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Statement of Charles G. Groat Director, U.S. Geological Survey, U.S. Department of the Interior Before the House Committee on Government Reform, Subcommittee on the Federal Workforce and Agency Organization On The Yucca Mountain Project

April 5, 2005

Good morning, Mr. Chairman and Members of the Subcommittee. Thank you for the opportunity to speak with you on behalf of the U.S. Geological Survey (USGS) on the Department of Energy's (DOE) Yucca Mountain Project. Let me emphasize from the outset how seriously USGS takes this situation. USGS is a large – approximately 9000 person – organization. We have a 125-year reputation for sound, unbiased science. Anything that casts aspersions on that reputation disturbs us greatly. We, as do you, look forward to the completion of the ongoing investigations to fully determine the impacts and appropriate responses.

At USGS, our most valuable assets are our employees, who are the underpinning of our longstanding and first-rate reputation for sound, objective science. On March 14, 2005, we learned from DOE that improprieties in the quality assurance process were allegedly committed by USGS scientists working on the Yucca Mountain Waste Repository project six years ago. I have referred the matter to the Department of the Interior's Inspector General for action. I take these charges seriously, and will do everything I can to ensure that the scientific information the USGS provides to the Nation meets the highest standards of accuracy and credibility.

Throughout the entire history of the Yucca Mountain Project USGS scientists have been major participants in the earth science research that has been conducted on behalf of the Department of Energy. The emails that are the subject of the current investigation were sent between 1998 and 2000 and refer to data incorporated into two Analysis and Model Reports concerning water infiltration. These reports are available on the Department of Energy website. Inasmuch as this matter is under investigation by the Inspector General, we are unable to discuss it until the investigation is complete. At that time we would be happy to provide a briefing or meet with Members to discuss this matter. I am eager to have a full and impartial review of what occurred and the implications for the scientific work and the project as a whole. However, this statement will provide you with a brief history of USGS involvement in studies of high-level nuclear waste disposal and the Yucca Mountain Project, highlighting a few of the most significant USGS contributions.

History

In 1955, the National Academy of Sciences (NAS) invited a group of 65 distinguished engineers, geologists, and other scientists to discuss disposal of high-level nuclear waste. The USGS contribution included one member of the steering committee and nine of the invitees to the Committee. The final report (NAS National Research Council Publication 519) espoused the concept of geologic disposal and concluded that

salt deposits seemed most promising as a host geologic medium.

In the late 1960's, the U.S. Atomic Energy Commission (AEC) studied a salt deposit near Lyons, Kansas, as a potential high-level waste disposal site. Studies of salt domes in the Gulf of Mexico area followed.

Late in 1972, AEC asked USGS to evaluate the geohydrologic possibilities of placing high-level waste in geologic formations, principally other than salt. The final report (USGS Open-File Report 74-158) cited 30 previous reports on the subject and concluded with several optimal considerations for the site:

- Hydrologic isolation was paramount and, therefore, low permeability rock and a virtually fault-free site were recommended.
- Low seismic risk.
- Low possibility of flooding by rising sea level.
- Low potential hazard for surface- or ground-water regimes in glacial or rainy climates.
- Low potential for exhumation by erosion.

One specific recommendation reads, "The Basin and Range province of the western United States, particularly the Great Basin exclusive of seismic-risk zone 3, appears to have potential for mined chambers above the deep water tables in tuff, shale, or argillite." The body of the report provides several examples of favorable geologic features at the Nevada Test Site.

In 1976, USGS Director Vincent McKelvey wrote to the Department of Energy (DOE) and suggested the Nevada Test Site as a potential high-level waste site, noting its remoteness, its varied geologic environments, and that we already had significant data collection and interpretation at the site.

Throughout the 1970s and 1980s, USGS was tasked by Congress to study and comment on the problem of disposal of high-level radioactive waste. Conclusions (USGS Circular 779) evolved to the following:

- (1) Salt deposit sites were less than ideal for a retrievable system of waste disposal in a geologic medium
- (2) Systematic examination of media other than salt should continue
- (3) Major studies of flow and transport are needed, especially in fractured rock
- (4) More tools should be developed to evaluate potential repositories (e.g., methods of dating old ground water)
- (5) More research is needed on the extent to which the repository itself can localize escape of radionuclides to the environment.
- (6) Uncertainties in earth-science predictions should be recognized as well as importance of multiple barrier approach for radionuclide containment.

