KOCH

KOCH NITROGEN COMPANY LLC

April 30, 2009

Via Certified Mail Return Receipt Requested 7007 0710 0003 4183 2201

Director, RCRA Corrective Action & Permits Branch
Air, RCRA and Toxics Division
U.S. Environmental Protection Agency Region VII
901 North Fifth Street
Kansas City, Kansas 66101 (2 copies)

RCAP RECEIVED
MAY 05 2009

RE: Koch Nitrogen Company, LLC – Dodge City, Kansas
EPA ID No. KSD044625010
Quarterly Progress Report for First Quarter 2009

Ladies/Gentlemen:

In accordance with Section C.13 of the above referenced Permit, Koch Nitrogen Company, LLC (KNC) hereby submits the enclosed original and duplicate of the Quarterly Progress Report for the First Quarter of 2009.

If you have any questions about the attachments, please contact AnnieLaurie Burke at (620) 227-8631, ext. 350.

Sincerely,

Gary J. LeRock

Gary J. LeRock
Plant Manager

cc via certified mail: **7007 0710 0003 4183 1136**
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via certified mail: **7007 0710 0003 4183 1556**
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QUARTERLY PROGRESS REPORT
1st QUARTER 2009

DODGE CITY NITROGEN PLANT
KOCH NITROGEN COMPANY, LLC

EPA ID NO. KSD044625010

April 30, 2009

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CERTIFICATION STATEMENT

In accordance with Sections B.2.b and B.22 of the Part II Permit, I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

By: Gary J. LeRock

Gary J. LeRock
Plant Manager

A description of the work completed (Part II Permit Section C.13.a): This Quarterly Report covers activities in the first quarter of 2009, during which KNC accomplished the following work:

- The first quarter groundwater sampling event was completed January 21, 2009. As requested by EPA, we have supplemented our approved SAP methods to include differentiation between trivalent chromium (Cr+3) and the hexavalent form (Cr+6), and between nitrate (NO3) and nitrite (NO2).

- Phase II RFI sampling results from AOC-1 were evaluated during the first quarter. Results of the analyses are discussed below.

- Phase II RFI sampling at SWMU-3 was initiated in late March 2009. Results will be analyzed during the second quarter of 2009.

- As previously reported, KNC discovered leakage from cracks in the RO Equalization Basin during the first quarter of 2007. KNC coordinated with EPA, KDHE, and a consulting structural engineer to finalize plans for Basin repair and upgrades. Detailed engineering is in progress on the repairs, which will include circumferential strapping and an impervious internal liner. KDHE issued a temporary authorization to allow this work to proceed by letter of November 5, 2008. It is anticipated that the repairs will be initiated during the second quarter of 2009.

- KNC continued engineering for stormwater projects within the boundaries of various AOCs and SWMUs. The projects include the following;

    1. Sunflower Tank: repair walls and provide paved vehicular/pedestrian access into containment

    2. NH3 Process and Utility Area: grade area and provide drainage for runoff
    3. Drum Corral: pave area within corral and install perimeter berm

    4. Fire Engine Building: establish containment and repair paving

    5. Sanitary Lagoon: repair sidewalls

    6. East Road: stabilize road sides and repair paving

    7. Bunker North of the Wastewater Building: install roof and retaining curb

- Notification for permit modification related to the name change from Koch Nitrogen Company to Koch Nitrogen Company, LLC. The notification was sent to those on the RCRA facility mailing list.

Summaries of all findings, including summaries of laboratory data (Part II Permit Section C.13.b): The following findings were determined during the first quarter:

Laboratory results from the soil sampling at AOC-1 conducted in December 2008 were evaluated during the first quarter. The speciation of chromium and nitrogen-bearing compounds enabled a better understanding of the observed distribution of these compounds at the AOCs and SWMUs. The results are generally consistent with current understanding of the behavior of chromium and nitrates in the environment. The analytical results are discussed below and compared to their environmental fate based on geochemical properties of the compounds.

