LANL General 02

James

Los Alamos
NATIONAL LABORATORY
memorandum

**Risk Reduction and Environmental Groundwater Protection Program (RRES-GWPP)**

*To/MS:* Distribution
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*Symbol:* RRES-GWPP:02-03
*Date:* September 23, 2002

SEP 2002

**SUBJECT: QUARTERLY MEETING NOTES – JULY 24, 2002(ACTION PLAN FOR THE EXTERNAL ADVISORY GROUP SEMI-ANNUAL REPORT DATED JUNE 2002)**

Attached are the minutes from the July 24, 2002, Hydrogeologic Characterization Program Quarterly Meeting held at the Plaza Resolana, Santa Fe, New Mexico. 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.

The FY03 proposed work, with anticipated funding, is to drill four wells with NNSA funding (R-2, R-6, R-11, and R-24) and two wells with Environmental Management funding (R-4 and R-18). The FY03 well schedule represents a moving R-6 up to FY03 in place of R-27 in order to complete the Los Alamos/Pueblo Canyon watershed. If new money becomes available from accelerated cleanup funding, then an update of scope of FY03 activities will be provided.

Non-field activities planned for FY03 include efforts in information management, groundwater pathways assessment, regional aquifer modeling, geologic model, quarterly and annual meetings, and the annual report.

Please review these minutes for accuracy. If you identify substantive changes that should be made, please submit your comments to me in writing, via e-mail at nylander@lanl.gov, or by telephone at 665-4681.

Also attached is the Action Plan addressing comments and recommendations given by the External Advisory Group in their Semi-Annual Report dated June 2002.

CN/th

Enclosure: Meeting Purpose, Attendees, and Agenda
Action Plan

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J. Aldrich, EES-16, MS D462
T. Antan, EES-13, MS M992
J. Arends, RRES-MAQ, MS J978
S. Baldridge, EES-11, MS D462
C. Bare, RRES-ECO, MS M887 (3 copies)
A. Barr, RRES-SWRC, MS K498
B. Beers, RRES-WQH, MS K497
K. Birdsell, EES-16, MS M992
S. Bolivar, EES-13, MS M992
D. Broxton, EES-16, MS M992
W. Carey, EES-16, MS D462
G. Cole, EES-16, MS D462
A. Dorries, EES-13, MS M992
C. Echohawk, EES-9, MS C323
D. Erickson, ADWP, MS A106
D. Farley, EES-13, MS H865
B. Gallaher, RRES-WQH, MS K497
A. Gallegos, EES-15, MS J495
L. Goen, ADO, MS F627
F. Goff, EES-16, MS D462
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B. Grimes, MS A117
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D. Hollis, RRES-R, MS M992

J. Holt, ADO, MS A104
E. Keating, EES-16, MS T003
C. LaDelfe, EES-17, MS M992
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A. Lee, RRES-WQH, MS M992
C. Lewis, EES-9, MS D462
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B. Latham, NNMCAB
M. Manzanares, NNMCAB (2 copies)
GWPP File, MS M992
IM-5, MS A150
LANL Reading Room, MS A117
RRES-RPF (ER2002-0674)

# Los Alamos National Laboratory
# Hydrogeologic Characterization Program
# Quarterly Meeting
# July 24, 2002
# Minutes

## MEETING PURPOSE, ATTENDEES, AND AGENDA

The Los Alamos National Laboratory Groundwater Integration Team (LANL GIT) met with the New Mexico Environment Department (NMED), the Department of Energy (DOE), and stakeholders on July 24, 2002 to host the 2nd Quarter Groundwater Meeting. The meeting was held at the Plaza Resolana, Santa Fe, New Mexico. Charlie Nylander (GIT Chair) facilitated the meeting.

The following groups and stakeholders were represented (see List of Attendees for specific information):

NMED-Hazardous and Radioactive Materials Bureau
NMED-DOE Oversight Bureau
New Mexico Attorney General
DOE-Environment, Safety, and Health
DOE-Environmental Management
DOE-Northern New Mexico Citizen's Advisory Board
Defense Programs
San Ildefonso Pueblo
Concerned Citizens for Nuclear Safety
University of California
LANL-Groundwater Integration Team (GIT)

The purpose of the Quarterly Meeting was to provide NMED, DOE, and stakeholders with information on LANL's groundwater protection efforts and present planned activities for the upcoming fiscal year. The meeting agenda was as follows:

Introductions

Groundwater Integration Team (GIT) Subcommittee Reports
- Information Management
- Well Construction
- Geochemistry
- Hydrology
- Modeling

Groundwater Protection Program

Groundwater Protection Core Team

FY03 Planning Session

# Los Alamos National Laboratory
# Hydrogeologic Characterization Program
# Quarterly Meeting
# July 24, 2002
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## SUMMARY OF PRESENTATIONS AND DISCUSSIONS

### Introduction
Charlie Nylander (LANL) welcomed participants to the Los Alamos National Laboratory Hydrogeologic Characterization Program quarterly meeting.

### Information Management Subcommittee Report
Kendra Henning (LANL) described the work on the Water Quality Database in the past quarter. Achievements included successful advances in software development, updated water level and well construction data, ERDB/WQDB chemistry data exchange, and groundwater data management integration.

The following addresses will access the WQDB website:

http://wqdb.lanl.gov (internal)
http://wqdbworld.lanl.gov (external)

The development of the chain of custody module was completed this past quarter and is operating successfully. This module integrates with the WQDB Sample Planning and Tracking modules and generates chain of custody paper work for field activities.

The WQDB has new data for water levels, well construction, and chemistry. The water level data includes a listing of station names and date ranges. As the transducers generate data, the WQDB provides a graphic of the water level profile. Different screen water levels are plotted on different plots.

Well construction data includes completion reports, final configuration data, borehole geophysics, fact sheets/as-builts, and Westbay information. On-line links connect the user to the completion reports. The Westbay section also contains links for more well detail. The geophysics section offers video and any geophysics montages. Videos can take up to one hour to download on a fast DSL line. May add the geophysics logs in ascii files that can be read by certain geologic software packages.

June 2002 saw the first successful exchange of data between ERDB and WQDB. Data for R-wells 9, 9i, 12, 15, and 19 were exchanged. There were some issues with uniformity on the website that are currently being resolved; for example, the < signs.

Next quarter efforts will be towards integrating the groundwater data management processes. The goal is a single database repository for drilling, characterization, and surveillance data to include sample planning and tracking, well construction, chemistry, and geophysics. Will also be investigating a means to make more documents available over the website.

### Well Construction Subcommittee Report
John McCann (LANL) summarized well construction and quarterly sampling activities for the last quarter.

Well R-14 drilling started on June 2. This well is located in Mortandad Canyon. Cored to 306 ft and that core is now being analyzed. The regional aquifer groundwater level is 1180 ft. The well is currently being developed and the water is looking good. New drilling techniques were used: stiff foam in vadose zone worked great and the geophysics good. Used bentonite mud in saturated zone but lost circulation; tried casing advance. Only made 40 ft with casing advance and terminated at 1325 ft. The original target

depth was 1664 ft. Also, geophysics was not done in the lower portion because of the heavy-wall casing used in the casing advance drilling method.

