KANSAS

DEPARTMENT OF HEALTH
AND ENVIRONMENT

Mark Parkinson, Governor
Roderick L. Bremby, Secretary

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September 3, 2009

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RCRA

Gary J. LeRock, Plant Manager
Koch Nitrogen Company, LLC
11559 US Highway 50
P. O. Box 1337
Dodge City, KS 67801-1337

Re: 2009 Groundwater Operations and Maintenance Inspection Report
Koch Nitrogen Company, Dodge City
EPA ID# KSD044625010

Dear Mr. LeRock:

The Kansas Department of Health and Environment (KDHE) appreciates the assistance of Koch Nitrogen Company, LLC (KNC) in conducting an Operations and Maintenance (O&M) Inspection on the groundwater monitoring system at the Dodge City facility. Enclosed is a copy of the O&M Inspection Report. KDHE identified the following deficiencies for the CME Inspection. Cross must address these deficiencies to the satisfaction of KDHE.

1. KDHE noticed evidence of water retention near well TW-38, which is located in a surficial depression. KNC must grade this area to prevent the retention of water around this well.

2. The date recorded on the field forms document that static water levels were measured on Sunday, July 13, 2008. KDHE was present to observe water level measurements on July 14, 2008. Please clarify if static water levels were measured on both days or if an incorrect date was recorded on the field form. KNC must ensure field documentation is complete and accurate.

3. The groundwater monitoring system in use at the facility incorporates a combination of groundwater monitoring wells and recovery wells. As mentioned in Section 6.0, the impact of the recovery system on the groundwater flow cannot be determined unless a separate system is in place to measure static water levels in the aquifer. KDHE recommends KNC submit a proposed monitoring system for review by KDHE and EPA.

4. KNC included the analytical data from the Feedmill Well or the Dodge City Services Well on the chromium and nitrate-nitrite plume maps. These wells are installed in the

Dakota Aquifer and cannot be directly correlated with wells installed in the Ogallala Aquifer. KNC must exclude these data points from future maps.

5. Total depth measurements were not reported on field forms, but were discussed in the facility's annual report. KNC must provide documentation of all field measurements.

6. The groundwater monitoring system in use at the facility incorporates a combination of groundwater monitoring wells and recovery wells. As mentioned in Section 6.0, the impact of the recovery system on the groundwater flow cannot be determined unless a separate system is in place to measure static water levels in the aquifer. KDHE recommends KNC submit a proposed monitoring system for review by KDHE and EPA.

7. For the reasons described in Section 6.0, KDHE will no longer accept potentiometric surface maps that include depth-to-water data acquired from operating recovery wells using the Sonic meter. KNC must modify future maps to comply with this requirement.

Please submit a schedule to address these deficiencies by October 30, 2009. If you have any question regarding this letter, the CME Inspection Report, or would like to request a meeting, please contact me at (785) 296-1616 or espellman@kdheks.gov .

Sincerely,

Everett Spellman

Everett Spellman
Professional Geologist
Hazardous Waste Permitting Section

Enclosure – 2009 O&M Inspection Report

cc: Andrea Stone - USEPA/Region 7/ARTD/RCAP – w/enc.
Allen Guernsey - KDHE/DEA/SWDO/Waste Programs - w/enc.
Bill Bider - KDHE/BWM – w/o enc.

1.0 INTRODUCTION

Operation and Maintenance Inspections (O&M) are performed periodically at facilities regulated by the Resource Conservation and Recovery Act (RCRA) conducting groundwater monitoring under Title 40 of the Code of Federal Regulations (40 CFR) Part 264 Subpart F or 40 CFR Part 265 Subpart F. The Kansas Department of Health and Environment (KDHE) is the agency authorized to enforce these regulations. On July 14-16, 2008 KDHE conducted an Operation and Maintenance Inspection (O&M) at the Koch Nitrogen Company, LLC (KNC) facility located in Dodge City.

The O&M inspection is used to determine whether groundwater samples are collected appropriately, the groundwater sampling equipment is maintained in proper working order, the monitoring wells continue to yield representative groundwater samples, and if any violations have occurred in KNC's operation and maintenance of the groundwater monitoring system. Additionally, the O&M inspection provides KDHE an opportunity to collect and assess groundwater and hydrogeologic data, evaluate the adequacy of the monitoring system, and identify any issues or concerns that may need to be evaluated in the future.

