverse-osmosis (RO) treatment unit, the Osmo PRO 300 System, was installed. The system consists of the feed pump and chemical pretreatment, the RO machine (membrane assembly), permeate collection and drain of rejected water to the process sewer.

1.2 Geology

The Facility is underlain by Tertiary deposits commonly referred to as the Ogallala Formation. The deposits are primarily clay with lesser amounts of caliche, sand, silt and gravel. At depths below approximately 30 feet, the clay deposits become interbedded with lenses of sand, silt, and gravel. The sand lenses are primarily composed of very fine to medium grained sand, and commonly contain silt and clay. The silt lenses are not very common, and only a few gravel lenses have been identified. Caliche is common in the upper portion of the unconsolidated deposits, and most frequently is encountered at depths ranging from approximately 40 to 100 feet.

The unconsolidated deposits are underlain by the Graneros Shale at depths ranging from approximately 100 to 165 feet. The Graneros Shale consists of bluish to gray, noncalcareous claystone and shale and is an aquitard between the Ogallala and underlying Dakota Formations. The Graneros Shale is relatively thin (less than 60 feet) and contains thin sandstone lenses. The Dakota Formation underlies the Graneros Shale and is composed of white, gray, red, brown and tan claystone, siltstone, shale, and sandstone. Regional data indicate that the formation extends from approximately 180 to over 350 feet below ground surface (ft bgs) (Farmland, 2001).

1.3 Hydrogeology

Groundwater is present within the unconsolidated depths of the Ogallala Formation ranging from approximately 70 to 120 ft bgs. Regional and site water level data indicate that the groundwater generally flows toward the Arkansas River to the southeast. In 1982, the former owner of the Facility began groundwater recovery at the site with multiple recovery wells following the discovery that constituents of concern (COCs) from Facility operations were present in groundwater. On average, the groundwater recovery system processes and treats 100 to 150 million gallons of water annually as permitted by the Kansas Department of Agriculture. These volumes correspond to average pumping rates ranging from 190 to 280 gallons per minute. The recovered water is treated onsite by an RO system that was installed in 2006. The treated water is re-used at the Facility as cooling water and then discharged to the Facility's wastewater treatment system. The water is then disposed of at one of the Facility's two permitted Class 1 nonhazardous waste injection wells.

Water level data indicate that the recovery wells create cones of depression in areas of active pumping. Historic water level data indicate that the water table elevation is declining at a rate of approximately 2 feet per year. A number of formerly productive wells and piezometers have become dry as a result of the drop in water level.

The average horizontal hydraulic conductivity in the Ogallala was determined to be in the range of 0.864 to 12.96 feet per day (ft/day) based on slug tests and a pumping test performed in 1988 (Woodward-Clyde, 1988). Slug tests performed at select wells in May 2009 identified similar hydraulic conductivity values (0.85 to 6.90 ft/day) (Geostat, 2009).

Groundwater flow within the Graneros Shale is limited because of its lithologic character. As noted above, the Dakota formation is the next deepest aquifer beneath the site. In the Dakota formation, groundwater is contained in relatively thin sandstone lenses. A single slug test in the upper Dakota sandy zone indicated a horizontal hydraulic conductivity of 8.3 ft/day.

2 OBJECTIVES AND SCOPE

The overall sampling objective is to monitor the extent and persistence of COCs at compliance point wells for the Facility. The purpose of this SAP is to provide the methodology and procedures to produce reliable data that is reflective of groundwater conditions at and near the Facility. The procedures in this revised SAP are in general compliance with the RCRA Ground

Water Monitoring Technical Enforcement Guidance Document (USEPA, 1986). Water level measurement, well purging and sampling, decontamination, and other pertinent field procedures are outlined in detail in Section 3 of this SAP.

2.1 Groundwater Monitoring Program

The Facility extracts groundwater from the unconsolidated deposits through a recovery well network. Groundwater from most of these recovery wells is used beneficially at the Facility following treatment through the RO process. Groundwater from the remaining wells is pumped directly for disposal in either of the two underground injection wells (Injection Wells 2 and 3) at the Facility. The recovery wells were constructed, beginning in 1982, with four or five inch PVC casing with sawcut perforations. The recovery wells are operated and monitored through a radio controlled network, which allows banks of wells to be turned on and off, as needed. However, since the installation of a second underground injection well in 1998, most wells are pumped continuously, with shutdowns related only to on-going maintenance and sampling when necessary. As additional investigations at the Facility have been completed, the groundwater monitoring and recovery system has evolved. Since the initial discovery of chromium in 1982, the Facility has installed approximately 115 wells.

The Facility's monitoring network is summarized in Table 1 and depicted in Figure 2. In accordance with the existing Permit, KNC collects and analyzes groundwater samples quarterly from select off-site private water wells in the vicinity of the Facility. Table 1 identifies the monitoring well network, relevant construction details and the target analytes at each location.

The private wells scheduled for quarterly sampling are listed in Table 2. Ten wells were originally specified in the previous Groundwater Sampling and Analysis Plan (Farmland, 2001). Plumbing at the Coker well has been disconnected and it has not been sampled for several years. Also it has not been possible to sample the Chaffin well since 2007 as the property has been for sale and the building is vacant. The Dodge City Services well has been inaccessible since late 2010 as the facility in not in operation. KNC will resume monitoring these private wells if and when they return to use. An additional private well, referred to as the Buehne North well, was added to the list of private wells in 2004 at the request of the owner. Figure 3 shows the property ownership boundaries near the KNC Facility and the locations of private wells included in quarterly sampling. Samples from private wells will be collected directly from a designated outlet, as determined by the well owners and subject to their continuing approval to access the wells.

