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11 MR. BARRACLOUGH: Thank you, ladies and
12 gentlemen. It is my pleasure to be here tonight to
13 speak about this subject that is so important to
14 the country and to the state of Idaho. My name is
15 Jack T. Barraclough. I live at 3018 West Mooreland
16 Circle in Idaho Falls, Idaho 83402.
17 I am a certified professional
18 hydrologist in an earlier career. Retired from
19 U.S. Geological Survey after 35 years. Then I
20 spent ten years with Scientific Specialists with
21 EG&G Idaho and later Lockheed Martin. I am an
22 Idaho state representative serving my fourth term
23 or just finished my seventh year.
24 Much of the time has been spent in Idaho
25 Falls studying the migration of contamination

1

1 through fractured busalt. I worked ten years in
2 Florida in water studies including the groundwater
3 supply for Kennedy Space Center, deep well
4 injection of treated waste in Pensacola, and salt
5 water encroachment studies in a number of other
6 places in Florida.
7 During my career I have been a
8 consultant at Hanford, Washington at the Richland
9 site, Oakridge National Laboratory in Tennessee,
10 Savannah River Plant in South Carolina, and six
11 years as an HRMP, Hydrology Radionuclide Migration
12 Project at the Nevada test site.
13 I have also been on overview programs at
14 all the commercial waste burial sites in the
15 country and most of the burial sites on DOE
16 facilities. I have also been consultant to the
17 U.S. Air Force on agent orange contamination in
18 Florida and Mississippi, and helped clean up the
19 organic contaminants at two air bases in
20 California. I have been a consultant to the Warp
21 Valley Radioactive Burial site in California, which
22 is just a little south of Yucca Mountain.
23 I also spent some time looking at the
24 Yucca Mountain groundwater migration program eight
25 or ten years ago to determine as a statement was

1 made and a report was written that the repository
2 would contaminate all the groundwater as far south
3 as Mexico and San Diego.
4 Therefore, the studies of sites with
5 water migration through rock and soil in and above
6 the groundwaters and surface has been a major part
7 of my adult life. These studies include high-
8 level and low-level radioactive waste, transuranic
9 waste, hazardous, chemical, industrial, military,
10 and municipal waste.
11 I am currently vice chair or co-chair or
12 member of about a dozen environmental waste
13 committees as a legislator, so I am still involved
14 in this activity and it gives me perspective that
15 others might not have to that degree.
16 The United States produces about 20
17 percent of its electricity from nuclear reactors.
18 Coal produces 57 percent and all the other things
19 such as gas, generators, hydropower, solar, wind,
20 oil, et cetera produce less than 25 percent. The
21 20 percent is number two and it has been a major
22 part of our electrical generation over the years.
23 And almost 30 years ago a decision was
24 made to assess a fee of one-tenth of a cent, one
25 mill on each kilowatt hour of electricity produced

1 by nuclear power. This fund has generated with the
2 interest associated about 16 billion dollars and
3 the fund was to solve the problem of use of nuclear
4 fuel. The fund still collects about six hundred
5 million a year and about three hundred million a
6 year is spent on the program.
7 So this problem was anticipated years
8 ago and a funding mechanicism was set up to resolve
9 the problem. Unfortunately, a lot of the fund has
10 been used by Congress for deficit offset. Now, we
11 don't do that in the Idaho Legislature, but they do
12 in Congress.
13 Yucca Mountain to be used as a high-
14 level radioactive waste repository is a solution to
15 a problem that began in the '40s and '50s. At
16 present there are about 150 separate sites in 41
17 states where used nuclear fuel and high-level
18 radioactive waste is stored. The electric energy
19 industry had to pay twice because DOE promised to
20 take the used fuel in January of 1998, and of
21 course they didn't keep their promise, so it leaves
22 the utilities with the problem of having to
23 purchase and build storage facilities on each of
24 their sites.
25 Almost every state is benefited from

