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Date: September 10, 1999
Refer to: E/ER:99-260

*JK.
Please be
prepared to
discuss this
next week*

HSWA LANL G/M/99

Mr. James Bearzi
Hazardous and Radioactive Materials Bureau
Harold Runnels Building
2044A Galisteo Street
P.O. Box 26110
Santa Fe, New Mexico 87502

**SUBJECT: RESPONSE TO HAZARDOUS AND RADIOACTIVE MATERIALS
BUREAU AUGUST 20, 1999 LETTERS ON REGIONAL CHARACTERIZATION
WELLS UNDER THE HYDROGEOLOGIC WORKPLAN**

Dear Mr. Kieling:

This letter is in response to two letters that we received from your office dated August 20, 1999, dealing with issues related to the drilling of regional wells for characterization purposes under Los Alamos National Laboratory's (LANL) Hydrogeologic Workplan (HWP), which was approved by the New Mexico Environment Department (NMED) on March 25, 1998. Since both letters dealt with common issues relating to timetables for well completion activities and arise out of the application of the HWP to these issues, we have deemed it appropriate to respond to both letters at one time. For the sake of clarity and convenience, we refer to the letter with the RE of "Completion of R-9 and R-15 Regional Characterization Wells at LANL" as Letter 1, and the letter with the RE of "Information Regarding the R-25 Well and Comments Regarding the June 23, 1999 Quarterly Groundwater Protection Program Meeting Notes, LANL (NM0890010515)" as Letter 2.

Letter 1 appears to have arisen out of an unfortunate misunderstanding regarding a notification letter that LANL had sent HRMB on August 11, 1999. That letter notified HRMB of the pending completion of regional groundwater characterization well R-9. Letter 1 seems to interpret the notification as meaning that the drill rig currently located at well R-15 is to be moved to well R-9 for completion of the latter, **before** completion of well 15, and then moved back again to well R-15 for completion of that well. Based on this misunderstanding, Letter 1 takes issue with the movement of the drill rig from one incomplete well to another and questions the economic sense of such a move.

The August 11, 1999 letter does not indicate that the drill rig from an incomplete R-15 will be moved to an incomplete R-9; in fact, the letter does not even refer to well R-15 at all. The August 11, 1999 letter was a routine 10-day notification on well R-9 and had nothing to do with R-15. It is LANL's intention to complete R-15 and then proceed to



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complete R-9, **not** to move from one incomplete well to another incomplete well, as Letter 1 mistakenly suggests. We anticipate completion of both of these wells before the end of FY99. Additionally, well R-25 will be completed by the end of CY99.

Letter 1 also makes the assertion that LANL is out of compliance with its permit by failing to implement the HWP. We disagree with this assertion. While acknowledging that the drilling of regional aquifer characterization wells has not occurred at the rate that HRMB and LANL had initially desired, substantial progress in implementing the HWP has been made. At least two regional aquifer characterization wells will have been completed by the end of FY99, and R-25 and R-12 will be completed by the end of CY99. LANL anticipates drilling to completion another 3-5 wells (i.e. wells R-31, R-27, R-19, R-5, and R-28) to the regional aquifer by the end of FY 2000. To tie down the iterative, technically complex endeavor of locating and drilling regional aquifer characterization wells to a firm timetable is not appropriate and is not consistent with the process that was mutually arrived at and has been observed in implementing the HWP.

To illustrate the above point, we note that both well R-9 and well R-15 were drilled out of the initially planned sequence, based primarily on input from the NMED to the GIT. R-9 was drilled out of the planned sequence in response to a written request by NMED. R-15 was moved forward in the planned drilling sequence to respond to NMED concerns about Mortandad Canyon.

