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Presentation to the Nuclear Waste Technical Review Board by Judy Treichel, Executive Director

TOTAL SYSTEM PERFORMANCE ASSESSMENT TRANSPARENCY How can the public know what the TSPA is and what it means?

The Civilian Radioactive Waste Management Program Plan, published in May 1996 defines the objective of a TSPA as: *evaluation of the probable behavior of the potential repository. More specifically, it refines performance evaluation by considering both normal and disrupted conditions from events such as earthquakes and volcanism. Additionally, it makes predictions about performance by considering the levels of uncertainty in key areas such as ground-water flow, thermal effects, corrosion, etc.* It is important to note that when members of the general public hear the word **repository**, they think only in terms of the natural site.

At the beginning of site characterization at Yucca Mountain many public meetings were held and a lot of media attention was given to the project in an effort to inform the community about what the program was and what would happen at the site. The people were told repeatedly that Yucca Mountain would be the most intensely studied real estate in the world and that "if it can't meet the regulations (those that existed at the time) or if it doesn't fit the requirements of the guidelines -- we walk away." Specific statements were made such as, "if it's found that ground-water can travel to the accessible environment in less than 1,000 years, if it's 999 years, we abandon the site." The public was led to believe, both in face to face meetings with project officials and through many media reports that Yucca Mountain could and would be disqualified as a repository site if *any one* of the qualifying conditions could not be met. Never was it mentioned, during that time of frequently held public meetings and updates, that *disqualifiers* could be fixed, mitigated, or averaged against other factors. So, the existing public conception of what this project is about and how it is conducted, is not the result of a misunderstanding or misinformed, uneducated deduction. It comes from clearly stated information that the Department of Energy widely disseminated for many years. To graduate from the originally stated definition of site characterization to the current plan for Total System Performance Assessment is seen by this already skeptical community as a double-cross. It directly feeds into the long existing public distrust and lack of confidence both in the Yucca Mountain project and DOE itself. In fact, this change in site evaluation was mentioned at the recent public hearing on the guideline changes. The commentor said that we were led to believe that if the site flunked earthquakes, it would fail. But now we find that it can pass in other engineering areas and wind

up with a passing grade point average and graduate. This can be tolerated with high school or college students. They may turn out to be lousy employees but not a threat to society. Not so with a nuclear waste repository.

In the case of TSPA versus the existing guidelines, a weird sort of circular, flawed logic seems to be in play. The revision of the guidelines leads to TSPA and TSPA then requires the change in the guidelines.

All that I have said so far is to explain that here in Nevada, and elsewhere I'm sure, the public feels deceived and manipulated. They express angry opposition and adamant disapproval about this project, not because they don't understand but because they understand very well what has happened and what is continuing to happen.

So--as to the subject of this session of the meeting--the transparency of TSPA 1997. It is not difficult to explain, in layman's terms, what a TSPA is and what it is for. It is a document that describes the ability of Yucca Mountain, with a lot of engineering assistance, to contain high-level nuclear waste through predictions made by computer models. But you wouldn't know that from reading all or part of any of the previous TSPAs. The 1996 Program Plan states that the TSPA will "evaluate the possible range of performance caused by uncertainty." I think that this is another example of weird logic. Performance will be whatever it is. What varies are the *predictions* about performance, due to the huge amount of uncertainty in understanding the natural conditions at Yucca Mountain. And it is the uncertainty factor that made the previous TSPAs so difficult to decipher. The document produced in 1995 is so muddled and mired down in the consideration of, and attempts to bound uncertainties that it is incomprehensible.

Considering the level of uncertainty that existed when that document was published, the whole exercise was premature. It may well be that it is premature to prepare TSPA 1997. In any case, it could be understandable to both technical experts and the public if a clear description was given about the known conditions at Yucca Mountain from verified data collection, and then the uncertainties can be described and a range of predictions can be made with computer models. But the results will not, and should not be accepted by the public or the experts as reliable rationale for confidence. They are guesses, no more and no less.

