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TO: John J. Linehan, Director, HLPD, Division of High-Level Waste Management, M/S 4 H 3

FROM: Paul T. Prestholt, Sr. On-Site Licensing Representative

DATE: June 8, 1990

SUBJECT: ALTERNATIVES TO LICENSE APPLICATION STRATEGY (ATLAS)

The following is an amplification of the discussion of the ATLAS task that I included in my February and March, 1990 report.

In the above report, I stated that the word "risk" as used in the ATLAS task involves an aspect of health and safety. This is not true. The work "risk" refers only to the risk of implementing any given strategy. In all future discussions and documents concerning ATLAS, the word risk will not be used.

The task of developing alternative strategies for licensing a repository is in response to a commitment by the Secretary of Energy to the U.S. Congress to identify ways to improve the schedule for receipt of spent fuel at a licensed repository before 2010.

Alternative strategies have been sought that would affect schedule due to changes in plans for evaluating site suitability and demonstrating regulatory compliance, alternative sets of licensing activities, alternative approaches to prioritization of testing, options for repository and waste package design, assessment of legal and regulatory constraints with a view to accelerating preparation of the license application, and earlier start dates for repository operations. The ATLAS Task Force focused on the identification of alternative strategies with the potential to shorten the repository schedule by more than one year. The one year criteria was selected as a criteria that would be both significant and within the accuracy of analysis resources that are available. Strategies that would significantly reduce uncertainties in the current schedule were also identified.

The objective of the ATLAS task is to develop a set of recommendations for credible alternatives to the present licensing strategy in which the license application will be submitted to the NRC earlier than the currently planned date of 2001.

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Alternative strategies have been sought that would affect schedule due to changes in plans for:

- Evaluating site suitability and demonstrating regulatory compliance.
- Alternative sets of licensing activities.
- Alternative approaches to prioritization of testing.
- Options for repository and waste package design.
- Modification of legal and regulatory constraints to allow more rapid completion of the license application.
- Earlier start of waste acceptance dates for a licensed facility.
- Receipt of HLW at non-repository sites.

The evaluation of ATLAS scenarios will be conducted on the basis of two assumptions: (1) that the current planned scope of work would be adequate to allow the NRC to grant repository construction authorization in accordance with current laws, regulations, and applicable prececents from nuclear power plant licensing, and (2) that the results of early site suitability evaluations will result in a recommendation to proceed with development of underground testing activities. If the site is not found suitable, the current schedule would be invalidated and DOE would need further direction from Congress.

The following is the ATLAS schedule and deliverables:

Table 1. ATLAS SCHEDULE AND DELIVERABLES

Date	Place	Activity or Milestone
April 18:	LV	Extended Core Group meeting to begin "strawman" development.
May 3:	LV	Extended Core Group progress update meeting.
May 17:	LV	Project Office/participant and extended core group evaluation and comment on Core Group "strawman" ranking.
May 31:	DC	DOE/HQ/consultant evaluation and comment on Core Group "strawman" ranking.
July 5:	NA	Project Office delivers Final Draft Report with ranked Alternative licensing strategies.
Tentative:		
July 25:		HQ/Project Office briefing to NWTRB.
July 30:		DOE/HQ provides comments on 7/5 deliverable to Project Office.
August 8:		Briefing to DOE/HQ executive committee.
Sept. 1:		Project Manager transmits final ATLAS report to DOE/HQ.
Sept. 15:		Recommendation to RW-1 for action.

The following is chapter three of the above mentioned preliminary draft document that explains the approach the Project is taking in developing ATLAS:

3.0 APPROACH

3.1 OVERVIEW OF ATLAS ACTIVITIES

This section summarizes the preliminary approach developed by the ATLAS core group for identifying and evaluating alternative licensing strategies. The effort was divided into three tasks:

1. Identify strategies.
2. Evaluate and rank the strategies.
3. Make recommendations and write the final report.

The following sections describe these tasks, with particular emphasis on the sequence of activities conducted in each task.

3.1.1 Identify Alternative Licensing Strategies

The sequence of project tasks and the activities they comprise are illustrated in Figure 3. In the first task, the ATLAS core group conducted a series of workshops to identify promising ideas in the following categories:

- Performance standards.
- Performance allocation.
- NRC licensing and legislative processes.
- Site characterization activities.
- Organization structure.
- Design, construction, and operation strategies.
- Outreach.