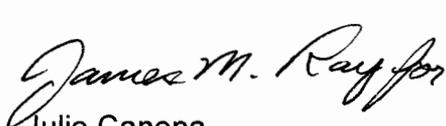
The HWP recognizes the importance of ongoing interactions and mutually agreed upon planning efforts as it calls for an annual meeting each March in which the scope of work for the succeeding 12 months is negotiated. In addition, quarterly meetings are held to monitor and, if needed, make adjustments to the ongoing work schedule. This approach has been adopted as the members of the GIT have recognized the need for flexibility in light of the technical complexity involved in drilling a deep characterization well that must penetrate a series of geologic strata that are far from uniform. We believe that maintaining the cooperative planning process called for by the HWP is preferable to adopting a more formal "schedule of compliance," which by its nature departs from the flexibility contained in and called for in the approved HWP. In light of this important principle, we would respectfully request that NMED reconsider its request for such schedule.

Letter 2 provided comments on two documents previously submitted to NMED: "Information Regarding R-25 Well" (July 16, 1999) and "Quarterly Groundwater Protection Program Meeting Notes" (July 23, 1999). The comments were provided in two attachments: Attachment A- comments on the R-25 well information and Attachment B- comments on the Quarterly Meeting Minutes. Responses to the comments in Attachment A and Attachment B are provided in Attachment 1 and Attachment 2, respectively, to this letter.

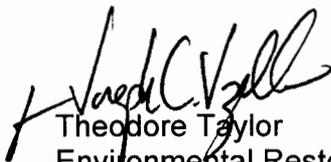
It remains our hope that our mutual efforts to cooperatively plan the implementation of the HWP can continue in accordance with the approaches and procedures that have been developed since NMED's approval of the HWP. We are committed to successfully

accomplishing in a timely manner the characterization called for and reflected in the HWP. We believe that the issues raised in and by Letters 1 and 2 and in this letter need to be addressed further, and suggest that in our next GIT Quarterly meeting, scheduled for October 14, 1999, we engage in a dialogue concerning our respective expectations over these issues. In the meantime, if you wish to discuss the contents of this letter further, please contact Charlie Nylander at (505) 665-4681.

Sincerely,



Julie Canepa
Environmental Restoration
Los Alamos National Laboratory



Theodore Taylor
Environmental Restoration
Los Alamos Area Office



Charles Nylander
Hydrogeologic Workplan
Los Alamos National Laboratory

JC/TT/CN/em

Attachments: a/s

Cy (w/enc.):

J. Browne, Dir., MS A100, w/attach.
T. Baca, E-DO, MS J591 w/attach.
A. Barr, ESH-19, MS K490, w/attach.
M. Buska, E/ET, MS M992
R Burick, Dir., MS A100, w/attach.
J. Davis, NMED SWQB, w/attach.
D. Erickson, ESH-DO, MS K491, w/attach.
V. George, E/ER, MS M992, w/attach.
T. Gunderson, Dir., MS A100, w/attach.
D. Gurule, DOE LAAO, MS A316, w/attach.
J. Kieling, NMED HRMB, w/attach.
M. Kirsch, E/ER, MS M992, w/attach
M. Leavitt, NMED GWQB, w/attach.
D. McInroy, E/ER, MS M992
J. Mose, LAAO, MS A316, w/attach.
D. Neleigh, EPA, 6PD-N, w/attach.
J. Parker, NMED OB, w/attach.
J. Plum, DOE LAAO, MS A316, w/attach.
T. Taylor, DOE LAAO, MS A316, w/attach.
G. Turner, DOE LAAO, MS A316, w/attach.
J. Vozella, DOE LAAO, MS A316, w/attach.
S. Yanicak, NMED OB, w/attach.
J. Young, NMED HRMB, w/attach.
ER Catalog # 199900120
RPF, MS M707
Tracker, RM 604, MS M992

ATTACHMENT 1
Los Alamos National Laboratory
Response to NMED August 20 Letter 2
Attachment A

General Comments

1. *Los Alamos National Laboratory's (LANL) response to the "homework" primarily focuses on assurances that the drilling crews will have the necessary experience with the equipment, completion techniques, etc. to complete the drilling outlined in the Hydrogeologic Workplan (HWP). In addition to the experience of the drill crews, LANL needs to discuss assurances that the contractors and subcontractors have demonstrated experience with the needs of the drilling program. A practical solution to ensuring an experienced drill crew is to stipulate in the drilling contracts that the drilling contractors and subcontractors have the necessary experience. For example, the contract should require experience with the required drilling technologies (i.e. Barber, mud rotary, hollow stem auger, dual wall reverse air rotary, etc.) for installation of groundwater characterization and monitoring wells including Westbay©. This should, alleviate many of the problems encountered with the apparently inexperienced contractors, subcontractors and Tonto/Dynatec company/crew acquiring the knowledge/experience as they drilled R-9, R-12, and R-25.*