Current activities include:

- Four wells to be installed by end of this FY (R-16, R-20, R-23, R-32). Three of the four are in Pajarito Canyon. Want to get deep as possible in R-16 for hydrologic data.

- Currently working on R-32. Drilled to 60 ft and hit a boulder. Moved the rig, drilled down, tried to get conductor casing down, but a boulder sheared it off. Moved the rig again, drilled through the alluvium, set casing, concrete is now setting.

- R-20 is scheduled next and will start with different drilling contractor – Stewart Brothers. This borehole will be used to pilot test a water sampling technology. This technology was developed in Germany and used successfully in Africa to differentiate fresh from brackish water while drilling water supply wells.

- R-16 will be drilled last because of heavy equipment in a recreational area in White Rock.

- R-21, located by TA-54, is to be installed by DOE, who will be using the Corp of Engineers (COE). The COE has the ability to contract with various organization and will do firm fixed price.

- R-22 will be started with another Dynatech contractor

- Actively involved in procuring new drilling contractor.

The sampling activity for the quarter included completion of characterizations sampling for eight wells (R-7, R-9, R-9i, R-12, R-15, R-19, R-22, and R-25). Screening samples were collected at R-13 and MCOBT 4.4. Sampling rounds were completed for the CdV wells (R-37-2 and R-15-3).

The well completion report for R-7 was completed. Two geochemistry reports (R-19 and R-12) were completed.

Drilling a well requires much work in addition to the drill going into the ground. For a typical well, the work scope is detailed as follows:

1. Prepare statement of work, sampling analysis plan, and evaluate contractor bids
2. Procure well materials, e.g., steel, Westbay systems
3. Prepare site-specific health and safety plans and ESH-ID reviews
4. Complete planning, obtain permits, and conduct readiness review
5. Perform site access and pad preparation, mobilize equipment
6. Conduct borehole drilling and obtain samples
7. Perform geophysical logging
8. Construct well in borehole and backfill
9. Demobilize big rig
10. Perform well development
11. Perform hydrologic testing
12. Install Westbay sampling equipment
13. Perform well surface completion and site restoration
14. Prepare fact sheet
15. Perform borehole core and groundwater sample analyses
16. Prepare well completion report
17. Perform project management activities

DP added $7.6 million to do five additional wells this year. There may be more funding next year. Six wells were funded, but if the accelerated cleanup funding goes through, could get additional funding.

**Geochemistry Subcommittee Report**
Brent Newman (LANL) reviewed Geochemistry Subcommittee progress for the quarter. The topics of interest include quarterly groundwater sampling, characterization of drilling fluids, geochemistry characterization reports, and the advanced hydrotest facility.

The status of quarterly groundwater sampling is:

| Well | Sampling Depths | Sampling Rounds | Summary of Constituents of Interest |
|---|---|---|---|
| R-5 | Screen 1: 169 ft<br>Screen 2: 375 ft<br>Screen 3: 678 ft<br>Screen 4: 860 ft | 1 round | |
| R-7 | Screen 1: 378 ft<br>Screen 2: 744 ft<br>Screen 3: 915 ft | 4 rounds | |
| R-8a | Screen 1: 731 ft<br>Screen 2: 825 ft | No sampling | |
| R-9 | Screen: 741 ft | 4 rounds | **Regional**: Tritium (11.8 pCi/L) |
| R-9i | Screen 1: 199 ft<br>Screen 2: 279 ft | 4 rounds | **Perched**: Tritium (200 and 129 pCi/L) |
| R-12 | Screen 1: 468 ft<br>Screen 2: 507 ft<br>Screen 3: 811 ft | 4 rounds | **Perched**: Tritium (141 pCi/L)<br>**Regional**: Tritium (63.4 pCi/L) |
| R-13 | Screen: 940 ft | 1 round | |
| R-15 | Screen: 1019 ft | 4 rounds | **Regional**: Tritium (1.71 pCi/L), Nitrate plus nitrite (as N) (2.33 mg/L), and Perchlorate (4.19 µg/L) (single J value) |
| R-19 | Screen 1: 844 ft - dry<br>Screen 2: 909 ft<br>Screen 3: 1190 ft<br>Screen 4: 1413 ft<br>Screen 5: 1586 ft<br>Screen 6: 1730 ft<br>Screen 7: 1835 ft | 4 rounds | |
| R-22 | Screen 1: 906 ft<br>Screen 2: 962 ft<br>Screen 3: 1273 ft<br>Screen 4: 1379 ft<br>Screen 5: 1449 ft | 4 rounds | |

| Well | Sampling Depths | Sampling Rounds | Summary of Constituents of Interest |
|---|---|---|---|
| R-25 | Screen 1: 755 ft<br>Screen 2: 892 ft<br>Screen 3: 1063 ft<br>Screen 4: 1192 ft<br>Screen 5: 1303 ft<br>Screen 6: 1406 ft<br>Screen 7: 1605 ft<br>Screen 8: 1796 ft | 4 rounds | |
| R-31 | Screen 1: 439 ft<br>Screen 2: 515 ft<br>Screen 3: 666 ft<br>Screen 4: 827 ft<br>Screen 5: 1007 ft | 2 rounds | |
| CdV-15-3 | Screen 1: 624 ft - dry<br>Screen 2: 806 ft - dry<br>Screen 3: 980 ft - dry<br>Screen 4: 1254 ft<br>Screen 5: 1350 ft<br>Screen 6: 1640 ft | 6 rounds | |
| CdV-13 | Screen 1: 927 ft<br>Screen 2: 1201 ft<br>Screen 3: 1365 ft<br>Screen 4: 1553 ft | 2 rounds | |

Constituents of interest result from four rounds of sampling and validated data. Additional characterization sampling is being conducted during July and August at several locations (R-22 [high priority], 25, 15, 9, 9i, 12, 7, and 19 [low priority]).

Groundwater with measurable tritium occurs at MCOBT 4.4, R-5, R-7, R-8, R-9, R-9i, R-12, R-15, and R-25. The wells contain a component of groundwater less the 60 years of age. Activities of tritium are less than detection at well R-19, which indicates that the well is not impacted from the Laboratory.

Drilling fluid characterization was conducted. Drilling fluid additives are used to improve drilling efficiencies and are evaluated for potential impacts. A comprehensive assessment of the geochemistry of additives was done to distinguish the additive in samples of core and water. The extraction procedure included leaching or digesting samples for 48 hours using deionized water, hydrochloric acid, or nitric acid. Leachates were filtered through 0.45-micrometer membranes. The leachates were analyzed using ion chromatography, ICP-OES and ICP-MS, ion selective electrode, titration, GC-MS, and TOC analyzer.

Geochemistry characterization reports for R-9, R-9i, R-12, R-15, and R-19 were completed this quarter. The characterization reports provide information on analytical results for inorganic and organic chemicals and radionuclides measured during four sampling events.

