



KOCH NITROGEN COMPANY

August 1, 2005

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Chief of the RCRA, Corrective Action & Permits Branch
Air, RCRA and Toxic Division
U.S. Environmental Protection Agency – Region VII
901 North Fifth Street
Kansas City, Kansas 66101

Chief of the Hazardous Waste Permits Section
Bureau of Waste Management
Kansas Department of Health and Environment
1000 SW Jackson, Suite 320
Topeka, Kansas 66612-1366



**Re: Second Response to Comments on October 27, 2004 Draft RFI Work Plan
Koch Nitrogen Company – Dodge City, Kansas Nitrogen Plant
EPA I.D. No. KSD044625010**

On May 3, 2005, Koch Nitrogen Company (KNC) received two sets of comments from the Kansas Department of Health and Environment (KDHE) and the U.S. Environmental Protection Agency – Region VII (EPA) on a draft RFI Work Plan submitted by KNC to the agencies on October 27, 2004.

The first set of agency comments addressed the Sampling and Analysis Plan, consisting of the Field Sampling Plan (FSP) and Quality Assurance Project Plan (QAPP). The response to these comments was due 30 days from the date of receipt of the agency comment letter. The second set of comments addressed the draft RCRA Facility Investigation (RFI) Work Plan and the response to these comments is due 90 days from the date of receipt of the agency comment letter.

KNC submitted its first response to comments by letter dated June 2, 2005. With this letter, KNC is submitting its second response to comments, including a revised RFI Work Plan containing changes made in response to agency comments.

It is our intention to respond as thoroughly and specifically as possible to each agency comment on the draft RFI Work Plan. KNC is committed to working with both agencies to produce a Work Plan that meets the needs of all parties. In order to facilitate the review, KNC would be happy to meet with the agencies at any time to respond to any questions that may arise from this submittal.

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Please call AnnieLaurie Burke (620) 227-8631, ext. 350 if you have any questions or to schedule a meeting on revised RFI Work Plan. We look forward to working with you to complete the review and approval of this plan.

In accordance with Section 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.

Sincerely,

KOCH NITROGEN COMPANY



Gary J. LeRock
Plant Manager

cc w/enc.: Everett Spellman, KDHE, 1000 SW Jackson, Suite 320, Topeka, Kansas 66612-1366
AnnieLaurie Burke, Environmental Excellence Leader, KNC, Dodge City, Kansas
Katrina Krier, Chemist, KNC, Dodge City, Kansas
Stephen B. Ellingson, Ph.D., Koch Mineral Services, Wichita, Kansas

cc w/o enc.: William Spratlin, Director, Air, RCRA, and Toxics Division, EPA Region VII
Ron Hammerschmidt, Ph.D., Director, Division of Environment, KDHE

**KOCH NITROGEN COMPANY DODGE CITY, KANSAS
RESPONSE TO AGENCY COMMENTS ON DRAFT RFI WORK PLAN
AUGUST 1, 2005**

The following is the response of Koch Nitrogen Company (KNC) to written comments on the RCRA Facility Investigation (RFI) Work Plan made by the U.S. Environmental Protection Agency Region VII (EPA) and Kansas Department of Health and Environment (KDHE) (collectively, the Agencies), dated April 27, 2005 and received by KNC on May 2, 2005. Comments from the Agencies are duplicated in bold text.

By letter of June 2, 2005, KNC has previously provided responses on the portion of the comments for which the Agencies requested responses within thirty days. The following are responses on the remainder of the Agencies' comments on the RFI Work Plan for which the Agencies requested responses within 90 days. The applicable KNC response is provided after each Agency comment below. The Agencies' comments are numbered as in the original letter and are separated into paragraphs (e.g., "1.A") where necessary to address multiple points in one comment.

APPENDIX B

RFI WP GENERAL COMMENTS

Comment 1: The purpose of the RFI WP is to describe what will be included in the investigation (SWMUs & AOCs) and how the investigation will be conducted (sampling locations, number of samples, depth of samples, analytical methods, description of how the vertical and horizontal extent of contamination will be determined, etc.), as well as the information specifically requested in the scope of work for the RFI WP found in Part II Section C.6 of the Permit. This RFI WP does not accomplish that goal. KNC has compiled a large amount of information, but does not give enough specifics with regards to the purpose of the RFI WP as stated above. The agencies believe the RFI Work Plan in its present form is actually more of a comprehensive current conditions summary report in the detail of material that it covers than an RFI Work Plan in the traditional sense. In reviewing the work plan it was difficult to isolate the work that was being proposed because descriptions of what was being proposed were located in different parts of the document. For example, proposed fieldwork is discussed and presented in Section 5.0 of the work plan, in separate sections containing tables and figures in the work plan, in Appendix A - CDU Closure Plan, Appendix C - Sampling and Analysis Plan/Quality Assurance Project Plan, and Appendix L- Shaw Standard Operating Procedures.

KNC Response: The draft RFI Work Plan contained information on the sampling locations (Figures 4-5 thru 4-16 for soil, Figure 5-1 for background, and Figure 5-2 for treatability testing), number of samples (Tables 5-1, 5-2, 5-3, 5-4, and 5-5), depth of samples, analytical methods and description of how the vertical and horizontal extent of constituents will be determined (Soil – Section 5.2, and Appendix A for inactive Chrome Destruct Unit (CDU) investigation, Groundwater – Section 5.3.2). The purpose of the

draft RFI Work Plan (Page 1-1) was to present “. . . a detailed description of the methods to be used to gather the information needed to characterize the nature, three-dimensional extent, and the direction(s) and rate(s) of migration of hazardous wastes and hazardous constituents . . .”

The draft RFI Work Plan was not intended to be a comprehensive current conditions summary. The Current Conditions Report was prepared in April 2001 (Weis, 2001) and was referenced in the draft RFI Work Plan. KNC is not aware of a single document that summarized the previously collected information for the Solid Waste Management Units (SWMUs) or Areas of Concern (AOCs). Further, a document that uses this information to guide future data collection has not been prepared.

KNC respectfully disagrees that the previously submitted draft RFI Work Plan did not meet the requirements of Part II Section C.6 of the Permit but understands from this comment that the Agencies would prefer a different organization of that information. In response to this comment, KNC has reorganized the RFI Work Plan in accordance with the Agencies' suggestions. Specifically, a Field Sampling and Analysis Plan (FSP) and Quality Assurance Project Plan (QAPP) were submitted to EPA and KDHE on June 2, 2005. In addition, the organization of the revised RFI Work Plan submitted with this response to comments was developed to more clearly present existing site information and outline the rationale and scope of work of the RFI.

Comment 2: The draft RFI WP is not organized in a manner that is conducive to reviewing it in a timely manner. Use of the Appendices is confusing. Some Appendices apply to specific documents within the RFI WP, but other Appendices apply to the whole work plan. The Appendices use an alpha numbering system. Perhaps, a different numbering system would eliminate the confusion. Leave the Appendices that apply to specific documents as is, but change the Appendices that apply to the whole RFI WP to a numeric system.

KNC Response: In response to the April 27, 2005 comment, the appendices and the data contained in the appendices have been reorganized to more clearly present known site information. For instance, analytical data collected from particular SWMUs or AOCs have now been included in summary tables directly following the text portion of the revised RFI Work Plan. Furthermore, the revised appendices containing the analytical data provided in summary tables and other site data have been reorganized within the revised appendices for more efficient reference and review.

Comment 3A: Reference is made throughout the document that sampling will be done for certain hazardous waste and/or constituents/contaminants at the solid waste management units (SWMUs) and areas of concern (AOCs). As stated in Part II Permit Condition C.6.c., "The purpose of the RFI Work Plan is to present a detailed description of the methods to be used to gather the information needed to characterize the nature, three-dimensional extent, and the direction(s) and rate(s) of migration of all hazardous wastes and hazardous constituents that have been released to soil, sediment, groundwater, and surface water for those solid waste

management units (SWMUs) and areas of concern (AOCs)..." As further defined in the Part II A. DEFINITIONS, "'Hazardous constituent" means any constituent identified in Appendix VIII of 40 CFR Part 261 or any constituent identified in Appendix IX of 40 CER Part 264" and, "Hazardous waste" means any solid waste as defined in 40 CFR Part 261.2 which also meets any of the criteria of a hazardous waste as listed in 40 CFR Part 261.3" Although Nitrate/Nitrite is not a listed hazardous constituent of Appendix VIII to 40 CER Part 261, it is required in accordance with K.S.A. 65-3430 and 40 CFR 270.32(b)(2) because this constituent presents a significant threat to human health and the environment.

However, based on EPA's letter dated February 21, 2003, which KNC cites in its draft RFI Work Plan, EPA states on Page 3, paragraph lb., "With the objective of the initial phase of the RFI being the determination of the presence or absence of contamination, it is important to look for a wide variety of potential contaminants so that reliable conclusions regarding presence/absence may be made. EPA believes this initial scan for contaminants in all media including soil, sediment, sludge, surface water and groundwater should include analysis for volatile organic compounds (VOCs), semi-volatile organic contaminants (SVOCs), 40 CFR Part 264 Appendix IX metals, total petroleum hydrocarbons, nitrate, and sulfate." Please revise the text throughout to state that everywhere a SWMU or AOC is listed or described as needing further investigation that VOCs, SVOCs, 40 CFR Part 264 Appendix IX metals, total petroleum hydrocarbons, nitrate, and sulfate sampling will be conducted for soil, sediment, sludge, surface water and groundwater. EPA further states in that same paragraph, "From this initial broad scan a subset of contaminants detected will be identified by Farmland and EPA as contaminants of concern (COCs), specific to the SWMU or AOC being investigated."

KNC Response: KNC agrees with the Agencies that it may be helpful to have these samples analyzed for a broad list of parameters. The parametric coverage for a given SWMU or AOC should reflect the type of constituents likely released at that SWMU or AOCs. In the February 21, 2003 letter, the EPA listed specific parameters that should be analyzed at most of the SWMUs and AOCs proposed for investigation. KNC has not deviated from that February 21, 2003 list of parameters provided by the EPA. In fact, the parametric coverage to account for unknown waste streams was expanded in accordance with the April 24, 2005 comments in the revised RFI Work Plan.

In the January 24, 2003 letter, the EPA agreed to focus the parametric coverage at several of the SWMUs (i.e., 8, 10, 11, 17, and 19) and AOCs (i.e., 1 and 5). KNC incorporated that more-focused parametric coverage into the draft RFI Work Plan to ensure consistency with what EPA specified and has expanded parametric coverage based on the April 24, 2005 comments in the FSP (Tables I-2-1 and I-2-3). The type of constituents likely released at these SWMUs and AOCs is relatively well-known and focusing the parametric coverage on those constituents is appropriate.

KNC proposes to perform an expansive analytical testing program as part of SWMU assessment activities. Table I-2-1 (Summary of RFI SWMU/AOC Characterization

Activities) and Table I-2-3 (Proposed Sample Identification, Location, Depth Interval, and Analytes for Solids Investigation) of the FSP (Volume 1) identify the proposed analytical testing program proposed to identify potential constituents of concern in soil. An identical table to I-2-1 (Summary of RFI SWMU/AOC Characterization Activities) is included in this revised RFI Work Plan as Table 6-1.

The Site Wide Groundwater Investigation (Section 6.3 of the revised RFI Work Plan) will initially focus on delineating chromium and nitrate plus nitrite in groundwater. These two constituents have been detected at the Facility and nitrate plus nitrite is relatively mobile in groundwater. Existing site monitoring wells are scheduled for volatile organic compound (VOC) sampling and analysis (Table I-2-2 of the FSP, and Table 6-3 of the revised RFI Work Plan) as part of routine quarterly monitoring. Based on these groundwater sampling results and the results of the proposed leaching tests on soil samples (Section 6.2 of the revised RFI Work Plan), the parametric coverage for the groundwater sampling may be expanded, as described in Section 6.3.3 of the revised RFI Work Plan.

Comment 3B: Additionally, in Part II of the Permit, Condition C.6.h. (2) it states, "List all hazardous wastes/constituents which were handled in the SWMU/AOC and could have been released, and develop a list of analytes for which soil and groundwater samples will be analyzed."

KNC Response: Section 4 and Table 2-1 of the draft RFI Work Plan described the historical and current waste streams for each SWMU and AOC to the extent that such information is available to KNC. As KNC was not the owner of the site at the time of the historic releases that are the subject of this investigation, it only has access to information that was provided to it by the prior owner or is available in public records. A list of analytes for soil and groundwater samples was presented in Table 5-1 and 5-2 of the draft RFI Work Plan.

In the revised RFI Work Plan, potential hazardous constituents known or suspected to have been managed or present at each SWMU/AOC are presented in Section 4 and Table 2-1. In addition, Table I-2-1 of the revised FSP (Table 6-1 of the revised RFI Work Plan) provides available historical information for SWMUs/AOCs and indicates the proposed sampling analysis for soil investigations, while Table I-2-2 of the FSP provides the proposed sampling analysis for groundwater investigations. Tables II-1-2 and II-1-3 of the revised QAPP provide the specific analyte lists for soil and groundwater samples proposed for this RFI. There appears to be some conflict in the April 27, 2005 comment letter regarding the specific analytical tests being requested (see June 2, 2005 KNC Response to Agency Comments on the Sampling and Analysis Plan numbers 10 and 25A). KNC has made an effort to reconcile these conflicts and has proposed reasonable analytical tests for the various samples. Table 6-1 summarizes the proposed analyses for soil, settleable matter, and surface water, if present. Groundwater samples are summarized in Table 6-3. KNC would be receptive to additional clarification from the Agencies regarding their requests for parametric coverage.

Comment 4: Statements are made throughout the RFI WP that wells contaminated above chromium levels are not used for potable purposes. This does not preclude these wells from being used for other purposes such as watering pets, livestock, gardens or irrigation of agricultural fields, etc.

It is commendable that KNC is hooking up two residents to City water, or in the interim, providing bottled water for drinking water. However, these other uses of the well water need to be addressed. In addition, since this plume of contamination is migrating, thought needs to be given to the fact that contamination could occur in additional wells surrounding the plant or in wells farther out from the initial private wells/irrigation wells that are monitored. There are no restrictions for any private person or industry to drill a new water well in the surrounding area.

KNC Response: Current data do not support a conclusion that a plume of contamination is migrating, and the work proposed in the RFI Work Plan is intended to fill in data gaps to further evaluate groundwater conditions.

KNC has entered into written contracts with the Cokers and the Bogners, two families with residences near the facility, limiting use of groundwater. The Cokers have entered into an agreement that prevents consuming or otherwise using any groundwater from their premises. This agreement extends to their heirs, executors, administrators, successors and assigns, and any business invitees. The Cokers have informed KNC that the distribution piping in the well pit has been disconnected. The Bogners have entered into an agreement which prevents consuming any groundwater from their premises as of June 21, 2004, and will prevent use of groundwater from the premises for any purpose at the time that the Bogners are connected to the city water supply. The Bogners have also agreed to promptly disconnect the existing groundwater well at the premises commencing on the date that the Dodge City public water supply connection is made to the residences at the premises.

The complete delineation described in the draft and revised RFI Work Plans will provide additional information to complete an evaluation of these potential pathways. A description of livestock watering pathways is provided in KNC's response to comment No. 28B.

As clarified in Section 6.3 of the revised RFI Work Plan, KNC is proposing sampling activities to fully define the extent of nitrate plus nitrite and chromium in off-site groundwater. Depending on the results of the leaching tests on the soil samples, additional parameters may be added to the groundwater sampling activities. KNC also currently samples specified off-site residential wells on a quarterly basis.

With regard to the installation of future wells in the area, it is KNC's understanding, based on a review of applicable state and county requirements and discussions with KDHE, that there are controls in place to address the potential for future well construction in the area of the facility. First, Kansas statutes require that any well contractor desiring to engage in the business of constructing, reconstructing or treating

water wells must apply to KDHE for a license. KSA 82a-1206 (a). Second, within 30 days after installation of any well, KDHE regulations require the water well contractor to submit a report of the installation, which must include "any polluted or other noncompliant conditions which the contractor was able to correct and any conditions which the contractor was unable to correct." K.A.R. 28-30-4(a). The landowner who constructs, reconstruct, or plugs a water well used by the landowner for farming, ranching or agricultural purposes or located at his place of abode must also file a water well record within 30 days. *Id.* This information must be submitted to KDHE on Form WWC-5, which has a specific line item for the identification of the "nearest source of possible contamination" (see Form Item 6). The well installation information is collected by KDHE and posted online on the web site of the Kansas Geological Survey at <http://www.kgs.ku.edu/Magellan/WaterWell/index.html>.

