

General

Los Alamos

Los Alamos National Laboratory
Los Alamos, New Mexico 87545

memorandum

TO: Distribution
Charles Nylander
FROM: Charlie Nylander, ESH-18
DATE: March 16, 2000
MAIL STOP/TELEPHONE: K497/5-4681
SYMBOL: ESH-18/WQ&H:00-0083
SUBJECT: **ACTION PLAN FOR THE EXTERNAL ADVISORY GROUP SEMI-ANNUAL REPORT DATED DECEMBER 1999**

Attached is the Action Plan addressing comments and recommendations contained in the External Advisory Group Semi-Annual Report dated December 23, 1999.

If you have any questions or comments concerning this action plan, please direct them to myself at 665-4681 or nylander@lanl.gov.

CN/rm

Enclosures: a/s

Distribution:

A. Armijo, NNM CAB, Nambe Pueblo, NM, w/enc.
J. Arends, CCNS, w/enc.
K. Agogino, EPD, DOE/AL, Albuquerque, NM, w/enc.
R. Enz, DOE/LAAO, MS A316, w/enc.
T. Taylor, LAAME, DOE/LAAO, MS A316, w/enc.
J. Vozella, DOE/LAAO, MS A316, w/enc..
M. Johansen, DOE/LAAO, MS A316, w/enc.
G. Turner, DOE/LAAO, MS A316, w/enc.
J. Ordaz, DOE/HQ/DP-13, Germantown, MD, w/enc.
T. Longo, DOE/HQ/EM-45, Germantown, MD, w/enc.
W. Holman, ERD/DOE, Oakland, CA, w/enc.
E. Anderson, EAG, Sciences International Inc., Alexandria, VA, w/enc.
R. Charles, EAG, Ranchester, WY, w/enc.
R. Powell, EAG, Powell & Associates, Las Vegas, NV, w/enc.
J. Powers, EAG, Murray, UT, w/enc.
J. Powers, EAG, Salt Lake City, UT, w/enc.
J. Powers, EAG, Bloomington, MN, w/enc.
D. Schafer, EAG, Stillwater, MN, w/enc.
A. Chang, EPA, Dallas, TX, w/enc.

RECEIVED
MAR 21 2000
DOE OVERSIGHT BUREAU



13345

ER / Framework

R. Mayer, EPA, Dallas, TX, w/enc.
D. Neleigh, EPA, Dallas, TX, w/enc.
P. Reneau, IT Corp., MS M892, w/enc.
F. Orth, Los Alamos County, Los Alamos, NM, w/enc.
M. Bates, Los Alamos Study Group, w/enc.
R. Hull, LATA, MS M321, w/enc.
S. Johnson, LATA, MS M321, w/enc.
M. Everett, MK/PMC, MS M327, w/enc.
A. Crowder, MK/PMC, MS M327, w/enc.
K. Bitner, Neptune & Co., Albuquerque, NM, w/enc.
K. Hull, Neptune & Co., Albuquerque, NM, w/enc.
J. Bearzi, NMED/HRMB, Santa Fe, NM, w/enc.
J. Kieling, NMED/HRMB, Santa Fe, NM, w/enc.
J. Young, NMED/HRMB, Santa Fe, NM, w/enc.
M. Leavitt, NMED/GWQB, Santa Fe, NM, w/enc.
P. Bustamante, NMED/GWQB, Santa Fe, NM, w/enc.
J. Davis, NMED/SWQB, Santa Fe NM, w/enc.
J. Parker, NMED/DOE/OB, Santa Fe, NM, w/enc.
M. Dale, NMED/DOE/OB, MS J993, w/enc.
C. Hanlon-Meyer, NMED/DOE/OB, Santa Fe, NM, w/enc.
S. Yanicak, NMED/DOE/OB, MS J993, w/enc.
P. Maggiore, NMED Secretary, Santa Fe, NM, w/enc.
R. Montoya, NMED/DOE/OB, Santa Fe, NM, w/enc.
B. Wedgeworth, NMED/DOE/OB, Santa Fe, NM, w/enc.
M. Taylor, NMED/HRMB, Santa Fe, NM w/enc.
J. Mullany, NMED/GWQB, Santa Fe, NM w/enc.
G. Lewis, NMED/HRMB, Santa Fe, NM w/enc.
B. Jacobs, Bandelier, NM, w/enc.
J. Pecos, Cochiti Pueblo, Cochiti, NM, w/enc.
D. Duffy, Jemez Pueblo, Jemez, NM, w/enc.
J. Chavarria, Santa Clara Pueblo, Espanola, NM, w/enc.
R. Gutierrez, Santa Clara Pueblo, Espanola, NM, w/enc.
D. Saracino, San Ildefonso Pueblo, Santa Fe, NM, w/enc.
K. Nasser, Revision, Denver, CO, w/enc.
R. Koch, SAIC, MS J521, w/enc.
R. Lewis, Schlumberger, Englewood, CO, w/enc.
B. Johnson, Westbay, N. Vancouver, w/enc.
F. Patton, Westbay, N. Vancouver, w/enc.
C. Abeyta, USGS, w/enc.
Congressman T. Udall, Santa Fe, NM, w/enc.
K. Henning, CIC-15, MS M311, w/enc.
G. Suazo, CRO-1, MS A117, w/enc.
T. Gunderson, DLDOPS, MS A100, w/enc.
J. Aldrich, EES-1, MS D462, w/enc.
D. Broxton, EES-1, MS J462, w/enc.
G. Cole, EES-1, MS D462, w/enc.
F. Goff, EES-1, MS D462, w/enc.

D. Hickmott, EES-1, MS D462, w/enc.
P. Longmire, EES-1, MS D469, w/enc.
D. Vaniman, EES-1, MS D462, w/enc.
R. Warren, EES-1, MS D462, w/enc.
K. Birdsell, EES-5, MS F649 , w/enc.
E. Keating, EES-5, MS C306, w/enc.
B. Robinson, EES-5, MS-F649, w/enc.
B. Stone, EES-5, MS-F649, w/enc.
A. Pratt, EES-13, MS M992, w/enc.
A. Dorries, EES-13, MS M992, w/enc.
S. Bolivar, EES-13, MS H865, w/enc.
D. Daymon, EES-15, MS M992, w/enc.
E. Springer, EES-15, MS J495, w/enc.
B. Newman, EES-15, MS J495, w/enc.
A. Gallegos, EES-15, MS J495, w/enc.
M. Baker, EM-DO, MS J591, w/enc.
J. Canepa, EM/ER, MS M992, w/enc.
R. Vocke, EM/ER, MS J591, w/enc.
D. Hollis, EM/ER, MS M992, w/enc.
M. Cummings, EM/ER, MS M992, w/enc. , (2 copies)
B. Martin, E-ER, MS M992, w/enc.
D. Erickson, ESH-DO, MS K491, w/enc.
B. Gallaher, ESH-18, MS K497, w/enc.
S. Kinkead, ESH-18, MS K497, w/enc.
S. McLin, ESH-18, MS K497, w/enc.
K. Mullen, ESH-18, MS K497, w/enc.
C. Nylander, ESH-18, MS K497, w/enc.
S. Rae, ESH-18, MS K497, w/enc.
D. Rogers, ESH-18, MS K497, w/enc.
B. Turney, ESH-18, MS K497, w/enc.
A. Barr, ESH-19, MS K498, w/enc.
M. Cash, ESH-19, MS P-915, w/enc.
P. Schumann, ESH-19, MS M992, w/enc.
C. Bare, ESH-20, MS M887, w/enc., (3 copies)
J. Sisneros, F-1, MS P908, w/enc.
D. Woitte, LC-GL, MS A187, w/enc.
P. Wardwell, LC-GL, MS A187, w/enc.
J. Holt, NWT-PO, MS F629, w/enc.

