

# Los Alamos

Los Alamos National Laboratory  
Los Alamos, New Mexico 87545

## memorandum

*K. King*

TO: Distribution

DATE: December 18, 2000

FROM: *Charlie Nylander*  
Charlie Nylander, ESH-18

MAIL STOP/TELEPHONE: K497/5-4681

SYMBOL: ESH-18/WQ&H:00-0425

SUBJECT: **QUARTERLY MEETING NOTES - JUNE 22, 2000**



Attached are the minutes from the June 22, 2000 Hydrogeologic Characterization Program Quarterly Meeting. A number of major issues were discussed. These minutes are being sent to you because you have received a copy of the Laboratory's Hydrogeologic Workplan and a binder for the Annual Reports and Meeting Minutes or you have requested to be on the distribution list. If you are not interested in continuing to receive meeting minutes, please contact me at the address or telephone number listed below.

Major agreements from the June 22, 2000 Quarterly Meeting were:

- Safety precautions after the Cerro Grande Fire prohibit activities in the canyons during the rainy season. Therefore, if funding is available after fire rehabilitation is complete, R-7 in Los Alamos Canyon will be replaced by R-22 on the mesa near Area G in the FY00 schedule. Also, due to less funding from DP, drilling of R-5 will be postponed until FY01.
- FY01 schedule includes: complete R-22; drill and complete R-7, MCOBT-1, MCOBT-2, CDV-R37-2, R-27, R-5, and R-24; and begin drilling R-8.
- The Hydrogeologic Workplan section on information management and modeling will be revised instead of creating two additional workplans. A draft of the Hydrogeologic Workplan Section 3 is expected to be complete by June 30 for discussion with NMED.
- There was agreement that Torqease and EZ mud will no longer be used together, due to the combined effects of the two. However, the data collected from well R-19 shows that the additives break down sufficiently with well development and can be used to facilitate drilling when necessary.
- NMED expressed concern that funding to drill R-22 may not be available. LANL committed to bring the NMED concerns to LANL management.
- LANL and NMED committed to discussing the possibility of combining R-27 and R-28. Access concerns would require moving R-27 close enough to R-28 that drilling a single well might be most appropriate.

Please review these minutes for accuracy. If you identify substantive changes that should be made, please submit your comments to me in writing, or via e-mail at [nylander@lanl.gov](mailto:nylander@lanl.gov), or by telephone at 665-4681. Additionally, I would appreciate a reply from the New Mexico Environment Departments' Hazardous and Radioactive Materials Bureau indicating their concurrence with the meeting minutes and action items.

CN/rm



*General*  
*HOWA LANL G/M/DO*

*TC*

Enclosures: a/s

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**Los Alamos National Laboratory  
Hydrogeologic Characterization Program  
Quarterly Meeting  
June 22, 2000**

**Introduction**

Charlie Nylander (LANL) welcomed everyone to the quarterly meeting for the Hydrogeologic Characterization Program. The meeting is an opportunity to meet with NMED and stakeholder groups. This is the third quarterly meeting this year. Quarterly meetings are for the formal exchange of information. The routine weekly communication has been off-schedule from the fire, but we will try to get back into the routine schedule. Notes from the annual meeting in March 2000 and the EAG semi-annual report will be issued soon. The EAG semi-annual report is being edited and will be mailed by end of the month. Also the meeting notes from the Annual Meeting will also be finalized by the end of the month. After the minutes from the Annual Meeting are distributed, the NMED is asked to provide concurrence on actions.

**Subcommittee Reports**

Information Management Subcommittee

Kelly Bitner (Neptune & Co/LANL) read the report provided by Kendra Henning (LANL).

- The fire caused schedule delays, but the schedule is back on track now.
- Location and Well Construction module database designs are complete. ESH and ER have each created these tables in database environments. Legacy data migration and new data storage in these tables is underway.
- The ESH Location module software is in testing. This software is used for data entry, update, and report generation. The Location module will go into production before the end of July.
- Priority changes due to fire-related circumstances include Sample, Chemistry, Field and Runoff (discharge and gage height) modules. Accelerated design meetings took place over the last two weeks, and design specifications for these modules will be circulated for signoff during the week of June 26.
- ESH will delay the programming of end-user software for the Well Construction module for now. Will accelerate the programming of end-user software to include Sample, Chemistry, Field and Runoff (discharge and gage height) modules.

Well Construction Subcommittee

David Broxton (LANL) described the fire effects at active well sites.