If a potential source of contamination is identified following submittal of Form WWC-5, KDHE may request water samples for chemical analysis. K.A.R. 28-30-4(d).

In addition to the well registration requirements, KDHE has promulgated well construction regulations. These regulations specify that "each water well shall be so located as to minimize the potential for contamination of the delivered or obtained groundwater and to protect the groundwater aquifers from pollution and contamination." K.A.R. 28-30-6(a). These regulations stipulate that "[a]ll groundwater producing zones that are known or suspected to contain natural or manmade pollutants shall be adequately cased and grouted off during construction of the well to prevent the movement of the polluted groundwater to either overlying or underlying fresh groundwater zones. K.A.R. 28-30-6(l). KDHE has also stipulated that contaminated wells must be properly plugged and abandoned. According to the regulations, "[i]f the hole penetrates an aquifer containing water with more than 1000 milligrams per liter, mg/l, total dissolved solids or is in an area determined by the department to be contaminated, the entire hole shall be plugged with an approved grouting material from the bottom of the hole, up to within three feet of the ground surface using a grout tremie pipe or similar method." K.A.R. 28-30-7(d).

In addition to KDHE controls, local governments in Kansas have been delegated authority to regulate drinking water wells. KDHE regulations require well locations to be approved by municipal or county governments. K.A.R. 28-30-8(a). Ford County, the county in which the KNC facility is located, has adopted a zoning ordinance that specifies that all well contractors must be licensed by KDHE, Ford County Environmental Code 3-5.5, and that "[n]o person shall develop, construct sell or lease any water supply subject to the regulations of this Code until a permit has been obtained from the Administrative Agency. Code 3-4.1. Furthermore, no permit to develop a non-public water supply will be issued without an approved plan. Code 3-4.2

Moreover, KDHE requires that anyone operating a public water supply must have a permit issued by KDHE. K.A.R.28-15-16(a). The applicant for a permit must "submit the results of an analysis performed by a state-certified laboratory regarding the physical, bacteriological, chemical, and radiological constituents of the raw water to ensure that the

proposed treatment facilities will produce potable water meeting the primary drinking water regulations established in article 15a.” K.A.R.28-15-16(d). In addition, KDHE prohibits the construction or expansion of a new or expanded public water supply facility “at a site which the department determines: ...(c) is adjacent to a major source of pollution, which the department determines has a potentially adverse influence on the water supply.” K.A.R.28-15-17(c).

These requirements confirm that there is currently a fully adequate legal framework in place under Kansas law to ensure that the Agencies will have immediate knowledge of any attempts to place or use a well in areas of impact, or of potential impact, from this site, and will have ample authority to regulate or restrict such a well. Based on existing regulations and ordinances, both the state and local governments will be notified upon the installation of any new well in the area of the facility. The regulations anticipate and address concerns relating to contaminated groundwater by requiring specific well construction techniques to protect groundwater sources from existing contamination, limiting the installation of wells in contaminated areas, and requiring proper abandonment of certain contaminated wells.

As part of on-going efforts to eliminate potential groundwater exposures, KNC proposes to check the well registration database annually to identify new wells down gradient of the KNC facility. If these wells have not been sampled, subject to authorization from the owners, KNC will sample these wells to determine water quality.

Comment 5A: In Part II, Section C.6., it lists specific information which the RFI Work Plan (RFI WP) will include. Some of this information has not been included in KNC’s draft RFI WP. Specifically, C.6.d.1 states, "A map showing the entire facility property, with the facility property boundary clearly identified, and adjacent property ownership indicated, at a scale of 1 inch = 200 feet, and with ground surface topography shown at a contour interval of 1 foot in order to depict all surface water containment areas and surface water drainage patterns." KNC offers an explanation as to why it chose not to use the scale cited above. However, this requirement is stipulated in the Permit and is based on Federal Regulation. Please correct the appropriate maps to reflect the scale referenced in this Permit condition. KNC should use the map of this scale that was included in the facility Part B Permit Application. The work plan included Figure 2-1, which presents facility features superimposed onto an aerial photograph, and is of an acceptable scale of 1" = 300', but a base map is also needed so as to clearly indicate monitoring well and soil sampling locations and other information. The map must also include sufficient overlap onto adjacent properties so that delineation of the offsite groundwater contamination may be shown. The scale of some of the maps submitted, such as Figure 2-9 (1"1200') is too small to clearly depict features due to the size of the facility.

KNC Response: In response to the April 27, 2005 Agency comment, maps of the facility and adjacent areas have been revised. Figure I-2-1 of the draft RFI Work Plan provided a map showing the entire facility and identified adjacent property owners at a scale of 1' = 200'.

Comment 5B: Section C.6.e. does not include the groundwater flow on the cross-section nor does it describe briefly the lithology of the units on the cross-sections. Please correct the appropriate figures to include this information.

KNC Response: The cross-sections in the draft RFI Work Plan (Figures 4-29 through 4-36) provided the potentiometric surface reported in site wells in July 2004. The groundwater flow direction is influenced by pumping from the numerous recovery wells, but can be inferred from the water levels posted on these figures. The cross-sections in the revised RFI Work Plan provide much of the same basic information (water levels reported during routine monitoring) previously submitted in the draft RFI Work Plan. To describe flow between the wells on these cross-sections, information on the cross-sections is referenced to a potentiometric surface map generated from the April 2005 sampling event (Figure 3-10). This map provides estimated flow directions with arrows across the facility and adjacent property. These flow directions have been incorporated into the revised cross-sections, to the extent possible, to provide a conceptual description of groundwater flow.

A brief description of the lithology (e.g., top soil, clay sand, clay) was provided on the cross-sections in the draft RFI Work Plan. The lithological interpretation presented in these cross-sections was based on grouping into three main stratigraphic units (i.e., unconsolidated deposits, Graneros shale, and Dakota Formation). These stratigraphic groupings were based on available lithologic data, which generally were limited to visual descriptions of drill cuttings. Until additional field work is complete, additional detail beyond the three unit groupings could be misrepresentative of lithologic conditions.

Figures 3-2, 3-3, 3-4, 3-5, and 3-6 of the revised RFI Work Plan provide the same general lithologic descriptions and groundwater flow direction information provided in the draft RFI Work Plan cross-sections. Where applicable, the lithologic descriptions have been revised to identify the top of the Graneros shale and provide additional lithologic descriptions.

Comment 5C: In section C.6.f., KNC was required to use the contaminant concentration maps and cross sections to identify data gaps with regard to defining the extent of groundwater contamination. The purpose of this was to encourage use of as much available data as possible and then guide the drafting of the work plan to propose only work that is needed to fill the information gaps.

KNC Response: Constituent concentration maps and cross-sections were used to guide the proposed data collection activities. Isoconcentration maps for chromium, nitrate plus nitrite, and VOCs were presented as Figures 3-1, 3-2, and 3-3 of the draft RFI Work Plan. Cross sections were presented as Figures 4-18 through 4-26 of the draft RFI Work Plan.

For the revised RFI Work Plan these isoconcentration maps and cross-sections were updated with the April 2005 groundwater sampling results. The isoconcentration maps in the revised RFI Work Plan were updated with analytical results from the April 2005 sampling event. To clarify the understanding of current conditions, the reported concentration of a particular constituent is posted on these figures to demonstrate, as applicable, areas where delineation is complete and areas where data gaps exist. The lateral coverage on these maps has also been expanded to include residential wells currently sampled by KNC. The posting of chromium, nitrate plus nitrite, and VOC concentrations in cross-section uses the April 2005 groundwater data and available lithologic information.

Comment 5D: Section C.6.g. (4) requires information regarding assessment of parameters to evaluate the attenuation capacity of the natural aquifer materials and groundwater system, and goes on to list specific information required. The RFI WP does not appear to list this information. If this is a data gap, please state that this information will be acquired during the RFI. If however, KNC already has this information, please add this information to the RFI WP.

KNC Response: The testing to assess the mobility and fate of contaminants in groundwater, geochemical parameters [e.g., Dissolved Oxygen (DO), Oxidation Reduction Potential (ORP), and Total Organic Carbon (TOC)] that may be used to characterize the fate and transport of chromium and nitrate plus nitrite was previously identified in Table 5-3 of the draft RFI Work Plan, titled “Summary of Bench-Scale Treatability Study Parameters for Groundwater.”

The assessment of groundwater attenuation capacity is repeated in Section 6-3.4 of the revised RFI Work Plan. Groundwater attenuation parameters proposed for aqueous samples were repeated in Table I-2-2 of the FSP (Table 6-3 of the revised RFI Work Plan), and include the parameters discussed previously. Testing of the saturated aquifer matrix material (solids) is summarized in Table I-2-1 of the revised FSP and is provided again in Table 6-1 of the revised RFI Work Plan.

Though listed in the Part II Permit as ion exchange capacity, KNC proposes to perform anion exchange capacity testing (AEC) to better characterize the forms of nitrate plus nitrite and chromium present at the site. KNC would appreciate the Agencies’ approval of this proposed change. If assessment activities identify metal cations that were previously not viewed as constituents of concern as requiring additional assessment, Cation Exchange Capacity (CEC) analysis will be performed. KNC also proposes to perform mineralogical analysis on saturated matrix materials using x-ray diffraction (XRD).

Comment 5E: Section C.6.g. (5) requires information on the determination of grain size distribution of unconsolidated aquifer material in zones of contamination, from selected proposed monitoring wells, in order to improve well design and increase the effectiveness, efficiency, and longevity of remediation wells. This information does

not appear to be included in the RFI WP. Please add this information to the RFI WP or identify it as a data gap.

KNC Response: The determination of grain-size distribution was discussed in Section 5.5 (Page 5-9) of the draft RFI Work Plan. The intent was that during the source reduction actions, borings would be advanced to groundwater and then soil samples from the saturated zone would be collected. The grain-size distribution of these soils would be determined. This information would then be used to select ahead of time an appropriate sand pack and screen size for the future well installations (see Section 5.3.2 – Groundwater Investigation of the draft RFI Work Plan). This would eliminate the need to hold well-installation borings open while samples were collected and grain-size distributions were completed. It would also eliminate the need to have a range of sand pack and screen sizes on-site pending the results of the grain size distributions.

The proposed analysis to address this requirement is presented in Section 6.4.1 of the revised RFI Work Plan. A description of the procedures was provided in Section I-3.2 of the FSP. Proposed testing of the subsurface material (solids) is now summarized in Table I-2-1 of the FSP and is provided again in Table 6-1 of the revised RFI Work Plan.

Cover letter dated 10-27-04. Page 3, "Subtask 3B - Groundwater Investigation"

Comment 1: The text states that "Groundwater samples from existing and newly installed wells will be collected to determine the nature and extent of Facility-related constituents in groundwater beneath the Facility. The concentrations of detected constituents will be compared to risk-based screening levels."

The nature and extent of groundwater contamination must be fully characterized in order to ensure protection of human health and the environment, and this must include contamination that has migrated from the facility to off-site neighboring properties as well as contamination beneath the facility property. Please revise the text accordingly.

KNC Response: KNC is aware that the nature and extent of constituents in groundwater beneath and adjacent to the Facility must be fully characterized. In fact, in the first bullet describing Subtask 3B – Groundwater Investigation (draft RFI Work Plan Page 5-8), KNC listed a series of off-site wells (i.e., Wells 70, 80 and 84) that would be sampled. The third bullet of Subtask 3B – Groundwater Investigation stated that “. . . if gaps are detected in the monitoring well network, they will be addressed during the installation of monitoring wells.” The intent of Subtask 2A – Hydrogeological Investigation and Recovery Well Optimization was to identify any gaps and sample or install additional wells to close those gaps. KNC has never stated that it would restrict groundwater sampling or well installations to on-site areas.

Section 6.3 of the revised RFI Work Plan has been clarified to provide the sampling and analysis program to fully delineate and/or identify site constituents in unconsolidated deposit and Dakota Formation groundwater on- and off-site. A summary of the initial

groundwater delineation analytical program was summarized in Table I-2-2 of the FSP and proposed sampling locations were clarified in Figure I-3-1 of the FSP. This clarification is also provided in Table 6-3 in the revised RFI Work Plan. The proposed sampling locations in Figure 6-2 were specifically sited to address groundwater conditions to the south of the Facility and to provide information necessary to determine whether further off-site investigation is required.

RFI WP SPECIFIC COMMENTS

Comment 1: Section 1.3, Project Tasks. Task 1 - CDU Closure: The Agencies do not agree with the clean closure determination used in the closure plan. Clean closure of a unit consists of remediating contaminated soil and groundwater to an established minimum health-based standard. The closure plan addresses soil, but does not address contaminated groundwater. In accordance with Part II of the permit, the facility is conducting a site-wide investigation using the "post-closure rule." Although the facility could attempt to demonstrate clean closure through an expensive investigation, the results would not change the groundwater clean up requirements under Part II of the permit. Therefore, the inactive CDU investigation should be completed as a part of the entire site-wide investigation. KNC should revise the text, by deleting the reference to clean closure and refer to "no further action required." In addition, the determination of "no further action required" should be deferred until the RFI investigation is complete. This determination should be made in conjunction with the site-wide decision for corrective action.

KNC Response: KNC is aware that clean closure consists of delineating constituent levels and, if these levels are above health-based remedial standards, remediating the soil. The proposed investigation of the inactive CDU did address the potential for constituents in soil to leach to groundwater (see Closure Plan for the CDU previously submitted to the Agencies January 13, 2004, as amended in October 26, 2004 and included as Appendix A to the draft RFI Work Plan). KNC does not believe that the existing data suggests that the inactive CDU is a source of chromium in the groundwater. The proposed additional soil sampling in the RFI Work Plan will definitively address the potential for CDU contribution of chromium to the groundwater.

There are no data at this time upon which the Agencies could currently rely to conclude that clean closure cannot occur. KNC is proposing to conduct further investigation of the soils adjacent to the inactive CDU as part of the entire site-wide investigation. A determination of either "no further action" or the need for remediation at the inactive CDU will be made when the appropriate data have been collected. Upon receipt of data supporting clean closure, KNC will request that the Agencies approve the Closure Plan for the CDU. This course of action was the basis of the settlement agreement that resolved the Permit appeals and led to the issuance of the amended RCRA Permits. See Part II Permit C.5.(f).

Comment 2: Page 1-2, Section 1.3. Project Tasks, Task 2- Soil Investigation: The site-specific PRGs and geotechnical samples should be defined in the RFI work plan. Region 9 PRGs are not intended as a set of final cleanup or action levels to be applied at contaminated sites. Before applying PRGs at a site, the facility must consider whether the exposure pathways and exposure scenarios at the site are fully accounted for in the PRG calculations. Regions 9 PRGs do not consider impact to groundwater or livestock.

KNC Response: The discussion of the soil investigation in Section 1.0 – Introduction was intended to be an overview. Section 1.3 (Page 1-2) then states “See Section 5.0 for details on the scope and methods to be used in this investigation.”

Section 5.2, Task 5-2 Soil Investigation describes the number of geotechnical that will be collected in each area (generally two), the depth of those geotechnical samples (surface to 5 feet below land surface) and the geotechnical methods (Page 5-2).

The methods for the proposed risk assessment were described in Section 5.6 (Page 5-10). KNC is aware that default PRGs from EPA Region IX are not intended to be final cleanup or action levels. Typically site-specific PRGs are higher than default PRGs. KNC’s intent was to fully delineate constituents to the default PRGs. KNC did consider a range of exposure pathways that have a reasonable potential to be complete (Figure 5-3). KNC is aware that default PRGs do not consider livestock watering. However, KNC did evaluate this pathway (see KNC response to comment 28A).

Comment 3: Page 2-1, Section 2.1 Site Location, second sentence: The sentence states, "The southern parcel, which houses the Facility production area, is fenced with 24-hour security, consists of more than 300 acres, and is located north and south of Highway 50 in...Later in that paragraph it describes the northern parcel as being located north of Highway 50. The southern parcel is located south of Highway 50, not north of Highway 50. Please correct the sentence to read, "The southern parcel, which houses the..., and is located south of Highway 50."