2.2 Analytical Parameters

Table 3 summarizes the analytical parameters of interest for the groundwater monitoring network. In general, groundwater samples will be collected and submitted to a Kansas Department of Health and Environment (KDHE) certified laboratory for the analysis of hexavalent chromium, total chromium, nitrate (as N) and nitrite (as N). Nitrate plus nitrite (as N)

will be reported as the sum of nitrate and nitrite concentrations. In addition, groundwater samples will be collected for volatile organic compound (VOC) analysis semi-annually from a subset of wells as indicated in Table 1.

Laboratory procedures, quality assurance, and quality control procedures are provided in the Quality Systems Manual (Appendix A). Table 3 lists the laboratory methods and practical quantitation limits for the listed sampling parameters.

3 GROUNDWATER MONITORING PROCEDURES

3.1 Well Gauging

Groundwater elevation measurements will be collected semi-annually from each of the monitoring wells. These measurements will be made prior to semi-annual groundwater sampling events. Depth to water measurements will be made using a water level meter within a 24-hour period, as conditions allow. All existing monitoring wells have been surveyed to a common benchmark, and the top of casing (TOC) elevation data will be used with the depth to water measurements to generate a semi-annual Facility groundwater elevation map. Well construction and survey information is summarized along with complete well construction details in Table 1.

The total depth of all wells without dedicated pumps will be determined, at a minimum, annually. Due to the difficulty and expense of removing dedicated submersible pumps from recovery wells, total depth measurements of these wells will be collected on a schedule to assess each well once every five years. If a pump is pulled for maintenance in a recovery well, sampling technicians will collect a measurement of total depth. In the event that total depth measurements are not collected through necessary maintenance from 20% of existing recovery wells in the preceding year, a pump service company will be utilized to pull pumps, so these measurements can be collected.

While gauging water levels and total depth in the well network, field personnel will conduct a well integrity inspection to assess the condition of locks, protective casings, and well pads. Observations will be recorded on field forms (Appendix B) and any deficiencies will be reported to the Facility for maintenance.

3.2 Well Development and Sampling

Well purging techniques depend on well characteristics and formation yield. Procedures for purging recovery wells and monitoring wells are described below. Table 1 identifies the groundwater sampling methodology for each well. Equipment operation manuals for purging and sampling equipment are included in Appendix C.

3.2.1 Recovery Well Sampling

Each recovery well has a permanent submersible pump that can be turned on or off from a control box at ground surface. The well head area includes a well pump control box, a valve that can be open or closed to the groundwater recovery network and a dedicated sampling port. Before sampling, field personnel must ensure that the well head is closed to the recovery system. Each well head has a valve that controls access to the recovery system that must be closed prior to sampling. Active recovery wells should be allowed to purge for approximately one minute before sample collection to remove groundwater within the sample point tubing.

If during the purging process outlined above any valve or the dedicated pump does not operate properly, a sample will not be collected. The operational problem will be documented on a field form (Appendix B) and reported to the Facility. Maintenance will be performed within an appropriate time scope and the well will sampled within 30 days of the start of the semi-annual event.

3.2.2 Low-Flow Sampling

Monitoring wells screened in hydraulically productive materials have been fitted with a pneumatic bladder pump. Each pump was pre-assembled with a Teflon® bladder and polyvinyl chloride (PVC) discharge tubing cut to fit each well. Each assembly was attached to a form-fit well cap assembly and factory cleaned. At the well head, the pump assembly was lowered in place to the approximate middle of each well screen interval. Each well cap assembly is equipped with a pump discharge fitting, an airline fitting, and an access hole for water level measurements. All replacement bladder pumps will be constructed as described above.

Low flow purging provides an alternative to purging the stagnant water column of groundwater prior to sample collection. Bladder pump tubing is placed at the middle of the well screened interval and pumping speeds are low (less than 0.5 litres per minute) to provide a representative sample from the target area. Water levels are monitored during purging to confirm that the water level is not being drawn down significantly. Dedicated bladder pumps have been calibrated at each location to a control box program ID that maintains a drawdown of less than 0.3 feet during low flow purging. Every 2 years, KNC will confirm the program ID calibration at each well. If drawdown exceeds 0.3 feet at any location, the control box program ID will be modified to reflect the low flow requirements and the new program ID will be noted on field documents. If flow is insufficient for low flow purging, an alternative sampling method will be implemented.

During low flow purging, groundwater passing through a flow through cell will be continuously monitored for pH, dissolved oxygen (DO), temperature, oxidation-reduction potential (ORP), and electrical conductivity (EC) with a water quality meter. All water quality measurements will be recorded on field sampling logs. Purging will be considered complete when water quality measurements remain within the groundwater stabilization criteria given in Table 4 for a

minimum of three consecutive measurements taken three to five minutes apart (Puls and Barcelona, 1996). Prior to sample collection, the flow through cell will be detached and the sample will be collected directly from the well discharge tubing.

If water quality parameters will not stabilize, or a minimum drawdown of less than 0.3 feet cannot be maintained, low flow purging may be abandoned in favor of purging three well volumes or until the well is dry. In the event that a bladder pump fails, the malfunction will be documented and reported to KNC for repair. If repairs are not feasible within 30 days, an alternative sampling technique outlined in this Section will be employed for sample collection.

3.2.3 Low Yield Monitoring Well Sampling

Monitoring wells that are screened along formation intervals that cannot meet low flow purge requirements due to insufficient recharge will be sampled using no-purge (e.g. Hydrasleeve) samplers. No-purge samplers will be installed such that a sample will be collected from the target depth (middle of the well screen). Standard operational procedures for Hydrasleeve samplers are included in Appendix C. Once a sample has been obtained from the well, a new no-purge sampler will be attached to the calibrated tether and left to equilibrate for the following semi-annual event. In the event that a complete sample cannot be obtained from the existing sampler, a new device will be installed and left to equilibrate for a minimum of twenty four hours prior to sampling.

