

U.S. DEPARTMENT OF ENERGY

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YUCCA MOUNTAIN PROJECT

RESPONSE PACKAGE

SITE CHARACTERIZATION PLAN PUBLIC HEARINGS

AMARGOSA VALLEY, NEVADA MARCH 20, 1989

MARCH 1990

UNITED STATES DEPARTMENT OF ENERGY
NEVADA OPERATIONS OFFICE/YUCCA MOUNTAIN PROJECT OFFICE



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AMARGOSA VALLEY, NEVADA

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MR. GERTZ: Good afternoon and welcome. My name is Carl Gertz, and I am manager of the Yucca Mountain project office. I will be the Department of Energy's presiding official for today's hearing on the Yucca Mountain Site Characterization Plan which describes the U.S. Department of Energy's plans for characterizing Yucca Mountain, Nevada to determine its suitability for a nuclear waste repository.

For the record, this hearing is convened at approximately 2:00 p.m. in the Amargosa Valley Community Center in the town of Amargosa Valley, Nevada. The hearing was noticed in the Federal Register on Friday, December 30th, as well as being advertised widely in local newspapers. In addition, notices were sent to our public mailing lists, and the news media were notified.

We are here today to receive your comments on the Site Characterization Plan. The Department of Energy has prepared this document as a plan to guide detailed scientific studies which will be conducted at Yucca Mountain during the next five to seven years.

The SCP is a living document; it will be updated and modified as more is learned about the geologic, hydrologic and climatological conditions at the site. These changes will be compiled into SCP Progress Reports which will be issued semiannually to the Nuclear Regulatory Commission, State of Nevada, and to the public. The first SCP Progress Report is due to be published this summer.

In addition to the comments that you make this afternoon and tonight, written comments on DOE's site characterization plans may be made at any time during the site characterization process, which is expected to last the next five to seven years. These comments may be sent to the Yucca Mountain Project Office, U.S. Department of Energy, Post Office Box 98518, Las Vegas, Nevada, 89193-8518.

Both oral and written comments will receive the same consideration. At about the same time the SCP Progress Reports are issued, DOE will issue comment response packages. These will contain responses to the comments on the SCP that you make this afternoon and tonight, and any written SCP comments that are submitted. This includes comments made by the public, by the State of Nevada, by the Nuclear Regulatory Commission and other interested parties.

Originally, April 15th was the deadline set for the close of the initial SCP comment period. At the request of Governor Miller, that deadline has now been extended to June 1st. Let me emphasize, however, that comments on DOE's site characterization studies or activities received after June 1st will be considered by DOE and receive responses at a later date.

Last month DOE held a series of Project Update Meetings. These meetings were designed to provide the public information about the Project that the public told us they wanted to hear. Those meetings were intended to furnish you with information. This afternoon and tonight we are looking for information from you. Notice of both the Project Update Meetings and the SCP hearings was widely advertised in local newspapers and printed in the Federal Register. In addition, as I pointed out before, public mailing lists and the media were notified.

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In a few moments I will introduce the moderator of this afternoon's hearing. The moderator is an individual with experience in chairing public proceedings and he is not a DOE employee. He will conduct the hearing, calling on speakers and closely following the presentations. He will also certify the record of this meeting.

Also here this afternoon is a technical expert who will listen to the presentations and who, along with myself, may ask clarifying questions in order to make sure that the record fully reflects your comments. All comments made here today are being recorded by a professional court reporter, and will be made here today -- excuse me. -- and will be transcribed. The transcript from the hearings will be made available in local libraries as soon as possible after it is prepared. A list of these libraries is available in the rear of the room. Anyone wishing to purchase a copy of the transcript can make arrangements with the hearing reporter during breaks or after the hearing.

Now I would like to introduce the technical representative on this panel tonight this afternoon. On my right is Jean Younker, a Yucca Mountain Project geologist, who had a major role in development of the SCP. She worked with about 300 scientists and engineers developing the plans to obtain data, to assess the suitability of Yucca Mountain for a high-level waste repository. A former university professor, she has a doctorate degree in geology.

At this point I would like to introduce today's moderator. Lamond Mills on my left is a former U.S. attorney in Southern Nevada. He is now in private practice in Las Vegas. He has experience in conducting public proceedings. As I said earlier, he is here to conduct the meeting, call on speakers and follow the presentations. I will now turn the hearing over to him.

MR. MILLS: Thank you, Carl. I'm going to take just a couple of minutes to explain the procedures that we're going to be following this afternoon, and I'll probably do that every so often so that the new people coming in will have an opportunity also to understand exactly how we're going to do it. We've made arrangements, as you know, that people prior to this hearing could register and have an opportunity to be heard. We're also accepting registrations as people come in at the present time.

You will be given ten minutes to speak. Approximately eight minutes of that time, after eight minutes I will indicate by raising my hand that you have used that portion of your time, and I will notify you at the end of the ten-minute time that your time is up. We would ask then that you complete that thought that you're on, and relinquish your time so that everyone can be heard.

Some of you may have brought a written copy of your comments. We encourage that, and if you have, please leave one at the back table back there at the registration, as well as with the court reporter, so that it can become part of the record. If you only brought one copy, check back at the registration table, and we've made arrangements to have that photocopied.

As you come forward, please indicate your name so that the court reporter is sure to get that down. We are going to start with those speakers who notified us first, and it will follow also with those who check in during the

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course of the meeting. They will be called in the order in which they presented themselves.

All speakers, both those who reserve time in advance and those who register this afternoon, will be given the opportunity to speak. The only exception to this will be in the order of the exception that we may make is if public officials may come in and we may take them out of order to accommodate them. But that will be the only exception.

Likewise, we're going to have recesses. I can tell by the gathering that we're not going to use up all of our time, and in that case we're going to go into recess for a certain period of time. As others arrive who want an opportunity to speak, we will again adjourn the meeting, and we will hear their comments.

We are here to hear from the public, and we want to hear from you and give everyone an opportunity to do that. We ask that only one person speak at a time. This is obvious for the court reporter, and to make sure that we do get down exactly what you're here to say.

There will be no questioning of the individual providing the comments except, as previously indicated by Carl, a question may be asked by the panel to the information giver, the person at the mike, in order to clarify their position to make sure that we understand exactly what they're saying.

I also may announce any further procedural rules during the course of this meeting to make sure that everyone is heard, and that it goes smoothly. Again, we want to thank you for coming, and without any further ado, we'll call on our first speaker who is Mr. Carl Johnson.

Mr. Johnson, come forward.

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COMMENT 1

MR. JOHNSON: Thank you. My name is Carl Johnson. I am the administrator of technical programs for the Nevada Agency for Nuclear Projects. The Nevada Agency for Nuclear Projects, the Nuclear Waste Project Office, is the state agency assigned by Nevada statute to oversee the U.S. Department of Energy's high-level waste repository program management, and the disposal program itself. The professional staff of the agency and its technical contractors, including elements of the University of Nevada System and private-sector firms, are now in the process of carrying out a technical review of the Department of Energy's Site Characterization Plan for the Yucca Mountain Candidate waste repository site.

The Agency for Nuclear Projects has been instructed by Nevada Governor Bob Miller to take the time necessary, to review and assure its thoroughness and technical rigor, notwithstanding the schedule constraints imposed on the SCP review process by the DOE. This is similar to the direction of the chairman of the U.S. Nuclear Regulatory Commission to the NRC staff regarding its required review of the same SCP document. The Agency expects to submit its technical review to Department of Energy on behalf of the State of Nevada by September 1, 1989, at which time it will also be released for public distribution.

We have made a preliminary analysis of the available elements of DOE's overall program of studies and evaluations proposed to be carried out during the site characterization period. Our conclusion is that the comprehensive program remains conceptually incomplete, in that the supporting and associated documents necessary to even begin site characterization are either incomplete, nonexistent or lacking in sufficient detail to determine what work is actually proposed, and how the various work elements interface with each other.

RESPONSE

The U.S. Department of Energy (DOE) recognizes the commentator's concern, which is similar to some of the U.S. Nuclear Regulatory Commission's (NRC) comments. DOE is working to provide additional information on planned site characterization activities and integration of these activities in detailed study plans (which provide the next level of detail from the Site Characterization Plan), technical procedures, and the semiannual Site Characterization Progress Reports. These documents will be available for public review and comment.

With respect to the commentator's concern regarding the completeness of the Site Characterization Plan, Section 113(b)(1) of the Nuclear Waste Policy Act (NWPA) requires a "general plan" for site characterization of a potential repository. The December 1988 Site Characterization Plan (SCP) and its supporting documents are very lengthy and very detailed, especially when compared with the requirement stating the need for a general plan. In its Site Characterization Analysis, the NRC described the SCP as an adequate basis with which to begin the testing program described in it. The Nuclear Waste Technical Review Board has reported that the SCP contains no major omissions regarding the scientific program of study to be carried out during site characterization.

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Even though the SCP is not a licensing document, the purpose of a site characterization program is guided by the eventual use of the data within a regulatory framework. The repository program is, and will remain, a highly complex regulation-driven geotechnical program. The regulatory agencies, the NRC and the U.S. Environmental Protection Agency (EPA), have set forth requirements that are designed to set specific requirements for repository performance. Part B of the EPA standards (40 CFR 191) for a geologic disposal system was remanded by Federal Court to the agency for revision, and EPA is currently in the process of revising its standards. With regard to the U.S. Environmental Protection Agency (EPA) Standards, DOE believes that the remanded standard provides an adequate working guideline until such time as a revised rule is issued. Even though several requirements of the revised rule may differ from 40 CFR 191 as originally issued, it is not expected that the types and amount of scientific data to be collected will change significantly, although the application of that data may. SCP plans will be reassessed following release of the revised 40 CFR 191 to determine if they are still appropriate. When the EPA standards are finalized, DOE will have to abide by these requirements. The original standards in Part B are still used by DOE for planning purposes until a revised standard is brought forward.

The SCP is a blueprint that lays out the technical data needs as seen at the beginning of this effort. Plans can change with the addition of new information. Some degree of ambiguity or apparent incompleteness cannot be avoided in the SCP because many details pertaining to study methods, techniques, and equipment to be used in many specific study programs are guided by, or dependent on, results obtained early in the study. Thus, the SCP and the study plans developed from it must provide the flexibility to adapt to new information. A planning document that is very specific removes the flexibility needed in adapting plans to field experience. For example, prototype testing could lead to modifications in methods or techniques originally envisioned to be used to collect data. Study and activity descriptions in the SCP contain sufficient information on each study to provide a reviewer with an understanding of the basis for, and general nature of, the tests and analyses to be performed.

The SCP is organized as follows: the first 7 chapters of the SCP summarize what has been learned over a decade of study at the site and provide a conceptual design for the repository and waste package, based on this current knowledge. The current knowledge of the site was used to develop a study program to differentiate phenomena that are better known from those which are not well known. Chapter 8 describes the technical program, consisting of 106 studies that are in turn composed of 308 activities, that is planned to acquire additional information about the site. How the different SCP studies, and the data gathered by each, relate to one another is explained in the issues-resolution strategy. Data gathered by the technical program are to be used in performance assessments to evaluate whether the site can comply with regulatory requirements. The SCP contains the strategy and focus only for obtaining specific geotechnical and engineering information needed by the repository program. It does not lay out the plans for other parts of the repository program. Various other documents, plans, and status reports will be prepared by DOE during site characterization that explain and address other important issues; for example, radiological monitoring, transportation, socioeconomic impacts, and environmental monitoring. These studies will be performed in parallel with the technical program and, while these studies are

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important, their results will not help the scientists evaluate whether the site can contain and isolate waste for thousands of years.

REFERENCES

40 CFR Part 191 (Code of Federal Regulations), 1986. Title 40, "Protection of Environment," Part 191, "Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes," U.S. Government Printing Office, Washington, D.C., pp. 7-16.

COMMENT 2

Without a clear articulated comprehensive plan of activities and proposed specific studies and all the necessary environmental plans and activities, it is not possible to evaluate the true merit of the plans that are being presented here for review. Of particular note, in light of the Department of Energy's stated initiation to begin Exploratory Shaft Facility construction in November 1989, is the lack of sufficient and acceptable ESF location rationale, and study plans to support the initiation of this potentially irreversible action.

The DOE has scheduled initiation of the Exploratory Shaft site preparation for May of 1989. The State of Nevada objects to this activity being undertaken as scheduled, and strongly recommends that the ESF site preparation be deferred until the following concerns are resolved.

The DOE expects the Exploratory Shaft Facility site preparation to result in the application of 6.7 million gallons of water to the site for surface pad construction.

Also, some fraction of the 43 million gallons of water allocated to dust control at the ESF will also be applied to the pad. This is roughly equivalent to dumping an additional one full year's rainfall directly on the ESF site in a short period of just a few months. It is important to recognize this because the studies planned at the ESF include hydrologic analysis of the unsaturated zone while the underground ESF is still being constructed.

The data collected are intended to be used, ultimately, in determining the site's suitability, and the artificial addition of a significant amount of water to the unsaturated hydrologic system will bring the validity of these data into serious question.

Knowing of this concern, it is reasonable to conclude that the ESF site preparation is, in the terminology of the Nuclear Regulatory Commission, important to safety in repository licensing considerations. This being the case, the ESF site preparation should not proceed until the following two matters are adequately addressed.

First, the potential effects of this addition of water to the hydrologic system being studied must be sufficiently understood to resolve the data validity question.

Second, the resolution of the data validity question and the actual application of the water to the site must be subject to the controls of an approved Quality Assurance Program and Procedures, which at this time are not fully in place in the DOE program, nor is it expected that they will be in place by May 1989.

RESPONSE

In the Secretary of Energy's "Report to Congress on Reassessment of the Civilian Radioactive Waste Management Program" (DOE/RW-0247; issued November 30, 1989), the revised schedule it contained for beginning exploratory shaft facility (ESF) construction was late 1992. This deferred date will allow the

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U.S. Department of Energy (DOE) adequate time to analyze recommendations on ESF design and construction made by the Nuclear Waste Technical Review Board (NWTRB) in a meeting in Las Vegas, on April 11-12, 1989. The Site Characterization Plan (SCP) reported that the ESF would be constructed using conventional drill/blast/muck methods. During the meeting, the NWTRB suggested that DOE study the possibility of constructing the ESF with a tunnel boring machine, and DOE has begun a study to review the impacts of using this mining technology on the tests that are to be carried out in the ESF, insofar as tests and analyses in the SCP had assumed a drill/blast method for ESF construction.

Water needed for dust control and construction of the ESF has been carefully considered by DOE exactly for the reasons stated in the comment. DOE also is concerned about the potential to influence the results of ESF testing in the unsaturated zone. The sequencing of unsaturated zone ESF tests to avoid interference between them was dealt with in the five ESF-related study plans that have been approved by DOE and sent on to the U.S. Nuclear Regulatory Commission (NRC). If the construction method for the ESF is changed, this analysis will have to be reexamined.

The water needed for pad construction and dust control referenced in the comment represent total estimates that are applied over a period of time. The total number of gallons to be used is not as important as knowing what fraction of any specific amount would infiltrate, over a given time, rather than evaporate or be taken up by desert vegetation. With this information, water used for pad construction and dust control can be metered out to ensure that the rate of application does not surpass the rates of evaporation/transpiration to limit infiltration into the unsaturated zone.

Each participating organization on the Yucca Mountain Project must operate under its own Quality Assurance Plan (QAP), which fulfills the requirements laid out in the Project Office's QAP 88-9 as accepted by the NRC in December 1988. Participant QA plans need to be consistent with these requirements, as well as with those procedures all participants use in common that implement the requirements of QAP 88-9. DOE has committed itself to a course of action, and NRC has concurred, that no new site characterization activities will be carried out until a "qualification" audit can confirm the adequacy and workability of each participant's QAP. Drilling and trenching are both examples of "new" work that is currently on-hold until a qualification audit confirms that the proper controls are in place. As of December 1989, all Project participants except Los Alamos National Laboratory have passed their qualification audits, which includes acceptance of their QAPs by the NRC. The Yucca Mountain Project Office and the Office of Civilian Radioactive Waste Management (OCRWM) in Washington, D.C., have yet to undergo a qualification audit, but are scheduled to undergo one in the near future. Throughout site characterization, regular audits by participant, Project Office, and OCRWM QA staff will confirm whether participant plans and procedures are being successfully implemented.

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REFERENCES

DOE (U.S. Department of Energy), 1989. Secretary of Energy's Report to Congress on Reassessment of the Civilian Radioactive Waste Management Program, DOE/RW-0247, Washington, D.C.

COMMENT 3

I now would like to repeat the essence of some of our findings regarding the draft SCP released last year for our informal review and comment. These comments bear repeating, since we have not discovered that they were heeded in DOE's preparation of this statutorily required Site Characterization Plan.

We believe the DOE's conceptual approach to site characterization at Yucca Mountain should be re-examined, and the SCP significantly revised before it can be viewed as a credible basis for evaluating the suitability of the site for the safe nuclear waste isolation for the thousands of years required.

It should come as no surprise that Nevada's expectations are that any repository site determined to be suitable must first be the best understood piece of geology on earth. To meet this requirement, nothing less than the most rigorous, objective scientific investigation will be acceptable. This must precede the emphasis on engineering a repository at Yucca Mountain, which is the most obvious focus of the DOE's current Site Characterization Plan.

RESPONSE

With regard to the commentator's concern about U.S. Department of Energy's (DOE) approach to site characterization at Yucca Mountain, a preliminary determination of suitability of the Yucca Mountain site, based on information available from the literature and studies at the site since the late 1970s, was made before recommending the Yucca Mountain site for characterization in May 1986. This initial determination of suitability for further work must now be focused into a testing program (site characterization) to determine the site's suitability within the regulatory framework.

The issues resolution strategy in the December 1986 Site Characterization Plan (SCP) defines the data needed to address compliance with U.S. Environmental Protection Agency (EPA) and U.S. Nuclear Regulatory Commission (NRC) regulations, and directs the reader to relevant SCP sections for discussion of how site data would be used to evaluate long-term performance of the repository system. The SCP addresses the question of site suitability in Issues 1.9 (postclosure performance), 2.5 (preclosure radiological safety), and 4.1 (feasibility of construction), which are discussed in SCP Sections 8.3.5.18, 8.3.5.6, and 8.3.5.7, respectively. These sections also cover the qualifying and disqualifying conditions of DOE's siting guidelines (10 CFR 960) in each of these areas. 10 CFR 960 was based on a comparative evaluation between several sites being characterized to determine a single candidate site for a repository. The appropriate role for the 10 CFR 960 guidelines in light of the programmatic changes caused by passage of the Nuclear Waste Policy Amendments Act of 1987 is currently under review by DOE.

DOE's siting guidelines make direct reference to the regulatory requirements for the preclosure and postclosure performance of the repository system, including both the natural (site) and engineered components. The guidelines generally require evaluation of whether the conditions and processes at the site are such that these regulatory requirements can be met.

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REFERENCES

- 10 CFR Part 960 (Code of Federal Regulations), 1987. Title 10, "Energy," Part 960, "General Guidelines for the Recommendation of Sites for Nuclear Waste Repositories," U.S. Government Printing Office, Washington, D.C., pp. 518-551.

COMMENT 4

This misdirected emphasis on DOE's part results from its apparent but unproven assumption that the site is suitable for a waste repository. This assumption seems to prevail in spite of the fact that the key standard for determining site suitability for long-term nuclear waste isolation has yet to be established by the U.S. Environmental Protection Agency. And it is not expected to be final, finally adopted into regulation for another two to three years. The initial EPA standard was overturned in federal court, and returned to the Agency for additional consideration.

The Site Characterization Plan also does not, but should, reflect a high priority on carrying out the prerequisite geologic and geohydrologic studies that address the conditions most likely to lead to an early disqualification of the site. These include such issues as faulting and earthquake potential, volcanism, the significance of fracture flow in both the unsaturated and saturated zones, and mineral resource potential at the site.

RESPONSE

With regard to the U.S. Environmental Protection Agency (EPA) standard, the U.S. Department of Energy (DOE) believes the essential elements of the standard that pertain to the safety of a repository exist in the initial standard. Though remanded back to EPA for reconsideration by Federal Court, the standards that had been embodied in Part B of 40 CFR 191 are still in use by DOE, for planning purposes, until a revision is brought forward. Even though there may be changes when the EPA issues its revised standard, DOE believes the initial standard is sufficient for the purpose of conducting site characterization since the basic scientific information that will be required to address the revised standard is not likely to change significantly.

With regard to placing a high priority on studying potential disqualifying conditions, the NRC regulations in 10 CFR 60 emphasize the performance aspects of both natural and engineered barriers and, therefore, no single site feature or piece of information is likely to be obtained directly from field studies that would, by itself, automatically disqualify the site. The results from a broad spectrum of field studies are needed to adequately support performance assessment modeling and to evaluate potential disqualifying factors such as pre-emplacement ground-water travel time or the presence of site conditions that could lead to radionuclide releases in excess of the regulatory limits. DOE has recognized the major areas of uncertainty regarding the suitability of the site with respect to meeting the regulatory requirements. These areas involve (1) geohydrology and hydrologic processes operating in the unsaturated zone; (2) preclosure tectonics, surface faulting and ground motion; (3) postclosure tectonics, potential for volcanism and impact of tectonic activity on hydrologic conditions; and (4) human interference and potential for significant natural resource occurrence. High-priority surface-based testing activities related to each of these areas have been identified. Some activities have been underway for years (i.e., are ongoing efforts) while others will be initiated when the prerequisites for new site characterization activities are complete. The information from these activities will be evaluated as it is obtained during site characterization to determine whether changes in the site characterization program are warranted and to assess the potential suitability and licensability of the site. The site may be

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disqualified at any time should the data and the results of performance evaluations support such a finding.

REFERENCES

- 10 CFR Part 60, (Code of Federal Regulations), 1987. Title 10, "Energy," Part 60, "Disposal of High-Level Radioactive Wastes in Geologic Repositories," U.S. Government Printing Office, Washington, D.C., pp. 627-658.
- 40 CFR Part 191 (Code of Federal Regulations), 1986. Title 40, "Protection of Environment," Part 191, "Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes," U.S. Government Printing Office, Washington, D.C., pp. 7-16.

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COMMENT 5

The conceptual approach of the Site Characterization Plan puts unjustified early emphasis on construction of the Exploratory Shaft Facility, when critical surface-based geologic and hydrologic studies should have the highest priority in the initiation of site characterization activities.

With those remarks, thank you very much.

MR. MILLS: Now, it's indicated you have two more minutes, Mr. Johnson.

MR. JOHNSON: I know, but that completes my statement.

MR. MILLS: Thank you. Have you given a copy of that either back there at registration? Would you go back, please and do that for them?

MR. JOHNSON: I can do that.

MR. MILLS: Thank you very much.

RESPONSE

The Secretary of Energy's "Report to Congress on Reassessment of the Civilian Radioactive Waste Management Program" (DOE/RW-0247; issued November, 1989) calls for a delay in underground testing in an Exploratory Shaft Facility (ESF). This delay would allow attention to be focused on surface-based tests that could identify potential unsuitable conditions at the site. Of the 106 studies in the Site Characterization Plan (SCP), 92 of them are "surface-based," either carried out on the surface, for example, trenching, mapping, or other sample gathering, or based at the surface, for example drilling.

Focusing the U.S. Department of Energy's (DOE) early site characterization work on the surface-based program comes in direct response to comments offered on the SCP/Consultation Draft by the U.S. Nuclear Regulatory Commission (NRC), the State of Nevada, and the Edison Electric Institute. Early site characterization would focus DOE's resources on collecting data on the site's suitability without an ESF. Much information can be obtained through surface-based testing to focus on issues related to seismic faulting, unsaturated-zone hydrology, volcanology, and natural resource potential. A preliminary review of site suitability based on this data could then be made to allow an informed decision as to whether an ESF should be constructed.

The construction-phase tests to be performed in the exploratory shafts and the underground exploration and testing program planned for the ESF are all important. Some information on large-scale features or variability in site conditions are only obtainable underground through direct access to the rocks in which a repository would be built. Many of the tests and analyses that are part of the 14 studies planned in the ESF generally need to be gathered over a long time-frame. The planned program of geologic drifting in the ESF to investigate structural features is also likely to provide more information than can be acquired through a program of surface-based exploration alone. The long-term in situ tests planned for the ESF are ultimately needed to provide confidence in DOE's understanding of site processes and conditions. An ESF had been planned early in the site characterization effort since

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experiments of long duration were to be carried out, and a period of time is required for ESF shafts and tunnels to re-equilibrate with the surrounding rocks after construction.

REFERENCES

DOE (U.S. Department of Energy), 1989. Secretary of Energy's Report to Congress on Reassessment of the Civilian Radioactive Waste Management Program, DOE/RW-0247, Washington, D.C.

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MR. MILLS: Our next speaker will be Doris Jackson.

COMMENT 6

MS. JACKSON: In the year 1862, three young prospectors -- I don't believe they were all old -- walked across Amargosa desert, meaning Bitter Land. They looked up a mountainside and one said: Hey, Bruce -- they weren't all named Zeke or Tex. -- look at all them Yuccas. Why, they go way up the hill. We'll call this Yucca Mountain. And maybe if we're lucky, why they'll deposit all the high-level waste in there. Why, we'll be famous. Just for finding the exact spot in all the lands of America to bury all the waste.