The Advanced Hydrotest Facility is a proposed large-scale physics project, which involves constructing tunnels in the upper part of Otowi (250 – 300 ft deep). Near the end of the mesa at TA-53, tunnels will cross Sandia Canyon, over the mesa, and into Mortandad Canyon. In Mortandad Canyon, there will be three borings between MCOBT 8.5 and R-13. Core samples taken at the facility (five in Sandia Canyon

and three in Mortandad Canyon) will provide additional information for vadose zone geochemistry and will further delineate contaminant destructions in the Bandelier Tuff.

Proposed work, contingent upon funding, is to collect core samples; analyze for anions including perchlorate and nitrate leached from core; and for stable isotopes and H3, Sr 90, Uranium (isotopics); and measure moisture content.

**Hydrology Subcommittee Report**
David Rogers (LANL) discussed the Hydrology Subcommittee efforts over the last quarter. The Purtyman, 1975 document (Purtymun, Geohydrology of the Pajarito Plateau with Reference to Quality of Water, 1949-1972; LA-UR-02-4726) will be put in the LANL library and will be available.

Bill Stone (LANL) discussed the development of R-14. The well started with wire brushing and getting 200 NTU, which is good for drilling with mud. Went back in with surging tool on wireline, which allows the use of a bailer without pulling out of the borehole. Now seeing higher NTUs as expected. Will do pumping next.

**Modeling Subcommittee Report**
Bruce Robinson (LANL) reviewed modeling efforts of the last quarter: geologic model, regional aquifer model, groundwater pathways assessment, and the VOC plume model for Area L. The geologic model now incorporates new R well data since the FY99 model was constructed. This development is so recent; there is no presentation as of yet.

Regional aquifer model is incorporating new geologic model. This is the underpinning of hydrologic model publications.

VOC plume model has been improved based on review comments. The improvements include the addition of interchange between VOC in air and pore water. There is an improved fit between model and observations. The VOC plume model for Area L did not change conclusions. The model better fits the data, but for decision-making purposes, the first model was good. An effort is being made to try to capture the full range of uncertainty for the entire system.

A list of five recent publications was distributed as a hand out. All publications have LAUR numbers and can be disseminated.

The goal of the groundwater pathways assessment project is to produce a report of model predictions with uncertainties of the concentration-time histories and plume locations for key contaminants in the regional aquifer and estimates of the likelihood that these contaminants will be detected in the R-well network and/or existing water supply wells within a specified time frame. The report will also identify the important conceptual models and parameters requiring additional study in an effort to reduce uncertainties. Several meetings will be held to discuss the conceptual models of the groundwater pathways assessment and parameters report.

The major steps in conducting the project are to 1) select contaminants of concern, 2) document conceptual models, 3) develop submodels to predict behavior and uncertainties of contaminant source terms and vadose zone and regional aquifer contaminant transports, 4) construct systems model linking submodels, 5) assign distributions for uncertain parameters, and 6) perform Monte Carlo simulations. Then the question can be asked – is the uncertainty acceptable? The answer will be used to guide data collection; however input is needed from Core Team regarding criteria. The bounding uncertainties may change as new data is added. The new geologic model is being used. The modelers try to anticipate the

uncertainties and incorporate them into the model. Err on the side of including conceptual models that there is not sufficient data to eliminate. Would like public input and will request input this afternoon.

Joni Arends (CCNS) has not further about stakeholder involvement in the modeling, as indicated in the Annual Meeting in March. It was suggested that the GIT might do something with the Citizen's Advisory Board. Also the GIT members could work with groups to arrange special activities. There is a commitment to provide more information on modeling to interested parties.

**Groundwater Protection Program**
Charlie Nylander (LANL) discussed the Laboratory's reorganization with respect to the environmental programs and groups. The new Risk Reduction and Environmental Stewardship (RRES) Division includes portions of the following groups: Environment, Safety, and Health, Engineering, and Waste Management.

Beverly Ramsey is Acting Director. A final candidate will be selected this fall. B. Ramsey has a PhD in Systems Ecology and has worked throughout the DOE complex and for private consulting firms. She is skilled in the waste management arena and is a strong and skilled division leader.

Technical groups are capability groups, which have resident scientists and engineers that work on programs such as the Groundwater Protection Program. Programs have a large comprehensive scope and the groups provide personnel.

The attributes of the reorganization are:
- ER and ESH are working closely
- Simpler budgeting process
- The Division Leader works for Associate Director for Operations who is also in control of RTBF funding
- Direct line to consolidate funding and people

The reorganization is considered a positive change, but uncertainty comes along with the change.

Groundwater Protection Program scope is larger than characterization efforts; it encompasses aspects of the overall concept of protecting groundwater. The program plan is to be drafted by end of this fiscal year. The plan will capture how all aspects (including stewardship) integrate to protect groundwater and have proper funding.

Concern was expressed that there is too much emphasis on long-term stewardship instead of environmental clean up. The President's budget cuts stewardship from $8 million to $1 million. In response, it was stated that institutional funds for stewardship have been requested, so that stewardship can continue regardless of direct funding.

If there is an emphasis on accelerated cleanup, what happens to stewardship? Sites are being pushed into stewardship under NNSA. Perhaps New Mexico sites need a new process. In response to this concern, C. Nylander suggested a call to call M. Johansen (DOE) or B. Ramsey (LANL).
It was also stated that DOE/NNSA realizes that long-term stewardship is required. May be some sort of tax, or other mechanism, can be used. Headquarters is working on plans to transition to NNSA.

Long-term stewardship means different things to different people. Being a steward of groundwater natural resource is different from long-term care and monitoring of waste sites.

Citizens want to see clean up and removal of waste so it does not get to the groundwater. Citizens are asking for direct oversight and accountability by DOE of LANL activities.

The Groundwater Protection Program functional organization chart was displayed and discussed. Field operations include drilling, sampling maintenance, plugging and abandonment of wells. Interpretation and analysis includes modeling, interpretation, environmental surveillance reporting, special publications, and special studies. Regulatory compliance and stewardship encompasses interactions with regulators and stakeholders, pollution prevention, regulatory compliance, and interrelationship between ER and GPP. The program plan is being drafted to describe this universe.

Request was made for well construction of about $14 million outside of accelerated cleanup. For personnel, about $6 million from indirect funds. If successful, overall budget in $20 million.

**Groundwater Protection Core Team**

K. Bitner (LANL) discussed the function of the Groundwater Protection Core Team. The Core Team, composed of LANL, DOE, and NMED personnel, is designed to provide leadership and guidance to the Groundwater Protection Program, address criticisms regarding lack of management in the hydrogeologic characterization program, and to improve communication between the three management entities (LANL, DOE, NMED).

With the aid of the groundwater technical team, the Core Team will work towards objectives of characterization, monitoring, and source control (protection of the regional aquifer and prevention of connectivity).

Objectives:

Characterization –

- Sufficient characterization to design a regional aquifer monitoring for water supply, RCRA Subpart F facilities, and down-gradient boundary.
- High priority known release areas characterized to determine nature and extent, sufficient to design remedy.

Monitoring –

- Have regional aquifer monitoring largely in place for water supply, RCRA Subpart F facilities, and down-gradient boundary.
- Initiate monitoring for compliance with HSWA.
- Refine the hydrogeologic conceptual model to increase the reliability of model predictions.