3.3 Sample Collection

Following purging of groundwater wells using a dedicated submersible pump or bladder pump, field personnel will fill all required sample bottles in the order from most to least volatile:

- VOCs, if required;
- Total Chromium; then
- Nitrate/Nitrite/Hexavalent Chromium.

Labels supplied by the contract laboratory will be affixed to each sample bottle and include, at a minimum, the following information:

- Sample identification;
- Sampling Personnel;
- Date/time of sampling;
- Analyses requested; and
- Preservatives, if any.

The chain-of-custody form will be prepared with the preceding information and include the sampler's signature. The samples will be preserved on ice at 4°C and prepared for shipment under chain of custody. The samples will then be relinquished to the shipping company under chain of custody and transported to the laboratory within specified holding times. In the event that laboratory samples must be shipped by a common carrier, a custody seal will be used to seal samples.

3.4 Sample Analysis

A Kansas certified laboratory will analyze the groundwater samples according to methods outlined in EPA Publication SW-846 "Test Methods for Evaluating Waste Physical/Chemical Methods". At present, Continental Analytical Services (CAS) of Salina, Kansas performs groundwater analyses for routine groundwater monitoring. Laboratory methods and practical quantitation limits are provided in Table 3. The CAS Laboratory Quality Systems Manual for groundwater analyses pursuant to this SAP is included in Appendix A. In the event that a different laboratory is utilized, the laboratory will be required to submit a Quality Systems Manual and confirm certification by the KDHE.

3.5 Decontamination

Decontamination of non-dedicated sampling equipment (i.e., water level probe) between wells is important to prevent possible cross-contamination between wells. Between wells, non-dedicated sampling equipment will be rinsed with an Alconox® solution and triple rinsed with deionized water. Decontamination water will be collected and disposed of properly in accordance with Facility procedures.

All purge and waste water collected during groundwater sampling activities will be disposed of by delivery into the treatment system at the Facility and managed by the Facility according to protocol. Disposable equipment, including tubing, personal protective equipment (PPE), and any other material not for re-use will be disposed of according to Facility protocols.

3.6 Quality Assurance/Quality Control Samples

Quality Assurance/Quality Control (QA/QC) will be documented through standard laboratory procedures (Appendix A) and field sampling. The overall quality assurance objective is to ensure that data of known and acceptable quality are provided. All data will be calculated and reported in units consistent with industry standards.

Field QA/QC samples will consist of two primary areas of quality control. The first area is quality control designed to assess the potential of sample contamination occurring in the field and/or during shipping procedures. Trip blanks and field blanks are used to determine the effects of transportation and ambient field conditions, respectively, on the occurrence of VOCs detected in samples. A basic description of each is provided below:

- Trip Blank – These samples will be prepared in the laboratory by filling the appropriate clean sample container(s) with laboratory certified analyte-free water and adding the applicable chemical preservative. These containers will be shipped prior to sampling and will be labeled "Trip Blank". The analyses to be performed will be identified on each container. The trip blank will be shipped back to the laboratory along with the routine sample set containers for a given event. This blank is tested to detect contamination that may occur as a result of the containers, sample coolers, cleaning procedures, or chemical preservative used. Trip Blanks will be supplied by the certified laboratory and submitted for VOC analysis at a frequency of one per sample cooler.

- Field Blank – Field Blank containers will be prepared in the field at a routine sample collection point during a monitoring event by filling the appropriate sample containers with the field supply of analyte-free water. This field supply shall be the same water used for cleaning and decontamination of all field purge and sampling equipment. This blank is tested to detect contamination that may occur as a result of site ambient air conditions and serves as an additional check for contamination in the containers, sample transport coolers, cleaning procedures, and any chemical preservatives. Field blanks will be taken for volatile organics analysis at least once per sampling event or once per twenty routine samples.

A second area of standard field QA/QC samples are field duplicates, matrix spike, and matrix spike duplicates. These QA/QC samples are described as follows:

- Field Duplicates – Field duplicates are an extra set of samples taken at a particular monitoring point. These are independent samples which are collected from the same location and time of collection of the routine sample. The field duplicate should be stored and analyzed independently of the routine sample. Duplicate results, when compared to the analytical results of the routine sample, are useful in analyzing and documenting the precision of the sampling and analytical process. Duplicates will be collected for all analyses being performed as part of the groundwater monitoring program once per twenty routine samples as specified in the Field Sampling Plan. Duplicates shall be labeled "DUP" with the date of collection.

- Matrix Spike and Matrix Spike Duplicates – Matrix Spike and Matrix Spike Duplicate samples are collected in the same manner as field duplicate samples. Prior to analysis, Matrix Spike Samples will have a known amount of analyte added to the sample. This is done to ensure that there are no interferences related to the matrix that limit recovery of the added analyte.

Further discussion of the laboratory quality objectives, including definitions, methods, procedures, organization and responsibilities of the laboratory, may be found in the laboratory Quality Systems Manual (Appendix A).

4 DOCUMENTATION AND REPORTING

4.1 Evaluation and Response

The groundwater flow conditions will be evaluated at least annually to confirm that the network is meeting the objectives of 40 CFR § 264.97. If, due to a change in groundwater flow conditions or well depth, the network wells are no longer capable of fulfilling this requirement, additional wells, or other appropriate remedies will be proposed and implemented to modify the network, in consultation with the KDHE.

Monitoring will continue at the Facility to determine the rate and extent of groundwater movement of site COCs. Sampling and analysis will be performed to determine: (1) whether hazardous waste or hazardous waste constituents have impacted and/or will impact the groundwater; (2) the rate and extent of migration of hazardous waste or hazardous waste constituents in the groundwater, and (3) the concentration of hazardous waste or hazardous waste constituents in the groundwater.