We'll be rich. We won't have to prospect anymore. Turn ol' "Mazy" loose. Well, not loose. Just tie her up over by them "Yuccies". They'll want all this land and they'll pay us. Why, I'll bet we'll get at least \$200. We'll head for San Francisco. Nothing ever happens there.

Oh, but what about all them people that live in that valley, Bruce? What in the world's going to happen to them?

Well, what do you mean? They'll be all right. Don't you know, they flood whole towns when they build a dam. They what you call relocate people. They take them off your homestead -- it's only a lot of hard work. -- and they buy you a little house on a lot with neighbors and shrubs and everything, even a sidewalk. But you'll have to stay put and don't complain; it's all for the best. You'll adjust. What the hell, you've done it before.

Woa, woa, woa, Bruce. Now you've gone too far. I've changed my mind. I'm not hurting them folks. Instead of Yucca Mountain, we'll call it Endangered, and we'll put it on the list.

If this had happened, we wouldn't be here today. But since we are, these are my comments:

Mr. Gertz, I would like to commend you on the way you've turned DOE around. As far as the public concerns, you have the insight to put these major problems on a more personal basis than did your predecessor, Dr. Veith. We felt somewhat intimidated, and he had a way of making our questions seem ridiculous.

Now that this policy has changed, yes, we have comments, and these are mine: "I" is a word not used very often by me. Today it is a word uppermost in my mind. I love Amargosa Valley. I love the people that live in Amargosa Valley. I love the air. I love the quiet. I love the freedom. I love the scenic beauty. I love the colors. I love the sunsets. I love the dawns. The stars light up our desert floor. I am not a martyr. I do not want Yucca Mountain high-level waste repository.

This valley is the only place I know of where no one wants to leave. We never look for a way out; we look for a way to stay. This enchanted valley has a hold on us, like a mother holds a child. The traumatic and negative impact on us all will be severe. The stigma of a radioactive dump will be everlasting.

RESPONSES TO AMARGOSA VALLEY PUBLIC HEARING COMMENTS

Amargosa Valley experiences a slow but steady growth, doubling in size about every ten years. All looking for the same things I mentioned at the beginning of my comments. What reaction will they have once the repository is here? A black mark that we will be unable to erase. Without growth, you become stagnant. Property values go down, businesses fail, and you die. My children and grandchildren live in this valley. Is this the legacy I want to leave Amber Dee? I think not.

Back in the 40's, little did they know the problems they would be leaving for further generations. As we progress with new technologies, we create problems that we and generations after us are going to have to deal with.

Stigma is crucial to Nevadans, and most critical to Amargosa Valley. To what extent has and does this stigma harm us and our family life? The potential benefits from taxable repository purchases could easily be undone by risk effects. Projection of grants equal to tax revenues would not compensate for the shortfall.

We the public want consideration. We the public want some control. We the public want warm feelings. We the public want property values, assurances. Perhaps during site characterization, you'll draw down the water and the pup fish will save us all. We will have the benefits of knowing more about our valley than any other place in the world. Then we can continue to build and fulfill our dreams of living out our lives in peace. Without Yucca Mountain waste repository.

Thank you.

MR. MILLS: Thank you.

RESPONSE

The U.S. Department of Energy shares your concern for the environment in the Amargosa Valley and is committed to conducting site characterization activities in an environmentally acceptable manner in accordance with all applicable laws. An Environmental Monitoring and Mitigation Plan (EMMP) has been developed to monitor for and to mitigate significant adverse environmental impacts that might occur. As detailed in the 1986 Environmental Assessment, the Yucca Mountain Project is not expected to affect ground water in the Amargosa Valley, including Ash Meadows. Nevertheless, the EMMP describes a program for monitoring the effects of water use. For example, water levels in Ash Meadows will be monitored to protect the endangered pupfish.

REFERENCES

DOE (U.S. Department of Energy), 1986. Environmental Assessment: Yucca Mountain Site, Nevada Research and Development Area, Nevada, DOE/RW-0073, Washington, D.C.

RESPONSES TO AMARGOSA VALLEY PUBLIC HEARING COMMENTS

COMMENT 7

Our next speaker will be Roger Dehart.

MR. DeHART: Thank you. Here are some written comments from Inyo County to the Department of Energy, and my testimony will sort of parallel that letter.

MR. GERTZ: Thank you.

MR. DeHART: My name is Roger Dehart, and I am the Inyo County planning director. I am here today to present to you and make it a matter of public record some of the apprehensions and concerns of the residents of Inyo County, especially the residents of eastern Inyo County. These apprehensions and concerns have come about as a result of Congress' decision to locate the nation's first high-level nuclear waste repository at Yucca Mountain, Nevada.

The testimony you are supposed to consider and hear today involves the DOE's Site Characterization Plan which will be implemented over the next few years. Now, I cannot specifically address the contents of the Site Characterization Plan as it has not been made available for public review in Inyo County.

Inyo County is the second largest county in the State of California, with approximately 10,000 square miles. It's very rural in character with a population of only 18,000. In addition, over 98 percent of our county is under the ownership of various governmental agencies. Now, this places Inyo County at an extreme disadvantage in being able to expend time and monies necessary to fully evaluate the Site Characterization Plan and the impact the Yucca Mountain Repository may have on the environment and on the citizens of Inyo County.

Based upon this lack of resources, Inyo County applied to the Department of Energy for the designation of an affected unit of local government. This request was justified, based on a number of facts which indicate Inyo County will be directly affected by this project. In fact, Inyo County has the second greatest potential of being adversely affected environmentally than any other county, excepting Nye County.

A few of these facts are:

Inyo County is the closest adjacent county to Yucca Mountain, being only 14 air miles away.

Inyo County shares a common aquifer with Yucca Mountain Repository site, and this aquifer flows southwesterly into Inyo County, and into the Amargosa River drainage basin.

The first area this common aquifer surfaces is at Ash Meadows, adjacent to the Nye County/Inyo County border, and also at Alkali Flats, which is located within Inyo County. In addition, it is thought that the springs which surface at Furnace Creek Ranch in Death Valley National Monument also are fed by this common aquifer.

RESPONSES TO AMARGOSA VALLEY PUBLIC HEARING COMMENTS

RESPONSE

The U.S. Department of Energy (DOE) acknowledges that representatives of Inyo County have taken issue with the Secretary of Energy's decision not to grant Inyo County an affected status under subsection 2(31) of the Nuclear Waste Policy Act of 1982, as amended. DOE believes that the matter of Inyo County has received careful consideration, and that analyses indicate that no significant impacts to Inyo County would arise to warrant its designation as an "affected unit of local government" at this time. Should subsequent developments provide new information that in the county's view warrants the Secretary's reevaluation, such as the actual establishment of transportation routes or the results of site characterization studies to be conducted in the coming years, Inyo County can again petition for an affected status. In addition, on April 7, 1989, shortly after the comments were presented, Inyo County brought suit in the Ninth Circuit of the U.S. Court of Appeals to challenge the Secretary's decision not to grant the county affected status. Consequently, the propriety of the Secretary's decision will ultimately be decided in that forum.

Ash Meadows, Alkali Flats, and Death Valley are indeed believed to be discharge points for the regional ground-water system which includes the Yucca Mountain area. However, the proposed repository will be constructed in unsaturated rocks above the aquifer. Between the bottom of the repository and the top of the water table are hundreds of feet of predominantly low-permeability rock which are expected to retard downward movement of radionuclides. A significant portion of these rocks are zeolitic and their ion-exchange properties provide the potential for chemical retardation of radionuclide movement. In addition to these favorable natural features, engineered barriers will be constructed to further contain the waste and prevent migration.

One of the performance objectives for a geologic repository is that the geologic setting shall be such that it would take at least 1,000 years for ground-water seepage to reach the accessible environment (the edge of an envelope 5 km or 3 miles from the outer boundary of a repository). According to a computer model prepared by Sinnock and others (1986), the travel time from the repository through the unsaturated zone to the water table would take more than 9,000 years. Calculations of flow time in the saturated zone from below the repository to the accessible environment range from about 170 to 1,700 years.

REFERENCES

- Sinnock, S. (ed.), Y. T. Lin, and M. S. Tierney, 1986. Preliminary Estimates of Ground-water Travel Time and Radionuclide Transport at the Yucca Mountain Repository Site, SAND85-2701, Sandia National Laboratories, Albuquerque, N. Mex.

RESPONSES TO AMARGOSA VALLEY PUBLIC HEARING COMMENTS

COMMENT 8

One of the proposed railroad routes for the shipment of high-level nuclear waste to Yucca Mountain passes through Inyo County. A study is now being conducted on the possible highway transport of this nuclear waste using routes located in Inyo County; specifically, State Highways 127 and 178.

RESPONSE

With respect to the commenter's concerns regarding transportation routes in California and Inyo County, the three potentially feasible rail routes under consideration by the Yucca Mountain Project do not go into California. One route, however, does pass west of Pahrump near the California border. The other two routes are much further from the California border. The Nevada Highway Routing Study (Ref. DOE/NV-10576-7, dated April 1989), issued by the Project, identifies the use of Interstate 15 and Interstate 40 in California and no local routes in Inyo County. The only way the state highways identified in the comment could be used for transporting spent nuclear fuel and high-level waste (should Yucca Mountain be found suitable for a repository) is by mutual agreement of Nevada and California, after a risk evaluation of the routes done by a State agency in accordance with U.S. Department of Transportation (DOT) requirements and by a recommendation to the DOT by the State of California.

REFERENCES

DOE (U.S. Department of Energy), 1989. Highway Routing Study, DOE/NV-10576-7, Nevada Operations Office, Las Vegas, Nevada.

RESPONSES TO AMARGOSA VALLEY PUBLIC HEARING COMMENTS

COMMENT 9

Approximately 20 percent of Inyo County is included within the radiological monitoring program sampling area.

Based upon these facts, Inyo County will be affected, and I think it's realized by the Department of Energy.

Please see joint response following Comment 10.

COMMENT 10

Recently, Death Valley National Monument has expressed concern over this project and the possible impacts it may have on the Monument.

The citizens of Inyo County have, through their board of supervisors, supported Inyo County's request to be designated as an affected unit of local government.

The State of Nevada has supported Inyo County's request to be designated as an affected unit of local government.

The California Energy Commission has supported Inyo County's request to be designated as an affected unit of local government.

The governor of the State of California, George Deukmejian, has supported Inyo County's request to be designated as an affected unit of local government.

And presently our two senators, Cranston and Wilson, are now being asked to support Inyo County's request to be designated as an affected unit of local government.

Our initial request to the Department of Energy was denied back on October 3rd, 1988, by the then secretary Mr. Herrington. Inyo County has subsequently asked for reconsideration by the new Secretary of the Department of Energy, Admiral Watkins, in December of 1988, and we are still awaiting his reply three and a half months later.

I understand we can't ask any direct questions, but I would like a response as soon as possible from the Department of Energy. If the 180-day appeal period elapses from the first denial by Mr. Herrington, will that prohibit Inyo County from taking any appeal measures through the Federal Courts? Or does our request for reconsideration place this 180-day appeal period on hold? I would like to get an answer as soon as possible on that.

Inyo County can attest to the fact that we have the potential to be directly affected by the Yucca Mountain Nuclear Waste Repository. Much more so than Clark County which will be affected primarily from a socioeconomic standpoint. Or by Lincoln County which is affected only by its possible transportation of high-level nuclear waste through its borders; the same as Inyo County.

RESPONSES TO AMARGOSA VALLEY PUBLIC HEARING COMMENTS

To summarize, we feel it was ridiculous for the Department of Energy to deny Inyo County's request to be designated as an affected unit of local government, and thereby prohibiting Inyo County and its citizens from taking any active role in the review and evaluation of the Site Characterization Plan. Inyo County does not have the resources or manpower to undertake such a monumental task on its own without federal support.

We therefore demand that the Department of Energy immediately review our second request to be designated as an affected unit of local government. If approved, this will permit Inyo County to take an active role in the site characterization process, and to evaluate any adverse environmental impacts which may occur within our borders. This will also allow Inyo County and its citizens to be considered in the decision making process which we so greatly desire, and we feel rightfully deserve.

Thank you.

MR. MILLS: Thank you.

RESPONSE TO COMMENTS 9 AND 10

While the comments here do not directly pertain to the Site Characterization Plan, the U.S. Department of Energy (DOE) acknowledges that representatives of Inyo County have taken issue with the Secretary of Energy's decision not to grant Inyo County an affected status under subsection 2(31) of the Nuclear Waste Policy Act of 1982, as amended. DOE maintains that the matter of Inyo County has received careful consideration, and analyses indicated that no significant impacts to Inyo County would arise to warrant its designation as an "affected unit of local government" at this time. Should subsequent developments, such as the actual establishment of transportation routes or the results of site characterization studies to be conducted in the coming years, result in new information which in the country's view would warrant the Secretary's re-evaluation, Inyo County can again petition for affected status. It also should be noted here that on April 7, 1989, shortly after the comments were presented, Inyo County brought suit in the Ninth Circuit of the U.S. Court of Appeals to challenge the Secretary's decision not to grant the county affected status. Consequently, the propriety of the Secretary's actions here will ultimately be decided in that forum.

See also responses to Amargosa Valley Written Public Comments WA-10 through WA-14.

COMMENT 11

Our next speaker will be Paul Payne.

MR. PAYNE: I am Paul Payne. I represent the Fifth Supervisorial District of Inyo County. My district covers over 5,000 square miles, and over one-half of the area of Inyo County. It is an area which contains an immense range of land forms and vegetation and wildlife habitats (from Mount Whitney to Bad Water).

Within my district are numerous small rural communities consisting of Lone Pine, Olancho, Darwin, Keeler, Shoshone, Tecopa, Death Valley Junction, just south of here.

The economic base for many of these communities was supported by mining operations. Over the last few years, mining activity has declined in the eastern portion of Inyo County. Today, many of the economies are based upon highway and tourist services.

This is clearly evident when one realizes the number of tourists visiting Death Valley National Monument is in excess of 720,000 people per year. There is pending legislation to elevate the Monument to national park status, which will no doubt increase the number of visitors. Any proposal which would adversely affect this expanding economy base will be opposed by Inyo County.

The Yucca Mountain High-Level Nuclear Waste Repository is a proposal which may not have any adverse impact upon this economic base. The fact that Inyo County could be affected by air or ground water contamination; by the transportation of nuclear waste through Inyo County by rail or truck; and just by the location of the repository near a major tourist attraction is of great concern.

Yes, we have legitimate fears and concerns which were only intensified by the Department of Energy's denial of designating Inyo County as an affected unit of local government. All Inyo County has at present is a two-page letter from the Department of Energy, which in summary, simply states, Don't worry. Inyo County will not be affected. Trust us.

Being able to take an active role in the Site Characterization Plan as an affected unit of local government will help assure Inyo County that Yucca Mountain will not have the same problems which are now occurring at Hanford, Washington; Fernal, Ohio; Clinch River, Tennessee; Savannah River, Georgia; Rocky Mountain Arsenal, Colorado, and Idaho Falls, Idaho.

As the elected representative from the Inyo County's Fifth Supervisorial District, I have the obligation and responsibility to promote the health, safety and welfare of its citizens. The Department of Energy, through its denial of Inyo County's request to be designated as an affected unit of local government, prohibits me from fulfilling this obligation.

Thank you.

MR. MILLS: Thank you.

RESPONSES TO AMARGOSA VALLEY PUBLIC HEARING COMMENTS

RESPONSE

The U.S. Department of Energy (DOE) acknowledges that representatives of Inyo County have taken issue with the Secretary of Energy's decision not to grant Inyo County an affected status under subsection 2(31) of the Nuclear Waste Policy Act of 1982, as amended. DOE maintains that the matter of Inyo County has received careful consideration, and analyses indicated that no significant impacts to Inyo County would arise to warrant its designation as an "affected unit of local government" at this time. Should subsequent developments provide new information which in the county's view would warrant the Secretary's re-evaluation, such as the actual establishment of transportation routes or the results of site characterization studies to be conducted in the coming years, Inyo County can again petition for affected status. It also should be noted here that on April 7, 1989, shortly after the comments were presented, Inyo County brought suit in the Ninth Circuit of the U.S. Court of Appeals to challenge the Secretary's decision not to grant the county affected status. Consequently, the propriety of the Secretary's actions here will ultimately be decided in that forum.

RESPONSES TO AMARGOSA VALLEY PUBLIC HEARING COMMENTS

MR. MILLS: I notice some of you have come in after we started. This is your moment to be heard. If you wish to be heard, go ahead and register at the back of the room.

Our next speaker will be "Leslie" Lowe.

RESPONSES TO AMARGOSA VALLEY PUBLIC HEARING COMMENTS

COMMENT 12

MR. LOWE: That's Lisle Lowe. I am on the Amargosa Town Advisory Board. I just wanted to make a comment on the timing of the meeting at 2:00 in the afternoon. Most of the residents have jobs or are not available. If they were, I think you would find that 80 to 90 percent of the people are for this project, and it would be better if they were here. That's all I have to say.

MR. MILLS: Thank you. For your information, there is also hearings going to be conducted tonight as well to give everyone an opportunity.

RESPONSE

The U.S. Department of Energy (DOE) shares the commentator's concern regarding the timing of these hearings. To accommodate those who work during the day, DOE held this same hearing again in the evening. In addition, DOE is accepting written comments on its site characterization activities at any time during the site characterization process and will respond to these comments individually or in written "response packages," which will be issued periodically to State and local government officials and to the public as groups of comments are received by DOE. This means that the opportunity for citizens' comments is not limited or restricted in any way by public hearing locations and schedules. These comments should be addressed to:

U.S. Department of Energy
Yucca Mountain Project Office
101 Convention Center Drive
P.O. Box 98518
Las Vegas, Nevada 89193
Attention: Carl P. Gertz

In addition, DOE holds Project Update Meetings every six months during which the public have an opportunity to provide comments and ask questions. Comments provided during these meetings will be compiled and reviewed by Project scientists to make sure that site characterization planning and activities address relevant concerns. These meetings are widely advertised through public mailing lists and the media and are held at rotating locations throughout Nevada.

RESPONSES TO AMARGOSA VALLEY PUBLIC HEARING COMMENTS

COMMENT 13

Paul Watkins is next.

MR. WATKINS: My name is Paul Watkins. I am the elected president of Death Valley Area Chamber of Commerce.

The Death Valley Area Chamber of Commerce is an association of business people, mostly in eastern, southeastern Inyo County. Some of our chamber business members are from the Pahrump Valley, and some of them are from the Amargosa Valley that we are in now. Our service area includes the Stovepipe Wells, Furnace Creek Ranch, Tecopa's Hot Springs and Shoshone. We also have members from Pahrump, San Bernardino County -- that is Baker -- and Nye County, that is Amargosa Valley.

I have come here today to underline and support Inyo County Board of Supervisors in their requests, seeking affected status as an affected unit of local government. We have been monitoring this request for affected status by the Inyo County Board of Supervisors and support it.

I would like to reiterate that the second request has been made, as Mr. Dehart said; that the first request was turned down. I would like to underline the realities that the communities of Tecopa and Shoshone and Death Valley Junction have the potential to be significantly impacted by the site characterization study, and the high-level repository, inasmuch that the aquifer of the Amargosa has its source in Nevada and some on the Test Site and on Yucca Mountain itself.

It is difficult for a chamber of commerce to stand up to the Department of Energy, and it is difficult for Inyo County, with only 18,000 residents, to stand up to the Department of Energy. But I am compelled to come here on behalf of the business people that the Death Valley Chamber represents, and express our concerns over the impact on our lives of this site characterization and the high-level nuclear repository.

Death Valley enjoys a transient population of some -- some of our visitors stay for a few weeks to a few months during the winter. Some are just traveling through. But in the entire Death Valley service area, it is upwards of 800,000 people this year -- or there is last year. We anticipate that to reach a million people within the next two years. That is more than the population of the City of Las Vegas.

This transient population is the lifeblood of the businesses and the people in southeastern Inyo County. Anything that would be done to stigmatize this area as a nuclear waste zone, or any accident that happened on Routes 127 and 178, that are considered alternate routes for transportation of high-level nuclear waste into the repository, would seriously affect our communities.

Our chamber hasn't had the chance to thoroughly read the Site Characterization Plan. We have a committee that is studying it. Although it is very costly, we are fortunate to have a young scientist, Fred Johnson, who will be making written and oral input into testimony this day. We support his testimony, and we will most likely be sending him to Washington with further testimony, and we will be monitoring this process throughout.

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There's some other points I'd like to touch on. Our concerns are, of course, the long-term safety and health of our communities. We question how the Department of Energy can at all consider state highway Routes 127 and 178 as transportation routes for high-level nuclear waste into the repository, without granting affected status of a unit of local government to the Inyo County Board of Supervisors.

There are no incorporated townships in southeastern Inyo County. The communities that I've mentioned are just small communities that are represented by the Board of Supervisors of Inyo County, and we support, once again, their efforts to seek affected status.

RESPONSE

The U.S. Department of Energy (DOE) acknowledges that representatives of Inyo County have taken issue with the Secretary of Energy's decision not to grant Inyo County an affected status under subsection 2(31) of the Nuclear Waste Policy Act of 1982, as amended. DOE believes that the matter of Inyo County has received careful consideration, and that analyses indicate that no significant impacts to Inyo County would arise to warrant its designation as an "affected unit of local government" at this time. Should subsequent developments, such as the actual establishment of transportation routes or the results of site characterization studies to be conducted in the coming years provide new information that in the county's view warrants the Secretary's reevaluation, Inyo County can again petition for affected status. In addition, on April 7, 1989, shortly after the comments were presented, Inyo County brought suit in the Ninth Circuit of the U.S. Court of Appeals to challenge the Secretary's decision not to grant the county an affected status. Consequently, the propriety of the Secretary's decision will ultimately be decided in that forum.

With respect to the commenter's concerns regarding potential transportation routes in California and Inyo County, the three potentially feasible rail routes being studied by the Yucca Mountain Project do not go into California. One route, however, does pass west of Pahrump near the California border. The other two routes are much further from the California border. The Nevada Highway Routing Study (DOE/NV-10576-7), issued by the Yucca Mountain Project identifies the use of Interstate 15 and Interstate 40 in California and no local routes in Inyo County. The only way that the state highways identified in the comment could be used for transporting spent nuclear fuel and high-level waste is by mutual agreement of Nevada and California, after a risk evaluation of the routes done by a State agency in accordance with U.S. Department of Transportation (DOT) requirements and by a recommendation to the DOT by the State of California.

REFERENCES

DOE (U.S. Department of Energy), 1989. Highway Routing Study, DOE/NV-10576-7, Nevada Operations Office, Las Vegas, Nevada.

RESPONSES TO AMARGOSA VALLEY PUBLIC HEARING COMMENTS

COMMENT 14

Also in my testimony, I would like to step outside of my hat as president of the Death Valley Area Chamber of Commerce and make a personal comment. As a resident of Tecopa for 21 years with two young children and a homeowner, I would like to express my concerns over what would happen if something wasn't right at the nuclear repository. If there were an accident on any of the transportation routes in our communities, and what would happen if the repository caused an international stigma over this whole area. I enjoy riparian rights on the tributary of the Amargosa River, as appropriated from the State of California Water Resources. I am concerned about the purity of water in my riparian rights water designation -- appropriation, that is.

I am not submitting written testimony at this time. I am just saying that we will support the testimony by our committee head, what we call Legislative Watch, Mr. Fred Johnson who will be giving his testimony later. Thank you.

MR. GERTZ: I have a question. Excuse me, Paul. Thank you very much for your testimony.

I just have one clarifying question about the DOE's supposedly consideration of routes within California for high-level waste transportation. Is there any -- I know of no consideration that we're doing that. But there may be some documents that I am not aware of. If you could provide that to me a little bit afterwards or something, I'd appreciate it. Because in our current planning, I don't know of any transportation routes within Inyo County that we are considering for high-level waste transportation.

MR. WATKINS: As alternate routes we had heard of Routes 127 and 178 being used as alternate routes in the event of something happening on Nevada 160 or Nevada 95 as alternate routes. I don't have documentation at this time. I'll rely on the testimony of Mr. Johnson and any documents he may have.

MR. GERTZ: I appreciate that. Thank you very much.

MR. MILLS: Thank you.

RESPONSE

Regarding the commentator's concerns about using state highways for transporting spent fuel and high-level waste to a repository, the Nevada Highway Routing Study (DOE/NV-10576), issued by the Yucca Mountain Project, identifies the potential use of Interstate 15 and Interstate 40 in California and no local routes in Inyo County. The only way that those state highways you identify could be used is by mutual agreement of Nevada and California, after a risk evaluation of the routes done by a State agency in accordance with U.S. Department of Transportation (DOT) requirements and a recommendation to the DOT by the State of California.

