PUBLIC MEETING

PROPOSED PLAN FOR THE ENVIRONMENTAL CLEANUP FOR THE U.S. DEPARTMENT OF ENERGY AREAS AT THE FORMER LABORATORY FOR ENERGY-RELATED HEALTH (LEHR) UNIVERSITY OF CALIFORNIA, DAVIS

VETERANS MEMORIAL CENTER, CLUB ROOM
203 E. 14th Street
Davis, California

October 23, 2008

Reported by Karen Cosgrove, CSR No. 12425

APPEARANCES

SPEAKERS FROM DEPARTMENT OF ENERGY, OFFICE of LEGACY MANAGEMENT:

Vijendra Kothari

Robert Devany

Deborah Sullivan

THURSDAY, OCTOBER 23, 2008, 7:07 p.m.

* * *

MS. SULLIVAN: All right. Good evening, folks. Thank you for coming.

As most of you are probably already aware, everybody in attendance, with the exception of the young lady here who represents the school newspaper -- is that it?

MS. COBB: Yeah. The Aggie.

MS. SULLIVAN: The Aggie. Most other folks -- I guess everyone is either attached to the project somehow or representing an agency, a stakeholders group, or the department.

So, anyway, with that, let's talk about some housekeeping items.

As most of you have discovered, we've got refreshments over here. The rest rooms are as you came in the building here on either side. I guess it's straight out to the left.

Feel free to get up. There's not enough of us to make a real difference, you know, in terms of noise level, so feel free if you need to walk about or use your cell phone outside; rest room; take a break with the coffee. That sort of thing. We'll just make it real casual tonight.

Okay. With that, let me tell you a little bit about why we're here. Let's see.

The LEHR site, as most of you are aware, is a former laboratory for energy-related research located on the campus of the University of California, Davis.

And the Office of Legacy Management, which organization I'm attached to -- and by the way, my name is Deborah Sullivan, public relations -- public affairs officer for the Office of Legacy Management.

And that organization within DOE manages long-term surveillance of maintenance of cleanup sites. We currently have or manage 72 sites around the country, including Puerto Rico. So we'll add -- I don't know -- close to another 30, 40, maybe even 50 sites in the next few years. We've got a long-range plan and lots to do.

At this point I'd like to draw your attention to the agenda.

We'll have VJ do a little background information. He is the project manager for LEHR for the Department of Energy. He's been with the agency for 29 years, and for the last five years in the Office of Legacy Management.

At that point we'll proceed to the presentation, and we'll ask to clarify any kind of questions that you have. Let's hold them to the end of the presentation, and then take a brief break and come back, and we will take, for the reporter, any formal comments.

Okay? Any questions of me before we proceed?

Okay. Well, at this time, I'd like to introduce VJ Kothari, from the Department of Energy, Office of Legacy Management. And let's go.

MR. KOTHARI: The objective of this meeting is to share with you the proposed plan and hear your views on the final cleanup remedy of the DOE of the LEHR site. You are a very important part of the decision-making process.

The proposed plan, which is about a 20-page document -- and we, in this presentation, provide you the highlights of the cleanup progress, cleanup goals, and options or alternatives for the remedial actions. And you'll have a chance to ask questions and provide valuable comments or written comments on the proposed plan.

Next, we are fortunate enough to have regulatory agencies, cities, and UC Davis work with us to support this. So we thank the EPA, Environmental Protection Agencies; Michele Dineyazhei, who is leaving the team and taking a new assignment and -- which our new -- they were not able to come today. We will miss Ms. Dineyazhei. We wish the best of everything.

Next is the California Department of Toxic Substance. It's Steve Ross, who is here.

On the Water Board, Susan Tim (phonetic) is not able to come today, and she's represented by Cori Condon. Yes. And they provide a lot of support on the groundwater

monitoring and other which is valuable.

The Public Health, Radiologic Health Branch, Steve Hsu, who is represented by Jeff Wong.

And we also thank Julie Roth, Mary Rust, and Fred Lee for their valuable suggestions because they bring the suggestions from the cities and groups.

And, finally, thanks to Sue Fields and Ms. Judy -- Christine Judal for their continued support and what they achieved so that we can achieve this goal today.

Now, I'm going to say the DOE's role in the cleanup.

DOE is a federal agency responsible for this cleanup. And for the -- in the DOE site, there are -- some work is done by the -- because this is a Superfund site, UC Davis is responsible and the DOE is responsible. So we work very close with the UC Davis, and we are responsible for the selection of the remedy and the performance and maintenance of the remedy.