Source control –

- Test and implement one or more remediation systems in high priority release areas to assess effectiveness.

**FY03 Planning Session**

Charlie Nylander (LANL) outlined FY03 proposed work. With anticipated funding, DP will drill four wells (R-2, R-6, R-11, and R-24) and EM two wells (R-4 and R-18). Well R-6 was switched for R-27. With these wells, LA/Pueblo Canyon wells will be completed as well as fault-related wells. Characterization sampling and analysis will be conducted in completed well and hydrologic testing in new wells.

Non-field activities planned for FY03 include efforts in information management, groundwater pathways assessment, regional aquifer modeling, geologic model, quarterly and annual meetings, and the annual report.

If new money comes available from accelerated clean up, will provide an update of scope of FY-03 activities.

**Discussion on Approach to Groundwater Modeling**
Bruce Robinson (LANL) led the discussion on groundwater modeling. Contaminants from source travel through vadose zone into regional aquifer and to potential receptors.

Noting that there are other pathways to exposure (e.g. alluvial systems, springs, ecological receptors), B. Robinson stated that modeling distinguishes between pathways and receptors. He would like to see the Core Team nail down what the program is protecting. But the pathways are not just regional aquifer. Need to look at contaminants and conceptual model of how contaminants move. Also need regulatory criteria.

When asked if focusing on current receptors and/or future receptors, B. Robinson stated that in the absence of guidance, current day receptors are the focus. Currently assessing if the current monitoring network would detect contamination before it reaches a water supply well. Efforts could be expanded to focus on the future. Need guidance from the Core Team.

Currently dealing with just water supply wells, but modeling will expand to address all pathways. So at any point the concentration could be predicted.

Most models are in place, but are always being upgraded to address questions or issues such as calculations that include uncertainty in flow direction. If uncertainties are very large and cannot resolve a question, it will be useful to know where more information is necessary.

When asked if LANL has enough data for resolution for the entire area, the responses was that there is enough data to perform calculations and get the range. There is enough data from R-wells and shallow data, and older wells to provide bounds.

Why focus on predicting concentrations? The focus should be on flow paths to determine where to put monitoring wells. Even if the predicted concentration is low, will still have to monitor.

Flow paths and travel times will be a major emphasis. If the travel time is 1000s of years, shouldn't waste time with a well. Focus should be on a travel time of 30 years. Suppose a risk assessment was conducted and the predicted concentration was three times lower than standard and HE is present above standard. Where should the focus be? Not trying to get rid of uncertainty, but to quantify it. Want to provide information on how much certainty there is to decision-makers.

There are standards and precedents. The Core Team needs to decide on what numbers should be used. For example, WIPP has already established a point of compliance and a level. These were based on another model to establish what is an unacceptable level.

In absence of criteria, LANL is continuing to work on pathways assessment, which might help with Core Team decisions.

Concern was expressed that there will be waste left in the ground, and a point of compliance that isn't addressed. Modeling to Cochiti is needed as it is not known how far south water flows. LANL responded by stating that currently modeling known sources within boundaries, but pathways do not stay within LANL boundaries and the modeling will go as far as it needs to.

Regarding sources, not just looking at contaminants detected in regional aquifer. Being more inclusive in not throwing out contaminants that may not make it out of the vadose zone. There is no way possible to include every chemical species, so some screening is necessary. Want to let the model show what happens to those chemicals. Extensive reviews are needed to determine source areas and inventories starting at source area and trying to capture uncertainty in the inventory.

Modeling intended to assess perchlorate. In the model, will dump the DC level perchlorate and see where it goes.

What are you doing with porosity of soils and how moving through? Modelers are conducting contaminant flow and transport models with measurements of moisture content.

Regarding fate and transport in specific lithologies, confidence in behavior of specific chemicals, there is a broad range in uncertainty. But if the uncertainty is wide, can still model while understanding the uncertainty. Currently using dissolved species, so not concerned about precipitation. Sorption is important. Some chemicals (perchlorate, H3) do not sorb. Regarding radionuclides, the sorption will likely be significant and have significant uncertainty.

Is flow in fractures being considered? There is a lot of evidence that water will flow through the matrix. Not true for every rock layer or every spot. But for most of the Laboratory, percolation is towards the matrix of Bandelier Tuff. Will be doing fast path preferential pathways – fractures.

What will be published in December? The published results of a model of several contaminants will include overall predictions of overall plume locations, concentrations, travel times, and assessment of uncertainty in those.

C. Nylander (LANL) stated that another aspect is to take predicted plumes compared to existing monitoring wells. This will help focus on areas where monitoring is needed or more characterization is needed. Three or four years ago, did not have models or sophisticated analysis. Now that they are available, it is worth doing this analysis.

PRSs have been identified as source terms. Are 100% of releases modeled, even if it is a solid? There are situations where there is a solid source. For those, would have a release model. If there is uncertainty in solubility, will have a probability distribution. If there was a liquid source, eg outfall, This will be treated differently. But sources will be treated as realistically as possible; do not want to be over or under conservative.

Concern was stated that records are not good about what went into earlier sites. This then translates into high uncertainty.

Uncertainty in parameters is reflected in probability distribution. Calculations then sample from each probability distribution for each parameter. Run a simulation of the plume using the sampled input. Run many simulations resulting in many realizations of the plume. These realizations, when plotted, also produce a probability distribution. This can be used to determine that 95% of the calculations are below same number.

It was noted that this does not account for uncertainty in the conceptual model; for example, matrix flow vs. fracture flow in vadose zone.

Another way to address conceptual model uncertainty is to construct two different models and run sensitivity analyses. With this method, a modeler can look at implications of one flow to another.

In general, modelers want to use QA'd data to maintain a pedigree, but do not want to throw anything out. Modelers want to use everything that went into the geologic model - water level information, contaminant measurements in vadose zone and regional aquifer.

An effort will be made to have models be self-documented, for example, source terms. There will be links that specify where the information came from.

It was stated that better input would be received when a document is published with a request for comment and input. Suggest input on conceptual models in white paper format.

How does the new 3-D geologic model affect hydrologic model? It is important in stratigraphic refinement, particularly as they relate to hydrogeologic properties.

**Los Alamos National Laboratory**
**Hydrogeologic Characterization Program**
**Quarterly Meeting**
**July 24, 2002**
**Minutes**

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Los Alamos National Laboratory
Groundwater Integration Team

# Action Plan

for

External Advisory Group
June 2002 Recommendations

September 16, 2002

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## INTRODUCTION

This Action Plan addresses the recommendations in the External Advisory Group's (EAG) eighth semi-annual report, "Semi-Annual Report to the Groundwater Integration Team of the Los Alamos National Laboratory by the External Advisory Group", dated June 2002. The EAG was established in October 1998 to provide a periodic external assessment of Los Alamos National Laboratory's (LANL or Laboratory) Hydrogeologic Characterization Program and the implementation of proposed characterization activities.

This is the eighth Action Plan written to address EAG recommendations. This Action Plan addresses the recommendations from the EAG June 2002 report. Previous EAG semi-annual reports dated November 1998, July 1999, December 1999, March 2000, December 2000, June 2001, December 2001, and October 2001 detail that year's recommendations.

