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Docket 40-8684

JUL 8 1982

40-8684/MNE/82/06/18/0

WMUR:JAP
Docket No. 40-8684

MEMORANDUM FOR: Docket No. 40-8684

FROM: Jeffrey A. Pohle, Project Manager
Operating Facility Section I, WMUR

SUBJECT: REVIEW OF WESTERN NUCLEAR, INC. PUMPING TEST PROGRAM; PRE-LICENSING GUIDANCE

Background

In a letter dated April 30, 1982, Mr. C.D. Bartholomew of Western Nuclear submitted their proposed pumping test program for NRC comment prior to implementing the plan. The program is for a planned research and development in situ solution mining operation. A license application has not yet been submitted.

Discussion

The ore zone occurs within the K2 sand at the project site. The K series (K1, K2, K3) are effectively only one single aquifer. Only a very thin, green-grey mudstone separates the K1 - K2 "sands". There is no significant confining layer between the K2 - K3 "sands". In fact, a distinction between a K2 - K3 sand sequence is a distinction I would not have made if I had prepared the original terminology. Occasional clays, mudstones or siltstones occur within most sandstone aquifers in the Powder River Basin. Western Nuclear's assumption of communication among all K series sands was verified nearby (~800 feet NW) by a pump test run in 1979. Therefore, the entire K series should be treated as the ore zone aquifer and any communication between a K1, K2 or K3 sand is not an issue that will need resolution in the future although a monitor well in the K1 sand may be required to verify restoration of the entire K series. My concern would be that mine chemicals migrating into the K1 during operations would not be removed or "flushed" out during restoration because it is likely that the injection-recovery wells will be open only to the mineralized zone in the middle of the K2 sand. This is only a preliminary conclusion which I have not communicated to Western Nuclear. Such details would be covered in our review of the application and environmental report.

Overlying the K series is a continuous green-grey mudstone with lignite beds and interbedded sandstones. The "interbedded" sandstones appear to

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be about 15 feet thick (depth of 295'-310') at well JC-918. Above this sequence is a 30 foot thick sandstone (depth of 250'-280') at JC-918. The shallow monitor well was to be completed at about 250 feet (WCOW-27S).

Underlying the K series is the L sandstone. No holes of adequate depth exist as yet so no information on the L sandstone or underlying confining beds was available for my review. Western Nuclear's proposal is that deep monitor well WCOW-28D be completed at about 700'. Apparently there is an upper and lower L sandstone. WCOW-28D was to have been completed in the lower L sandstone.

From the proposed plan both the upper and lower monitor wells were to be drilled about 50 feet from the pump well (WCPW-21).

On May 24, 1982, I had a telephone conversation with Charles Bartholomew of Western Nuclear. I highlighted what I thought were the pertinant issues related to the pump test based on my review. These are as follows:

1. The proposed completion depth of 250' for shallow monitor well WCOW-275 may indeed be too shallow. This completion depth would be above the grey sandstone (250'-280') shown on the geophysical log for well JC-918. In addition, this grey sandstone may not be the proper unit to monitor during the pump test. There is a 15' thick sandstone (295'-310') within the green-grey mudstone "confining" bed above the K sands. This unit may be a potentially usable source of water and, therefore, be the "immediately adjacent overlying aquifer" to be tested and monitored.

2. Although little information was available about the underlying L sandstone (upper and lower), Mr. Bartholomew indicated that the proposal called for completion of the deep monitor well (WCOW-28D) in the lower L sand. I inquired as to whether the upper L sand was an aquifer of usable water quality. Mr. Bartholomew indicated it was. Therefore, I recommended that WCOW-28D be completed in the upper L because it would be the most immediately adjacent underlying aquifer.

3. I suggested that wells WCOW-27S and WCOW-28D be constructed as close as possible to the pump well. The intent is to observe potential drawdown in these wells to assess confinement of the ore zone, therefore, they should be located so as to allow maximum stress to

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be applied to the area being monitored. Greatest drawdown occurs at the pump well, therefore, any pressure transmitted across the confining bed will first occur nearest the pump well. This also helps to limit debate on the adequacy of the length of the pump test.

4. Although the wells haven't been constructed yet and it wasn't totally clear from the information presented when it would, it did appear that all K2 sand wells would be open to the same interval (i.e., partially penetrating). Pump test data can be corrected for partial penetration efforts of either the pump well or observation wells. The theoretical validity of having both partially penetrating observation wells and pump wells is not clear to me. I suggested having their consultant investigate this.

5. The most important point of my discussion was to define the goals of a pump test program. They are twofold.

   a. To determine gross and obvious intercommunication between the ore zone and adjacent aquifers. This usually results from improperly abandoned wells and larger scale fracturing. This is a qualitative observation of data from shallow and deep monitor wells.

   b. To determine the vertical permeability of the confining beds so as to estimate potential movement of lixiviant, vertically, from the ore zone. Travel times can be estimated using the vertical permeability, thickness of confining beds and injection pressures.

The pump test and site characterization must accomplish these goals.

I did not discuss the applicability of using Hantush's unsteady state partial penetration well function in determining vertical permeabilities. Western Nuclear's consultant (In-Situ, Inc.) will do the analysis of the pump test. How best to achieve the above stated goals should be left to

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those who design and run the pump testing program to allow for program flexibility.

/s/

Jeffrey A. Pohle, Project Manager
Operating Facility Section I
Uranium Recovery Licensing Branch

Approved By: /s/

John J. Linehan, Section Leader
Operating Facility Section I
Uranium Recovery Licensing Branch

cc: Charles D. Bartholomew, WNI
Grey Bogden, WNI

Case Closed: 04008684030E

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