A brief history. The federal government-sponsored research at LEHR operated by UC Davis for 30 years between 1958 to 1988. Radiological and hazardous waste was disposed on and off site. The site was also used by UC Davis to dispose of some potentially hazardous and radiological waste.

Because some of the waste contaminated soil and

groundwater presented a potential risk to human health and the environment, the EPA designated LEHR a Superfund site in 1994. The proposed plan is only the cleanup of the six DOE areas, which you will see.

Now I'd like to introduce Bob Devany of Weiss Associates to present the other technical information on the cleanup progress at LEHR.

Bob has been involved in this project for more than 12 years, and he's a California-licensed geological and hydrogeologist with more than 22 years of experience working at Superfund sites in California. He has overseen the majority of the site investigation and cleanup activities connected at LEHR site and was one of the key authors of the proposed plan.

Bob.

MR. DEVANY: Thanks, VJ.

This is kind of an exciting time here. Somewhere -- I don't know if I was in the shower or stuck in traffic, but I you realized that we could tell a story that kind of spans big science when we talk about LEHR a little bit. And I think we're going to talk a little bit about the nuclear age, the space age, and what I'm coining the environmental age. I don't know if anybody has done that yet, but I think we're in it. So we're transitioning into it. So I think LEHR kind of was in the middle of all of

that in some ways.

So I'll go in the right direction here. I wanted to start out in the space age. 1970.

This is an interesting photo that we dug up out in some container out at the site in a box somewhere that -- somebody, I guess, had flown their plane over and taken this nice picture of the site. I think it really gives you an idea of what it looked like during its heyday. It looks much different now, as I'll be showing you.

But the main central feature you can see right here are the dog pens. We've heard these as the Western Dog Pens. They're about a hundred and twenty thousand square feet. I think there are about 360 pens or so in this area.

And then later, the Eastern Dog Pens was added over here.

The central lab is located right in here.

Some of the release areas we'll be talking -- the radium/strontium treatment system was right back in here. And you can actually see a building that has been removed called the Imhoff Building that covered the Imhoff Tank that -- during the D&D phase.

And I guess it's important to point out that when the lab closed down in '88, that DOE pretty aggressively moved into a process of decontaminating, decommissioning

these buildings, cleaning out any residual contamination existing in the labs, and part of that involved removing this building.

The CERCLA project is focused on dealing with releases, in general, below the surface; things that got into the ground; potentially, in the groundwater.

Down here on this side, this important feature -- the Putah Creek -- the south fork is located right here and the levy structure. So the levy is to protect the site from any flooding.

This is an interesting facility right in this. This is called Cobalt-60 Radiator Facility. It looks kind of like a drive-in, but the dogs didn't -- and I guess I should mention that the primary research animal here were beagle dogs. And it was, as we noted, a radiobiology laboratory, and, mainly, the focus of the studies were the toxicity of different types of radioisotopes and radiation.

In particular, we'll be talking about a fission product -- and I'll tell you more about what that is -- called strontium-90, which was a primary isotope involved in this part of the work in these pens; and also radium-226, which is a natural-occurring, uranium-series isotope.

But back to the gamma radiator. This was a fixed gamma source which emits gamma rays, which are similar to x-rays, so they shine like a light. When the shielding was

removed, the gamma rays shown out into the field here, and you can imagine that the -- that the dogs that were stationed up front got a higher dose than the dogs in the back. And the source was contained right here, and it would be -- my understanding is it would shine for about 22 hours a day, and then they would pull it back.

Gamma radiation does not activate or create radiation in soil or other matter, so this was not a source of contamination. It's not a subject of our studies.

By the way, this is Old Davis Road right here, and the campus would be located about a mile to the north.

Back on my theme of science in the nuclear age. You can't talk about LEHR -- I don't think -- without really talk about the nuclear age. And we debated as to where the nuclear age begins, and it certainly began prior to 1940. For a while, we had the Big Bang over here somewhere.

But, anyway, we certainly developed the ultimate getting into the atomic age -- the bomb stage was on the shoulders of some great science. Marie Curie, the discoverer of radium-226. Great physics and chemistry were happening back in here.

But, in particular, I think LEHR starts with the atomic bomb. It was 1945 that the bomb was launched. It was -- began to emit fission products into the atmosphere at that point in time so that -- and fission products are very

unique things because they're things that are new to bio-organisms in a sense that fission products only occur when you're exposing heavy isotopes like uranium and plutonium, and that was something that didn't happen much on earth. There's a few, strange places in Africa where it happened a lot, but, in general, it doesn't happen.