1 nuclear generation of electricity even though every
2 state doesn't have nuclear reactors. The United
3 States has about 108 active reactors at present,
4 which is about one-fourth of the world's reactors.
5 The other countries plan to add to nuclear
6 electricity generation.
7 A few years ago I visited Prairie
8 Island, Minnesota where two nuclear reactors are
9 located. I was impressed to see used nuclear fuel
10 after it has gone into wet storage to be put in dry
11 storage in these huge casks, and the dry storage
12 facility is five and a half feet above the hundred-
13 year recurrence interval flood plain of the
14 Mississippi River. Yucca Mountain is really a lot
15 better solution to used fuel than the distribution.
2 16 A few years ago I looked at the
17 transportation issues of used nuclear fuel, and at
18 that time I think there are about 2400 shipments of
19 which there had been seven accidents and none of
20 them released radiation. Now, I think, the number
21 is more than 3000 with eight accidents and then
22 there had been about 700 shipments of nuclear Navy
23 fuel, and as far as I know there hasn't been any
24 substantial problems with any of these shipments.
25 So this is something that has been going on for

1 years and years and is part of our life.

5 2 The impressive thing to me about, and I
3 have seen films of this although I have never been
4 in any of the demonstrations, is to see how
5 powerfully strong these casks or storage containers
6 are that they have been subject to train accidents
7 and earthquakes and highway accidents and
8 derailments, fire, et cetera, and puncture tests,
9 and it seems like they pass all these tests very,
10 very well. They really are very, very stout.
11 Yucca Mountain also would be used to
12 store nuclear Navy used fuel. Three years ago I
13 had the privilege of flying out from Norfolk in the
14 Atlantic Ocean and landing on the George
15 Washington, one of the newer nuclear carriers. And
16 this is a scary experience when you think of coming
17 down out of the sky and landing on that bouncing
18 carrier and hope that you'll -- the tail hook that
19 has been famous from other occasions will catch one
20 of those four cables and stop you from your
21 airborne speed in just a few hundred feet, and we
22 watched the operation of the George Washington all
23 day.
24 There are about 3000 ship's crew and
25 about another 3000 when they have the full

1 complement of airplanes. It's almost 1100 feet
2 long, weighs almost -- displaces almost a hundred
3 thousand tons. Has four steam catapults and with
4 the nuclear loading, nuclear fuel, they can cruise
5 eight hundred thousand to a million miles in about
6 23 to 25 years. Then they have one refueling of
7 nuclear fuel and then they can cruise another eight
8 hundred thousand to a million miles in the next 23
9 to 25 years. By then the carrier is ready to be
10 decommissioned.
11 We have about 12 carrier groups now.
12 After the training that they were receiving in the
13 MidAtlantic with a bunch of NATO Forces, and
14 submarines, and surface ships, the George
15 Washington deployed in the Mediterranean, and later
16 in the Persian Gulf. If we are going to project
17 power to be used all around the world we need those
18 carrier task force.
19 As a World War II Navy veteran on a
20 light cruiser it gives me a little perspective on
21 what we used to have in the Navy and what they have
22 now. They are really a well-trained team. I was
23 impressed by how young they were. Of course, at my
24 age everyone looks young. But how well-trained
25 they were and how well they carried out their

1 mission.

2 And we certainly are the world's experts

3 in Navy carrier task forces. The Soviets finally

4 built one carrier and I don't think they can get it

5 to work very well. It is just a disaster. Now the

6 Chinese claim they are going to plan a 15-carrier

7 task force, and they got a great, steep learning

8 curve. I don't know if they can steal all the

9 secrets to get that going. But it shows that we

10 really need these. We need the nuclear Navy. Both

11 the submarines and the carriers and the surface

12 ships.

13 If you are going to have a force like

14 that one of the things you need is a way to safely

15 dispose of nuclear waste spent or use of nuclear

16 fuel. Then when I was catapulted off the carrier

17 that evening it really made the Disney World ride

18 seem very, very tame.

6... 19 There is another aspect of Yucca

20 Mountain and that's the foreign research reactor

21 spent fuel. A lot of people are very concerned

22 about the shipments of why are we taking fuel from

23 these foreign countries. Well, it is not their

24 fuel. It is our fuel, and we loaned it to them.

25 And we made agreements in the early '60s to use

6 cont.

1 this fuel and then return it, so it would keep it
2 out of terrorists and we keep control of it.
3 I think whenever you are looking at
4 something like Yucca Mountain you are going to look
5 at the whole picture of what's involved, and what
6 are the options if we don't have it, and if we
7 don't have a safe place.