LANL's procurement process, which is used to obtain contractor services, meets all federal acquisition requirements and is intended to procure the best combination of quality and price in a fair and consistent manner. This system was used to request proposals from drilling companies in 1993 and then award a contract to Dynatec (formerly Tonto Drilling) in 1996. The request for proposals was advertised in the Commerce Business Daily, the standard location of advertisements related to federal government procurements. The scope of this procurement was to support the multi-phase RCRA Facilities Investigation (RFI) being conducted at the Laboratory by the Environmental Restoration Program. The RFP was very explicit regarding the objectives of the RCRA RFI, and the needs of the drilling program. Specific information was provided in the RFP regarding drilling methods, anticipated drilling depths, coring, analytical sampling, well completion, equipment requirements, anticipated surface and subsurface conditions, etc, in order to assure that proposals would adequately anticipate the technologies, methods, and experience needed to perform the scope of work.

The sub-contract was eventually awarded pursuant to the RFP, effective September 18, 1996 to the best qualified firm to submit a proposal. The contract, among other considerations, required that the "subcontractor shall furnish qualified personnel, sample equipment, and facilities to perform the statement of work"...The subcontract further requires that: "the subcontractor shall not employ for the work any unfit person or anyone not skilled in the work assigned to the person and shall devote only its best qualified personnel to work under this subcontract."

During performance of this contract, the decision was made to use a different drilling technique than was specified in the contract. The drilling technique, using the Barber

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Attachment A

drill rig is relatively new, and the drilling contractor did not have experience with this specific technique, although highly qualified in drilling operations. R-25 was the first borehole the Barber drill rig was used for and the drilling crew was faced with a steep “learning curve”. The “learning curve” was unavoidable, and the drill crew now has the necessary experience required to drill boreholes using this technique.

The procurement of new drilling and field support services is in process. Similar to the earlier procurement, it will emphasize the objectives, the needs of the program, and personnel requirements. The Laboratory appreciates the recommendation that the contractors and subcontractors have demonstrated experience with the needs of the drilling program, and believe that it is apparent that the Laboratory has made and will continue to make subcontracting improvement efforts to implement the intent of the recommendation. However, we do not agree with the observation in Attachment A that the current contractors and subcontractors are “apparently inexperienced,” as they are qualified and have substantial experience in well drilling operations.

2. *Because drilling and well completion costs affect completion of other work implemented by the ER Program due to budget constraints, cost comparisons should be included for each option and a description of the resultant budgetary affect.*

We agree with the concern that budget constraints ultimately limit the scope of work that can be implemented by the Laboratory, and certainly limit work performed by the ER Project as specifically referenced in Attachment A’s statements. However, we believe that the request for cost comparisons for drilling and well completions and a description of the resulting budgetary implications involves contracting matters that are exclusively the responsibility of UC/DOE. We also believe that NMED would agree that the drilling and well completion activities are more appropriately driven by regulatory requirements and that cost should not be the sole basis for drilling and well completion decisions.

3. *Attachment 1: The third paragraph of the cover letter regarding the Information Regarding R-25 Well indicates that a “contingency plan will be invoked if the implementation of the R-25 recovery plan is not successful.” HRMB could not find a description of the contingency plan in the recovery plan, only references to a contingency plan. If the recovery plan for R-25 is not successful, LANL shall include the decision points that would lead to plugging and abandonment of R-25 (when enough is enough) in the contingency plan.*

Section 8 in the R-25 recovery plan is titled “Contingency Plan” and contains a description of the actions that will be taken for anticipated problems with screen 3 repair and screen 9 usability, and addresses the process of evaluation if other problems are

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Attachment A

identified. A decision to plug and abandon R-25 would be one potential end point of the evaluation process described in the "Contingency Plan".