KNC Response: In response to the April 27, 2005 comment, this has been corrected as requested in Section 2.1 of the revised RFI Work Plan.

Comment 4: Page 2-1. Section 2.2 Facility Operations, third sentence: This sentence states, "The ammonium polyphosphate liquid fertilizer is produced using a portable fertilizer unit (owned and operated typically by Mears Fertilizer, Inc.) and a diesel fuel-fired generator." Is any waste generated from his unit? If so, please include information on the waste, testing, analytical results, disposal method, etc.

KNC Response: This portable fertilizer unit under routine operation does not generate any solid or hazardous wastes.

Comment 5: Page 2-1. Section 2.3, Site History: The second paragraph states, "Storm water is retained on site within earthen basins located east of the production facilities." Is this statement accurate? Is the former east pond used as a storm water retention basin? Please provide additional detail on the storm water retention in the earthen basins east and west of the production facilities.

KNC Response: This statement is accurate. Since 1976, during and following periods of unusually high rainfall, storm water may collect in the Former East Pond. In the draft RFI Work Plan KNC provided information on earthen basins east and west of the production facilities, including a description of storm water retention. Storm water that falls in process areas is routed to the process sewer for subsequent treatment and re-use or disposal. Storm water falling in non-process areas in the western portion of the facility drains to the north and south ponds. Storm water falling in non-process areas in the eastern portion of the facility drains to the East Ponds.

Records reflect that the North and South Ponds were constructed in 1968, near the time of the Facility construction (see Sections 4.3.1.1. and 4.3.1.2. of the draft RFI Work Plan). The Former East Pond was constructed in 1976 (see Section 4.3.1.3 of the draft RFI Work Plan). Prior to construction of the Former East Pond, it is likely that storm water that fell on the eastern portion of the Facility flowed east and may have reached the intermittent stream to the east. This intermittent stream flows north toward Ford County Lake, which is over three miles north of the Facility. KNC is not aware of additional detail on storm water retention.

Comment 6: Page 2-2. Section 2.4.2 Storm Water. second sentence: This sentence states, "Storm water collected from other areas of the Facility are collected in the North, South, and Former East Ponds, and is evaporated without discharge to surface water." Please identify where the "storm water" is collected from other areas of the Facility, what happens to the water after it is collected, and whether storm water is retained and/or dumped in the North, South and Former East Ponds.

KNC Response: The "other areas" of the Facility where storm water is routed to the North, South and East Ponds are generally located west and east of the main process area. Storm water that currently falls on the east side of the facility is managed in the Former East Pond. Storm water that falls on the west side goes into the North and South Pond. Storm water that falls into the process area flows into the process sewer where it is treated, reused and/or disposed. The process sewer influent is treated and disposed in the permitted UIC wells.

Comment 7: Page 2-3. Section 2.6.3. Environmental Indicators, second paragraph, first sentence: The sentence states, "The human exposure to groundwater pathway was eliminated through the use of engineering controls." See Risk Assessment General Comments #1, 2, & 3. The human exposure pathway for groundwater cannot be eliminated. The potential exists for human exposure from contaminated groundwater. A comprehensive groundwater investigation is necessary to make this determination.

KNC Response: The Environmental Indicator Determination completed by the EPA on July 20, 2004, stated that "Current Human Exposures Under Control has been verified. Based on a review of the information contained in this EI Determination, 'Current Human Exposures' are expected to be 'Under Control' at the Koch Nitrogen Company facility, EPA ID #KSD044625010, located at Dodge City, Kansas under current and reasonably expected conditions." It is specifically stated that there is no complete pathway between the constituents in groundwater and residents, workers, construction workers, trespassers or food. There have been no changes to the information referenced in the document since the date of this determination.

Based on this reported absence of complete exposure pathways, it is not clear how the potential can currently exist for human exposure to constituents in groundwater.

KNC proposed to install additional off-site wells to comprehensively verify the extent of constituent levels in the groundwater. Using the information from this additional work, KNC will evaluate current and hypothetical future risks associated with potable and non-potable uses (i.e., watering pets, livestock and gardens, irrigating agricultural fields and washing cars) in a Risk Assessment Work Plan to be submitted to the Agency.

In order to reduce the potential for exposures, KNC has proactively implemented strict procedures for on-site excavation or trenching work, amended the existing lease with the Dodge City Community College (DCCC) to prevent any farming in the area of the Former East Pond (see KNC response to comment No. 8), and provided city or bottled water to the adjacent residences. KNC also entered into agreements with the Bogners and the Cokers to connect them to the public water supply and to eliminate the use of groundwater for any purpose at their properties. KNC is not aware of any current on-site workers or off-site residences being exposed to potentially harmful levels of facility-related constituents.

As noted in KNC response to comment No. 4, state and county regulations provide effective controls over the installation and use of any new drinking water wells in the area.

Comment 8: Page 2-3. Section 2.6.3. Environmental Indicators, third paragraph, first sentence: The sentence states, "The human exposure to soil pathway at the Facility has been eliminated." This statement is not accurate. The risk has been reduced, but not eliminated. To eliminate this pathway, there would be no contamination in the soils, the soils would be capped or the risk would be greatly reduced. See Risk Assessment General Comment #1 for further information. Additionally, the policy developed by KNC is in effect for onsite workers. It does not protect the Dodge City Community College when they are on the property. Please modify the sentence to reflect that the risk has been reduced, but not eliminated.

KNC Response: By letter dated January 23, 2004, KNC submitted a copy of the Facility's excavation and trenching procedures to EPA. These procedures identify subsurface soil contamination as a risk at the KNC Dodge City Facility and require prior approval by the KNC Environmental Department before any type of excavation or trenching work can commence (Section 4.9 of the Excavation and Trenching Procedure).

The Environmental Indicator Determination completed by the EPA on July 20, 2004 issued by EPA, stated that "Current Human Exposures Under Control has been verified. Based on a review of the information contained in this EI Determination, 'Current Human Exposures' are expected to be 'Under Control' at the Koch Nitrogen Company facility, EPA ID #KSD044625010, located at Dodge City, Kansas under current and reasonably expected conditions." It is specifically stated that there is no complete pathway between the constituents in soil and residents, workers, construction workers, trespassers or food.

Based on this reported absence of complete exposure pathways, it is not clear how the potential can currently exist for human exposure to constituents in soil.

On July 12, 2004, KNC amended the lease with DCCC to exclude farming activities in the Former East Pond. The amendment states:

"Lessee will not, and will not permit any other person or entity to, use the east pond land located on the Premises, as highlighted on the plot plan attached hereto and incorporated herein as Exhibit A, for any purpose, including for agricultural purposes."

By imposing this restriction on farming in the Former East Pond, KNC has eliminated this potential exposure pathway.

One purpose of the proposed investigation and risk assessment is to determine if future exposures to constituents in on-site soils, the Former East Pond and groundwater could represent a significant risk. Until this investigation is complete, KNC will continue to control current human exposures through the methods identified above. The text in the revised RFI Work Plan has been modified to clarify this situation.

Comment 9: Figure 3.1: The contours depicted on this map do not accurately portray the location of chromium-contaminated groundwater.

KNC Response: The contours depicted on Figure 3-1 accurately show the chromium concentrations based on the available information. KNC did not close contours where information was not available and dashed the contours where the information was incomplete.

The isoconcentration maps in the revised RFI Work Plan were revised with analytical results from the April 2005 sampling event. To clarify the understanding of current conditions, the reported concentration of a particular constituent is posted on these

figures to demonstrate, as applicable, areas where delineation is complete and areas where data gaps exist. The lateral coverage on these maps has also been expanded to include residential wells currently sampled by KNC. On these new maps, contours are dashed where the information is incomplete. Based on these data, KNC proposed to collect additional delineation information. Once this additional information is collected, the contour map will be updated and submitted to the Agencies in the RFI report.

Comment 10: Figure 3.2: The contours depicted on this map do not accurately portray the location of nitrate-contaminated groundwater.

KNC Response: The contours depicted on Figure 3-2 accurately show the nitrate plus nitrite concentrations based on the available information. KNC did not close contours where information was not available and dashed the contours where the information was incomplete.

The isoconcentration maps in the revised RFI Work Plan were updated with analytical results from the April 2005 sampling event. To clarify the understanding of current conditions, the reported concentration of a particular constituent is posted on these figures to demonstrate, as applicable, areas where delineation is complete and areas where data gaps exist. The lateral coverage on these maps has also been expanded to include residential wells currently sampled by KNC. On these new maps, contours were dashed where the information is incomplete or questionable. Based on these data, KNC proposed to collect additional delineation information. Once this additional information is collected, the contour map will be updated and submitted to the Agencies in the RFI Report.

Comment 11: Page 3-1. "Section 3.3.1 - Surface Water", 2nd Paragraph: The text states that "Dikes constructed for the facility evaporation ponds and the high evaporation rate prevent surface water discharges associated with industrial activity from leaving the Facility."

The agencies agree that while the wastewater disposal ponds were designed to manage wastewater primarily through evaporation, it is possible that during unusually high precipitation events that high water levels in the ponds could have caused discharge of the impounded water through the overflow devices. The areas around these overflow devices where discharged water would have flowed need to be sampled to ensure that constituents associated with the contents of the ponds were not discharged during these events.

KNC Response: KNC is not aware of any information indicating that wastewater or storm water has been discharged from these ponds. However, it is possible that during unusually heavy precipitation events impounded water may have flowed through the overflow device on the north end of the North Pond. In the June 2, 2005 submittal to the Agencies, KNC agreed to sample the soil north of the overflow structure on the North Pond.

On August 29, 2003, 8.65 inches of rain was recorded over a 4-hour period, with a total of 10 inches of rain falling in a six-hour period, at a gauging station approximately 6 miles from the KNC facility. This rainfall event is greater than the design precipitation (5 inches) over a 24-hour period for a 25-year storm (Source: Technical Paper No.40 U.S. Department of Commerce, January 1963). Surface water was not observed to overflow the ponds during or after this event.

Comment 12: Page 3-1 and 3-2. Section 3.3.2 Geological Profile: Part of this section appears to be based on speculation. Statements are made that "... deposits (in the Graneros) are expected in areas where channels were eroded into the Dakota. Conversely, thin, relatively fine-grained sections in the Graneros are expected in areas where the Dakota was not eroded. Therefore, the thickness of the Graneros Shale is expected to be variable based on the local depositional environment." What is this based on? Please clarify where this information was obtained from rather than speculation.

KNC Response: This description was not based on speculation. This description was based on site-specific information and published reports from the Kansas Geological Survey (KGS), which were cited (Waite, 1942 and Zeller, 1968) in the draft RFI Work Plan. KNC had proposed to collect additional geologic information (retained as Sections 6.3 and 6.4 of the revised RFI Work Plan). Once this additional information is collected, the geologic profile will be updated and submitted to the Agencies in the RFI Report.

Comment 13: Page 3-2. Section 3.3.2.1. Geology: The text should discuss the details and thickness of each geologic unit beneath the site. The Agencies assume this section of the RFI work plan will be enhanced based on the information obtained during the RFI investigation.

KNC Response: Most of the previous geologic information was obtained from drill cuttings rather than formal geologic logging activities (e.g., ASTM D 2487). This site-specific information was combined with published KGS reports to develop a description of the subsurface geology. The thickness of the Dakota Formation in this region ranges from about 56 to 235 feet (Waite, 1942). The thickness of the Graneros shale and unconsolidated deposits was shown on the geologic cross-sections in the draft RFI Work Plan. The Agencies are correct that details and the thickness of each geologic unit beneath the site will be enhanced and provided in the RFI Report.

Comment 14: Page 3-2. 1" Paragraph. Section 3.3.2.2 -Hydrogeology: KNC has designated the groundwater at the facility as two (2) separate areas of concern (AOCs); AOC 6 is groundwater in the Dakota Formation, and AOC 7 is groundwater in the upper unconsolidated aquifer. Because the final Permit does not list an AOC 7, reference to AOC 7 must be deleted, as it would require a permit modification to do so.

KNC Response: Area of Concern (AOC) 7 was designated to represent site-wide groundwater in unconsolidated deposits based on previous EPA correspondence (see

January 24, 2003 letter from EPA to Farmland Industries, Inc. and February 3, 2003 letter from EPA to Farmland Industries, Inc.).

The designation of AOC 7 has been removed in the revised RFI Work Plan, although additional investigative work in the unconsolidated deposits was proposed in the draft RFI Work Plan and has been retained in Section 6.3 of the revised RFI Work Plan.

Comment 15A: Page 3-3 2nd Paragraph. Section 3.3.2.2 - Hydrogeology: The text discusses estimates of hydraulic conductivity based on a previous pumping test. Did KNC evaluate this pumping test to determine whether the data could be used to accurately calculate aquifer parameters, particularly hydraulic conductivity? Accurate aquifer parameters are particularly important at this site since a pump and treat system will be an integral part of a site remedy.

KNC Response: KNC has reviewed the existing pumping test data and believes that the hydraulic conductivity values are within the expected range. KNC agrees that hydraulic conductivity measurements are critical to characterizing groundwater physical parameters, which is why additional testing of the site hydraulic conductivity was proposed in Sections 5.3.1.3 of the draft RI Work Plan. This information has been retained in Section 6.4 of the revised RFI Work Plan.

Comment 15B: Also, the second paragraph contains misleading information. Elevated levels of chromium have been detected in the Dakota even after the wells were repaired or replaced. The text should be revised to include historical information.

KNC Response: Elevated levels of chromium have not been detected in these wells following their repair or replacement a number of years ago. The United Product (Kansas Byproducts) well was rehabilitated in March 1990. The next groundwater sample was collected from the well in August 1990 and the chromium level was below the detection limit. All of the subsequent groundwater samples from this well have contained no detectable levels of chromium. The feed mill well was rehabilitated in December 1994. The next groundwater sample was collected from the well in April 1995 and the chromium level was below the detection limit. All of the subsequent groundwater samples from this well have contained no detectable levels of chromium.

Historic information on chromium and nitrate plus nitrite levels in the United Protein and Feed Mill Wells was previously provided in Appendix I of the draft RFI Work Plan and was also summarized in Attachment B – Rehabilitation of United Protein and Feed Mill Dakota Wells of KNC’s June 2, 2005 response to the Agencies April 27, 2005 comments. These data demonstrate that the concentration reduction for chromium in both wells was immediate.

Figure 4-21 of the revised RFI Work Plan provide a summary of historical chromium levels in these two wells, which demonstrate the reduction to non-detect levels.

Comment 16: Page 3-3, 3rd Paragraph. Section 3.3.2.2 Hydrogeology: The plan makes conclusive statements about the site-specific properties of the Graneros shale with regard to its continuity beneath the facility and its ability to hydraulically separate the upper unconsolidated Ogallala Formation from the Dakota Formation. The plan must provide data supporting these conclusions.

KNC Response: KNC provided additional supporting information to substantiate the hydraulic separation between the unconsolidated deposits and Dakota Formation in the June 2, 2005 response to the Agencies' Comment No. 2.B and Attachment C – Well B-2 Pumping Test. Data from this May 2005 pumping test (i.e., no water level change in shallow unconsolidated well when the groundwater was pumped from the deeper Dakota Formation well) provides compelling support for the hydraulic separation between the unconsolidated deposits and Dakota Formation. Additional data will be collected during the implementation of the RFI Work Plan that will further support this conclusion.

Comment 17: Page 3-3, 4th Paragraph. Section 3.3.2.2 - Hydrogeology: The text states that "Groundwater level measurements at monitoring wells B-1 and B-2, which are screened in the unconsolidated deposits [112.6 to 109.1 ft below land surface (bls) and Dakota (176.4 to 169.5 ft bls)], respectively, had an approximate 61-foot difference between water levels during the July 2004 sampling event, with the lower potentiometric head occurring in the deeper well. This large gradient is consistent with the conclusion that the two units are not hydraulically connected,"

The agencies believe that a head difference of 61 feet is anomalous, This is a very large difference, unusually so, and what is interesting is that this difference also very closely approximates the vertical difference of the two well screens, which is 62.6 at the screen mid-points. It is possible that water is not entering the deeper well for some reason, such as improper construction or placement of the screen. The deeper well should be tested to see if it is functioning properly.