AOC-1: Chromium in Soil

Chromium was detected in all collected samples in AOC-1. About 75% of the samples had total chromium concentrations below 20 mg/kg, which is the detection limit for both trivalent and hexavalent chromium speciation analyses. Thus, for 75% of the samples, no direct information is available regarding the speciation (oxidation state) of chromium in the sample. However, some observations regarding speciation can be made using samples where either hexavalent and/or trivalent chromium were detectable at or above 20 mg/kg.

As shown in Figure 1 below, when trivalent chromium was detected at or above the speciated detection limit of 20 mg/kg, it comprised the bulk of the total chromium present; in other words, the preponderance of total chromium in collected samples consisted of the trivalent species. There are instances where hexavalent chromium was detectable, but it comprised a much smaller percentage of the total chromium present. Thus, it is reasonable to expect that, for samples where neither trivalent nor hexavalent chromium are reported (namely, those samples where total Cr was below the speciated detection limit of 20 mg/kg), the speciation would follow this same pattern, with the bulk of this chromium being present as the trivalent form.

The predominance of trivalent chromium in the soil samples is to be expected. Ferrous iron (solids or dissolved), as well as organic compounds, which are commonly present in the soils in this area, readily reduce hexavalent chromium to trivalent chromium. Trivalent chromium is relatively immobile, precipitating as chromium (III) hydroxide ($Cr(OH)_3$). Hexavalent chromium is readily soluble in water. Upon any release of hexavalent chromium to soils, much would be expected to be chemically reduced and subsequently retained in the soil as a chromium hydroxide. Any hexavalent chromium that is not reduced is likely to migrate downward. There it is likely to either (1) be reduced in another portion of the soil profile, or (2) potentially be captured in groundwater.

Figure 2 illustrates chromium speciation with depth. The highest concentrations are near the surface for total, tri- and hexavalent chromium. No hexavalent chromium was detected at depth at or above the 20 mg/kg detection limit, with the exception of SB-22, where Cr+6 was found slightly above the detection limit. Figure 2 also illustrates that the total chromium present consists primarily of the trivalent species. The elevated near-surface soil chromium profile in Figure 2 suggests that much of the chromium released was retained in the soil. This is likely related to the variation of soil composition with depth, where more ferrous iron and/or organic material is available near-surface to reduce trivalent chromium chemically.

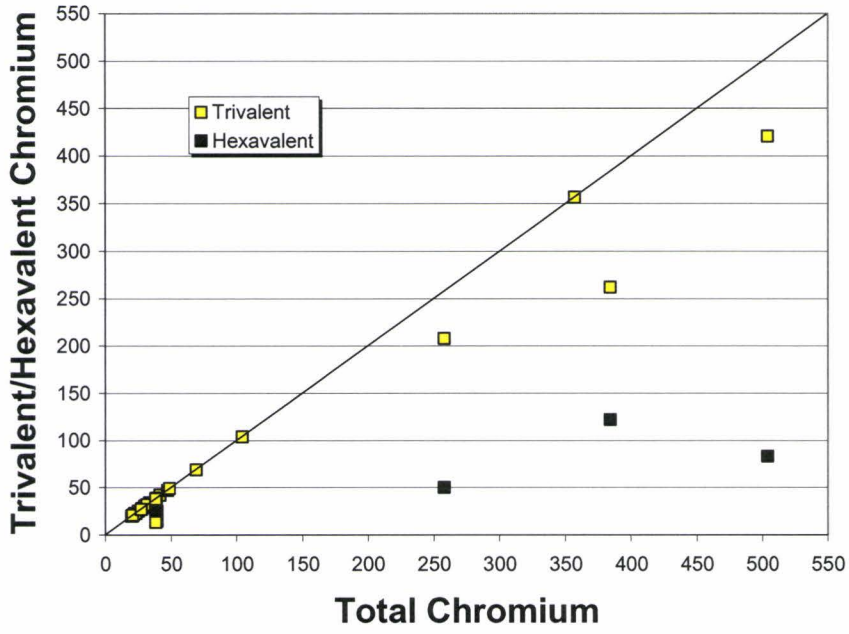

Figure 1. Speciated chromium as a function of total chromium.