Cy: LANL Reading Room, w/enc., MS A117
CIC-10, w/enc., MS A150
WQ&H File, w/enc., MS K497

**Los Alamos National Laboratory
Groundwater Integration Team**

Action Plan

for

**External Advisory Group
December 1999 Recommendations**

March 2000

CONTENTS

Introduction 3

EAG December 1999 Recommendations and GIT Proposed Actions 3

Tables

1. EAG Current Recommendations and Proposed Actions14

Appendix A:

Comprehensive List of Recommendations and Status of Proposed Actions.....20

Appendix A Tables:

A-1. EAG Reports and Corresponding LANL GIT Action Plans20

A-2. Comprehensive List of Recommendations and Status of Proposed Actions21

INTRODUCTION

This Action Plan addresses the recommendations in the External Advisory Group's (EAG) third semi-annual report, "Semi-Annual Report to the Groundwater Integration Team of the Los Alamos National Laboratory by the External Advisory Group", dated December 23, 1999. 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 third Action Plan written to address the current EAG recommendations. Recommendations from the previous EAG semi-annual reports dated November 1998 and July 1999 are included in Appendix A.

EAG DECEMBER 1999 RECOMMENDATIONS AND GIT PROPOSED ACTIONS

The following section provides a description of each EAG recommendation paraphrased from the December 1999 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 and July 1999 Semi-Annual Reports) that are similar.

Recommendation 12-99-1: Formation of a Senior Management Team to help define end product(s) with representatives from LANL, DOE, and NMED.

The EAG and the managers present at the October 1999 Quarterly Meeting agreed that a subset of those present should form a team to elucidate the products expected, with strong input from the GIT and the Data Quality Objective (DQO) processes that have been initiated. A sequence of events might include goal definition by each of the major parties, specific products that meet this goal, measurements needed for these products, and schedule for reaching this decision. The Senior Management Team will produce mature products from mature planning; not in a hurry, but with design, conviction, and forethought. It was also agreed that a goal-oriented individual who will assure products are defined expeditiously and renegotiate as necessary should chair this team

Proposed Action 12-99-1

At the October 1999 Quarterly Meeting, the managers in attendance committed to forming a group to define an acceptable "end state" to the hydrogeologic characterization program. The Program Manager commits to identifying a manager willing to organize and chair this group. The assistance of EAG member Dr. Robert Charles may be requested to facilitate the initiation of the group.

Recommendation 12-99-2: Continued examination of add-on requests and divesting the GIT of items not specifically enumerated by the Workplan.

The EAG observed that a number of factors may be contributing to mission creep under the Workplan: plume chasing, intermediate wells, early remediation, funding of various scientific add-ons, drilling of monitoring wells, modeling beyond the Laboratory boundaries, and additional regional wells. The relationship between urgent important tasks and long-term important tasks

seems to be getting out of balance. Focusing on long-term-objectives will dampen out many short-term problems.

Proposed Action 12-99-2

The GIT agrees that the focus should remain on accomplishing long-term objectives as defined in the Hydrogeologic Workplan. The Response to Contamination process developed by the GIT has been pilot tested by the GIT and NMED. This process is now approved for use when contamination above a regulatory standard or health advisory is encountered while implementing Hydrogeologic Workplan activities. This process defines the timing of a response by the Environmental Restoration (ER) Project to the detection of contamination, while allowing the Hydrogeologic Workplan activities to continue without interruption. It is expected that having this process in place will assist in keeping a focus on the Hydrogeologic Workplan objectives. However, as noted in the Proposed Action for Recommendation 12-99-1, the long-term objectives are not clearly defined. The definition of the end state by the management team will also help in maintaining a focus on the long-term objectives.

Recommendation 12-99-3: Establishment of a policy for data distribution.

The EAG noted that the stakeholders continue to be concerned about the lack of consistent data sharing by the Laboratory. The mechanism of data distribution remains obscure, but the use of a Memorandum of Understanding (MOU) is being explored. The reluctance on the part of the Laboratory to share data comes from experience where any change in "preliminary" data during the validation process causes discomfort for the Laboratory and the legal apparatus thereof, particularly after distribution to the media. It should be a management decision which preliminary data will and will not be distributed. After data validation is completed, the Laboratory should, of course, ascertain that all the validated data is provided to the requesting stakeholders.

Proposed Action 12-99-3

The GIT concurs on the need to equitably distribute data that has been validated to all stakeholders. This will be accomplished this fiscal year when the data will be available on the Water Quality Database via the Internet. The distribution of preliminary (unvalidated) data does require a Laboratory management and legal counsel approval process. This becomes an important issue when preliminary data must be used to make decisions regarding issues such as well construction. The Program Manager will request the assistance of Laboratory legal counsel in developing a preliminary data distribution policy.

Recommendation 12-99-4: Re-enumeration of the criteria for well prioritization.

While some reprioritization of wells is necessary due to changing needs, such decisions need to be frozen once made for a period of time in order to maintain some commitment to a set of priorities. The EAG feels that additional priorities should be included in the list of technical priorities listed in the Workplan.

Proposed Action 12-99-4

The GIT concurs with the need to maintain a commitment to a well drilling schedule to facilitate planning. From the perspective of the program, the focus remains on characterization of the site-wide hydrologic setting. This focus leads to drilling wells that will reduce uncertainties in the hydrologic and geologic characteristics of the Laboratory. However, there is significant pressure to reprioritize the well schedule to focus on contaminant distribution. The GIT and the NMED Hazardous and Radioactive Materials Bureau have had initial discussions on the prioritization scheme and have agreed to reach a consensus prioritization at the Annual Meeting scheduled for March 2000.

Recommendation 12-99-5: The EAG will meet with CAB at a mutually agreeable time and place.

A specific request was made by the Citizen's Advisory Board (CAB) to include the EAG in one of the CAB upcoming meetings. The full EAG meets only twice a year but will endeavor to have presentation at a future CAB meeting.

Proposed Action 12-99-5

The GIT encourages the EAG to participate in a CAB meeting. If a regularly scheduled CAB meeting is coincident with the Annual Meeting in March, it may present an opportunity for the entire EAG to attend. If the timing of the meetings are not coincident, the attendance of the EAG Chair at another CAB meeting is encouraged.

Recommendation 12-99-6: Development of a risk-based conceptual approach.

In order to implement a risk-based approach to evaluation of contaminants that may be encountered during well drilling, it is essential that the stakeholders first commit to using a risk-based approach to evaluation of contamination. Screening criteria for determining levels of concern and establishing priorities are important to decision making concerning the use of resources. Interim to the development of a complete site-specific hydrogeologic model, simple models might be considered for use in evaluating the levels of concern and need for further evaluation.

The precedence of using a risk-based approach under Superfund and RCRA provides strong encouragement and a framework for developing such an approach for dealing with contaminants that may be encountered in groundwater at LANL. Such an approach is encouraged and should be worked out in advance with NMED. A well-guided risk-based approach will be enormously useful for interpreting the significance of contaminants encountered during drilling as well as for dealing with legacy cleanup issues and RCRA permitting issues.

Proposed Action 12-99-6

The GIT and NMED have implemented a decision process that incorporates a qualitative assessment of risk. This decision process is used only to determine the timing of a response to the detection of contamination, not to define the scope of the response. The scope of the response should be based on a more quantitative assessment of risk. The ER Project has developed a risk assessment approach that will be used in defining the scope of the response. The GIT encourages the EAG to

provide comments on the ER Project approach to risk assessment. A presentation of the risk assessment approach will be provided at the Annual Meeting in March.

Recommendation 12-99-7: The selection of an individual on the GIT to lead development of subordinate DQO's, manage QAPP for the Workplan, and elucidate its relationship to the existing documents in the Environmental Restoration (ER) and Environmental Safety and Health (ESH) as well as the Workplan final products.

The EAG would like to suggest that consideration be given to the development of these DQO processes under the auspices of a GIT Quality Assurance Project Plan (QAPP) for the Workplan unless that is already being done. If such QAPPs are developed and/or are being developed in individual divisions, they should be coordinated into a single QAPP for the Workplan. Perhaps the Senior Management Team could assist in this endeavor.