The Amargosa River contains flowing water only some of the time. During wetter periods of the year, some flowing water has been documented within the sediments composing the riverbed. The river, which originates in Oasis Valley

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and flows southeast from Beatty, is not recharged from below by ground water but merely drains surface runoff from Oasis Valley, through Beatty, and southeast across the Amargosa Desert. The Amargosa River and ground water in the saturated zone below Yucca Mountain are not coupled. Water in the saturated zone below Yucca Mountain (about 2,000 ft below the crest) flows south-southwest. If a repository were located in the proposed horizon of the Topopah Spring Tuff, and assuming radionuclides migrated to the saturated zone after closure of the repository, these radionuclides still could not migrate upward from the saturated zone to the near-surficial alluvium comprising the riverbed of the Amargosa River.

REFERENCES

DOE (U.S. Department of Energy), 1989. Highway Routing Study, DOE/NV-10576-7, Nevada Operations Office, Las Vegas, Nevada.

RESPONSES TO AMARGOSA VALLEY PUBLIC HEARING COMMENTS

MR. MILLS: The next speaker will be Bennie Troxel.

COMMENT 15

MR. TROXEL: My name is Bennie Troxel. I am a retired but not inactive geologist. I live in Napa, California, and I have a field office in Shoshone, California.

My main concern is based upon an incident that occurred I think nearly two years ago, if not a little farther back. I was in the field and a fellow was sharing my home in Shoshone with a geologist from the U.S. Geological Survey. He got a phone call from his boss in Menlo Park, who said that the DOE had initiated a stop work order, and he had to report back to his office immediately. That stop work order has since, as I understand it, stopped all Geological Survey employees from any further field research.

Being a field geologist I may be somewhat prejudice in this, but I don't see how you can gather all the data you need to make the decisions required to be made without wearing out the outcrop to the utmost for such a critical problem.

I know, and I have a lot of respect for the several Geological Survey employees, geologists who I have had the privilege of working with or become acquainted with in the field out here. Many of whom were working on DOE money with the Survey. And I regret that their great talent is not being utilized to the utmost, particularly in light of the fact that, as I understand it, there are deadlines to make decisions based on the data available, and I am deeply concerned that not all the data will be available if this stop work order is to continue for any significant period of time in the future.

My experience is such that I have a moderately reliable background in regional tectonics in this area, and I have had the privilege of sharing this with some of the Geological Survey people. As a matter of fact, my colleague, Loren Wright, my field colleague, and I have actually provided data to the Geological Survey on peripheral areas here not within the Test Site itself; Funeral Mountain's immediately to the west of us, for instance.

So I don't need to dwell any further on this, but I still see a significant need for field research, based in the several categories. For instance, there's a need for more deep boreholes, and I am sure many people agree to this, but my concern is why are they not going on now?

Seismic studies, where at one time there was a proposal for deep seismic retraction studies. "Kopor" type of study that was proposed, but has not been further followed, as far as I know. Trenches across known fault traces in this area to gain as much information as we can about when they occurred, what the recurrent intervals area, and so on. Especially on the fault traces in the younger fault zone which abound to the south and to the west of the Test Site.

Volcanic activity patterns need to be determined, based primarily on field sampling, and then further laboratory analyses. Secular and spatial migrations of faults or extensions of faults, or movements along the fault zones.

Regional geologic framework, as probably we need to know more about this to get the proper background for what's occurring, or is apt to occur within the Test Site itself. Chronology of volcanic ash. We are blessed with an abundance of field deposits, of deposits of ash in many of the young rocks around here, and many of these remain unsampled.

An area that has just barely been touched upon is the study of folds. There are many small folds in the valley floors within this region as precursors of fault activity. In other words, a folding of the young sediments before there's an actual ground rupture. One of the areas, the particular feature that I am concerned with is the Death Valley Fault zone. I have done some field studies on many segments of it, and I feel that there's much more to be done on that.

An area outside of my expertise, but I certainly agree that it needs much more study is the study of hydrology of the basins in through here.

I thank you.

MR. MILLS: Thank you.

RESPONSE

The stop-work order mentioned in the comment was issued on July 26, 1988, to the U.S. Geological Survey (USGS) scientists working for the Yucca Mountain Project. This stop-work order was based on the lack of adequate procedural control over the work the USGS was undertaking in certain areas of study. Specifically, the Quality Assurance (QA) program in place was not being properly implemented in all areas and, in certain areas, its effectiveness was questioned. The U.S. Department of Energy (DOE) did not intend to prohibit the continued collection of basic, irretrievable data, and DOE believes that this has not occurred. The stop-work order was lifted in October 1989.

Stop-work orders may result from a QA audit that indicates controls on Project work are deficient to the extent that the affected activities need to cease until the proper controls are put in place. The USGS stop-work order was not to block the gathering of data that may have been detrimental to the Yucca Mountain repository program. The results of scientific work on the Project are public information whether or not the data is favorable to the repository program or not.

With regard to the geophysical studies mentioned in the comment, SCP Activity 8.3.1.4.2.1.6, "Integration of Planned Geophysical Studies" of Study 8.3.1.4.2.1 "Characterization of the Vertical and Lateral Distribution of Stratigraphic Units Within the Site Area," is designed to integrate the various needs for geophysical information between all SCP studies requiring the application of geophysical techniques.

Ash beds are a primary means with which to determine the relative times of fault movement. Because volcanic ashes contain natural radioactive elements and their isotopes, they can be dated radiometrically and used to bracket the age(s) of fault activity using the rule of cross-cutting relationships, which is a fundamental tool in relative age dating.

RESPONSES TO AMARGOSA VALLEY PUBLIC HEARING COMMENTS

The Furnace Creek (Death Valley) Fault Zone will be investigated with the intent to understand the regional tectonic framework as part of SCP Study 8.3.1.17.4.3 "Quaternary faulting within 100 km of Yucca Mountain, including the Walker Lane." The various closed drainage basins in the Yucca Mountain vicinity and adjacent Nevada Test Site are to be further studied as part of the ge hydrology program in Section 8.3.1.5 of the SCP.

Studies of faulting (preclosure tectonics) and volcanism (postclosure tectonics) in the Yucca Mountain region are described in SCP Sections 8.3.1.17 and 8.3.1.8, respectively. Of particular concern in assessing the stability of the site area are results of studies that will examine the evidence for past faulting up to about 2 million years ago, with emphasis on evidence for seismic activity that is very young.

Regarding planned hydrologic studies, site characterization of the ground-water flow system in the saturated zone focuses on determination of (1) boundary conditions imposed by structure, including conditions of recharge and discharge, (2) hydraulic gradients in three dimensions, and (3) bulk aquifer properties of hydrostratigraphic units. The resulting description of boundary conditions, hydraulic properties of faults, hydraulic gradients, and aquifer properties will form the basis for modeling that will conclude with calculations of flow paths, fluxes, and velocities within the saturated zone. Studies to carry out these activities are part of Investigation 8.3.1.2.3 "Studies to provide a description of the saturated zone hydrologic system at the site."

There are no current plans to drill through the deep carbonate aquifer at the outset of site characterization. However, an analysis to determine the need for these data will be undertaken as part of SCP Activity 8.3.1.2.1.3.1, "Assessment of the regional hydrologic data needs in the saturated zone." This activity is designed to define priorities for data requirements for the description of regional ground-water flow in the saturated zone. While enough data currently exists to construct models of regional ground-water flow, sufficient uncertainty in initial and boundary conditions exists to reduce the certainty of model results. Current data will be reevaluated, and an assessment will be made to determine what additional data are needed to test alternative conceptual models. Consideration will be given to drilling a deep borehole into the Paleozoic rocks beneath the Amargosa Desert and/or to deepen existing drillholes USW WT-21 and USW WT-22 into Paleozoic rocks. The need to penetrate the Paleozoic carbonate aquifer will be evaluated in the context of existing hydrologic data and current conceptual models of the regional flow system. DOE believes various alternative conceptual models of the regional flow system can be adequately tested without resorting to deep drilling, especially in absence of a demonstrated need that such data is truly necessary to answer questions about saturated-zone ground-water flow in the Amargosa Valley. The hydrologic data acquired from SCP Investigation 8.3.1.2.3 will be applied in SCP Activity 8.3.1.9.2.2.1, "Projected trends in local and regional ground-water development, and estimated withdrawal rates in southern Nevada, proximal to Yucca Mountain," which is designed to analyze the future demands on local and regional ground-water resources. The objectives of this activity are to assess the current and project supply and demand for ground water in the geohydrologic study area and estimate the value of these ground-water resources.

RESPONSES TO AMARGOSA VALLEY PUBLIC HEARING COMMENTS

Many studies outlined in the SCP are currently underway and have been ongoing for years. Examples of ongoing studies include (1) hydrologic, meteorologic, and seismic monitoring at the site, (2) geodetic surveys, and (3) laboratory analyses of degradable and irreplaceable samples. No "new" site characterization activities will begin until the proper quality assurance controls governing the work are in place. Examples of new work currently on-hold would be drilling and trenching.

RESPONSES TO AMARGOSA VALLEY PUBLIC HEARING COMMENTS

MR. MILLS: That concludes those that we have a list for. We're going to take a five-minute break. I've noticed some of you folks have come in later. We are here to hear from you. Just go right back to the table back there and sign up if you want to be heard. Or some of you who spoke earlier, if something's been said that brought to your mind something else you wish to tell us, please sign up again. We want to hear from you.

With that, we'll take a five-minute break. (Thereupon a brief recess was taken, after which the following proceedings were had:)

RESPONSES TO AMARGOSA VALLEY PUBLIC HEARING COMMENTS

MR. MILLS: Our next person will be Jean Gray.

COMMENT 16

MRS. GARY: Good afternoon. I am Jean Gary, a 25-year resident of this community. I worked the first seven years that I lived here at the Nevada Test Site. Since then I've been employed in this community or at our home ranch. We have a ranch within just a few hundred yards of this building. We are now -- we now have a fourth generation of Garys at that ranch.

We can see Yucca Mountain from our ranch, and in general our family has never had any conflict between our personal lives and what has been transpiring at the Test Site. We further do not expect any problems with our life-style, our health and our welfare from activities associated with Yucca Mountain. We feel that we are properly informed by the government agencies concerning Test Site activities.

Our physical well-being is well monitored by the Environmental Protection Agency, Desert Research and USGS, who conduct extensive sampling and continuous monitoring for the community and the communities surrounding Nevada Test Site.

Our local library maintains an updated reference table of information. A community monitoring station is installed near the library, and maintained by the Environmental Protection Agency as part of a network of monitoring stations in surrounding communities.

In addition, water, milk and animal tissue samples are routinely collected and analyzed. A number of our neighboring families have volunteered for whole body counts, and data through three generations is now being taken.

As a resident of the closest community to the proposed repository, I feel that the agencies involved in the site selection process are functioning within the intent of the Nuclear Waste Policy Act and its amendments. The long-term nature of these studies is reassuring to me. I think it behooves us all to become informed and to stay informed about the progress of these studies, rather than forming opinions emotionally without benefit of information.

And so for that reason, I appreciate these types of meetings and the opportunity to speak to you about my feelings of being comfortable with them.

Thank you.

MR. MILLS: Thank you, Mrs. Gary.

RESPONSE

The U.S. Department of Energy appreciates the commentator's remarks supporting the site characterization work at Yucca Mountain.

RESPONSES TO AMARGOSA VALLEY PUBLIC HEARING COMMENTS

MR. MILLS: There appearing at this time that there are no further people who wish to be heard, we will take a recess until 3:45. If anyone comes in or wishes to speak prior to that, we will take consideration at that time. But as it now stands, we are recessed until 3:45.

(Thereupon a brief recess was taken until 3:45, at which time, the following proceedings were had:)

MR. MILLS: If we could have your attention, the time is 3:45, and we would like to again come to order. We have one person who signed up to speak to us. Our next speaker will be Cal Weston.

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COMMENT 17

MR. WESTON: My name is Calvin L. Weston. I get my mail in Pahrump.

I just wanted to make a statement that there are more people here that's been against this high-level dump at Yucca than there has been before. It seems like the people who live nearest are the ones that are more in favor.

If it should come to a point to where it would be disband, I want to go on record as saying that we already have a dump site, a tremendous dump site in Yucca Flats, and if they would move it into the craters at Yucca Flats because it's already contaminated, the materials that come from all over the United States could be flown in because it's a level country and they could easily make a landing strip. That would avoid any sabotage enroute by truck.

If it was placed in the craters, the hole would already be dug so we could save cost on that. There's local sealant here in the country that could seal it, and when the crater was filled you could dome it over and that would keep the rain waters out. At such time if they wanted to retrieve it, it would be very possible to retrieve it, and the material could be used again.

But the big thing is it is in already contaminated country, or an area that's been highly contaminated. Every test out there is a dump site.

That's all I got to say.

MR. MILLS: Thank you, Mr. Weston.

RESPONSE

The U.S. Department of Energy believes that there are significant arguments against using available collapse craters caused by underground nuclear explosions for high-level waste disposal. First, nuclear testing still continues beneath Yucca Flat and will continue for an unknown time; and underground testing and proposed disposal operations could not be carried out in such close proximity to one another. In addition, collapse craters are relatively shallow (that is, only tens of feet deep). Thus, given normal rates of erosion, near-surficial burial of high-level waste could easily lead to this material being exhumed and exposed within the 10,000-year isolation period. To prevent such exposure, the current U.S. Nuclear Regulatory Commission regulations for disposal of high-level nuclear waste call for an underground facility no less than 1,000 ft below ground surface.

RESPONSES TO AMARGOSA VALLEY PUBLIC HEARING COMMENTS

It does not appear at this time that there are any more speakers. As a consequence, we will adjourn until 4:30.

(Thereupon a brief recess was taken until 4:30, at which time, the following proceedings were had:)

MR. MILLS: For the record, the meeting will now come to order. Because no one has signed up to speak we will adjourn until 4:55, at which time we will review and see if anyone else has come in. We'll stand adjourned until then.

(Thereupon a brief recess was taken until 4:55, at which time the following proceedings were had:)

MR. MILLS: The meeting will now come to order.

There being no further people having presented themselves to be heard, we will adjourn this meeting until 7:00 p.m. this evening.

MR. GERTZ: As the hearing official, I'd like to announce that this session is adjourned until 7:00 p.m.

(Thereupon a dinner recess was taken, after which the following proceedings were had:)

MONDAY, MARCH 20, 1989, 7:00 O'CLOCK P.M. SESSION

* * * * *

MR. GERTZ: I guess we are going to get started, ladies and gentlemen.

Good afternoon and welcome. My name is Carl Gertz, I am manager of the Yucca Mountain project office. I will be the Department of Energy's presiding official for today's hearing on the Yucca Mountain Site Characterization Plan which describes the U.S. Department of Energy's plans for characterizing Yucca Mountain, Nevada to determine its suitability for a nuclear waste repository.

For the record, this hearing is convened at approximately seven p.m. on March 20th at the Amargosa Valley Community Center in the town of Amargosa Valley, Nevada.

This hearing was noticed in Federal Register on Friday, December 30th as well as being advertised widely in local newspapers.

In addition notices were sent to public mailing lists and the news media were notified.

We are here today to receive your comments on the Site Characterization Plan.

The Department of Energy has prepared this document as a plan to guide detailed scientific studies which will be conducted at Yucca Mountain during the next five to seven years.

RESPONSES TO AMARGOSA VALLEY PUBLIC HEARING COMMENTS

The SCP or Site Characterization Plan as we call it is a living document. It will be updated and modified as more is learned about the geologic, hydrologic and climatological conditions of the site.

These changes will be compiled into SCP progress reports which will be issued semiannually to the Nuclear Regulatory Commission, NRC, the State of Nevada and to the public.

The first SCP progress report is due to be published this summer.

In addition to the comments that you make this evening, written comments on DOE Site Characterization Plans may be made at any time during the site characterization period which is expected to last the next five to seven years.

These comments may be sent to the Yucca Mountain project office, U.S. Department of Energy Post Office Box 98518, Las Vegas, Nevada, 89153-8518.

Both oral and written comments will receive the same consideration.

At about the same time the SCP progress reports are issued, DOE will issue comment response packages. These will contain responses to the comments on the SCP that you make this evening and any written SCP comments that are submitted.

This includes comments made by the public, State of Nevada, Nuclear Regulatory Commission and other interested parties.

Originally April 15th was the deadlining set for the close of the initial SCP comment period.

At the request of Governor Miller the deadline now has been extend to June 1st. Let me emphasize, however, that comments on DOE site characterization studies or activities received after June 1st will be considered by DOE and receive responses at a later date.

Last month DOE held a series of project update meetings. These meetings were designed to provide the public information about the project that the public told us they wanted to here. Those meetings were intended to furnish you with information. This afternoon--tonight, I should say, we are looking for information from you.

Notice of both the project update meetings and the SCP hearings was widely advertised in local newspapers, was printed in the Federal Register.

In addition public mailing lists and the media were notified.

In a few moments I will introduce the moderator of tonight's hearing. The moderator is an individual with experience in chairing public proceedings and he is not a DOE employee. He will conduct the hearing calling on speakers and closely following the presentations.

He also will certify the record of the hearing.

RESPONSES TO AMARGOSA VALLEY PUBLIC HEARING COMMENTS

Also here tonight is a technical expert who also will listen to the presentations and who along with myself may ask clarifying questions in order to make sure that the record fully reflects your comments.

All comments made here today are being recorded by a professional court reporter and will be transcribed. The transcript from the hearings will be made available in local libraries as soon as possible, approximately three weeks after it is prepared.

A list of these libraries is available at the door.

Anyone wishing to purchase a copy of the transcript can make arrangements with the hearing reporter during breaks or after the hearing.

Now, I would like to introduce the technical representative of the panel this evening. On my right is Jean Younker, a Yucca Mountain project geologist who had a major role in development of the Site Characterization Plan. She worked with about 300 scientists and engineers to develop the plans, to obtain data to assess the suitability of Yucca Mountain for a high level waste repository.

She is a former university professor and has a doctorate degree in geology.

At this point I would like to introduce tonight's moderator. Lamond Mills is a former U.S. attorney in Southern Nevada who now is in private practice in Las Vegas. He has experience in conducting public proceedings.

As I said earlier, he's here to conduct the meeting, call on speakers and follow the presentations.

I will now turn the hearing over to him.

MR. MILLS: Thank you, Carl. Before we begin, I thought I'd take just a couple of moments and explain the procedure so that we are all aware of them.

We made arrangements so that everyone who comes here tonight will have an opportunity to come to the microphone, give their name and address [sic] this panel.

You will be given ten minutes at that time, and after you have spoke for eight minutes, I will hold up my hand indicating that there is two minutes left, and we would ask at the end of your time when I hold up my hand such as this that you conclude your remarks and conclude the thought that you are on.

This is an opportunity for you to express your views, and as I indicated, we are encouraging that. Some of you may have brought a written statement. If you do, and you get an opportunity beforehand, please check back at the registration desk so that they can make extra copies because we'd like a copy to go into the record as part of our public record as well as a copy kept back there, and we'll give you back a copy of your addresses.

RESPONSES TO AMARGOSA VALLEY PUBLIC HEARING COMMENTS

We are going to be taking everyone in the order in which they applied, and for people who come in later, we will add them in. We certainly have plenty of time tonight and we don't want to cut anyone short at any time.

We ask that only one person speak at a time. As Carl mentioned, we are taking it down with a court reporter.

And, finally, there is going to be no questioning of a person providing comments except by the panel. And the panel's questions are limited to questions to serve to qualify comments given. They are not here to interrogate or question in any way. This is our opportunity to hear from you and that's the purpose of this meeting.

If there is any further procedure changes as we go along, we will announce them as we proceed.

Finally, I'm going to call on our first speaker, and that's Mr. Brain Carter. If he would come forward and address the panel.

If Mr. Carter is not here, then let's hear from Fred Johnson, and I'll pick up Mr. Carter in a few minutes.

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COMMENT 18

MR. JOHNSON: My name is Fred Johnson and I'm a geologist from Tecopa, California down in Inyo County, California, and I am currently employed by American "Borate" Company in Amargosa Valley and over in Death Valley, and I have lived in Inyo County in Tecopa and worked in Death Valley area for about 15 years.

I am here tonight primarily to ask for effected status for Inyo County. I'm also here tonight not to express an opinion for or against the Yucca Mountain site, but to express my support for a thorough and politically unbiased study of the site. I believe that a study that will be thorough and that will not compromise scientific data and facts because of political pressures, that's what I'd like to see.

This is not an issue of for or against, it really can't be at this present time. We've got an edict from Congress to do this, and we should do it right.

It's up to everyone here and everyone involved to ensure that the study is done right because we are talking about high level nuclear waste that must be contained for over 10,000 years. Just one big slip in 10,000 years could be devastating, therefore there is a great responsibility that rests upon the shoulders of all concerned parties that should include the nation, everyone to do it right. Continuous and informed interaction during the study phase is the responsibility of the public, Department of Energy, the scientific community, the U.S. Geological Survey, our legislators and the press.

In light of this needed interaction and concerns expressed by many citizens, I wish to discuss some important concerns and present reservations on the present processes.

I feel the DOE must work quickly to solve and answer some of the following problems and questions actually to sort of keep a good faith and credibility between the agency and the people. I've got a few reservations that I'll run through here.

Of course, due to the congressional decision we only have one site selected for characterization, and that's Yucca Mountain. Even those original choices were originally limited to the areas that were already effected by DOE so we really didn't get a site that was selected by unbiased scientific study, it was a politically convenient situation on a single site.

We have no alternatives so therefore we must really study this site quite a bit, but I would like to suggest that the Department of Energy and the U.S. Geological Survey show some very good faith in going back to Congress and lobbying Congress to have an alternative site set up, at least one to be studied just in case we have some problems with this one that we can't overcome.

The sites that they should study should be based on true scientific inventory rather than political convenience.

RESPONSES TO AMARGOSA VALLEY PUBLIC HEARING COMMENTS

RESPONSE

The U.S. Department of Energy (DOE) agrees that the program of study must be scientific and unbiased and is committed to do that during its site characterization program. DOE believes that the safety and environmental regulations governing the program, the process of preparing an Environmental Impact Statement, the licensing proceeding with the U.S. Nuclear Regulatory Commission, and the amount of independent oversight afforded the program will ensure an objective process. If site characterization data indicate that Yucca Mountain is not suitable, the Nuclear Waste Policy Amendments Act of 1987 requires DOE to stop work at Yucca Mountain and report back to Congress.

DOE realizes the need for an open and frank dialogue with the public regarding the repository program. DOE is accepting written comments on its site characterization activities at any time during the site characterization process and will respond to these comments individually or in written "response packages," which will be issued periodically to State and local government officials and to the public as groups of comments are received by DOE. This means that the opportunity for citizens' comments is not limited or restricted in any way by public hearing locations and schedules. These comments should be addressed to:

U.S. Department of Energy
Yucca Mountain Project Office
101 Convention Center Drive
P.O. Box 98518
Las Vegas, Nevada 89193
Attention: Carl P. Gertz

In addition, DOE holds Project Update Meetings every six months during which the public have an opportunity to provide comments and ask questions. Comments provided during these meetings will be compiled and reviewed by Project scientists to make sure that site characterization planning and activities address relevant concerns. These meetings are widely advertised through public mailing lists and the media, and are held at rotating locations throughout Nevada.

The United States is currently committed by law to a policy of isolation of high-level nuclear waste in deep, mined, geologic repositories. Those countries in the world that have custody of high-level wastes are either committed to geologic disposal by law or policy, have stated it to be the preferred option, or have long-term investigations underway at potential sites within their borders. Deep geologic disposal of high-level wastes was advocated by the National Academy of Sciences in the late 1950's, and at that time salt appeared to be a very prospective host-rock for this purpose. The Earth Research Development Administration, a DOE predecessor organization that existed from 1964-1977, began research in other types of potentially suitable host-rocks, such as crystalline rock (granites), volcanic tuffs, shales, and volcanic basalts.

Regarding alternatives to Yucca Mountain, prior to passage of the Amendments Act of 1987, the Nuclear Waste Policy Act of 1982 set up a program of site screening to narrow a nationwide search for potential sites to a very few. The 1982 Act called for the formulation of general guidelines to

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screen sites as to their geologic potential to the extent that further investment in a research program was justified. In 1983, 9 sites were identified across the country in various geologic media: bedded salt, dome salt, basalt, and volcanic tuff. From this list, 5 sites were nominated as suitable for characterization, and in May 1986 the Secretary of Energy selected 3 of these sites for detailed characterization, Hanford, Washington; Yucca Mountain, Nevada; and Deaf Smith County, Texas. The selection of 3 sites from 5 was made with a multiattribute decision-aiding methodology (DOE, 1986).

The Amendments Act of 1987 changed national policy from parallel characterization of several sites to sequential characterization of one site at a time, and identified Yucca Mountain as the first site to undergo characterization. If DOE determines that the Yucca Mountain site is unsuitable, the Amendments Act directs DOE to report to the Congress within 6 months for further direction. A decision regarding suitability of the Yucca Mountain site cannot be made without the execution of a detailed characterization program. It is premature for DOE to offer alternatives in absence of a determination of the site's unsuitability. The 1987 Amendment changed procedural aspects of the study program needed for a repository, but the nation's commitment to deep geologic disposal of high-level nuclear wastes was not altered.

REFERENCES

DOE (U.S. Department of Energy), 1986. A Multiattribute Utility Analysis of Sites Nominated for Characterization for the First Radioactive Waste Repository--A Decision-Aiding Methodology, DOE/RW-0074, Office of Civilian Radioactive Waste Management.