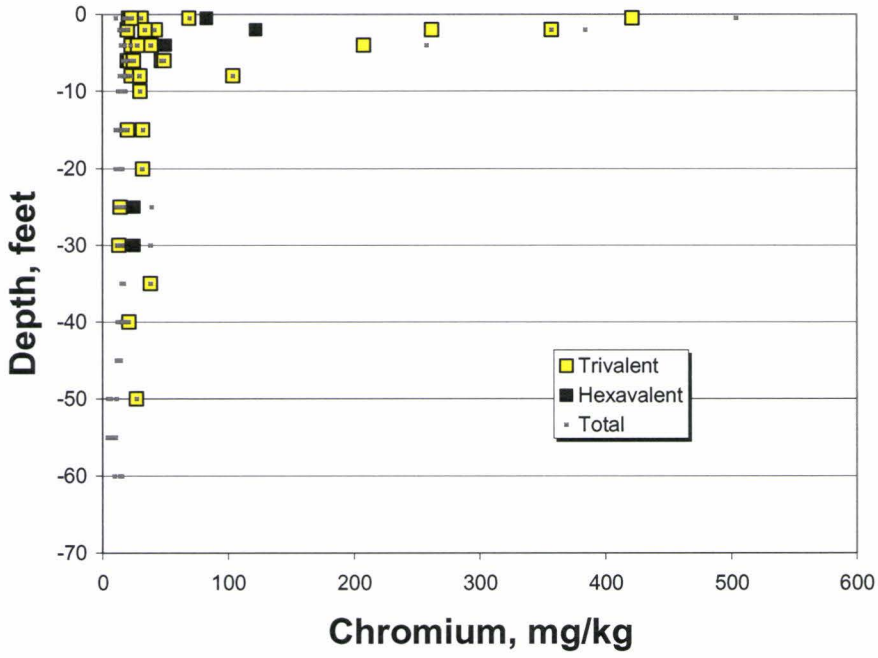

Figure 2. Chromium speciation as a function of depth.

AOC-1: Nitrogen in Soil

Although there were some measurable occurrences for nitrite (NO_2), the bulk of the (inorganic) nitrogen occurs as nitrate. The dominance of nitrate is favored at typical surficial soil geochemical conditions. Generally, nitrate concentrations are much higher at the ground surface than at depth, as illustrated in Figure 3. However, location SB 22 (Soil Boring 22) shows distinctly different results with a high concentration not only at the ground surface, but also at depth, 35 feet below ground surface. There is no such similar anomaly with chromium at this depth (see Figure 2 above). The spike at 35 feet in SB22 may represent the residue of another point source in the AOC that has "meandered" through the heterogeneous soil layers in a non-uniform fashion. Note, however, that there is no corresponding trend for chromium in this boring, suggesting any associated chromium has been chemically reduced and retained (attenuated) in near surface soils, whereas the nitrate does not tend to attenuate..