The EAG would like to avoid the development of another project bureaucracy or committee that would result in fewer actual accomplishments and delay progress. We suggest that the GIT select someone within their group, preferably someone with both QA and goals-oriented scientific experience, to serve as the QA Officer (QAO). The selected person would then coordinate with the management committee that is determining the actual nature and content of the Hydrogeologic Workplan projects to be developed. The QAO could then develop, reference, and incorporate data quality needs into the QAPP. Members of the EAG will assist in whatever capacity possible as some members having fairly extensive quality assurance and quality control experience.

Proposed Action 12-99-7

The work done on Hydrogeologic Workplan activities is ostensibly conducted under the auspices of the ER Project Quality Assurance Management Plan and the implementing administrative and technical procedures. However, the GIT agrees that implementation of the QA requirements should be formalized. The adoption of Hydrogeologic Workplan activities into the ER Project QA system will begin with a Quality Assurance self-assessment. The self-assessment will be conducted by a member of the ER Project QA staff and a Quality Assurance Specialist from ESH-14. The purpose of this assessment is to identify areas where implementation of QA requirements need to be strengthened. The assessment will provide the information necessary to bring a coherent and consistent QA system to the Hydrogeologic Workplan activities.

Recommendation 12-99-8: Development and regular updating of the web site for routine communication of data, issues, etc.

Some members of the EAG, as well as other stakeholders, have requested communication of important materials in the interim period between meetings. There seems to be a number of ad hoc activities meant to communicate progress, data, policy decisions, etc. between scheduled meetings. It was suggested that this information be displayed on the web site and archived for back notices.

Proposed Action 12-99-8

The ESH-18 web site will be expanded to include the GIT activities. The map and contents of the web site is under development now. The schedule and contents of the web site will be discussed at the Annual Meeting in March.

Recommendation 12-99-9: Data gathering activities should be guided by the development of the DQO processes for these activities and supports the efforts in this direction.

The EAG had previously recommended that data gathering activities be guided by the development of DQOs. Presentations made at the October 1999 Quarterly Meeting/EAG Meeting indicated progress in this direction. The EAG recommends that these DQOs and associated Standard Operating Procedures (SOP) be subject to external review prior to finalization. The EAG further recommends both the DQO development and the resultant SOP formulations are done under the auspices of a Hydrogeologic Workplan QAPP (Recommendation 12-99-7).

Proposed Action 12-99-9

The GIT continues to promote the use of DQOs (or equivalent approaches) to planning data collection within the GIT Subcommittees. As indicated in the response to recommendation 12-99-7, the GIT has recognized the need to formalize QA implementation for Hydrogeologic Workplan activities. The ER Project administrative procedures require peer review for all documents.

Recommendation 12-99-10: The SOPs developed under the DQOs or DQO-like process be subjected to some form of external review prior to finalization.

The EAG would recommend that the SOPs, which are developed, be subjected to some form of external review prior to finalization. These SOPs should, of course, be developed under the auspices of a Hydrogeologic Workplan QAPP, preferably as a component output of a QAPP that would encompass the DQO development, resultant SOP formulations, and guidelines for data verification. This would result in "pedigreed" data suitable for inclusion in the Water Quality Database.

Proposed Action 12-99-10

The SOPs that are being used and those that will be developed for use on the drilling program will undergo peer review as prescribed by the ER Project administrative procedures.

Recommendation 12-99-11: The request of information needed to better understand the relationships of DQOs and SOPs to the QAPPs developed in ER and ESH and to better evaluate the potential need for development of a QAPP for the Workplan.**Proposed Action 12-99-11**

The QAPP which governs the data collection for the Hydrogeologic Workplan is the ER Project Quality Assurance Management Plan (QAMP). SOPs required to implement the ER Project QAMP are developed following the ER Project administrative procedures. A presentation on the ER Project QAMP will be provided

at the Annual Meeting. Additional information required by the EAG can be requested after the Annual Meeting in March.

Recommendation 12-99-12: Technical sessions be held for the purpose of examining data gathering at later semi-annual meetings.

The EAG would like to request that technical sessions addressing several specific issues with regard to the development of data gathering SOPs and processes be incorporated into the next semi-annual meeting that is attended by the EAG.

Proposed Action 12-99-12

The suggestions for technical sessions will be incorporated into the Annual Meeting agenda to the extent possible given time constraints.

Recommendation 12-99-13: The plan for a comprehensive Water Quality Database and input from users in both the preliminary and latter stages of a database module's development should be continued.

The data collected under the auspices of the Hydrogeologic Workplan will now be incorporated into an institution-wide comprehensive "Water Quality Database." The EAG realizes that the development of such a comprehensive database requires a great deal of effort but is confident that the effort will be worth the invested resources.

The modular approach being used by the Information Management Subcommittee to develop the database seems to be logically structured to optimize limited personnel resources while making the development tasks manageable. The chosen order appears reasonable given the scope of the data that must be entered, the relative degree of data importance, and the required level of data interpretation prior to implementation. The EAG would like to suggest the promotion of the development of the water level module prior to the chemistry module.

The EAG encourages that testing and comments are solicited from potential users prior to finalization of each module's data entry and display system, beginning with prototype. The EAG also encourages the creators of the data entry and display system to seek a priori input from potential users during the initial development of these systems. This could minimize extensive overhaul of the systems in their later stages of development.

Proposed Action 12-99-13

The Water Quality Database (WQDB) development team has adopted the EAG recommendation to implement the system's water level module prior to the chemistry module. Detailed design efforts related to the programming of the water level module will begin in late February 2000. Chemistry module design and implementation will follow.

The WQDB development team completes a software design process prior to any programming. This process helps ensure that the system will meet the needs of users, thereby reducing the potential for system rewrites due to inadequate implementation. The modular design process includes a cooperative effort between development team members, GIT subject matter experts, and additional representatives of the end-user community. A system design document is published for each module, and these documents are subject to review and signoff by the GIT Information Management subcommittee and designated

subject matter experts prior to implementation. The design document for each system module includes:

1. Database table design and a data dictionary defining each field in each table.
2. System business rules (data edits, required and optional fields, etc.).
3. Prototypes of user interfaces.
4. Any special legacy data migration instructions.
5. Valid values for lookup lists that control the quality and consistency of data entry.
6. Standard report definitions.

Recommendation 12-99-14: Continue with efforts to better understand the spatial distribution of infiltration, porosity, and hydraulic conductivity.

One of the unknowns associated with the modeling effort continues to be the spatial distribution of infiltration. For much of the problem solving that will be accomplished using models, this may not be a serious limitation. For example, as long as the model faithfully reproduces head gradients and hydraulic conductivities, most predictive simulations such as travel times and contaminant concentration will be valid. An additional limitation continues to be estimation of effective aquifer porosity. Based on data presented at the EAG meetings, the effective porosity term appears to be insensitive to other observed phenomena. Efforts should continue to quantify this term as best possible. Frankly, this is not an unusual problem and, unfortunately, is one that plagues most contaminated transport studies.

Proposed Action 12-99-14

The geologic and hydrogeologic setting beneath the Pajarito Plateau is very complex. To "completely characterize" the plateau (i.e., to sample in every different unit) in order to develop a deterministic model would be cost prohibitive and take much too long. The modeling approach that will be taken is to use statistically based distributions as input for hydrologic parameters that are based on (and constrained by) the data collected from the R-wells. This statistical approach to developing input parameters in the hydrologic models will be discussed at the Annual Meeting in March.

Recommendation 12-99-15: Geochemical modeling as it relates to fate and transport of contaminants or where it can yield better understanding of ground water flow directions and rates is promoted.

The EAG endorses the LANL objective of developing geochemical conceptual models of the canyon systems. Although not strictly necessary from a hydrologic modeling perspective, wherein only water flow would be of concern, geochemical modeling is of utmost importance for developing an understanding of the transport and fate of contaminants in subsurface. This is clearly significant for the canyon systems since studies and observation have shown that the bulk of water movement at LANL occurs in these locations, some of which have coincidentally served to channel potentially contaminated outfalls from certain Technical Areas.