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COMMENT 19

To show good faith and to get close to the present timetable, the Department of Energy must immediately rescind the two-year old work stop order on the U.S. Geological Survey. Now is the time when all the knowledgeable input is needed to augment and insure a good scientific data base for geologic conclusions.

There is some very real concern that the Department of Energy will have-- whether or not the Department of Energy will have all the needed surface and underground geologic studies done before licensing in 1995. With the U.S. Geological Survey not doing any work for two years and only three years after things get going in the underground to start looking at the underground data, the timetable set by the Department of Energy is unrealistic. Will the Department of Energy start waste haulage and emplacement without thorough evaluation of all data? This may lead to an unfavorable incident that allows a high level nuclear waste repository that later becomes scientifically indefensible.

The Department of Energy should show good faith and reevaluate the timetable and inform the public.

RESPONSE

The site characterization process will consist of an in-depth series of surface and underground tests that will produce data needed to evaluate whether or not the Yucca Mountain site is suitable as a repository host site. No decision will be made on site suitability until site characterization data have been collected and reviewed. At that time, if the data indicate that the site could safely isolate waste for thousands of years and if the President and Congress approve, a license application for the site would be submitted to the U.S. Nuclear Regulatory Commission (NRC) for licensing. Thus, there would be no waste acceptance and emplacement unless NRC has certified, based on detailed safety and environmental evaluation of data collected, that the site and repository can safely isolate the wastes for the thousands of years needed. If the U.S. Department of Energy (DOE) determines that the present schedule does not allow sufficient data collection, the DOE will reevaluate the schedule and modify its plans as necessary.

The stop-work order mentioned in the comment was issued on July 26, 1988, to the U.S. Geological Survey (USGS) scientists working for the Yucca Mountain Project. This stop-work order was based on the lack of adequate procedural control over the work the USGS was undertaking in certain areas of study. Specifically, the Quality Assurance (QA) program in place was not being properly implemented in all areas and that, in certain areas, its effectiveness was questioned. The U.S. Department of Energy (DOE) did not intend to prohibit the continued collection of basic, irretrievable data, and DOE believes that this has not occurred. The stop-work order was lifted in October 1989.

Stop-work orders may result from a QA audit that indicates controls on Project work are deficient to the extent that the affected activities need to cease until the proper controls are in place before the work can be allowed to continue. The USGS stop-work order was not to block the gathering of data

RESPONSES TO AMARGOSA VALLEY PUBLIC HEARING COMMENTS

that may have been detrimental to the Yucca Mountain repository program. The results of scientific work on the Project are public information whether or not the data is favorable to the repository program or not.

COMMENT 20

Much is not known, not known about the hydrologic system of Yucca Mountain site and especially the northern and southern Amargosa Valley. There has been some concerns about ground water pumping and, oh, concerns about, oh, of course there is concerns about contamination and things like that, but on the ground water pumping issue, will the major usages of water in the site characterization process add to a net cumulative effect which may be negative to Amargosa?

In order to estimate these potential effects, hydrologic studies, especially deep well drilling and on and off Test Site studies may be, should be accelerated and expanded.

I might suggest that maybe the Department of Energy get with the State of Nevada and possibly some industry-related people and try and form some sort of a thing where we can study some of the hydrologic basin outside of the Test Site so that we can have an overall look and we don't sit and put all of our drill holes in one boulder and not realize what the real world is telling us.

RESPONSE

The U.S. Department of Energy (DOE) shares the commentor's concerns regarding the hydrologic system at Yucca Mountain. According to the Environmental Assessment (DOE, 1986) siting a geologic repository at Yucca Mountain probably would not adversely impact other local users, such as those in Amargosa Valley.

Possible subsidence due to ground-water withdrawal in the Amargosa Valley is not foreseeable, since ground water used during site characterization would be withdrawn from wells J-12 and J-13, until or unless some other distribution system was set up to serve the needs of the various site programs. These wells are well within the boundaries of the Nevada Test Site, and withdrawal from them would not induce subsidence in the Amargosa Valley. Current agricultural usage of ground water in the southwestern part of the Amargosa Valley far outstrip any quantity anticipated for activities involving site characterization or repository operation. DOE knows of no subsidence problems produced by pumping in this area.

DOE shares the commentor's concerns regarding the hydrologic system at Yucca Mountain. Water-use estimates for site characterization and, if the site is found suitable, subsequent repository construction and operation at Yucca Mountain are still in the early stages of development. The water required during the site characterization period, however, would be far less than that needed during the construction and operation of a repository. To date, published information on water use in the hydrogeologic study area indicates that siting a repository would not adversely impact other local users. Test results by Young (1972), Claassen (1973), and Thordarson (1983) indicate that the welded tuff aquifer contains adequate water to supply repository construction, operation, and closure (Morales, 1986). According to current plans, water for site characterization activities would be drawn from wells J-12 and J-13 which penetrate a welded tuff aquifer, until a distribution system could be constructed.

RESPONSES TO AMARGOSA VALLEY PUBLIC HEARING COMMENTS

Regarding planned hydrologic studies, site characterization of the ground-water flow system in the saturated zone focuses on determination of (1) boundary conditions imposed by structure, including conditions of recharge and discharge, (2) hydraulic gradients in three dimensions, and (3) bulk aquifer properties of hydrostratigraphic units. The resulting description of boundary conditions, hydraulic properties of faults, hydraulic gradients, and aquifer properties will form the basis for modeling that will conclude with calculations of flow paths, fluxes, and velocities within the saturated zone. Studies to carry out these activities are part of Investigation 8.3.1.4.2 "Studies to provide a description of the saturated zone hydrologic system at the site."

There are no current plans to drill through the deep carbonate aquifer at the outset of site characterization because an analysis must be done first to determine the need for the data to be undertaken as part of SCP Activity 8.3.1.2.1.3.1, "Assessment of the regional hydrologic data needs in the saturated zone." This activity is designed to define priorities for data requirements for the description of regional ground-water flow in the saturated zone. While enough data currently exists to construct models of regional ground-water flow, sufficient uncertainty in initial and boundary conditions exists to reduce the certainty of model results. Current data will be reevaluated and an assessment will be made to determine what additional data are needed to test alternative conceptual models. Consideration will be given to drilling a deep borehole into the Paleozoic rocks beneath the Amargosa Desert and/or to deepen existing drillholes USW WT-21 USW WT-22 into Paleozoic rocks. The need to penetrate the Paleozoic carbonate aquifer will be evaluated in the context of existing hydrologic data and current conceptual models of the regional flow system. DOE believes various alternative conceptual models of the regional flow system can be adequately tested without resorting to deep drilling, especially in absence of a demonstrated need that such data is truly necessary to answer questions about saturated-zone ground-water flow in the Amargosa Valley.

The hydrologic data acquired from SCP Investigation 8.3.1.4.2, will be applied in SCP Activity 8.3.1.9.2.2.1, "Projected trends in local and regional ground-water development, and estimated withdrawal rates in southern Nevada, proximal to Yucca Mountain," which is designed to analyze the future demands on local and regional ground-water resources. The objectives of this activity are (1) assess the current and project supply and demand for ground water in the geohydrologic study area, and (2) estimate the value of these ground-water resources.

The determinants of supply will be examined; namely, the physical and chemical characteristics of the ground-water system, which includes aquifer depth, recharge area, volume, and water quality (salinity); quantities available from alternative sources; the cost of water from alternative sources; and the institutional factors relating to water laws and rights. What determines demand will also be examined; namely, historical, current, and projected trends in population growth; economic conditions including industry, employment, and income; current and projected future trends in consumptive usage of water (i.e., domestic, commercial, residential, and agricultural); and climate and price.

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Because of the uncertainty in forecasting changes in those factors that will determine the future supply and demand situation for ground water, a reasonable range of plausible scenarios will be developed. These will form the basis to estimate the current and future value of the ground-water resources in the geohydrologic study area and to project probable withdrawal rates and locations.

REFERENCES

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COMMENT 21

The Department of Energy, unfortunately, we got totally ignored in Inyo County for the obvious potential effects of the Yucca Mountain site to the southern Amargosa Valley in Inyo County, California, and this affected community status should have been approached in the study section in the 175 report.

Even though the community area of Tecopa and Shoshone and southern Amargosa meet the size criteria by being more than 250 residents within a hundred miles to the Amargosa entrance to Yucca Mountain, this problem should be alleviated as soon as possible because it's an obvious mistake and overlook but it may actually lead to showing bad faith toward the Department of Energy to the people even though it may have been a Congressional decision that caused some of these problems. I believe an addendum to the study of section 125 should be requested and done. These communities share a surface ground water aquifer with the Yucca Mountain site and anything that could potentially adversely effect this vital water resource in our desert will drastically impact the socio-economic viability of the Tecopa-Shoshone area. Other adverse economic impacts may occur as workers leave Inyo County to relocate near the Test Site.

RESPONSE

While the concerns expressed in this comment here do not directly pertain to the Site Characterization Plan, the U.S. Department of Energy (DOE) acknowledges that representatives of Inyo County have taken issue with the Secretary of Energy's decision not to grant Inyo County an affected status under subsection 2(31) of the Nuclear Waste Policy Act of 1982, as amended. DOE believes that the matter of Inyo County has received careful consideration, and that analyses indicate that no significant impacts to Inyo County would arise to warrant its designation as an "affected unit of local government" at this time. Should subsequent developments, such as the actual establishment of transportation routes of the results of site characterization studies to be conducted in the coming years, provide new information that in the county's view warrants the Secretary's reevaluation, Inyo County can again petition for an affected status. In addition, on April 7, 1989, shortly after the comments were presented, Inyo County brought suit in the Ninth Circuit of the U.S. Court of Appeals to challenge the Secretary's decision not to grant the county an affected status. Consequently, the propriety of the Secretary's decision will ultimately be decided in that forum.

With respect to the commentator's concern regarding water resources, water-use estimates for site characterization and, if the site is found suitable, subsequent repository construction and operation at Yucca Mountain are still in the early stages of development. The water required during the site characterization period, however, would be far less than that needed during the construction and operation of a repository. To date, published information on water use in the hydrogeologic study area indicates that siting a repository would not adversely impact other local users. According to current plans, water for site characterization activities would be drawn from wells J-12 and J-13, which penetrate a welded tuff aquifer, until a distribution system could be constructed. The maximum annual water demand for the repository is anticipated to rise to a peak of 120 million gallons

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(454,200 m³) per year by the end of the seventh year of construction, and decrease to about 115 million gallons (435,280 m³) per year, and remain at this level for the next 25 years. The minimum average water demand for the following 23 years of operation would be approximately 2.5 million gallons (9,462 m³) per year. Estimates of the quantity of water needed to support site characterization activities are considerable less. Preliminary estimates indicate that maximum total water use for all phases of the exploratory shaft construction and testing will be 41,507,100 gallons (1.57 x 10⁸ m³) (DOE, 1988).

REFERENCES

DOE (U.S. Department of Energy), 1988. Site Characterization Plan, Yucca Mountain Site, Nevada Research and Development Area, Nevada, DOE/RW-0199, Vols. I-IX, Oak Ridge, Tennessee.

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COMMENT 22

Geologic Concerns: Major geologic concerns, I'm sure you guys are looking at them, I just want to reiterate a little bit of it. There is potential for the rise in ground water table which has been brought to attention by your geologist Szymanski. In the Amargosa Valley in my experience there is a widespread evidence of young siliceous sinter springs which moved quartz material with hot water to very near the top of the valley fill in many of these areas along fracture zones. These hot water zones moved upwards along faults, okay, that fractured the surface of the valley fill.

Now, this is quite young. I have not--I have noticed that the faults actually do interrupt some alluvial cover on top of that. Some of these are occurring along the extension of the Pahrump Valley fault zone as it extends northwestward across the Amargosa Valley, stepping left laterally toward the Bear Mountain and Yucca Mountain area.

I believe the study should extend out into the Amargosa Valley and look at these siliceous spring sinters that extend in the Ash Meadows area coming upward through the American Borate Company mill area and on toward Yucca Mountain.

The Pahrump Valley fault zone could be an important fault zone and may give you an idea of the timing of some of these events.

My observations also on many of the basalt or lava flow areas of the past, six million years ago in the Furnace Creek formation were that there were almost always somewhere nearby evidence in nearby in time of siliceous springs, siliceous or quartz rich water, okay.

Detail study of the faults and tectonics may lead to helping you on that.

On ground water, actually we go past that ground water situation, we go into volcanic activity. We realize there is some young volcanic activity and we need to work toward trying to determine where in the sequence of volcanic activity, we realize in about 100,000 year cycle these things run in, where we exist in that particular thing. Faults will continue to move, they will continue to open up. We realize there are faults at Yucca Mountain.

RESPONSE

On July 26, 1989, the Yucca Mountain Project Office released the technical review report, "Review of a Conceptual Model and Evidence for Tectonic Control of the Ground-water System in the Vicinity of Yucca Mountain, Nevada." The report was compiled from the comments of 24 Project scientists on the November 1987 draft manuscript by J.S. Szymanski, "Conceptual Considerations of the Death Valley Ground-water System with Special Emphasis on the Adequacy of this System to Accommodate a High-level Nuclear Waste Repository."

Both the manuscript and the review report focus on work relevant to several studies and activities within SCP Investigation 8.3.1.8, postclosure tectonics. Reviewers concluded, though not unanimously, that (1) the tectonic processes and geomechanical models that Szymanski proposed dominantly influence the hydrologic system and are described with insufficient rigor for

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testing or further analysis; (2) although the stress and geothermal heterogeneities in the earth's shallow crust probably influence the hydrologic system, the magnitude and duration of the effects proposed in the manuscript are highly unlikely; (3) the geologic and hydrologic field data claimed to support Szymanski's hypothesis are more readily and consistently explained by traditionally accepted geologic and hydrologic processes, particularly when supplemented by other available evidence; (4) Szymanski's recommendations for testing his hypothesis lack valid diagnostic criteria. In other words, if the recommended testing was carried out, the results would not demonstrate the validity of the Szymanski hypothesis. The review recommends some additions and modifications to existing plans that have not yet been fully evaluated for possible incorporation into the U.S. Department of Energy's (DOE) program of study for the site.

Also in July 1989, the Project Office released a final report by Szymanski entitled, "Conceptual Considerations of the Yucca Mountain Ground-water System with Special Emphasis on the Adequacy of this System to Accomodate a High-level Nuclear Waste Repository." The final report will be reviewed by the National Academy of Sciences (NAS) and another review panel. DOE anticipates that the results of the NAS review will provide a definitive opinion as to the feasibility and likelihood of the mechanism proposed by Szymanski.

DOE believes that the deposits of siliceous sinter referred to in the comment are those described by Hay, Fenton, Teague, and Kyser (1986). They interpreted these deposits to record the discharge of silica-rich water along permeable zones, probably fault-related. Hay et al. interpreted them to have formed by silica replacement of somewhat older carbonate and clay deposits that had been deposited previously in marsh or pond environments. The oxygen isotopes in the siliceous and carbonate materials indicate that the later springs or seeps discharged at temperatures of about 81° F, rather than at higher temperatures that might indicate water rising along faults from considerable depths as the comment suggests.

Silica supersaturation is common in the ground water in the vicinity of the American Borate Company mill because the water has flowed southward through volcanic tuffs and alluvium derived from tuff. Hay et al. proposed that ground water beneath the northeastern Amargosa Desert (northwest of Pahrump Valley) changed from a bicarbonate type to a silicate type about 2.5 million years ago because of a drying climate and lesser availability of local recharge in nearby hills composed of Paleozoic carbonate rock. They do, however, note one occurrence of siliceous deposits in alluvial material less than 10,000 years old near the American Borate Company mill. Given the climatic history of the region as it is currently understood, this could be anticipated.

The evidence that is currently available indicates a higher water table beneath the Amargosa Desert, and presumably Yucca Mountain, during much of the last several million years, persisting or recurring until about 10,000 years ago. DOE currently believe that climatic change is principally responsible for the rather deep modern water table, but evaluation continues, for example in light of the mechanism proposed by J. Szymanski. Studies of the effects of both climatic changes and tectonism, including faults, on the hydrologic system at Yucca Mountain are described in Sections 8.3.1.5, 8.3.1.17, and

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8.3.1.2 of the SCP, respectively. Existing data and interpretations, such as those proposed by Hay et al., will be evaluated as part of these studies. Additional data may be gathered if the preliminary evaluations indicate that they would be important to predicting future hydrologic conditions at Yucca Mountain.

Seven basaltic volcanic centers are located between 5 and 76 miles from the Yucca Mountain site. Scientists from Los Alamos National Laboratory working on the Yucca Mountain Project have calculated the preliminary probability of disruption of a repository by future basaltic volcanism as between 1 chance in 100 million to 1 chance in 10 billion per year (over a period of 10,000 years this would be 1 chance in 10,000 to 1 chance in 1 million). These bounds are being re-examined in light of new information in the understanding of these small-volume, basaltic volcanic centers. These developments are that (1) many of the volcanic centers exhibit brief periods of eruptive activity separated by longer periods of inactivity; (2) the centers may be active from time spans exceeding 100,000 years; (3) there is a decline in the volume of eruptions of these centers through time; and (4) small-volume eruptions occurred at two of the basaltic centers within the last 10,000 to 20,000 years. Based on continuing analysis of this information, two scenarios are possible for future volcanic activity in the Yucca Mountain vicinity. The first is recurrence of small volume eruptions at one or both of the youngest volcanic centers in the region. This would represent an anticipated event, but there are virtually no consequences of such events at the Yucca Mountain site. The second scenario is formation of a new volcanic center. This would represent an unanticipated event that falls within the probability range above.

Initial potassium-argon (K-Ar) age determinations made in 1986 of lava flow samples from the Lathrop Wells Cone yielded an approximate age of 270,000 years. It was assumed at that time that this age represented the time for the entire volcanic event that formed the cone. During follow-up study, the erosional history of the cone suggested that an age of 270,000 years was too old. The geometric shape and slope angle of the cone, the lack of drainage channels on the cone sides, and the thin apron of eroded debris at the base of the cone, suggested an age younger than the 270,000 years indicated by radiometric dating, possibly as young as 10,000 years. Radiometric dating techniques which use long-lived isotopes to date relatively young events are prone to more uncertainty than if short-lived isotopes are used to date young events. Studies to be carried out during site characterization will focus on using a variety of dating tools and techniques, not just K-Ar dating, to determine how many volcanic events occurred to form the cone, and on using ancient soils interbedded with ash beds to determine the time between eruptive events. By looking closely at the internal stratigraphy, or layering, of the cone, a more accurate age for the Lathrop Wells Cone and the ages for those eruptive events that formed it can be determined.

Another eruption at the Lathrop Wells Cone would be very unlikely to compromise the performance of the proposed repository. Relative to large silicic volcanoes, basaltic cinder cones like the Lathrop Wells Cone (as well as all of the other Quaternary-age cones in the Yucca Mountain vicinity) have an eruptive style that is described by volcanologists as nonexplosive. The size and power of the largest eruptions that took place at these cinder cones near Yucca Mountain is very small compared with the silicic type (e.g., the eruption of Mount St. Helens in May 1980). To affect the ability of the

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proposed repository to contain radioactive waste, a cinder cone would have to erupt right through the repository. Even if a magma pipe (dike) feeding a cinder cone eruption came up right through the repository, the most likely scenario is that the molten rock in the dike would immediately freeze against the sides, so that there would be very little interaction between magma and waste canisters. The type of seismicity that could be induced by magma rising toward the earth's surface, for example, at Lathrop Wells, is typified by numerous (swarms), low-intensity earthquakes (Richter scale 2 to 3). Such low-intensity earthquakes would not be very important with regard to the waste isolation capability of the site.

New evidence that some eruptions in the Yucca Mountain region are more recent than was previously believed certainly does indicate a need for further careful study of volcanism in the area. Volcanism studies are a continuing part of site characterization activities.

The Great Basin has been under an extensional stress regime for about the last 16 million years. Volcanic activity began about 16 million years ago, and corresponded with faulting caused by the extensional strain (pull-apart). Two phases of tectonic activity can be recognized: (1) older extensional faulting associated with silicic volcanism from about 11 million to 7 million years ago, and (2) Basin and Range type faulting for about the past 7 million years. By 6 to 8 million years ago, the volcanic activity had changed to basaltic-type activity characterized by low-volume eruptions of short duration, with the rate of magma production apparently declining over the last 4 million years.

Studies of faulting (preclosure tectonics) and volcanism (postclosure tectonics) in the Yucca Mountain region is described in SCP sections 8.3.1.17 and 8.3.1.8, respectively. Of concern in assessing the stability of the site area is studying the evidence for past faulting up to about 2 million years ago, with emphasis on evidence for seismic activity that is very young.

Earthquake hazards are an important concern for the stability of repository surface facilities during its operational and monitored retrievability stages and the postclosure period after repository sealing. The seismic design of repository facilities, the design required to accommodate maximum ground motions during the 80 or so years of repository operation will be conservative. Based on preliminary information, a design-basis earthquake would be approximately a Richter magnitude 6 to 6.5. That is, surface facilities would be designed to accommodate such an event.

The approach to seismic hazard analysis in the SCP is to apply probabilistic methods to evaluate the adequacy of deterministically derived (measured and observed) estimates for potential ground motion that would be used as the design basis for surface facilities. Seismic monitoring of the Yucca Mountain region has not been carried out long enough to allow recognition of seismic patterns that might exist over the area. The seismic data that has been gathered, and records available, from historic earthquakes, can be used to bound the recurrence intervals of earth movement from regional seismic sources. Geologic data must provide the primary constraint for evaluating the likelihood for earthquakes on known faults. It isn't the fact that faults exist in the Yucca Mountain area, but answers to questions such as how long a fault is, what is the degree of connection to other faults, how long ago

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movement occurred along it, how much movement took place per occurrence, and how often movement took place, that are important.

Using measured (seismic) and observed (mapping and cross-cutting age relationships) attributes, facilities would be designed to incorporate potential ground motions that could occur as a result of a seismic event(s) from an earthquake of specified magnitude on a particular fault. A probabilistic seismic hazard analyses would integrate this data to determine a probability of fault movement within a 10,000-year period. Such an analysis would provide a probability for ground motion potential of different earthquake sources (faults) at different distances from the site which have different recurrence of intervals. All known faults showing movement during the past 2 million years within 60 miles of the site are to be considered in this analysis.

REFERENCES

- Hay, R. L., R. E. Pexton, T. T. Teague, and T. K. Kyser, 1986. "Spring-Related Carbonate rocks, Mg Clays and Associated Minerals in Pliocene deposits of the Amargosa Desert, Nevada and California," Geological Society of America Bulletin, Vol. 97, pp. 1488-1503.

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COMMENT 23

Now, what's real important, we must determine whether or not we are going to be dealing with a fracture flow system in the future 10,000 years or whether we are still dealing with a rock flow.

In closing in response upon suggestions, I believe that the public is responsible and they are very responsible for getting mailing lists and becoming informed and interact with the project, to ask questions and offer knowledgeable suggestions to the DOE.

The DOE's responsibility is to solicit that information, evaluate every knowledgeable concern from the public that they can, keep the public informed of new concerns, and their actions toward them. Maintain flexibility to incorporate change.

I believe that, you know, if we are faced with a dangerous and insurmountable consequence, be up front and let us know right away. Be willing to stop work and move to an alternative site.

The legislators' responsibility essentially is to start looking for the alternative site right now because if there is a possibility, we've got to have it.

The responsibility of the press, it's the press' responsibility to report the facts, keep the public knowledgeable. The press should guard against instigating controversy by sticking to scientific facts and staying away from opinions formulated from fear, lack of knowledge and rumor. The press should try to help all concerned and help keep this important site characterization away from political pressure and toward real truthful scientific evaluation. Thank you.

MR. MILLS: Thank you, Mr. Johnson.

A question, sir.

MS. YOUNKER: I just wanted to ask you about the siliceous deposits that you mentioned that you thought might be young. Do you know of anyplace in the published literature where we could look for anything about that, or is this pretty much your own observation?

MR. JOHNSON: They haven't really been studied or written up very well. Throughout the Amargosa Valley where there's fault structures, some of them you can pick up on satellite photos.

MS. YOUNKER: I have seen the ones you were talking about, but I thought you were talking about ones that you were pretty sure had some silica in them.

MR. JOHNSON: Oh, yes.

MS. YOUNKER: Okay.

MR. JOHNSON: One ideal place is right at the base of the hill at the American Borate Company mill site.

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MS. YOUNKER: Okay.

MR. JOHNSON: In that particular one you have an older alluvium that is sitting on top of valley fill material that has been tilted up at about 50 degrees along the fault, and there is a siliceous center that's welling up through the clay deposits up to the base of the alluvium.

MS. YOUNKER: Thank's very much.

RESPONSE

The U.S. Department of Energy (DOE) agrees that the hydrology of the unsaturated zone is an extremely important factor in determining the potential suitability of the Yucca Mountain site. The unsaturated zone is an important natural barrier for migration of radionuclides. The advantages of waste isolation in the unsaturated zone, (waste emplaced in a geologic environment that is essentially dry), remains a prime reason why the Yucca Mountain site has survived scientific scrutiny to the extent that it remains a location under consideration for a geologic repository. DOE also acknowledges the need for obtaining a good understanding of unsaturated zone hydrology. Determining how dry the unsaturated zone actually is remains an important goal of the characterization effort.