KNC Response: This water level difference is not anomalous and supports the conclusion that the unconsolidated deposits and Dakota Formation are hydraulically separated. Data from the May 2005 pumping test (i.e., no water level change in shallow unconsolidated well when the groundwater was pumped from the deeper Dakota Formation well) provides compelling support for the hydraulic separation between the unconsolidated deposits and Dakota Formation. See KNC response to comment 2B and Attachment C of the June 2, 2005 KNC Response to Comments on the SAP. The approximate 61-foot difference in water levels between the unconsolidated deposits and Dakota Formation is consistent with information provided by the Kansas Geological Survey (KGS) (see Figures 3-8 and 3-9 of the revised RFI Work Plan).

Comment 18: Page 3-3, Section 3.3.3 - Groundwater Flow Direction: The text discusses the chemical data that indicates groundwater flow to the north, which is against the natural flow direction (south-southeast) and presents several possible reasons for this to occur. The agencies believe that groundwater flow to the north could also have resulted from operation of the four (4) water production wells north

of the facility (Conrardy), particularly the two wells located closest to the KNC facility (Woodward-Clyde, 1988, Figure 1). What is the current status of the Conrardy wells? Please provide additional information.

KNC Response: It is KNC's understanding that two of the Conrardy wells were plugged; one in the southwestern portion of the property is sampled quarterly by KNC in accordance with the Part I permit, and the remaining well is used for industrial purposes. The well that is sampled by KNC was noted on Figure 1 of the 1988 Woodward-Clyde report as being field verified. The location of the other three wells noted on Figure 1 was reportedly obtained from KGS reports; however, these locations were not field checked at that time.

It is unlikely that pumping from the Conrardy wells had any material influence on the migration of constituents from the Facility. The intermittent and relatively small volume of groundwater pumped from these wells would be unlikely to affect groundwater flow north of the Facility.

The Conrardy well is sampled each quarter by KNC. The chromium and nitrate plus nitrite as nitrogen levels reported during the most recent sampling event (April 2005) were less than 0.01 mg/L and 2.34 mg/L, respectively.

Comment 19A: Page 3-4. Section 3.4.1 Chromium, first paragraph, fourth sentence: The sentence states, "Wells containing elevated chromium levels are not used for potable purposes." Since the plume is migrating and is off-site, this statement is misleading. Wells could become contaminated with the migration of the plume. Also, those wells could be used for watering gardens, pets, livestock, irrigation of fields, washing cars, etc. Reference to wells screened in the Ogallala and Dakota Aquifers not being used as potable water is incorrect and misleading. Until chromium and nitrate contamination was confirmed in the Ogallala and Dakota, each aquifer was used as a source of potable water.

KNC Response: Current data do not support a conclusion that a plume of contamination is migrating, and the work proposed in the RFI Work Plan is intended to fill in data gaps to further evaluate groundwater conditions. KNC is aware that chromium and nitrate plus nitrite have been detected in off-site monitoring wells screened in the unconsolidated deposits. However, these wells containing elevated levels are not currently used for potable (i.e., drinkable) purposes. None of the adjacent wells screened in the Dakota Formation contain elevated levels of chromium or nitrate plus nitrite.

KNC is also aware that groundwater from off-site wells may be used for watering pets, livestock, gardens or irrigation of agricultural fields. It should be noted, however, that both the Cokers and the Bogners have entered into agreements with KNC related to future groundwater use as noted in KNC response No. 4.

The quarterly groundwater monitoring program conducted by KNC in accordance with the Part I Permit would detect future increases in off-site migration. A recent analysis

of these historic data (KNC, 2005) show that chromium levels in most of the wells are decreasing and, with the exception of well TW-80, the chromium levels in all of the perimeter wells are below the Ground Water Protection Standard. KNC has proposed additional investigatory work to assess these trends in well TW-80.

KNC proposes to check the well registration database annually to identify new wells along the down-gradient portion of the facility, and the well use, construction, and ownership of the new well. If these wells have not been sampled and as authorized by the owners of those wells, KNC will sample these wells to determine the water quality in those wells.

Finally, KNC proposed to install additional off-site wells to verify the extent of constituent levels in the groundwater. Using the information from this additional work, KNC will evaluate current and hypothetical future risks associated with potable and non-potable (watering pets, livestock and gardens, irrigating agricultural fields and washing cars) uses.

Comment 19B: In addition, the Agencies are not aware of any zoning restrictions in the use of groundwater in the Ogallala and Dakota Aquifer for potable purposes. Also, elevated levels of chromium and nitrate have been detected in the Dakota. Historical information should be included. Please revise the fourth sentence, and this section to accurately reflect the situation. In addition, please revise this section to include the historical information.

KNC Response: Both the Cokers and the Bogners have entered into agreements with KNC that limit the use of groundwater from those properties as noted in KNC response No. 4. As part of on-going efforts to eliminate potential groundwater exposures, KNC proposes to check the well registration database annually to identify new wells down gradient of the KNC facility. If these wells have not been sampled, subject to owner approvals, KNC will sample these wells to determine water quality.

Wells screened in the unconsolidated deposits containing elevated levels of chromium or nitrate plus nitrite are not used for potable (i.e., drinking water) purposes. Wells screened in the Dakota Formation do not contain elevated chromium or nitrate plus nitrite. Historical information on chromium levels in the United Protein and Feed Mill Wells was previously provided in Appendix I of the draft RFI Work Plan and summarized in Attachment B – Rehabilitation of United Protein and Feed Mill Dakota Wells of KNC's June 2, 2005 response to the Agencies' April 27, 2005 comments. This information has been retained in Figure 4-21 of the revised RFI Work Plan.

Comment 19C: The last paragraph indicates two potential sources for chromium contamination in the groundwater. KDHE maintains that although the inactive CDU may not have been a major contributor to the chromium contamination found in the groundwater, the data does not eliminate the inactive CDU and associated piping as a potential contributor to the contamination. KNC states in Section 3.4.1.2

that "these ponds could have received both hexavalent and trivalent chromium." Please revise accordingly.

KNC Response: The sampling and analysis plan provided in Appendix A of the draft RFI Report provided KNC's approach to characterizing, as applicable, the contribution of chromium from the inactive CDU and associated piping to groundwater. The wording has been modified in the revised RFI Work Plan to indicate that the CDU and associated piping is a potential source of groundwater impacts although we do not believe this to be the case based on what is currently known about the history of spills and releases at the site.

Comment 20: Page 3-4. Section 3.4.1.1. Chromate Spill Locations, second paragraph, third sentence: This sentence states, "Soil samples collected at the CDU show that elevated levels of chromium are not present (Appendix A), and that it is unlikely that chromium from the CDU reached groundwater." Soil samples were not collected from the entire area comprising the former Chrome Destruct Unit (CDU) because the previous owner constructed a building and basins over part of the former CDU. Therefore, clean closure of the CDU can not be conclusively shown. As outlined in the Permit, if clean closure can not be demonstrated, this "unit" will be considered a SWMU and will be handled under corrective action.

KNC Response: Soil samples were collected from the inactive CDU before the prior owner constructed the cooling tower addition and additional neutralization basin. In October 1990, two soils samples were collected from the inactive CDU before the cooling tower addition was constructed (see Sample Nos. 2 and 3, draft RFI Work Plan Appendix A-C). These two samples were extracted using the Toxicity Characteristic Leaching Procedure (TCLP) and then analyzed for chromium. The chromium levels were very low and ranged from less than 0.006 to 0.011 milligrams per liter (mg/L). These levels were less than the TCLP limit for a hazardous waste of 5.0 mg/L. The TCLP is a more aggressive extraction method than the Synthetic Precipitation Leaching Procedure (SPLP), which can be used to assess the potential leaching of constituents from soil to groundwater (KDHE, 2003 and USEPA, 1996). These TCLP levels (which likely overestimate potential leaching from soil to groundwater) were less than the SPLP limit of 2 mg/L (KDHE, 2003). Therefore, it is unlikely that chromium from this area leached from soil to groundwater.

Before the cooling tower addition was constructed, soil in the inactive CDU was removed. The soil removal likely extended to a depth of many feet to allow the construction of the subsurface footings and basin for the cooling tower addition. Removing this soil eliminated any current or future direct exposure route for chromium.

In October 1990, one soil sample was collected from the inactive CDU before the additional neutralization basin was constructed (see Sample No. 6, draft RFI Work Plan Appendix A-C). This sample was extracted using the TCLP and then analyzed for chromium. The chromium level was 0.375 mg/L, which is less than the TCLP and SPLP

limits. Therefore, it is unlikely that chromium from this area leached from soil to groundwater.

Before the additional neutralization basin was constructed, soil in the inactive CDU was removed. The soil removal likely extended to a least 12 feet below land surface. Removing this soil eliminated any current or future direct exposure route for chromium.

There are no data at this time upon which the Agencies could currently rely to conclude that clean closure cannot occur. KNC is proposing to conduct further investigation of the soils adjacent to the inactive CDU as part of the entire site-wide investigation. A determination of either "no further action" or the need for remediation at the inactive CDU will be made when the appropriate data have been collected. Upon receipt of data supporting clean closure, KNC will request that the Agencies approve the Closure Plan for the CDU. This course of action was the basis of the settlement agreement that resolved the Permit appeals and led to the issuance of the amended RCRA Permits. See Part II Permit C.5.(f).

Comment 21: Pages 3-4 & 3-5. Section 3.4.1.2. South and North Ponds: The last sentence is misleading. The current data indicates the groundwater chromium concentrations are higher beneath the east pond. Please revise the text to indicate the referenced time period for the information.

KNC Response: The last sentence in Section 3.4.1.2 of the draft RFI Work Plan was intended to reference the data contained in Appendix E (which was referenced parenthetically), not chromium levels in the groundwater. The sampling data in Appendix E of the draft RFI Work Plan showed that chromium levels in these samples were generally higher in the South and North Pond rather than the East Pond.

The text of the revised RFI Work Plan will be revised to clarify the comparison between chromium levels in samples from the ponds and groundwater beneath the ponds.

Comment 22A: Page 3-5. Section 3.4.2. Nitrate, first paragraph, fourth sentence: The sentence states, "Wells containing elevated nitrate levels are not used for potable purposes." Since the plume is migrating and is off-site, this statement is misleading. Wells could become contaminated with the migration of the plume. Also, those wells could be used for watering gardens, pets, livestock, irrigation of fields, etc. Please change this sentence accordingly.

KNC Response: Current data do not support a conclusion that a plume of contamination is migrating, and the work proposed in the RFI Work Plan is intended to fill in data gaps to further evaluate groundwater conditions. There are no wells that are currently monitored that have elevated nitrate plus nitrite levels that are used for potable (drinking) water purposes. This is consistent with the Environmental Indicator Determination made by the EPA in July 2004. With the exception of TW-80, data for which has already been provided, we have no other information to indicate that that nitrate plus nitrite plume is

moving off-site. KNC will continue to monitor all wells as required by the Part I Permit to identify future conditions.

Comment 22B: In addition, please revise the first paragraph to explain the historical use of the groundwater for potable purposes and indicate when the potable usage was discontinued. Documentation confirms the fact that two residential wells are no longer used for potable purposes due to elevated levels of chromium and nitrate.

KNC Response: Only two private wells contained elevated levels of chromium or nitrate plus nitrite and both residences have been supplied with alternative drinking water. KNC initially provided the Coker residence with bottled water and subsequently connected the residence to city water. The pump has been disconnected from the Coker well and it no longer supplies groundwater. KNC began providing the Bogner's with bottled water and installed a water line in June 2005. However, until authorization is received from the Burlington Northern and Santa Fe Railroad and Land O'Lakes Feed Mill, this line cannot be connected to the public water supply, as it must run beneath the railroad tracks to make the connection.

KNC does not know whether the United Protein and Feed Mill wells were used for potable (i.e., drinkable) purposes before they were rehabilitated in March 1990 and December 1994, respectively.

Comment 22C: Also, the text should discuss zone restrictions (if any) on groundwater usage for potable purposes. The text in this section indicates only two potential sources of nitrate. Groundwater data for nitrate from the eastern portion of the facility (monitoring well TW-8) indicates the UAN tank and the north and south ponds may not be the only source of the nitrate contamination.

KNC Response: The restrictions on future groundwater usage for potable purposes are discussed in KNC response to Comment No. 4 (state and county well installation regulations). Ford County would also have to approve any change in land use on adjacent property.

The text in Section 3.4.2 of the draft RFI Work Plan did not indicate that there were only two sources of nitrate plus nitrite. KNC wrote "Other releases of nitrate may have occurred from the other SWMU/AOCs at the Facility" (Page 3-5).

Comment 23: Page 3-5. Section 3.4.2.1. 30,000-Ton UAN Tank Leak: A reference for soil boring B-1 should be provided in the text.

KNC Response: Analytical results for UAN Tank Leak soil boring B-1 were provided in Appendix K of the draft RFI Work Plan; a reference to this information was provided in Section 4.3.1.1 of the draft RFI Work Plan (page 4-14) where the proposed investigation of the AOC was described. This information is retained in Section 4.2.7.3, Table 4-9 and Appendices O and M of the revised RFI Work Plan.

Comment 24: Page 3-5. Section 3.4.2.2, South and North Ponds: The last paragraph is misleading. Current nitrate data indicates the concentrations are higher beneath the east pond area, although historical data indicates the reverse. Text should reflect, at a minimum, the current conditions. Please revise. In addition, the title of this section should be "South, North, and East Ponds." Please revise the text accordingly.

KNC Response: Comment noted.

Comment 25A: Page 3-6. Section 3.5.1.2 Subsurface Soil, second paragraph, fourth sentence: The sentence states, "Although leaching from soil to groundwater is a transport mechanism, use of constituent-containing groundwater has been eliminated and no potable (drinking water) exposures to elevated constituents in groundwater are occurring." This statement is misleading. KNC is hooking up two residents to City water, or in the interim, providing bottled water for drinking water. However, other uses of the well water need to be addressed.

KNC Response: The Cokers and the Bogners have entered into agreements with KNC relating to immediate and future groundwater use as described in KNC response to comment No. 4 above. The state and county regulations also provide controls on the installation of new wells for potable purposes as discussed in KNC response to Comment No. 4.

In the draft RFI Work Plan and in the revised RFI Work Plan, KNC proposed(es) to install additional off-site wells to delineate the extent of constituent levels in the groundwater. Using the information from this additional work, KNC will evaluate current and hypothetical future risks associated with potable and non-potable (watering pets, livestock and gardens, irrigating agricultural fields and washing cars).

Comment 25B: In addition, since this plume of contamination is migrating, thought needs to be given to the fact that contamination could occur in additional wells surrounding the plant within a one-mile radius or in wells farther out from the initial private wells/irrigation wells that are monitored. There are no restrictions for any private person or industry to drill a new water well in the surrounding area. The soil-to-groundwater leaching pathway must be considered for this RFI Work Plan. The elimination of the potable groundwater pathway is inappropriate at this time. Sufficient information regarding the potable groundwater conditions to the south of the facility is not available at this time. Revise the fourth sentence to accurately reflect the situation.

KNC Response: Current data do not support a conclusion that a plume of contamination is migrating, and the work proposed in the RFI Work Plan is intended to fill in data gaps to further evaluate groundwater conditions. There are no wells that are currently monitored that have elevated chromium levels that are used for potable (drinking) water purposes. This is consistent with the Environmental Indicator Determination made by the

EPA in July 2004. With the exception of TW-80, data for which has already been provided, we have no other information to indicate that the nitrate plus nitrite plume is moving off-site. KNC will continue to monitor all wells as required by the permit to identify any future conditions.

Comment 26A: Page 3-7. Section 3.5.2.1 Potable Water. first paragraph, first sentence: The sentence states, "Groundwater beneath the Facility and adjacent properties containing elevated constituent levels are not used for potable (drinking water) purposes." As stated above, this statement is misleading. Two properties are being hooked up to City water and in the interim; one property's residents are using bottled water for drinking water purposes. Other uses for the well water need to be considered (pet watering, livestock watering, watering gardens, irrigation, etc.). The plume of contamination is migrating and could impact additional wells within a one-mile radius of the facility or farther out. There are no restrictions for any private person or industry on drilling a new water well in the surrounding area. Revise this sentence to accurately reflect the situation. The potential exists for human or ecological receptors of groundwater south of the facility. Ownership of the land often dictates usage of groundwater. KNC can not restrict use of groundwater beneath land they do not own. KNC should include a discussion of zoning of the surrounding land and future use for groundwater in the area.