Proposed Action 12-99-15

The GIT Geochemistry Subcommittee developed an initial geochemical conceptual model and presented it to the EAG at the Quarterly Meeting/EAG Meeting in October 1999. This model will continue to be refined as new data are collected and analyzed. Additionally, these same geochemical elements have been added to the hydrogeologic conceptual model

in the Annual Report. The Annual Report process will ensure the geochemical conceptual model is re-evaluated and updated on at least an annual basis. Geochemical modeling continues to be an interpretative task for the GIT Geochemistry Subcommittee.

Recommendation 12-99-16: Better evaluation of the advantages and disadvantages of using parameters developed from surface complexation modeling versus the incorporation of simple linear isotherm Kd values in the models, and the use of non site specific Kd" is recommended.

The EAG recommends an evaluation of the advantages and disadvantages of using parameters developed from surface complexation modeling versus the incorporation of simple linear isotherm Kd values within the overall transport models. It is not that the EAG is opposed to the use of the site-specific Kd values in the models if they provide satisfactory and verifiable transport results, but the EAG believes that surface complexation modeling could ultimately provide greater flexibility for simulating a wider variety of geochemical conditions in the subsurface. This could become important should conditions change due to unexpected influences, for example, the intrusion of a plume into a previous unimpacted zone on of the subsurface.

Proposed Action 12-99-16

The GIT concurs with the need to include surface complexation modeling in the "toolbox" for interpreting data collected for the hydrogeologic characterization program. The Geochemistry Subcommittee has begun modeling simulations to determine Kds from surface complexation.

Recommendation 12-99-17: Properly designed profile wire screens in the monitoring wells should be used.

It is recommended that profile wire screens be used in the monitoring wells to maximize the "developability" of the wells. The EAG understands that recent proposals have included the possibility of using punched or slotted casing (louvers). Use of such screens hinders well development because they provide limited open area. For a given diameter and slot size, profile wire screens generally provide five to eight times as much open area. For a given diameter and slot size, profile wire screens and well completion case histories have shown that high open screens can be developed more effectively than low open area screens. It would not be cost effective to cheapen the well intakes in these monitoring wells.

Proposed Action 12-99-17

Wire screens are currently planned for all of the wells. If alternative types of well screens are considered in the future, the EAG will be asked to provide technical review.

Recommendation 12-99-18: All processes involved in creating and sampling the monitoring wells should be considered within the context of capturing the information needed to accomplish the monitoring objectives.

For a successful monitoring program, it is important that data needs to accomplish these objectives are considered throughout the process, from planning the well location to collecting and storing the samples. Recently, certain aspects of the drilling and monitoring program of the Workplan have raised legitimate questions about the processes and procedures being used as

well as modifications being considered for installing, completing, and sampling wells. It is important that all these processes be considered within the context of capturing the information needed to accomplish the monitoring objectives.

Proposed Action 12-99-18

As noted in the EAG report, the Hydrogeologic Workplan does define the monitoring objectives. The considerations regarding drilling method, well design, and sampling procedures are critical to the success in achieving the objectives. The GIT Geochemistry Subcommittee has been assigned the task of evaluating the considerations brought forward by the EAG and providing recommendations to the GIT regarding those considerations. A presentation on groundwater sampling at the Annual Meeting in March will address these recommendations.

Recommendation 12-99-19: Unencumbered casing advance drilling should be used as a substitute for mud rotary drilling if extensive data needs are not needed.

It is incumbent upon the GIT to understand the data compromises that will result if the processes and procedures were manifested within the context of the Workplan. Drilling with mud carries a risk of adsorbing contaminants, particularly the cationic contaminant, onto the bentonite. The mud penetrates into the pore space around the well screen if it is not removed by well development. Should this occur, it could result in reduced concentration or non-detects on contaminants that are actually present in the vicinity of the well.

Proposed Action 12-99-19

At present, casing advance is the only well drilling method planned. However, the GIT will continue to evaluate alternative drilling methods suggested by stakeholders. The EAG will be essential to evaluation of alternative drilling methods.

Recommendation 12-99-20: For long screen wells that are already installed, characterize flow rates across the screened interval with depth, and/or characterize the well for contaminants along the screen length to determine where to place the pump.

For long screen wells that are already installed, the flow rates should be characterized across the screened interval with depth. The pump intake should be situated in a zone with reasonably good flow on the assumption that this is where the contaminant is also likely to be moving most rapidly. Then use low-flow sampling techniques. If possible, characterizing the well for contaminants along the screen length is an even more direct approach to determining the best sampling depth. The use of long-screened wells should be avoided.

Proposed Action 12-99-20

The GIT Geochemistry Subcommittee is evaluating the concerns regarding well drilling, well design, and sampling methods and will report on their recommendations at the Annual Meeting in March.

Recommendation 12-99-21: Different construction techniques should be considered for long-screen completions that are not yet installed. Perhaps consider Westbay sampling installations.

The use of long well screens raises a number of issues that have become well known in recent years. These issues can cause problems with data interpretation relevant to the monitoring goals at LANL.

Proposed Action 12-99-21

The GIT Geochemistry Subcommittee is evaluating the concerns regarding well drilling, well design, and sampling methods and will report on their recommendations at the Annual Meeting in March.

Recommendation 12-99-22: The monitoring wells at LANL should not be screened above the water table.

The EAG is unaware of any value in screening a monitoring well at LANL above the water table. The EAG recommends that this practice be discontinued.

Proposed Action 12-99-22

The Technical Enforcement Guidance Document has been used for technical construction specifications for screen placement. However, the GIT Geochemistry Subcommittee is evaluating the concerns regarding well drilling, well design, and sampling methods and will report on their recommendations at the Annual Meeting in March.

Recommendation 12-99-23: Different construction techniques (i.e., not single long screen) should be considered for wells that will be subjected to screen aeration as the water table drops during the well's lifetime.

The EAG recommends that construction techniques be modified for future installations to preclude declining water tables from resulting in screen aeration. Numerous geochemical effects can result that affect sample quality when air is allowed to intrude into the formation around the monitoring well, all of which are detrimental to obtaining representative samples. Such effects are primarily due to oxidation of mineral surfaces, solutes, etc.

Proposed Action 12-99-23

The GIT Geochemistry Subcommittee is evaluating the concerns regarding well drilling, well design, and sampling methods and will report on their recommendations at the Annual Meeting in March.

Recommendation 12-99-24: Low-flow sampling should be used for routine monitoring in all the monitoring wells at LANL due to the potentially detrimental impacts of high-flow sampling on sample quality.

There are a number of problems with bailers or high purging and sampling flow rates that are compounded by their use in wells with long screens. These problems have been addressed in numerous publications and include sampling device insertion that mixes the stagnant casing water into the screened interval, the generation of large volumes of purged water for disposal,

confounding hydrogeologic effects, and turbulence and aeration effects. The single solution to these problems, given current technological limitations, is to use low-flow purging and sampling techniques that minimize disruption to the samples.

Proposed Action 12-99-24

The GIT Geochemistry Subcommittee is evaluating the concerns regarding well drilling, well design, and sampling methods and will report on their recommendations at the Annual Meeting in March.

Recommendation 12-99-25: The proper collection of core sequences should be continued for the deep monitoring wells installed in areas having high expected contaminant probability. Consideration must be given to reducing the amount of coring in locations where contaminants are considered to be unlikely, thus speeding well installation.

The EAG recommends that properly collecting core sequences be continued for the deep monitoring wells to be installed in areas having high-expected contaminant probability. However, it might be possible to eliminate, or significantly reduce, the amount of coring in locations where contaminants are considered unlikely should the need for well installation and concerns about the overall drilling cost exceed the value of the core.