2.0 FACILITY DESCRIPTION

The KNC facility is located on a 300-acre parcel of land in the north half of Section 22, Township 26S, Range 24E, in a rural area approximately three miles east of Dodge City in Ford County, Kansas. The land surrounding the facility is used primarily for agricultural purposes, but there are several rural residences within a one-mile radius of the facility. Although currently owned by KNC, the facility was once owned by Farmland Industries, Inc.

The Farmland facility manufactures nitrogen fertilizers, particularly anhydrous ammonia and urea ammonium nitrate (UAN), for agricultural use. The 600-ton/day plant was built in 1966, and began operations in 1968. The raw materials used in the manufacturing process include natural gas, water, air, carbon dioxide and urea. The plant consists of two fertilizer production facilities, the anhydrous ammonia facility and the urea-ammonium nitrate solution facility. The ammonia unit is based on the steam-methane pressure reforming process for production of synthesis gas. The actual production layout consists of a 30-acre process area with boilers, cooling and stripping towers, heat exchangers, two large ammonia storage tanks, and one large liquid nitrogen tank.

3.0 REGULATORY STATUS AND HISTORY

The hazardous waste management unit at the facility (Figure 1), subject to RCRA groundwater monitoring regulations is the Chromium Destruct Unit (CDU). The CDU was used to treat cooling tower blowdown, reducing it from hexavalent chromium to non-soluble trivalent chromium. Until 1983, the cooling tower water was treated with hexavalent chromium as a corrosion inhibitor. Prior to disposal, the cooling tower water was treated in the CDU, which is located immediately east of the ammonia unit cooling tower. When the previous owner

discontinued using chromate corrosion inhibitors, the CDU was adapted for use in the treatment of groundwater containing chromium concentrations above toxicity characteristic levels.

On February 19, 1986 the former owner submitted a closure certificate for the CDU to KDHE in accordance with 40 CFR 265.115. The CDU was completely removed from service in 1991, when a new Andco electrochemical chromium reduction unit was placed in operation for the remediation of the chromium contaminated groundwater. In 2007, the Andco unit was replaced with a reverse osmosis unit which is capable of removing the nitrate-nitrite contamination in addition to the chromium contamination.

The main sources of contamination are believed to be from a spill of approximately 1,200 gallons of chromic acid in the 1970's and leaking underground cooling tower piping. This caused a major plume of chromium contamination to migrate off-site. In addition, releases caused by facility operations resulted in a large nitrate-nitrite groundwater plume that also extends beyond the facility's property boundary.

4.0 MONITORING SYSTEM

After the discovery of groundwater contamination, the former owner initiated a groundwater monitoring program by installing more than ninety-four monitoring and recovery wells from 1982 through 1995. Eventually, a set of thirty-eight wells were selected from this conglomeration of wells. Twenty-five of these wells are sampled each quarter and thirteen wells are sampled every other quarter. KNC also collects groundwater samples from nine private wells. The locations of these wells are shown on Figure 1 and information for each well is presented in Table 1.

In the past few years, several changes were made to the monitoring system. Failure of a pump in well TW-18 due to a damaged well screen prompted the removal of this well from the recovery system and the inclusion of well TW-13 into the monitoring system. From July 2006 through January 2007, KNC requested authorization to conduct a temporary optimization study of the groundwater recovery system. This study consisted of the evaluation of several recovery well configurations to develop conceptual ideas for the design of the final recovery system. Also, KNC installed additional monitoring wells as part of the RFI Investigation being conducted under the direction of EPA, but these wells have not been incorporated into the monitoring system. Each modification to the monitoring system or the recovery system will need to be incorporated into appropriate sections of the facility's SAP and permit.

Most wells in the approved monitoring network were constructed as water supply wells for groundwater recovery purposes, but are also utilized as monitoring wells. Most wells are equipped with pumps that extract contaminated groundwater from the aquifer for treatment by the reverse osmosis unit and use by the facility. These wells range in total depths from 105 feet to 174 feet below the surface of the ground with over eighty percent of the wells installed at depths between 130 and 150 feet. The filter packs for many of these wells range from 13 feet

below the surface of the ground to total well depth. Similarly, forty percent of the wells have 30-foot saw-cut screen intervals with the remaining intervals ranging from 20 to 70 feet in length and all but four wells are cased with five-inch PVC pipe. In contrast, the few monitoring wells included in the monitoring system are smaller in diameter, have shorter screen intervals, and are equipped with low-volume bladder pumps for sample collection.