4. *Attachment 1: R-25 Recovery Plan, Sections 5.0 and 6.0: The decision tree identifying the critical points and options should not only include the repair to screen three in R-25, but should also include how the integrity of those seals and sand pack will be evaluated due to the possible development of pathways between zones affected by falling tremie lines and eventual recovery of most of the tremie pipes.*

LANL should also discuss how the effectiveness of cement infiltration is to be measured. Due to the nature of the bend in the casing, great variability in the slot-size from the original configuration is expected and may not penetrate the sand pack adequately. Also, identify the company that will be completing the repair work that is outlined in this document and identify if they have experience in accomplishing this type of repair.

When the repair of screen 3 is completed, two methods will be used to demonstrate that no pathways exist in the backfill at the time of well installation. First, a neutron log of all of R-25 will be run to identify void spaces in the backfill material. This type of logging was conducted on lower portion of R-25 prior to failure of screen 3 and found that the backfill was exceptionally good. The few small void spaces that were identified were in the grouted sections and were not interconnected. Second, tracers will be used to confirm the integrity of the seals. Applying both of these methods is expected to adequately demonstrate the absence of pathways. Water quality trends will be used to assess the possibility of pathways developing over time. If the data suggest that the well itself is acting as a conduit of contaminants, an evaluation of whether plugging and abandonment is warranted will be made.

The cement used in the repair of screen 3 has two purposes. The first is to keep the screen stable while the interval is cored. The microfiber cement will be chased with Portland cement to ensure maximum solidification in the screened zone. The second is to create a barrier between the backfill and the open well. Infiltration of the cement is critical to the creation of a barrier. Three activities were to ensure adequate cement infiltration. First, screen 3 was examined closely with the downhole video camera. The slot size does not observably vary in the bent section of the screen. Second, pilot-scale testing was done to ensure that adequate infiltration was achieved. In the pilot-scale tests the cementing material was fined-grained enough to penetrate the screen slots and the sand pack. Third, the cement will be pumped into the interval under pressure ensure maximum infiltration.

The R-25 repair and recovery is being done under the direction of LANL personnel with the advice and guidance of a drilling consultant from LATA and two members of the External Advisory Board, Jack Powers and David Schafer. A handpicked crew from

ATTACHMENT 1
Los Alamos National Laboratory
Response to NMED August 20 Letter 2
Attachment A

Dynatec will be placing the cement and conducting the coring operations. The crew members were selected based on their experience with cementing and coring operations. In addition, extensive discussions with manufacturers (Halliburton, Dow Well) have increased our confidence in the repair approach.

5. *Attachment 2: Lessons Learned, Borehole Drilling, Page 2: Indicate if the drilling technique may also have contributed to the problems encountered. For example, list the most efficient operating depth and maximum depth that the barber rig is capable. The Hazardous and Radioactive Materials Bureau (HRMB) believes that the drilling technique needs to be reevaluated to determine if it is the most appropriate methodology that LANL could use considering the geologic and hydrogeologic setting and the data needs. HRMB encourages LANL to evaluate/consider other potential drilling techniques that could be used. In order to identify more efficient drilling methods, the data quality objectives need to be reconsidered if the current scope outlined in the HWP is too ambitious.*

The geologic conditions at LANL present a challenge to drilling boreholes in that the boreholes do not remain open without stabilization. The method used in R-25 employed casing advance techniques to keep the borehole open. While problems were encountered using this method, it is likely that any drilling technique that meets the requirement to stabilize the borehole would also encounter problems. The standard Odex/Stratex casing advance drilling system did not perform adequately at LANL, as evidenced by our experience drilling well R-9. However, using lessons learned, our drilling system improvements such as the use of a modified Barber Rig and new heavy wall drill casing, demonstrated that casing advance drilling can be accomplished to depths of 1,000 to 2,000 feet. However, we agree that a re-evaluation of the data quality objectives is critical in determining the drilling method(s) that should be employed for the regional aquifer wells. A working session with NMED staff to conduct this re-evaluation is planned for September 13 and 15.