If, as the 1996 Program Plan states, "an important objective of performance assessment modeling is to identify the significance of the current uncertainty in processes, models, and parameters," then the TSPA can be useful. But for it to be of value, it must be used to understand what is not known, rather than as a basis for confidence in predictions of repository performance. The TSPA should be a tool, not a product. However, just the opposite is occurring.

The Technical Review Board has been saying, since it came into existence, that DOE should be using performance assessment to help guide decisions on what site characterization work needs to be done to reduce uncertainty.

The Department has begun work on a Viability Assessment that will be completed in 1998. The centerpiece of that is TSPA 1997. Many of us fear that the Viability Assessment will be misinterpreted and misused as a site suitability document. It will consist of four parts - repository and waste package design, license application plan, repository cost and schedule estimate and TSPA. TSPA will probably dictate part of the design decisions as well as cost and schedule determinations. In addition, it could become the part of the VA that provides the illusion that enough reliable data exists to determine suitability. So the necessity for the TSPA to be transparent and put in its proper context, is not only important for the public audience but even more so for decision makers. If, in fact it becomes a product rather than a tool, it will not just circumvent and conceal the need to do additional, vital scientific investigation at the site, but will provide the ultimate seal of approval.

In the case of the student who has failed some important classes but manages to slip through with a barely passing grade point average, that graduate can be trained later, on the job or, most likely will wind up taking work that is less demanding with less responsibility. Similarly, we are used to accepting engineering fixes and even failures. We can all think of things that "just never worked or turned out the way we thought they would." The world is full of examples. Unfortunately there are many such examples in existing DOE waste sites that are now cleanup sites. This project is promised to be a departure from that. Its motto is "do it right the first time."

Concerned citizens have believed for a long time that the program at Yucca Mountain is geared toward, and aimed at building a repository rather than conducting a research project. The way in which this TSPA is done and written can make or break that argument. If it is written properly, so that it is understandable, with clear descriptions of the areas and levels of uncertainty, it will show both the public and decision makers where the next steps in site characterization should be. However, if uncertainties are disguised as manageable weaknesses, resulting in layers of assumptions that ultimately create an illusion of confidence and accuracy, it will be the same as the previous TSPAs. It won't be understandable or transparent. It will cancel necessary site characterization and prove the sceptics right.

My assignment here was to talk about TSPA and there are other sessions dealing with the repository siting guidelines. But I find it impossible to talk about the two topics separately, especially now, when the existing guidelines are proposed to be abandoned in favor of TSPA. According to the Nuclear Waste Policy act, there should be strict guidelines, probably more restrictive than the current ones. A continuing series of TSPAs would be done to enable both decision makers and the general public to see if new data showed that the guidelines could be met. It is likely that with the new, streamlined program that this could be the final TSPA and it alone could serve to determine site suitability and/or licensability. That would violate the intent of the Act.

In the conclusion of the 1995 TSPA there is a discussion of eight significant questions regarding the flux and flow of water through the engineered and natural barriers of the Yucca

Mountain site and the resulting release of radio nuclides to the environment and to individuals who may extract water from the aquifer. It ends by saying, “ *information on the distribution of the amount and rate of water movement through the various scales relevant to the prediction of post-closure performance, remains the key need to enhance the representativeness of future iterations of TSPA.*” Since this document was completed, we have learned that water moves through the mountain, to the repository level, much faster than was predicted when it was written. There is no doubt that a few years from now, many of the assumptions used in TSPA 1997 will have to be changed.

A major remaining unknown, due to lack of data, is - What will be an acceptable thermal load? The current assumption has little to do with waste isolation capability. It is instead based on repository capacity needs.

This uncertainty won't be made clear in TSPA 1997. It must be clearly understandable to people that big changes in predicted performance may be made in the future. This is part of being transparent.