5.0 SITE INSPECTION

On July 14-16, 2008, KDHE completed the field evaluation for the Operation and Maintenance Inspection (O&M) at the KNC facility during a quarterly groundwater sampling event. Mr. Cory Zellers with KNC and Mr. Joe Corbin, a consultant, performed the field activities for KNC. Although not in the field, Ms. AnnieLaurie Burke was available in her office at the facility to answer technical questions. Field personnel used the procedures defined in KNC's June, 2003 Sampling and Analysis Plan (SAP). Everett Spellman represented KDHE during the field inspections. Observations by KDHE are documented on the RCRA Operation and Maintenance Inspection Checklist in Appendix A. Site conditions and field activities at the time of the inspection are documented in the photographic images included as Appendix B. Copies of KNC's field notes for the July sampling events are provided in Appendix C.

6.0 DATA EVALUATION

KDHE observed evidence of standing water at well TW-38 as shown in Photograph 8. This well is located in a low-lying area that occasionally holds water near the well head. The well construction log for this well documents that the gravel pack was installed to a depth of only thirteen feet below ground surface. Standing water near this well could penetrate the subsurface and enter the well screen via the gravel pack. To prevent this potential problem, KNC must slope the soil surface to allow water to drain to the other end of the surficial depression away from the well head. Another observed problem was the presence of animal burrows in several well pads as documented by Photograph 3. KNC must continue to repair the damaged well pads caused by burrowing animals. With the exception of these two items of concern, KNC's maintenance of the groundwater monitoring/recovery system is acceptable.

On July 14, 2008, the field team used a sonic water level meter to obtain depth-to-water measurements in recovery wells equipped with operating submersible pumps and a measuring tape in wells without pumps. The field team used appropriate field techniques for each instrument as described in the SAP. KNC used these depth-to-water measurements to construct the potentiometric surface map presented in Figure 2. As a comparison, KDHE created the map shown in Figure 3 using groundwater elevation data acquired by the measuring tape from wells not equipped with submersible pumps.

KDHE does not agree with KNC's potentiometric surface map for two main reasons. First, by including depth-to-water measurements from recovery wells with operating submersible pumps, KNC assumed the groundwater elevation within each operating recovery well was the same as that in the surrounding aquifer. However, due to well loss, this situation is unlikely and can only

be verified by measuring the groundwater elevation in the aquifer immediately surrounding the well. A second problem with the map in Figure 2 involves the use of data obtained by the Sonic meter. Accurate Sonic meter readings depend on the timing of a return sound wave. Air temperature variations and objects inside a well can alter the return sound wave and influence measurement accuracy. In comparison, measuring tape readings are not affected by these variables.

The differences in the accuracy of the sonic meter and measuring tape devices are evident when reviewing graphs of historical groundwater elevation data. The graphs of a few wells presented in Figure 4 show that the data acquired prior to May 2001, when groundwater elevations were obtained using a measuring tape, are more reliable than those collected after that date, when the facility began using the Sonic meter. Most notable are the graphs of wells TW-87 and TW-93 which are equipped with submersible pumps. These graphs show equivalent readings significantly above the trend indicated by measurements acquired by the tape measure suggesting the sonic meter actually measured the depth of an object in the well instead of the depth to groundwater.

As a result of these two problems, KDHE will no longer accept potentiometric surface maps that include data from the Sonic meter. KDHE recommends that KNC evaluate alternative methods to acquire depth-to-water measurements from wells with operating pumps. KDHE also suggests that KNC establish a system to measure groundwater levels that is separate from the recovery system and capable of evaluating the efficiency of the recovery system. Separating these two functions will allow KNC to evaluate the influence the recovery system has on the aquifer.

KNC also uses a measuring tape to measure total well depths in each well. The permit requires that KNC measure the total depth of twenty percent of the wells each year with all wells being measured within a five year interval. Table 1 of the "2008 Annual Ground Water Corrective Action Monitoring Report" identifies the wells that were measured during the year, but does not provide the actual total depth measurements. KNC must submit these measurements so KDHE can verify KNC's assessment of well screen occlusion.