6. *Attachment 2: Lessons Learned, Geologic Conditions, Page 7: It appears that LANL has not considered any alternative drilling technology other than mud rotary, please clarify and discuss the rationale for only listing mud rotary as the only alternative. LANL should consider using a variety of drilling techniques depending on the data needs and expected target depths, geologic and hydrogeologic conditions at each regional well location.*

We are prepared to discuss a comparison of available drilling methods in the DQO re-evaluation currently scheduled on September 14 and 15, 1999. NMED's input on minimum data objectives for characterization under RCRA and HSWA will be an important consideration in our discussion.

ATTACHMENT 2
Los Alamos National Laboratory
Response to NMED August 20 Letter 2
Attachment B

1. *In addition to the action items listed in the cover letter accompanying the Quarterly Groundwater Protection Program Meeting Notes, Los Alamos National Laboratory (LANL) and the Hazardous and Radioactive Materials Bureau (HRMB) need to revisit the data quality objectives (DQOs) for the implementation of the Hydrogeologic Workplan (HWP). Revisiting the DQO's should aid in the definition of the scope of work specified in the new drilling service procurement process (e.g., additional rig(s) and multiple drilling technologies).*

We concur that the re-evaluation of the DQOs is necessary and has been currently scheduled for September 14 and 15.

2. *LANL and HRMB need to jointly develop a strategy for "plume chasing" and it's integration with other programs at LANL.*

We concur that a joint strategy for plume chasing is necessary and will continue to dialogue with NMED about this until a mutually agreeable strategy has been developed. Please note that a site-specific "plume chasing" strategy is being developed by the LANL ER Project for the "260 outfall", which will be submitted to NMED as part of the CMS Plan modification. We believe that all "plume chasing" investigations will be determined by site-specific conditions.

3. *Outlined in the HWP is the schedule for the remaining fiscal year (FY99) as well as fiscal year 2000. HRMB expects R-25, R-15, R-9, and R-12 to be completed by the end of the first quarter (1/1/99) of FY00. As part of the implementation of the HWP, five additional regional aquifer wells are also expected to be completed by the end of FY00. The wells identified in the Quarterly Meeting Notes are R-31, R-27, R-19, R-5, and R-28. After revisiting the DQO's and HWP well prioritization some of these wells may change, but the number expected for completion will not. HRMB believes this schedule to be quite ambitious; however, with anticipated changes (procurement of a new drilling contract, additional rigs, reconsideration of DQO's, etc.) to the HWP drilling program. HRMB is expecting this schedule to be met. In other words, this schedule will be considered a compliance schedule. LANL should note that the completion of the nine wells does not include any intermediate wells that may be required or "plume chasing" wells associated with the 16-260 Corrective Measures Study or other similar actions elsewhere at LANL.*

Please see our comments in the letter to which this is an attachment regarding the advisability of establishing a formal schedule of compliance in light of the approach and processes adopted by the HWP. In connection with that, it may be useful to re-examine the purpose of the Hydrogeologic Workplan (HWP) at this time. As a result of the New Mexico Environment Department's (NMED) denial of LANL's groundwater monitoring waivers and its determination that DOE/UC had an inadequate understanding of the hydrogeologic setting at the site, the development of a characterization plan was required. Upon NMED's recommendation, the plan utilizes an iterative approach that incorporates new information and data into the site conceptual model as it becomes available. This

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Attachment B

method enables effective decision-making to occur in the characterization process on a step-by-step basis. The plan was also designed to evaluate groups of geographically close and process-similar units in 'aggregates'. This approach was developed, in part, to reflect EPA's concept of the limit of the waste management area as described in the definition of the point of compliance. In this definition, it is acceptable to circumscribe several units with an imaginary line when locating the point of compliance, a vertical surface at the hydraulically downgradient limit of the waste management area at which the groundwater protection standards apply (New Mexico Annotated Code, Title 20, Chapter 4, Part 1, (20 NMAC 4.1) Subpart VI, 264.95(2)). The aggregate approach bounded similar areas in a manner that supported not only logical hydrogeologic characterization but regulatory application as well. By NMED's approval of the HWP (May 22, 1998), DOE/UC believed that implementation of the plan would adequately address the regulatory issues previously cited by HRMB.