KNC Response: Current data do not support a conclusion that a plume of contamination is migrating, and the work proposed in the RFI Work Plan is intended to fill in data gaps to further evaluate groundwater conditions. Both the Cokers and the Bogners have entered into agreements with KNC relating to immediate and future groundwater use as described in KNC response to comment No. 4 above. The state and county regulations also provide controls on the installation of new wells for potable purposes as discussed in KNC response to comment No. 4.

KNC proposed to install additional off-site wells to verify the extent of constituent levels in the groundwater. Using the information from this additional work, KNC will evaluate current and hypothetical future risks associated with potable and non-potable (watering pets, livestock and gardens, irrigating agricultural fields and washing cars).

The quarterly groundwater monitoring program conducted by KNC in accordance with the Part I Permit would detect future increases in off-site migration.

KNC is not aware of any ecological (non-domesticated or non-farm animal) receptors that are being exposed to groundwater south of the facility.

Section 3.4.8 of the revised RFI Work Plan provides a summary of well use within a one-mile radius of the Facility. Wells in the vicinity of the site and their use are summarized in Figure 3-12 of the revised RFI Work Plan. Information on land use and zoning is provided in Section 3.2 of the revised RFI Work Plan. A zoning map shows that the KNC property has a commercial authorization and the surrounding and adjacent properties are mostly used for agricultural purposes, with residences on the plots.

Comment 26B: In addition, the text should contain information about the historical use of the groundwater. The text should also include historical data related to the elevated levels of chromium and nitrate in the Dakota aquifer. The Agencies disagree with the last sentence of this section which eliminates the potable groundwater as a potential pathway. The groundwater investigation should be completed prior to making the determination. There are residential homes down gradient of the plume, which currently use the groundwater from the Ogallala. The text should reflect this information.

KNC Response: Information on historical use of groundwater in the vicinity of the Facility is provided in Section 3.4.8 of the revised RFI Work Plan.

Historical information on chromium and nitrate plus nitrite levels in the United Protein and Feed Mill Wells was previously provided in Appendix I of the draft RFI Work Plan and summarized in Attachment B – Rehabilitation of United Protein and Feed Mill Dakota Wells of KNC's June 2, 2005 response to the Agencies' April 27, 2005 comments. This information has been retained in Section 4.2.7.4 of the revised RFI Work Plan.

KNC proposed to install additional off-site wells to verify the extent of constituent levels in the groundwater. Using the information from this additional work, KNC will evaluate current and hypothetical future risks associated with potable and non-potable uses (i.e., watering pets, livestock and gardens, irrigating agricultural fields and washing cars).

Comment 27: Page 3-7. Section 3.5.2.1 Potable Water. second paragraph, fourth sentence: This sentence states, "Groundwater from the unconsolidated deposits beneath the Facility and adjacent properties is not currently used for potable use and it is not anticipated to be used for such in the future." This statement is clearly erroneous. Properties surrounding the Facility and further out are using the groundwater for drinking water and irrigation purposes. As long as the plume of contamination is migrating, there is a potential that other wells will be impacted by the contamination. Revise this sentence to accurately reflect the situation.

KNC Response: There are no wells that are currently monitored that have elevated chromium levels that are used for potable (drinking) water purposes. This is consistent with the Environmental Indicator Determination made by the EPA in July 2004. With the exception of TW-80, data for which has already been provided, we have no other information to indicate that that nitrate plus nitrite plume is moving off-site. We will continue to monitor all wells as required by the permit to identify any future conditions. Current data do not support a conclusion that a plume of contamination is migrating, and the work proposed in the RFI Work Plan is intended to fill in data gaps to further evaluate groundwater conditions.

Comment 28A: Page 3-7, Section 3.5.4 Livestock Watering Pathway, first and second sentences: The sentences state, "Groundwater from the unconsolidated

deposits is used for local livestock watering. Previous evaluations of this practice indicated that exposure to nitrate did not pose an unacceptable risk to the livestock." What "previous evaluations" is KNC referring to? Please include information on any evaluations conducted.

KNC Response: KNC currently allows local farmers to use groundwater from wells TW-12 and TW-79 for livestock watering. This practice was reportedly begun by the prior owner. Initially, KNC raised a concern about the suitability of this groundwater for livestock watering. In response to this concern, KNC completed a risk-based analysis of the nitrate plus nitrite levels in groundwater from these wells (KNC, 2004; Attachment A). Well TW-12 has not been sampled recently; however, well TW-12 is nearby and nitrate plus nitrite data for this well was used in this evaluation. Recent data are available for well TW-79. The maximum nitrate plus nitrite level in these wells was less than 19 NO₃ + NO₂-N mg/L. Research (cited in KNC 2004) indicated that water containing less than 100 mg/L NO₃+NO₂-N mg/L should not harm livestock. The maximum level in these wells was over five-times less than the level of concern.

Chromium has not been detected in these wells above the Ground Water Protection Standard list in the Part I Permit. Therefore, KNC did not believe that chromium levels in groundwater from these wells represented a threat to livestock. KNC 2004. A copy of the evaluation of risk is provided as Attachment A to this Response to Comments. The conclusions of this memorandum are consistent with the ecological risk data provided by the Agencies in Comment 28B below.

Comment 28B: Also, the ecological risk assessors were given the following information to determine the ecological risk numbers for livestock, chromium offsite at 100 ug/L; Nitrate/Nitrite offsite at 150 mg/L. The ecological risk numbers for livestock are as follows:

Species	Average dose from drinking water- Chromium (mg/kgBW/day)	Toxicity Reference Value (ORNL, 1996) based on CR ⁺⁶	Hazard Quotient
Chicken	0.011	0.99	0.01
Cow	0.0095	1.4	0.007
Pig	0.0096	1.4	0.007
Horse	0.0095	1.4	0.006

Species	Average dose from drinking water – Nitrates (mg/kgBW/day)	Toxicity Reference Value (ORNL, 1996)	Hazard Quotient
Chicken	16.5	NA	NA
Cow	14.25	272	0.05
Pig	13.5	272	0.05
Horse	14.4	272	0.05

KNC Response: Comment noted.

Comment 29: Section 4.2.1 - SWMU 4 Former Injection Well No.1: The plan discusses the occlusion problems encountered with this disposal well, re-conditioning efforts, and finally that it was abandoned by injection of concrete. The agencies are concerned that although the inner casing may have been filled with concrete during abandonment, the annulus could remain a conduit through the Graneros leading to groundwater contamination moving from the upper unconsolidated aquifer down into the Dakota, especially since abandonment occurred at a time before it was known that there was a groundwater contamination problem at the facility. It was difficult to tell exactly how the well was constructed from the documentation provided in the plan in Appendices E and F; is there any other documentation available relating to the construction and abandonment of Injection Well No. 1? If so, please provide.

KNC Response: Available information related to the construction and operation of Injection Well No. 1 in KNC files was previously provided in Appendix I of the draft RFI Work Plan. KNC is planning additional investigative work at SWMU 4 (Former Disposal Well 1), that include sampling of the unconsolidated deposits at discrete vertical intervals and installation of a new Dakota Formation monitoring well in the vicinity of Former Injection Well No. 1. The scope of work for this task is provided in Section 6.3 of the revised RFI Work Plan.

Comment 30: Page 4-3, Section 4.2,4 SWMU 14 Settling Basin near the ANDCO Unit, second paragraph, last sentence: The sentence states, "Based on recent TCLP analysis, this sludge is not a characteristically hazardous waste." Please provide the analytical results.

KNC Response: Analytical results for recent TCLP analysis of sludge from SWMU 14 were provided in Appendix 4-2 of the draft RFI Work Plan. This information is also provided in Table 4-2 and Appendix C, as referenced in Section 4.1.3 of the revised RFI Work Plan.

Comment 31: Page 4-5. Section 4.2.12 SWMU 26 West-Side Basin, second paragraph, first and second sentences: These sentences state, "Soil sampling has been performed at this SWMU. Results indicate that the settleable matter from the SWMU is not hazardous." Please provide information regarding this sampling event and the analytical results.

KNC Response: A copy of the sampling results for the sludge inside of SWMU 26 was provided in the October 26, 2004 letter from KNC to EPA. A copy of this letter was also included in Appendix A of the draft RFI Work Plan. The results (labeled "WW BLDG") showed that all of the constituents were below the detection limit. This information is also summarized in Table 4-4, provided in its entirety in Appendices D and F, and referenced in Section 4.1.8 of the revised RFI Work Plan.

Comment 32: Page 4-6.5th Paragraph, Section 4.2.15 - AOC 6 Dakota Formation: In discussing the contaminated production wells at the United Protein facility, the plan states these wells were constructed such that the filter pack extended through the Graneros shale, providing a conduit for contamination to move from the upper contaminated Ogallala down into the Dakota Formation where the wells were screened. It is also stated that two of the UPI wells known as the 1979 East and the 1982 South were plugged in 1990, and a third well known as the 1986 well was resealed and remains in use, is there documentation that details how the wells were abandoned and resealed? If so, please provide.

KNC Response: Construction logs for two United Protein (Kansas Byproducts) wells were presented in Appendix I of the draft RFI Work Plan.

Comment 33: Page 4-6. 6th Paragraph. Section 4.2.15 - AOC 6 Dakota Formation: In discussing the contaminated production well at the former Land-O'-Lakes Feedmill facility the plan states that this original well was abandoned in 1994, and a new well was installed that is screened solely in the Dakota. Is there documentation available that details how the original well was abandoned, and how the new well was constructed? If so, please provide.

KNC Response: The construction log for the Feed Mill well was presented in Appendix I of the draft RFI Work Plan. No additional documentation from the former owner was identified regarding the abandonment of this well or construction of the replacement well.

Comment 34: Pages 4-6 and 4-7. Section 4.2.15 - AOC 6 Dakota Formation: The plan discusses the chromium and nitrate contamination that was found in the water production wells owned by United Protein and the former Land-O'-Lakes Feedmill located southeast of the facility. The plan concludes that the contamination most likely resulted from the construction of the wells because they were filter-packed through the Graneros shale, thus providing a conduit from the shallow Ogallala Formation which exhibits chromium and nitrate contamination to the deeper Dakota Formation. The plan goes on to support this conclusion by stating that the sampling results from the resealed UPI well and the Land-O'-Lakes replacement well have not detected any contamination.

While the agencies are in agreement with KNC that the construction of the old production wells at UPI and Land-O'-Lakes could have caused the contamination as postulated, concerns about water quality in the Dakota remain. It is possible that contamination may have been introduced into the Dakota as a result of the problems associated with Former Injection Well No.1, or simply as a result of the construction of Former Injection Well No. I. As stated in the plan in Section 4.2.1, Former Injection Well No.1 was used to dispose of the same wastewater that was discharged to the evaporation ponds, and this wastewater contained chromium and nitrates. The plan states in Section 4.2.1 that an occlusion of the well was identified at a depth of 360 feet, and casing corrosion had occurred between 400 and 500 feet

below ground surface. The agencies believe that these problems could have resulted in the introduction of contaminants into the Dakota, and believe it is necessary to install several monitoring wells in the Dakota in order to evaluate groundwater quality. Monitoring wells are better able to yield discrete "grab" samples representative of actual in situ conditions as opposed to production well samples. These wells would need to be designed and carefully installed using double-cased techniques in order to ensure that inter-aquifer exchange does not occur with the contaminated upper unconsolidated (Ogallala) water-bearing unit. Revise this section to include detail on well installation in the Dakota Aquifer. See Appendix A, FSP Comment # 26.b.

KNC Response: This comment from the Agencies does not appear to be based on any monitoring data and is therefore, to our knowledge, speculative. KNC understands that the Agencies wish to rule-out the potential for other preferential pathways to the Dakota Formation. KNC is therefore planning additional investigative work at SWMU 4 (Former Disposal Well 1), that includes sampling of the unconsolidated deposits at discrete vertical intervals and installation of a new Dakota Formation monitoring well. The scope of work for this task is provided in Section 6.3 of the revised RFI Work Plan. KNC proposes to perform this investigation to determine whether there is any indication that site-related constituents have migrated to the Dakota Formation, as suggested in the comment. If analytical results indicate that chromium and nitrate plus nitrite have been preferentially transported through the Former Injection Well No. 1, additional sampling of the Dakota Formation will be performed, as applicable, to complete delineation. The procedure to install Dakota Formation wells was previously provided in Section I-3.3 of the FSP.

KNC believes that the groundwater samples from the production wells at United Protein (Kansas Byproducts) and the Feed Mill wells provide a representative sample to assess the potential risks to potential groundwater receptors. The well construction for these production wells is the same or similar as would be used for any other wells installed in this zone. Any private wells installed in the Dakota Formation would also be screened over a similar interval to ensure that an adequate volume of water could be obtained from the well to support domestic use. Therefore, the existing wells provide groundwater data that is representative for a potential off-site resident that utilizes groundwater from the Dakota Formation.

Comment 35: Page 4-7. Section 4.3.1. SWMU I through 4 South, North, and East Ponds: The second paragraph provides a detailed list of the process wastewater streams entering the ponds. This text is a snapshot in time (1985) and does not include a discussion of all waste streams that entered the ponds. In addition, in 1985 the east pond was not in use. It is known that the wastewater streams have changed over time (chromate was discontinued in the cooling water in 1983). Revise the text to include all waste streams that entered the ponds.

KNC Response: The text description provided in Section 4.3.1 of the draft RFI Report provides a summary of the waste streams that KNC has direct knowledge of from

existing site records. The broad analytical coverage proposed as part of RFI activities at the North, South, and East Ponds (see Table 6-1 of the revised RFI Work Plan and Table I-2-1 of the FSP) will be performed to identify, as applicable, other constituents that may have been managed in these ponds.

Comment 36A: Page 4-9, Section 4.3.1.3 Former East Pond, third paragraph, third sentence: This sentence states, "On April 8, 2004, KNC informed the EPA that it was planning to amend the lease with DCCC to prevent farming of the Former East Pond." This statement is not entirely accurate. It was during a phone conversation with the former Environmental Compliance manager that EPA recommended that KNC not allow DCCC to farm the former East Pond until an investigation was conducted and it was determined that no contamination was found in that SWMU.

KNC Response: Reference to the proposed lease amendments has been eliminated from the description of SWMU 3 in the revised RFI Work Plan. See KNC response to comment No. 8 above. This potential exposure pathway has been eliminated.

Comment 36B: Additionally, the second sentence should be revised to indicate the prior owner ceased operations of the east pond as a wastewater pond in 1984, but no closure record can be located.

KNC Response: The text in Section 4.2.1.3 of the revised RFI Work Plan has been revised to address this comment.

Comment 37: Page 4-9. Section 4.3.2. SWMU 5 Former Landfarm and SWMU 6 Former Washout Area: The text should explain the surface water runoff from these SWMUs.

KNC Response: Figure 2-2 of the revised RFI Work Plan provides a topographic map of the Facility and adjacent properties at a one-foot contour interval. According to the contours posted on this figure, surface water runoff in the now covered and vegetated former landfarm and washout area would flow to the east and southeast and into the South Pond. Additional text has been added to Section 4.2.3.1 (SWMU 5) and 4.2.3.2 (SWMU 6) of the revised RFI Work Plan to update these descriptions. See also KNC response to comment Nos. 6 and 11 above.

Comment 38: Page 5-1. Section 5.0 Scope of Work: See General Comment #3. In addition, the Agencies will only consider "total chromium" for risk assessment purposes.

KNC Response: KNC requests clarification of this statement and respectfully suggests that the Agencies reconsider their comment. The vast difference in solubility and associated toxicity of hexavalent and trivalent chromium species has been widely documented in numerous EPA publications. This observation is supported by the following summary table of preliminary remediation goals (PRGs) or screening standards provided by EPA Regions III, VI and IX.