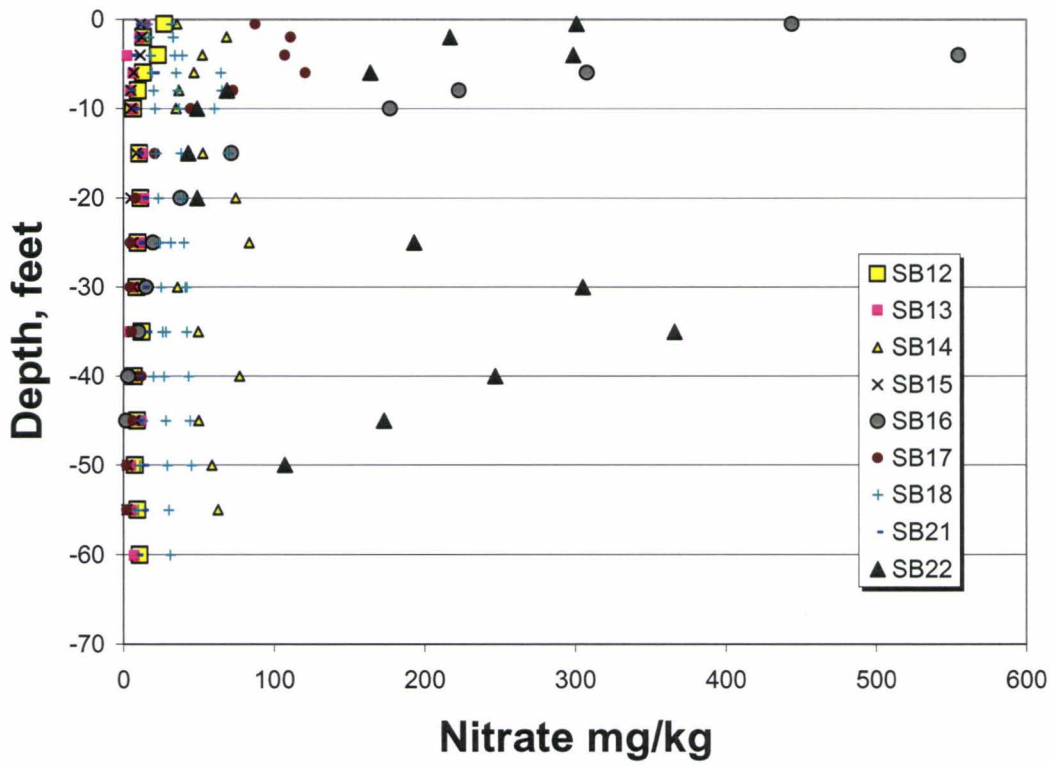

Figure 3. Nitrate as a function of depth.

Overall Relationships

In addition to measurements of speciated chromium and nitrogen, data were also collected for soil pH and redox potential (ORP or Eh, in millivolts, mV). While soil pH is typically an easily-measured and consistent parameter, ORP measurements are more subject to interference by a variety of factors. The redox potential mV values obtained are generally of the "mixed potential" type, i. e., the combined result of several redox pairs contributing to the observation.

Therefore, caution is advised in interpreting the ORP values. Nonetheless, they are useful for perspective to consider speciation of chromium and nitrogen in light of the ORP-pH conditions measured for the soil. A graph of ORP (or Eh) versus pH is a standard geochemical tool that is used to evaluate the stability conditions for materials in the environment. Figure 4 is a simplified Eh-pH diagram that graphs the measured ORP and pH values for site soils. Also plotted on this figure are lines that define the theoretical equilibrium between the Cr (III)/Cr (VI) couple and the Nitrate/Nitrite couple.