So the strontium product -- or the fission products presented questions in science as to what biological effects those would have. Because it turns out that some of the fission products are going to imitate other types of compounds. For example, strontium has a similar chemistry of calcium. So as a result, it was theorized and later proved through LEHR's work and other work that that strontium will -- a large amount is excreted when you ingest it, but then 20 to 30 percent is retained in the skeletal structure.

So there were these questions about what happens over time when these things accumulate in the body. It occurred about iodine. Iodine accumulates in the thyroid. Same type of thing. All of a sudden you have a compound that is now radioactive and adjacent to sensitive tissues in the body.

So the -- this was a big unanswered question. And it's personal to me because it turns out that the Hiroshima and Nagasaki bombs were dropped in August of 1945 three days

apart, and then it turns out that my dad landed in Nagasaki as part of the Second Division Marine Corps in September of 1945. So he was right there. He was at ground zero. And it was always a big question. What does that mean? Is this going to -- is he going to get cancer? Is he going to die young?

FEMALE AUDIENCE MEMBER: My dad was there too.

MR. DEVANY: Really.

FEMALE AUDIENCE MEMBER: He was a prisoner of war in Nagasaki.

MR. DEVANY: In fact, the first mission of the Second Marines was to go and get those guys.

FEMALE AUDIENCE MEMBER: Maybe your dad --

MR. DEVANY: Maybe they knew each other.

But, anyway, my dad died in August at the age of 90 and not from cancer.

So, you know, when I think back about it, he was actually a benefactor of the nuclear age in that if he faced the risk he faced -- I think, combat, if the bomb hadn't been dropped.

I don't want to get into any debates here, but as a person -- as an individual, he benefited because he had a long life and didn't face the risk of combat because I'm pretty sure the Second Marine Division was going to Japan one way or another at that point in time.

But at any rate, the atomic bomb. And then the hydrogen bomb. You know, fission products. No worries. You've got hydrogen now. But it turns out that to make a hydrogen bomb work, you need a fission bomb to set it off. So it turned out that during this period of atmospheric testing, these fission isotopes were going into the atmosphere and into the soil.

And, you know, at the Nevada test site, we're testing people in Utah, people in Chicago -- they're all seeing fission products during this period.

In fact, here's an interesting graph from -- they start collecting data in 1960 here. And you can see -- we don't need to worry about the units here too much, but strontium-90 intakes peak here in about 1964. Okay.

FEMALE AUDIENCE MEMBER: And that's the general population.

MR. DEVANY: Yeah. This is general population.

So for some years, people had been taking samples of all these food stuffs out there.

And you can see the -- and so this was kind of like global warming now. You know, we're seeing this line going up.

So, fortunately, people were wise and realized this wasn't a good thing to be doing. So the Nuclear Test Ban Treaty was signed by the U.S. and

Soviet Union in 1964. At that point all testing goes underground. Okay. And sure enough, we start to see the attenuation so -- and one of the things -- strontium-90 has a 30-year half-life, so it's still retained in soils. And there's another little, tiny factory here that the Chinese were still doing above-ground testing until the mid-1980s. So they're still in the atmosphere. We're picking up fission product up here.

But anyway -- so this was a fundamental question -- science question for LEHR to answer. It was like, well, what can we tolerate? How much strontium is too much strontium?

We evolved with uranium, you know, so that's -- they were kind of looking at uranium. We know about radium. We know about -- and what about these new things, and what are they going to do? So this was a real question that needed to be answered to benefit mankind, and that's what they did.

So this -- so then they operate through the '70s and closed in 1988 and then a cleanup process -- followed by the cleanup. So that's kind of the science behind it all.

This is just back -- now we're in the environmental age with free satellite photos, and we can start to see that -- what the region looks like today.

This was taken a couple years ago. Here's our

creek. The south fork of Putah Creek, an artificial channel that was -- diverted water from the original -- I believe this is the original channel, more or less, of Putah Creek. This is called the south fork, hand-dug in the 1800s.

You can see the land use is -- we have the UC Davis research facilities, largely animal-holding facilities here and here, and labs and office space in here. And then we have the new wastewater treatment plant. The old location was up in here, was it? Somewhere up in here, I think. This was the horse place.

FEMALE AUDIENCE MEMBER: I think it was a little bit to the northeast. The other way. No. To the little -- to our right a little bit.

MR. DEVANY: Okay. So this has been open five years or so.

FEMALE AUDIENCE MEMBER: Yeah. About 1999 or 2000.