These scenarios were later combined and regrouped into license application strategies.

Workshop participants were drawn from diverse backgrounds, including senior Yucca Mountain Project staff, technical representatives from participating project organizations, DOE/Headquarters staff, and outside consultants and advisors. The workshops were conducted as "brainstorming" sessions, designed to promote diverse and creative alternatives. To avoid stifling good ideas, the workshop ground rules prevented evaluation or criticism of scenarios suggested by participants.

At the close of each workshop, authors of the scenarios were asked to provide a one-page write-up that included: an action-oriented title; a brief scenario description; a summary of the possible effects on program success, schedule, and cost; and a list of possible impediments to implementation. Following the workshops, the ATLAS core group met to refine the scenarios. First, the scenarios were grouped according to their potential area of impact on the program. These groups of scenarios comprise the alternative licensing strategies described in this report. Second, the alternative licensing strategies were categorized according to the decision-making authority required for implementation. Three classes were created, and the strategies commonly referred to as low, medium, and high "risk" (see Table 3). This

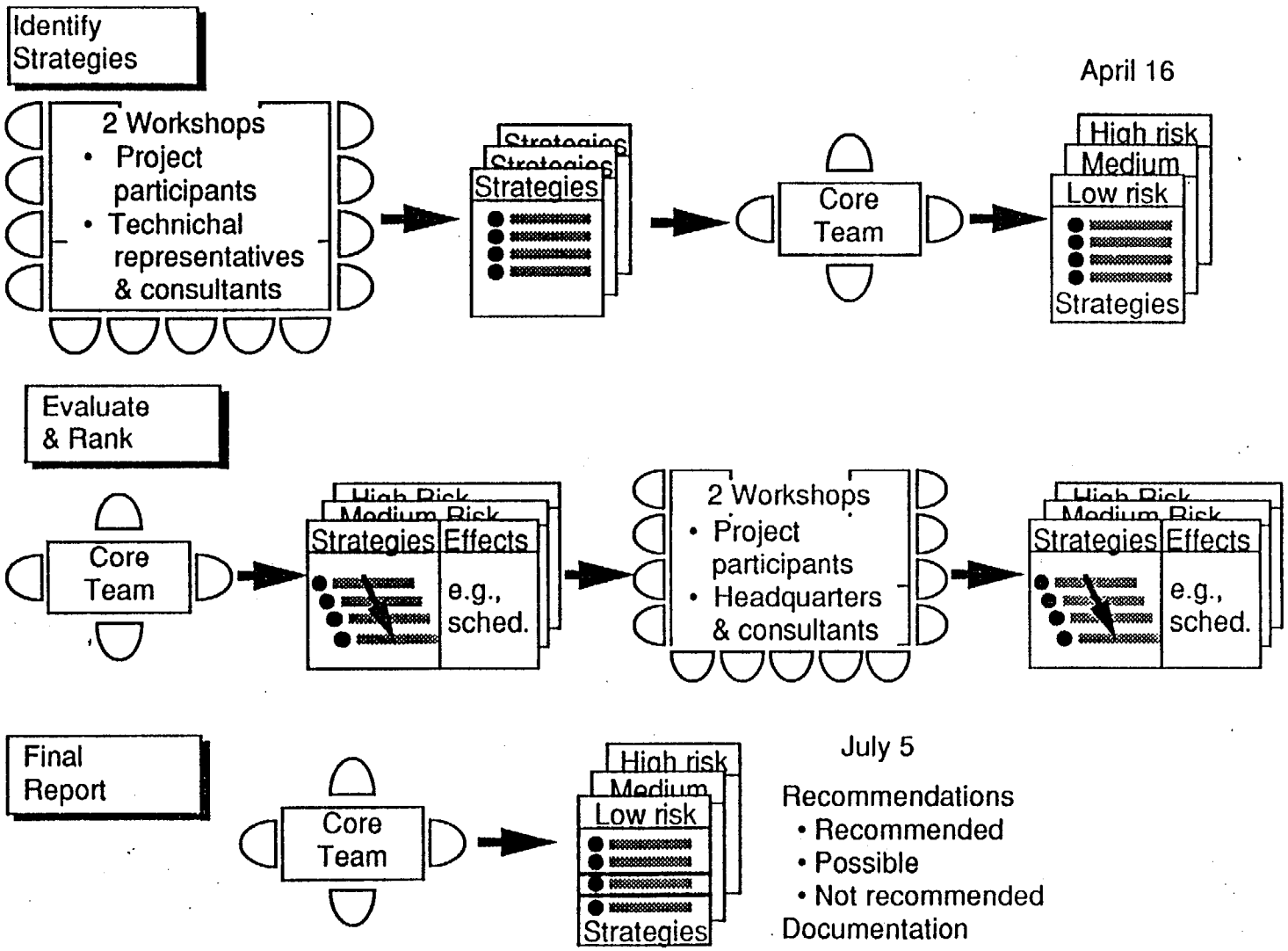

Figure 3. Identification and Evaluation of Alternative Licensing Strategies

Table 3. Risk Categories

Class	Type of Strategy	Authority
"Low-Risk" Strategies	Affects site work using base case surface and in situ testing concepts and scope.	DOE
"Medium-Risk" Strategies	Affects surface and in situ testing concepts, scope, and regulations	DOE/NRC/others
"High-Risk" Strategies	Affects fundamental relationships and legal frameworks	Congress, courts, etc.

choice of terms does not imply anything about the safety of an MGDS at Yucca Mountain. Rather, the risk levels describe the difficulty of implementation as pertaining to "management risk." The levels reflect whether or not DOE has decision-making authority (low risk), needs the concurrence of others in the Executive Branch (medium risk), or strategies under control of organizations outside the Executive Branch (high risk).

The core team also screened the scenarios, combining those that were similar or complementary. This produced a total of 12 alternative licensing strategies. The strategy descriptions are the focus of this report. Section 4 of the report summarizes the alternative licensing strategies and Appendix A provides additional detail.

3.1.2 Evaluate and Rank Alternative Licensing Strategies

The next task is evaluating and ranking the strategies. This is done within each implementation risk category defined in Section 3.1. The decision analysis methodology to be used is currently being developed and tested by the core team. A preliminary discussion is found in the next section.

