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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 7
901 NORTH 5TH STREET
KANSAS CITY, KANSAS 66101

APR 0 2 2010

CERTIFIED MAIL
RETURN RECEIPT REQUESTED
Article Number: 7006 2760 0000 8647 5091

Mr. Gary J. LeRock
Plant Manager
Koch Nitrogen Company, LLC
P.O. Box 1337
Dodge City, Kansas 67801-1337

RE: Koch Nitrogen Company's (KNC's) Phase II Work Plan Addendum: Groundwater Characterization and the U.S. Environmental Protection Agency (EPA) Region 7 Responses to KNC's June 12, 2009, responses to EPA's comments dated April 2, 2009.
Koch Nitrogen Company, LLC
Dodge City, KS
EPA RCRA ID No. KSD044625010

Dear Mr. LeRock:

The U.S. Environmental Protection Agency (EPA) Region 7 is in receipt of the Phase II Work Plan Addendum: Groundwater Characterization (Groundwater Characterization Addendum). The EPA has reviewed this document and is offering the enclosed comments.

Please note: This is Koch Nitrogen Company's (KNC's) *one* opportunity to revise this document in an approvable form. Failure to submit an approvable Groundwater Characterization Addendum will result in the EPA modifying and/or drafting the Groundwater Characterization Addendum. The EPA modified/drafted document *will be* the approved Groundwater Characterization Addendum as specified in the Part II Permit Condition C.14.c.

Please revise the Groundwater Characterization Addendum and resubmit no later than thirty (30) calendar days from certified receipt of this letter. Please respond to each comment in writing and include with the Revised Groundwater Characterization Addendum submittal.

RECYCLE
PAPER CONTAINS RECYCLED FIBERS

If you have any questions regarding this letter or wish to discuss, please call me at 1-800-223-0425 ext. 7662 or direct at (913) 551-7662.

Sincerely,

Andrea R. Stone

Andrea R. Stone
Environmental Scientist
Air and Waste Management Division
RCRA Corrective Action & Permits Branch

Enclosure (1)

cc: Everett Spellman, KDHE (w/encl)
Elise Stucky-Gregg, KNC-Dodge Office (w/encl)

ENCLOSURE

Specific Comments on the Groundwater Characterization Addendum:

1. Section 1.13 Hydrogeology, Page 2, Last Paragraph, Third Sentence: This sentence states, "The VOCs are associated with the production facilities in the north central portion of the site. Please provide additional details on the VOCs in the production facilities with your response, and modify this paragraph accordingly.

2. Section 2.0, Scope of Work, Page 5, Third Paragraph, Last Sentence: In this sentence it discusses the field decision criteria that will be used to evaluate where the well screens will be placed and references a Section 3.1.3. There is no section 3.1.3. Please correct.

3. Section 3.1, Approach, Page 7, Second Paragraph, Second Sentence: This sentence states, "As the data are analyzed and additional access agreements finalized, KNC will continue with the drilling and installation of subsequent clusters." Please provide a status on the finalization of the access agreements, and modify this sentence, accordingly.

4. Section 3.3.1, Monitoring Well Construction, Page 11, First Paragraph, Second Sentence: In this sentence, it discusses filling the borehole with bentonite chips/pellets "to within approximately 3 feet of the base of the well screen." Does this mean there will be a "gap" between the bentonite and the base of the well screen? Please explain and provide additional detail to this section.

Geologist Comments on the Groundwater Characterization Addendum:

1. Page 5, Section 2.0, 2nd Paragraph: The work plan states that the shallow and deep monitoring wells for each cluster will be located within ten (10) feet of each other, and that this could result in grout infiltration from one well affecting the water quality of the other well.

   There will likely not be a problem with grout migrating laterally affecting the water quality of a neighboring cluster well, based on observation of the lithology of the subsurface materials. In order to help ensure there is not a problem with grout contamination, the specification that the two wells in a cluster should be within ten (10) feet of each other should be changed to read that the two wells should be located within a range of 10-15 feet of each other. By specifying a minimum distance of ten feet the problem of lateral grout migration will be alleviated. Please revise.

2. Page 5, Section 2.0, 2nd Paragraph: The work plan states that cement grout infiltrating a permeable zone of an adjacent well can impact the water quality by lowering the pH of the groundwater. Typically cement and cement-bentonite grout contamination, such as occurs when the well seal is improperly installed, results in an *increase* of the pH of the groundwater due to the alkalinity of the grout. Please revise accordingly.