- R-19 - No damage as well was down mesa from the fire.
- CDV-15 - Well site untouched by fire. Burned around the site about 30 yards away but not on it.
- R-25 - Pumping water at time of fire. None of the major equipment was damaged, but fire burned hot in that area. Lost a power cable, plastic tarps, and straw bales.

Status of drilling program is as follows.

- R-25 - Continued well development up to fire. Next step is to install Westbay in early July.
- R-31 - Installed Westbay, and well is ready for quarterly sampling.
- R-19 - Well is complete and being developed.
- R-9i - Complete and Westbay installed.
- CDV-15-3 - Completed to depth, well installed, and geophysics run in open borehole. Will do development when R-19 is completed.

R-7 funding was given back to the ER Project where it will be used to deal with surface related BMPs. We are expecting to get money back to do another well this year; however R-7 will not be done because it is in a canyon south of TA-21 and is not safe. Instead, the R-22 site on the mesa near Area G is being considered. Before the fire, stainless steel and Westbay supplies needed to finish drilling this year were purchased, so all that material will be ready.

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Hydrology Subcommittee

David Rogers (LANL) said that ESH-18 is under a lot of pressure due to the Cerro Grande Fire. Steve McLin has been working on surface water runoff numbers. David Rogers is working with ER on surface contamination issues.

Bill Stone (LANL) presented information on water quality throughout the development process at R-9i as an example of well development and hydrologic testing. R-9i is approximately 300 ft deep, and the screened intervals are in basalts. Development was expected to be easy in basalt. A two-stage approach was used: 1) bailing and 2) pumping.

A stainless steel bailer was used. Water was sampled for field parameters at 15-minute intervals. Screen 1 bailed 250 gallons in two hours. Turbidity went from 55 to 8. Screen 2 bailed 300 gallons in two hours. Fine sand and silt from sump. Turbidity about 38 NTU.

Did not use packers when pumping. Placed the pump just below the screen. Screen 1 pumped at 25 gpm for 1400 gallons. Turbidity increased then decreased to 3.2 NTU. Screen 2 pumped at 25 gpm for 2600 gallons. Turbidity down to 2 NTU. Pump turned off then on again and still had good NTU value. Pumped the sump and got 2.6 NTU. Development halted.

The testing approach included straddle packer injection on both screens. Injected at rate of 11 gpm in upper screen and measured with an in-line flow meter. Water came up out of rod in two minutes. Injected at rate of 19 gpm in lower screen for 30 minutes. Also did pumping test in this screen. Preliminary transmissivity values about 5-10 ft<sup>2</sup>/day. All well testing data will be compiled in a separate report by ESH-18.

Don Diego Gonzalez (Pueblo de Cochiti) asked if both screens were in basalt. Bill Stone (LANL) responded that both the upper and lower screens are in basalt. Michael Dale (NMED/DOE-OB) asked how R-9i was drilled. Bill Stone (LANL) responded that R-9i was drilled dry, and David Broxton (LANL) added that the drilling used the downhole hammer.

Modeling Subcommittee

Bruce Robinson (LANL) reported on activities that have been done since the Annual Meeting in March.

Regional aquifer:

- Pump test simulation and R-5 recommendations for pump test designs.
- Geochemical aspects-isotopes and stable isotope chemistry. Mineral/water interactions as additional calibration constraints.
- Interpretations of permeability data. Correlate between different wells and long-term response to pumping and geologic model.
- Contributed to revision of the modeling section of the Hydrogeologic Workplan.

MDA/Canyons scale:

- Report on vapor phase organic transport at MDA-L. Construction and calibration of model predictions and recommendations on sampling frequency.
- New hydrologic data and new geologic models compiled source term data on U and Sr for Los Alamos Canyon. Initial transport simulations.

Post-fire refocusing of ER modeling in Los Alamos Canyon:

- Modeling ponded conditions in canyon bottom
- Temporary high infiltration effect on transport
- Surface contaminant redistribution and impact on subsurface migration

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- Geochemical effects on transport-remobilize sorbed contaminants

Modeling team involved in planning for field measurements:

- Vadose zone contaminant profiles pre-flooding
- Initial planning of instrumented infiltration measurement site

The Army Core of Engineers is working on retention basins, and there is concern about the potential effects on groundwater. We have given advice on configuration of shallow wells to monitor groundwater from those basins. Also want NMED input on these.

Geochemistry Subcommittee

Pat Longmire (LANL) described the progress on geochemical activities.