## EAG JUNE 2002 RECOMMENDATIONS AND GIT PROPOSED ACTIONS

The following section provides a description of each EAG recommendation paraphrased from the June 2002 Semi-Annual Report, and the LANL Groundwater Integration Team (GIT) proposed action for addressing the recommendation. Each recommendation is provided a "tracking" number that includes the month and year of the EAG report from which it was taken. A summary table of each of the recommendations and proposed actions is provided (Table 1). The summary table also provides a crosswalk to previous EAG recommendations (November 1998, July 1999, December 1999, March 2000, December 2000, June 2001, December 2001, and October 2001 Semi-Annual Reports) that are similar.

### MANAGEMENT AND GLOBAL ISSUES – Program Management

***Recommendation 6-02-1: The primary recommendation is for the Senior Management Core Team to meet sooner rather than later and make some choices.***

The EAG recognizes the immediate need for defining end states to the Hydrogeologic Characterization Program. The decisions to be made are managerial and administrative, as well as technical. The Senior Management Core Team should convene immediately to make necessary decisions, with the assistance of staff, to define the end states of the program.

***Proposed Action 6-02-1:***
The GIT concurs with the need to have guidance from LANL, DOE, and NMED senior managers. The Groundwater Protection Core Team formed in April 2002. The Core Team charter and schedule will be as determined by the Core Team.

**Recommendation Requiring Additional Action:**

***12-01-2 agrees to preparation of some final document draft. The new recommendation above reinforces 7-00-1 and 12-99-1 where commitment was made to define end states. The EAG does not recommend combining these various quests for end states.***

The EAG and GIT agree that a draft final report for the program will help guide the direction of the program toward completion. The EAG suggests that the draft be created from modifications to the annual report.

***12-01-2:***
The GIT concurs with this recommendation and will evaluate the format of the FY02 Groundwater Annual Status Report with this in mind.

**MANAGEMENT AND GLOBAL ISSUES – Management and Stakeholder Issues**

***No new recommendations.***

**MANAGEMENT AND GLOBAL ISSUES – Data Quality Objectives**

***Recommendation 6-02-2: Convene the Core Management Team and quickly make program objective and goal decisions that allow the data quality objectives to be clearly defined and developed to the needed level of accuracy and precision.***

The EAG states that existing DQOs for the HWP are vague with respect to the level of accuracy and precision necessary to reach Workplan goals. With the assistance of technical staff, it is imperative for the Core Team to make decisions regarding accuracy, precision, and levels of confidence of Workplan objectives. Refer also to Recommendation 6-02-1 above.

***Proposed Action 6-02-2:***
The GIT concurs with the need to have guidance from LANL, DOE, and NMED senior managers. The Groundwater Protection Core Team formed in April 2002. The Core Team charter and schedule will be as determined by the Core Team.

**Recommendation Requiring Additional Action:**

***Reconsider the EAG recommendation that is addressed in the LANL Action Plan for EAG Recommendations (March 31, 2002) with the Proposed Action 12-01-5 for any subsequent DQO iterations, especially with regard to better documenting the rationale for the decisions and considering the process in terms of risk management decisions or drivers.***

Several references were cited indicating DOE's acceptance and use of the DQO process. The EAG stated that the DQO iteration undertaken in 2001 was not a true DQO process, but a discussion between technical staff and without employing risk assessment or risk management decision-making. The EAG would like a more true and well-documented DQO process to be used in decision making. GIT responded by stating that the DQO process does not have to involve risk assessment or risk-based decisions.

The EAG restates its recommendation that decision-making regarding environmental concerns must be guided by risk-assessed DQOs.

***12-01-5:***
The GIT is using the Groundwater Pathways Assessment as the primary tool in developing risk-based DQOs.

**MANAGEMENT AND GLOBAL ISSUES – Administrative**

***No new recommendations.***

## TECHNICAL ISSUES – Data Gathering and Database

***Recommendation 6-02-3: Establish a database mechanism whereby online reports can be generated for subsets of parameters rather than for all parameters or just a single parameter.***

The EAG compliments efforts in the on going development of the Water Quality Database (WQDB). Recognizing their limited efforts in exploring the WQDB, the EAG does recommend more flexibility in creating reports using selective multiple parameters. If the WQDB has this functionality, the EAG requests instructions.

***Proposed Action 6-02-3***

The WQDB team will add this enhancement to their task list.

***Recommendation 6-02-4: Online database searching and displaying functions should be optimized for speed.***

The EAG requests that the Information Subcommittee research the optimization of the database systems relative to increasing the speed at which reports are created and displayed. Using high-speed Internet connections and state of the art computer hardware has not enhanced the speed of information display, allowing the EAG to conclude that the issues reside with the database. It is suggested that the Subcommittee investigate optimization of search engines, hardware, and software.

***Proposed Action 6-02-4***

During the week of July 29, 2002 the WQDB team spent time tracing WQDB performance problems and tuned the database. It is now significantly faster than it has been in the past. Internal configuration parameters were the primary cause of the problem, but it is worth noting that the server on which the public website database resides is nearing the end of its useful life. The WQDB team has identified a newer, larger server that it can migrate to, and intends to do so in the next one to two months. This should offer additional performance improvements.

***Recommendation 6-02-5: Develop some methods for graphically depicting relationships between wells, flowpaths, etc, that are short of a GIS system but still allow stakeholders to better comprehend the data relationships.***

Due to security issues, LANL maps are not currently available on-line. The EAG would like the GIT to investigate other means to display geographical references, which would summarize data relationships for WQDB users. The EAG suggests reviewing options available with charts, graphs, and cross-sectional subsurface-only depictions.

***Proposed Action 6-02-5:***

The WQDB team will add this enhancement to their task list. There has been a desire to move in this direction for some time, but have been resource constrained (need more staff). As mentioned, security restrictions on public availability of maps have also made the issue more complex, as the GIT would like to use traditional ESRI GIS tools to deliver these capabilities. As an alternative, more sophisticated chart and graph options for website data are being investigated. Also attempting to establish database relationships that allow queries by geographical reference such as by canyon designation.

## TECHNICAL ISSUES – Modeling

***Recommendation 6-02-6: Evaluate impacts of recent diversions of GIT modeling resources from scheduled Workplan tasks, and adjust schedule as necessary.***
Modeling resources have been focusing efforts on post fire-related activities and water supply issues related to the Santa Fe Buckman Well Field. The EAG would like the diversion of modeling efforts to be assessed in relation to the well drilling and data collection efforts. If the diversion of modeling efforts is impacting analysts' input and guidance to data collection activities, then funding and schedule changes are necessary to accelerate modeling activities to bring them in line with the Workplan program.

***Proposed Action 6-02-6:***
The schedule laid out in the Workplan for modeling is still realistic and does not need adjustment. The GIT believes that although the two items mentioned in the technical issue have taken time, planning was not taken into consideration. The modeling is going forward alongside the drilling program, and will continue to be used to provide input on prioritization of well placement and the DQO process. Also striving for a more robust planning process to mitigate the resource diversions that occur when additional studies arise; such as post-fire modeling and the extensive presentation and reporting requirements of the Buckman well field study.