Aspects of the Site Characterization Plan (SCP) geohydrology program in Section 8.3.1.2 are designed to address the 1,000-year minimum pre-waste emplacement ground-water travel time (GWTT) requirement contained in 10 CFR 60.113(2). The requirement states that this travel time is to be measured along the fastest path of likely radionuclide travel from the disturbed zone to the accessible environment (the edge of an envelope around the repository block extending outward to a distance of 5 km or about 3 miles). To address this requirement, DOE needs to determine the locations where, and the degree to which, fracture flow occurs in the unsaturated zone versus matrix flow. DOE believes that current monitoring of existing boreholes and those new holes to be added for the geohydrology program as site characterization proceeds, will provide an adequate area and vertical sample distribution to assess the relative importance of these two mechanisms and, in turn, whether the site can meet the 1,000-year GWTT requirement. Testing in the Exploratory Shaft Facility is also designed to evaluate the importance of fracture flow vs. matrix flow. Compliance with the ground-water travel time requirement will be addressed using mathematical models (performance assessment program), where probability-based determination of meeting the travel time requirement will be made.

DOE agrees with the need to foster and maintain an educated public regarding the repository program. DOE is accepting written comments on its site characterization activities at any time during the site characterization process and will respond to these comments individually or in written "response packages," which will be issued periodically to State and local government officials and to the public as groups of comments are received by DOE. This means that the opportunity for citizens' comments is not limited or restricted in any way by public hearing locations and schedules. In addition, DOE holds Project Update Meetings every six months during which the public have an opportunity to provide comments and ask questions. Comments provided during these meetings will be compiled and reviewed by Project scientists to

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make sure that site characterization planning and activities address relevant concerns. These meetings are widely advertised through public mailing lists and the media, and are held at rotating locations throughout Nevada. These comments should be addressed to:

U.S. Department of Energy
Yucca Mountain Project Office
101 Convention Center Drive
P.O. Box 98518
Las Vegas, Nevada 89193
Attention: Carl P. Gertz

REFERENCES

10 CFR Part 60, (Code of Federal Regulations), 1987. Title 10, "Energy," Part 60, "Disposal of High-Level Radioactive Wastes in Geologic Repositories," U.S. Government Printing Office, Washington, D.C., pp. 627-658.

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COMMENT 24

MR. MILLS: Our next speaker will be Mr. Charles Holtz.

MR. HOLTZ: My name is Charles Holtz. I have lived in the Amargosa Valley for a little over 20 years. I have a degree in physics with a major in fusion power generation so I probably know enough to just be dangerous.

I read all of your reports, the site characterization plans until I'm blue in the face with them, and you have generated mountains of paperwork, and I think all in all it's a pretty convincing job, but I think that the, that we have been--well, you have made the decision to put the repository here, apparently it's been made. Unless something disastrous shows up that says no, this has been designated as the spot. I think that the--well, I think that the, we have been doing a lot of cutting bait. I think the time has come to go fishing and no pun is really intended there, but it's time to get the show on the road. I think that the, from the standpoint of doing the right thing for the country, I think it's patriotic to do something with the repository. I think that this, from what I have read is probably the best place to put it. There is no ideal place. You are not going to find it, so I think that we should be going full steam ahead until something shows up one way or the other.

Now, I have a feeling that if it does show up, you're probably going to find solutions to whatever those problems are.

I'm a little concerned about the 10,000 year thing. The half life of plutonium is 25,000. In 100,000 years you are still going to have a significant quantity of that material left, so we are talking about an awful long time, but I suspect that 10,000 is probably designated by Congress to be some date that you have to work to because obviously we are not going to work to 100,000.

I have been accused of being for the repository. I'm neither for nor against. I like my life-style here. I don't think the repository is going to do much for me or for the area. If we wind up with 200 people, that's not a lot.

The air is good, the climate is good, and now unless you put nuclear materials into the atmosphere, I don't think we are going to have much trouble around here, and you are not going to create a lot of smoke or bad things in that respect.

Now, I think that the, it behooves the DOE to adequately compensate the state and the county, and I have a deep concern about the local areas, Beatty and Amargosa. I think if we have to rely on the county, we are not going to do very well in Amargosa. There is a lot of things that we need that I think probably could be obtained, schools, police facilities, things like that, fire safety.

I have a three-point program that I would like to offer. The one is, the one point is the adequate compensation to the state and county and the local area, and the other one is at one time I was accused that Holtz wants it all, and that's probably partly correct because I think if you are causing a

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problem all over the country, lots of states are up in arms, people are attending meetings and putting all kinds of objections in and you get this problem everywhere you go, so a long time ago I proposed or suggested that the MRS facility should be here where the repository is going to be. You've got MRS's at all of the power generation facilities, and I think if it were shipped here and installed in an MRS here, also if it was packaged here and placed here, yes, we would have it all. But I think that would be perhaps an incentive to the state and to the areas to be more willing to accept the repository because you are going to bring a lot more labor and a lot more income to this state. So I can see that.

And my last concern is the amount of material that you have. I think I mentioned this before, too, but I'm concerned that you possibly could have a critical mass.

Now, a long time ago, I think it was over a thousand years, it was stated that there was a nuclear explosion that took place in Africa spontaneously. We are going to have a mountain of this stuff here, and I think it should be looked into very carefully that the possibility of a critical mass is not there.

Now, I know 235 is not very easy to make a high order, 238 is a little easier and plutonium is easier yet, and we have a lot of it, and we have neutrons flying all over the place, from the sun. If it will go through 20,000 or 20 yards of lead, it sure is going to go through a lot of dirt. So I would like that particular area looked into very carefully, and I thank you for your attention.

MR. MILLS: Thank you, Mr. Holtz.

RESPONSE

The U.S. Department of Energy (DOE) agrees with the commenter's concern about proceeding with the site characterization program to gather the necessary information with which to evaluate the suitability of the Yucca Mountain site. The 10,000-year standard for a geologic repository contained in the Environmental Protection Agency (EPA) original requirements of 40 CFR 191 (currently under revision by EPA) is fundamentally based on the physics of decaying radionuclides contained in spent reactor fuel. When spent fuel is freshly pulled from a reactor, it is very hot and the type of ionizing radiation that is given off from short-lived radionuclides, the residue of split uranium atoms locked in the spent fuel pellets (fission products), is dominated by the emission of beta particles and gamma rays. Over a period of about 1,000 years, the bulk of these radioactive fission products decay to very low levels. All the while, the type of ionizing radiation given off by longer-lived radionuclides, also locked in the spent fuel (such as plutonium), is dominated by alpha particles. The emission of alpha particles from the long-lived radionuclides is masked by the high-activity beta particles and gamma ray emissions of the fission products between the time the fuel is irradiated and about 1,000 to 10,000 years. The period between about 1,000 and 10,000 years is a transition stage, whereby the dominant type of radiation emitted from spent fuel changes from beta particle/gamma ray to alpha particle.

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If the volume of original reactor fuel (enriched to about 3 percent uranium-235) was, for example, 60 cubic yards, the amount of radiation given off by this volume about 10,000 years after it was irradiated in a reactor, would approach the quantity of natural radiation contained in uranium ore, about 100,000 tons, required to manufacture the 60 cubic yards of enriched u-235 fuel.

The 10,000-year standard evolved not only from the physics of decaying radionuclides but was also based on the credible limits of predictive geoscience. Even with the most powerful computers available and the most sophisticated computer models that can be designed, there is a practical limit at which the multiplication of uncertainties into the future renders the predictions made with these models problematic. These uncertainties are embedded in the assumptions used during collection of the data as well as in how the data is analyzed. Since a repository program is an exercise in predictive geoscience and engineering design for an unprecedented period of time, the 10,000-year standard was regarded as a practical limit on the ability to make credible predictions. The ability to make credible predictions for the performance of a repository for a period of 100,000 years, for example, is regarded by many as beyond the range of predictive geoscience.

To be as thorough as possible, however, the DOE siting guidelines (10 CFR 960) state that the DOE would extend performance assessment modeling over a period of 100,000 years. The appropriate role for the 10 CFR 960 guidelines, given the changes caused by passage of the Nuclear Waste Policy Amendments Act of 1987, is currently under review by DOE.

Of all the natural evidence with which to view the migration potential of radionuclides in rock, the most relevant to disposal of high-level nuclear waste is the natural nuclear reactor that occurs in a uranium mine at Oklo, Gabon, in Africa. In a succession of sedimentary rocks deposited about 2 billion years ago, the fissionable isotope of uranium-235 was concentrated enough by natural sedimentary processes to go beyond the point of criticality. Detailed investigations of the radionuclides preserved in the rock indicate that the duration of criticality was about 300,000 years and that 12 tons of uranium-235 underwent fission. The short-lived radionuclides have long since decayed away, but the analysis of the spatial distribution of the remaining, very long-lived radionuclides that resulted from this fission reaction found that they or their natural daughter products migrated no further than 30 ft from their point of origin in the original deposit of uranium-235.

DOE has studied and will continue to evaluate potential socioeconomic impacts on the community of Amargosa Valley. Possible impacts on local services and facilities were identified in the Section 175 Report and changes in local conditions will be monitored. The Nuclear Waste Policy Act authorizes DOE to provide financial and technical assistance to mitigate socioeconomic impacts that result from the program. The Nuclear Waste Policy Act, as amended also provides the State of Nevada the option of either accepting a "Benefits Agreement" or working with the Nuclear Waste Negotiator to specify the terms and conditions under which the state would agree to host the repository.

The spacing and configuration of boreholes designed to contain nuclear waste would be such that criticality will be impossible. That is, the design of a repository, the density and spacing of waste packages in a given area, will

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preclude the possibility of criticality as well as minimize the heat loading of repository rock. Neutrons are created during fission which can only take place in the presence of the proper amount of fissionable material. High-level nuclear waste, either spent reactor fuel or borosilicate glass is not concentrated enough to ever go critical. There are three types of ionizing radiation, alpha particles, beta particles, and gamma rays. A sheet of paper can stop an alpha particle. A centimeter of concrete or the thickness of one's hand can stop a beta particle. It requires about 3 ft of concrete (or natural rock) to stop gamma rays.

DOE appreciates your suggestion for locating the Monitored Retrievable Storage (MRS) facility at Yucca Mountain. However, the Nuclear Waste Policy Amendments Act of 1987 (NWPAA) specifically prohibits DOE from siting an MRS facility (should it be developed) in Nevada.

REFERENCES

- 40 CFR Part 191 (Code of Federal Regulations), 1986. Title 40, "Protection of Environment," Part 191, "Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes," U.S. Government Printing Office, Washington, D.C., pp. 7-16.
- 10 CFR Part 960 (Code of Federal Regulations), 1987. Title 10, "Energy," Part 960, "General Guidelines for the Recommendation of Sites for Nuclear Waste Repositories," U.S. Government Printing Office, Washington, D.C., pp. 518-551.

COMMENT 25

Our next speaker will be Shauna Crossland.

MS. CROSSLAND: Well, I'm not a geologist and I'm not an economist, but I am a mining brat with a degree in agriculture, and I've spent a good deal of my life moving into or out of boom towns, so I know that in a socio-economic sense this area is going to survive with or without the repository.

The two things that concern me much more than socio-economic things are, number one, water. When you look around us in all the surrounding states and all the surrounding areas, everybody in the western United States particularly is becoming increasingly aware that we are using up our water resources, and they are not being replenished as fast as we are using them.

This area does have apparently a lot of ground water, and I'm appalled at how little we know about that resource, for sure where it comes from, and how fast it can be replenished, if it's used. We don't even know if the agricultural use that's gone on up until now has lowered the water table. And if we know that little about the ground water now, how can we determine the amount that you people and the mining companies want to take out are going to affect us and how can we risk that water with it being contaminated, possibly, for in the future. We have a very precious commodity that we are sitting on top of, and I think we need to take, make every effort we can to make sure that we don't jeopardize it.

RESPONSE

The U.S. Department of Energy (DOE) shares the commentator's concerns regarding the hydrologic system at Yucca Mountain. Water-use estimates for site characterization and, if the site is found suitable, subsequent repository construction and operation at Yucca Mountain are still in the early stages of development. The water required during the site characterization period, however, would be far less than that needed during the construction and apportionment of a repository. To date, published information on water use in the hydrogeologic study area indicates that siting a repository would not adversely impact other local users. According to current plans, water for site characterization activities would be drawn from wells J-12 and J-13, which penetrate a welded tuff aquifer, until a distribution system could be constructed. Chapter 3, p. 1-130, of the Site Characterization Plan contains a discussion of water-use estimates with quantitative estimates.

Regarding planned hydrologic studies, site characterization of the ground-water flow system in the saturated zone focuses on determination of (1) boundary conditions imposed by structure, including conditions of recharge and discharge, (2) hydraulic gradients in three dimensions, and (3) bulk aquifer properties of hydrostratigraphic units. The resulting description of boundary conditions, hydraulic properties of faults, hydraulic gradients, and aquifer properties will form the basis for modeling that will conclude with calculations of flow paths, fluxes, and velocities within the saturated zone. Studies to carry out these activities are part of Investigation 8.3.1.2.3 "Studies to provide a description of the saturated zone hydrologic system at the site."

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There are no current plans to drill through the deep carbonate aquifer at the outset of site characterization. However, an analysis to determine the need for the data will be undertaken as part of SCP Activity 8.3.1.2.1.3.1, "Assessment of the regional hydrologic data needs in the saturated zone." This activity is designed to define priorities for data requirements for the description of regional ground-water flow in the saturated zone. While enough data currently exists to construct models of regional ground-water flow, sufficient uncertainty in initial and boundary conditions exists to reduce the certainty of model results. Current data will be reevaluated, and an assessment will be made to determine what additional data are needed to test alternative conceptual models. Consideration will be given to drilling a deep borehole into the Paleozoic rocks beneath the Amargosa Desert and/or to deepen existing drillholes USW WT-21 and USW WT-22 into Paleozoic rocks. The need to penetrate the Paleozoic carbonate aquifer will be evaluated in the context of existing hydrologic data and current conceptual models of the regional flow system. DOE believes various alternative conceptual models of the regional flow system can be adequately tested without resorting to deep drilling, especially in absence of a demonstrated need that such data is truly necessary to answer questions about saturated-zone ground-water flow in the Amargosa Valley.

The hydrologic data acquired from SCP Investigation 8.3.1.2.3 will be applied in SCP Activity 8.3.1.9.3.2.1, "Projected trends in local and regional ground-water development, and estimated withdrawal rates in southern Nevada, proximal to Yucca Mountain", which is designed to analyze the future demands on local and regional ground-water resources. The objective of this activity are to assess the current and projected supply and demand for ground water in the geohydrologic study area and to estimate the value of these ground-water resources.

The determinants of supply will be examined: namely, the physical and chemical characteristics of the ground-water system, which includes aquifer depth, recharge area, volume, and water quality (salinity); quantities available from alternative sources; the cost of water from alternative sources; and the institutional factors relating to water laws and rights. What determines demand will also be examined: namely, historical, current, and projected trends in population growth; economic conditions including industry, employment, and income; current and projected future trends in consumptive usage of water (i.e. domestic, commercial, residential and agricultural); and climate and price.

Because of the uncertainty in forecasting changes in those factors that will determine the future supply and demand situation for ground water, a reasonable range of plausible scenarios will be developed. These will form the basis to estimate the current and future value of the ground-water resources in the geohydrologic study area and to project probable withdrawal rates and locations.

COMMENT 26

The other thing that concerns me, being around mining people all my life I have had to learn a little bit about geology just out of self-defense, and one of the things that fascinated me about this area when I first came here was how unstable it's been throughout its history. In every direction you look there are faults and evidence of volcanic activity and the whole history of this area geologically is one of instability, and I can't believe that with that kind of history right up until recent times it could suddenly become so stable that there would be no threat from earthquakes or volcanic activity or any of those kind of things as far as storing nuclear waste underground for the next 10,000 years.

So I hope--I guess I'm not really against it and I'm not for it because I really feel like we don't know enough to make a good decision, and what I hope that you will do is to study it, work with the State, work with whoever you have to work with to study the water and to study the geology and to make certain that this really is the best place, and if it looks like it isn't to choose another one that would be better. Thank you.

MR. MILLS: Thank you.

RESPONSE

The Great Basin has been under an extensional stress regime for about the last 16 million years. Volcanic activity began about 16 million years ago and corresponded with faulting caused by the extensional strain (pull-apart). Two phases of tectonic activity can be recognized: (1) older extensional faulting associated with silicic volcanism from about 11 million to 7 million years ago and (2) Basin and Range type faulting for about the past 7 million years. By 6 to 8 million years ago, the volcanic activity had changed to basaltic-type activity characterized by low-volume eruptions of short duration with the rate of magma production apparently declining over the last 4 million years.

Although the volcanic tuffs that make up the potential host-rock for a repository at Yucca Mountain were formed 11 to 13 million years ago, they are old enough to indicate stability through the time period of 10,000 years required by Environmental Protection Agency (EPA) regulations regarding long-term performance of a geologic repository (EPA is currently revising these regulations). 10,000 years is between 0.0007 and 0.0009 percent of the time that has passed since these rocks were formed. The 10,000-year period is the time over which high-level waste in spent fuel would decay to a level approximately equivalent to the amount of uranium ore required to produce the fuel.

Studies of faulting (pre-closure tectonics) and volcanism (post-closure tectonics) in the Yucca Mountain region are described in Site Characterization Plan (SCP) Sections 8.3.1.17 and 8.3.1.8, respectively. Of particular concern in assessing the stability of the site area are results of studies that will examine the evidence for past faulting up to about 2 million years ago, with emphasis on evidence for seismic activity that is very young.

Earthquake hazards are an important concern for the stability of repository surface facilities during its operational and monitored retrievability stages,

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and the postclosure period after repository sealing. The seismic design of repository facilities, the design required to accommodate maximum ground motions during the 80 or so years of repository operation, will be conservative. Based on preliminary information, design-basis surface facilities would have to be designed to accommodate an earthquake of approximately a Richter magnitude 6 to 6.5.

The approach to seismic hazard analysis in the SCP is to apply probabilistic methods to evaluate the adequacy of measured and observed estimates for potential ground motion that would be used as the basis for designing surface facilities. The Yucca Mountain region has not been monitored for seismicity long enough to allow recognition of seismic patterns that might exist over the area. The seismic data that have been gathered and records available from historic earthquakes can be used to bound the recurrence intervals of earth movement from regional seismic sources. Geologic data must provide the primary constraint for evaluating the likelihood for earthquakes on known faults. More important than the mere existence of faults in the Yucca Mountain area are questions such as how long a fault is, what is the degree of connection to other faults, how long ago movement occurred along the fault, how much movement took place per occurrence, and how often movement took place.

Using measured (seismic) and observed (mapping and cross-cutting age relationships) attributes, facilities would be designed to incorporate potential ground motions that could occur as a result of a seismic event(s) from an earthquake of specified magnitude on a particular fault. A probabilistic seismic hazard analyses would integrate this data to determine a probability of fault movement within a 10,000-year period. Such an analysis would provide a probability for ground-motion potential of different earthquake sources (faults) at different distances from the site which have different recurrence of movement intervals. All known faults showing movement during the past 2 million years within 60 miles of the site are to be considered in this analysis.

With regard to volcanism, preliminary data on the Lathrop Wells Cone, 12 miles south of the proposed repository site in Yucca Mountain, suggests it was formed in a single eruption about 250,000 years ago. Through further studies, however, DOE has now learned that this cone formed in many eruptions rather than just one and that the most recent eruption was about 10,000 years ago or perhaps younger. The number of small cinders cones in the region that are products of several eruptions is greater also than was previously thought. These data also mean that individual eruptions are smaller than was previously interpreted (because the volume of the whole cone is still the same) and that a future eruption, if it occurs, is much more likely to occur at the site of a previous eruption than at a new site. These new data, therefore, suggest that another eruption at the Lathrop Wells Cone is significantly more likely than was previously believed, but it does not in itself indicate any greater likelihood of an eruption through the proposed repository site at Yucca Mountain, an area unaffected by the basaltic volcanism in Crater Flat, west of Yucca Mountain.

Another eruption at the Lathrop Wells Cone would be very unlikely to compromise the performance of the proposed repository. Relative to large silicic volcanoes, basaltic cinder cones like the Lathrop Wells Cone (as well

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as all of the other Quaternary-age cones in the Yucca Mountain vicinity) have an eruptive style that is described by volcanologists as nonexplosive. The size and power of the largest eruptions that took place at these cinder cones near Yucca Mountain is very small compared with the silicic type (e.g., the eruption of Mount St. Helens in May 1980). To affect the ability of the proposed repository to contain radioactive waste, a cinder cone would have to erupt right through the repository. Even if a magma pipe (dike) feeding a cinder cone eruption came up right through the repository, the most likely scenario is that the molten rock in the dike would immediately freeze against the sides, so that there would be very little interaction between magma and waste canisters. The type of seismicity that could be induced by magma rising toward the earth's surface, for example, at Lathrop Wells, is typified by numerous (swarms), low-intensity earthquakes (Richter scale 2 to 3). Such low-intensity earthquakes would not be very important with regard to the waste isolation capability of the site.

New evidence that some eruptions in the Yucca Mountain region are more recent than was previously believed certainly does indicate a need for further careful study of volcanism in the area. Volcanism studies are a continuing part of site characterization activities.

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MR. MILLS: Our next speaker is Steve Bradhurst.

COMMENT 27

MR. BRADHURST: Thank you. Mr. Moderator and panelists, for the record my name is Steve Bradhurst and I'm here tonight on behalf of Nye County Board of County Commissioners. Nye County wishes to comment on the Site Characterization Plan. Written comments will be submitted in addition to my oral comments tonight.

First comment pertains to hydrology and you have already heard a number of comments relative to the hydrology of the area and the studies that are anticipated, and more specifically I'd like to address the hydrologic test holes that are planned. The Site Characterization Plan indicates a number of hydrological test holes will be drilled in Amargosa Valley to better understand the Amargosa Valley hydrologic system.

It appears, and I could be wrong, that these test holes will be limited to the valley fill aquifer and will not go deep into the deep carbonate aquifer.

Nye County has said in the past and will say it again that it is important to have a comprehensive picture of the Amargosa Valley hydrologic system or systems.

So we recommend that DOE drill into the deep carbonate aquifer and that the test holes be located in the Ash Meadows sub basin as well as the Alkalai Flats sub basin, that is the test holes that will go into the valley fill aquifer as well as the deep carbon aquifer.

RESPONSE

Site characterization of the ground-water flow system in the saturated zone focuses on determination of (1) boundary conditions imposed by structure, including conditions of recharge and discharge, (2) hydraulic gradients in three dimensions, and (3) bulk aquifer properties of hydrostratigraphic units. The resulting description of boundary conditions, hydraulic properties of faults, hydraulic gradients, and aquifer properties will form the basis for modeling that will conclude with calculations of flow paths, fluxes, and velocities within the saturated zone. Studies to carry out these activities are part of Investigation 8.3.1.4.2 "Studies to provide a description of the saturated zone hydrologic system at the site."

There are no current plans to drill through the deep carbonate aquifer at the outset of site characterization, in absence of an analysis to determine the need for the data to be undertaken as part of SCP Activity 8.3.1.2.1.3.1, "Assessment of the regional hydrologic data needs in the saturated zone." This activity is designed to define priorities for data requirements for the description of regional ground-water flow in the saturated zone. While enough data currently exists to construct models of regional ground-water flow, sufficient uncertainty in initial and boundary conditions exists to reduce the certainty of model results. Current data will be re-evaluated and an assessment will be made to determine what additional data are needed to test alternative conceptual models. Consideration will be given to drilling a deep

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borehole into the Paleozoic rocks beneath the Amargosa Desert and/or to deepen existing drillholes USW WT-21 and USW WT-22 into Paleozoic rocks. The need to penetrate the Paleozoic carbonate aquifer will be evaluated in the context of existing hydrologic data and current conceptual models of the regional flow system. Various alternative conceptual models of the regional flow system can be adequately tested without resorting to deep drilling, especially in absence of a demonstrated need that such data is truly necessary to answer questions about saturated zone ground-water flow in the Amargosa Valley.

COMMENT 28

Another hydrologic concern is the ground water extraction. Site Characterization Plan states that one of the events that could, this is a quote, one of the events that could significantly affect the waste isolation ability of the Yucca Mountain site is intentional withdrawal of ground water, unquote.

It's certainly no surprise to the people in this room that Las Vegas Water District covets Amargosa Valley water, whether it be the shallow fill aquifer water or the deep carbon aquifer. And no doubt Las Vegas will need new sources of water to sustain its growth in the 21st century.

The question that begs an answer is what will be the impact on the repository if the deep carbon aquifer that lies beneath the Yucca Mountain site is depleted to some extent of water due to significant pumping by, say, the Las Vegas Water District, whether the pumping be in Lincoln County or someplace in Nye County, what will happen if that significant resource of water is, as I say, depleted over time? It might take 10, 15, 20, 50 or 100 years.