3. Pages 7-9, Section 3.1.1 - General Comment: This section of the work plan presents a methodology for the installation of the monitoring wells, with emphasis on the placement of the well screens in the two (2) wells comprising each well cluster as recommended by the EPA in a letter to KNC dated April 2, 2009. The purpose of these well clusters, as explained in the April 2, 2009 letter (see Geologist Comment #2 on pages 4-6 of the enclosure included with the April 2, 2009 letter), is to provide a more thorough characterization of the horizontal and vertical extent and distribution of groundwater contamination, and to also provide a better understanding of three-dimensional groundwater flow within the area of groundwater contamination. The EPA believes this information is essential for designing and operating an effective and efficient groundwater remediation system.

   In reviewing Section 3.1.1, the EPA is concerned that the methodology for locating the well screens as proposed will be very difficult and impractical to apply under field conditions. The EPA would like to clarify that its recommendation for the installation of these well clusters is based on the need for an accurate characterization of contaminant distribution and groundwater flow in three dimensions within the saturated portion of the unconsolidated Ogallala Formation, which is the interval bounded by the surface of the water table and the top of the Graneros Shale. The thickness of this saturated interval averages approximately fifty (50) feet in the vicinity of the facility, and this is why the use of two-well clusters was recommended. Also, the EPA believes that this entire unconsolidated saturated interval is interconnected, although there may be areally discontinuous zones of variable permeability within the sequence. The EPA does not anticipate the use of these monitoring well clusters as recovery wells in the future, thus the ability of the wells to produce water is not a crucial factor. The purpose of the well clusters is to provide contaminant concentration data along with groundwater potentiometric data in the shallow and deeper portions of the unconsolidated aquifer. Please revise this methodology in accordance with the following specific comments.

4. Section 3.1.1, Page 8, 2nd Paragraph: The work plan states that it is difficult to determine the surface of the water table because of the operation of the many recovery wells (66) and that the water table surface estimate may be off by as much as ten (10) feet, since the water levels will have to be measured in the recovery wells themselves. The EPA agrees with this assessment of the difficulty in obtaining accurate water level measurements, which are important in locating the well screens of the shallow monitoring wells. This problem is well-illustrated in the groundwater surface contour maps which are included in the annual groundwater corrective action reports. The EPA believes the best solution to this problem would be to temporarily shut down all of the recovery wells. Immediately before the pumps are shut down, measurements of water levels should be made at selected non-pumping wells and recorded so that drawdown during pumping can be determined. After the pumps are shut down, water levels from key wells may then be measured in order to determine when recovery to static conditions has occurred. Once it has been determined that water levels have returned to static conditions, water levels can be obtained from the same set of wells from which water levels were obtained just prior to the shut down.

Two water surface elevation maps may then be produced from the pumping and non-pumping water levels, and these maps and water level data can be used to help determine the locations of the well screens in the shallow monitoring wells. KNC can then propose screened intervals for the shallow monitoring wells. KNC, KDHE, and EPA will need to get together and discuss the proposed shutdown of the recovery wells at some point prior to doing it, since it will require regulatory approval. Please revise accordingly.

5. Section 3.1.1, Page 8, 2nd Paragraph: The EPA agrees with KNC in that it can be difficult to distinguish the boundary between a basal clay that is adjacent to the top of a shale bedrock. The top of the Graneros Shale will need to be carefully determined at each deep monitoring well location. KNC's approach in going by the logs of previous borings located near where the deep monitoring well will be placed is a good one. The EPA recommends that the first few deep wells drilled should be ones located peripherally around the edges of the study area, then this information can be used to locate the top of the Graneros Shale for the remaining wells. Please revise accordingly.

6. Section 3.1.1, Page 8, 3rd Paragraph: The work plan states that if the well screens are not placed adjacent to units with good permeability it may not be possible to purge the wells sufficiently prior to sample collection due to inadequate recharge.