***Recommendation 6-02-7: The GIT subcommittees and teams should take the opportunity early in the Core Team process to clearly identify the specific points of guidance they have recently been seeking that will ultimately assist them in bringing Workplan activities to a successful conclusion.***
The EAG recommends the Modeling Subcommittee educate the Core Team on the role of modeling in the Workplan, and then seek Core Team guidance on regulatory issues and criteria necessary to assist in the development of goals for modeling analyses. The modeling analyses are integral to the identification of additional data needs, which in turn will define data collection efforts within the scope of final Workplan goals.

***Proposed Action 6-02-7:***
The GIT agrees with this EAG recommendation, and intends to communicate and obtain guidance from the core team to focus the modeling effort.

***Recommendation 6-02-8: Incorporation of uncertainty into modeling analyses, and development of scenarios to be modeled, should be focused on issues important to, and specifically identified by, decision makers.***
Stakeholders have requested that modeling incorporate specific scenarios to provide a context for presentation purposes. Also, the GIT stated plans to incorporate uncertainty into modeling activities. The EAG urges caution in using uncertainty and scenarios in modeling analyses. Scenarios and uncertainty should be carefully defined to avoid unrealistic outcomes. End uses of modeling results should be clearly stated during the initial stage of the modeling project. This will help identify and develop appropriate technical approaches to address end state goals as defined by the Core Team.

***Proposed Action 6-02-8:***
It is believed that the development of a process involving the Core Team will lead to the desired outcome of focusing the modeling on issues important to stakeholders and decision makers. Because the modeling staff is part of the process, the staff will be able to provide guidance as to

what can and cannot be done with models, what types of scenarios should be examined, and the appropriate modeling approach needed to address the scenario. A two-way interaction between modelers and the core team will ensure that "the right problems" are being solved and that the core team is informed on the strengths and limitations of the models. Regarding the danger of obtaining unrealistic outcomes, the plan calls for uncertainty analyses within the confines of what is currently known about the system. Therefore, the hydrology and modeling staff will be scrutinizing all scenarios to assess their realism, and if a scenario is proposed that is believed to be inconsistent with data or known hydrologic principles, the issue will be discussed with the person who proposed the scenario and concurrence will be sought in conclusions. End uses of models such as the Groundwater Pathways Assessment modeling are being developed and will be clearly stated in updates at GIT quarterly meetings and in reports.

## TECHNICAL ISSUES – Geochemistry and Geochemical Modeling

***Recommendation 6-02-9: Carefully consider where tasks appropriate to the Workplan end and those associated with remediation (vis-à-vis the ER project) begin so that appropriate resources are utilized for each.***

The EAG feels that the Permeable Reactive Barrier project is outside the scope of the Workplan. If the project is to be pursued, it should not be under the guise of the Workplan or its budget.

***Proposed Action 6-02-9:***

The permeable reactive barrier (PRB) project is outside the scope of the Hydrogeologic Workplan. The project, however, should be summarized periodically because it is a component of groundwater remediation and a topic of interest to the Groundwater Protection Program. Presentation of PRB information at the Annual Meeting was in response to a direct stakeholder request.

***Recommendation 6-02-10: Show how the geochemical modeling comes together as a whole for the Plateau.***

The EAG recognizes the value of information provided by geochemical modeling. It is recommended that modeling be presented in context of the Pajarito Plateau as a complete plan, rather than a series of projects.

***Proposed Action 6-02-10:***

The Geochemistry Subcommittee agrees with this recommendation. More integration with geochemical modeling will take place in FY03. The Geochemistry Subcommittee will be performing more geochemical simulations with emphasis on integration of geochemical processes (adsorption and reactive transport) along known flowpaths.

## TECHNICAL ISSUES – Geologic Modeling

***Recommendation 6-02-11: Focus geologic modeling efforts funded by the Workplan on areas of significant water infiltration and flow as well as trying to understand geological impacts on aqueous chemistry.***

The EAG recognizes that the GIT geologic modeling efforts are being focused on areas of high significance to Workplan objectives, such as infiltration through faults and fractures, investigation of extent and porosity of stratigraphic layers in zones of infiltration and the regional aquifer, and how these influence fluid flow and contaminant transport and fate beneath wet canyons having known or potential contaminant source terms. Given the time and resource limits of the Workplan, these efforts should continue.

***Proposed Action 6-02-11:***

Geochemical modeling will focus on adsorption, speciation, and precipitation using reactive transport and batch approaches. Empirical data will provide validation and calibration for geochemical modeling simulations.

## TECHNICAL ISSUES – Drilling and Well Completion

***Recommendation 6-02-12: In developing wells with multiple screen zones, use dual packers to isolate individual screens for pumping with a submersible pump.***

The EAG stresses the importance of isolating individual screen zones with packers for pumping with a submersible pump. It is understood that the Field Support Facility has the necessary equipment to support this effort. And it is understood that tight zones that do not produce enough flow, submersible pumping can not be done. For those zones that do have static water levels lower than the well average, the EAG recommends isolation pumping to improve well development effectiveness.

***Proposed Action 6-02-12:***

The GIT concurs with the benefits of having a dual packer for pumping isolated individual screens to thoroughly develop the wells. The availability of equipment that will fit inside the wells will continue to be investigated.

***Recommendation 6-02-13 Keep the 5-inch OD casing size as an option for completing the R wells.***

Replacing the 5-inch OD casing with the larger 6 5/8 inch OD pipe has the advantage of using larger development tools and pumping test equipment. The larger size pipe requires a larger borehole for installation, which would work well for open borehole wells or wells with 11 ¾ inch OD advance casing. The EAG suggests that the 5-inch OD casing be retained as an option for wells drilled with 9 5/8 inch OD advance casing. This would allow sufficient annular space for backfill materials.

***Proposed Action 6-02-13:***

The GIT concurs with the recommendation and will keep the option of completing R-wells with 5-inch OD casing.

***Recommendation 6-02-14: In the face of regulatory pressure, remain vigilant in retaining control over key design decisions such as drilling methods, development procedures, screen design, and so on.***

The EAG believes that the NMED may be infringing on LANL design decisions regarding drilling methods, well development, and contractual issues as indicated in NMED's March 1, 2002 letter to LANL. The EAG suggests that LANL maintain control over key decision in the well drilling and development program and resist recommendations that may result in bad outcomes.

***Proposed Action 6-02-14:***

The GIT will continue to invite NMED involvement in the process of determining DQOs and well design. However, the final decisions will remain with LANL.

**TECHNICAL ISSUES – Hydrology**

***Recommendation 6-02-15: Continue to monitor the manufacture and utilization of a dual packer assembly for conducting packer pumping tests, or provide the EAG information on why this can't be done.***

Regarding plans made last year to purchase dual packer equipment that would allow constant-rate pumping tests to be conducted on individual screen zones, the EAG would information about the status of the plan. LANL has expressed that technical difficulties has made implementation of the equipment impossible, while the manufacturer, Baski, Inc., feels that implementation is possible. The EAG requests clarification of the issue and recommends purchasing equipment, if feasible.

