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My name is Gregor Gable, I am an anti-nuclear activist who like many others are concerned about geologic storage of high level nuclear waste at Yucca Mt. and the radiologically consequences that it may have on future generations of children. I strongly believe that we have a major responsibility to deal with the nuclear waste that has been created, but Yucca Mt is not the correct solution. I have five major point to discuss today.

For the purpose of these hearings rather than reading the following world wide web links and information stored on those pages into the record. I wish to have them included either as a web link for on line publication or as printed text for reference in the print media.

FIRST

Yucca Mt. was studied by then DOE scientist Jerry Szymanski, in the 1980's and he surmised that hot, deep water rises inside Yucca Mt periodically to a level above the repository horizon. He found evidence of crystal formations that he said were produced by up welling waters.

After receiving Jerry Szymanski Yucca Mt report from then Yucca Mt Project Director Carl Gertz, this was then read into to the public record for comment. The National Academy of Science upon review of his report, discredited it stating that the water infiltration, was caused by downward percolation of rainfall.

So once again I will read into the record for your response the inability of Yucca Mt to isolates radioactivity from rapid flooding of the repository of groundwater:

In June of 1998 Yuri, V. Dublyansky, Ph.D. gathered mineral samples in the Exploratory Studies Facilities (ESF) from the entire extent of the of the 8.7 km-long tunnel and in October of 1998 performed fluid inclusion studies in them. These findings can be found at http://www.ieer.org/ieer/reports/yucca/summrec.html and in more detail at http://www.ieer.org/ieer/reports/yucca/summrec.html.

I would like to present some of the findings of this report:

"This report analyzes mineral samples of calcite collected from Yucca Mountain in June 1998 by the author. Calcite (calcium carbonate) is a mineral that often forms veins and incrustations in rock fractures. It is practically always formed by precipitation from water. Calcite can be formed in geologic media by percolation of water from the surface or by up welling of water from below. Examination of calcite samples from the **Yucca Mountain subsurface discussed in this report leads to two principal conclusions:**

The studied calcite was formed by up welling of water and not from percolation of surface water; and

The water that entered the Yucca Mountain repository area in the past from below was at elevated temperatures.

The main evidence for these findings is as follows:

1. Water was found trapped in tiny cavities in the calcite samples. These trapped water bodies are called fluid inclusions. Many fluid inclusions had vapor bubbles formed in them, indicating that the water had shrunk after it became trapped. The shrinkage of

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water evidences that the water has cooled from its original temperature. This is **evidence of the presence of water at elevated temperature in the repository zone in the geologic past that could not have come from surface sources.**

2. A few samples showed the presence of hydrocarbons. These are all-gas inclusions in calcite, in which traces of aromatic hydrocarbons were found. Aromatic hydrocarbons are heavy molecules that could not have originated in surface sources. There is evidence of hydrocarbons in the geologic media beneath Yucca Mountain area. Hence, the **trapped hydrocarbons provide supplementary, though at present, fragmentary additional evidence of up welling of water into the repository horizon.**

3. Veins and crusts at Yucca Mountain besides calcites contain other minerals such as opal, quartz, and minor fluorite. These minerals are typically precipitate from warm or hot water. In particular, it is extremely rare for quartz and fluorite to be formed from surface water percolation. Hence, **the presence of these minerals is strong evidence of past presence of up welling warm water in the Yucca Mountain area.**

4. Minerals formed in unsaturated zone, that is, above the water table, are typically deposited in laminated formations consisting of millions of tiny crystals. For example, stalactites in caves are created in this way. By contrast, large individual perfectly shaped crystals require a saturated environment to form. **The calcite at Yucca Mountain often forms perfectly shaped individual crystals, clearly indicating that the area was, at some time in the past, saturated.**

The study also addresses the question of the age of the calcites. This is because the only way to estimate the future performance of any site as a geologic repository is to study its past. The timing of the formation of the calcites is important because it provides evidence of when the area was saturated and hence of the probability of its becoming saturated in the future during the period relevant to repository performance.

Peak radiation does from Yucca Mountain are expected to occur in the period between 100,000 years and one million years from now. Saturation in the recent geologic past would have serious negative repercussions for the suitability of Yucca Mountain as a repository.