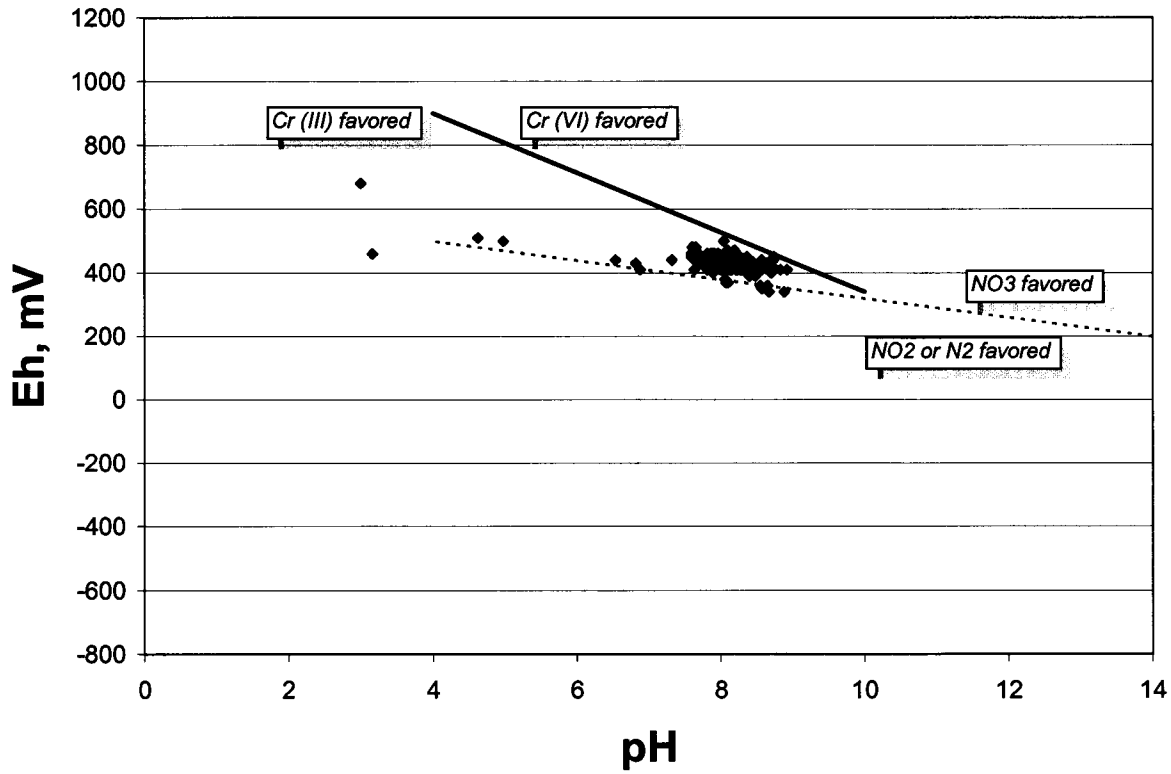

Figure 4. Eh-pH diagram showing measured site soil conditions.

For the redox couple lines in Figure 4, the measured site data points plot below the Cr(III)/Cr(VI) line, where Cr(III) is theoretically favored. This is consistent with the observed site soils, where the majority of samples showed the predominance of Cr(III). On the other hand, the plotted points lie above the equilibrium line for Nitrate/Nitrite, where nitrate should predominate. Sampling results also support this observation, as nitrate is the dominant form of nitrogen in the soil data from the site.

A redox ladder is a tool that is useful in understanding the speciation of chromium and nitrogen in the site soils. This tool is simply a graphical representation of the relative positions of the potentials (voltages) for the various applicable redox pairs (a simple one-dimensional Eh-pH diagram, a single vertical line corresponding to Eh at a fixed pH). The ladder illustrates the basic order in which oxidation-reduction will occur. Figure 5 below is a redox ladder showing several of the redox pairs that are related to the site soils. The redox pairs include:

- CrO_4^{2-} (hexavalent chromium in the form [chromate] that exists at site soil pH) – $Cr(OH)_3$ (trivalent chromium as a low solubility solid)
- NO_3^{1-} (nitrate) – NO_2^{1-} (nitrite)
- MnO_2 (manganese dioxide, a common manganese soil mineral phase) – Mn^{2+}

These three couples are shown in Figure 5 with the oxidized species on the top and the reduced species on the bottom. The values represent redox potential (Eh) in millivolts.

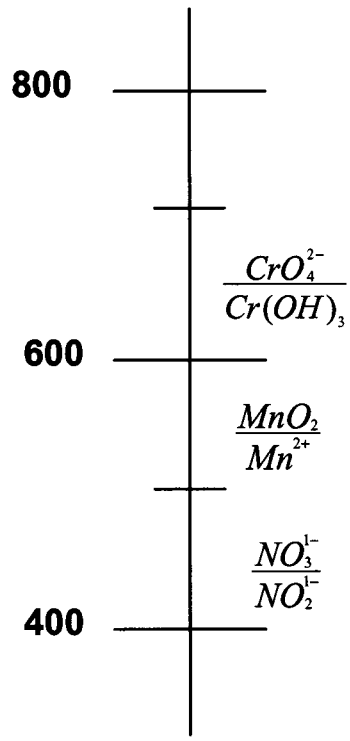

Figure 5. Redox ladder.