MR. DEVANY: And, of course, the definition of the Superfund site -- this line shows the historic laboratory boundaries right here, but the Superfund site really extends out here because we have the UC Davis disposal right out here. But then it -- you know, it surrounded the university and the town up here, and then largely agricultural with rural residences scattered around this area here.

This creek recharges groundwater, so it is a

higher elevation than the water table, and it loses water into the water table. I'll show you more later.

So here's a map. And I think, as VJ mentioned, the site has been divided to two responsible parties: UC Davis and DOE. And this map kind of outlines the two areas. DOE areas are shown in orange and yellow, and the UC Davis areas are shown in blue here.

And you can see there's a -- you have three municipal-type landfills for UC Davis here, surrounded by some burial holes here.

DOE areas are moving from east to west. We now have the Eastern Dog Pens right here. We showed a photo of that earlier. This was dog pens, as we stated, and then the bigger dog pen area here. It's shown in yellow because it's not carried forward, and it's a "no further action" area, so it's not discussed as part of the proposed plan in terms of further remedial action or actions to address contaminates.

We have the Southwest Trenches right here. This was a buried-waste disposal unit.

We have the Domestic Septic System 4. I'll describe more what those are later, but you can see it partially.

We have the Radium/Strontium Treatment System, which is this area right here.

And then Dry Wells A through E.

This is a simplified block model so you can start to get an understanding of the conditions beneath the site. And this is an important diagram here because a lot of what DOE is planning in the proposed plan deals with protection of groundwater.

So in this diagram here, we can see these -- this is a cut. You can see it represents an area of the site. So we're looking at this -- this face right here is this cut right along here, going east/west. And you can see we're cutting into these burial units; dog pens, which is a surface feature; and more burial units here.

And the important things here are this blue line right here would represent a general water table depth, which is about 40 feet but it varies seasonally.

And then beneath that, the white area is generally reflecting low permeability. That means that it's fine-grain material that water does not readily migrate through. So it's low-permeability silt and clay soils in this region here.

And it's not until we get to depth of about 80 feet where we hit a significant -- from a hydrological standpoint, it's called an aquifer, which is a geologic unit that's capable of producing useable quantities of water.

So you can see it's depicted here as a gravel ridge layer; quite permeable in that when you compare the

migration rates of water, water in this area might move on the order of ten feet in a year, and it might move on the order of a thousand feet per year. So substantial contrast in permeabilities.

What that means is that if contaminants reach this that they would then be transported in this direction, generally to the east or the northeast, in this unit. And this unit is -- supplies water to agriculture and rural residences to the east.

Those wells have been sampled for a number of years, and they're not impacted but -- and I'd also like to point out there's a substantial monitoring network of wells. Certainly, these are just representing concepts here. But there's about 60 wells right now on this site, and they are routinely monitored for various contaminants. So there's a good protection to know where contaminants are and where they might be going.

These represent what a well might look like. As with the monitoring well, we would reach down, and it would have an intake -- which we call a screen because it looks kind of like a screen -- down in here and that's -- water is drawn into this. And when we take our samples, it's done in a way that it's representative of the water that's in the aquifer here.

In HSU, what we call Hydrostratigraphic Unit 1,

there would be a screen up in here that -- we would use that for sampling.

Working along in the concepts, I want to talk a little bit about the release mechanisms; how do releases occur at the site. And it's fairly simple. There's four basic types of release mechanisms at the site.

The first one we'll start with is a buried waste. According to the practice at the time and the regulations of the time, the site, like lots of other universities, had on-site disposal sites for municipal, chemical, and radiological type of waste.

And the examples here would be, for DOE, the Southwest Trenches area and another area called the DOE Disposal Box. This is where there was waste. In the Southwest Trenches, we found a lot of gravel that was just taken from these dog pens periodically. It was buried out here. There was a laboratory and things like that but not things like drums or barrels and big things of fluid. It was mainly dry waste that was buried. And then it would be capped with low-permeability soil.

The other type of -- another type of release occurred in something we call a domestic septic system, which is just that. It's like a septic system that you might find at a rural residence where it has a settling tank where the solids settle out and are periodically pumped and

disposed.

And then it has a leach field that takes the liquid waste. It's released through a perforated pipe, and then it infiltrates usually through a gravel bed. And it -- there may be residual contamination that extends into the soil.

A dry well is like a leach field, but it's kind of turned on end. So it's drilled with a drill rig downward. Usually, they're two to three feet in diameter and filled with gravel. Wastewater would flow into the dry well and then seep out into the formation.