EPA Region	Chromium III Soil Residential (mg/kg)	Chromium III Soil Industrial (mg/kg)	Chromium VI Soil Residential (mg/kg)	Chromium VI Soil Industrial (mg/kg)
IX	100,000	100,000	30	64
VI	100,000	100,000	30	71
III	120,000	1,500,000	230	3,100

The solubility and thus toxicity of chromium clearly varies from 4 to 5 orders of magnitude depending on the species of chromium encountered. Though chromium is not speciated in the Tier I and II tables of the KDHE Risk-Based Standards for Kansas (RDK) Manual (KDHE, 2005), Section 5.0 of the RSK Manual clearly states that "In the Tier II approach, KDHE assumes that 100 percent of the chromium detected is hexavalent chromium, which is significantly more toxic than trivalent." Later in the same paragraph, the evaluation of speciation data is described as follows, "The user of RSK Manual may opt to perform a Tier 3 analysis based upon the actual speciation of a compound detected at the site..." Consequently, speciation is absolutely critical to characterizing the solubility and risk posed by any chromium concentrations identified.

Comment 39: Page 5-1. Section 5.1 Task I - CDU Closure (SWMUs 8.23, and 24): As stated previously in Specific Comment #8, this is a SWMU and will be treated as a SWMU. Clean-closure of the unit can not be accomplished given the fact that the previous owner built a building and basins over part of the old CDU. EPA is not sure why KNC devoted so much attention to one unit, when EPA said that this "unit" would be treated as a SWMU utilizing the Post-Closure Rule, allowing for a site-wide investigation. Also, on page 25 of the "Closure Plan for the Inactive Chromium Destruction Unit" in Section 4.2.3, it states, "If soil chromium levels underlying the inactive CDU components indicate future exposure potential exists above approved risk-based levels (4,000 mg/kg for trivalent chromium), or the potential for release to ground water exists (chromium using SPLP levels greater than 2.0 mg/L), excavation..." If soil is going to be excavated, TCLP should be utilized to determine the proper disposal method. EPA has not approved any clean up levels. At this time, it is premature to talk about risk-based levels. Please revise the text accordingly. Also, please revise the title to add SWMU 25.

KNC Response: See KNC responses to comments No. 1 and No. 20 above.

Comment 40A: Page 5-4. Section 5.3 Task 3 Groundwater Assessment (AOC 7): Please refer to Specific Comment #10. Also, bullet #1 states, "confirm the presence and extent of constituents above risk-based levels. Risk-based levels have not been established. Until the investigation is completed, it is difficult to determine risk-based numbers until you know what is out there (vertical and horizontal extent of contamination, receptors, etc.). It is EPA's policy to use MCLs at the property boundary. This investigation does not propose field activities to confirm the presence and extent of constituents above risk based levels (MCLs). In addition,

the Ogallala and Dakota are drinking water aquifers. Therefore a groundwater assessment should be completed for each aquifer. If remediation is necessary, remediation goals should be based on MCLs.

KNC Response: The proposed groundwater delineation program provided in Section 5.3.2 of the draft RFI Work Plan and retained in Section 6.3 of the revised RFI Work Plan consists of delineating groundwater constituents to applicable screening levels. Groundwater data will be initially compared to the Ground Water Protection Standard (i.e., the maximum contaminant level in the list of Region IX PRGs). If no Ground Water Protection Standard exists, the Region IX tap water PRG will be used to evaluate the data. The PRGs for non-carcinogens will be multiplied by a factor of 0.1 to account for potential additive effects.

The groundwater assessment will be completed for the unconsolidated deposits and the Dakota Formation.

KNC will prepare a Risk Assessment Work Plan that describes the proposed approach for completing risk assessment under separate cover upon approval of the RFI Work Plan.

Initially, soil samples will only be collected from within the facility boundaries and north of the North Pond. The surface and subsurface soil sample results will be evaluated by comparing them to the EPA Region IX Industrial Preliminary Remediation Goals (PRGs). The Region IX PRGs for non-carcinogens will be multiplied by 0.1 to account for potential additive affects. If constituents at the facility boundary exceed their Region IX Industrial PRGs, delineation will continue off-site. Analytical results for off-site soil samples (e.g., north of the North Pond), will be evaluated by comparing the results to the Region IX Residential PRGs.

Deep soil samples, generally from the 8- to 10-foot BLS depth interval, will be collected at the SWMUs/AOCs to evaluate the potential for SWMU/AOC related constituents to leach to groundwater. Deep soil samples will be extracted using the synthetic precipitation leaching procedure (SPLP) and then analyzed for the target constituents. The SPLP results will be evaluated by comparing them to their MCL or Region IX tap water PRG multiplied by a factor of 20 to account for dilution as specified in the KDHE Risk Guidance (KDHE 2003).

Comment 40B: In addition, bullet #2 in this section states, "..., risk-based goals of the Correction Action program and," This should be "Corrective" instead of "Correction." Please change accordingly.

KNC Response: Text in revised RFI Work Plan has been revised to reflect this comment.

Comment 40C: Also, in paragraph three, sixth sentence it states, "Preliminary simulations from the MODFLOW computer program (McDonald & Harbaugh, 1988) were run using existing data and conservative assumptions." What

"conservative assumptions" were used? Please list out. Field data must be used to support the model for decision-making purposes.

KNC Response: During this phase of the project, KNC is not proposing to use a groundwater model. If a groundwater model is planned in the future, KNC will submit a document describing the use and inputs of the model for EPA and KDHE review and approval.

Comment 41: Page 5-6. Section 5.3.1.3 Hydraulic Characteristics Evaluation. Step 1. Regional Non-Pumping Groundwater Gradients, second paragraph: The shut down of the recovery system will create an issue of noncompliance with Part I and Part II of the Permit. KNC may request temporary authorization to shut down the recovery system. This temporary authorization would allow KNC to complete the groundwater assessment, but require KNC to return the groundwater recovery system to service under the requirements of Part I and Part II of the permit or submit a request for permit modification within a specific period of time.

KNC Response: It is anticipated that the system will be shut down, with the approval of the Agencies, to perform constant rate pumping tests as part of physical characterization activities (retained as Section 6.4.3 of the revised RFI Work Plan). The exact number of wells, time out of service, and procedures for bringing wells back online will be determined after delineation activities are complete and other physical property testing has been performed to identify data gaps. KNC will request temporary authorization from EPA and KDHE prior to temporarily shutting down components of the recovery system. KNC will submit to EPA and KDHE a document describing the testing that will be performed, the duration of the shut down, and interim measures, as necessary, for approval prior to shutting down the system or system components.

Comment 42: Page 5-7. Section 5.3,1.3 Hydraulic Characteristics Evaluation. Step 2. Evaluate Groundwater Recovery System Performance, first paragraph, second sentence: This sentence states, "This portion of the evaluation will be accomplished by sequentially turning the recovery wells back on and monitoring drawdown in the surrounding wells (e.g., wells TW-77, TW-78, TW-79 and TW- 81A)." This section is vague with respect to shutting off the wells and turning the wells back on. This section needs to include additional detailed information on when the wells will be turned back on (i.e., one day, two days, etc.). Also, explain in greater detail whether the wells will be turned back on, (i.e., one at a time, two at a time, etc). Will there be a lag time between one being turned on and the next one being turned on. Also, what is the timeframe when all of the wells will be turned back on?

KNC Response: It is anticipated that the system will be shut down, with the approval of the Agencies, to perform constant rate pumping tests as part of physical characterization activities (retained as Section 6.4.4 of the revised RFI Work Plan). The exact number of wells, time out of service, and procedures for bringing wells back online will be determined after delineation activities are complete and other physical property testing has been performed to identify data gaps. KNC will request temporary authorization

from EPA and KDHE prior to temporarily shutting down components of the recovery system. KNC will submit to EPA and KDHE a document describing the testing that will be performed, the duration of the shut down, and interim measures, as necessary, for approval prior to shutting down the system or system components. Absent delineation and other physical property testing data, it is premature to identify the specifics of the constant rate pumping tests at this time.

Comment 43: Page 5-8, Section 5.3.1.3. Hydraulic Characteristics Evaluation, Step 3: The work plan must provide additional information on the calibration of the model. The RFI report must include a discussion of model approach, documentation of all calculations, summary of sensitivity analysis, summary of all model calibration, boundary conditions, grid spacing, and field data to support the model.

KNC Response: During this phase of the project KNC is not proposing to use a groundwater model. All references to a groundwater model have been removed from the revised RFI Work Plan. If a groundwater model is planned in the future, KNC will submit a document describing the use and inputs of the model for EPA and KDHE review and approval.

Comment 44: Page 5-8. Section 5.3.1.4 Groundwater Refinement and Recovery Well Optimization: In the second sentence, reference is made to "optimization modeling simulations." What exactly does this mean? Please provide an explanation of these terms. In addition, in reading this section it is not clear how the model simulations are going to accurately reflect actual well operation. Please explain. If the groundwater model is used as a tool for this investigation, a groundwater model report should be included as part of the RFI report. This report should detail all aspects of the model, including detailed model data, assumptions, and supporting field data, with an electronic copy of the model.

KNC Response: During this phase of the project, KNC is not proposing to use a groundwater model. All references to a groundwater model have been removed from the revised RFI Work Plan. If a groundwater model is planned in the future, KNC will submit a document describing the use and inputs of the model for EPA and KDHE review and approval.

Comment 45A: Page 5-8. Section 5.3.2 Subtask 3B - Groundwater Investigation: In the first bullet item it states, "First, EPA has requested that specific wells be sampled and analyzed. These wells include TW- 02, 08, 21, 39, 40, 65, 70, 80, 84, 87, 89, 90, 92, and 94 or 95." Where did this information come from? These are not the wells designated in the Part I of the Permit in Section IV.B.4 Table 1 - Corrective Action Monitoring System or in Section IV.C. Corrective Action Program Table 2 - Groundwater Recovery Wells. EPA does not have any recollection of this request to KNC. Please explain.

KNC Response: In letter dated January 24, 2003 from EPA, and in a letter dated February 21, 2003 from EPA, the Agency requested specific wells be sampled. The

following table summarizes the requests from EPA. KNC agrees that EPA did not reference TW-84 or TW-95 in these letters. TW-84 is currently a sampled well and there is currently no installed or proposed well TW-95.

EPA WELL SAMPLING REQUEST SUMMARY

Well Numbers	Date of EPA Letter	Letter Citation
TW-40, TW-94, TW-80, TW-92	January 24, 2003	Comment 1.d and Comment 5, second paragraph (TW-94)
TW-87, TW-39, TW-21	January 24, 2003	Comment 2, third paragraph, Comment 6, first paragraph (TW-21), Comment 17, fourth paragraph (TW-21).
TW-8, TW-2, TW-65, TW-70	January 24, 2003	Comment 3, third paragraph.
TW-89, TW-90	January 24, 2003	Comment 17, fourth paragraph
TW-89	February 21, 2003	Comment 6

Comment 45B: Also, in bullet item number 2 states, "Second, EPA has requested that a set of perimeter wells be sampled once and analyzed for VOCs, SVOCs, metals, hexavalent chromium, nitrate, and sulfate." Again, where did this information come from? EPA does not recall requesting this of KNC. Also, EPA is interested in "total chromium" not just "hexavalent chromium."

KNC Response: In a January 24, 2003 letter from EPA, the Agency states, "The Work Plan must propose a set of facility perimeter wells for which samples will be analyzed for the parameters specified in previous comment 1b, specifically VOCs, SVOCs, 40 CFR Part 264 Appendix IX metals, total petroleum hydrocarbons, nitrates, and sulfates." See General Comments on Site-Wide Groundwater Issues, second full paragraph. (Emphasis added.) In the same letter, EPA refers to sampling total and hexavalent chromium when discussing investigation of SWMU 8, the Former Chrome Destruct Unit. See EPA Comment 7 above.

Comment 45C: Additionally, in bullet item number 3, second sentence, it states, "EPA has requested that at least two wells be installed near the South Pond (SWMU 1) and groundwater samples be collected and analyzed for nitrate and chromium." Again, where did this information come from? EPA does not have any recollection of this request to KNC. Please explain.

KNC Response: In a January 24, 2003 letter from EPA, the Agency states, "In order to provide a comprehensive assessment of groundwater downgradient of the South Pond, groundwater samples should be collected from TW-40, TW-94, and TW-80 and analyzed for the parameters listed above in comment 1.b. At the same time these wells are

sampled, samples should be collected from TW-92 and the two new monitoring wells proposed by Farmland and analyzed for chromium and nitrate in order to provide a good assessment of the distribution of these known contaminants of concern.” Comment 1.d (Emphasis added.)

Comment 45D: This investigation does not address the off-site groundwater issues or the Dakota. The work plan must be revised to include this investigation to delineate the extent of plume(s) in both aquifers. EPA has specified in Part II, Section C.6., what is required for the RFI. Please review.

KNC Response: The proposed groundwater delineation program provided in Section 5.3.2 of the draft RFI Work Plan and retained in Section 6.3 of the revised RFI Work Plan consists of delineating groundwater constituents to applicable screening levels. Groundwater chromium and nitrate plus nitrite data will be initially compared to the Ground Water Protection Standard (i.e., the maximum contaminant level). Figure 6-2 of the revised RFI Work Plan identifies the initial borings proposed to complete lateral delineation of nitrate plus nitrite and chromium to the south and southwest. Furthermore, sampling at discrete vertical intervals is proposed to identify, as applicable, evidence of vertical concentration gradients within the unconsolidated deposits. If groundwater concentrations in these borings exceed the respective Ground Water Protection Standards, additional step-out borings will be advanced until chromium and nitrate plus nitrite are delineated in the unconsolidated deposits.

The proposed strategy for the Dakota Formation delineation is to install a permanent Dakota Formation well down-gradient of former injection Well No. 1, which EPA suspects to be a potential conduit for migration from the unconsolidated deposits to the Dakota Formation. As discussed in the responses to KNC response to comments 16 and 17, after rehabilitation, groundwater from the UPI and Feed Mill wells has consistently been below regulatory standards or non-detect (chromium). Consequently, impact to the Dakota Formation has not been confirmed at this time. If the chromium or nitrate plus nitrite are detected at concentrations greater than the Ground Water Protection Standards in the new Dakota Formation well down-gradient of Former Injection Well No. 1, additional delineation and monitoring well installation activities will be performed in the Dakota Formation.

Comment 46: Page 5-9. Section 5.4 Task 4-Bench-Scale Treatability Study: General Observation: This section would be more appropriate in the Corrective Measures Study portion of the Corrective Action process. If KNC intends to conduct this study, a report "detailing" all aspects of the study must be submitted as a part of the RFI Report.

KNC Response: If bench-scale studies or other activities outside of the scope of work identified in the revised RFI Work Plan are planned, a separate work plan will be provided to the EPA and KDHE that identifies the proposed testing scope of work and rationale. KNC will request approval prior to beginning the particular study.

Comment 47A: Page 5-10. Section 5.6. Risk Assessment: The risk assessment is incomplete as discussed in this work plan. The risk assessment must include an assessment of the groundwater in the Ogallala and the Dakota Aquifers. Completion of the risk assessment will not be possible without a complete investigation of the Dakota and Ogallala Aquifer.

KNC Response: KNC agrees with earlier EPA statements regarding completion of delineation activities (e.g., sampling the unconsolidated deposits and Dakota Formation) prior to performing a risk assessment. KNC proposes to provide the EPA with a Risk Assessment Work Plan following approval of the revised RFI Work Plan. The Risk Assessment Work Plan will provide a detailed description of exposure scenarios, pathways, points, and media, models proposed to characterize risk, model inputs as they relate to site-specific risk characterization, and proposed toxicity values.

Comment 47B: Exposure area for SWMUs 1, 2, and 3 is too large. For the purposes of risk assessment, large exposure areas lead to a significant amount of uncertainty regarding potential health risks at the site. Exposure units should be much smaller than the areas defined to estimate health risks. Hot spots should be considered exposure units.

KNC Response: EPA (1992, 1996) does not recommend using localized "hot spots" as exposure units to assess potential risk. As explained (EPA, 1992) an individual is assumed to move randomly across an exposure area over time, spending equivalent amounts of time in each location. Thus, the concentrations contacted over time are best represented by the spatially averaged concentration over the exposure area. Consequently, it is unlikely that a site worker would be exposed on a daily basis (e.g., 250 days per year for 25 years) to localized "hot spots" that may or may not be identified within the former ponds.

KNC will prepare a Risk Assessment Work Plan that describes the proposed approach for assess exposure areas under separate cover upon approval of the RFI Work Plan.