4.2 Documentation of Field Activities

All data collected in the field will be recorded on standard forms (similar to the forms in Appendix B) to make it convenient for field staff to record important observations and to minimize the chance that important data may be overlooked. A field groundwater sampling file will be maintained on-site. The first portion of the file will include field measurement forms (including the Field Water Quality Sampling and Analysis Data Sheet and Well Gauging Log) with a compilation of all field data recorded during each sampling event. The Field Water Quality Sampling and Analysis Data Sheets contain logs of field pH, temperature, DO, ORP and EC measurements during purging. The Well Gauging Logs record groundwater level measurements. The groundwater sampling file will also include a well maintenance log, that contains a description of maintenance work requirements, as applicable, identified during well gauging, and a summary of work performed to correct. Copies of work orders, if required to complete this work, will be maintained in this portion of the file.

The second portion of the file will contain logistical information including: well completion information, type of sample containers required, laboratory statements of container cleanliness, calibration logs, operator's manuals for all equipment, laboratory address and telephone number, chain-of-custody records and copies of special instructions to the laboratory or shippers, shipper's freight bill (if needed), blank copies of chain-of-custody and analysis request forms, and a copy of laboratory QA/QC requirements.

Sampling personnel will be responsible for inspection of each well during each sampling event to identify any required maintenance to the system, including the condition of the well pad, well cap, protective casing, security provisions, identification markings, and the visible well casing at each monitoring well. Sampling personnel will be responsible for accurate recordkeeping during

all field activities including documenting any required maintenance activity. All activities will be noted on appropriate log forms, initialed and dated. Any incorrect transfers of data will be highlighted, changed, and initialed.

Field data collected will be recorded immediately onto field sampling forms that will include, where applicable, the following information:

- Sampling date/time;
- Sampling location;
- Field measurement data (e.g., pH, EC, temperature, and DO); and
- Analytes to be measured.

Laboratory results will be tabulated as they are processed or received. The following data will be tabulated quarterly in evaluations for each monitoring well network.

- Raw data results;
- Results for each medium or constituent monitored; and
- Data reduction for statistical analysis.

These data will be transmitted, if available, in quarterly RCRA updates.

4.3 Statistical Analyses

The Facility will analyze groundwater chemical trends using EPA-approved statistical analysis software. Basic statistical information, including means and standard deviations will be calculated using the EPA-approved statistical analysis software. Each compliance monitoring well (monitoring wells B-1, A-3B, SIT-RG-08, TW-05, TW-79, and TW-80) will be compared to the groundwater protection standard using a non-parametric tolerance level to indicate groundwater impact. As site characterization activities continue and a final groundwater remedy is initiated, compliance wells will be modified as necessary.

Analytical data for COCs from the individual compliance point wells will be statistically compared to the groundwater protection standards. If the individual well data is statistically greater than the groundwater protection standards, the sampling program will continue. If, for three consecutive quarters, the individual well data is statistically less than the groundwater protection standards, a request will be made to the KDHE to reduce the sampling frequency on that well to annual sampling.

4.4 Annual RCRA Groundwater Monitoring Report

Annually, pursuant to 40 CFR § 264.100(g), a RCRA Groundwater Monitoring Report will be prepared and submitted to the KDHE to describe the RCRA groundwater monitoring activities at the Facility for the previous year. This report will be submitted on, or before, March 1 of each year. Below is an outline of the annual groundwater monitoring report format to be used in subsequent reports.

Annual Groundwater Report Outline

SECTION 1.0 INTRODUCTION

- 1.1 Nature and Evolution of Groundwater Monitoring Network
- 1.2 Site Location

SECTION 2.0 SUMMARY OF SAMPLING ACTIVITIES

- 2.1 Recovery Well Operation and Well Abandonment
- 2.2 Maintenance to Recovery/Monitoring Well Network
- 2.3 Sampling Events
- 2.4 Miscellaneous Activities

SECTION 3.0 MONITORING WELL NETWORK AND GROUNDWATER ELEVATION MEASUREMENTS

- 3.1 Total Depth Measurements
- 3.2 Groundwater Elevation Measurements
- 3.3 Comparison of Measured Total Depth with Original Total Depth
- 3.4 Groundwater Elevation Contour Maps

SECTION 4.0 EVALUATION OF TOTAL CHROMIUM

- 4.1 Analytical Results
- 4.2 Non-Parametric Tolerance Statistical Analysis
- 4.3 Chromium Isoconcentration Contour Maps
- 4.4 Chromium Concentrations versus Time Plots
- 4.5 Summary and Discussion of Chromium

SECTION 5.0 EVALUATION OF NITRATE PLUS NITRITE (as N)

- 5.1 Analytical Results
- 5.2 Non-Parametric Tolerance Statistical Analysis
- 5.3 Nitrate Plus Nitrite (as N) Isoconcentration Contour Maps
- 5.4 Nitrate Plus Nitrite (as N) Concentrations versus Time Plots
- 5.5 Summary and Discussion of Nitrate Plus Nitrite (as N)

SECTION 6.0 EVALUATION OF VOCs
6.1 Analytical Results
6.2 Non-Parametric Tolerance Statistics
6.3 VOC Isoconcentration Maps
6.4 VOC Concentrations versus Time Plots
6.5 Summary and Discussion of VOCs
SECTION 7.0 ADEQUACY OF RECOVERY/MONITORING NETWORK
7.1 Effectiveness of Corrective Action Program
7.2 Inward Hydraulic Gradient
7.3 Reduced Monitoring at Certain Wells
7.4 Upgradient Monitoring
7.5 Well Plugging and Abandonment
SECTION 8.0 CONCLUSIONS AND RECOMMENDATIONS
SECTION 9.0 REFERENCES