Proposed Action 12-99-25

The amount of coring planned for each borehole is determined based on a number of factors including hydrologic uncertainties, stratigraphic uncertainties, and expectations regarding contaminants. The GIT feels that the uncertainties in the hydrologic and geologic setting should be weighed equally with presence of contaminants. Coring, as a type of data collection, is also weighed against the cost and time required. R-31, a borehole drilled in an area not expected to have contaminants, was planned for 100% coring because it is in an unknown area of the Laboratory. Fortunately, it was found that the geology at the R-31 location was amenable to open hole drilling and collection of geophysical logs, so that coring was unnecessary. However, for each well, the GIT will weigh the alternatives, costs, and benefits in uncertainty reduction to determine the amount of coring.

Table 1 provides a summary of the December 1999 EAG recommendations and the Laboratory's proposed actions. This table also provides a crosswalk to previous EAG recommendations (November 1998 Semi-Annual Report) that are similar.

**Table 1.
EAG Current Recommendations and Proposed Actions**

Number	Recommendation	Action	Estimate of Schedule and Funding Impacts from Recommendation
12-99-1	Formation of a Senior Management Team to help define end product(s) with representatives from LANL, DOE, and NMED.	The Program Manager commits to identifying a manager willing to organize and chair this group. The assistance of EAG member Dr. Robert Charles may be requested to facilitate the initiation of the group.	Schedule: low Cost: low Notes: Recommendation focused on end state and would have small impact now. Cost would involve additional travel and time for Dr. Charles.
12-99-2	Continued examination of add-on requests and divesting the GIT of items not specifically enumerated by the Workplan.	The Response to Contamination process is expected to keep a focus on the Hydrogeologic Workplan objectives. The definition of the end state by the management team will also help in maintaining a focus on the long-term objectives.	Schedule: none Cost: none Notes: Recommendation to maintain scope/schedule.
12-99-3	Establishment of a policy for data distribution.	Data will be available on the Water Quality Database via the internet. The distribution of preliminary (unvalidated) data does require a process that has Laboratory management and legal counsel approval. The Program Manager will request the assistance of Laboratory Legal in developing a preliminary data distribution policy.	Schedule: none Cost: none Notes: Policy for data distribution is necessary for this and other environmental programs at LANL.
12-99-4	Re-enumeration of the criteria for well prioritization.	The GIT and NMED/HRMB have had initial discussions on the prioritization scheme and have agreed to reach a consensus prioritization at the Annual Meeting scheduled for March 2000.	Schedule: low Cost: low Notes: Reprioritization will be for wells starting in FY01, so the cost/schedule impacts are expected to be minimal.
12-99-5	The EAG will meet with the CAB at a mutually agreeable time and place.	The GIT encourages the EAG to participate in a CAB meeting. If the timing of CAB meetings is not coincident with EAG meetings, then the Chair of the EAG should attend a CAB meeting.	Schedule: none Cost: low Notes: Cost would involve additional travel and time for Dr. Charles.

**Table 1.
EAG Current Recommendations and Proposed Actions**

Number	Recommendation	Action	Estimate of Schedule and Funding Impacts from Recommendation
12-99-6	Development of a risk-based conceptual approach.	The Response to Contamination process incorporates a qualitative assessment of risk. The ER Project has developed a risk assessment approach that will be used in defining the scope of the response. A presentation of the risk assessment approach will be provided at the Annual Meeting in March.	Schedule: none Cost: none Notes: EAG is asked to provide comment on the ER Project risk assessment approach.
12-99-7	The Selection of an individual on the GIT to lead development of subordinate DQO's, manage QAPP for the Workplan, and elucidate its relationship to the existing documents in the Environmental Restoration (ER) and Environmental Safety and Health (ESH) as well as the Workplan final products.	The adoption of Hydrogeologic Workplan activities into the ER Project QA system will begin with a Quality Assurance self-assessment. The assessment will provide the information necessary to bring a coherent and consistent QA system to the Hydrogeologic Workplan activities.	Schedule: low Cost: low Notes: Ensuring consistency with the ER Project QA system may require 1 FTE, to be determined based on self-assessment.
12-99-8	Development and regular updating of the web site for routine communication of data, issues, etc.	The ESH-18 web site will be expanded to include the GIT activities. The map and contents of the web site is under development now. The schedule and contents of the web site will be discussed at the Annual Meeting in March.	Schedule: none Cost: low Notes: The expansion of the existing web site will have little cost impact.
12-99-9	Data gathering activities should be guided by the development of the DQO processes for these activities and supports the efforts in this direction.	The GIT continues to promote the use of DQOs (or equivalent approaches) to planning data collection within the GIT Subcommittees.	Schedule: low Cost: none Notes: DQO approaches to planning activities tend to increase planning time slightly, but decrease data collection costs.

**Table 1.
EAG Current Recommendations and Proposed Actions**

Number	Recommendation	Action	Estimate of Schedule and Funding Impacts from Recommendation
12-99-10	The SOPs developed under the DQOs or DQO-like process be subjected to some form of external review prior to finalization.	As indicated in the response to recommendation 12-99-7, the GIT has recognized the need to formalize the QA implementation for Hydrogeologic Workplan activities. The ER Project administrative procedures require peer review for all documents.	Schedule: none Cost: none Notes: Peer review is conducted on documents prepared by the ER Project.
12-99-11	The request of information needed to better understand the relationships of DQOs and SOPs to the QAPPs developed in ER and ESH to better evaluate the potential need for development of a QAPP for the Workplan.	The SOPs that are being used and those will that be developed for use on the drilling program undergo peer review as prescribed by the ER Project administrative procedures. A presentation on the ER Project QA program will be included in the Annual Meeting in March.	Schedule: none Cost: none Notes: Peer review is conducted on all documents prepared by the ER Project.
12-99-12	Technical sessions be held for the purpose of examining data gathering at later semi-annual meetings.	The suggestions for technical sessions will be incorporated into the Annual Meeting agenda to the extent possible given time constraints.	Schedule: none Cost: none Notes: Technical sessions have been a part of every Annual Meeting.
12-99-13	The plan for a comprehensive Water Quality Database and input from users in both the preliminary and latter stages of a database module's development should be continued.	The Water Quality Database (WQDB) development team has adopted the EAG recommendation to implement the system's water level module prior to the chemistry module. The WQDB development team completes a software design process prior to any programming. This process helps ensure that the system will meet the needs of users, thereby reducing the potential for system rewrites due to inadequate implementation. The modular design process includes a cooperative effort between development team members, GIT subject matter experts, and additional representatives of the end-user community.	Schedule: none Cost: none Notes: The recommendation regarding stakeholder input were already part of the database development process.

**Table 1.
EAG Current Recommendations and Proposed Actions**

Number	Recommendation	Action	Estimate of Schedule and Funding Impacts from Recommendation
12-99-14	Continue with efforts to better understand the spatial distribution of infiltration, porosity, and hydraulic conductivity.	The modeling approach that will be taken is to use statistically-based distributions as input for hydrologic parameters that are based on (and constrained by) the data collected from the R-wells. This statistical approach to developing input parameters in the hydrologic models will be discussed at the Annual Meeting in March.	Schedule: none Cost: low Notes: Statistically-based distribution of input parameters does not impact schedule, but may require additional statistical support.
12-99-15	The EAG promotes the geochemical modeling as it relates to fate and transport of contaminants or where it can yield better understanding of ground water flow directions and rates.	Geochemical modeling continues to be an interpretative task for the GIT Geochemistry Subcommittee.	Schedule: none Cost: none Notes: Recommendation requires no changes. Geochemical modeling was included in interpretative tasks.
12-99-16	The EAG recommends better evaluation of the advantages and disadvantages of using parameters developed from surface complexation modeling versus the incorporation of simple linear isotherm Kd values in the models and the use of non site specific Kd.	The GIT concurs with the need to include surface complexation modeling in the "toolbox" for interpreting data collected for the hydrogeologic characterization program. The Geochemistry Subcommittee has begun modeling simulations to determine Kds from surface complexation.	Schedule: none Cost: none Notes: Recommendation requires no changes. Geochemical modeling was included in interpretative tasks.
12-99-17	Properly designed profile wire screens in the monitoring wells should be used.	Wire screens are currently planned for all of the wells. If alternative types of well screens are considered in the future, the EAG will be asked to provide technical review.	Schedule: none Cost: none Notes: Recommendation requires no changes.