Comment 47C: Define the "available livestock water quality rating information." As stated in previous comments, Region 9's PRGs were developed for human exposure pathways. The Agencies disagree with the statement "groundwater samples from all wells during the most recent RFI sampling event will be considered to be representative of groundwater exposure point conditions." Considering only the most recent data is too restrictive. Temporal and geographical variability necessitates all groundwater data be assessed for trends, high and low concentrations, potential migration pathways, containment of plume(s), and other similar evaluations.

KNC Response: Chromium has not been detected in these wells above the Ground Water Protection Standard listed in the Part I Permit. Therefore, KNC did not believe that chromium levels in groundwater from these wells represented a threat to livestock. (KNC 2004; Attachment A). The conclusions of this memorandum are consistent with the

ecological risk data provided by the Agencies in KNC responses to comment No. 28A and 28B above.

Current concentrations can be used to represent future concentrations in groundwater assuming steady-state conditions (USEPA 1989).

The temporal and geographical variability in groundwater data is formally assessed for trends and high and low concentrations by KNC at least annually. For example, the 2004 Annual Ground Water Corrective Action Report (KNC, 2005) provides summary statistics, non-parametric tolerance tests, Sen's Slope/Mann Kendall Trend tests, box and whisker plots, and time series analysis of the groundwater monitoring data. These analyses show a generally equal number of wells with increasing and decreasing nitrate plus nitrite trends, and a general decrease in the number of wells with elevated chromium levels. The temporal and geographical variability will continue to be evaluated using these and possible other statistical analyses. Temporal and geographical variability necessitates all groundwater data be assessed for trends, high and low concentrations, potential migration pathways, and other similar evaluations.

Comment 48: Page 5-10. Section 5.6.1 Risk Assessment Data Evaluation: This section discusses "identification of background data." How is "background data" going to be determined? What criteria are going to be used? Is KNC using EPA's guidance on collection of background data? Please add additional detail to this section.

KNC Response: At this time, KNC is not proposing to perform background sampling and analysis. As discussed in Section 6.5.2 of the revised RFI Work Plan, if background sampling is proposed, KNC will submit a work plan to EPA and KDHE that identifies the proposed sampling locations, sample number, and proposed analysis prior to performing a background study.

Comment 49: Page 5-11. Section 5.6.2 Approach and Organization, first sentence: This sentence states, "The overall approach for the risk assessment is to determine if COPCs, released at the Facility, pose potential threats to human health..." KNC also needs to consider the effects on the environment. Please add "and the environment" after "human health" in the first sentence, so the sentence reads "The overall approach for the risk assessment is to determine if COPCs, released at the Facility, pose potential threats to human health and the environment..."

KNC Response: KNC will also consider the effects on the environment. KNC will delineate to human health PRGs and assume that those levels are also protective of the environment. There are no environmental receptors on the facility, so off-site environmental receptors will be assessed based on the results of the site delineation.

Based on the known distribution of site-related constituents, on-site receptors would consist of workers potentially exposed to soil. Off-site receptors would consist of humans using groundwater for mainly non-potable purposes (e.g., washing cars, watering

lawns and gardens, etc.) and livestock, as identified by the EPA in Comment 28B. KNC proposes to use the risk factors provided by the EPA in comment 28B to address livestock exposures as part of the risk assessment process. Because the site is an active industrial facility, we do not believe that viable habitat is present within the facility boundary for ecological receptors.

The only known on-site exposure media is soil and the only known off-site exposure media is groundwater. On-site receptors would consist of site workers and off-site receptors would consist of humans using the groundwater for non-potable purposes or for watering livestock. Because the site is an active industrial facility, viable habitat for ecological receptors is not present within the facility boundary. If soil containing site constituents is delineated to areas off-site, the conceptual model will be revised and other relevant receptors, as applicable, will be identified.

Comment 50: Page 5-12. Section 5.6.2.1 Data Compilation And Constituents of Potential Concern Selection. second paragraph, second sentence: The sentence states, "Any non-background constituent with at least one sample detection above...Please change the sentence to read, "Any non-background constituent with at least one sample detection at or above..."

KNC Response: At this time, KNC is not proposing to perform background sampling and analysis.

Comment 51A: Page 5-12. Section 5.6.2.2 Exposure Assessment, second paragraph, first sentence and third paragraph: The first sentence of paragraph two focuses on human exposure. KNC also needs to focus on the environment. Please change the first sentence in the second paragraph to read, "The salient features of the Facility and the surrounding area that might influence human exposure and the environment will be described, and..."

KNC Response: KNC will also consider the effects on the environment. KNC will delineate to human health PRGs and assume that those levels are also protective of the environment. There are no environmental receptors on the facility, so off-site environmental receptors will be important based on the results of the site delineation. KNC agrees with EPA statements regarding completion of delineation activities prior to performing a risk assessment. KNC proposes to provide the EPA with a Risk Assessment Work Plan following approval of the revised RFI Work Plan. The Risk Assessment Work Plan will provide a detailed description of exposure scenarios; pathways, points, and media; models proposed to characterize risk; model inputs as they relate to site-specific risk characterization; and proposed toxicity values. Concurrently, KNC requests that discussions of risk assessment be placed on a separate submittal and review path such that the delineation program provided in the revised RFI Work Plan can commence without delay.

Comment 51B: In addition, paragraph three discusses the exposure patterns and potential pathways of human exposure identified in the conceptual site model will be documented in the risk assessment. Again KNC needs to also focus on the environment.

KNC Response: KNC will also consider the effects on the environment. KNC will delineate to human health PRGs and assume that those levels are also protective of the environment. There are no environmental receptors on the facility, so off-site environmental receptors will be important based on the results of the site delineation.

As discussed in comment 49, the only known on-site exposure media is soil and the only off-site exposure media is groundwater. On-site receptors would consist of site workers and off-site receptors would consist of humans using the groundwater for non-potable purposes or for watering livestock. Because the site is an active industrial facility, viable habitat for ecological receptors is not present within the facility boundary. If soil containing site constituents is delineated to areas off-site, the conceptual model will be revised and other relevant receptors, as applicable, will be identified.

Comment 52A: Page 5-16. Section 5.7.6 Risk Assessment, second paragraph: Reference is made in this paragraph to EPCs. Please define the term.

KNC Response: EPC refers to exposure point concentrations.

Comment 52B: Also, reference is made to "Facility-specific PRGs." Facility-specific PRGs have not been determined.

KNC Response: The proposed soil and groundwater delineation program described in Section 5.2 (soil) and 5.3.2 (groundwater) of the draft RFI Work Plan and retained in Section 6.0 of the revised RFI Work Plan consists of delineating soil constituents to applicable industrial (for on-site soil) and residential (for off-site soil) default PRGs published by EPA Region XI. Groundwater data will be initially comparing to the Ground Water Protection Standard (i.e., the maximum contaminant level in the list of Region IX PRGs). If no Ground Water Protection Standard exists, the Region IX tap water PRG will be used to evaluate the data. The PRGs for non-carcinogens will be multiplied by a factor of 0.1 to account for potential additive effects.

KNC will prepare a Risk Assessment Work Plan that describes the proposed approach for determining facility-specific PRGs under separate cover upon approval of the RFI Work Plan.

RISK ASSESSMENT COMMENTS

GENERAL COMMENTS

Comment 1: Several exposure pathways are eliminated in the work plan due to actions and controls in place to mitigate exposures (i.e., bottled water, excavation

and trenching procedures, personal protective equipment, etc.). Note, Risk Assessment Guidance for Superfund Volume 1 Human Health Evaluation Manual (Part A) (RAGS Part A) states that a baseline risk assessment is an analysis of the potential adverse health effects under the assumption of no action. Actions and controls to mitigate exposures, such as the ones presented above, should not be used to eliminate potential exposure pathways.

KNC Response: All applicable exposure pathways will be addressed in the Risk Assessment. An exposure pathway will be considered applicable if it meets the four elements by the EPA (1989), and outlined below:

- a source and mechanism of constituent release to the environment;
- an environmental transport medium (e.g., air, groundwater) for a released constituent;
- a point of potential contact with the impacted medium; and
- an exposure route (e.g., ingestion, inhalation, dermal contact) at the contact point.

Based on the media known to be impacted at the site, on-site exposure will include an industrial exposure scenario and a construction/utility worker scenario for soil. Off-site exposure will include residential and agricultural exposure scenarios for groundwater. Groundwater risks will include an ingestion scenario. If the results of the RFI indicate that other media and/or constituents provide additional exposure pathways, these exposure pathways will also be evaluated.

Comment 2: It is not clear whether the risk assessment will address potential future exposure pathways. For consistency with RAGS, the risk assessment should address potential future exposure pathways.

KNC Response: KNC has agreed with earlier EPA statements regarding completion of delineation activities prior to performing a risk assessment. It should however be noted that the current industrial land use of the KNC property is not expected to change in the future and thus on-site exposure pathways evaluated as part of the risk assessment will address only industrial exposure scenarios. The adjacent property consists of farmland with associated residences, with some industrial activity. Though not under KNC control, it is not anticipated that land use on adjacent properties will vary from current activities. Potential future exposure pathways for relevant media in off-site areas, as applicable, will be identified in the Risk Assessment Work Plan.

Comment 3: Tables 5-6 through 5-9, which contain information on exposure pathways, receptors, exposure intake parameters, cannot be located in the RFI Work Plan. EPA recommends that KNC provide this information to EPA prior to the submittal of the risk assessment.

KNC Response: During document production for the draft RFI Work Plan, Tables 5-6 through 5-9 were inadvertently left out and were not submitted. A copy of these tables is included as Attachment B.

Detailed exposure parameters and pathways will be included as part of the Risk Assessment Work Plan that will be submitted to the Agency following approval of the RFI Work Plan and prior to performance of any risk assessment activities.

Comment 4: The work plan states that portions of the property were used by local farmers in the past. EPA recommends that KNC consider a farmer exposure scenario in the risk assessment.

KNC Response: The Risk Assessment Work Plan will provide an approach for estimating risk to an agricultural worker for off-site properties. This pathway will include incidental ingestion, dermal contact, and inhalation of irrigation water. As stated in the response to comment 2 above, KNC does not view the farmer exposure scenario as applicable for a future on-site use as the property will remain in industrial use.

RISK ASSESSMENT SPECIFIC COMMENTS

Comment 1A: Page 3-6. Section 3.5.1.1. Paragraph I: This section states "... maintenance activities typically do not entail frequent direct contact with surface soil. Thus, current worker exposure to surface soils is limited to occasional pedestrian-type exposures." Based on this passage and other information, it is not clear whether the maintenance worker is being evaluated separately or under an occasional pedestrian-type exposure. However, it is Region 7's opinion that a maintenance worker exposure is not the same as a pedestrian-type exposure. Therefore, the risk assessment should address a maintenance worker scenario.

KNC Response: Potential exposures to constituents in soil during routine maintenance activities would be addressed by the occasional pedestrian-type exposures. Most of the maintenance activities conducted at the facility are related to aboveground equipment and the potential exposure to constituents in the soil is expected to be minimal. Excavation or trenching activities (currently prohibited without personal protective equipment) could expose workers to constituents in surface and subsurface soil. On-site screening will be done using a default industrial exposure scenario, which is more conservative than the exposure scenarios for maintenance workers or pedestrians. The evaluation on this pathway will be provided in the Risk Assessment Work that KNC will submit to the Agencies upon approval of the RFI Work Plan.

Comment 1B: As for the occasional pedestrian-type exposure, it should be addressed under an indoor worker exposure scenario. While direct contact with contaminated surface soil may be limited under current site conditions, indoor workers could potentially be exposed to soils tracked in from the outside. As presented in the December 2002 Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites, indoor workers have no direct contact with

outdoor soils, but may be exposed to contaminants through ingestion of contaminated soils that have been incorporated into indoor dust.

KNC Response: KNC is aware that indoor workers could be exposed to constituents in soil tracked from the outside. The evaluation on this pathway will be provided in the Risk Assessment Work that KNC will submit to the Agencies upon approval of the RFI Work Plan.

Comment 1C: In addition to evaluating current exposures pathways, the risk assessment should also consider changes in future land use. Unless there is strong evidence to the contrary, the risk assessment should consider a future outdoor worker exposure scenario.

KNC Response: A change in land use under the Ford County Zoning Bylaw would require public notice and the approval of Ford County. The evaluation on this pathway will be provided in the Risk Assessment Work that KNC will submit to the Agencies upon approval of the RFI Work Plan.

Comment 2: Page 3-6. Section 3.5.1,2. Paragraph 1: This paragraph states that the construction worker exposure pathway is incomplete because workers will be wearing appropriate personal protective equipment (PPE) and that the "Facility enforces an excavation and trenching procedure to prevent worker from being exposed to constituents in subsurface soil." While these steps may minimize worker exposure to subsurface contaminants, they are not valid reasons to eliminate the potential future construction worker exposure pathway (See Risk Assessment General Comment #1). There is the potential that procedures set in place by the Facility may not be followed, especially if land use or ownership changes. Also, PPE may minimize, but does not necessarily prevent direct exposure with contaminated media. The risk assessment should address potential exposures to subsurface soil (i.e., construction/utility worker) assuming a reasonable maximum exposure (RME).

KNC Response: The evaluation of future construction/utility workers exposed to constituents in subsurface soil will be provided in the Risk Assessment Work that KNC will submit to the Agencies upon approval of the RFI Work Plan.

Comment 3: Page 3-7, Section 3.5.2.1: Although residences have been or are in the process of being connected to public water, this is not sufficient reason to exclude the potable water use pathway (See Risk Assessment General Comment #1). The risk assessment should address the potential future potable water use pathway.

KNC Response: The evaluation of future potable groundwater use will be provided in the Risk Assessment Work that KNC will submit to the Agencies upon approval of the RFI Work Plan.

Comment 4: Page 3-7. Section 3.5.2.2. Paragraph 1: It is recommended that KNC provide EPA information on the exposure routes and models that will be used to estimate exposure point concentrations for the Lawn and Garden Watering exposure pathways. EPA also recommends addressing other uses, such as filling small swimming pools and car washing.

KNC Response: The evaluation on these pathways will be provided in the Risk Assessment Work that KNC will submit to the Agencies upon approval of the RFI Work Plan.

Comment 5: Page 3-8, Section 3.3.3: The vapor intrusion pathway should be evaluated using the Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway From Groundwater and Soils (Subsurface Vapor Intrusion Guidance), dated November 2002.

KNC Response: The vapor intrusion pathway will be evaluated for on-site workers if the characterization determines that VOCs exist or may exist beneath buildings that are routinely occupied. Details will be provided in the Risk Assessment Work that KNC will submit to the Agencies upon approval of the RFI Work Plan.

Comment 6: Page 5-10. Section 5.6.1. Paragraph 3: This paragraph states that inorganics will be compared to background values to determine which constituents will be retained as COPCs. However, no discussion is provided on how background concentrations will be quantified. KNC should provide EPA the methods by which background concentrations of inorganic will be quantified. Characterization and evaluation of background constituents should be consistent with the documents entitled Guidance for Characterizing Background Chemicals in Soil at Superfund Sites, OSWER 9285.7-41, dated June 2001, and Role of Background in the CERCLA Cleanup Program, OSWER 9285.6-07P, dated April 2002.

KNC Response: At this time, KNC is not proposing to perform background sampling and analysis. As discussed in Section 6.5 of the revised RFI Work Plan, if background sampling is proposed, KNC will submit a work plan to EPA and KDHE that identifies the proposed sampling locations, sample number, and proposed analysis prior to performing a background study. The text of the RFI Work Plan has been revised.

Comment 7: Page 5-12. Section 5.6.2.1: This section states that all non-background detected constituents will be compared to EPA Region 9 Preliminary Remediation Goals (PRGs). Note, Region 9 PRGs for non-cancer health effects are set at a hazard quotient of 1.0, Non-carcinogenic compounds should be screened at a hazard quotient of 0.1 in order to account for the potential additivity of non-cancer health effects.

KNC Response: Comment noted. Non-carcinogenic constituents will be screened using a hazard quotient of 0.1 to account for potential additivity.

Comment 8: Page 5-13, Section 5.6.2.3, Paragraph 3: EPA's current human health toxicity value hierarchy per OSWER Directive 9285.7-53, dated December 5, 2003, is as follows:

- * Tier 1- EPA's IRIS
- * Tier 2- EPA's Provisional Peer Reviewed Toxicity Values (PPRTVs) - The Office of Research and Development National Center for Environmental Assessment/Superfund Health Risk Technical Support Center (STSC) develops PPRTVs on a chemical specific basis when requested by EPA's Superfund program.
- * Tier 3- Other Toxicity Values - Tier 3 includes additional EPA and non-EPA sources of toxicity information. Priority should be given to those sources of information that are the most current, the basis for which is transparent and publicly available, and which have been peer reviewed.