5 REFERENCES

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TABLES

Table 1
Semi-Annual Groundwater Monitoring Network
Koch Nitrogen Company, LLC, Dodge City, KS

Well ID	Completion Date	Top of Casing (ft msl)	Ground Surface (ft msl)	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	Screen Length (ft)	Well Diameter (inches)	Well Use	Analytical Parameters	Sampling Method
B-1	3/28/1988	2511.79	2509.69	108	113	5	2	M	C N	No Purge
A-3B	3/25/1988	2527.30	2525.15	115	120	5	2	M	C N	Bladder
C-3B	3/29/1988	2526.71	2524.96	94	114	20	2	M	C N	No Purge
MW-01	5/18/2011	2536.09	2533.39	117	122	5	2	M	C N	No Purge
MW-02	5/20/2011	2526.23	2523.70	114	119	5	2	M	C N	No Purge
MW-03	5/22/2011	2520.84	2518.50	105	110	5	2	M	C N	No Purge
MW-17	6/20/2011	2562.83	2560.03	165	170	5	2	M	C N	No Purge
MW-18D	7/10/2011	2543.06	2540.35	140	145	5	2	M	C N	No Purge
MW-18S	7/10/2011	2543.07	2540.25	119	124	5	2	M	C N	No Purge
MW-19D	7/8/2011	2548.22	2545.01	154	159	5	2	M	C N	No Purge
MW-19S	7/8/2011	2548.02	2545.04	129	134	5	2	M	C N	No Purge
MW-22D	5/24/2011	2507.37	2505.03	126	131	5	2	M	C N	Bladder
MW-22S	5/24/2011	2507.28	2504.58	84	89	5	2	M	C N	No Purge
MW-23D	6/18/2011	2557.59	2554.69	171	176	5	2	M	C N	No Purge
MW-23S	6/18/2011	2557.43	2554.58	142	147	5	2	M	C N	No Purge
SIT-RG-01	5/4/2006	2540.98	2538.08	132	152	20	2	M	C N	No Purge
SIT-RG-02	5/6/2006	2544.14	2541.36	130	160	30	2	M	C N	No Purge
SIT-RG-03	5/21/2006	2546.86	2543.84	143	153	10	2	M	C N	No Purge
SIT-RG-04	5/20/2006	2555.53	2552.44	142	152	10	2	M	C N	No Purge
SIT-RG-05	5/22/2006	2542.87	2539.92	140	150	10	2	M	C N	No Purge
SIT-RG-06	6/1/2006	2521.87	2519.00	112	122	10	2	M	C N	No Purge
SIT-RG-08	5/8/2006	2533.77	2530.87	98	128	30	2	M	C N V	No Purge
TW-01A	11/14/1994	2538.56	2535.91	95	140	45	5	M R	C N	Sample Port
TW-05	6/24/1982	2542.50	2540.56	125	145	20	5	M	C N V	Bladder
TW-07	6/26/1982	2527.28	2525.40	120	140	20	5	M R	C N	Sample Port
TW-09	9/22/1982	2526.03	2523.32	95	125	30	5	M R	C N	Sample Port
TW-10	7/13/1982	2541.33	2539.10	120	140	20	5	M R	C N V	Sample Port
TW-11	7/18/1982	2509.30	2505.56	100	120	20	5	M	C N	Bladder
TW-12	7/21/1982	2508.66	2505.75	100	120	20	5	M	C N	Sample Port
TW-13	7/22/1982	2506.15	2503.50	90	110	20	5	M R	C N	Sample Port
TW-14	7/23/1982	2515.42	2512.87	105	125	20	5	M R	C N	Sample Port
TW-16	8/4/1982	2534.44	2532.29	110	130	20	5	M R	C N	Sample Port
TW-17	8/16/1982	2510.73	2508.09	90	120	30	5	M R	C N	Sample Port
TW-18	8/17/1982	2500.51	2498.54	90	120	30	5	M R	C N	Sample Port
TW-19	8/27/1982	2528.41	2525.56	110	140	30	5	M R	C N	Sample Port
TW-20	8/28/1982	2543.34	2541.49	142	172	30	5	M R	C N	Sample Port
TW-21	8/30/1982	2543.66	2542.66	130	160	30	5	M R	C N V	Sample Port
TW-22	9/27/1982	2499.82	2496.21	95	125	30	5	M	C N	Bladder
TW-23	10/22/1982	2508.82	2506.77	110	140	30	5	M R	C N	Sample Port
TW-26	11/16/1982	2541.54	2539.27	120	140	20	5	M R	C N	Sample Port
TW-27	11/17/1982	2543.88	2541.42	120	150	30	5	M R	C N	Sample Port
TW-28	11/18/1982	2529.09	2527.72	100	130	30	5	M R	C N	Sample Port
TW-29	12/7/1982	2543.79	2539.84	110	140	30	5	M R	C N V	Sample Port
TW-30	12/8/1982	2536.75	2533.77	110	140	30	5	M R	C N V	Sample Port
TW-31	12/10/1982	2535.42	2532.01	110	140	30	5	M R	C N	Sample Port
TW-37	3/8/1983	2530.98	2529.70	105	135	30	5	M R	C N	Sample Port

M - Monitoring
R - Recovery
C - Total chromium and hexavalent chromium
N - Nitrate and nitrite as N
V - Volatile organic compounds
Well elevations surveyed by BHC Rhodes in May 2012.