Once that methodology is in place, the core team will use it to make a "straw man" evaluation of each of the refined alternative strategies. This will include, at a minimum, a preliminary judgment about effects on schedule, cost, and probability of project success. This preliminary evaluation will be presented for review and comment by participants in two additional workshops. Workshop participants will review the analysis and the ranked list of alternative strategies.

3.1.3 Development of Recommendations

By July 5, 1990, the core team will make its draft recommendations to OCRWM management. This will include the set of licensing strategies that deserve careful consideration as alternatives to the current licensing strategy. Recommendations will include the highest ranking strategy in each of the three "risk" classes. Specific scenarios will also be recommended for

implementation. The core team will produce a final report and will maintain backup documentation on all scenarios as part of quality assurance records for the ATLAS task.

3.2 EVALUATION AND RANKING METHODOLOGY

The analytic method for evaluating and ranking scenarios is currently being developed and tested by the core team. This section, therefore, provides only a brief summary of the approach being taken and the type of results anticipated. These ideas are preliminary and may change in response to results of trial applications of the method.

The analytic approach is based on decision analysis, a quantitative approach to aid decision making. Decision analysis is most useful when decisions are complicated by uncertainties, value tradeoffs, or many decision alternatives. This evaluation of alternative licensing strategies has all three of these complicating factors.

3.2.1 Factors Considered in the Evaluation

The core team developed the diagram in Figure 4 to represent many of the important considerations in choosing among alternative licensing strategies. For example, the net benefits of the repository depend on its benefits and impacts (costs). Its benefit depends upon how soon it is available to receive spent fuel and the quantity of fuel ultimately accepted by the repository or MGDS. The time to fuel acceptance depends on the time to complete the license application, when NRC issues a construction authorization, the construction of the facility itself, and NRC acceptance of the operating license application. These activities depend on conditions such as the general "health" of the MGDS program and the perceptions of the program by oversight groups such as the NRC, the National Academy of Science, and the Nuclear Waste Technical Review Board.

The potential negative consequences of the repository are divided into economic costs and societal impacts. Economic costs include waste disposal costs and costs to utilities for spent fuel that must be stored at reactor sites when the repository is not accepting spent fuel or costs to DOE for interim storage of fuel accepted from utilities prior to opening a repository site. Societal impacts include any risks to the public due to preclosure operations or after the repository is closed. Other impacts, such as environmental or aesthetic effects, are included for completeness.