This directive can be found at
<http://www.epa.gov/superfund/programs/risk/hhmemo.pdf>.

KNC Response: Comment noted.

Comment 9: Page 5-13, Section 5.6.2.4. Paragraph 1: This section states that PRGs will be developed with a target cancer risk level of 1×10^{-5} . Carcinogenic PRGs should be developed with a target cancer risk level of 1×10^{-6} , EPA's point of departure, for carcinogenic compounds, unless sufficient justification can be provided for an alternative risk level.

KNC Response: Comment noted. Carcinogenic constituents will be screened using a target cancer risk level of 1×10^{-6} .

References

Kansas Department of Health and Environmental (KDHE). 2003. Risk-Based Standards for Kansas, RSK Manual – 3rd Version; dated March 1.

Koch Nitrogen Company (KNC). 2004. Technical Memorandum: Livestock Watering Pathway Evaluation, Dodge City, Kansas Nitrogen Plant.

Koch Nitrogen Company (KNC). 2005. 2004 Annual Ground Water Corrective Action Report; dated April 28.

U.S. Environmental Protection Agency (USEPA). 1989. Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation manual (Part A), Interim Final, Publ. No. EPA/540/1-89/002; dated December.

U.S. Environmental Protection Agency (USEPA). 1992. Supplemental Guidance to RAGS: calculating the Concentration term, Volume I. Number 1; Publ. No. NTIS PE92-963373.

U.S. Environmental Protection Agency (USEPA). 1996. Soil Screening Guidance: User's Guide, Second Edition; Publ. No. 9355.4-23; dated July.

Waite, Herbert A. 1942. Geology and Ground-water Resources of Ford County, Kansas. Kansas Geological Survey Bulletin 43.

Zeller, Doris E. 1968. The Stratigraphic Succession in Kansas. State Geological Survey of Kansas Bulletin 189.

Weis, W. A. 2001. Current Condition Report; dated April 16.

Attachments

- A - Technical Memorandum: Livestock Watering Pathway Evaluation, Dodge City, Kansas Nitrogen Plant.(2004). (KNC response to comment 28A.)
- B - Risk tables 5-6 through 5-9 from October 2004 draft RFI Work Plan. (KNC response to comment Risk 3.)

Attachment A
2004 Technical Memorandum: Livestock Watering Pathway Evaluation
Koch Nitrogen Company
Dodge City, Kansas
EPA ID No. KSD044625010
August 1, 2005

TECHNICAL MEMORANDUM
Livestock Watering Pathway Evaluation
Dodge City, Kansas Nitrogen Plant

Shaw Environmental, Inc. Project 110848.01

2004

Prepared for:

 **KOCH**

KOCH NITROGEN COMPANY

Prepared by:


Shaw® Shaw Environmental, Inc.

Shaw Environmental, Inc.
1285 Rudy Street
Onalaska, Wisconsin 54650

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1.0 Introduction

The conceptual site model evaluation of the Facility, as presented in the October 2004 Draft RFI Work Plan, identified the watering of livestock as a potentially complete exposure pathway. Further evaluation of this pathway based on available livestock-specific constituent toxicity information and Facility groundwater data is presented in this memo. Nitrate was the only constituent of potential concern detected in water samples from wells used for livestock watering.

2.0 Nitrate Toxicity Assessment

Mature livestock can tolerate higher concentrations of nitrate in their water supply than can young livestock. In the case of calves, however, much of their fluid is derived from nursing and very little nitrate is secreted in milk. Nitrate toxicity from water is more likely to occur when livestock drink water from ponds, road ditches, or other surface impressions that collect drainage from feedlots, heavily fertilized fields, silos, septic tanks or manure disposal lagoons. Nitrate in livestock feed is a more common exposure pathway, however when evaluating possible toxic situations, it is recommended that both the feed and water be considered because they are additive (Rasby, et al., 1988).

Nitrate concentration guidelines indicate that water containing less than 100 mg/L $\text{NO}_3\text{-N}$ should not harm livestock. Nitrate concentrations between 100 and 300 mg/L $\text{NO}_3\text{-N}$ in drinking water should not harm livestock by itself, but may cause problems when combined with feeds containing nitrates. The cause for concern increases with higher concentrations and during periods of drought when forage plants tend to take up more nitrates. Water concentrations greater than 300 mg/L $\text{NO}_3\text{-N}$ could cause typical nitrate poisoning (Peterson, 1999).

3.0 Groundwater Exposure Assessment

Two wells (TW-12 and TW-79) near the Facility provide water for livestock watering. Well TW-12 has not been sampled recently however TW-11 is nearby. Groundwater sample data from TW-11 and TW-79 two wells indicate the presence of nitrates (Table 1). Nitrate plus nitrite concentrations in water samples collected in 2004 from these two wells range from 2.90 to 18.7 mg/L $\text{NO}_3\text{+NO}_2$ (as N). Since these concentrations are significantly less than the nitrate guideline of 100 mg/L $\text{NO}_3\text{-N}$, there is no risk at this time for nitrate toxicity to livestock.

4.0 References

Peterson, H.G. 1999. Livestock and Water Quality. Agriculture and Agri-Food Canada-Prairie Farm Rehabilitation Administration.

Rasby, Rick, Rick Stock, Bruce Anderson, and Norm Schneider. 1988. Nitrates in Livestock Feeding. Cooperative Extension, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln. Lincoln, Nebraska.

Table

Table 1. Nitrate + Nitrite Concentrations in Groundwater Samples.
Koch Nitrogen Company. Dodge City, Kansas.

Sample Date	Nitrate + Nitrite as N mg/L	
	TW-11	TW-79
1/27/2004	2.90	17.0
4/16/2004	3.26	18.7
7/21/2004	3.79	14.1
7/21/2004 Duplicate	3.78	
10/27/2004	4.14	12.4

Attachment B
Risk Tables 5-6 through 5-9
Koch Nitrogen Company
Dodge City, Kansas
EPA ID No. KSD044625010
August 1, 2005

TABLE 5-6
SELECTION OF EXPOSURE PATHWAYS
 Koch Nitrogen Company
 Dodge City Nitrogen Facility
 Dodge City, Kansas

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Exposure Areas	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway	Corresponding Exposure Assumption Table	
Current	Groundwater	Groundwater	Off-site Well	Resident	Adult/ Child	Ingestion	Off-Site	Quant	Residents near the Facility have private wells that may be used for lawn and garden watering	Tables 5-7 & 5-8	
						Dermal Absorption	Off-Site	Quant			
						Inhalation	Off-Site	Quant			
			Livestock water tank	Livestock			Ingestion	Off-Site	Qual	Groundwater from selected wells used to water livestock	Tables 5-7 & 5-8
	Surface Soil	Surface Soil	Surface Soil	Worker	Adult	Ingestion	On-Site	Quant	Workers with limited surface soil exposures during regular operations.	Table 5-9	
						Dermal Absorption	On-Site	Quant			
						Inhalation	On-Site	Quant			
	Subsurface Soil	Groundwater	Off-site irrigation wells	Residents	Adult/ Child	Ingestion	Off-Site	Quant	Potential for leaching to groundwater will be determined	Tables 5-7 & 5-8	
						Dermal Absorption	Off-Site	Quant			
Inhalation						Off-Site	Quant				

TABLE 5-7
VALUES USED FOR DAILY INTAKE CALCULATIONS

Koch Nitrogen Company
Dodge City Nitrogen Facility
Dodge City, Kansas

Scenario Timeframe:	Current
Medium:	Groundwater
Exposure Medium:	Groundwater
Exposure Point:	Residential Off-Site Irrigation Well
Receptor Population:	Resident
Receptor Age:	Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/
Ingestion	IR-GW	Ingestion Rate of Groundwater	L/day	0.005	10% of Swimming, EPA, 1989	---	---	Ingestion Intake Term (kg*day/L) = $\frac{BW*AT}{IR-GW*EF*ED}$
	EF	Exposure Frequency	days/year	180	Professional Judgement	---	---	
	ED	Exposure Duration	years	24	USEPA, 1997	---	---	
	BW	Body Weight	kg	70	USEPA, 2001a	---	---	
	AT-C	Averaging Time (Cancer)	days	25550	USEPA, 2001a	---	---	
	AT-N	Averaging Time (Non-Cancer)	days	8760	Based on ED	---	---	
Dermal	Daevent - term	Absorption rate per event	mg*cm/event	Calculated	USEPA, 2001a	---	---	Dermal Absorption Term (kg*day/cm ³) $\frac{BW*AT}{Daevent-term \times EV \times ED \times EF \times SA}$
	SA	Skin Surface Available for Contact	cm ²	5700	USEPA, 2001a	---	---	
	EV	Event Frequency	events/day	1	---	---	---	
	EF	Exposure Frequency	days/year	180	Professional Judgement	---	---	
	ED	Exposure Duration	years	24	USEPA, 1997	---	---	
	BW	Body Weight	kg	70	USEPA, 2001a	---	---	
	AT-C	Averaging Time (Cancer)	days	25550	USEPA, 2001a	---	---	
	AT-N	Averaging Time (Non-Cancer)	days	8760	Based on ED	---	---	
Inhalation (Outdoors)	WACF	Water to Air Conversion Factor	L/m ³	Calculated	USEPA SCREEN 3 Model	---	---	Inhalation Intake Term (kg*day/L) = $\frac{BW*AT}{WACF*INR-GW*EF*FI*ED}$
	INR-GW	Inhalation Rate	m ³ /day	20	USEPA, 2001b	---	---	
	FI	Fraction Inhalation at Exposure Point	days/days	0.083	2 hrs per day	---	---	
	EF	Exposure Frequency	days/year	180	Professional Judgement	---	---	
	ED	Exposure Duration	years	24	USEPA, 1997	---	---	
	BW	Body Weight	kg	70	USEPA, 2001a	---	---	
	AT-C	Averaging Time (Cancer)	days	25550	USEPA, 2001a	---	---	
	AT-N	Averaging Time (Non-Cancer)	days	8760	Based on ED	---	---	

Sources:

USEPA, 1989: Risk Assessment Guidance for Superfund. Vol.1 Human Health Evaluation Manual, Part A. OERR. EPA/540/1-89/002.

USEPA, 1997: Exposure Factors Handbook. EPA/600/P-95/002Fa.

USEPA, 2001a. Risk Assessment Guidance for Superfund. Volume 1: Human Health Evaluation Manual. Supplemental Guidance. Dermal Risk Assessment.

USEPA, 2001b. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24

TABLE 6-8
VALUES USED FOR DAILY INTAKE CALCULATIONS

Koch Nitrogen Company
Dodge City Nitrogen Facility
Dodge City, Kansas

Scenario Timeframe:	Current
Medium:	Groundwater
Exposure Medium:	Groundwater
Exposure Point:	Residential Off-Site Irrigation Well
Receptor Population:	Resident
Receptor Age:	Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation
Ingestion	IR-GW	Ingestion Rate of Groundwater	L/day	0.005	10% of Swimming, EPA, 1989	---	---	Ingestion Intake Term (kg*day/L) = $\frac{BW*AT}{IR-GW*EF*ED}$
	EF	Exposure Frequency	days/year	180	Professional Judgement	---	---	
	ED	Exposure Duration	years	6	USEPA, 2001b	---	---	
	BW	Body Weight	kg	15	USEPA, 2001b	---	---	
	AT-N	Averaging Time (Non-Cancer)	days	2190	Based on ED	---	---	
Dermal	Daevent - term	Absorption rate per event	mg*cm/event		USEPA, 2001a	---	---	Dermal Absorption Term (kg*day/cm ³) $\frac{BW*AT}{Daevent-term \times EV \times ED \times EF \times SA}$
	SA	Skin Surface Available for Contact	cm ²	2800	USEPA, 2001a	---	---	
	EV	Event Frequency	events/day	1	USEPA, 2001	---	---	
	EF	Exposure Frequency	days/year	180	Professional Judgement	---	---	
	ED	Exposure Duration	years	6	USEPA, 2001b	---	---	
	AT-N	Averaging Time (Non-Cancer)	days	2190	Based on ED	---	---	
Inhalation (Outdoors)	WACF	Water to Air Conversion Factor	L/m ³	2190	USEPA SCREEN 3 Model	---	---	Inhalation Intake Term (kg*day/L) = $\frac{BW*AT}{WACF*INR-GW*EF*FI*ED}$
	INR-GW	Inhalation Rate	m ³ /day	10	USEPA, 2001b & KDHE, 2003	---	---	
	FI	Fraction Inhaled at Exposure Point		0.083	2 hrs per day	---	---	
	EF	Exposure Frequency	days/year	180	Professional Judgement	---	---	
	ED	Exposure Duration	years	6	USEPA, 2001b	---	---	
	AT-N	Averaging Time (Non-Cancer)	days	2190	Based on ED	---	---	

Sources:

- USEPA, 2001: Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual. Supplemental Guidance. Dermal Risk Assessment.
- USEPA, 2001a. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual. Supplemental Guidance. Dermal Risk Assessment.
- USEPA, 2001b. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24

TABLE 5-9
VALUES USED FOR DAILY INTAKE CALCULATIONS

Koch Nitrogen Company
Dodge City Nitrogen Facility
Dodge City, Kansas

Scenario Timeframe:	Current
Medium:	Surface Soil
Exposure Medium:	Surface Soil
Exposure Point:	Contact with Surface Soil
Receptor Population:	Worker
Receptor Age:	Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Ingestion	IR-S	Ingestion Rate	mg/day	100	USEPA, 2001b			Ingestion Intake Term (kg*day/kg) = $\frac{BW*AT}{IR-S*CF*ED*EF*FI}$
	CF	Conversion Factor	kg/mg	1.0E-06	-			
	FI	Fraction Ingested	unitless	TBD	Site Specific			
	EF	Exposure Frequency	days/year	TBD	Site Specific			
	ED	Exposure Duration	years	TBD	Site Specific			
	BW	Body Weight	kg	70	USEPA, 1997			
	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1991			
	AT-N	Averaging Time (Non-Cancer)	days	TBD	Based on ED			
Dermal	CF	Conversion Factor	kg/mg	1.0E-06	-			Dermal Absorption Term (kg*day/kg) = $\frac{BW*AT}{SSAF*DABS*SA*CF*ED*EF}$
	SA	Skin Surface Available for Contact ¹	cm ²	2,733	USEPA, 2001a			
	SSAF	Soil to Skin Adherence Factor	mg/cm ² /event	0.2	USEPA, 2001a			
	DABS	Absorption Factor	unitless	Chemical Specific	USEPA, 2001a			
	EF	Exposure Frequency	days/year	TBD	Site Specific			
	ED	Exposure Duration	years	TBD	Site Specific			
	BW	Body Weight	kg	70	USEPA, 1997			
	AT-C	Averaging Time (Cancer)	days	25,550	USEPA, 1991			
	AT-N	Averaging Time (Non-Cancer)	days	TBD	Based on ED			
	Inhalation	SACF	Soil to Air Conversion Factor	kg/m ³	Calculated	USEPA, 2001b		
IR		Inhalation Rate	m ³ /day	20	USEPA, 2001b			
FI		Fraction Ingested	unitless	TBD	Site Specific			
EF		Exposure Frequency	days/year	TBD	Site Specific			
ED		Exposure Duration	years	TBD	Site Specific			
BW		Body Weight	kg	70	USEPA, 1997			
AT-C		Averaging Time (Cancer)	days	25,550	USEPA, 1997			
AT-N		Averaging Time (Non-Cancer)	days	TBD	Based on ED			

Notes:

1 - Assumes face, forearms, and hands are exposed.

Sources:

USEPA, 1997: I USEPA, 19; USEPA, 1997: Exposure Factors Handbook. EP. USEPA, 1997: Exp; USEPA, 1997: Expos; USEPA, 1997: Exp; USEPA, 1997: Expo; USEPA, 1997: Expos USEPA, 1997: Exposure Factors Handbook USE
USEPA, 1991: Risk Assessment Guidance for Superfund - Supplemental Guidance- Standard Default Exposure Factors Interim Final.
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USEPA, 2001b. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24