Table 1
Semi-Annual Groundwater Monitoring Network
Koch Nitrogen Company, LLC, Dodge City, KS

Well ID	Completion Date	Top of Casing (ft msl)	Ground Surface (ft msl)	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	Screen Length (ft)	Well Diameter (inches)	Well Use	Analytical Parameters	Sampling Method
TW-38	1/11/1983	2532.76	2531.68	105	135	30	5	M R	C N	Sample Port
TW-39	3/14/1983	2536.87	2534.18	105	135	30	5	M R	C N V	Sample Port
TW-40	3/16/1983	2537.80	2535.75	115	145	30	5	M R	C N V	Sample Port
TW-48	5/17/1983	2532.27	2529.99	120	150	30	5	M R	C N	Sample Port
TW-49	8/15/1983	2521.92	2519.86	95	125	30	5	M R	C N	Sample Port
TW-51	8/19/1987	2545.38	2543.54	140	170	30	5	M R	C N	Sample Port
TW-52	3/22/1983	2520.12	2518.37	75	105	30	5	M R	C N	Sample Port
TW-53	8/24/1983	2527.52	2524.75	108	115	7	5	M R	C N	Sample Port
TW-54	8/25/1983	2535.19	2533.41	100	130	30	5	M R	C N	Sample Port
TW-55	9/9/1983	2527.52	2525.77	95	125	30	5	M R	C N	Sample Port
TW-56	9/10/1983	2534.90	2532.96	103	133	30	5	M R	C N	Sample Port
TW-57	9/19/1983	2527.11	2525.06	95	125	30	5	M R	C N	Sample Port
TW-58	9/21/1983	2538.88	2536.33	105	135	30	5	M R	C N	Sample Port
TW-63	10/10/1983	2547.36	2543.86	102	132	30	5	M	C N	Bladder
TW-64	10/11/1983	2540.48	2538.85	105	135	30	5	M R	C N	Sample Port
TW-65	2/3/1984	2527.79	2525.71	110	150	40	5	M R	C N V	Sample Port
TW-66	2/6/1984[2]	2522.86	2520.33	100	140	40	5	M R	C N	Sample Port
TW-67	2/9/1984	2513.18	2510.18	90	130	40	5	M R	C N	Sample Port
TW-68	2/11/1984	2529.50	2526.72	100	140	40	5	M R	C N V	Sample Port
TW-69	9/5/1984	2526.21	2524.10	100	140	40	5	M R	C N V	Sample Port
TW-70	9/6/1984	2518.03	2515.04	95	135	40	5	M R	C N	Sample Port
TW-71	5/8/1985	2534.64	2532.88	100	140	40	5	M R	C N	Sample Port
TW-72	5/9/1985	2527.14	2525.03	90	130	40	5	M R	C N	Sample Port
TW-73	8/5/1985	2516.00	2514.04	90	130	40	5	M R	C N	Sample Port
TW-74	8/6/1985	2520.44	2518.06	80	125	45	5	M R	C N V	Sample Port
TW-75	8/7/1985	2514.95	2512.74	80	125	45	5	M R	C N	Sample Port
TW-76	12/7/1989	2509.30	2506.97	71	131	60	4	M R	C N	Sample Port
TW-77	9/4/1990	2525.12	2521.84	80	140	60	5	M R	C N	Sample Port
TW-78	3/26/1991	2523.19	2521.71	92	142	50	5	M R	C N	Sample Port
TW-79	3/26/1991	2513.96	2511.39	71	141	70	5	M	C N	Bladder
TW-80	3/26/1991	2555.58	2551.96	113	173	60	5	M	C N	Bladder
TW-82	12/7/1993	2511.15	2508.80	70	110	40	5	M R	C N	Sample Port
TW-83	12/7/1993	2519.63	2517.36	82	132	50	5	M R	C N	Sample Port
TW-84	12/7/1993	2520.95	2518.66	82	132	50	5	M R	C N	Sample Port
TW-85	12/7/1993	2514.99	2512.50	71	121	50	5	M R	C N	Sample Port
TW-86	12/7/1993	2506.99	2505.16	71	131	60	5	M R	C N	Sample Port
TW-87	4/23/1993	2536.80	2534.95	79	139	60	5	M R	C N	Sample Port
TW-88	4/23/1993	2541.18	2539.70	108	148	40	5	M R	C N	Sample Port
TW-89	4/23/1993	2543.55	2541.86	99	149	50	5	M R	C N V	Sample Port
TW-90	4/23/1993	2544.10	2542.30	99	159	60	5	M R	C N V	Sample Port
TW-91	4/23/1993	2544.25	2542.36	101	161	60	5	M R	C N	Sample Port
TW-92	7/20/1995	2546.26	2545.13	112	162	50	5	M R	C N	Sample Port
TW-93	7/20/1995	2542.34	2540.85	102	162	60	5	M R	C N V	Sample Port
TW-94	7/20/1995	2542.25	2540.08	100	170	70	5	M R	C N	Sample Port

M - Monitoring
R - Recovery
C - Total chromium and hexavalent chromium
N - Nitrate and nitrite as N
V - Volatile organic compounds
Well elevations surveyed by BHC Rhodes in May 2012.