- Completed anion and stable isotope distributions in R-31.
- The R-15 completion report with hydrology contribution and perchlorate will be distributed to editors early next week and finished in July.
- Involved in designing analytical suites for radionuclides, inorganics, and organics that are combustion products. Collecting water from alluvium.
- Completed the first phase of background geochemistry DQOs, sampling stations, and analyses. Anticipate finishing report by September 30.

Surface complexation modeling of Sr and U is as follows. Initial results consistent with observations.

- Sr does adsorb onto hydrous ferric oxide (HFO) when the pH is between 6-9.
- $\text{Ca}^{2+}$  strongly competes for sorption sites, which decreases Sr adsorption onto HFO. If ash changed pH, would change sorption of Sr. More likely in alluvial water than NA-rich perched water.
- U(VI) does not completely adsorb onto HFO. Increasing alkalinity decreases U adsorption when the pH is between 7.5-9

Michael Dale (NMED/DOE-OB) asked about the pH from surface water so far. Pat Longmire (LANL) said we will be measuring it. Don Diego Gonzalez (Pueblo de Cochiti) asked for an update on the analytical lab problem with Sr, which was brought up at the Annual Meeting in March. David Rogers (LANL) said samples are being redirected, we are working on resolving why it happened. Now using Paragon, the same analytical laboratory used by the ER Project and NMED. Michael Dale (NMED/DOE-OB) said that NMED is using Paragon, but when the samples are the result of splitting samples, the NMED uses Berringer. Charlie Nylander (LANL) said internal labs are going through process of proving abilities before they will be used.

Don Diego Gonzalez (Pueblo de Cochiti) asked if recent rains caused runoff greater than normal or not. David Rogers (LANL) said the June 2 half inch of rain caused moderately large runoff in Los Alamos, Pueblo, and Rendija canyons. In Los Alamos Canyon, the incised channel was bank full. Don Diego Gonzalez (Pueblo de Cochiti) asked if these observations were caused by the fire. David Rogers (LANL) responded that runoff increases when vegetation is stripped away. At Bandelier there had been data from two previous fires where the runoff increased from 200 cfs to 3000 cfs. The BAER team predicted similar numbers. After the June 2 event, the BAER team was convinced that their numbers were in the ballpark. Steve McLin of ESH-18 came up with higher numbers.

Michael Dale (NMED/DOE-OB) asked if flow from Pueblo and Los Alamos canyons reached the Rio Grande. David Rogers (LANL) said before the fire there were 63 runoff stations. About half are operational after the fire. The stations upstream and downstream of the Laboratory are back in operation. Trying to upgrade the design to handle higher flows. Each station is set up now with two samplers and there is consideration for making increasing the number of samplers to four. There is a problem with debris taking out the stations. Planning for manual sampling but safety is of concern. There are four stations that can be sampled safely, and writing the Hazard Control Plan is in progress. Putting in

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cableways similar to Otowi. Asking USGS to sample Rio Grande to Cochiti before rain and a couple of times afterward.

**Program Status after the Fire**

Charlie Nylander (LANL) said there have been impacts on schedule and scope as a result of the fire. A lot of resources have been refocused on recovery, canyons, and runoff. There were realities of drilling in canyons, but the fire has added another dimension. Before the fire, the primary scheduling constraint was the possible presence of T&E species. Now the concern is about flooding. As senior management came to grips with the safety concerns, there have been lots of new controls placed on access. There are health and safety concerns on snags, spot fires, etc. It will take several weeks to get permission to get back into the field. Received approval on June 1 to get into R-19 and CDV-15.

It was announced at the Annual Meeting that DP funds are low and would slip drilling of R-5 into FY01. Stakeholders tried to get money, including CCNS who wrote a letter to Senator Domenici. However, we are still in the same predicament with DP funds. ER funds were refocused for fire recovery efforts. It is still uncertain whether money will be available to drill another well this year. The well was supposed to be R-7, but can not drill in the canyon at this time of year. If money becomes available, drilling R-22 will be considered.

John Young (NMED-HMB) asked if use of the drill rigs would be lost and what would the lag time be to get them back. Charlie Nylander (LANL) said the rig on CDV-15 will be demobed off site when done. But a brand new rig is scheduled to come to the Lab. The contract with the drilling company is in progress. May bring rigs on site and pay standby. Want to maintain momentum and experience therefore are concerned about not being able to start. Deba Daymon (LANL) said she is working on these issues. The new well will be done under the new drilling contract. Do not need two rigs to complete what is funded for this year, but do want assurance that we can get them when we need them. It is probably not a two-rig effort for the rest of the summer. Charlie Nylander (LANL) said the UDR rig would stay on-site to do Westbay installations. The schedule shows that next year two rigs will be running simultaneously. Drill rig #1 will start R-22 this year, R-7 from November to February, MCOBT#1 and MCOBT#2 from February to June, and CDV-R37-2 from July through end of FY01. Drill rig #2 will start with R-27 in October 2000, R-5 from January 2001 to April, R-24 from May to September, and start R-8 before end of FY01.