***Proposed Action 6-02-15:***

The GIT concurs with the EAG recommendation on purchasing a dual packer assembly, both for well development and for conducting packer tests. The availability of equipment that will fit inside the wells will continue to be investigated.

**Recommendation Requiring Additional Action:**

***The various types of hydrologic tests addressed in the last EAG report (Recommendations 12-01-16, 17 & 18) are still being discussed and debated among the GIT as of the April 2002 meeting. Informed management decisions from the Core Team may be necessary to resolve whether to proceed with certain, or any, of these proposed tests.***

Piezometers for the purpose of acquiring hydraulic data (12-01-16), forced gradient tracer tests (12-01-17), and colloidal borescope flow measurements (12-01-18) were discussed in the 12-01 Action Plan for EAG Recommendations. LANL stated that the tests had to be fully investigated before implementation. The EAG requests the Core Team facilitate a decision on the implementation of these tests.

***12-01-16,17,18:***

The Core Team has stated that their purpose is to provide management decisions and guidance and will not become involved in making technical decisions. The GIT must provide the technical basis for these decisions. The Groundwater Pathways Assessment is anticipated to be a helpful tool in determining whether the data that would result from implementing these hydrologic tests would be useful in reducing uncertainty.

## TECHNICAL ISSUES – Groundwater Monitoring

***No new recommendations.***

## TECHNICAL ISSUES – Risk Based Assessment

***Recommendation 6-02-16: Use risk-based objectives to determine when characterization is adequate.***

The Workplan's goals and objectives, protecting beneficial uses of groundwater, are risk-related. The EAG recommends risk-based objectives be used to define "characterization" for the purpose of meeting Workplan goals and objectives. This will provide the Workplan with a definable set of parameters to determine when characterization is adequate to meet current and future goals of protecting the uses of groundwater.

***Proposed Action 6-02-16:***

The GIT concurs with this recommendation. The Groundwater Pathways Assessment is anticipated to be a key tool in defining risk-based objectives.

***Recommendation 6-02-17: Rank future data needs according to relative significance to the completion of the Workplan.***

The EAG recommends the Core Team use decision goals as defined in Table 6-1 of the Groundwater Annual Status Report Fiscal Year 2001, costs and schedules for future data needs, and associated research programs to rank research and data collection efforts necessary to improve the characterization of the site.

***Proposed Action 6-02-17:***

The GIT concurs with this recommendation. The Groundwater Pathways Assessment is anticipated to be a key tool in defining risk-based objectives.

***Recommendation 6-02-18: Clearly define the chemicals of potential concern (COPCs) and the associated toxicities, estimated quantities and physical/chemical properties as an integral part of the Workplan and to guide essential elements of the Workplan.***

The EAG restates its previous recommendations to define COPCs and their potential magnitude and toxicities as a means to aid the monitoring and modeling programs in determining when components of the characterization program have reached a level to assure the safety of LANL operations. Defining the COPCs will also form a guideline in determining future directions of the Workplan as related to geochemical studies, pollutant transport and fate, and monitoring focus.

***Proposed Action 6-02-18:***

The GIT concurs with this recommendation. The Groundwater Pathways Assessment includes this effort and is expected to be complete in December 2002.

***Recommendation 6-02-19: Address the potential use of alternate concentration limits (ACLs) for characterizing contaminants.***

The EAG has recommended in previous reports that ACLs be considered to help determine potential contaminant concerns. The EAG now recommends that the Core Team address the

use of ACLs and their applicability to the site. It may be beneficial for the Core Team to investigate precedents set at other sites.

***Proposed Action 6-02-19:***

The concept of ACLs or the New Mexico version, known as alternative abatement standards where abatement has been demonstrated to be technically infeasible, has been introduced to the Core Team. However, the Core Team has established its own agenda and schedule.

**TABLE 1.**
**EAG CURRENT RECOMMENDATIONS AND PROPOSED ACTIONS**

| Number | Recommendation | Action | Estimate of Schedule and Funding Impacts from Recommendation |
|---|---|---|---|
| 6-02-1 | The primary recommendation is for the Senior Management Core Team to meet sooner rather than later and make some choices. | The GIT concurs with the need to have guidance from senior managers of LANL, DOE, and NMED. The Groundwater Protection Core Team formed in April 2002. The Core Team charter and schedule will be as determined by the Core Team. | *Low impact, unless the Core Team requires major changes to planned work.* |
| 6-02-2 | Convene the Core Management Team and quickly make program objective and goal decisions that allow the data quality objectives to be clearly defined and developed to the needed level of accuracy and precision. | The GIT concurs with the need to have guidance from senior managers of LANL, DOE, and NMED. The Groundwater Protection Core Team formed in April 2002. The Core Team charter and schedule will be as determined by the Core Team. | *Low impact, unless the Core Team requires major changes to planned work.* |
| 6-02-3 | Establish a database mechanism whereby online reports can be generated for subsets of parameters rather than for all parameters or just a single parameter. | The WQDB team will add this enhancement to their task list. | *Low impact.* |
| 6-02-4 | Online database searching and displaying functions should be optimized for speed. | The database is now significantly faster since internal configuration parameters were the primary cause of the problem. However, the public website server is nearing the end of its useful life and a newer, larger server will be in use in the next 1-2 months. This should offer additional performance improvements. | *No impact* |

**TABLE 1.**
**EAG CURRENT RECOMMENDATIONS AND PROPOSED ACTIONS**

| Number | Recommendation | Action | Estimate of Schedule and Funding Impacts from Recommendation |
|---|---|---|---|
| 6-02-5 | Develop some methods for graphically depicting relationships between wells, flowpaths, etc, that are short of a GIS system but still allow stakeholders to better comprehend the data relationships. | The WQDB team has wanted to move in this direction for some time, but resource constraints and security restrictions on public availability of maps have also made the issue more complex. As an alternative, we are investigating more sophisticated chart and graph options for website data. We are also attempting to establish database relationships that allow queries by geographical reference such as by canyon designation. | *Low impact* |
| 6-02-6 | Evaluate impacts of recent diversions of GIT modeling resources from scheduled Workplan tasks, and adjust schedule as necessary. | We believe that although the two items mentioned in the technical issue have taken time that we had not taken into consideration in the planning, that the schedule laid out in the Workplan for modeling is still realistic and does not need adjustment. The modeling is going forward alongside the drilling program, and will continue to be used to provide input on prioritization of well placement and the DQO process. We are also striving for a more robust planning process to mitigate the types of diversions of resources that occurs when new items such as post-fire modeling and the extensive presentation and reporting requirements of the Buckman well field study happen in the future. | *Low impact* |

