SUMMARY OF GEOLOGIC REVIEW GROUP MEETING

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**UNION
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INTRODUCTION

The Office of Waste Isolation program was reviewed; topics involving program management and geologic aspects of waste isolation were discussed; and specific items identified as follows:

- I. Definition and Responsibility of the Geologic Review Group
- II. Current Observations
- III. ERDA/OWI Advisory Group Interrelationships
- IV. Committee Operation and Agenda Considerations
- V. Comments and Recommendations
 - A. Ad Hoc Committees and Workshops
 - B. Contacts with State Agencies
 - C. Prejudgment of Rock Type and Location
 - D. Priorities in Site Selection
 - E. Program on "Clay-Shale" Experiments
 - F. Summary Volume on Salt Data
 - G. Seismic Stability of Underground Openings
 - H. Dating of Ground Water

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REA

I. DEFINITION AND RESPONSIBILITY OF THE GEOLOGIC REVIEW GROUP

The Geologic Review Group (GRG), according to its charge from OWI, has the responsibility "to study and critically review all geologic study plans and activities of the NWTs program leading to site selection and development of facilities" for the safe disposal of radioactive waste.

The GRG interprets its responsibility broadly. Although its primary function is to evaluate and make recommendations about specific geologic activities, the GRG feels that it should also have some involvement with the organizational structure under which these activities are carried out. It should, for example, be aware of relationships between OWI and ERDA, particularly with respect to other review groups that may from time to time be appointed, in order to promote cooperation and avoid overlapping and adversary relationships. It can serve a useful purpose by making suggestions regarding the setting up and staffing of workshops and ad hoc committees for studies of specialized topics. Especially important can be advice regarding relations of OWI geologic activities with the work of state agencies. By extending its responsibility in these directions, the GRG feels that it can give maximum help in evaluating and expediting geologic activities leading to site selection.

The responsibility of the Group is limited to geologic planning and activities. Although review of the development of facilities for terminal storage is included in its charge, the GRG interprets this to mean only the geologic aspects of such development.

II. CURRENT OBSERVATIONS

The GRG wishes to compliment the management of OWI for the depth and detail of the program briefings that they have received during the two meetings held to date. The general approach to the urgent problem of terminal storage of radioactive waste as planned by OWI seems to be appropriate and should result in the necessary scientific and technical data that will guide the way to the development of safe and adequate facilities.

We endorse the plan to develop multiple facilities in different geologic settings at diverse geographic locations, and agree that judgment of the suitability of the several geologic environments should not be made until adequate information has been obtained. It is also clear that the urgency of the problem dictates that investigations proceed concurrently on the several potentially usable geologic situations.

The GRG also concurs with the plan to carry out most of the specific project work by use of competent contractors rather than by the assembly of an extensive "in-house" organization. By so doing the potential of scientific and technical input is at the maximum. This method of operation emphasizes the importance of the selection of fully competent regional geologic project managers. It is felt that the GRG may be of value to OWI management in advice and assistance in this selection process.

The GRG is of the opinion that bi-monthly formal meetings, as now planned, are adequate. However, to assure proper coordination, one or more members of the GRG should, whenever possible, be in attendance at meetings of special-topic ad hoc committees and workshops.

III. ERDA/OWI ADVISORY GROUP INTERRELATIONSHIPS

It is recognized that the complexities of a National Waste Terminal Storage program warrant the use of various advisory and review groups. The judicious and efficient use of these groups requires that considerable attention be given to development of objectives, selection of professional expertise, current professional or job responsibilities, and liaison between various advisory groups.

For example, the GRG as appointed by OWI has certain defined responsibilities. Presumably, the Association of American State Geologists Review Group reporting to ERDA Headquarters also has certain defined responsibilities. It should be obvious that the specific objectives of each review group be clearly understood by everyone and exchange of information must be accomplished in an expeditious manner. Such close cooperation is particularly important when professional interests of review groups overlap, although state and local job responsibilities may clearly cast an individual reviewer into the role of a state or local representative.

IV. COMMITTEE OPERATION AND AGENDA CONSIDERATIONS

Consistent with its stated responsibilities as an advisory geologic review group to OWI, the GRG believes that it can be most effective if it is informed, at the earliest possible time, about all proposed principal actions or activities that may involve geologic and related factors. In this way the OWI would benefit from the considered advice that the GRG could provide before final OWI decisions are made with regard to the

appointment of geology program managers, various ad hoc or standing committees bearing on geologic and related aspects of the program, permanent OWI principal appointments in geology, and similar commitments that could clearly affect the scope and direction of the waste management program.

It is recommended that OWI management distribute proposed agenda for GRG meetings to all its members at least two weeks in advance of scheduled meetings to allow for adequate preparation and possible comment.