And then here, this is the beginning of the dog pen. So in the experiments, the dogs were ingesting strontium and being injected with radium-226. And after some time -- they were kept indoors for several weeks, and then they would be moved out to the pens to live their life. And the excretion from the dogs would create some contamination.

But like I said, based on conversations with the researchers and our observations here, this material was periodically removed and buried. And we understand that's because they didn't want the dogs to receive an external dose. It was all about what they had ingested. They didn't necessarily want a dose from the gravel itself. So when it had radiation levels built up, they'd scrape it up, and

they'd bury it on site.

This is a shot just to get a feel of what these dog pens looked like in the 1960's. You can see the gravel here. And then each pen -- it was actually kind of overengineered. There were concrete curbs around the perimeters. The fence posts were set up. There's an interior concrete curb. And then they had their Napa wine barrels. I think these were mainly for sunshades so...

FEMALE AUDIENCE MEMBER: And rain.

MR. DEVANY: And rain. That's what it looked like. And there are several hundred of these pens.

So let's talk a little bit about the CERCLA process. We refer to it -- I'm sorry. I said the CERCLA process. I'm calling it the Superfund process. It really is the CERCLA process.

Does anybody know what that stands for?

FEMALE AUDIENCE MEMBER: Yes. Everybody knows what --

MR. DEVANY: Everybody knows? I think it's the --

FEMALE AUDIENCE MEMBER: Comprehensive Environmental Response --

MR. DEVANY: Very nice. Very nice.

THE COURT REPORTER: Could you repeat that for me, please.

FEMALE AUDIENCE MEMBER: Comprehensive

Environmental Response Compensation and Liability Act.

MR. DEVANY: Of 1980.

So what is that all about? So there are definitely are lawyers and congresspeople involved in all that.

But, anyway, actually, that says a lot, I think. It was about -- you know, it was about Love Canal. It was about abandoned waste sites. It was about toxics. What are we going to do about it?

And, really, there was this fundamental thing of, you know, what -- who's going to pay for this cleanup? Because we've got a subdivision built on an old landfill that mom and pop owned, and they're all gone. So what are we doing?

So this -- the Superfund itself was taxing chemical producers and petroleum producers and -- creating, I guess, a trust fund that would then go to fund it. And I think between 1980 and 1985, they reached about $1.6 billion, which doesn't sound like nearly enough money. I don't know what it is now.

But it was a mechanism and a process -- and this is the process -- to systematically both find these sites -- you know, list them -- and this is called the -- you know, we're down in here. The preliminary assessment and site inspection and then placement on something called the

National Priorities List. Okay. Let's make a list. Let's find out what the really bad stuff is. Let's clean it up fast and get through it and then move into this pipeline, a very -- kind of an engineering approach. Let's go through it in stages. Let's check the boxes here. Here we are down here. It doesn't look too good. But I'll tell you more about that later. So that -- that's Superfund.

And the -- what DOE and lots of other folks realized around, I'm going to say, you know, early to mid-'90's was this takes a lot of time to get through all this stuff. You know, to get everybody to agree and there's lots of stakeholders and all this stuff so that the -- I think it was GAO came out with a report saying, Wait a minute. There's another way to clean up this stuff. And it's actually contained in CERCLA. It's a way -- and it's called removal actions. It's to kind of short-circuit some of this stuff and go in there and say, We're going to get in there, and we're going to do some cleanup. We're realizing this is not necessarily a final action, but maybe we can design it so it is your final or very close to the final action.

So DOE took this approach at the LEHR site and embarked on a series of removal actions. So basically at LEHR what that meant is a lot of excavation; a lot of taking the material, packaging it, sending it to certified,

off-site disposal sites.

And when the material was removed, then there was a comprehensive and statistically-based sampling program where you go in and you take samples, and you confirm and you know what the residual contamination is at that point. And then that carried into -- that fed back into the remedial investigation. So the remedial investigation was conducted during and after the removal actions. And then that information goes into the feasibility study where it looks at the options to address the contamination and carries you, you know, where we'll be going here in the next year or two. The rod is -- the final rod is probably a year off, and then you'll get into this -- 2010, when we decide -- that's where we are.

And then, of course, the goal is deleting this site or portions of it or whatever happens from this national priorities list.

So this was one of the key removal actions conducted at the site. This is back in an area I described -- remember, the Imhoff building was back in here. That was removed during the D&D process. And under that was a large septic tank. It was called the Imhoff Tank. It was a large septic tank, and it fed wastewater, along with another set of tanks over here, into this region here.

And then it -- and then there were three dry

wells. These are vertical, gravel-filled holes that went down to about 40 feet.