The redox ladder reflects a change in the order of reaction as conditions move from relatively oxidizing (top of ladder) to more reducing (bottom of ladder) which is the same as the couples shown; hexavalent chromium is reduced to trivalent chromium before nitrate is reduced to nitrite. The oxidized species of a couple having more positive ORP (higher on the ladder) is theoretically capable of oxidizing the reduced species of couples below them in the ladder. For example, in Figure 5 chromate (CrO_4^{2-}, hexavalent chromium) is capable of oxidizing nitrite. This series of reactions will cause hexavalent chromium to be reduced first (to trivalent chromium) and nitrite should really not exist until all hexavalent chromium is consumed. A manganese couple is included in Figure 5, since manganese can act as a reductant [i. e., converting hexavalent Cr to the trivalent form], or an oxidizer (converting Cr(III) to Cr(VI)], depending on environmental conditions. Mn in the form of manganese dioxides (MnO2) is one

of the only two naturally-occurring constituents that are known to oxidize trivalent Cr to the hexavalent form, the other being dissolved oxygen (Palmer and Puls, **Natural Attenuation of Hexavalent Chromium in Groundwater and Soils,** USEPA Office of Research and Development, EPA154015-941505, October 1994). The typically dry conditions at the site make this reaction unlikely, as it would require the two compounds to come together and react as solids.

For site soils, given the likely presence of soil organic matter and possibly ferrous iron, hexavalent chromium should be reduced and should be reduced preferentially to nitrate. This is consistent with the current AOC-1 data set.

Laboratory results from the first quarter 2009 groundwater sampling event were evaluated during the first quarter. While the total Cr and NO3 +NO2 as N results for the groundwater sampling were consistent with those of the previous quarter, the results for Cr+3, Cr+6, NO2 and NO3 as separate species allowed for a more detailed and ongoing assessment.

Summaries of all problems or potential problems encountered during the reporting period and actions taken to rectify problems (Part II Permit Section C.13.c): No significant problems were encountered during this period.

Projected work for the next quarter (Part II Permit Section C.13.d): In the next quarter (second quarter 2009), KNC expects to conduct the following work under Part II of the permit:

- KNC will continue sampling of AOCs and SWMUs in accordance with the Phase II RFI Work Plan.

- EPA, KDHE and KNC will meet on May 15 at EPA's offices to discuss implementing certain elements of the Ground Water Recovery Optimization Report, and integrating this effort into the overall investigative activities.

- KNC recently received approval with comments of the Addendum No. 1 to the RFI Phase II Sampling and Analysis Plan. Based on this approval, KNC will begin sampling at the sites of the miscellaneous small spills.

- KNC completed the Andco basin final design and will initiate repairs in the second quarter.

- Well protection panels are scheduled to be installed in the second quarter. The panels are intended to protect the wells from debris and vehicle traffic.

- Although not a part of the Part II permit requirements, KNC will complete the following additional activities:

    1) Second quarter 2009 groundwater sampling, and
    2) 2009 Groundwater Report.

Any instances of noncompliance with Part II of this permit not otherwise required to be reported pursuant to Part II Permit Conditions B.18 (Part II Permit Section C.13.e): To the extent that the Part II Permit includes requirements to continue implementation of the existing groundwater monitoring, recovery, and treatment system, supplemental information regarding potential instances of noncompliance are described in the attached document.

SUPPLEMENTAL INFORMATION
SUBMITTED WITH THE
FIRST QUARTER REPORT 2009
Koch Nitrogen Company, LLC
Dodge City, Kansas
EPA ID No. KSD044625010
April 30, 2009

Pursuant to Section I.E. 14 of the Hazardous Waste Management Facility Permit, Part I (Part I Permit), Koch Nitrogen Company, LLC (KNC) is required to "report all other instances of noncompliance not otherwise required to be reported above in Sections Permit Conditions I.E.10 through I.E.13, at the time monitoring reports are submitted."

The following items have been previously discussed with the Agencies, who have indicated that they do not consider these to be deviations. However, because there are inconsistencies between certain permit documents, or between the language in these documents and best practices (e. g., use of most recent and accurate analytical methods), KNC is listing these items to meet the intent of Section I.E. 14 of the Part I permit.

KDHE and KNC have previously discussed and revised a request for modifications to the Part I Permit to ensure consistency of wording and to clarify the acceptable use of alternate methods. KDHE and EPA have recently suggested in informal discussions that there may be more effective approaches to managing the permit; for example, EPA indicates that they prefer to consolidate the two parts of the Permit. KNC looks forward to further discussions of these approaches to management of the Permit at the anticipated meeting with the Agencies. Based on the Agencies' input, KNC will then prepare the appropriate documents and submit them for approval.