John Young (NMED-HMB) said it would not be acceptable to not drill another well this year. Fire does not lessen the importance of the groundwater program. Charlie Nylander said we will carry that message to the upper management. John Young (NMED-HMB) said NMED had sent a letter that stated that NMED expected activities to continue. We have seen a vast improvement in the drilling program and do not need a hiatus right now. Ted Ball (LANL) said we need to be more explicit about the well being drilled. John Young (NMED-HMB) said NMED would write another letter if that is what is needed. Gene Turner (DOE) said getting the same message from DOE Management.

John Young (NMED-HMB) asked about the drilling contract announcement. Deba Daymon (LANL) said the person working on the procurement was pulled off to work on other projects, so no one is currently working on the procurement. She said she would drill another well under either the old or new contract. John Young (NMED-HMB) said he would be disappointed if Dynatec is the only option. Charlie Nylander (LANL) said he has written memos about the contracts. Another letter from NMED would be helpful. John Young (NMED-HMB) said that if there has to be another letter it would be stern and threatening with compliance. He said he is losing patience talking. Charlie Nylander (LANL) said the pressure from the fire recovery (Attorney General and Secretary Maggiore) have created other priorities. John Young (NMED-HMB) said he recognizes the pressures, but the focus is on off-site migration.

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**Damage Assessment/Well Head Protection**

Deba Daymon (LANL) said that wellhead protection is one of the activities in the new post-fire focus. Steve McLin is running HEC models to determine the depth of peak flows. He will link at individual well locations in Los Alamos, Pueblo, Pajarito, and Mortandad canyons. There are three wells where flood potential is an issue: R-9, R-9i, and LAOI-1.1. JCI is working on the design for wellhead protection. R-15 is far enough from the stream channel so that flooding is not a concern. R-12 is close to the stream channel, but there was not much fire damage so runoff response is expected to be minimal.

A team looked at the alluvial wells and identified 22 (mostly in Los Alamos Canyon) for wellhead protection. One criteria used was not to spend more to protect the alluvial wells than it would cost to replace them. There are restrictions on equipment. No design yet, but it will be mostly to keep them from silting. Working on contracts to do this work. Will plug and abandon R-7 pilot hole early next week. Do not if know canyons will be accessible to equipment. Looking at how to change the schedule of wells in the canyons for a couple of years. Additionally, we are massively sampling alluvial wells.

Michael Dale (NMED/DOE-OB) asked about accessing caps and plugs. Deba Daymon (LANL) said that to make them tight, overdrilling is needed. However, can not get the drill rig in there. Do not want to seal them because want to sample them through the summer. ESH wells and drinking water wells are being addressed by David Rogers (LANL) and Bob Beers (LANL). Bob Beers (LANL) is working with the County. Michael Dale (NMED/DOE-OB) made the point that San Ildefonso also has wells in canyons and the importance of coordinating with them now about how to protect them.

Deba Daymon (LANL) said that for all wells that are started, Westbay will be installed. There is a contract for pumps in single completion wells. Quarterly sampling will go on as soon as field personnel are hired. The new drilling contractor will have a task leader to do quarterly sampling. The paperwork for R-22 has been started in case the funding comes through.

John Young (NMED-HMB) said he is concerned that wells such as those in Mortandad Canyon could become injection sources. Charlie Nylander (LANL) said in the canyons that were not burned, do not expect much difference. Deba Daymon (LANL) said could issue a letter about the well head protection for all types of wells. Charlie Nylander (LANL) said do not want to lose any facilities with a value. Deba Daymon (LANL) said the criteria for wellhead protection are: 1) is it a conduit for contaminants, 2) is it of value to save, and 3) has it been used.

**Modeling and Information Management Updates**

Charlie Nylander (LANL) said that NMED requested revised sections of the Hydrogeologic Workplan on March 27. We are committed to revising both the modeling and Information Management sections to give a better idea of task scheduling and deliverables. The NMED letter requested a response in 45 days. Worked through April and met with NMED. Decided to upgrade section 3 of the Hydrogeologic Workplan. Have regrouped after Laboratory closure and fire and currently working on draft. Expect to submit on June 30. John Young (NMED-HMB) said a letter granting an extension was sent.