**Table 1.
EAG Current Recommendations and Proposed Actions**

Number	Recommendation	Action	Estimate of Schedule and Funding Impacts from Recommendation
12-99-18	All processes involved in creating and sampling the monitoring wells should be considered within the context of capturing the information needed to accomplish the monitoring objectives.	The GIT Geochemistry Subcommittee has been assigned the task of evaluating the considerations brought forward by the EAG and providing recommendations to the GIT regarding those considerations. A presentation on groundwater sampling at the Annual Meeting in March will address these recommendations.	Schedule: unknown Cost: unknown Notes: Pending evaluations of the Geochemistry Subcommittee.
12-99-19	Unencumbered casing advance drilling should be used as a substitute for mud rotary drilling if extensive data needs are not needed.	At present, casing advance is the only well drilling method planned. However, the GIT will continue to evaluate alternative drilling methods suggested by stakeholders. The EAG will be essential to evaluation of alternative drilling methods.	Schedule: none Cost: none Notes: Recommendation requires no change.
12-99-20	For long screen wells that are already installed, characterize flow rates across the screened interval with depth and/or characterize the well for contaminants along the screen length to determine where to place the pump.	The GIT Geochemistry Subcommittee is evaluating the concerns regarding well drilling, well design, and sampling methods and will report on their recommendations at the Annual Meeting in March.	Schedule: unknown Cost: unknown Notes: Pending evaluation by Geochemistry Subcommittee.
12-99-21	Different construction techniques should be considered for long-screen completions that are not yet installed.	The GIT Geochemistry Subcommittee is evaluating the concerns regarding well drilling, well design, and sampling methods and will report on their recommendations at the Annual Meeting in March.	Schedule: unknown Cost: unknown Notes: Pending evaluation by Geochemistry Subcommittee.

**Table 1.
EAG Current Recommendations and Proposed Actions**

Number	Recommendation	Action	Estimate of Schedule and Funding Impacts from Recommendation
12-99-22	The monitoring wells at LANL should not be screened above the water table.	The Technical Enforcement Guidance Document has been used for technical construction specifications for screen placement. However, the GIT Geochemistry Subcommittee is evaluating the concerns regarding well drilling, well design, and sampling methods and will report on their recommendations at the Annual Meeting in March.	Schedule: unknown Cost: unknown Notes: Pending evaluation by Geochemistry Subcommittee.
12-99-23	Different construction techniques (i.e., not single long screen) should be considered for wells that will be subjected to screen aeration as the water table drops during the well's lifetime.	The GIT Geochemistry Subcommittee is evaluating the concerns regarding well drilling, well design, and sampling methods and will report on their recommendations at the Annual Meeting in March.	Schedule: unknown Cost: unknown Notes: Pending evaluation by Geochemistry Subcommittee.
12-99-24	Low-flow sampling should be used for routine monitoring in all the monitoring wells at LANL due to the potentially detrimental impacts of high-flow sampling on sample quality.	The GIT Geochemistry Subcommittee is evaluating the concerns regarding well drilling, well design, and sampling methods and will report on their recommendations at the Annual Meeting in March.	Schedule: unknown Cost: unknown Notes: Pending evaluation by Geochemistry Subcommittee.
12-99-25	The proper collection of core sequences should be continued for the deep monitoring wells installed in areas having high expected contaminant probability. Consideration must be given to reducing the amount of coring in locations where contaminants are considered to be unlikely, thus speeding well installation.	The amount of coring planned for each borehole is determined based on a number of factors including hydrologic uncertainties, stratigraphic uncertainties, and expectations regarding contaminants. The GIT feels that the uncertainties in the hydrologic and geologic setting should be weighed equally with presence of contaminants.	Schedule: none Cost: none Notes: Recommendation not accepted.

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.

Thus far, three EAG reports have been published: November 1998, July 1999, and December 1999. 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	This document	02-00

Table A-2 provides a mechanism for tracking past recommendations and the status of implementation of proposed actions. Each action has been given a "tracking" number, which includes the EAG report publication month and year. Notation is provided where recommendations are substantially the same in both the November 1998 and July 1999 EAG report.

Table A-2
Comprehensive List of Recommendations and Status of Proposed Actions

Tracking Number	Action Status	EAG Recommendation	LANL GIT Action	Notes
7-99-1	Complete	Develop an understanding of the relationships of upper management among the stakeholders.	The upper management of LANL, DOE, and NMED will be invited to the quarterly meetings, annual meeting, and the next EAG meeting.	Combined with Recommendation 11-98-4 . The GIT chairperson has provided briefings as requested and will continue to be available on an on-call basis for briefing upper management.
7-99-2	Pending	Pursue some aspects of benchmarking.	Potential contractors have been contacted to determine their capabilities in this area and initial ideas for a scope of work have been discussed.	Combined with Recommendation 11-98-18 . The benchmarking study is important to the GIT and some progress has been made toward implementing this study. Due to budget constraints, the study can not be started until October 1999.
7-99-3	Complete	Continue meetings between external stakeholders and the EAG.	The GIT intends to continue this forum of expression and feedback at EAG meetings.	The feedback from the stakeholders has been positive.
7-99-4	Pending	Continue extensive communication efforts, including the expansion of Internet utilization.	In addition to formal and informal meetings with the stakeholders, the GIT plans to make information accessible via the Internet.	Combined with Recommendation 11-98-1 . The Water Quality Database will be accessible through the Internet. A GIT web page with links to searchable GIT minutes, the Hydrogeologic Workplan, field implementation plans, well completion reports, daily drilling reports, and other documents have been under consideration.

**Table A-2
Comprehensive List of Recommendations and Status of Proposed Actions**

Tracking Number	Action Status	EAG Recommendation	LANL GIT Action	Notes
7-99-5	Complete	Continue preparation and implementation of action plans responding to the EAG's recommendations.	An action plan will be prepared in response to each EAG report.	The recommendations have been numbered to facilitate tracking. Each successive action plan will provide a status of cumulative set of recommendations to ensure that each is fully addressed.
7-99-6	Complete	Continue providing meeting locations that enhance focus.	The meeting locations will be off-LANL whenever possible to enhance focus.	Positive feedback was received on the choice of Ghost Ranch for the location for the annual meeting. Similar settings will be considered for future meetings.
7-99-7	Complete	Prepare hard copies of presenter's more technical transparencies.	The overheads will be compiled into a meeting booklet to facilitate the EAG program reviews.	
7-99-8	Complete	Add some technical sessions.	There will be increased time allotted to technical presentations. Concurrent sessions may be appropriate if the participants at meetings have clearly defined and distinct interests that can be addressed in separate sessions.	The GIT would like to try this approach on a pilot basis. There is a concern that some stakeholders may feel left out of discussions that are held concurrently.
7-99-9	Pending	Add EAG members for geoscience and economics expertise and, possibly temporary members in other areas.	The GIT requests that the EAG identify potential new members and invite their commitment to serve on the EAG.	The GIT concurs in the need to expand the fields of expertise within the EAG.
7-99-10	Pending	Develop a risk-based conceptual plan in three categories: Chemicals of Concern, Source, Transport and Fate, and Exposure to Receptors.	A plan to address contamination found while implementing Hydrogeologic Workplan activities will be presented to NMED and EAG during the October meeting.	Development of this plan requires coordination of different groups and programs within LANL so that it can be incorporated into the re-issued RCRA permit.