According to the presently accepted concept by the Yucca Mountain Project, the unsaturated zone at Yucca Mountain was formed 9-10 million years ago and since that time the water table has never risen more than 85-100 m above its present level (e.g., Marshall et al., 1993), which is 300 m below the repository horizon. This would mean that the water table never reached zone where the high-level nuclear waste repository is planned to be constructed. The concept of the Yucca Mountain repository relies on the unsaturated environment as a major barrier that will prevent migration of radioactivity from repository into the accessible environment.

According to current regulations, performance of the repository must be ensured for at least 10,000 years in the future (10CFR60). Moreover, peak doses are expected to occur after 100,000 years or more. Therefore, the viability of the site critically depends on whether or not the hypothesis on the long-term stability of the unsaturated zone is correct." End Quote

I feel that the surrounding water table could rise at any time in the future which would compromise the mountain ability to isolate radioactive isotopes from leaking to the biosphere. I

also am in agreement with some "Scientists at the DOE's Los Alamos National Laboratory [who] theorized that a steam explosion could disrupt the repository 1,000 feet below the mountain's surface".

(http://www.lasvegassun.com/sunbin/stories/text/1999/jun/10/508910304.html)

This could be greater disaster than the Chernobyl reactor accident.

SECOND

On June 9th as reported in the Las Vegas Sun the **amount of radioactive materials that are being planned for Yucca Mt may have to be 50 percent or in excess of 105,000 tons rather than the 77,000 tons that the repository has been scheduled for**, as reported by Russ Dyer, Yucca Mt Project Manager. This story many be found at http://www.lasvegassun.com/sunbin/stories/text/1999/jun/10/508910304.html

My concerns are the ability of the mountain to stand the excess thermal load shock above the planned temperature load. The thermal heat studies has not been studied for the suggested nuclear waste load. How will the present cask storage units hold up to such excess temperatures? What is the reaction of the Yucca Mt. tuff to the new proposed temperatures? Yucca Mountain's rock may not be capable of containing such high levels of thermal heat and radioactivity with out serious faulting and cracking.

THIRD

Bacteria at Yucca Mountain could corrode nuclear waste containers is the headline for the new story in which DOE scientist. Department of Energy scientists have confirmed that bacteria found inside Yucca Mountain could pose a threat of corrosion if containers of nuclear waste are buried there. These new articles can be found at

http://www.lasvegassun.com/sunbin/stories/text/1999/jun/02/508875192.html

and

http://www.lasvegassun.com/sunbin/stories/text/1998/jun/02/507287270.html

The main findings are below:

Researchers at the DOE's Lawrence Livermore National Laboratory in Northern California say they have evidence that microbes in rocks and soil could eat away metal containers designed to store radioactive wastes at the proposed Yucca Mountain repository.

If the buried containers released the radiation, it could threaten people and the environment by escaping through ground water.

The scientists reported their findings to the American Society for Microbiology today.

Microorganisms, especially bacteria, have long been known to cause faster corrosion of metals. Bacteria also live deep within the earth, such as at Yucca Mountain, 90 miles northwest of Las Vegas.

Metal pieces of proposed packaging materials were exposed to bacteria from rock within Yucca Mountain inside a laboratory container. The container was fed with a continuous supply of ground water, representing conditions expected in the repository.

The ongoing studies at Livermore will determine what the bacteria does to the metal and groundwater as well as how fast the bacteria corrodes the metals.

The DOE is studying Yucca Mountain to see if it can contain highly radioactive wastes for at least 10,000 years.

The repository design plans to use both engineered barriers, such as metal waste containers, and the underground tuff formed from volcanic ash during eruptions more than 12 million years ago.

UNLV microbiologist Penny Amy and her colleagues retrieved bacteria from tunnels at Yucca Mountain and the Nevada Test Site more than a year ago.

These bacteria were between 3 million and 6 million years old and stayed dormant in the rocks. When they were exposed to radiation from Cobalt-60, then given nutrients and water, the bacteria revived.

While such bacteria could take hundreds of thousands of years to travel through Yucca Mountain, it could take fewer than 50 years for them to gravitate through fractures in the rock, Amy said.

Craig Venter of the Institute for Genomic Research in Rockville, Md., is on the cutting edge of this research.

Some of the microbes on Earth are critically important for recycling nutrients through ecosystems, helping animals digest food and keeping the biosphere healthy in general.

"Deinococcus radiodurans", a microbe whose genome (the part of the cell that carries DNA) only recently has been sequenced by scientists such as Venter, has the remarkable ability to withstand 1.5 million rads of radiation.