V. COMMENTS AND RECOMMENDATIONS

A. Ad Hoc Committees and Workshops

The GRG considers the utilization of ad hoc committees and special workshops to be an appropriate and constructive means of dealing with specific program aspects. In order that OWI might benefit most fully from GRG advice, it is recommended: (1) that the GRG be involved in preliminary discussions that may lead to the establishment of such ad hoc committees and workshops; and (2) that a member of the GRG participate in the activities of such groups when the GRG considers that to be appropriate; and (3) that reports of such groups be made available to the GRG as soon as possible.

B. Contacts with State Agencies

The final selection of a site for a facility will be within the boundaries of a state. In many of the states a large body of scientific and technical information exists, in some cases unpublished, about the state. Also, state regulations may need to be dealt with. It is recommended that the official state agencies and the resident scientific community be contacted by OWI management before the initiation of field investigations in any state and, where appropriate, such organizations and individuals be considered by OWI as potential contractors for the development of detailed information on specific sites.

C. Prejudgment of Rock Type and Location

The GRG is concerned that the acceptability of various media for waste isolation could be prejudged, at least in the mind of the public. If, for example, salt is widely advertised as the most suitable medium and if for any reason all sites in salt are rejected, then the public might conclude incorrectly that all other media, being inferior to salt, should also be rejected. In this regard, precise terminology should be used. The danger exists that if one site in "shale" is proved to be unsuitable, all other "shale" sites might be suspect. Rather than using the term "shale," precise petrographic, stratigraphic, and/or geographic labels should be used. For example, the rejection of a site in silty diatomite in Clark County, Nevada, should not cast doubt on the suitability of fine-grained illitic marine mudstone in central Iowa. The same comment also applies to such terms as limestone, granite, and basalt.

Although salt may have advantages over other rock types, many considerations in addition to the local integrity of the storage vault must be considered in the selection of sites. The GRG urges that all reasonable options be kept open for as long as possible in the site selection process.

D. Priorities in Site Selection

The GRG appreciates the complicated combination of political, social, and scientific factors which influence the selection of sites for waste isolation. Nevertheless, we urge that the selection process be formalized as much as possible by the establishment of appropriate criteria. This will not only be of help in the process itself, but it should also aid in the justification of the final site selection in the various governmental and public reviews which will undoubtedly take place. The GRG wishes to offer assistance concerning the geological aspects of site selection criteria.

E. Program on "Clay-Shale" Experiments

The GRG is pleased to see that steps have been taken to initiate an investigation of the thermal and radiation effects on the properties of "clay-shale." Although this is a preliminary proposal for the sampling, choice of lithic types, and properties to be studied, certain comments seem appropriate:

- (a) It is desirable to restrict the choice of materials to preserve focus and coherence. Rock types under current consideration for disposal sites should receive the highest priority.
- (b) Particular attention should be devoted to structural and mineralogical stability, chemical changes, and fluid and mechanical properties.
- (c) The program, as reviewed, should be considered in two parts. We recommend that the first part be to study candidate "shales" most likely to be involved in a nuclear waste storage facility. The second part can then be directed toward (1) other materials and (2) other properties, as resources permit and interest dictates.
- (d) The GRG would like to be kept informed about, and have opportunity to comment upon, the various aspects of the program as it develops.

F. Summary Volume on Salt Data

The concept of using salt masses as potential storage sites for radioactive wastes is now at least twenty-five years old. Consequently, a growing body of useful scientific knowledge exists. However, much of this information, particularly some of the important historical documents, exists only in report form in isolated libraries.

The GRG feels that it would be highly desirable for OWI to authorize the development of an analysis report on Salt as a Disposal Medium for Radioactive Wastes. This report should provide a review of the historical documents, laboratory studies, and field tests. It is suggested that this report be prepared in two volumes, i.e., an EXECUTIVE SUMMARY of about 50 pages, which would include tabulated data, and an ANNOTATED BIBLIOGRAPHY.

G. Seismic Stability of Underground Openings

The possibility of damage to storage vaults from seismic events has been cited as a hazard associated with nuclear waste isolation. Incomplete information and impressions of the GRG suggest that such hazards are commonly overstated. The GRG recommends that a short literature review be made of the mechanical stability of tunnels and mines which have been affected by strong earthquakes such as the San Francisco earthquake of 1906 and the Alaskan earthquake of 1964. Such a review would help to place this possible hazard in proper perspective.

H. Dating of Ground Water

Transportation of radionuclides by ground water is the most important hazard to evaluate in connection with subsurface isolation of nuclear wastes. The determination of existing ground-water velocities near waste storage vaults is, therefore, of utmost importance. One method of estimating approximate velocities is to determine the length of time the water has been

in the subsurface by use of ^3H or ^{14}C analyses. Unfortunately, half-lives of these radionuclides are too short to "date" water older than about 40,000 years. Inasmuch as isolation for more than 300,000 years may be desired, other dating techniques are needed.

The GRG recommends that a preliminary survey of possible absolute techniques such as ^{36}Cl dating or relative techniques such as He/Ar analyses be made. Such a survey should identify research topics which show definite promise of yielding practical results within the next five years.

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