**Drilling Additives**

Bob Hull (LATA) said that several polymers have been used in drilling. There has been concern about EZ Mud, and have had discussions with Baroid about the use of EZ Mud. It is used as an emulsion in small quantities. It contains a carrier oil and serves as a viscosifier that improves borehole stability and reduces water loss. It does not breakdown naturally, must be stimulated to do that. Torqease is another polymer that is an emulsion, but it is biodegradable. It reduces frictional sticking of drill string and is used sparingly. Baroid recommended that EZ Mud and Torqease not be used together. Quick Foam is another

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additive that is sometimes used. It is a foaming agent and biodegradable. It is used to improve hole integrity. The additives that have been used are:

- R-9 and R-12 were drilled with air and water.
- R-15 was drilled using some bentonite, Torqease in the upper part and nothing in the lower part.
- R-19 used all three additives.
- R-31 used bentonite and Torqease in the upper part and nothing in the lower part.
- R-25 used all three additives.
- CDV-15 used all three additives but in small quantities.

Bill Stone (LANL) said additives mess up water level probes. A three-stage development approach is used to remove additives: 1) jetting each screen for 15 minutes from top down, 2) air lifting first from the sump and extracting an equal amount of water as was added during jetting, and 3) air lifting individual screens until field parameters are acceptable. Then each screen is pumped and a sample is collected from below the screen.

Pat Longmire (LANL) presented the chemistry issues related to use of EZ Mud. It is a long chain, high molecular weight polymer. Surface chemistry has a negative charge density. Baroid has a titration procedure to measure EZ Mud in water. It is mixed as 0.5 cup to 1000 gallons water, and titration confirmed that. Samples from R-19 screen 7 were analyzed for Total Organic Carbon (TOC). When plotted on a graph of TOC vs EZ Mud concentrations, it is apparent that the higher the concentration of residual EZ Mud, the higher the TOC. Thus, TOC is a good parameter to measure to track the residual EZ Mud. The goal is to develop wells until the TOC in the water is the same as the TOC in tap water. The TOC concentration decreases with development. The polymers can be broken down through development as quantified by TOC and titrations. The results in R-19 are considered acceptable because there are no contaminants. In wells where there is HE present in the water, the presence of EZ Mud could bias the sampling results. The Geochemistry Subcommittee will evaluate the use of fluids. EZ Mud was used in CDV-15, but there were no detects in the screening.

Michael Dale (NMED/DOE-OB) asked if these additives are commonly used in the industry for environmental well drilling. Pat Longmire (LANL) said that they are used at Nevada Test Site. Charlie Nylander (LANL) said they have been used in municipal supply wells, but not evaluated. Charlie Nylander (LANL) said that it is good that Pat Longmire (LANL) has gone through the exercise to show that the additives clear up with well development. Do not see that sparing use of additives is a problem.

Michael Dale (NMED/DOE-OB) asked about the effect of EZ Mud on the hydraulic properties. Bill Stone (LANL) said it has no effect on hydraulics. Michael Dale (NMED/DOE-OB) asked about EZ Mud effect on inorganic chemistry of the water. Pat Longmire (LANL) said they are still evaluating the data. John Young (NMED-HMB) asked if there were any other alternatives. Bill Stone (LANL) said they could use the EZ Mud dry, not as a solution. Bob Hull (LATA) said not to use Torqease and EZ Mud together. Michael Dale (NMED/DOE-OB) asked what is the most commonly used fluid for drilling environmental wells. Charlie Nylander (LANL) said that other products will be looked at, but these are commonly used.

#### **Other Issues**

John Young (NMED-HMB) said that NMED needs to see the R-22 well site. Charlie Nylander (LANL) said there is a tentative location chosen and could go look today.

Michael Dale (NMED/DOE-OB) asked about recommendations for R-5 placement. Bill Stone (LANL) said it is not final but looks like it can be placed close enough to O-1 so that R-5 can be used in pump tests.

John Young (NMED-HMB) asked if it would be possible to drill in canyon bottoms next year. David Rogers (LANL) said runoff potential could be 100 times greater than normal the first year after the fire, 10 times greater the second year, and 3-5 times greater the third year depending on vegetation

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reestablishment. Charlie Nylander (LANL) said it would probably be a number of years before drilling will be allowed in the canyons during the rainy season.

Charlie Nylander (LANL) introduced the possibility of combining R-27 and R-28. If R-27 is moved downstream because it is difficult to access original proposed location, then it will be close to R-28. This will be a topic at the next Quarterly Meeting.

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