   The EPA would like to again emphasize that the purpose of these monitoring wells is to determine contaminant concentrations and provide water level data. If a well is slow to recharge, it will be acceptable to purge the well to dryness, and then sample when recharge occurs. If samples are excessively turbid, both field-filtered and unfiltered samples can be collected to help determine the mobile fraction since the purpose is to determine the gross distribution of contamination throughout the plume and not to assess risk. For the purpose of collecting potentiometric data, once the water level has equilibrated over sufficient time, the water level data will be valid. Thus it is not essential that the monitoring wells are capable of producing significant amounts of water. Please revise accordingly.

7. Section 3.1.1, Pages 8 and 9, Bulleted Items:

   First Bullet: The EPA recommended cluster wells at two depths based on an average saturated thickness of approximately fifty (50) feet at the site. If the saturated thickness is less than thirty (30) feet at a location based on high quality samples of the aquifer material, the EPA would recommend the installation of a single monitoring well with a 10-foot screen. Please revise accordingly.

   Second Bullet: Based on the lithologic properties of the unconsolidated aquifer at the facility, the EPA believes it may be very difficult to make a field determination of what constitutes "sufficiently permeable". The EPA recommends installing the wells in a prescriptive manner; i.e. the top of the shallow well screen approximately 5 feet below the water table surface, and the bottom of the deep well screen at or within 5 feet of the top of the Graneros Shale. Please revise accordingly.

Third Bullet: The criteria that the permeable unit must be greater than 3 feet in length is likely to be difficult to discern under field conditions, again favoring a prescriptive approach to determining the screened intervals. Please revise accordingly.

Fourth Bullet: As stated previously, it is likely that making a call during drilling as to whether a subsurface sample is sufficiently permeable based on field inspection techniques would be very difficult. Please revise accordingly.

Fifth Bullet: The EPA believes it would be unproductive to install a shallow cluster well unless the base of the shallow well screen is a minimum of 15 feet above the top of the filter pack in the adjacent deep well. Please revise accordingly.

8. Page 9, Next to Last Paragraph of Section 3.1.1:

The EPA believes it would be very difficult to make these determinations in the field during drilling, such as estimating the percentage of sand content of samples in identifying what is considered to be permeable units. The EPA believes that following the relatively complex criteria outlined in this paragraph, based on the ability to make determinations of permeability based on visual inspection, would not be practical under field conditions. The EPA recommends that KNC install the monitoring well clusters in a prescriptive manner. Please revise accordingly.

9. Page 9, Last Paragraph of Section 3.1.1:

The EPA believes that previous subsurface investigations have not revealed the presence of clearly discernible, areally extensive units of low or high permeability at the site. While the EPA agrees with KNC's statement that, in general, the variability of natural subsurface materials does not allow a single well installation strategy to be applied to all field conditions, the EPA also believes that sufficient subsurface information has been gathered at this particular site to be able to result in a general characterization of the unconsolidated aquifer. The EPA believes the unconsolidated aquifer at this site consists of a heterogeneous material consisting of alternating layers of variable permeability and of variable thickness, but which, most importantly, are also interconnected. For this reason the EPA believes there is sufficient knowledge of the lithology of the unconsolidated aquifer at this particular site to enable installing the two-well clusters in the prescriptive manner previously discussed; i.e., the top of the shallow well screen approximately five feet below the surface of the water table, and the bottom of the deep well screen approximately five feet above the top of the shale bedrock. As stated previously, the EPA recommended the installation of the two-well clusters based on the thickness of the unconsolidated aquifer being approximately 50 feet, and in situations where it is *clearly* less than 30 feet thick based on logs of high quality samples, a single well with a 10-foot screen would be recommended. Please revise accordingly.

10. Page 10, Last Paragraph of Section 3.2:

The work plan states that vertical profiling (sampling) of groundwater during drilling was originally proposed in the sampling and analysis plan, and it was attempted during drilling and well installation in 2006. It is further stated that profiling (sampling) of groundwater could not be accomplished because there was not a continuous permeable zone of sufficient thickness at any of the well locations. This is another example of why the EPA believes the best approach is to install the monitoring well clusters in a prescriptive manner; i.e., the top of the shallow well screen approximately five feet below the surface of the water table, and the bottom of the deep well screen approximately five feet above the top of the shale bedrock. Please revise accordingly.

11. Page 10, Section 3.2.1, 1st Paragraph:

In discussing drilling methods, the work plan states that KNC will consider rotasonic, rotary, and air percussion hammer drilling because these methods are commonly used to install monitoring wells because they are more time efficient and because rigs and crews are more readily available.