KNC uses dedicated low-flow bladder pumps to purge and sample groundwater at some wells, while at recovery wells, KNC samples groundwater from a port on the discharge line. KNC staff utilized sampling techniques described in the SAP to collect groundwater samples. The analytical data obtained by KNC are presented in Appendix D. KDHE collected split samples from Monitoring Wells TW-28 and TW-80, but due to a miscommunication with the Kansas Department of Health and Environment Laboratory (KDHEL), the laboratory did not report the results for total chromium. Therefore, the only constituent available for comparison was nitrate-nitrite. Analytical result for TW-28 was 48.4 mg/L for KNC compared to 50 mg/L for KDHE. Similarly, KNC measured this constituent at 164 mg/L in well TW-80, while KDHE measured it at 180 mg/L. Comparison of these data, show that the two laboratories generated similar analytical results. Analytical data for these constituents are presented in Appendix E.

Nitrate and Chromium isoconcentration maps generated by KNC are shown in Figure 5 and Figure 6. KDHE does not agree with KNC's interpretation of the analytical data and the contour lines drawn on these maps. One issue involves the presentation of data from the Feedmill and the Dodge City Services wells. These wells are screened in the Dakota Aquifer. Therefore, analytical data from these wells should not be included in the plume maps in the Ogallala Aquifer. Elimination of these data points from the dataset will result in the disappearance of the 0.01 foot isoconcentration contour surrounding the Feedmill well in Figure 5, and an eastward shift of the contours in the southeast portion of the site in Figure 6. Another interpretation KDHE does not agree with is the isolated contours around the property owned by Mr. Bogner in Figure 6. The extent of the contamination at the facility and the downgradient location of this sampling point indicate the detected concentrations are likely from facility operations. These lines of evidence also imply that KNC has not delineated the extent of the contamination. KDHE understands that KNC will delineate contaminant concentrations in the area between the facility and Bogner's property during future field investigations.

7.0 CONCLUSION

As mentioned above, KNC's maintenance of the groundwater monitoring system is acceptable with the exception of occasional standing water near well TW-38 and animal burrows in a few well pads. With regard to the system's operation, KNC's acquisition and analysis of groundwater samples are also acceptable. Operational problems identified by KDHE include the acquisition and use of depth-to-water measurements. As discussed in Section 6.0, KDHE recommends that KNC no longer use the sonic meter to measure groundwater depths and no longer combine depth-to-water measurement data from pumping and non-pumping wells. In connection with these problems, KDHE will no longer accept potentiometric surface maps that include data from the Sonic meter. KDHE also recommends that KNC evaluate alternative methods to acquire depth-to-water measurements from wells with operating pumps and establish a system to measure groundwater levels that is separate from the recovery system. Separating these two functions will allow KNC to evaluate the influence the recovery system has on the aquifer.

8.0 DEFFICIENCIES AND RECOMMENDATIONS

KDHE identified the following deficiencies and recommendations for the O&M Inspection. KNC must address these deficiencies to the satisfaction of KDHE. Recommendations, on the other hand, are provided for KNC's consideration.

1. KDHE noticed evidence of water retention near well TW-38, which is located in a surficial depression. KNC must grade this area to prevent the retention of water around this well.

2. The date recorded on the field forms document that static water levels were measured on Sunday, July 13, 2008. KDHE was present to observe water level measurements on July 14, 2008. Please clarify if static water levels were measured on both days or

if an incorrect date was recorded on the field form. KNC must ensure field documentation is complete and accurate.

3. The groundwater monitoring system in use at the facility incorporates a combination of groundwater monitoring wells and recovery wells. As mentioned in Section 6.0, the impact of the recovery system on the groundwater flow cannot be determined unless a separate system is in place to measure static water levels in the aquifer. KDHE recommends KNC submit a proposed monitoring system for review by KDHE and EPA.

4. KNC included the analytical data from the Feedmill Well or the Dodge City Services Well on the chromium and nitrate-nitrite plume maps. These wells are installed in the Dakota Aquifer and cannot be directly correlated with wells installed in the Ogallala Aquifer. KNC must exclude these data points from future maps.

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