**TABLE 1.**
**EAG CURRENT RECOMMENDATIONS AND PROPOSED ACTIONS**

| Number | Recommendation | Action | Estimate of Schedule and Funding Impacts from Recommendation |
|---|---|---|---|
| 6-02-7 | The GIT subcommittees and teams should take the opportunity early in the Core Team process to clearly identify the specific points of guidance they have recently been seeking that will ultimately assist them in bringing Workplan activities to a successful conclusion. | We agree with this EAG recommendation, and intend to communicate and obtain guidance from the core team to focus the modeling effort. | *Low impact, unless the Core Team requires major changes to planned work.* |
| 6-02-8 | Incorporation of uncertainty into modeling analyses, and development of scenarios to be modeled, should be focused on issues important to, and specifically identified by, decision makers. | We believe that the development of a process involving the Core Team will lead to the desired outcome of focusing the modeling on issues important to stakeholders and decision makers. End uses of models such as the Groundwater Pathways Assessment modeling are being developed and will be clearly stated in our updates at GIT quarterly meetings, and in our reports. | *Low impact, unless the Core Team requires major changes to planned work.* |
| 6-02-9 | Carefully consider where tasks appropriate to the Workplan end and those associated with remediation (vis-à-vis the ER project) begin so that appropriate resources are utilized for each. | The permeable reactive barrier (PRB) project is outside the scope of the Hydrogeologic Workplan. The project, however, should be summarized periodically because it is a component of groundwater remediation and a topic of interest to the Groundwater Protection Program. | *No impact* |
| 6-02-10 | Show how the geochemical modeling comes together as a whole for the Plateau. | More integration with geochemical modeling will take place in FY03. The Geochemistry subcommittee will be performing more geochemical simulations with emphasis on integration of geochemical processes (adsorption and reactive transport) along known flowpaths. | *Low impact* |

**TABLE 1.**
**EAG CURRENT RECOMMENDATIONS AND PROPOSED ACTIONS**

| Number | Recommendation | Action | Estimate of Schedule and Funding Impacts from Recommendation |
|---|---|---|---|
| 6-02-11 | Focus geologic modeling efforts funded by the Workplan on areas of significant water infiltration and flow as well as trying to understand geological impacts on aqueous chemistry. | Geochemical modeling will focus on adsorption, speciation, precipitation suing reactive transport and batch approaches. Empirical data will provide validation and calibration for geochemical modeling simulations. | *Low impact* |
| 6-02-12 | In developing wells with multiple screen zones, use dual packers to isolate individual screens for pumping with a submersible pump. | The GIT concurs with the benefits of having a dual packer for pumping isolated individual screens to thoroughly develop the wells. The availability of equipment that will fit inside the wells will continue to be investigated. | *Low to moderate impact, depending on the cost of the equipment.* |
| 6-02-13 | Keep the 5-inch OD casing size as an option for completing the R wells. | The GIT concurs with the recommendation and will keep the option of completing R-wells with 5-inch OD casing. | *No impact* |
| 6-02-14 | In the face of regulatory pressure, remain vigilant in retaining control over key design decisions such as drilling methods, development procedures, screen design, and so on. | The GIT will continue to invite NMED involvement in the process of determining DQOs and well design. However, the final decisions will remain with LANL. | *No impact* |
| 6-02-15 | Continue to monitor the manufacture and utilization of a dual packer assembly for conducting packer-pumping tests, or provide the EAG information on why this can't be done. | The GIT concurs with the EAG recommendation on purchasing a dual packer assembly, both for well development and for conducting packer tests. The availability of equipment that will fit inside the wells will continue to be investigated. | *Low to moderate impact, depending on the cost of the equipment* |
| 6-02-16 | Use risk-based objectives to determine when characterization is adequate. | The GIT concurs with this recommendation. The Groundwater Pathways Assessment is anticipated to be a key tool in defining risk-based objectives. | *Low impact* |
| 6-02-17 | Rank future data needs according to relative significance to the completion of the Workplan. | The GIT concurs with this recommendation. The Groundwater Pathways Assessment is anticipated to be a key tool in defining risk-based objectives. | *Low impact* |

**TABLE 1.**
**EAG CURRENT RECOMMENDATIONS AND PROPOSED ACTIONS**

| Number | Recommendation | Action | Estimate of Schedule and Funding Impacts from Recommendation |
|---|---|---|---|
| 6-02-18 | Clearly define the chemicals of potential concern (COPCs) and the associated toxicities, estimated quantities and physical/chemical properties as an integral part of the Workplan and to guide essential elements of the Workplan. | The GIT concurs with this recommendation. The Groundwater Pathways Assessment includes this effort and is expected to be complete in December 2002. | *Low impact* |
| 6-02-19 | Address the potential use of alternate concentration limits (ACLs) for characterizing contaminants. | The concept of ACLs or the New Mexico version, known as alternative abatement standards where abatement has been demonstrated to be technically infeasible, has been introduced to the Core Team. However, the Core Team has established their own agenda and schedule. | *Low impact* |

## APPENDIX A: COMPREHENSIVE LIST OF RECOMMENDATIONS AND STATUS OF PROPOSED ACTIONS

The EAG will produce two reports, e.g., "External Advisory Group Semi-Annual Report", for each fiscal year of implementation of the Hydrogeologic Characterization Program. Each report will contain the EAG's comments and recommendations. The Laboratory will address the comments and recommendations in an action plan for each of the EAG's reports.

Table A-1 provides a matrix matching EAG reports with the Laboratory's action plan addressing each report.

**Table A-1: EAG Reports and Corresponding LANL GIT Action Plans**

| EAG Report | Date | LANL GIT Action Plan | Date |
|---|---|---|---|
| "Semi-Annual Report to the Groundwater Integration Team of the Los Alamos National Laboratory by the External Evaluation Group" | 11-98 | "Los Alamos National Laboratory Groundwater Integration Team Action Plan for External Evaluation Group November 1998 Recommendations" | 2-99 |
| "Semi-Annual Report to the Groundwater Integration Team of the Los Alamos National Laboratory by the External Advisory Group" | 7-99 | "Los Alamos National Laboratory Groundwater Integration Team Action Plan for External Evaluation Group July 1999 Recommendations" | 11-99 |
| "Semi-Annual Report to the Groundwater Integration Team of the Los Alamos National Laboratory by the External Evaluation Group" | 12-99 | "Los Alamos National Laboratory Groundwater Integration Team Action Plan for External Evaluation Group October 1999 Recommendations" | 02-00 |
| "Semi-Annual Report to the Groundwater Integration Team of the Los Alamos National Laboratory by the External Evaluation Group" | 6-00 | "Los Alamos National Laboratory Groundwater Integration Team Action Plan for External Evaluation Group March 2000 Recommendations" | 9-00 |
| "Semi-Annual Report to the Groundwater Integration Team of the Los Alamos National Laboratory by the External Evaluation Group" | 12-00 | "Los Alamos National Laboratory Groundwater Integration Team Action Plan for External Evaluation Group December 2000 Recommendations" | 3-01 |
| "Semi-Annual Report to the Groundwater Integration Team of the Los Alamos National Laboratory by the External Evaluation Group" | 6-01 | "Los Alamos National Laboratory Groundwater Integration Team Action Plan for External Evaluation Group March 2001 Recommendations" | 7-01 |
| "Semi-Annual Report to the Groundwater Integration Team of the Los Alamos National Laboratory by the External Evaluation Group" | 12-01 | "Los Alamos National Laboratory Groundwater Integration Team Action Plan for External Evaluation Group December 2001 Recommendations" | 4-02 |
| "Semi-Annual Report to the Groundwater Integration Team of the Los Alamos National Laboratory by the External Evaluation Group" | 6-02 | This document | 9-02 |