And then there was a big -- a big pipe that went through here that had perforations so this wastewater would -- it basically affected soil all through this area here and back in here.

So we went in there and dug it up. This is actually shoring here because there was some utilities that we had to protect and things like that. But we dig it up and then take samples. And DOE supplied us with some great high-tech instrumentation that was developed within the complex to test for strontium in very low levels. So we could actually be, you know, digging out here and getting feedback within an hour or two or the next day or whatever as to what the concentrations were. And then this material was packaged up, and I think this went to the Hanford Reservation up in Washington with lots of other DOE waste disposal.

So anyway -- so we had kind of the investigation phase and then moved into this removal action phase. I'll tell you some more on those.

And then that -- after removals were complete, we get into this thing, and this is a key of the CERCLA process -- is risk assessment. It's, again, a systemic, kind of science-based system as to how do you -- you get

concentrations.

We're going to get some residual concentrations here and then process it the same way that they do at Davis' other Superfund site with, you know, Frontier Fertilizer or some other site that involved a systemic means to calculate if there -- what the risk is.

And when we talk about risk, we usually talk about excess cancer risk. Most of the toxins are carcinogens. Some are noncarcinogens, but it turns out that the areas that LEHR had are carcinogen risks. We'll talk about that a little bit more. And then that ends the feasibility study.

This is another removal action. This is the -- actually stepping back to '99, this was the Southwest Trenches. A series of trenches were excavated. The good news here was that the waste was where the researchers told us it was. They had maps. We dug. It was there. So we have a very high level of confidence that we got the waste that was there. We knew where it was, and it was there. And, again, we then sampled these bottoms and side walls and then back-filled it with clean soil.

FEMALE AUDIENCE MEMBER: I have a clarifying question.

When you point out these areas, would you show them on the map? Because I don't know this site as well.

MR. DEVANY: Yeah. So we're down in this area right here. Southwest Trenches. Thank you for that.

We were talking about radium/strontium right in here. Okay.

FEMALE AUDIENCE MEMBER: Thank you.

MR. DEVANY: And now we're talking about the dog pens. So this -- this is a view -- this view here -- we're standing right around here, looking out this way. So now, you know, part of the D&D process -- all the fences.

The curbs actually were -- in the Western Dog Pens were taken out as part of the removal action and the gravel, so now it's an open field. A couple of acres seeded with -- we tried to plant native grass out there. I don't know if it took.

All right. So here we are at the proposed plan. To reiterate, it's presenting DOE's preferred alternative to the public. It's a summary of this much larger feasibility study, which is available at the Yolo County Library in Davis and also online, if you wish to look at it.

It talks about the key factors that support the preferred alternative and gives you references and other ways to increase your understanding.

So let's start with this table. Remember that -- in fact, maybe I didn't emphasize this, but this proposed plan only deals with unsaturated soil. So that means soil

that lies above the water table, generally, above 40 feet in depth.

When we talk -- and that's -- we mentioned this as constituents of concern if there's anything in the soil.

There's two potential issues with that. One is human health risk we talked about generally. This is going to be excess cancer risk.

And then there's -- we're calling something called groundwater impact. What that means is that looking at this diagram here that we may have residual contaminants, say, beneath the buried waste. They have some potential to migrate downward through various processes, but, predominantly, it's going to be a process of infiltration -- yeah -- infiltration of surface water that might contact the waste and then carry it downward, and then it may impact groundwater in the future. Okay.

So we're not talking about these things necessarily impacting groundwater now, but they have potential to impact groundwater in the future. So that's a key point here.

Let's go down the human health risk list. This lists any chemical or radionuclides or other things. I have been focusing quite a bit on radionuclides, but the operations at the site also used chemical compounds, and there have been some releases of chemical compounds, and the

ones of concern for human health are listed here.

So we have something called polycyclic aromatic hydrocarbons. These are present in this area called DSS-4, which is kind of right in there. It's a small area. This is the area that partially underlies Building H-215.

Those are usually associated with combustion processes. And in this case, this is the highest cancer risk we see on the site. It's about -- the cumulative, I think, is five in 10,0000 or five -- yeah. Five in 10,000 would be the excess cancer risk here. We'll talk more about that later.

And then we go through all these other areas. We've got nothing here, nothing here, nothing here. Dry Wells, A through E -- nothing there.

And the Southwest Trenches here, we have strontium/radium risk at very close to one in a million. And I think it's slightly elevated. Three in one million.

Nothing in the Western Dog Pens.

In the Eastern Dog Pens right here, we have a slightly elevated risk. Close to one in four million. The pesticide called dieldrin and strontium.