**Table A-2
Comprehensive List of Recommendations and Status of Proposed Actions**

Tracking Number	Action Status	EAG Recommendation	LANL GIT Action	Notes
7-99-11	Pending	Have EAG review LANL's risk assessment team results and future plans.	The EAG will be asked to review the planned response to detecting contamination at the October meeting	
7-99-12	Pending	Develop a risk-based approach for interpreting the significance of finding on-site well contamination; as the site-specific, alternate contaminant level (ACL) approach has proven most useful for complex sites such as LANL.	Initial inputs to this plan were discussed at the Annual Meeting and work on it is continuing. The development of this plan requires coordination of different groups and programs within LANL so that it can be incorporated into re-issued RCRA permit.	Combined with Recommendation 11-98-7 . The ACL criteria have been incorporated into the response for detecting contamination.
7-99-13	Pending	Compare such plans to those used by other regulatory agencies (e.g. EPA) and other states.	The GIT will obtain the available resources and use them in the development of the response plan.	The GIT understands that this program is not an unfamiliar task.
7-99-14	Pending	Establish acceptance of site specific ACLs.	The ACL criteria have been incorporated into the response to detecting contamination as a first step to establishing the response to contamination.	Combined with Recommendation 11-98-2 . The GIT agrees that the process for establishing ACLs should be part of the response plan. However, the GIT feels that it is inappropriate to propose actual numbers for ACLs until more is known about the hydrogeologic characteristics of the specific locations for which they might be proposed.
7-99-15	Complete	Reconsider the Hydrogeologic Workplan DQO scenarios when updating the hydrogeologic conceptual models.	The conceptual models will be refined based on new data collected in this program. The DQO scenarios, which are based on the conceptual models, will likewise be refined as appropriate.	The GIT is in agreement with this recommendation. Each GIT subcommittee has been asked to begin the DQO process with the data collected thus far.

Table A-2
Comprehensive List of Recommendations and Status of Proposed Actions

Tracking Number	Action Status	EAG Recommendation	LANL GIT Action	Notes
7-99-16	Pending	Develop DQOs for processes subordinate, but essential to, the hydrogeologic characterization such as well completion, sample collection, data validation, database development, and model development.	The GIT subcommittees have been encouraged to use the DQO process (or a DQO-like process) in the areas mentioned in the recommendation and in all of their planning activities.	
7-99-17	Pending	Data gathering efforts should utilize DQO processes and a special session discussing these efforts should be held.	The GIT subcommittees have been encouraged to use the DQO process (or a DQO-like process) to develop comprehensive Standard Operating Procedures for data collection. At the next EAG meeting, the GIT will provide a report on the status of this activity.	
7-99-18	Complete	Database issues should be clarified, and funding issues for database development should be given a high priority	The Information Management Subcommittee has brought on a project management specialist to develop a resource-loaded schedule in order to develop a request for funding adequate to support the information management system development and maintenance.	Combined with Recommendation 11-98-14 . The GIT recognized information management as the keystone of this program. Development of the system is lagging in the information collection in the program. This is primarily due to funding priorities and constraints.

**Table A-2
Comprehensive List of Recommendations and Status of Proposed Actions**

Tracking Number	Action Status	EAG Recommendation	LANL GIT Action	Notes
7-99-19	Complete	The geologic model should be used for preliminary predictions of stratigraphic boundaries.	The predictions on the stratigraphic contacts will continue to be used in the Field Implementation Plan. As more data are added to the geologic model, these predictions will become more certain.	Predicted stratigraphic contacts are included in the Field Implementation Plan. The predictions come from the stratigraphic model. In areas of LANL where there are more nearby wells, the predictions are closer to reality than in areas of LANL where less is known. The basalts are a "wild card" because the geologic controls on the distribution are not well known.
7-99-20	Complete	An overall geochemical model should be developed.	A budget will be requested for this task. Each subcommittee member is engaged in the process so that the FY00 budget request will include adequate funding.	One goal of the GIT Geochemistry Subcommittee is to develop an overall geochemical model.
7-99-21	Pending	Present more geochemical calculations and carry out sorption isotherm experiments.	These are interpretive tasks that will have a funding request for FY00. Sorption studies are planned for areas where contamination is encountered so that remedial options can be developed.	
7-99-22	Complete	Additional hydrogeologic modeling results should be presented.	The modeling presentations for the next EAG meeting will focus on the technical details of the modeling accomplished thus far.	Combined with Recommendation 11-98-23. The budget constraints for the modeling effort are a result of the difficulties at well R-25. The response to the constraints is to focus on documenting what has been done rather than further development. This focus will have the additional benefit of having materials prepared for the next EAG meeting.

Table A-2
Comprehensive List of Recommendations and Status of Proposed Actions

Tracking Number	Action Status	EAG Recommendation	LANL GIT Action	Notes
7-99-23	Complete	The segmented approach to site modeling should be continued.	The segmented approach to site modeling will be continued.	Approaching the modeling at three different scales seems to be effectively providing modeling results to many users at the same time.
7-99-24	Pending	Review of hydrologic modeling reports is requested by the EAG.	The EAG will be requested to review the hydrologic modeling reports.	
7-99-25	Pending	The locations and rates of recharge should continue to be defined.	The results of the plateau-scale modeling will be presented at the October meeting.	In addition to the preliminary recharge discussion presented at the Annual Meeting, the plateau-scale modeling has indicated that recharge is a sensitive parameter in the model.
7-99-26	Pending	Improvement of drilling cost analyses, as part of benchmarking should continue.	Some potential contractors have been contacted to determine their capabilities in this area, and initial ideas for scope of work have been discussed.	The benchmarking study is important to the GIT.
7-99-27	Pending	Review of the design of stainless steel screens installed in the deep monitoring wells is requested by the EAG.	The EAG will be requested to review the well design for each well.	The specifications for well construction are included in the Field Implementation Plan for each well.
7-99-28	Pending	Evaluate drilling method after five or six wells have been drilled using the current method.	The procurement for continued drilling services will take place this fall. More discussions will occur before the drilling method(s) will be specified.	The new drilling procurement will allow the flexibility to try different drilling methods if the drilling costs remain high after five or six holes.
11-98-3	Complete	Have NMED representatives present during some portion of the next EAG meeting.	Arrangements will be made with NMED to attend appropriate portions of the meeting.	Inviting stakeholders to EAG meetings will continue.

**Table A-2
Comprehensive List of Recommendations and Status of Proposed Actions**

Tracking Number	Action Status	EAG Recommendation	LANL GIT Action	Notes
11-98-6	Complete	The proper sequence of priorities should be consistent in Tables 4.1 and 4.2.	<p>Tables 4-1 and 4-2 in the Hydrogeologic Workplan (May 22, 1998) will be revised as the program evolves and new data is collected.</p> <p>The priority sequence will be adjusted during quarterly meetings and will be reflected in the Annual Report.</p> <p>Information in Tables 4-1 and 4-2 will be updated on an annual basis and included in the Annual Report.</p>	The tables will be updated in every annual report.
11-98-9	Complete	Core should be logged and evaluated as soon as possible after retrieval. Core that will be used for parameter testing or sorptive potential should be stored in an intact state and tested as soon as possible.	<p>The procedures for handling core include logging the retrieved core as soon as possible after extraction.</p> <p>Immediately after logging, sections of the core that are of possible hydrologic, geologic, or geochemical interest are preserved.</p> <p>After the core from the entire borehole has been collected, portions of core are selected for testing.</p>	Adherence to the Standard Operating Procedures for handling core and other samples will continue to preserve the integrity of the samples.
11-98-11	Complete	Review data needs on a continual basis and review the scope of the characterization program on an annual basis in light of what the regulators require.	The Hydrogeologic Workplan was developed on the premise that data needs would be reviewed with each addition of new data and the scope of the program adjusted based on that review. The regulators are regularly involved in this review via the Annual Meeting, Quarterly Meetings, and informal meetings as required.	Continual re-evaluation of the data needs will continue in conjunction with stakeholder and EAG input.