The underlying regulatory basis for groundwater monitoring requirements was evaluated by DOE/UC during the development of the HWP. Depending on the status of the units in question, different monitoring requirements could apply. Specifically, in 20 NMAC 4.1, Subpart VI, 264.90, a distinction is made between regulated units (those surface impoundments, landfills, land treatment units, and waste piles that have received hazardous waste after July 26, 1982), and other solid waste management units (SWMUs). Regulated units are subject to 264.91-100 requiring, in many cases, groundwater monitoring. *[NOTE: A Subpart X unit, while it does not meet the definition of a surface impoundment, landfill, land treatment unit, or waste pile, can also be subject to 264.91-100 if it potentially impacts groundwater – otherwise, 264.101 applies.]* In contrast, no formal monitoring requirements are established in 264.101 for SWMUs that are not regulated units. Although monitoring may be a component of remediation, no automatic monitoring requirements are triggered by 264.101. Instead, actions pursuant to 264.101 are driven by the occurrence of an actual release for which a threat to human health and the environment has been established and corrective action is necessary.

The structured groundwater monitoring requirements applied to regulated units are comparatively prescriptive in nature. Sections 264.91-100 establish three monitoring programs, that, unless a demonstration can be made that no potential for migration of liquid from the regulated unit to the uppermost aquifer exists, may be necessary to implement for detecting and addressing releases to groundwater. These programs describe progressively more advanced requirements for monitoring groundwater during the detection, compliance, and corrective action phases.

To adequately establish a monitoring network under any of these programs, or to determine if a release from a SWMU requires corrective action, it is necessary to characterize the subsurface (including groundwater) in a comprehensive manner. It is DOE/UC's intention to perform the characterization activities set forth in the HWP to ensure information is gathered sufficient to either demonstrate an adequate groundwater monitoring waiver or provide for the subsequent installation of some form of monitoring network (or both, if appropriate). If it is determined to be necessary, actual repetitive

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monitoring described in any of the above-referenced programs or as a component of remediation of a release from a SWMU, will be performed outside the scope of this plan.

The iterative approach as described in the HWP is a decision-making process that explicitly includes the NMED. This process requires working together and allowing flexibility for changing priorities, physical conditions, or other factors. In the four years since the development of the HWP was started, there has been a satisfying history of working together in this way. The first discussions occurred in June 1996 when the groundwater strategy document was presented and discussed with HRMB. The characterization approach of using regional aquifer wells was discussed with HRMB and consensus reached in August 1996. The Draft HWP was submitted in December 1996 and a subsequent Request for Supplemental Information (RSI) was received from NMED. Based on the RSI and numerous discussions with HRMB, a significant change to the HWP was the addition of Quarterly Meetings described in the new Section 1.2 (Communication). Since the HWP was approved, there have been five Quarterly Meetings and two Annual Meetings documented with minutes. Among the decisions made in these Quarterly and Annual meetings are the re-prioritization of R-9 and R-15 at the request of HRMB, resulting in moving them up in the schedule.

This brief history of the working partnership that has developed is provided to illustrate the success of this approach. In contrast, if the HWP were made into a compliance schedule the partnership and flexibility that we have enjoyed would not be possible. We urge HRMB to consider the practicalities of substituting a compliance schedule, which by its very nature is inflexible, in the place of the agreed upon approach that allows for flexibility in addressing the realities of drilling and constructing deep wells in the context of a complex geologic setting. We would refer you to "Information Regarding R-25 Well" (July 16, 1999), previously submitted to NMED, which illustrates the challenges of drilling wells on the Pajarito Plateau.

4. *During the quarterly meeting, LANL identified seven interpretive tasks concerning modeling and hydrology. HRMB would like to see discussions of these seven tasks added to the quarterly and annual meeting agendas as a section in the annual report. In addition to discussing the status of the interpretive tasks, LANL should also include updates regarding in-situ and ex-situ hydrologic testing (i.e., identify an aquifer tests, core analyses, etc.).*

The progress of the Groundwater Integration Team sub-committees on the interpretative tasks will be routinely included on the agenda of the Quarterly and Annual meetings and will be included in the Annual Report.