And then on groundwater impacts, formaldehyde, molybdenum, and nitrate are associated with DSS-3, which is about right there.

DSS-4, along with its hydrocarbons, also has

selenium.

And then Dry Wells A through E are there. Chromium; hexavalent; mercury; molybdenum; silver; cesium-137; strontium.

Radium/Strontium Treatment. Only groundwater risks -- nitrate; carbon-14, a radioactive isotope of carbon; radium-226.

In the Southwest Trenches, we have some nitrate carbon-14.

The others don't have any problems with impacts.

So in general, under CERCLA, we are targeting to have risks within this range or lower. Use this as what we call a point of departure. That's our target.

These are -- and then we have another -- to mitigate future groundwater, we talked about that. So that's, again, the migration of material from the release areas to groundwater in the future.

Impacts to the environment. Any impacts to wildlife that might inhabit the site. The risk assessment did not identify any of these at this point, so our actions don't -- don't need to address this.

Comply with applicable state laws, basically, and then keep -- I think we mentioned this is an active research facility right now. UC Davis uses it on a daily basis. We want to keep that going without interrupting their work.

So we've put together a set of remedial options, and these are basically -- we look at the entire universe of technologies that could help remedy our situation at the site, and then we narrow them down to a short list. So this represents our short list for the site. I'll kind of describe each of these.

Required under CERCLA is that all alternatives include no further -- or we always look at "no further action" or a "no action" alternative. That's basically do nothing. What happens if we walk away from the site today and did nothing? What would be the impacts? So that's kind of our baseline.

Long-term groundwater monitoring addresses basically ingestion of groundwater, use of groundwater. It would ensure that the people are not -- people or plants or animals are not exposed to groundwater. So we're collecting data on the concentrations, locations, and transport of groundwater using a monitoring system.

We use a network with monitoring wells, many of which exist now. We have 60 wells on the site. Additional wells might be -- or would likely be added under this.

Contingency remediation means that since it's a placeholder, it means maintaining access of the contamination areas such that future remedial actions could be conducted, if they are deemed necessary.

So, for example, if monitoring indicated that a condition occurred that was much different than expected, DOE would have the ability to go to that area and do what's necessary. So they wouldn't -- it's basically keeping access available to do something in the future, if needed.

Land-use restrictions deal with -- some risks are associated with types of exposure, so some of the risks are now maybe elevated for, say, residential land use. A land-use restriction would not allow land use -- wouldn't allow residential development on the site, for example.

Capping is basically an impermeable cover that would cover the waste and mitigate infiltration of rain water and surface water.

Excavation and off-site disposal is just that. That's basically the way that removal actions are conducted. Digging the waste up; shipping it off-site.

Excavation and on-site treatment. Instead of disposing it off-site, there would be processes developed on the surface. For example, we have some nitrate issues. Nitrate could be removed by plant uptake. That would be an on-site treatment.

Limited removal. This would be restricting any excavations to a depth of 20 feet, which is the general depth of conventional excavation, and leaving deeper contamination behind.

And then in-situ or in-place bioremediation. This would be a process of either stimulating existing microbial populations in soil to detoxify or treat waste in the ground or introducing microbes to basically do the same thing.

And then the processes that these -- these options then are combined to form an alternative.

In our evaluation of the alternatives, when we do a comparison between the alternatives, we use a standard method of evaluation. It was developed by the EPA as required at a Superfund site. That includes first looking at threshold criteria. All alternatives, except "no action," must meet this. So it needs to provide for overall protection of human health and the environment and be compliant with the applicable laws and regulations.

Once we pass that stage, then we get into a balancing process for looking at long-term effectiveness and permanence; reduction in toxicity, mobility, or volume through treatment; short-term effectiveness and implementability and cost.

We're requesting your input at this point in terms to support the modifying criteria. And we -- as VJ indicated, we've been working closely with the state, and we continue to interchange your ideas with them before the final remedy is selected.

By the way, in the proposed plan -- you can't see

this very well, but these are reflecting the two tables that are at the end of the proposed plan. This is the evaluation process for each area we look at. We'll go through this and summarize it up here. And these are different alternatives for the site.

So we'll start with the Radium/Strontium Treatment Center, which is located right here. This is an area where the removal action was successfully completed. There are no direct health risks, so that means that the risk assessment indicated that everything -- all risk -- cancer -- there were no noncancer risks, and there were no risks above one in one million for excess cancer.

There is some possibility that residual contamination -- nitrate, carbon-14, and radium-226 -- are contained, so it could migrate, although our opinion is that has a very low probability of occurring.