**Table A-2
Comprehensive List of Recommendations and Status of Proposed Actions**

Tracking Number	Action Status	EAG Recommendation	LANL GIT Action	Notes
11-98-13	Complete	WESTBAY systems should be demonstrated and well understood before it is used.	LANL personnel have taken a number of steps to investigate WESTBAY system including visiting sites with WESTBAY systems installed for demonstration of sampling, and studying literature from sites that are using WESTBAY systems. The next demonstration of the WESTBAY system will be as installed in the R-25 well. Completion decisions for each well will be made after the drilling and initial sampling have been completed and will be based on the conditions encountered in each well. WESTBAY systems will only be installed in wells for which it is suitable.	The use of WESTBAY systems will be evaluated on a well-by-well basis and will incorporate stakeholder and EAG input.
11-98-17	Complete	Place filter packs greater than 2 feet (10 to 20 feet) above the top of the screens to account for settling of the filter material in wells that may be used for monitoring.	Filter pack will be placed 2 feet above the perforations; additionally 3 feet of fine sand will be placed above the filter pack.	Adherence to the Standard Operating Procedures for well construction will continue to preserve the integrity of the well.
11-98-22	Complete	Consider periodic rebid of drilling work on a combination of per-foot basis for drilling and coring and per-hour basis for other activities.	Rebid of the drilling contract will consider definition of per-foot charges for certain activities and per-hour charges for other activities.	The initial meetings to develop the drilling procurement documents have focused on how to structure the compensation framework.

Table A-2
Comprehensive List of Recommendations and Status of Proposed Actions

Tracking Number	Action Status	EAG Recommendation	LANL GIT Action	Notes
11-98-1	see 7-99-4	Continue the frequent, detailed and exhaustive communication efforts to keep relationships on the upswing with the regulators and the community as well as the funding organizations.	Maintain communication with stakeholders at the level that it has been for the past 2 years. Formal meetings will occur five times a year – four quarterly meetings and one annual meeting. Informal meetings and communication (e-mail, phone calls) will also continue as new information warrants. Make data accessible through the Internet.	Web interface will be operational in approximately one year. This recommendation is combined with 7-99-4 for further action.
11-98-2	see 7-99-14	Reach agreement with NMED on MCL's (and ACL's).	Initial discussions about MCLs and ACLs occurred at January 1999 Quarterly Meeting. Proposed approach in Annual Report. The proposed approach was discussed the Annual Meeting in March.	Requires coordination and consensus within the Laboratory (ESH-18, ER Project) to develop groundwater cleanup levels that can be proposed to NMED. This recommendation has been combined with recommendation 7-99-14 for action.
11-98-7	see 7-99-12	Develop contingency for examination of intermediate zones, particularly working with stakeholders to evaluate tradeoff between deep wells and shallower wells.	A proposed approach will be discussed with NMED at the Annual Meeting. The approach, when finalized, will be formalized by inclusion in the RCRA permit when it is reauthorized.	Requires coordination and consensus within the Laboratory (ESH-18, ER Project) to develop an approach that can be proposed to NMED. This recommendation has been combined with recommendation 7-99-12 for action.
11-98-14	see 11-99-18	FIMAD should more rapidly incorporate legacy data and the system be available for timely use by stakeholders	Environmental surveillance data and data collected under this program to be available through the Internet. Groundwater data will be linked to Environmental Restoration data, but the exact relationship of the Water Quality Database to FIMAD has not been determined.	The Groundwater Database is in development. This recommendation has been combined with 11-99-18 for action.

**Table A-2
Comprehensive List of Recommendations and Status of Proposed Actions**

Tracking Number	Action Status	EAG Recommendation	LANL GIT Action	Notes
11-98-15	Complete	The three-person drilling crew should have backups in case of fatigue, illness, or other reasons.	Evaluate the possibility of training another three-person crew.	The staffing provided by the driller under their contract is under close scrutiny. The procurement for continued drilling services to be released this fall might specify staffing levels.
11-98-20	Complete	Revise budget and update budget projections on a continual basis to reflect the iterative nature to the program.	There is quarterly reporting on the budget, an annual post mortem, and a projection for the next fiscal year. Budget revisions will be discussed at the annual project review.	This recommendation will be fully implemented at the annual project review scheduled for October 1999.
11-98-21	Complete	Have an annual project review to identify mid-course corrections and ensure cost-effective management and execution. The review should include performance reviews, costs to date, next year's tasks, and proposed budget.	An annual project review will be initiated for FY99. The review will include technical and management performance review, previous year costs, and next year tasks, and proposed budget. Participants will include LANL organizations (ESH-18, ER, EES, NWT) and DOE.	An annual project review is scheduled for October 1999.
11-98-23	see 7-99-20	Use modeling as a tool to evaluate the need for and location of future wells and as a communication tool with stakeholders.	Planned modeling activities for FY99 should produce a working model that can be used for this purpose. The model will also be used to communicate the program with stakeholders.	This recommendation has been combined with 7-99-20 for action.
11-98-4	see 7-99-1	Have a better description of the relationship and support within LANL for the activity, including how the management of ESH, ER, NWT, etc. regards the activity with respect to their other priorities.	A description of how the Hydrogeologic Workplan activities fit within the LANL structure will be prepared for the next meeting of the EAG.	This recommendation is combined with 7-99-1 for action.

**Table A-2
Comprehensive List of Recommendations and Status of Proposed Actions**

Tracking Number	Action Status	EAG Recommendation	LANL GIT Action	Notes
11-98-5	Complete	Have a more detailed stakeholders identification map defining relationships other than the three to five major stakeholders.	A stakeholder identification map will be prepared for the next meeting of the EAG.	The complete implementation of this recommendation is now scheduled for the October 1999 meeting of the EAG.
11-98-8	see 12-99-24	Use low-flow purging and sampling techniques for water-yielding wells and passive sampling for poorly-yielding wells.	The options and technical basis for each option should be an agenda item for the next meeting of the EEG.	This issue will have increased importance when a well is completed and quarterly sampling begins. Consensus with stakeholders on the use of these sampling techniques must be reached before sampling begins. This recommendation has been combined with 12-99-24 for action.
11-98-10	Complete	Consider using cement seals if the bentonite grout seals fail under certain circumstances.	Should the situation arise that bentonite seals are not effective, then other sealing options (including cement seals) will be considered, evaluated, and tested in order to continue the drilling.	In the event that other seals are necessary, the EAG will be asked to provide input on the sealing options. NMED will have to concur with any decision to change the well completion specifications.
11-98-12	see 12-99-19	Avoid mud-rotary drilling in order to preserve the pristine nature of subsequent samples.	There are no plans to use mud rotary-type drilling for the regional wells. Mud rotary-type drilling may be used in other circumstances, such as installation of wells targeted for the intermediate zone(s) where the exact depth and configuration is known prior to the start of drilling.	When mud rotary and other drilling methods are under consideration, the EAG will be asked to provide input on the options. Input from NMED will be requested with any decision to change the well drilling methods. This recommendation has been combined with 12-99-19 for action.

**Table A-2
Comprehensive List of Recommendations and Status of Proposed Actions**

Tracking Number	Action Status	EAG Recommendation	LANL GIT Action	Notes
11-98-16	Complete	Complete the wells with metal fittings rather than PVC.	<p>Currently all deep wells are planned for metal fittings.</p> <p>There may be conditions under which PVC fittings would be considered, but that decision would be made on a case-by-case basis considering the factors in the situation and weighing the pros and cons of PVC.</p> <p>This decision would not be made without seeking input from the stakeholders and technical experts.</p>	In the event that other fittings are evaluated for use, the EAG will be asked to provide input on the options. NMED will have to concur with any decision to change the well completion specifications.
11-98-18	Pending	Benchmark the costs-to-date against similar activities.	A benchmarking study will be initiated in early 1999 with the goal of having preliminary results for the next EAG meeting.	The GIT concurs with this recommendation. This recommendation is combined with recommendation 7-99-2 for action.
11-98-19	Complete	Develop more detailed GANTT chart with scheduled deliverables that indicates how the results of the hydrologic investigations will be incorporated into the RFIs and CMSs.	<p>How hydrologic results will be incorporated into ER Project documents will be determined and described.</p> <p>A GANTT chart may not be the best presentation of this information.</p>	The complete implementation of this recommendation is now scheduled for the October 1999 meeting of the EAG.