7

8 Now, I would like to speak a little bit
9 about how suitable is Yucca Mountain. The
10 topography is about as good as it gets. Because it
11 is kind of like you are thinking of looking at a
12 tent. And you build a tent with a steep -- you
13 never build a tent with a flat roof. You build it
14 with a steep angle so the rain and snow will run
15 off. That's exactly what they are doing. So the
16 topography is good.
17 Then when you think about storing
18 anything in mountains you have a lot of natural
19 advantages. In fact, I suggested this technique at
20 INEL years ago and Hanford studied disclosing or
21 storing of nuclear fuel in desert views.
22 One, you really minimize the amount of
23 water that can come in contact with the repository
24 because of the runoff. And two, you get a well
25 above the water table, so there is little chance

1 that you can postulate a type of flood or a rising
2 groundwater table in winter conditions that can
3 come up and inundate the repository. Then if you
4 want to monitor you can even excavate tunnels
5 beneath the repository to capture any kind of water
6 or transport of radionuclience that is occurring.
7 But primarily -- so the topography to me is great.
8 Now, nature doesn't build ideal systems.
9 And in mountains there is almost always faulting.
10 That is why the mountains are there in the first
11 place generally is because they have been uplifted
12 or with faults by the result of faulting. But in
13 the number of times that I have been at Yucca
14 Mountain and the times I have gone through the
15 tunnel and been able to walk up and touch the
16 faults, an old hydrologist can look at the fault
17 gauge and you can just look out and determine the
18 permeability just by inspection to see how low it
19 is and how sealed these materials are.
20 They are not open avenues which are the
21 case with many faults for water to go down. In
22 fact, that's where most geothermal springs come
23 from is movement along an active fault that water
24 can go down the fault and then get heated and be
25 brought up to the surface. The geology itself is

1 mostly volcanic material that has relatively low
2 permeability, so that's another advantage.
8 3 The surface water is almost nonexistent
4 except during some of the storms there because of
5 what little surface water there is. There is
6 sometimes six inches of rain, sometimes ten inches
7 of rain. And I don't know the evapo transpiration
8 there, but I know miles to the south of Warp Valley
9 was 105 inches a year. So the potential of
10 evaporation is ten times more than the rainfall or
11 more.
12 And then one of the biggest concerns is
13 how will these materials move southward as we
14 discussed earlier today in the groundwater. Well,
15 first you got to do several things. You have got
16 to introduce enough water to mingle with the
17 repository waste to dissolve some radionuclides
18 from them and then carry them downward in the
19 unsaturated soil. And transport in the solum,
20 which we studied in INEL considerably, is a very
21 difficult thing. Because you have relatively small
22 amounts of water and it behaves under different
23 principles. So the years that it would take for
24 enough water to accumulate, enough water to
25 dissolve the radionuclides from the repository, and

1 then carry it down to groundwater is a long time.

3 2 Yucca Mountain to me presents the best

3 of both worlds. For years I thought that you

4 should look at the best place that Mother Nature or

5 geology did and then combine it with the best

6 engineering developments that you can put in that.

7 And Yucca Mountain does that. It has some good

8 natural geologic barriers and qualities that would

9 minimize the amount of water migration. And then

10 it has maybe the tunnel concept and the sealing in

11 is very, very effective to make it a kind of

12 defense in depth or by strength or something.

13 And then in looking at the ground water,

14 and I was asked, as I said, to go to Yucca Mountain

15 a certain number of years ago to look at a report

16 that suggests that Yucca Mountain would contaminate

17 all the groundwater in southwestern United States.

18 And that is just not doable in those systems.

19 Each groundwater basin or whatever you

20 want to call it has certain beginnings and travels

21 and ends, and discharges into something else. And

22 in some of the basins in Nevada there is no direct

23 outlet. The precipitation falls on the mountains,

24 flows down to the valley, comes up and evaporates.

25 And that's why you have so many acclimate soils

1 there.