The EPA believes that much better site characterization would result from placing the emphasis on obtaining high-quality subsurface samples that are carefully examined and logged to a precision of 0.1-foot. Please revise accordingly.

12. Page 10, Section 3.2.1, 2nd Paragraph:

The plan states that rotary drilling methods were used by Farmland to install the monitoring and recovery wells at the site, and that water and bentonite mud were used. The plan further states that bentonite mud can reduce the formation permeability, and therefore polymer mud additives are recommended.

The EPA disagrees. The goal of *environmental drilling*, not *production drilling*, should be to avoid adding substances to the subsurface environment which may adversely affect analytical results. Experienced environmental drillers can often drill in unconsolidated materials using mud rotary without adding anything, using only the natural mud produced from the soils to lift the fines. If the materials become more difficult to lift, such as coarse sands and fine gravel, high-grade pure bentonite can be added sparingly and as needed to increase gel strength and lift the materials from the borehole.

There are many types of polymer drilling mud additives, and some require the addition of chemicals to break them down. Depending on the chemical composition of the additive and the breakdown material, analytical results may be adversely affected.

Certain common polymer-type additives, notably those that contain guar gum, can promote the growth of iron bacteria, which can severely foul wells. Also, some states regulate the use of drilling mud additives and this must be considered.

The plan states that if rotary drilling is used at the site, KNC will require the drilling contractor to provide a site-specific mud program which identifies the mud products, properties, how to monitor the drilling fluid and how the mud should be broken down during well installation. The EPA would like to review this before KNC proceeds with the well drilling and installation. Please revise accordingly.

13. Page 10, Section 3.1.1, 2nd Paragraph:

The work plan states that the rotary boreholes would be logged by observing the drill cuttings and observing the drilling rate. Although it would be difficult enough to visually discern sufficiently permeable zones from insufficiently permeable zones in the field by inspecting high-quality, minimally-disturbed samples, it would be impossible to do so by logging drill cuttings.

The EPA recommends that KNC consider a drilling method that acquires continuous, high-quality samples of subsurface materials. Direct mud rotary drilling can be an excellent method for obtaining high-quality samples of subsurface materials, but only with use of proper sampling equipment. The EPA can discuss various drilling methods with KNC if KNC desires to. Please revise accordingly.

14. Section 3.3.1, 3rd Complete Paragraph, Pages 11 and 12:

The work plan proposes to use only single 10-foot well screens in proposed monitoring wells MW-23 through MW-32. As stated in previous comments, the actual thickness of the unconsolidated aquifer at any given location should be the determining factor insofar as whether a two-well cluster with 5-foot screens is installed or whether a single well with a 10-foot screen is installed. Also, the determination of the thickness and properties of the unconsolidated aquifer should be determined from carefully prepared logs based on high-quality samples of subsurface materials. Please revise accordingly.

In discussing monitoring wells MW-23 through MW-32 the work plan references Table 1, but these wells were not listed in Table 1. Please revise accordingly.

15. Page 12, 3rd Paragraph:

Centralizers should be used on the top and bottom of the well screen to ensure the maximum amount of filter pack surrounds the well screen. Please revise accordingly.

16. Page 12, 3rd Paragraph:

The last sentence is ambiguous. When a surge block is used during well development, along with pumping and bailing, the height of the top of the filter pack needs to be monitored for possible settlement using a weighted tape. If settlement of the filter pack occurs, additional filter pack material must be added to maintain the specified height of the filter pack above the top of the well screen before the seal is installed. Please revise accordingly.

17. Page 12, 4th Paragraph:

The best seal for monitoring wells is produced from compressed and coated bentonite pellets. These pellets are able to fall through the water column without prematurely swelling and bridging in the wellbore as long as they are added slowly. Please revise accordingly.

18. Page 13, Last Paragraph of Section 3.3.1:

The point on the well casing that is surveyed needs to be clearly marked so the sampling team knows where to measure the water levels from. Please revise accordingly.

19. Page 13, Section 3.3.2:

Monitoring wells must be developed before the bentonite seal is installed so that if the filter pack should settle, additional filter pack material may be added to bring it up to the specified height above the top of the well screen. Please revise accordingly.

Development by alternately surging with a surge block and pumping or bailing is the preferred method for well development, with this procedure continuing until acceptably clear water is produced. During this development process the top of the filter pack needs to be monitored for potential settlement. Please revise accordingly.

