SUMMARY OF GEOLOGIC REVIEW GROUP MEETINGS

JULY 21-22, 1977

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REPORT OF THE GEOLOGIC REVIEW GROUP
Oak Ridge, Tennessee
July 21-22, 1977

The Geologic Review Group (GRG) met in the conference room of the Office of Waste Isolation (OWI) at Oak Ridge on July 21 and 22, 1977. Data and progress reports on the WIPP Program were presented by personnel from Sandia Laboratories, and Battelle, Pacific Northwest Laboratories' personnel presented data on risk and hazards analysis. OWI presented material on site criteria and associated factors, to which GRG devoted its major attention, continuing through an evening session.

The suggestions and recommendations of the GRG are as follows:

1. In view of the transfer of responsibility for work in regard to a repository at the Nevada Test Site (NTS), the GRG recommends that copies of its preceding report, which addresses NTS, be forwarded to the appropriate agency.
2. The GRG suggests that at appropriate future meetings, briefings and discussions be held on problems of shaft construction and conceptual design, problems of ultimate decommissioning, and long-range monitoring of facilities. At our next meeting, prime attention will be directed toward factors of site-selection criteria.
3. The GRG endorses the development of universally applicable site criteria for a radioactive waste repository. In developing these criteria, all pertinent scientific and technical aspects should be considered, as

well as socioeconomic factors. The GRG supports the proposed OWI approach of formulating basic criteria that are adaptable to any suitable geologic setting or region. Because the criteria on which decisions about a repository site are based should be general and universally applicable, the criteria must be supplemented by appropriate factors and parameters, from which suitable specifications may be derived for any specific site. In keeping with the goal to isolate radioactive waste from the biosphere, the GRG emphasizes that siting objectives should (a) include characteristics that ensure public health and safety (b) establish construction and operational requirements that comply with acceptable environmental guidelines and (c) permit construction and operation of a repository at an acceptable cost.

The GRG suggests the following criteria. These are preliminary only and will be reexamined at our next meeting, when the factors of site criteria are considered.

I. Geologic Criteria

A. Geometry

1. The repository rock shall be at a depth sufficient to separate the repository from surficial processes and catastrophic events that could result in a hazardous breach of the geologic isolation.

2. The repository rock shall be thick enough to preclude hazardous breaching caused by drilling and blasting during excavation of the repository or by radioactive heat production after the wastes are emplaced.
3. The repository rock shall have sufficient horizontal extent to provide adequate space to develop and operate the repository and to leave a wide zone of undisturbed rock on all sides.
4. The repository rock, if not homogeneous, shall have a geologic structure simple enough to minimize problems of constructing and operating the repository and to maintain the integrity of the repository when construction is completed.

B. Stability

1. The repository shall be located in a region where the amount of predictable long-term movement or uplift and subsidence of bedrock, with possible consequent changes of surface-water and ground-water regimes, shall not pose a threat to the physical integrity of the repository.
2. The repository shall be located in an area where faults are absent, or, if present, are known to have characteristics that will not compromise the repository operations, engineering design, or hydrologic regime of the site.

3. The repository shall not be located in or near an area where there is evidence of igneous activity during the last million years.

C. Hydrology

1. The repository rock, together with the surrounding geologic material, shall have a structure, texture, and mineral composition that will not permit the transport, by ground water, of hazardous amounts of radionuclides to the biosphere.
2. The water content of the repository rock shall be sufficiently low that it will not be liberated in large amounts by radioactive heat or undergo chemical reactions on a scale large enough to compromise the integrity of the repository.

D. Geochemistry

1. The repository rock shall consist of material that is not adversely affected by radiation from the stored wastes or by heat generated in the wastes by radioactive decay.
2. The repository rock shall not react physically or chemically with the radioactive waste or the waste form or with its container in such a way as to compromise the geologic containment.

E. Exploration

The geology of a prospective site shall not be so complicated as to require exploration procedures that could jeopardize the future usefulness of the site for a repository.

II. Engineering Criteria

A. Mechanical Properties

The repository rock shall have mechanical properties that will not jeopardize the construction, operation, and physical integrity of the repository.

B. State of Stress

The repository rock and its surroundings shall not be under a state of stress that could jeopardize the construction, operation, and physical integrity of the repository.

C. Seismicity

Predicted seismic activity in the region of the repository shall be low enough so as not to pose a threat to safe operation of the repository or to geologic isolation of the wastes.

D. Site Development

The geologic and topographic setting shall be compatible with future site development, including transportation, utilities, and disposal of excavated materials.

III. Socioeconomic Criteria

A. Mineral Resources

The repository rock and surrounding materials shall be sufficiently devoid of usable mineral resources that the immediate area will not be attractive to future generations seeking those resources.

B. Water Resources

The repository shall be located so as to avoid areas potentially attractive for future development of surface or subsurface water resources.

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