Table 2
Private Wells Sampled Quarterly
Koch Nitrogen Company, LLC, Dodge City, KS

Well Owner	Well Use	Well Location	Comments
Bogner	Domestic	SWSWNW 26-T26S-R24W	
Buehne (North)	Domestic	SESESE 16-T26S-R24W	
Buehne (South)	Domestic	SESESE 16-T26S-R24W	
Chaffin	Industrial	NWNESE 21-T26S R24W	Inactive since 2007
Tawzer	Domestic	NWSENE 21-T26S-R24W	
Conrardy	Domestic	SWSWSE 15-T26S-R24W	
Feed Mill	Industrial	NENESE 22-T26S-R24W	Dakota Well
Lix	Domestic	SWSWNW 23-T26S-R24W	
Dodge City Services	Industrial	SWSENW 23-T26S-R24W	Inactive since 2010; Dakota Well
Maxwell	Domestic	SWSWSE 27-T26S-R24W	

Table 3
Analytical Parameters
Koch Nitrogen Company, LLC, Dodge City, KS

Analytical Parameters	Analytical Method	Practical Quantitation Limit
Total Chromium	6010B	0.005 mg/L
Hexavalent Chromium	7196A (Modified)	0.010 mg/L
Nitrate/Nitrite	300.0/9056A	0.1 mg/L
Volatile Organic Compounds	8260B	1 µg/L

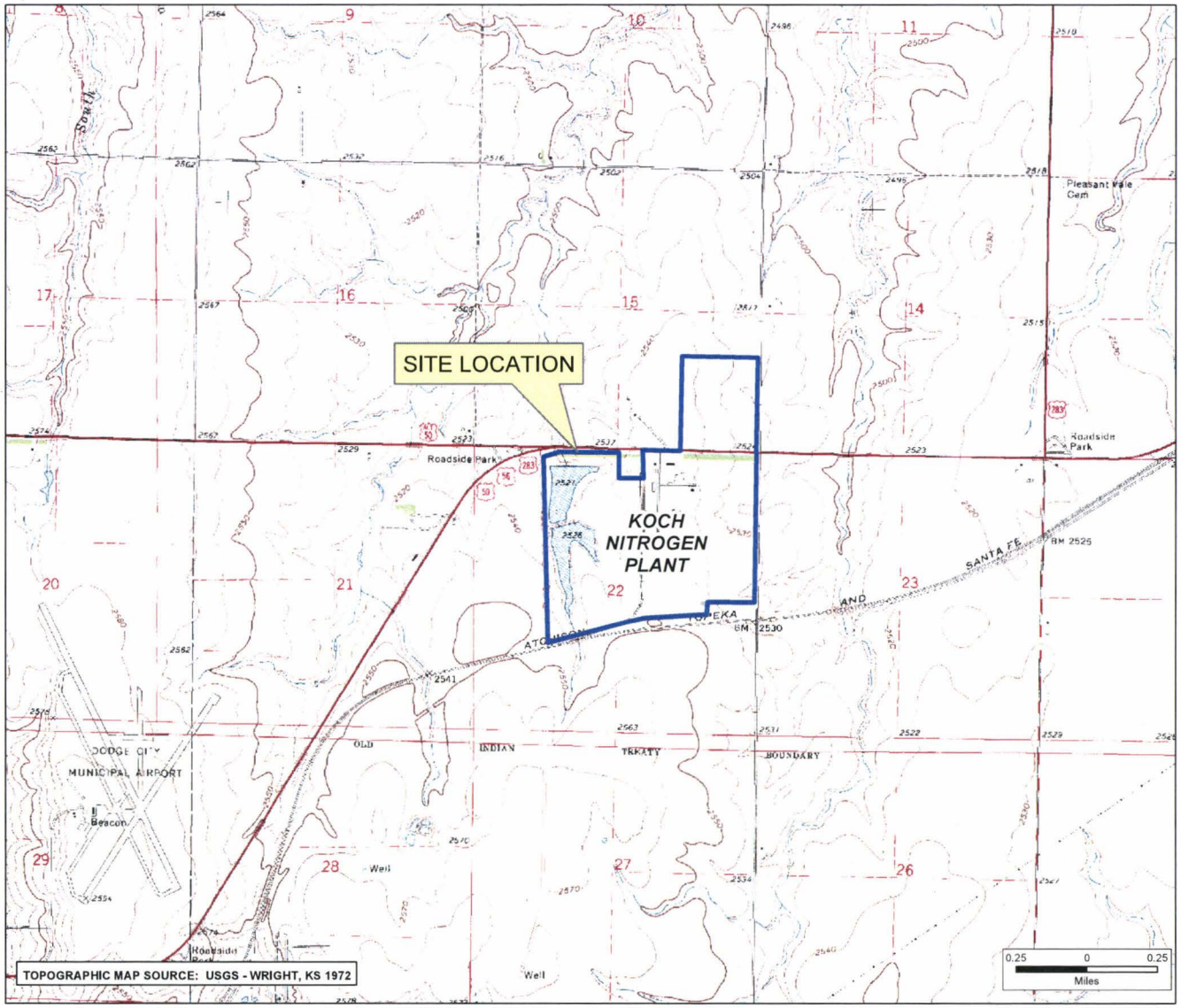
Notes:
All analytical methods from: Test Methods for Evaluating Solid Wastes, Third Edition, U.S. EPA as revised.
mg/L - milligrams per liter
µg/L - micrograms per liter

Table 4
Groundwater Stabilization Criteria
Koch Nitrogen Company, LLC, Dodge City, KS

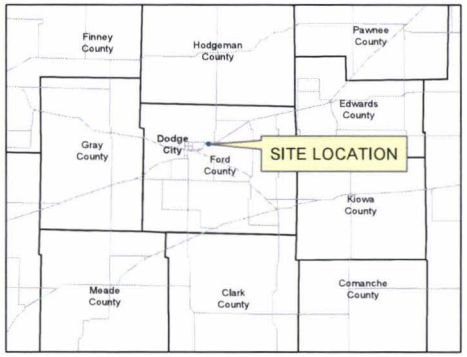
Parameter	Criteria	Units
Temperature	+/- 0.2	Degrees Celsius (°C)
pH	+/- 0.2	Standard Units (S.U.)
Specific Conductance	+/- 5.0 % of reading	mS/cm
Oxidation-Reduction Potential	+/- 5.0 % of reading	millivolts
Dissolved Oxygen	+/- 10 % of reading	mg/L