20. Page 13, Section 3.3.2, Last Sentence:

Please revise and explain the process of using filtered compressed air to surge and develop the wells.

21. Page 13, Section 3.4:

The State of Kansas has regulations which specify well and borehole abandonment procedures. Please include these procedures in the Groundwater Characterization Addendum.

22. Page 14, Section 3.6:

The new monitoring wells should not be sampled sooner than 30 days after completion of development of the last well because well development can significantly alter the distribution of contaminants in the plumes. Please revise accordingly.

23. Page 14, Section 3.6

Monitoring wells adjacent to and surrounding the existing wells that have previously detected volatile organic compounds (VOCs) must also be sampled for VOCs. KNC should review this previous data and propose the wells to be sampled for VOCs to EPA before finalizing the Groundwater Characterization Addendum. Please revise accordingly.

24. Page 14, Section 3.6, Last Sentence:

The Groundwater Characterization Addendum states that KNC does not plan to sample monitoring wells MW-27 through MW-32. All of the new monitoring wells are essential in defining the three-dimensional configuration of the groundwater contaminant plumes and need to be sampled. Please revise accordingly.

25. Page 14, Section 3.6:

The EPA believes that the recovery well system should be completely shut down for a period of time before sampling the monitoring wells. The operation of the recovery wells during groundwater sampling will significantly distort the configuration of the contaminant plumes, as can be seen from the quarterly groundwater potentiometric surface contour maps included in the groundwater corrective action reports. KNC, KDHE, and EPA will need to get together and discuss this issue since shutting the recovery wells down will require regulatory approval. Please revise accordingly.

EPA's Responses to KNC's June 12, 2009, responses to EPA's comments of April 2, 2009:

1. Page 2, KNC Specific Response 2

In clarifying what was meant by the phrase "operational flexibility", KNC describes this as being able to modify the groundwater recovery system by turning the pumps in select wells on or off, and increasing or decreasing the pumping rates.

The EPA is concerned that experimenting with different pumping configurations before the three dimensional extent of contamination has been accurately determined could be detrimental in that it could result in unwanted movement of the plume. The EPA believes that current operation of the recovery system should be continued as it is since neighboring water supply wells are not being impacted by the contamination.

Once the configuration of the plume has been conclusively determined, then adjustments to the system may be considered.

2. Page 2, KNC Specific Response 3

The EPA agrees with KNC that currently active subsurface utilities and piping in the area of AOC 1 prevent further delineation of subsurface contamination at AOC 1, and also

agrees with the proposal by KNC to resample in the previously sampled areas in order to determine the concentrations of both hexavalent and trivalent chromium, and also nitrate/nitrite levels, which was not done during the original sampling. Please indicate what the current status of this work is.

3. Pages 3 and 4, KNC Specific Response 11

KNC states that they redeveloped well TW-80 by pumping approximately 1000 gallons of groundwater over a 5 hour period, and that they sampled the well immediately afterwards. KNC then states that the analyte concentrations were lower than the previous quarterly sampling event by approximately one order of magnitude.

The EPA believes that after extensive pumping such as this, the well should not be sampled for a minimum of thirty (30) days to allow the aquifer and contaminant plume to stabilize. The lower concentrations often seen when wells, especially those located at the edge of a plume, are sampled immediately after extensive pumping are usually the result of water flowing to the well from many directions and therefore not representative of concentrations at that particular point (where the well is screened) in the plume.

4. Pages 8 and 9, KNC Response to Geologist Comment 5

The EPA requested that detailed information regarding wells located on neighboring properties should be collected and included in the Groundwater Characterization Addendum. KNC had indicated this information would be collected and included in the revised Groundwater Characterization Addendum, but it was not included. KNC did; however, include this information in the Quarterly Progress Report for Fourth Quarter 2009 dated January 27, 2010, in Table PW-01 and Figure No. PW-01. Please include this Table and Figure in the revised Groundwater Characterization Addendum.

5. Page 10, KNC Response to Geologist Comment 9:

KNC stated they would include a modified Figure B-4 in the Groundwater Characterization Addendum showing the results from sampling the private water supply wells for chromium, nitrate, and nitrite, but this figure was not included in the Groundwater Characterization Addendum. Please include this Figure and supporting text in the revised Groundwater Characterization Addendum.