That amount is 3,000 times the dose that would kill an average man.

"This thing can take more radiation than the Incredible Hulk," says Venter's colleague, Owen White, who led the Deinococcus project.

A few hours after a dose of radiation blasts the genome apart, it stitches itself together again.

My question is with these presence of the these bacteria and possible others types, nuclear waste casks, radiation and rapid infiltrating fresh water, how will the nuclear waste casks be able to maintain the integrity of the casks and protect the nuclear waste leaking to the biosphere?

Rapid infiltrating fresh Waters shown by the DOE report on Chlorine-36 (**http://www.state.nv.us/nucwaste/yucca/chlorine.htm**) in five of the faults uncovered by the Tunnel Boring Machine within the proposed repository block. These elevated Chlorine-36

levels could only have come from the atomshperic nuclear tests conducted in the Pacific Ocean less than 50 years ago. To get 600 or more feet below the surface where they were discovered in less than 50 years, this radioactive isotope had to have been carried there by water flowing rapidly downward from the ground surface - prima facie evidence that fast groundwater pathways exist at Yucca Mountain. The significance of this finding is that DOE's own siting guidelines, and the Nuclear Regulatory Commission licensing regulations, require a site to be disqualified if it is shown that groundwater travel time through the repository to the accessible environment (e.g., the aquifer) is shorter than 1,000 years. The Chlorine-36 discovery confirms earlier findings of elevated tritium levels in perched water bodies encountered previously by the U.S. Geologic Survey in boreholes below the repository level. Tritium is another radioactive element that was created by atmospheric weapons tests and, therefore, dates water in which it is found at no more than 50 years.

FOURTH

The proposed NRC rule would increase the current EPA regulationa of 4 millirem (mrems) to 25 (mrem) dosage limit is six times greater than limits authorized by the Environmental Protection Agency under the Safe Water Drinking Act.

Why should Nevadans living near the proposed Yucca Mountain repository be less protected from radioactive contamination of their water supply than, say, New Mexicans living near WIPP? The NRC rule proposes a lesser standard of protection for Yucca Mountain releases, despite the fact that local Nevadans will also be exposed to radioactivity from at least three other sources: the Nevada Test Site, the Beatty "low level" radioactive waste dump, and traces of plutonium from a test blast in the Nevada desert which migrated nearly a mile through groundwater, according to a study that prompted the government to recalculate slightly the risks that would be posed by an underground nuclear waste storage site.
(http://www.lasvegassun.com/sunbin/stories/text/1999/jan/06/508237448.html)

Since groundwater contamination would deliver Yucca's worst doses of radioactivity to nearby residents, water quality must be protected to the fullest extent of the law, which this proposed NRC rule fails to do.

Yucca Mountain should have the most stringent of standards, for leakage will only increase over time. Such stringent standards would guard against an unsafe location being licensed for the repository.

The proposed rule does not limit the thermal energy output of high-level radioactive waste per unit area of the repository emplacement area, which is a critical design and safety shortcoming.

Based on current development patterns, a Nye County farming community about 12 miles from the proposed Yucca Mountain site would likely be the closest point from the facility where humans would be exposed to radioactive particles originating at the site. But what about the folks who work on the Nevada Test Site or at Yucca Mt Site or anyone driving by on US HWY 95 (a major route between Las Vegas and Reno, NV). Less than 10 miles from Armogosa Valley which has a dairy that ships milk to Las Angles, CA is Death Valley National Park. Is this to be another national sacrifice area? If the proposed regulation is for a 12 mile limit, is that actually an area 12 miles in distance in each direction north, south, east and west or actually 576 square mile and of course 12 miles up. What is the actual distance that radiation will pose

a danger from the repository? What about the wildlife or the winged creatures in the area what is their danger?

FIFTH

The Treaty of Ruby Valley of 1863 **(http://www.lvrj.com/lvrj_home/1998/Apr-05-Sun-1998/photos/treaty.html)** and **(http://www.lvrj.com/lvrj_home/1998/Apr-05-Sun-1998/photos/treaty2.html)**)was a treaty of friendship and right of passage and never sold the land to the US government and the ownership of the land must be resolved prior to any attempted permitting process. Attempting to place the Yucca Mt Repository on Western Shoshone land is environmental racism. This is not your land and you have no right to place a nuclear waste repository on

I look forward to your responses.

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