I don't know if DOE has the authority and the ability to preclude that from happening. So, therefore, the question would be if there is significant withdrawal of water from the deep carbon aquifer, will there be subsidence and will there be some subsidence with respect to Yucca Mountain.

RESPONSE

The hydrologic data acquired from Investigation 8.3.1.4.2, SCP, will be applied in SCP Activity 8.3.1.9.2.2.1, "Projected trends in local and regional ground-water development, and estimated withdrawal rates in southern Nevada, proximal to Yucca Mountain," is designed to analyze the future demands on local and regional ground-water resources. The objective of this activity are, (1) assess the current and projected supply and demand for ground water in the geohydrologic study area, and (2) estimate the value of these ground-water resources.

The determinants of supply would be examined, namely; the physical and chemical characteristics of the ground-water system, which includes aquifer depth, recharge area, volume, and water quality (salinity); quantities available from alternative sources; the cost of water from alternative sources; and the institutional factors relating to water laws and rights. The determinants of demand would also be examined, namely; historical, current, and projected trends in population growth; economic conditions including industry, employment, and income; current and projected future trends in consumptive usage of water (i.e. domestic, commercial, residential, agricultural); and climate and price.

Because of the uncertainty in forecasting changes in those factors that will determine the future supply and demand situation for ground water, a reasonable range of plausible scenarios will be developed. These will form the basis to estimate the current and future value of the ground-water resources in the geohydrologic study area and to project probable withdrawal rates and locations.

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Possible subsidence due to ground-water withdrawal in the Amargosa Valley is not foreseeable, since ground water used during site characterization would be withdrawn from wells J-12 and J-13, until or unless some other distribution system was set up to serve the needs of the various site programs. These wells are well within the Test Site boundaries and withdrawal from them would not induce subsidence in the Amargosa Valley. Current agricultural usage of ground water in the southwestern part of the Amargosa Valley far outstrip any quantity anticipated for activities involving site characterization or repository operation. The U.S. Department of Energy knows of no subsidence problems produced by pumping in this area.

Water-use estimates for site characterization and, if the site is found suitable, subsequent repository construction and operation at Yucca Mountain are still in the early stages of development. The water required during the site characterization period, however, would be far less than that needed during the construction and operation of a repository. To date, published information on water use in the hydrogeologic study area indicates that siting a repository would not adversely impact other local users. According to current plans, water for site characterization activities would be drawn from wells J-12 and J-13 which penetrate a welded tuff aquifer, until a distribution system could be constructed. The maximum annual water demand for the repository is anticipated to rise to a peak of 120 million gallons (454,200 m³) per year by the end of the seventh year of construction, and decrease to about 115 million gallons (435,280 m³) per year, and remain at this level for the next 25 years. The minimum average water demand for the following 23 years of operation would be approximately 2.5 million gallons (9,462 m³) per year. Estimates of the quantity of water needed to support site characterization activities are considerably less. Preliminary estimates indicate that maximum total water use, for all phases of the exploratory shaft construction and testing will be 41,507,100 gallons (1.57 x 10⁸ m³).

REFERENCES

- DOE (U.S. Department of Energy), 1988. Site Characterization Plan, Yucca Mountain Site, Nevada Research and Development Area, Nevada, DOE/RW-0199, Vols. I-IX, Oak Ridge, Tennessee.

COMMENT 29

Another comment that pertains to the site characterization work force, the Site Characterization Plan states, quote, care will be taken to minimize adverse environmental and socio-economic impacts, unquote, and also, quote, as discussed in the DOE environmental assessment for the Yucca Mountain site, no significant adverse socio-economic impacts are expected from site characterization, unquote.

The concern is that the Yucca Mountain environmental assessment states that the site characterization work force will be 273 people. The recently released DOE section 175 report states that the site characterization work force will be 1425 people. Granted a number of these folks will be in the Las Vegas valley. This difference, I believe, needs to be addressed. Nye County has stated in the past and I will state it again tonight that we welcome the work force. All we need is some lead time to work with you to accommodate that work force.

RESPONSE

The U.S. Department of Energy is currently working with representatives of Nye County to develop a program that will identify potential socioeconomic effects and provide adequate time to address them.

The commentor is correct in the statement that there are significant differences between the employment estimates for site characterization that are shown in the environmental assessment and those included in the Section 175 Report. The Section 175 Report, which was prepared in 1988, includes updated employment estimates for site characterization that are based on a more detailed and comprehensive plan of scientific studies.

COMMENT 30

Another comment concerns the off-site support facilities for the Yucca Mountain project at the Test Site. Site Characterization Plan states DOE facilities at Jackass Flats at the Test Site will be used to support repository work. Such work will be done in laboratories at this site. There will be architectural engineering work and there will be a visitors center at this site.

Over the last few years Nye County has requested that the DOE relocate the visitors center and that will be associated with the repository at a site that the county has selected off site on Highway 95 by Lathrop Wells. It is a site that would be at the entrance to the Test Site at Lathrop Wells.

So reading in the Site Characterization Plan that this visitors center is going to be at the Test Site deep within the Test Site away from the general public is disturbing, and it is our hope that, and I know we have support from some DOE officials that this can be turned around and that any visitors center that is located or that is built associated with the repository be located off the Test Site so the general public can access that visitors center without going through the cumbersome process of being badged.

Also the county feels that DOE should do everything in its power to locate other repository support facilities off-site and encourage repository contractors to locate offices off-site.

Nye County just recently asked the Bureau of Land Management to set aside 480 acres at the entrance to the Test Site at the Lathrop Wells road that goes into the Test Site and that 480 acres is the site that we have in mind for our science park and as I said in the area we'd like to see our visitors center located. We certainly would welcome the DOE to locate other support facilities and to encourage its contractors to locate off site at that area or private land in Amargosa Valley.

RESPONSE

The U.S. Department of Energy appreciates your comments and is aware that Nye County is currently conducting a feasibility study on the concept of a visitors center located near the Amargosa Valley junction. We have discussed this idea with Nye County officials in the past and anticipate talking with them further when the feasibility study is complete. The Yucca Mountain Project does operate public information offices in Beatty and Las Vegas; for details on location and hours please call the Beatty office at 553-2130 and the Las Vegas office at 295-1312.

COMMENT 31

Finally I have an observation regarding the schedule, site characterization schedule. NRC's last quarterly report on repository program states DOE is having trouble meeting it's timetable for supplying NRC with documents that must be reviewed and approved by NRC prior to the exploratory shaft excavation in November, '89.

It appears with this slippage more and more work is going to have to be done over a shorter and shorter period of time, and the concern that the county has is that as we see this compression and that if DOE does not make this schedule, can't meet the schedule, there will be a call for a reform in the program; that is, if there isn't actual excavation come November of '89, there will be institutional pressure, Congress specifically as well as maybe pressure from the atomic nuclear industry to get on with the job, so to speak.

NRC is perceived and rightly so as being the primary safeguard to the people of Nye County and particularly here in Amargosa Valley, and that is that the process that DOE has to go through to get an application to construct and to operate a repository means that NRC is going to be looking at that site to see if it is safe, will it safely contain nuclear wastes over the 10,000 plus year period.

So the concern is that as the DOE has a problem meeting its schedule that there may be an effort, as I say, to reform the system, the process and there may be a desire on the part of some to dilute NRC's involvement in the program.

Knowing that NRC is going to read this transcript or at least some of their people, I'm inserting this into the transcript to point out that we would like to have NRC aware of our concern that they not be taken out of the picture and that their role not be deleted.

I guess the statement that should be made is that Nye County wants DOE and NRC to adhere to a schedule driven by quality assurance and not the other way around.

Thank you.

MR. MILLS: Thank you.

RESPONSE

The Secretary of Energy's "Report to Congress on Reassessment of the Civilian Radioactive Waste Management Program" (DOE/RW-0247; issued November, 1989) calls for a delay in underground testing in an Exploratory Shaft Facility (ESF). This delay would allow attention to be focused on surface-based tests that could identify potential unsuitable conditions at the site. Of the 106 studies in the Site Characterization Plan (SCP), 92 of them are "surface-based," either carried out on the surface, for example, trenching, mapping, or other sample gathering, or based at the surface, for example drilling.

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Focusing the U.S. Department of Energy's (DOE) early site characterization work on the surface-based program comes in direct response to comments offered on the SCP/Consultation Draft by the U.S. Nuclear Regulatory Commission (NRC), State of Nevada, and the Edison Electric Institute. Instead of beginning site characterization with a total-system approach (surface-based testing plus ESF) directed at evaluating the performance of engineered barriers, early site characterization would focus DOE's resources on collecting data on the site's suitability without an ESF. Much information can be obtained through surface-based testing to focus on issues related to seismic faulting, unsaturated-zone hydrology, volcanology, and natural resource potential. A preliminary performance assessment based on this data could then be made to allow an informed decision as to whether an ESF should be constructed.

The role of the U.S. Nuclear Regulatory Commission in the repository is defined by law. Also, quality assurance and safety will not be compromised because of schedule problems.

REFERENCES

DOE (U.S. Department of Energy). 1989. Secretary of Energy's Report to Congress on Reassessment of the Civilian Radioactive Waste Management Program, DOE/RW-0247, Washington, D.C.

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MR. MILLS: MR. Edward Garey will be the next speaker.

COMMENT 32

MR. GAREY: Good evening, my name is Eduardo C. Garey, and I'm a graduating senior at Beatty High School, and I have made an application to the University of Nevada, Reno.

As a student I'm interested in the studies of the Yucca Mountain repository and realize that this country must solve its energy problems.

Our class was invited to a low level waste--well, low level disposal site operated by U.S. ecology in Beatty. We felt that the operation was conducted safely and thoroughly.

Last year I had the pleasure of participating in a close-up program in Washington, D.C. and we had the experience of meeting in person with the Honorable Senator Reid and Hecht and Representative Vucanovich.

I was able to present prepared questions to each of them. They answered the social and economic questions directly but they purposely avoided questions pertaining to nuclear waste management.

Senator Reid chose to change the subject, Representative Vucanovich just ignored the question and Senator Hecht expressed concern and hope that a solution would be solved, would be found. Needless to say, our group was disappointed.

I welcome this opportunity to express my opinion that I consider the Department of Energy is presenting a realistic approach to the nuclear waste problems and believe that their conclusion, it will represent a logical solution to nuclear waste management.

Thank you, sir.

MR. MILLS: Thank you.

RESPONSE

The U.S. Department of Energy appreciates the commentator's remarks regarding the nuclear waste problem. The United States is currently committed to a policy of isolation of high-level nuclear waste in deep, mined, geologic repositories. Those countries in the world that have custody of high-level wastes are either committed to geologic disposal by law or policy, have stated it to be the preferred option, or have long-term investigations underway at potential sites within their borders. Deep geologic disposal of high-level wastes was advocated by the National Academy of Sciences in the late 1950s, and, at that time, salt appeared to be a very prospective host-rock for this purpose. The Earth Research Development Administration, a DOE predecessor organization that existed from 1974-1977, began research in other types of potentially suitable host-rocks, such as crystalline rock (granites), volcanic tuffs, shales, and volcanic basalts. The Nuclear Waste Policy Act (1982), as amended, implements a national policy of sequential characterization of sites for geologic disposal, whereas the NWPA of 1982 had established a program of

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parallel characterization. Unless U.S. Congress determines otherwise, our country will pursue deep geologic disposal.

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MR. MILLS: Has Mr. Brian Carter come in?

I notice that some of you have come in after we started. We are going to take a brief recess for approximately ten minutes. Any of you who have come in who did not hear the initial introduction, feel free to sign up at the back desk and you will be given ten minutes to make a presentation. After you have completed eight of those minutes, I'll hold up a two-minute signal and at the end of ten I'll raise my hand and you should conclude that thought. With that, we'll take a brief recess for ten minutes.

(Brief recess taken.)

MR. MILLS: If we could come back to order, our next speaker will be Nancy Fisher.

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COMMENT 33

MS. FISHER: Thank you very much. I am not a socio-economic major, I just want to make a comment for the record.

It seems to me that everything that I have heard so far is assuming that technology stops as of March 30th, 1989, and it is my understanding that technology doubles every 13 to 15 years. I kind of get the feeling that by the time we get around to building this thing we will be so far advanced that it may not even resemble what we are starting out with now.

If you could take someone from 1950, which is 39 years ago, put them in a deep sleep and wake them up today and try to explain to them that you could take a plastic cup, put a cup of coffee in it, stick it in a black box, touch a flat pad with numbers and you got a hot cup of coffee in a minute, explain the numbers or the letters TV, VCR, Xerox, laser, cat, per scans, that's 40 years.

I have an idea by the time this study is over we'll feel like we were just walking and getting our first pair of shoes. Thank you.

MR. MILLS: Thank you.

RESPONSE

At the present time, national policy defined in the Nuclear Waste Policy Act of 1982 calls for geologic disposal of high-level nuclear waste as the most suitable means for long-term isolation of waste from the environment. The U.S. Department of Energy recognizes the reality of technology advances; the nation, however, is faced with an immediate problem and there is no foreseeable technological advance that would entirely dispose of nuclear waste, or render it harmless. While reprocessing presents an alternative use for nuclear waste it does not eliminate the waste problem. Additionally, reprocessing is currently not economically viable in the U.S. because uranium ore is relatively inexpensive. However, the law does specify that the waste must be retrievable from a repository for at least 50 years. The time-frame would allow program adjustments on the basis of major technological developments that are currently unforeseen.

RESPONSES TO AMARGOSA VALLEY PUBLIC HEARING COMMENTS

That concludes those who have signed up to speak to us this evening. What we propose to do is take a 30-minute recess. We are going to be here until ten o'clock as was announced. If anyone who has addressed this panel earlier wishes to again, please sign up and we'll be glad to hear from you, and the rest of you here, if you want to address again with the guidelines we have set forth, we encourage you to put your name on the list back there and come forward and state your piece, and with that, we will be in recess until 8:35.

(Brief recess taken.)

MR. MILLS: We'd like to call the meeting back to order. And our first speaker will be Pat Copeland.

RESPONSES TO AMARGOSA VALLEY PUBLIC HEARING COMMENTS

COMMENT 34

MS. COPELAND: My name is Pat Copeland, and I represent several members of the Copeland family, and I want to speak on behalf of my husband Bill who is out of the area for a few days, but I wanted the opportunity mainly to let you know what we feel. We have resided in this valley for 21 years. We have naturally been very concerned as everyone has as the years have gone along, but we, in being involved in several government agencies or, I mean, getting the data from several government agencies we have been relaxed as the years have come along because we have felt the safety value has increased as far as living where we are adjacent to the Test Site.

One of the main things that we feel very relieved about--first off, we feel that this study on the Yucca Mountain study is going to be very beneficial. We feel that we are going to get the facts laid before us. The main thing that we are involved in are the monitoring stations. We have managed the monitoring station at 373 and 95 for several years. We get the complete readout data every week from all of the community monitoring stations, it's very in-depth. You would have to go to college several years, I think, to understand all of this, but we are kept completely abreast of any radiation.

This also involves not only our own area but it's a worldwide detecting monitoring station. The stations are controlled by satellite, as you well know.

We went through the Chernobyl event right along with them, and we were called in the middle of the day to increase our monitoring and we were at this time monitoring every few hours, and also I might add that we feel also that this station helps us in the U.S. Ecology problem that we kind of have with some of those trucks that go through.

We had one that went through recently and apparently pulled over and stayed overnight off of the road near the monitoring station up on the highway there, and shortly after 6:00 a.m. we got a telephone call from Las Vegas letting us know the satellite had gone off and was, as she put it, beep ~ these stations out here, and what had happened, there was a little bit of low level radiation from the truck that was in route to U.S. Ecology, pulled over to spend the night and go on.

It was just within a matter of a very few hours they had that detected, they had the truck located, they knew where he had come from, where he was going and who he was, and the situation was well in hand.

But we do, we are notified the minute there is any change.

Of course, we can see by our own readouts, you know, but this factor alone we feel very safe. I don't know what goes on inside the Test Site, all I know is what goes on outside of it by our own monitoring, and from this alone we feel that at least we have some kind of a control knowing what's happening. At least we get a look beforehand where a lot of these people don't in other areas, but I appreciate being able to speak before you and to let you know that we certainly are in favor of this. Thank you.

MR. MILLS: Thank you. Our next speaker will be Mr. Ken Garey.

RESPONSES TO AMARGOSA VALLEY PUBLIC HEARING COMMENTS

RESPONSE

The U.S. Department of Energy appreciates the commentor's remarks regarding the adequacy of the radiological monitoring program. The Yucca Mountain Project has implemented a radiological monitoring program that builds upon the Environmental Protection Agency monitoring program that has been operating around the Nevada Test Site (NTS) for many years. The Project monitoring program will collect air, water, sediment, soil, biota, and ambient radiation samples to accomplish the following objectives:

1. Characterize the work environment at the site.
2. Evaluate the potential impact of past and future NTS activities on the site.
3. Collect environmental data required to support facility design and preparation of the safety analysis report.
4. Monitor the impacts of site characterization on the environment.
5. Verify the acceptability of specific analytical techniques for evaluation of environmental levels of selected radionuclides.
6. Provide data that would be necessary for the decontamination and decommissioning of the site, as necessary.
7. Demonstrate compliance with legal regulatory environmental requirements.

Information collected by this program will be published in various technical reports that will be available to the public.

COMMENT 35

MR. KEN GAREY: Good evening. My name is Ken Garey. I have lived in this community of Amargosa Valley for approximately 25 years, and I have worked for various contractors and agencies at the Nevada Test Site. I'm a graduate engineer, retired after the completion of the spent fuel demonstration program in 1987 at the "Hemat" facility in area 25.

I worked on my first nuclear project in 1959, and I have been associated with nuclear projects since that time.

I am presently working as a consultant on a TRU Clean II Volume Reduction Program with equipment at the Nevada Test Site in Johnson Island, Pacific Ocean. I'm also station manager for the EPA community monitoring station located in this building complex.

From previous and continuing experience in the nuclear industry I try to keep informed of developments, and waste management is certainly one of the aspects in the industry. In my opinion it is solvable with existing technology and experience available.

The Nevada Test Site, I feel, is an ideal location to conduct studies and for consideration of storage of high level nuclear waste.

The National Laboratories scientific community and most of all experienced personnel are available here.

The security is in place and many corporate entities have had good experiences at the Test Site.

A waste repository is just a continuation of the ongoing nuclear development.

The Nuclear Regulatory Commission has set forth rules and regulations requiring compliance. Notably these are spelled out in the 10 CFR and 40 CFR regulations, and in addition the workmanship standards and materials are required to comply with the NQA-1 requirements for NRC licensing. With these guidelines in place, investigation, design, construction of the nuclear repository will be carried out in a safe and responsible manner in my opinion.

The public or these public informational exchanges such as the one we are attending today are examples of the NRC standards and regulations. Public opinion and comment is a necessary part.

I am confident that the nuclear industry can and must move forward into the next generation of reactors if this world is going to meet its energy requirements. A responsible approach to waste management is one aspect of energy development, and the Yucca Mountain repository investigation is an important part of that development.

The investor-owned public utilities acknowledge their responsibility by funding.

RESPONSES TO AMARGOSA VALLEY PUBLIC HEARING COMMENTS

Our federal Department of Energy is carrying out their responsibilities and private industry is cooperating with all agencies and the National Laboratories to resolve the spent fuel cycle of energy production for this nation.

As a citizen who has received the benefit of electrical energy and continues to benefit from low energy costs related to nuclear power, I feel responsibility to help in any way possible to assist in the waste management program.

I believe that the Yucca Mountain investigation concept is a sound concept and urge that it continue in its well-defined program to completion. Thank you.

RESPONSE

The U.S. Department of Energy appreciates the commentor's remarks reviewing the site characterization process.

RESPONSES TO AMARGOSA VALLEY PUBLIC HEARING COMMENTS

MR. MILLS: Thank you.

If there is no one else who signed up to speak, we will again take a recess for 30 minutes until 9:15. We'll stand in recess.

(Brief recess taken.)

MR. MILLS: For the record it's 9:15. We will reconvene. There is no one who signed up to speak and therefore we will recess until 9:55.

If there is anyone who wants to sign up, we'll still take sign ups.

(Brief recess taken.)

MR. MILLS: Is there anyone else who wishes to address the panel?

MR. GERTZ: Seeing no one else, as the hearing official, the hearing is officially closed at approximately ten p.m.

(Thereupon the proceedings were concluded.)

RESPONSES TO AMARGOSA VALLEY PUBLIC HEARING COMMENTS

CERTIFICATE OF REPORTERS

STATE OF NEVADA)

SS:

COUNTY OF CLARK)

We, Anna Maria Ciarrocchi and Barbara Shavallier, certified shorthand reporters, do hereby certify that we took down in shorthand (Stenotype) all of the proceedings had in the before-entitled matter at the time and place indicated; and that thereafter said shorthand notes were transcribed into typewriting at and under our direction and supervision and the foregoing transcript constitutes a full, true and accurate record of the proceedings had.

IN WITNESS WHEREOF, I have hereunto affixed my hand this _____ day of _____, 1989.

Anna Maria Ciarrocchi, C.S.R. #188

Barbara Shavallier, C.S.R. #84

AMARGOSA VALLEY PUBLIC HEARING WRITTEN COMMENT INDEX

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6. Detailed study of Faults on ~~area~~ tectonics may lead to

DOE should investigate a ^{Joint} study of G.W.

~~Test~~ - Hydrogeological ~~activity~~ ^{study} ~~near~~ ^{study} ~~of~~ ^{of} ~~my~~ ^{my} ~~observations~~ ^{observations} ~~Basalt~~ ^{Basalt} ~~springs~~ ^{springs} ~~had~~ ^{had}.
6. Detailed study of Faults and ~~area~~ tectonics may lead to

DOE should investigate a ^{Joint} study of G.W.

Hydrology outside Test Site to get a
thorough handle.

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Synopsis of Written Public Comment WA-1

The commentor expresses concern about the U.S. Department of Energy (DOE) undertaking a detailed study of tectonic activity, faults, and hydrology in the repository area. The commentor suggests a joint study of ground water outside the test site would facilitate a more thorough understanding of the hydrology.

Response

The area the DOE will study as part of the geohydrology Investigation 8.3.1.4.2, with regard to ground-water flow in the saturated zone, includes the closed drainage basins that not only encompass the Yucca Mountain vicinity but also the Nevada Test Site.

DOE has reviewed Mr. Szymanski's ideas, which were presented in a November 1987 draft manuscript titled "Conceptual Considerations of the Death Valley Ground-water System with Special Emphasis on the Adequacy of this System to Accommodate a High-level Nuclear Waste Repository." A report that compiled the comments of 24 project scientists was released on July 26, 1989, in a technical report entitled "Review of a Conceptual Model and Evidence for Tectonic Control of the Ground-water System in the Vicinity of Yucca Mountain, Nevada."

Briefly, Mr. Szymanski's hypothesis is that the water table under Yucca Mountain could undergo large variations in elevation over time periods of thousands of years or less in response to changes in stress in the rocks caused by earthquake activity. The principal evidence cited for this hypothesis is the presence of calcite-silica veins in fracture zones at Yucca Mountain, which he believes were deposited by rising, hot ground water from deep in the earth. To date, no studies conducted by other scientists have supported this theory; on the other hand, existing studies do not positively disprove the Szymanski hypothesis.

A distinction needs to be made between the potential for a rising water table according to the Szymanski hypothesis, and that which could result from a change in climate to wetter pluvial conditions. A water table rise due to pluvial conditions, which may coincide with a glacial stage, is considered possible (anticipated condition) in the next 10,000 years. The altitude of spring discharge deposits in the Amargosa desert indicates that the water table was not higher than 100 meters (330 feet) above its present position during the Quaternary (last 2,000,000 years), and computer flow modeling suggests that the maximum rise in water table altitudes during pluvial conditions would not exceed 130 meters (430 feet). Because the minimum distance between a repository (SCP conceptual design) and the current ground water table is about 180 meters (600 feet), the additional 50 meters (160 feet) provides reasonable assurance that a repository would not be flooded under wetter climatic conditions (DOE, 1986). The climatology program in SCP Section 8.3.1.5 describes the studies to be undertaken during site characterization to further examine this evidence.

Both the manuscript and the review report focus on work relevant to several studies and activities presented in the Site Characterization Plan (SCP)

Amargosa Valley Written Comments

Investigation on postclosure tectonics found in Section 8.3.1.8 of the SCP. The reviewers concluded, though not unanimously, that (1) the tectonic processes and geomechanical models that Mr. Szymanski proposed dominantly influence the hydrologic system and are described with insufficient rigor for testing or further analysis; (2) although the stress and geothermal heterogeneities in the Earth's shallow crust probably influence the hydrologic system, the magnitude and duration of the effects proposed in the manuscript are highly unlikely; (3) the geologic and hydrologic field data claimed to support Szymanski's hypothesis are more readily and consistently explained by traditionally accepted geologic and hydrologic processes, particularly when supplemented by other available evidence; and (4) Szymanski's recommendations for testing his hypothesis lack valid diagnostic criteria. In other words, if the recommended testing were to be carried out, the results would not demonstrate the validity of the Szymanski hypothesis. The review also recommends some additions and modifications to existing plans that have not yet been fully evaluated for possible incorporation into the DOE's program of study for the site.