1. **Private Wells**. Attachment D of the Part I Permit, and the September 7, 2001 RCRA Groundwater Sampling and Analysis Plan (SAP) (page 4) identify ten private wells that are to be sampled quarterly. Plumbing at the Coker well has been disconnected and it was not sampled during 2008. The Cokers have been connected to the City of Dodge City water system since the fall of 2004. The Bogners have been connected to the City of Dodge City water system since the fall of 2005. KNC continues to sample this well, where the analyte of concern is nitrogen species above the MCL. Mr. Bogner has indicated that he desires to continue using this water for irrigating his lawn and garden. The levels of N compounds present (<50 mg/l) are under the concentrations that would result from normal fertilizer application. It has not been possible to sample the Chaffin well since 2007, as previously noticed to KDHE. The current owner has the power turned off. During the next quarter's sampling, the Chaffin Well status will be verified. If conditions permit, the well will be sampled.

2. **Nitrogen Laboratory Method**. Section I.E.9.a of the Part I Permit specifies that chemical analyses must be those specified in the U.S. Environmental Protection Agency (EPA) Publication SW-846. The SAP indicates that the method to be used for nitrate plus nitrite analysis will be EPA Method 353.2. Based on direction from the Agencies, KNC is

using the latest approved methods for all analytes. In addition, at the direction of EPA, KNC began nitrate-nitrite speciation on these compounds. KNC anticipates that the small inconsistency among the permit conditions, the SAP requirement, and the Agencies' preference for most recent methods, and perhaps expanded methods, will be resolved by the selection of the agreed-upon permit management option.

3. **Nitrogen Species Measured**. Section I.E.9.a, and Attachment D of the Part I Permit state that the Permittee shall determine the concentrations of "nitrate" throughout the compliance period and any extension due to corrective action implementation according to the schedule set out in the SAP. There is no reference to testing for "nitrite" in the Part I Permit. However, Attachment C of the Part I Permit specifies that the Ground Water Protection Standard (GWPS) will be nitrate plus nitrite as N (See Part I Permit Attachment C). Table 2.3 of the SAP specifies that the groundwater sampling parameters should include nitrate plus nitrite. KNC has analyzed for nitrate plus nitrite as N since 2004. As noted above, KNC is currently speciating nitrate and nitrite at the direction of EPA.

4. **Field/Laboratory Forms**. Section IV.C.3.b of the Part I Permit provides that the Permittee will comply with the Ground Water Monitoring Plan set out in the Part B Permit Application. The Ground Water Monitoring Plan in the Part B Permit Application states that the data will be reported on Field Sampling and Laboratory Results Data Sheets (see Section E, p. E-2). KDHE has clarified that any format that includes all required data is acceptable. KNC anticipates that this issue will be resolved by the selection of the permit management option referenced above.

5. **Recovery Well Operation**. Wells TW-2, 4 and 8, and TW-79 have been identified in the Part I Permit as recovery wells (Part I Table 1 IV.C.1.a and Attachment D). KNC has noted previously, and KDHE and EPA have acknowledged, that TW-2 and TW-79 are not used for recovery, due to insufficient water level and the original well design, respectively. As previously noted, Wells TW-4 and TW-8 currently have insufficient water levels for recovery. Well TW-36 was found during the first quarter of 2007 to have a water level that has dropped below the well pump, as have the "CP" wells. The drop in water level in certain Plant wells correlates with a regional drop in water levels. The optimization of the recovered water system is expected to resolve the conflict between the permit conditions and the current condition of these wells.

6. **Alternate Field Meters**. The SAP in Section E, Appendix F of the Part B Permit Application provides that a multi-parameter water quality meter (MP20 Flow Cell) will be used during low-flow groundwater purging (See page 15 of SAP). The Agencies have previously acknowledged that nonfunctional equipment should be replaced with newer equipment that offers a higher degree of accuracy and reliability.