In 1978, DOE established the Nevada Nuclear Waste Storage Investigations (NNWSI) project. The spent fuel test at Climax, Nevada, was one of its first tests.

In 1979, investigations started in Area 25 of the Nevada Test Site at Yucca Mountain and in the Calico Hills. Both were below the water table. To address some of the technical complexities of operating below the water table, enhance the accessibility and monitoring throughout the operational period, and provide for possible retrieval of waste, USGS later (1982) proposed siting a repository above the water table in the thick (400-600 m) unsaturated zone in arid regions (USGS Circular 903).

In 1980, USGS had a lead role in developing the Earth Science Technical Plan for Disposal of Radioactive Waste in a Mined Repository, which was written by 17 scientists from five organizations.

In 1981, the USGS and seven State agencies (Arizona, California, Idaho, Nevada, New Mexico, Texas, and Utah) began evaluating the Basin and Range province for possible sites for the disposal of high-level radioactive waste. The results were published in a series of eight USGS Professional Papers.

In 1982, Congress enacted the Nuclear Waste Policy Act of 1982 which required DOE to develop criteria for recommending candidate sites for a repository. In 1984, DOE completed 10 CFR 960, which set out criteria for recommending potential repository sites to the President, and provided guidelines for developing the Site Characterization Plan (SCP).

In 1986, USGS, with input from three DOE National Laboratories, produced a first draft of section 8.3.1 of the SCP for DOE. In 1987, the Nuclear Waste Policy Act of 1982 was amended to direct DOE to characterize only Yucca Mountain, Nevada. In 1988, DOE released a final version of the SCP, with increased level of detail, and the development of 78 study plans.

Eventually over 200 holes were drilled, nearly 100 fault trenches excavated, and detailed mapping at 1:240 to 1:12,000 was completed, including fracture maps. The work has involved scientists from USGS, DOE national laboratories, universities, and private contractors. A final major addition to the data set has come from the 8-km long Exploratory Studies Facility and cross drift which have provided much better access for the subsurface characterization, including detailed mapping and secondary-mineral evidence for the long-term history of the unsaturated zone.

In addition to DOE funding, the USGS was funded separately by Congress to carry out investigations related to nuclear waste hydrology from 1979 to 1993 and by the Nuclear Regulatory Commission to carry out research on the hydrology and geochemistry of nuclear waste during the 1980s and 1990s.

Recent

In 1998, DOE released to the public a five-volume synthesis of 15 years of study of Yucca Mountain, entitled "Viability Assessment of a Repository at Yucca Mountain." I convened a five-person panel of senior scientists to review and comment on central earth science issues. The panel's evaluation of DOE's viability assessment was released to the public as USGS Circular 1184, "Yucca Mountain as a Radioactive Waste Repository."

In 2001, the Acting Director of DOE's Office of Civilian Radioactive Waste Management asked the USGS to comment on the Preliminary Site Suitability Evaluation. Questions included:

- Is the scientific basis adequate for finding the site suitable? If not, what more was needed?
- Should the Secretary of Energy proceed to recommend the site?
- Is there any reason for the President not to recommend development of an application for a license to construct?
- Any other comments on any relevant aspect of the Yucca Mountain site for use as a repository.

The USGS provided comments only within the scope of our earth science expertise. We noted that:

- Studies to date by the USGS and other earth scientists continue to support the concept of geologic disposal as the only viable, long-term approach for dealing with long-lived radioactive waste.
- Scientific data gathered to date supports the decision to recommend the site
- After site recommendation, additional studies need to be performed.
- As the final design of the repository is prepared, the USGS strongly supports the inclusion of three

design considerations: (1) maintaining the surrounding rock at a temperature less than boiling, (2) use of forced and natural ventilation, and (3) a period of retrievability and monitoring.

- Recognizing that uncertainty in the future performance of the repository remains, the USGS endorses a stepwise decision-making process and phased implementation of the repository program.

Mr. Chairman, this concludes my remarks. I will be pleased to respond to questions that Members of the subcommittee may have.