DOE conducted a workshop in April 1988 with DOE scientists, together with scientists independent of the project, including university professors who are experts in the origin of calcite-silica deposits, and technical staff from the U.S. Nuclear Regulatory Commission, and determined that the vein deposits at Yucca Mountain have the characteristics of "pedogenic calcrete," commonly known as caliche. DOE believes the weight of current evidence strongly indicates that these deposits originated as caliche.

In July 1989, the Project Office released a final report by Mr. Szymanski entitled, "Conceptual Considerations of the Yucca Mountain Ground-water System with Special Emphasis on the Adequacy of this System to Accommodate a High-level Nuclear Waste Repository." The processes described in the final report will be reviewed by the National Academy of Sciences (NAS), and another review panel. DOE anticipates that the results of the NAS review will provide a definitive opinion as to the feasibility and likelihood of the mechanism proposed by Mr. Szymanski.

DOE believes that the deposits of siliceous sinter referred to in the comment are those described by Hay, Pexton, Teague, and Kyser (1986), in an article published in the Geological Society of America Bulletin, v. 97, pp. 1488-1503, entitled, "Spring-related carbonate rocks, Mg clays, and associated minerals in Pliocene deposits of the Amargosa Desert, Nevada and California." The authors interpreted these deposits to record the discharge of silica-rich water along permeable zones, probably fault-related. Hay et al. (1986) interpreted them to have formed by silica replacement of somewhat older carbonate and clay deposits that had been deposited previously in marsh or pond environments. The oxygen isotopes in the siliceous and carbonate materials indicate that the later springs or seeps discharged at temperatures of about 81°F rather than at higher temperatures that might indicate water rising along faults from considerable depths as the comment suggests.

Silica supersaturation is common in the ground water in the vicinity of the American Borate Company mill because the water has flowed southward through volcanic tuffs and alluvium derived from tuff. Hay et al. (1986) proposed that ground water beneath the northeastern Amargosa Desert (northwest of Pahump Valley) changed from a bicarbonate type to a silicate type about 2.5

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million years ago because of a drying climate and lesser availability of local recharge in nearby hills composed of Paleozoic carbonate rock. The authors do, however, note one occurrence of siliceous deposits in alluvial material less than 10,000 years old near the American Borate Company mill. Given the climatic history of the region as it is currently understood, this could be anticipated.

The evidence that is currently available indicates a higher water table beneath the Amargosa Desert, and presumably Yucca Mountain, during much of the last several million years, persisting or recurring until about 10,000 years ago. DOE currently believes that climatic change is principally responsible for the rather deep modern water table, but evaluation continues, for example in light of the mechanism proposed by J. Szymanski. Studies of the effects of both climatic changes and tectonism, including faults, on the hydrologic system at Yucca Mountain are described in Sections 8.3.1.5, 8.3.1.17, and 8.3.1.2 of the SCP. Existing data and interpretations, such as those proposed by Hay et al., (1986) will be evaluated as part of these studies. Additional data may be gathered if the preliminary evaluations indicate that they would be important to predicting future hydrologic conditions at Yucca Mountain.

Two SCP activities, 8.3.1.9.2.1.3 (Assessment of the potential for geothermal energy at Yucca Mountain) and 8.3.1.8.5.2.3 (Evaluation of regional and ambient heat flow and local heat flow anomalies), are designed to address the potential for geothermal energy in the vicinity of Yucca Mountain. Geothermal resources in the area are characterized as low-temperature (less than 190°F). The site's potential for geothermal exploration is low because shallow resources of this type are widely available throughout Nevada and those likely to be exploited are moderate to high temperature resources.

The SCP contains a full program to study the seismicity of the site in Section 8.3.1.8. The volcanism issue is treated thoroughly in SCP Section 8.3.1.17. The geotechnical studies encompassed by the programs are both comprehensive and state-of-the-art.

REFERENCES

- DOE (U.S. Department of Energy), 1986. Environmental Assessment: Yucca Mountain Site, Nevada Research and Development Area, Nevada, DOE/RW-0073, Washington, D.C.
- Hay, R. L., R. E. Pexton, T. T. Teague, and T. K. Kyser, 1986. "Spring-Related Carbonate rocks, Mg Clays and Associated Minerals in Pliocene deposits of the Amargosa Desert, Nevada and California," Geological Society of America Bulletin, Vol. 97, pp. 1488-1503.

Synopsis of Written Public Comment WA-2

Comment regarding emphasis of study on age of volcanic activity at Yucca Mountain. Multiple working hypotheses should be used to maintain flexibility.

Response

The Site Characterization Plan (SCP) is merely a blueprint that lays out the technical scope of the characterization program as seen at the beginning of this effort. Plans can change with the addition of new information. The 106 study plans to evolve from the SCP present further detail in regard to testing methodology, techniques, and procedures. The ability to incorporate flexibility into the scientific investigation program is carried out through a formal process of change control. Significant changes to the SCP technical program would be reported in semiannual Site Characterization Progress Reports. In revising the SCP from the Consultation Draft, the U.S. Department of Energy (DOE) explicitly considered alternative conceptual models by adding hypothesis testing tables and cross-referencing these tables with those studies that would supply data capable of testing these hypotheses.

With regard to volcanism, preliminary data on the Lathrop Wells Cone, 12 miles south of the proposed repository site in Yucca Mountain, suggested it was formed in a single eruption about 250,000 years ago, based on one radiometric dating technique (K-Ar). Through further studies, DOE has now learned that this cone formed in many eruptions rather than just one and that the most recent eruption may have occurred as recently as 10,000 years ago. The number of small cinder cones in the region that are products of several eruptions is greater also than was previously thought. These data also mean that individual eruptions are smaller than was previously interpreted (because the volume of the whole cone is still the same) and that a future eruption, if it occurs, is much more likely to occur at the site of a previous eruption than at a new site. These new data, therefore, suggest that another eruption at the Lathrop Wells Cone is significantly more likely than was previously believed, but it does not in itself indicate any greater likelihood of an eruption through the proposed repository site at Yucca Mountain, an area unaffected by the basaltic volcanism in Crater Flat, west of Yucca Mountain.

Another eruption at the Lathrop Wells Cone would be very unlikely to compromise the performance of the proposed repository. Relative to large silicic volcanoes like Mount St. Helens, basaltic cinder cones like the Lathrop Wells Cone (as well as all of the other Quaternary-age cones in the Yucca Mountain vicinity) are similar to Hawaiian volcanoes and have an eruptive style that is described by volcanologists as nonexplosive. The size and power of the largest eruptions that took place at these cinder cones near Yucca Mountain is very small compared with the silicic type, e.g., the eruption of Mount St. Helens in May 1980. To affect the ability of the proposed repository to contain radioactive waste, a cinder cone would have to erupt right through the repository. Even if a magma pipe (dike) feeding a cinder cone eruption came up right through the repository, the most likely scenario is that the molten rock in the dike would immediately cool, so that there would be little interaction between magma and waste canisters. The type of seismicity that could be induced by magma rising toward the earth's surface, for example, at Lathrop Wells, is typified by numerous (swarms), low-intensity earthquakes (Richter scale 2 to 3). Such low-intensity

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earthquakes would not be very important in regard to the waste isolation capability of the site.

Evidence indicating that some eruptions in the Yucca Mountain region are more recent than was previously believed certainly does indicate a need for further careful study of volcanism in the area which is a continuing part of site characterization activities.

WA-3

c. D.O.E. should ~~work~~ work with all or as many of the knowledgeable scientific community as possible to get best answers to the volcano's problems.

Synopsis of Written Public Comment WA-3

DOE should maintain working relationship with the scientific community to obtain answers to the volcanic questions.

Response

The Department of Energy's (DOE) Yucca Mountain Project participants include scientists from the United States Geological Survey, Los Alamos National Laboratory, Sandia National Laboratory, and Lawrence Livermore National Laboratory. In addition, DOE uses other national laboratories for special studies, consulting firms as technical support contractors, and university professors for research and technical reviews. The Nuclear Waste Policy Act, as amended, created the Nuclear Waste Technical Review Board (TRB) to review DOE's programs. Interactions with the senior technical experts on the TRB has been ongoing and will continue throughout the program. In addition, the DOE has been conducting both formal and informal technical interactions with scientists and engineers from the United States Nuclear Regulatory Commission and experts representing the State of Nevada. In addition, the National Academy of Science has a standing committee that reviews the high-level waste program.

WA-4
 In the evolution of the Yucca Mtn. site
 geology, the D.O.E. is relying very heavily on
 scientific modeling from an underground
 in similar, but not identical geologic ~~form~~
 + ~~main~~. The underground studies at the
 actual site should carry more weight and
 should be well on to evolution and ~~under~~
 understanding before any high level ~~models~~
 is moved and replaced. This may entail a re-evaluation
 of time tables and acceleration ^{of studies} to gather
underground data, because licensing ~~is to~~

This may entail a re-evaluation
 of time tables and acceleration ^{of studies} to gather
 underground data, because licensing ~~is to~~
 handling is scheduled for 1985.

Synopsis of Written Public Comment WA-4

Concern about the validity of extrapolating hydrogeologic modeling based on studies not conducted at Yucca Mountain to the site itself. Scheduling of studies based on licensing in 1995.

Response

Various prototype rock mechanics and underground testing programs have been carried out on volcanic tuffs in the unsaturated zone exposed in G-Tunnel, on the northwestern part of the Nevada Test Site. An Exploratory Shaft Facility (ESF) is required by the Nuclear Waste Policy Act to allow scientists direct access for in situ testing on the rocks being considered for a repository. Prototype testing is done to develop testing equipment, techniques, and procedures that would eventually be used to gather licensable data under a qualified quality assurance program. The concept of an ESF is to answer questions on the representativeness of data, since the actual host rocks for a repository would be penetrated in the same area that a repository would be considered for construction.

The Secretary of Energy's "Report to Congress on Reassessment of the Civilian Radioactive Waste Management Program" calls for a delay in underground testing in an ESF. This delay would allow attention to be focused on surface-based tests that could identify potential unsuitable conditions at the site. Of the 106 studies in the Site Characterization Plan (SCP), 92 of them are "surface-based," either carried out on the surface, for example, trenching, mapping, or other sample gathering, or based at the surface, for example drilling.

Focusing the U.S. Department of Energy's (DOE) early site characterization work on the surface-based program comes in direct response to comments offered on the Site Characterization Plan/Consultation Draft by the U.S. Nuclear Regulatory Commission (NRC), the State of Nevada, and the Edison Electric Institute. Instead of beginning site characterization with a total-system approach (surface-based testing plus ESF) directed at evaluating the performance of engineered and natural barriers at the same time, early site characterization would focus DOE's resources on collecting data on the site's suitability without an ESF. Much information can be obtained through surface-based testing (mapping, trenching, drillholes) to focus on issues related to faulting, unsaturated zone hydrology, volcanology, and natural resource potential. A preliminary performance assessment based on this data could then be made to allow an informed decision as to whether an ESF should be constructed.

The construction-phase tests to be performed in the exploratory shafts and the underground exploration and testing program planned for the ESF are all important, because some information on large-scale features or variability in site conditions are only obtainable underground through direct access to the rocks in which a repository would be built. Many of the tests and analyses that are part of the 14 studies planned in the ESF generally need to be gathered over a long time-frame. The planned program of geologic drifting in the ESF to investigate structural features is also likely to provide more information than can be discovered through a program of surface-based exploration alone. The long-term in situ tests planned for the ESF are

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ultimately needed to provide confidence in the DOE's understanding of site processes and conditions. An ESF had been planned early in the site characterization effort since experiments of long duration were to be carried out.

The Secretary's "Report to Congress" also describes DOE's new initiative to evaluate alternative ESF testing requirements based on data needs, construction methods, and configurations. This initiative is in response to concerns expressed by the Nuclear Waste Technical Review Board and the NRC that additional underground drifting might be necessary to adequately characterize the site, and that mechanical mining methods should be considered for shaft and drift construction in order to minimize the potential for construction-induced effects on test results.

REFERENCES

DOE (U.S. Department of Energy), 1989. Secretary of Energy's Report to Congress on Reassessment of the Civilian Radioactive Waste Management Program, DOE/RW-0247, Washington, D.C.

WA-5

~~The~~ E. It must be determined whether, after 10,000 years we will be dealing with a rock ground water Flow system or a Fracture ground water Flow system as Faults will continue to move and ~~make~~ ^{create and modify} ~~open~~ ^{new} ~~up~~ ^{fractures}

Synopsis of Written Public Comment WA-5

Question about the nature of hydrologic flow system at the site: is it rock (matrix) flow or fracture flow?

Response

The U.S. Department of Energy (DOE) also considers the hydrology of the unsaturated zone to be an extremely important factor in determining the potential suitability of the Yucca Mountain site. The unsaturated zone is an important natural barrier for migration of radionuclides. The advantages of waste isolation in the unsaturated zone (waste would be emplaced in an essentially dry geologic environment) remains a favorable aspect of the Yucca Mountain site. Determining how dry the unsaturated zone actually is remains an important goal of the characterization effort.

Aspects of the geohydrology program presented in Section 8.3.1.2 of the Site Characterization Plan (SCP) are designed to address the 1,000-year minimum pre-waste emplacement ground-water travel time (GWTT) requirements contained in 10 CFR 60.113(2). The requirement states that this travel time is to be measured along the fastest path of likely radionuclide travel from the disturbed zone to the accessible environment (the edge of an enveloped area around the repository block extending outward to a distance of 5 km or about 3 miles). To address this requirement, DOE needs to determine the locations where, and the degree to which, fracture flow occurs in the unsaturated zone versus matrix flow. DOE believes that current monitoring of existing boreholes and new bore holes to be added for the geohydrology program as site characterization proceeds will provide an adequate areal and vertical sample distribution to assess the relative importance of these two mechanisms and, in turn, determine whether or not the site can meet the 1,000-year GWTT requirement. Testing in the Exploratory Shaft Facility is also designed to evaluate the importance of fracture flow versus matrix flow. Compliance with the ground-water travel time requirement will be addressed using mathematical models and data collected during site characterization to make a probability-based determination of pre-waste emplacement ground-water travel time. A study of the effects of tectonic conditions, including faulting on ground-water processes is described in SCP Section 8.3.1.8.

REFERENCES

- 10 CFR Part 60, (Code of Federal Regulations), 1987. Title 10, "Energy," Part 60, "Disposal of High-Level Radioactive Wastes in Geologic Repositories," U.S. Government Printing Office, Washington, D.C., pp. 627-658.

WA-6

with
Vander
with
the

A high intensive magma-volcanic material
 that enters repository by utilization of
 Fault conduits will cause increase in
 temp. & if associated with water ^(stagnant)
 most of the earlier magma events were
 their ^{abyssal or shallow} pneumatolytic conditions could
 occur in the repository. Even with ^{shallow}
 * must know or understand ^{ground wa}
 very well before ^{not only} placement of
 radioactive material, but right
 before extensive seepage of G.W.

Synopsis of Written Public Comment WA-6

Concern about the implications of Szymanski's hypothesis (ascending versus descending groundwater), the results of intrusive volcanic activity penetrating the repository via fault conduit, and the effect of the coupling of the two processes (resulting in heated ground water at the repository horizon).

Response

The heat loading caused by waste emplaced in tunnels would elevate the temperature proximal to the surrounding rock. The configuration of the emplacement borehole, for instance an insulating air gap between the canister and overpack (the sleeve into which a canister would fit), and the spacing and density of the waste canisters themselves would be designed to minimize heat loading of the surrounding rock. In addition, older spent fuel significantly reduces the heat loading the host-rock would experience. Therefore, the policy employed as to the emplacement age of spent fuel is an important factor that can influence the effects of heat. Concerns about the amount of ground water that might be present in the unsaturated zone and how heat may affect it would be addressed by construction of an Exploratory Shaft Facility and would allow scientists the opportunity to establish the presence and/or quantity of perched water in the unsaturated zone.

Any water in the unsaturated zone would first have to penetrate a system of multiple, engineered barriers [ceramic (spent fuel) or glass waste form, cladding, canister, and overpack] prior to coming into contact with a waste form. Potential canister materials are austenitic stainless steel or nickel alloys, copper-based alloys, or alternatively, bi-metallic or ceramic materials. The degradation properties of these materials are being investigated under expected repository conditions (steam or vadose water at temperatures of up to 200°C [about 400°F] in the presence of tuff, with and without gamma ray fields. The effects on rates of degradation in ground waters of varying compositions, as well as radiolysis products, are being studied over a range of temperatures. A number of degradation modes are being investigated, including uniform corrosion such as pitting, crevice attack, and transgranular stress-corrosion cracking. The results of these experiments will be used to estimate the length of time canisters will remain intact. The U.S. Nuclear Regulatory Commission (NRC) regulations in 10 CFR 60 require that the waste package offer substantially complete containment of the waste for a period between 300 and 1,000 years. In predicting the performance of a repository following its closure and sealing, all canisters (approximately 30,000 in the projected inventory) are assumed to have failed after 1,000 years, which places primary reliance on the geologic setting for waste isolation.

Site Characterization Plan (SCP) study 8.3.1.8.1.1, "Probability of a volcanic eruption penetrating the repository," and its companion study 8.3.1.8.1.2, "Effects of a volcanic eruption penetrating the repository," are designed to analyze the probability of such an event and the resulting consequences to waste isolation. The effects of a hydrovolcanic eruption on a repository is considered in SCP Activity 8.3.1.8.1.2.2, "Effects of hydrovolcanic eruptions." The objective of this activity is to obtain geologic parameters for the disruption of a repository by magmatic activity accompanying a

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hydrovolcanic (magma-water) explosion. These data are used for calculations of projected radiological release through performance assessments.

The U.S. Department of Energy (DOE) has reviewed Mr. Szymanski's ideas which were presented in a November 1987 draft manuscript titled "Conceptual Considerations of the Death Valley Ground-water System with Special Emphasis on the Adequacy of this System to Accommodate a High-level Nuclear Waste Repository." A report that compiled the comments of 24 project scientists was released on July 26, 1989, in a technical report entitled "Review of a Conceptual Model and Evidence for Tectonic Control of the Ground-water System in the Vicinity of Yucca Mountain, Nevada."

Both the manuscript and the review report focus on work relevant to several studies and activities presented in the SCP Investigation on postclosure tectonics found in Section 8.3.1.8 of the SCP. The reviewers concluded, though not unanimously, that (1) the tectonic processes and geomechanical models that Mr. Szymanski proposed dominantly influence the hydrologic system and are described with insufficient rigor for testing or further analysis; (2) although the stress and geothermal heterogeneities in the earth's shallow crust probably influence the hydrologic system, the magnitude and duration of the effects proposed in the manuscript are highly unlikely; (3) the geologic and hydrologic field data claimed to support Szymanski's hypothesis are more readily and consistently explained by traditionally accepted geologic and hydrologic processes, particularly when supplemented by other available evidence; and (4) Szymanski's recommendations for testing his hypothesis lack valid diagnostic criteria. In other words, if the recommended testing was carried out, the results would not demonstrate the validity of the Szymanski hypothesis. The review also recommends some additions and modifications to existing plans that have not yet been fully evaluated for possible incorporation into DOE's program of study for the site.

DOE conducted a workshop in April 1988 with DOE scientists, together with scientists independent of the project, including university professors who are experts in the origin of calcite-silica deposits, and technical staff from the Nuclear Regulatory Commission, determined that the vein deposits at Yucca Mountain have the characteristics of "pedogenic calcrete," commonly known as caliche. DOE believes the weight of current evidence strongly indicates that these deposits originated as caliche.

In July 1989, the Project Office released a final report by Mr. Szymanski entitled, "Conceptual Considerations of the Yucca Mountain Ground-water System with Special Emphasis on the Adequacy of this System to Accommodate a High-level Nuclear Waste Repository." Concepts and processes presented in the final report will be reviewed by the National Academy of Sciences (NAS). DOE anticipates that the results of the NAS review will provide a definitive opinion as to the feasibility and likelihood of the mechanism proposed by Mr. Szymanski.

With regard to volcanism, preliminary data on the Lathrop Wells Cone, 12 miles south of the proposed repository site in Yucca Mountain, suggests it was formed in a single eruption about 250,000 years ago. Through further studies, DOE has now learned that this cone formed in many eruptions rather than just one and that the most recent eruption may be as young as 10,000 years. The number of small cinders cones in the region, that are products of several

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eruptions is greater also than was previously thought. These data also mean that individual eruptions are smaller than was previously interpreted (because the volume of the whole cone is still the same) and that a future eruption, if it occurs, is much more likely to occur at the site of a previous eruption than at a new site. These new data, therefore, suggest that another eruption at the Lathrop Wells Cone is significantly more likely than was previously believed, but it does not, in itself, indicate any greater likelihood of an eruption through the proposed repository site at Yucca Mountain, an area unaffected by the basaltic volcanism in Crater Flat, west of Yucca Mountain.

Another eruption at the Lathrop Wells Cone would be very unlikely to compromise the performance of the proposed repository. Relative to large silicic volcanoes like Mount St. Helens, basaltic cinder cones like the Lathrop Wells Cone (as well as all of the other Quaternary-age cones in the Yucca Mountain vicinity) are similar to Hawaiian volcanoes and have an eruptive style that is described by volcanologists as nonexplosive. The size and power of the largest eruptions that took place at these cinder cones near Yucca Mountain is very small compared with the silicic type, e.g., the eruption of Mount St. Helens in May 1980. To affect the ability of the proposed repository to contain radioactive waste, a cinder cone would have to erupt right through the repository. Even if a magma pipe (dike) feeding a cinder cone eruption came up right through the repository, the most likely scenario is that the molten rock in the dike would immediately cool, so that there would be little interaction between magma and waste canisters. The type of seismicity that could be induced by magma rising toward the earth's surface, for example, at Lathrop Wells, is typified by numerous (swarms), low-intensity earthquakes (Richter scale 2 to 3). Such low-intensity earthquakes would not be very important in regard to the waste isolation capability of the site.

New evidence that some eruptions in the Yucca Mountain region are more recent than was previously believed certainly does indicate a need for further careful study of volcanism in the area, which is a continuing part of site characterization activities.

DOE also considers the hydrology of the unsaturated zone to be an extremely important factor in determining the potential suitability of the Yucca Mountain site. The unsaturated zone is an important natural barrier for migration of radionuclides. The advantages of waste isolation in the unsaturated zone (waste would be emplaced in an essentially dry geologic environment) remains a favorable aspect of the Yucca Mountain site. Determining how dry the unsaturated zone actually is remains an important goal of the characterization effort.

Aspects of the geohydrology program presented in Section 8.3.1.2 of the Site Characterization Plan are designed to address the 1,000-year minimum pre-waste emplacement ground-water travel time (GWTT) requirements contained in 10 CFR 60.113(2). The requirement states that this travel time is to be measured along the fastest path of likely radionuclide travel from the disturbed zone to the accessible environment (the edge of an enveloped area around the repository block extending outward to a distance of 5 km or about 3 miles). To address this requirement, DOE needs to determine the locations where, and the degree to which, fracture flow occurs in the unsaturated zone versus matrix flow. DOE believes that current monitoring of existing boreholes and

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new bore holes to be added for the geohydrology program as site characterization proceeds, will provide an adequate areal and vertical sample distribution to assess the relative importance of these two mechanisms and, in turn, determine whether or not the site can meet the 1,000-year GWRT requirement. Testing in the Exploratory Shaft Facility is also designed to evaluate the importance of fracture flow versus matrix flow. Compliance with the ground-water travel time requirement will be addressed using mathematical models and data collected during site characterization to make a probability-based determination of pre-waste emplacement ground-water travel time. A study of the effects of tectonic conditions, including faulting, on ground-water processes is described in SCP section 8.3.1.8.

Regarding planned hydrologic studies, site characterization of the ground-water flow system in the saturated zone focuses on determination of (1) boundary conditions imposed by structure, including conditions of recharge and discharge, (2) hydraulic gradients in three dimensions, and (3) bulk aquifer properties of hydrostratigraphic units. The resulting description of boundary conditions, hydraulic properties of faults, hydraulic gradients, and aquifer properties will form the basis for modeling that will conclude with calculations of flow paths, times, and velocities within the saturated zone. Studies to carry out these activities are part of investigation 8.3.1.4.2 "Studies to provide a description of the saturated zone hydrologic system at the site."

The hydrologic data acquired from SCP Investigation 8.3.1.4.2, will be applied in SCP Activity 8.3.1.9.2.2.1, "Projected trends in local and regional ground-water development, and estimated withdrawal rates in southern Nevada, proximal to Yucca Mountain," which is designed to analyze the future demands on local and regional ground-water resources. The objectives of this activity are (1) assess the current and project supply and demand for ground water in the geohydrologic study area, and (2) estimate the value of these ground-water resources.

Because of the uncertainty in forecasting changes in those factors that will determine the future supply and demand situation for ground water, a reasonable range of plausible scenarios will be developed. These will form the basis to estimate the current and future value of the ground-water resources in the geohydrologic study area and to project probable withdrawal rates and locations.