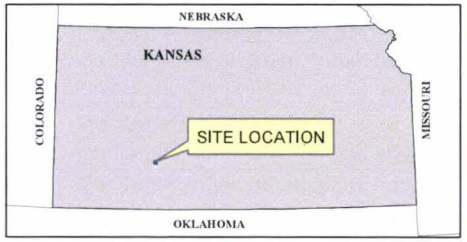
Notes:
mS/cm - milliSiemens per centimeter
mg/L - milligrams per liter

FIGURES



TOPOGRAPHIC MAP SOURCE: USGS - WRIGHT, KS 1972





-N-

SITE LOCATION MAP

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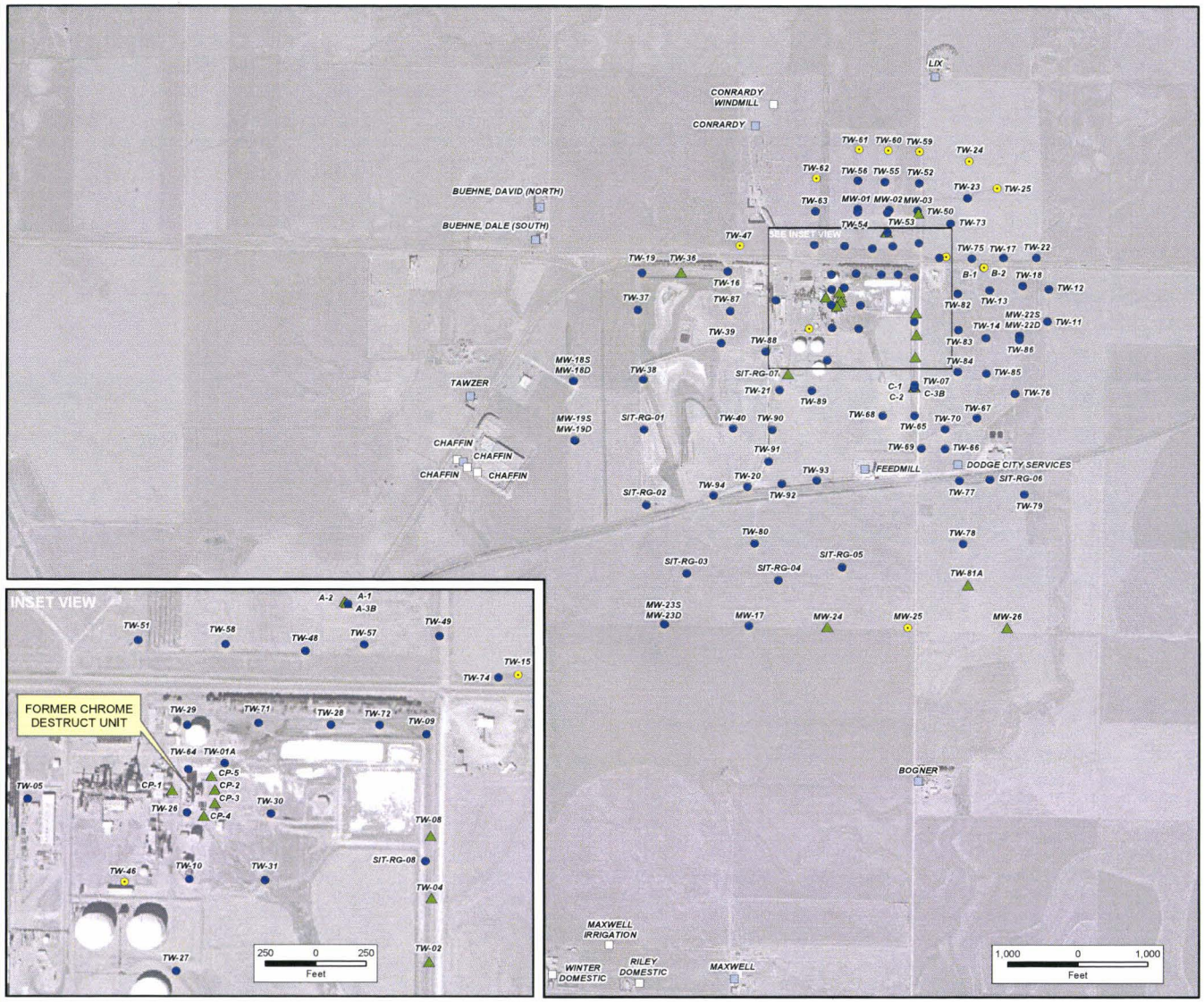
KOCH

KOCH NITROGEN COMPANY, LLC

PROJECT NO.	FIGURE NO. 1
DATE. SEP 2012	FILE NO.



LEGEND

- KNC WELL MONITORED SEMI-ANNUALLY
- KNC WELL PRIMARILY USED FOR WATER LEVEL GAUGING
- KNC WELL PROPOSED FOR PLUGGING AND ABANDONMENT BASED ON DRYNESS AND/OR SANDING UP OF THE WELL, AS DISCUSSED WITH EPA AND KDHE IN JULY 2012
- PRIVATE WELL MONITORED QUARTERLY
- PRIVATE WELL NOT SAMPLED

-N-

GROUNDWATER WELL NETWORK

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PROJECT NO.	FIGURE NO. 2
DATE. SEP 2012	REVISION NO.

LEGEND

■ PRIVATE WELL (OGALLALA AQUIFER UNLESS INDICATED)

-N-

2,000 0 2,000

Feet

PRIVATE PROPERTY OWNERS AND PRIVATE WELL LOCATIONS

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PROJECT NO.	FIGURE NO. 3
DATE. SEP 2012	REVISION NO.