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California Community Health Advocates

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October 10, 2001

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The Honorable Spencer Abraham
U.S. Department of Energy
1000 Independence Avenue SW
Washington, D.C. 20585

RE: Yucca Mountain Site Characterization Project: The preponderance of uncertainty.

Dear Secretary Abraham:

After reviewing your Draft Environmental Impact Statement and the Supplement to the Draft Environmental Impact Statement for a Nuclear Fuel Repository at Yucca Mountain, I was struck by the repeated pattern of uncertainty expressed by the authors of these documents, especially in areas of critical public concern. Because the vast preemptive power of the federal government concerning nuclear energy leaves citizens no choice but to rely exclusively on the expertise and capabilities of the DOE staff, we believe the uncertainties and contradictions evident in these reports are unacceptable and put future public health and safety at risk.

What do these documents tell us?

Of course, we are not scientists or nuclear engineers, but from our initial reading of these documents here is what we found:

I.

1. Will the engineering design for the repository work? We're not sure, says the report, we're still gathering information. ¹ In fact, we think we should put in place a "a lessons learned" strategy during development so that we can continue to change the design. ²
2. What is known about the site? Evidently not enough.

There is uncertainty regarding the influence of heat on water movement in the unsaturated zone. ³ but we'll study it, says the report.

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There is uncertainty concerning the influence of high temperatures on rock properties.⁴ But we're *planning* to conduct studies of heat on the chemical environment, says the report.

3. Are the waste packages sound? Well that depends, says the report. Studies show that if the waste package is breached some radionuclides will be released quickly, others, not so quickly. Which ones and how fast, we're still debating.⁵
4. If radionuclides reach the groundwater, do we know *where* the groundwater at the repository site goes once it leaves the site? We are debating this one too, says the report. We can't agree on flow paths. In fact, the "alternative" concept of flow shows a "largely different flow pattern."⁶

But, according to the report, this doesn't matter because the current design of the proposed repository "relies *heavily* on the delay of release by providing long-lived waste packages. The long lives of the packages tend to control the does results."⁷

5. What confidence do we have that the waste packages will have a long life? That depends, says the report, on the confidence we have in the long-term performance of the repository system in relation to groundwater contamination. ⁸ DOE has modeled this. Some of the variables they think represent impacts reliably, others do not, some are significant, others are not.

Table 5-3 in the Report (Environmental Consequences of Long-Term Repository Performance) shows the degree of confidence in the models ability to accurately represent impacts of various factors and the significance uncertainty may have on performance.

What does it show? That the model cannot be counted on to accurately represent the ultimate seepage into drifts. (Confidence—Low) and that the significance of this uncertainty to the overall estimate of performance is *high*.

Does the model reasonably represent dripping on waste packages? No. Is this important? Somewhat.

What about radionuclide concentration reductions during its transport between the waste package and the environment?

Well, not much confidence that the model represent *this* event (Low) Is this important? Very, according to Table 5-3. ⁹

In other words, the very factor DOE is relying on to buffer us from possible groundwater contamination—the long life of the waste packages—cannot be sufficiently guaranteed because of the considerable, admitted uncertainty in the behavior of the site characteristics, most notably, how, when and where water will degrade the integrity of the waste packages.

DOE staff evidently agrees that this is a problem. They answer this problem with a solution: the drip shield. Another layer of engineering solutions to buffer us from the uncertainties they have not had the time to clarify or study.

II. CCHA, it seems is not the only group concerned about uncertainty. The staff of the U.S. Nuclear Regulatory Commission—the ACNW Working Group on Chemistry Issues—in their letter of August 13, 2001 to Chairman Meserve—laid out their concerns as to whether DOE had done enough, as they said, “to determine with reasonable expectation that the repository will meet the regulatory requirements.”¹⁰

In the Working Group report, the concern centered on the corrosion of waste packages and drip shields. The chemistry data is poor, they say, the results of studies using such data, questionable.

They said:

“Given the complexity of the in-package chemistry and the importance in terms of radionuclide mobility, Doe needs to *better document* and *support* it’s approach.”¹¹

The NRC Study Group criticizes not only the data, but DOE methods of analysis, claiming that DOE has employed conflicting physical and chemical processes and conditions to model the source term release.

Critical of DOE staff’s approach to the radionuclide release question, they claim it is “not clearly discussed and leads to confusion and uncertainty.”¹²

In other words, the very methodology used to generate models to understand radionuclide source term release is flawed and unreliable and leads to conclusions that cannot be trusted.

In their words, they conclude:

--“localized corrosion on the degradation of welds are uncertain...”

--"The usefulness of DOE's sensitivity and importance analyses...to understand the most significant contributors to overall risk is *questionable*."

--"Potentially important colloid chemistry complexities may not be addressed..."

--Chemical processes governing radionuclide transport are given in a *gross* sense (in modeling) by the use of experimentally measured parameters that give little insight into the rate controlling chemical mechanisms."

--"DOE needs to more clearly link the simplifying assumptions used in the (in-package chemistry) model to experimental and analog evidence..."

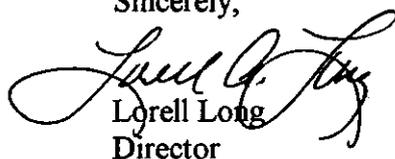
--"...abstractions of process model chemical phenomena...does not appear to capture important uncertainties in chemistry which control the release and transport of the important radionuclides."

--"DOE's striving for conservative assumptions in a chain of events can...(result) in unreasonable answers." 13

I think what is important here, and what the NRC work group has clearly amplified in their review, is that we cannot afford "unreasonable answers," we cannot afford "confusion and uncertainty," and we cannot afford science that leads to conclusions we cannot trust, and in which we have no confidence.

We continue to believe the public deserves better than a "lessons learned" strategy for dealing with nuclear radiation safety. We believe there is considerable evidence that DOE is on dangerous scientific ground, and that it cannot justify its push to approve the Yucca Mountain Repository project.

Sincerely,


Lorell Long
Director

NOTES:

1. Continued Evaluation of the Design Process, page 23. *Supplement to the Draft Environmental Impact Statement for a Geologic Repository of spent Nuclear Fuel, and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada, DOE, 1999.*
2. Ibid., page 24
3. *Environmental Consequences of Long-Term Repository Performance.* Page 5-10.
4. Ibid..
5. Ibid., page 5-13.
6. Ibid., page 5-15
7. Ibid.,
8. Ibid. page 5-22.
9. Ibid.
10. Report of the ACNW Working Group on Chemistry Issues and Related NRC Staff Capability for the Proposed High-Level Waste Repository at Yucca Mountain. Page 1.
11. Ibid., page 16.
12. Ibid., page 17.
13. Ibid. Page 22-24.