REFERENCES

- 10 CFR Part 60, (Code of Federal Regulations), 1987, Title 10, "Energy," Part 60, "Disposal of High-Level Radioactive Wastes in Geologic Repositories," U.S. Government Printing Office, Washington, D.C., pp. 627-658.

WA-7

~~It is the main effect of the...
Rise in H₂O is evidenced by...
Fault movement... Water.
Net Cumulative EFFECT. Usage~~

a. ~~The~~ Large scale proposed usages of
Groundwater in the Amargosa Drainage
System must be thoroughly evaluated

with ~~the~~ good hydrologic data gathered from
wells, springs, and all available sources. The
recommendations

R.O. E., mining companies, Farmers, ^{with life} environmental
concerns, and residents of the entire Amargosa

drainage system must share the water and be
aware of any constraints on future usage.

Recommendations
3) ~~the~~ only way to do this is with ~~the~~ ^{supp}

hydrologic data from surface as well as ~~the~~ ⁷
~~the~~ well drilling. Not enough
is known ~~to~~ about the hydrologic
systems involved and more study is needed
but must be accelerated.

WATER IS OUR MOST IMPORTANT
RESOURCE AND IT MUST BE UNDERSTOOD
TO ^{MAINTAIN} CONSERVATION ~~AND~~ MINDFUL

USE WHICH will allow recharge and contin-
uous use for all concerned in the future.

These studies should already be done

The U.S.G.S. proposed to drill deep in Amargosa
in 1985-1986, but ^{this has not been} not acted on yet.

Arthur

Synopsis of Written Public Comment WA-7

More study is needed to determine what effect the proposed large-scale water use will have on the Amargosa drainage system's water resources. The water must be shared by the U.S. Department of Energy (DOE), mining companies, farmers, wildlife environmental concerns, and the residents of the Amargosa area. More tests must be undertaken, and accelerated; deep drilling needs to be done to learn more about the hydrologic systems involved.

Response

The U.S. Department of Energy (DOE) shares the commenter's concerns regarding the hydrologic system at Yucca Mountain. Water-use estimates for site characterization and, if the site is found suitable, subsequent repository construction and operation at Yucca Mountain are still in the early stages of development. The water required during the site characterization period, however, would be far less than that needed during the construction and operation of a repository. To date, published information on water use in the hydrogeologic study area indicates that siting a repository would not adversely impact other local users. According to current plans, water for site characterization activities would be drawn from wells J-12 and J-13 which penetrate a welded tuff aquifer, until a distribution system could be constructed.

The maximum annual water demand for the repository is anticipated to rise to a peak of 120 million gallons (4,200 m³) per year by the end of the seventh year of construction, and decrease to about 15 million gallons (435,280 m³) per year, and remain at this level for the next 25 years. The minimum average water demand for the following 23 years of operation would be approximately 2.5 million gallons (9,462 m³) per year. Estimates of the quantity of water needed to support site characterization activities are considerably less. Preliminary estimates indicate that maximum total water use for all phases of the exploratory shaft construction and testing will be 41,507,100 gallons (1.57 X 10⁵ m³) (DOE, 1988).

There are no current plans to drill through the deep carbonate aquifer at the outset of site characterization, in absence of an analysis to determine the need for the data to be undertaken as part of Site Characterization Plan Activity 8.3.1.2.1.3.1, "Assessment of the regional hydrologic data needs in the saturated zone." This activity is designed to define priorities for data requirements for the description of regional ground-water flow in the saturated zone. While enough data currently exist to construct models of regional ground-water flow, sufficient uncertainty in initial and boundary conditions exists to continue to reduce the uncertainty of model results. Current data will be reevaluated and an assessment will be made to determine what additional data are needed to test alternative conceptual models. Consideration will be given to drilling a deep borehole into the Paleozoic rocks beneath the Amargosa Desert and/or to deepen existing drillholes USW WT-21 and USW WT-22 into Paleozoic rocks. The need to penetrate the Paleozoic carbonate aquifer will be evaluated in the context of existing hydrologic data and current conceptual models of the regional flow system. DOE believes various alternative conceptual models of the regional flow system can be adequately tested without resorting to deep drilling, especially in absence of

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a demonstrated need that such data is truly necessary to answer questions about saturated-zone ground-water flow in the Amargosa Valley.

For more detail concerning studies related to the ground-water system at Yucca Mountain, see the response to Comment 6.

REFERENCES

DOE (U.S. Department of Energy), 1988. Site Characterization Plan, Yucca Mountain Site, Nevada Research and Development Area, Nevada, DOE/RW-0199, Vols. I-IX, Oak Ridge, Tennessee.

Synopsis of Written Public Comment WA-8

Commentor expresses concern about age of volcanic systems, their potential for re-activation, cyclic behavior, hydrologic phases, and interaction of ground water with volcanic activity.

Response

With regard to volcanism, preliminary data on the Lathrop Wells Cone, 12 miles south of the proposed repository site in Yucca Mountain, suggested it was formed in a single eruption about 250,000 years ago, based on one radiometric dating technique (K-Ar). Through further studies, DOE has now learned that this cone formed in many eruptions rather than just one and that the most recent eruption may have occurred as recently as 10,000 years ago. The number of small cinder cones in the region that are products of several eruptions is greater also than was previously thought. Continuing work appears to indicate (1) many of the volcanic centers exhibit brief periods of eruptive activity separated by longer periods of inactivity; (2) the centers may be active from time spans exceeding 100,000 years; (3) there is a decline in the volume of eruptions of these centers through time; and (4) small-volume eruptions occurred at two of the basaltic centers within the last 10,000 to 20,000 years. These data also mean that individual eruptions are smaller than was previously interpreted (because the volume of the whole cone is still the same) and that a future eruption, if it occurs, is much more likely to occur at the site of a previous eruption than at a new site. These new data, therefore, do suggest that another eruption at the Lathrop Wells Cone is significantly more likely than was previously believed, but it does not in itself indicate any greater likelihood of an eruption through the proposed repository site at Yucca Mountain, an area unaffected by the basaltic volcanism in Crater Flat, west of Yucca Mountain.

Another eruption at the Lathrop Wells Cone would be very unlikely to compromise the performance of the proposed repository. Relative to large silicic volcanoes like Mount St. Helens, basaltic cinder cones like the Lathrop Wells Cone (as well as all of the other Quaternary-age cones in the Yucca Mountain vicinity) are similar to Hawaiian volcanoes and have an eruptive style that is described by volcanologists as nonexplosive. The size and power of the largest eruptions that took place at these cinder cones near Yucca Mountain is very small compared with the silicic type, e.g., the eruption of Mount St. Helens in May 1980. To affect the ability of the proposed repository to contain radioactive waste, a cinder cone would have to erupt right through the repository. Even if a magma pipe (dike) feeding a cinder cone eruption came up right through the repository, the most likely scenario is that the molten rock in the dike would immediately cool, so that there would be little interaction between magma and waste canisters. The type of seismicity that could be induced by magma rising toward the earth's surface, for example, at Lathrop Wells, is typified by numerous (swarms), low-intensity earthquakes (Richter scale 2 to 3). Such low-intensity earthquakes would not be very important in regard to the waste isolation capability of the site.

Evidence indicating that some eruptions in the Yucca Mountain region are more recent than was previously believed certainly does indicate a need for further

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careful study of volcanism in the area, which is a continuing part of site characterization activities.

IV. Responsibilities and Suggestions

When looking at the overall responsibility of the very large ~~and~~, complex, and ~~and~~ tremendous important process of site characterization and selection, it is evident that an entire nation is involved.

Although the Department of Energy ~~is~~ shoulders the brunt of the physical evaluation effort, it is of equal if not more importance that the public (the "people of" by the people, for the people") ~~be~~ be informed enough to be an effective insurance, ^{policy} that the job get gets done right.

3. Help lobby to get alternative sites (at least one) designated and studied.

B. The D.O.E. Responsibility

1. Evaluate every knowledgeable concern from public and keep the public informed of new concerns ^{as they develop} and the D.O.E.'s actions toward

- a. be willing to adjust timetables
 - b. be willing to incorporate new ideas
 - c. solicit new ideas.
 - d. continue public input-output throughout the entire project.
- work with other agencies and the public to get Congress to OK. Look for and act on alternative unbiased.
- ### C. Legislators and Politician's Responsibility

1. These representatives of the people should look closely ^{presently successful} at their past actions on site suitability ~~and present evidence~~ based on a political convenience decision to put a repository at a previously existing DOE ~~site~~.

2. Legislators should work to allow, and demand logical ~~and~~ scientific inventory to adopt at least one alternate site. We need to study Yucca Mountain but we need a good alternative so that the temptation to compromise scientific data and fact does not exist.

3. Get away from the ~~the~~ staid and uninformed "For or Against" argument. Legislators should help look for answers, not just that is the scientists job.

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Synopsis of Written Public Comment WA-9

Commentor discusses areas of responsibility for parties involved in characterization.

Response

The U.S. Department of Energy (DOE) appreciates your constructive comments regarding the responsibilities of the public, the DOE, and the legislators and politicians.

The United States is currently committed by law to a policy of isolation of high-level nuclear waste in deep, mined, geologic repositories. Those countries in the world that have custody of high-level wastes are either committed to geologic disposal by law or policy, have stated it to be the preferred option, or have long-term investigations underway at potential sites within their borders. Deep geologic disposal of high-level wastes was advocated by the National Academy of Sciences in the late 1950s, and at that time salt appeared to be a very prospective host-rock for this purpose. The Earth Research Development Administration, a DOE predecessor organization that existed from 1974-1977, began research in other types of potentially suitable host-rocks, such as crystalline rock (granites), volcanic tuffs, shales, and volcanic basalts.

Regarding alternatives to Yucca Mountain, prior to passage of the Amendments Act of 1987, the Nuclear Waste Policy Act of 1982 set up a program of site screening to narrow a nationwide search for potential sites to a very few. The 1982 Act called for the formulation of general guidelines to screen sites as to their geologic potential to the extent that further investment in a research program was justified. In 1983, 9 sites were identified across the country in various geologic media: bedded salt, dome salt, basalt, and volcanic tuff. From this list, 5 sites were nominated as suitable for characterization, and in May 1986 the Secretary of Energy selected 3 of these sites for detailed characterization, Hanford, Washington; Yucca Mountain, Nevada; and Deaf Smith County, Texas. The selection of 3 sites from 5 was made with a multiattribute decision-aiding methodology (DOE, 1986).

The Amendments Act of 1987 changed national policy from parallel characterization of several sites to sequential characterization of one site at a time, and identified Yucca Mountain as the first site to undergo characterization. If DOE determines that the Yucca Mountain site is unsuitable, the Amendments Act directs DOE to report to the Congress within 6 months for further direction. A decision regarding suitability of the Yucca Mountain site cannot be made without the execution of a detailed characterization program. It is premature for DOE to offer alternatives in absence of a determination of the site's unsuitability. The 1987 Amendment changed procedural aspects of the study program needed for a repository, but the nation's commitment to deep geologic disposal of high-level nuclear wastes was not altered.

REFERENCES

DOE (U.S. Department of Energy), 1986. A Multiattribute Utility Analysis of Sites Nominated for Characterization for the First Radioactive Waste Repository--A Decision-Aiding Methodology, DOE/RW-0074, Office of Civilian Radioactive Waste Management.

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Dear Mr. Gertz:

WA-10

This letter is the written portion of Inyo County's testimony for the March 20, 1989 public hearing on the Site Characterization Plan (SCP) for the proposed high-level nuclear waste repository at Yucca Mountain, Nevada. The specific areas we are commenting on are the Plan's failure to integrate activities by affected units of local governments into the SCP framework; the plan's failure to adequately address potential contamination of the regional groundwater system; failure to consider transportation impacts within the SCP framework; and failure to assess the socio-economic impacts associated with the construction and operation the project.

Response to WA-10

This comment is an introductory paragraph to specific concerns. Each of the specific concerns is addressed in Comments WA-11 through WA-14.

I. DESIGNATION OF "AFFECTED UNITS OF LOCAL GOVERNMENT" AND INYO COUNTY'S PARTICIPATION IN THE SITE CHARACTERIZATION PROCESS

WA-11
Inyo County is located less than 14 miles from the boundary of the Yucca Mountain Repository Site. As the closest contiguous county to the repository, we face effects from Yucca Mountain including possible groundwater contamination in the eastern portion of the County, transportation of high-level nuclear waste by rail lines and/or highways through the County, and the socio-economic impacts which will result from the construction and operation of the repository.

The Nuclear Waste Policy Amendments Act (NWPAA) provides for designation of "affected units of local government." This designation allows local governments to request grants and impact mitigation assistance, as well as providing those governments full participatory rights in the repository decision-making and negotiation process.

Specifically, the Act provides for funding "to review activities for purposes of determining any potential economic, social, public health and safety, and environmental impacts of a repository on such state, or affected unit of local government and its residents." It is obvious that participation by affected local governments in the site characterization process was one reason for the "affected unit" designations.

Inyo County must be designated as an "affected unit" as a result of potential impacts to groundwater, transportation of waste to the facility, and socio-economic impacts as a result of construction and operation of the facility. These impacts are discussed in detail below. Also demonstrating that the County is affected is the number of site characterization activities for the repository which will be conducted within our boundaries. Over 2,250 square miles of Inyo County (20 percent of the County's area) are included within the boundaries of the Radiological Monitoring Program Sampling Area.

In spite of the fact Inyo County is obviously affected by the proposed repository and the integrity of the SCP depends on the characterization activities to be conducted in Inyo County, then Secretary of Energy John Herrington denied an initial request by Inyo County to be designated as an "affected unit" on October 3, 1988. A request by the County for reconsideration by current Secretary James Watkins has gone unanswered since December 6, 1988.

Without designation as an affected unit, Inyo County will be unable to effectively participate in the repository siting process, including the Site Characterization Plan. As a small rural county, we simply do not have the resources and expertise on our own to participate in the process as Congress intended with passage of the NWPAA.

WA-11 Inyo County is convinced that Secretary Watkins' refusal to respond to our request to designate the County as an "affected unit" is the result of selective application of the NWPA criteria by Department of Energy. We feel this is a the result of trying to prevent involvement by California local governments (and the State's Congressional delegation) in the Yucca Mountain siting process.

This attempt to exclude Inyo County from the repository siting process has carried over to the site characterization process as well. After trying for two months to obtain a copy of the Radiological Monitoring Plan from the Yucca Mountain Project Office, a public document provided as a matter of course to other agencies, we had to obtain a copy through Senator Pete Wilson's office. None of the public hearings for the SCP will be conducted in Inyo County or anywhere in California (Reno will host one however) and no copies of the plan have been made available for public inspection in California. We find that astonishing considering there are 94 separate site characterization activities planned for Inyo County as the SCP is carried out.

Given Congress' intended role for local governments in the site characterization process and the DOE's attempts to frustrate Inyo County's participation in this process, we must conclude that not only has the intent of the NWPA been thwarted, but the integrity of the Site Characterization Plan has been compromised by DOE's actions.

Response to WA-11

The U.S. Department of Energy (DOE) acknowledges that representatives of Inyo County have taken issue with the Secretary of Energy's decision not to grant Inyo County an affected status under Section 116(c)(3) of the Nuclear Waste Policy Act of 1982, as amended. DOE maintains that the matter of Inyo County has received careful consideration, and analyses indicated that no significant impacts to Inyo County would arise to warrant its designation as an "affected unit of local government" at this time. Should subsequent developments, such as the actual establishment of transportation routes or the results of site characterization studies to be conducted in the coming years, result in new information which would warrant the Secretary's reevaluation, Inyo County can again petition for an affected status. It also should be noted here that on April 7, 1989, shortly after the comments were presented, Inyo County brought suit in the Ninth Circuit of the U.S. Court of Appeals to challenge the Secretary's decision not to grant the county an affected status. Consequently, the propriety of the Secretary's actions here will ultimately be decided in that forum.

II. FAILURE OF THE SITE CHARACTERIZATION PLAN TO ADEQUATELY ADDRESS POTENTIAL CONTAMINATION OF THE REGIONAL GROUNDWATER SYSTEM

WA-12

Inyo County's second area of concern regards the common aquifer running underneath the Yucca Mountain site into the County and the potential for groundwater contamination. This aquifer, the Alkali Flat - Furnace Groundwater Basin, first surfaces at Ash Meadows, adjacent to the Inyo County/Nye County Border; at Alkali Flat (Franklin Plays) near Death Valley Junction; and at springs near Furnace Creek in Death Valley National Monument.

The complex hydrology of the groundwater basin is poorly understood both in terms of radionuclide migration into the aquifer underneath the repository site, and the regional groundwater flow within the aquifer.

Inyo County concurs with the State of Nevada's concerns the geohydrologic setting has been virtually ignored in the SCP. It is obvious even to laymen that deep circulating springs and fractures in the strata near the waste site may short circuit the groundwater flow paths into the aquifer. This has the potential of radically decreasing the time it takes radionuclides to migrate to the water table. The studies proposed in the SCP will not adequately address these concerns.

The inadequacy of regional groundwater site characterization activities, however, is the primary concern to Inyo County. The Alkali Flat - Furnace Creek Aquifer acts as the only available water source for the communities of Death Valley Junction and Furnace Creek as well as numerous isolated residents living in the eastern portion of the County. Groundwater discharge into the Amargosa River at Franklin Well and Alkali Flat indicates a potential for contamination of water supplies in the Inyo County communities of Shoshone, Tecopa and Tecopa Hot Springs, well beyond the boundaries of the underground aquifer. This potentiality is totally ignored in the SCP.

The regional groundwater flow modeling strategy is based upon inadequate information and presupposes flow characteristics which are not adequately supported by available data. The use of a two-dimensional flow model would seem to ignore the three-dimensional characteristics of this deep aquifer system. This is

one area of the SCP which Inyo County would have examined in more depth had we been provided the resources to do so through "affected unit" designation.

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Response to WA-12

The U.S. Department of Energy (DOE) shares the commentator's concerns regarding the hydrologic system at Yucca Mountain. The drainage basins in the Yucca Mountain region are small and closed. Not only is there no discharge of ground water from the saturated zone to surficial bodies of water anywhere in the general vicinity of the site, e.g. rivers, lakes, but there appears to be little intercommunication between ground waters in different drainage basins. Current knowledge of the flow patterns of deep ground water in the saturated zone is preliminary and incomplete. Based on work done by Project scientists in previous years, it appears that most ground water moving beneath the proposed repository block at Yucca Mountain eventually discharges at springs and seeps in the Ash Meadows area of Nye County, Nevada, or at Franklin Lake Playa, Inyo County, California. Quantification of most is difficult prior to detailed site characterization work, however, rough estimates made by the U.S. Geological Survey have been as high as 80 percent. Some small fraction of the ground water in the saturated zone passing below Yucca Mountain probably does discharge at seeps and springs in the Furnace Creek area of Death Valley.

Site characterization of the ground-water flow system in the saturated zone focuses on determination of (1) boundary conditions imposed by structure, including conditions of recharge and discharge, (2) hydraulic gradients in three dimensions, and (3) bulk aquifer properties of hydrostratigraphic units. The resulting description of boundary conditions, hydraulic properties of faults, hydraulic gradients, and aquifer properties will form the basis for modeling that will conclude with calculations of flow paths, fluxes, and velocities within the saturated zone. Studies to carry out these activities are part of Investigation 8.3.1.4.2 "Studies to provide a description of the saturated zone hydrologic system at the site."

III. FAILURE OF THE SITE CHARACTERIZATION PLAN TO ADDRESS TRANSPORTATION ISSUES IN THE SITE EVALUATION PROCESS

WA-13

Perhaps the most glaring inadequacy in the entire Site Characterization Plan is the total failure to address transportation issues. We are aware that efforts are being undertaken by DOE to identify options for the transportation of high level waste to the repository site, and that these options will have significant impacts on Inyo County. These studies should be brought under the framework of the SCP and integrated into the review of the suitability of the Yucca Mountain site.

If high-level waste is transported to the repository site by rail, there will be serious environmental and socio-economic impacts on the eastern portion of Inyo County. Two of the three rail siding options (Ludlow and Crucero) would not only bring waste shipments through the County, but also require the acquisition of property for railroad right-of-way and construction of the rail line itself.

We are also aware that the California Emergency Response Planning Unit of the California Highway Patrol and California Department of Transportation, at the request of DOE, is evaluating potential highway routes for transportation of high-level nuclear waste to the Yucca Mountain site. Routes under consideration would pass through Shoshone to Pahrump on California Highway 178 or through Shoshone and Death Valley Junction to Lathrop Wells on California Highway 127. If waste is shipped by highway, residents of Death Valley Junction, Shoshone, Tecopa and Tecopa Hot Springs will all be placed at risk. The proposals appear to be an attempt to avoid shipping the waste through Las Vegas, which cannot be accomplished if the waste is shipped by rail. It is obvious that shipment by a dedicated rail line would be safer than shipment on narrow two-lane highways. Therefore, it must be concluded that a decision to ship high-level waste by trucks is politically motivated and not based upon safety considerations.

While other counties, both contiguous and non-contiguous, may experience impacts from waste transportation, the potential level of impacts from transportation may be as great on Inyo County as any of the counties already designated as affected units. Local governments which have been designated as "affected units", such as Las Vegas, seem to be able to at least participate in examination of transportation issues. Since Inyo County has not been designated as an "affected unit", and transportation issues are not being addressed in the SCP, we can do little more than watch helplessly from the sidelines as decisions are made which put residents of the County at risk.

Another concern is the Department of Energy's inconsistency in

WA-13 considering transportation impacts as a basis for designation as an affected unit of local government. Transportation impacts were among the primary considerations in designating Lincoln County, Nevada, as an affected unit. Inyo County certainly supports the designation of Lincoln County however, we must insist that the criteria for designation be fairly and consistently applied.

Response to WA-13

The U.S. Department of Energy (DOE) recognizes that the transportation of spent nuclear fuel and high-level waste to Yucca Mountain is a major concern of the people of Nevada. Under the Nuclear Waste Policy Act of 1982 (Section 2.(21)), however, site characterization is specifically limited to those activities that are undertaken to establish the geologic conditions and parameters of the site. Therefore, transportation was not included in the Site Characterization Plan. DOE recognizes the importance of studying this issue and is currently conducting numerous investigations. Transportation is being addressed in other documents such as the Transportation System Studies Plan and the Comprehensive Transportation Plan, as well as during activities such as the scoping process for the environmental impact statement, which is designed to obtain public comment and input, and to address public concerns.

IV. FAILURE OF THE SITE CHARACTERIZATION PLAN TO ADDRESS SOCIO-ECONOMIC IMPACTS IN THE SITE CHARACTERIZATION PLAN

WA-14
Location of the repository at Yucca Mountain would cause serious socio-economic impacts on Inyo County which are totally ignored in the SCP. Construction and operation of the high-level nuclear waste repository adjacent to Inyo County will bring new residents into the County and create a need for additional public facilities and services.

Currently, a number of employees of the Nuclear Test Site live within Inyo County in the Pahrump and Amargosa Valleys. Construction personnel and employees at the Yucca Mountain site may also be expected to reside in the area and require County services. Construction of a new rail line to transport nuclear waste through Inyo County would bring even more construction workers into the area and cause additional socio-economic impacts. Since the amount of privately owned land in Inyo County is extremely limited, impacts of the repository on housing and property values are very important.

Socio-economic impacts must be considered within the SCP framework. Because these impacts are totally ignored by the SCP, the burden of planning for the repository's impacts on public services and facilities, housing, and property values falls upon local governments. Again, because Inyo County has not been designated as an "affected unit" we will be entirely unable to fill this gap in the site characterization process.

In conclusion, Inyo County feels major revisions are needed in the methodology and characterization activities of the SCP. Thank you for the opportunity to present this testimony on the SCP. The County hopes that these hearings will not mark the end of public involvement in the site characterization process.

Response to WA-14

The U.S. Department of Energy (DOE) recognizes that the socioeconomic impacts of Yucca Mountain is a major concern of the people of Nevada. Under the Nuclear Waste Policy Act of 1982 (Section 2.(21)) and the 1987 Amendment, however, site characterization is specifically limited to those activities that are undertaken to establish the geologic conditions and parameters of the site. Therefore, socioeconomic impacts were specifically excluded from being identified in the Site Characterization Plan. DOE is continuing to study potential effects of the repository program on all sectors of the economy in southern Nevada, as well as population changes that may also occur. These concerns were addressed in the Environmental Assessment produced in 1985 and in the Section 175 Report produced in 1988 and will be addressed again in an environmental impact statement.

WA-14

REFERENCES

- DOE (U.S. Department of Energy), 1986. Environmental Assessment: Yucca Mountain Site, Nevada Research and Development Area, Nevada, DOE/RW-0073, Washington, D.C.
- DOE (U.S. Department of Energy), 1988. Section 175 Report: Secretary of Energy's Report to the Congress Pursuant to Section 175 of the Nuclear Waste Policy Act, as amended. DOE/RW-0205, Office of Civilian Radioactive Waste Management, Washington, D.C.

**RESPONSES TO STATE OF NEVADA
COMMENTS ON SITE
CHARACTERIZATION PLAN/CONSULTATION DRAFT**

OCTOBER 1989