3.2.2 Identifying Effects of Licensing Strategies

The next step in the approach is to identify the effects that each strategy has on the important factors shown in Figure 4. This step begins by identifying quantitative measures for each of the factors in Figure 4. For illustration, several factors in the figure we have numbered, and sample measures for those factors identified:

1. Probability that an operating license is granted.

2. Expected change in the date of fuel receipt, relative to the current schedule, given that a license is granted.

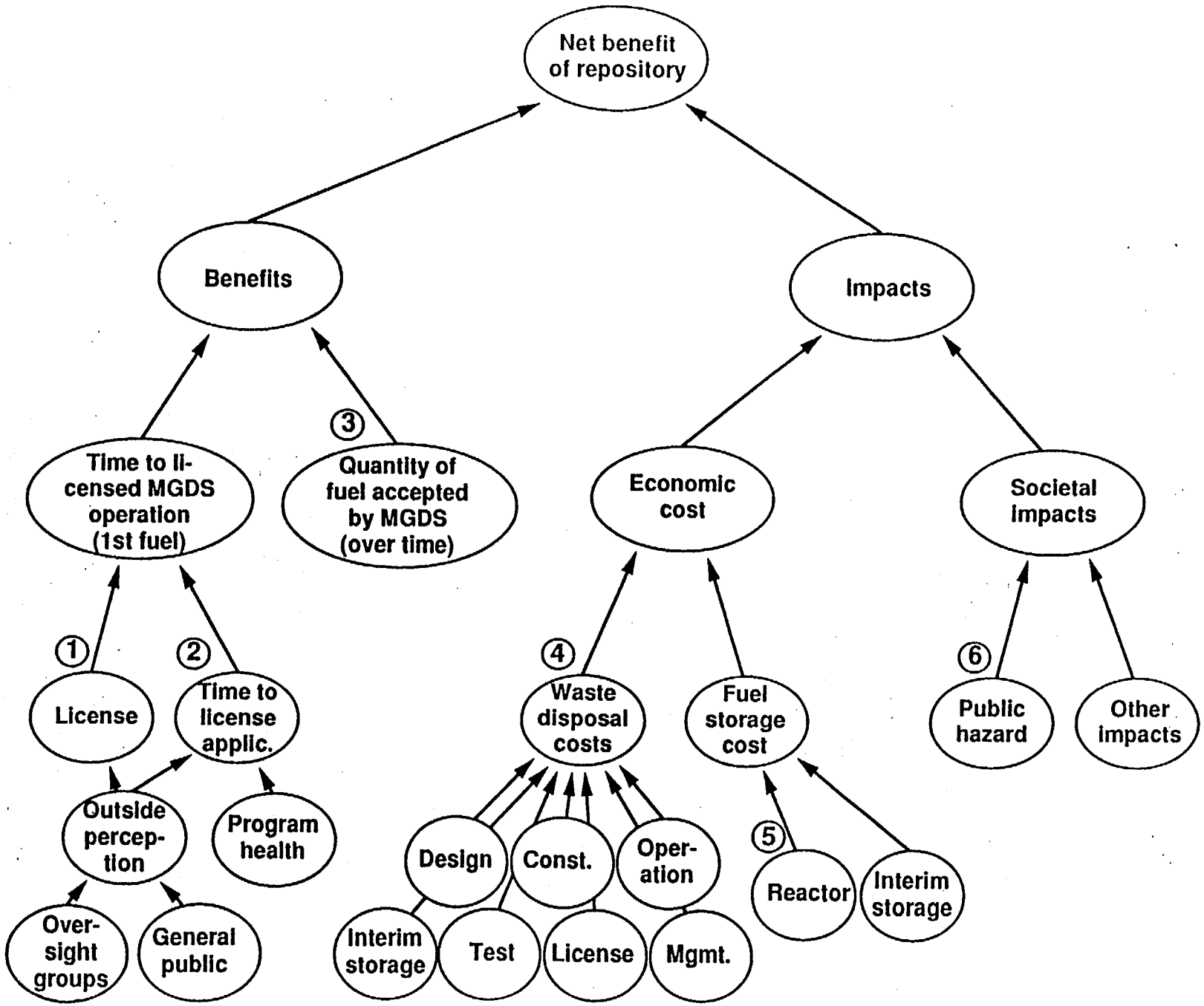

Figure 4. Evaluation of Alternative Licensing Strategies

3. Quantity of fuel ultimately accepted, relative to the DOE OCRWM Mission Plan.

4. Waste disposal and interim costs (now through closure of the repository).

5. Incremental spent fuel storage costs at reactors incurred if there are delays in accepting fuel at the repository.

6. Public hazard, measured by a probability distribution on cumulative curies released, such as would be produced by a performance assessment.