2 I calculated some travel times from the

3 Yucca Mountain area and some of the other areas on

4 Nevada test site to be something in the order of

5 20- or 30,000 years as a travel time. Now that's

6 just a number, and it is not accurate, and it

7 doesn't have any of the latest data. But it kind

8 of puts a time frame of what some of these might

9 move under the permeability of the soil, the

10 hydraulic gradient, and the thickness and width of

11 the groundwater body.

12 Then there is another phenomenon that we

13 have studied extensively in INEL and the other.

14 There is groundwater travel time. And then each

15 radionuclide has a different signal or different

16 properties, and it can travel with the groundwater

17 or be retarded or absorbed and travel much slower

18 than the groundwater.

19 In the thick appendix it gives a good

20 rundown of these distribution coefficients or

21 absorption qualities. I think the studies boil

22 down and it matches a lot of the information that I

23 have collected on the different radionuclides,

24 plutonium that we have measured in the INEL and

25 have the field properties to go along with the

1 distribution coefficients or the KD values as they
2 are called. So I was impressed by the amount of
3 work they have done in that area on draft
4 environmental impact statement.
5 Then another piece of information that I
6 just got a couple of weeks ago when I was in
7 Washington was some high-level waste people moving
8 beyond the Yucca Mountain viability assessment.
9 This is a report to Congress, the Secretary of
10 Energy, by the U.S. Nuclear Waste Technical Review
11 Board. And what they have been asked to do is not
12 determine whether Yucca Mountain is suitable as a
13 repository, but review the technical studies.
14 If you look on the front page of this
15 you see the credentials and the type of people that
16 they have on this board. These are not DOE people.
17 They are not working for Yucca Mountain. They are
18 an independent group that is making the assessment.
19 And what in essence they say is we need to learn
20 more about water, water vapor, water transport.
21 And they have been impressed with the studies but
22 they still think we need to do more.
23 And then the strongest recommendation
24 they made is instead of having the high temperature
25 set scenario you ought to have a lower temperature

because it might make the disposal of used fuel simpler. But this is certainly -- many things have said wait until you get the viability assessment.

3 cont'd.

And as I see this there are definitely not any show stoppers. There is not many things that would prevent Yucca Mountain.

9

And one other thing I would like to say is if you are from Nevada you can't help but feel this is being shoved down your throat. It is just human nature. Not in my backyard. Not in Nevada. We have had all those underground and above ground bomb shots, why do we have to have this? Well, one thing, they have got a really good place.

And I look at the nuclear waste issue that it's really a national problem. It is not a state problem, but it's a national problem. And it's easier in life to be against things than it is to be for things. And in my years and years of looking at this and comparing it to other places in the country they started out with about nine locations. Two or three of them I thought were just not suitable at all. Clearly their feeling in my field of hydrology was Yucca Mountain was the best. It just had more. It had more natural features than any of the other sites.

1 And I have been impressed, although
2 frustrated. In fact, some of the people I have
3 trained worked there or have been colleagues of
4 mine. But I have been impressed by the methodical,
5 thoughtful, detailed studies that they have made.
6 In earth science, I would submit, where have more
7 studies been made? Where is a more concentrated
8 effort? Where has there been more review?
9 These are not just -- unfortunately, the
10 system has said this is your one site so study it.
11 But I think the studies are honest and I think the
12 studies have been verified and backed up. To me
13 they make great sense as an earth scientist.
14 MR. HOLMES: I will mention we are at the
15 20-minute mark.
16 MR. BARRACLOUGH: Okay. Thank you. Sorry
4 17 about running on. But just in summary of all the
18 data I looked at, other than the fact that it seems
19 to be forced on Nevada, it certainly is, I think,
20 the quality of the study they have made have been
21 very, very excellent, outstanding. They have gone
22 into more detail than anywhere else I know. And I
23 just think this is a very good place. And I would
24 ask them to follow the viability assessment, factor
25 those information in, and keep on keeping on and

4 cont.

1 let's solve this important problem for the country.
2 Thank you.
3 MR. BROWN: Thanks very much. I guess in my
4 anxiety to introduce Representative Barraclough I
5 forgot to mention that Robin Sweeney is
6 representing the Department of Energy during this
7 comment period. Thanks very much.
8 Now, I would like to call on Mary Ellen
9 Giampaoli representing Nye County in Nevada. Good
10 Evening.

17