This is not necessarily a complete list, but it illustrates the type of effects that can be assessed for alternative strategies

3.3 DEVELOPMENT OF RECOMMENDATIONS

Once the effects of each strategy have been judged, the measures will be combined to produce an overall score for each. For example, the first two measures can be combined to produce a new evaluation variable such as the probability of spent fuel acceptance by 2010, or any other significant date. This new variable and the other evaluation measures will then be given weights, so that an overall score for each strategy can be computed. These scores will then be used to rank the alternatives. This general approach to evaluation is called multiattribute utility analysis.

The overall score for each strategy will also be used to screen out inferior strategies and to construct rankings of the strategies in each "risk" class. In many cases, it will be appropriate to evaluate individual scenarios. In this case, use the evaluation measures to recommend individual scenarios and combinations of complementary scenarios for priority implementation.

ATLAS Task Force's final recommendations will be based on quantitative evaluation and management judgment. As important as the recommendations, however, will be the insights behind the relative rankings. In particular, the core team will convey along with its recommendations the sensitivity of the rankings to alternative judgments regarding the effects of the scenarios or the relative weights used.

3.4 MANAGEMENT CONTROLS AND QUALITY ASSURANCE

Management of the ATLAS Task Force is accomplished by designated staff of DOE/Yucca Mountain Project and the Technical & Management Support Services (T&MSS) contractor. These lead, direct, and are members of the ATLAS core group. The core group, in turn, controls the activities of the extended core group and the scheduling staff, decision analysis consultant, and technical-regulatory consultants. The core team has the primary responsibility for conducting the evaluation. The ATLAS Task Force developed and is following an OSIR approved implementation plan (YMPO, 1990a).

3.4.1 Management Controls

Project Office and OSIR management will provide for review of the recommendations developed by the core group. The review will confirm that the products meet the requirements of the implementation plan (DOE, 1990a).

3.4.2 Quality Assurance

The activities of the ATLAS Task Force are governed by the Nevada Nuclear Waste Storage Investigations (NNWSI) Project Quality Assurance Plan (NNWSI, 1988). The ATLAS Task Force is operating under approved quality assurance grading (YMPO, 1990b) and quality assurance requirements (YMPO, 1990c) documents.

The ATLAS task has identified twelve alternative licensing strategies that are being reviewed at this time. They are:

1. Enhance Organizational Responsibility and Authority.
   A. Clearly define organizational responsibilities and authority.
   B. Establish programs for dealing with internal opinion.

2. Improve Operational Efficiency Related to Licensing Activities.
   A. Focus current resources toward licensing.
   B. Developing cooperative activities with outside organizations.

3. Early Acceptance of Limited Quantities of HLW Interim Storage.

4. Change DOE/NRC Licensing Relationships.

5. Changing Timing or Basis for Licensing.

6. Analog Studies and Testing Adjacent to the Site.

7. Site Characterization Operations.
   A. Change base-case allocation of resources.
   B. Simultaneous surface-based testing (SBT) and ESF.
   C. Procedural aspects of determining site suitability.
   D. QA enhancement relative to scientific R&D.

8. Site Characterization Structure.
   A. Complete linkage between performance allocation and site testing.
   B. Use ESF as a HLW demonstration facility in site characterization.

9. Increased Reliance on Engineered Barriers.

10. Increased Reliance on Natural Barriers.
    A. Early evaluation of the Calico Hills natural barrier.
    B. Shorten the distance between the surface and the repository horizon.
    C. Increase reliance on geochemical barriers.

11. Performance Standards.

12. Oversight Group Relationship.
    A. Encourage action oriented oversight from outside groups.
    B. Initiate actions to reduce permitting approval process delays.
    C. Revise technical review and oversight for repository.

It has been stressed to me by the YMP that this is a "brain storming" activity at the present time. No one at the project can predict where this will go in the future. The final product of the ATLAS task will not be a highly polished new licensing strategy that DOE management can propose or implement.