We looked at a series of alternatives. As I mentioned, "no further action" is required.

Alternative 2, which is long-term groundwater monitoring. So we would likely install additional wells immediately downgradient -- and these would act as kind of an early monitoring system so that if there was a release of these things, they would be detected early, and then they would be addressed, if needed, through contingency remedial action in laying these restrictions.

In this case, land-use restrictions really refer to a soil-management plan so that if the operations at the site -- such as utility, insulation, or future activities -- disturb the soil, there would be a plan in place to ensure that those soils were properly tested and managed; either reused on-site or disposed off-site. So that's the restriction that could come into play here.

The Alternative 3 involves capping the area. So it would be placing a cap over this area here, which would affect some of the current usage of the site. This is kind of a driveway right now.

And then it would also include groundwater monitoring because that would not necessarily ensure that there wasn't releases in the groundwater. And then, similarly, that soils-management plan. And then also it would need to have provisions to protect the cap from disturbance so it wasn't compromised in the future.

Alternatives 4 involve different series of removal. There's a complete removal and off-site disposal; removal and on-site treatment.

These things get very expensive because of the depth of the contamination. It's generally below a depth of 15 feet and may go as deep as 40 feet, so it would be very expensive. And this is that limited removal that would only go down to about 20 feet. So it would take out a few

pockets but still leave some behind.

And then, lastly, Alternative 5, in-situ bioremediation. This is actually a biostimulation of these existing microbial populations. Inject material that would increase their metabolism, and it would degrade some of the constituents in that process.

DOE's preferred alternative is Alternative 2, which is long-term groundwater monitoring, contingency remediation, and land-use restriction.

The rationale is that as I stated earlier, there is no human health risks. There are decreasing concentrations in groundwater, and the mass of the residual contaminants is very, very low, so they have low potential for significant impacts.

And it allows for future actions. DOE would remain responsible for that area into the future if anything changes.

Domestic Septic System 3 is here. It's a relatively small area just north of the Southwest Trenches area. Removal action has been completed. There are, again, no direct health risks. There are a few constituents remaining: Formaldehyde, molybdenum, and nitrate. So these were things probably used in the laboratory that got into the wastewater and was discharged into the ground.

The alternatives are essentially the same as the

last ones, so I wouldn't go through those.

In fact, DOE's preferred alternative is the same as radium/strontium, groundwater monitoring. So, again, nearby well installations to detect any releases quickly and then holding the space available for potential remediation, if needed.

Similar setup and rationale, with the addition that natural biodegradation of formaldehyde is likely. That should self-attenuate over time.

Domestic Septic System 4 is right in here. And this one -- this one does show elevated risk due to the polycyclic aromatic hydrocarbons so that we have a cancer risk of five in 10,000, which is elevated. But that is to a hypothetical, on-site resident. So that would be if the site were to be redeveloped and used by residents, we could potentially have an elevated risk to that resident.

There's some selenium that can and is currently impacting some groundwater.

So the alternatives are a little bit different, I guess, in that we have the Alternative 2 that you're familiar with -- the monitoring -- and then capping is Alternative 3.

And then Alternative 4 is limited removal because of the presence of the building right in here that -- there's contaminated soil beneath the building that is

inaccessible, so it would not be removed.

Similar selected preferred alternative. This one is different in that the land-use restriction here would prohibit residential use of this land. So along with the soil-management plan, this would not allow the site to be developed for residential purposes in this area here.

And it -- the rationale is that by digging it up, we would only dig up some of the contamination and leave it behind. So, really, you don't gain a lot by removing this waste. And, again, DOE would remain responsible in the future if something changes.

Dry Wells A through E. We have five wells right up in this area. They were actually part of a domestic septic system, so they received wastewater from the laboratories.

A partial removal was completed in that some upper casing and, you know, shallow backfill was removed in this area, but material deeper was not removed in this case.

There were several contaminants but in very, very low masses. We did calculations and found that if these did release, the area of contaminated water would be quite limited. And, in fact, we have a current well that's immediately downgradient, within 10 or 15 feet of this area, and it's not showing any contamination.

The alternatives were no further action, long-term

groundwater monitoring, land-use restrictions, and, again, this would be a soil-management plan. Capping, removal, and off-site disposal. And then just going down 20 feet or so and getting the shallow material off. Limited excavation.

Alternative 2 was selected by DOE. We don't have human health risks, no current groundwater impacts, and future action, if needed.

Our Southwest Trenches area right here. Again, again, a significant removal action was completed in '99 there. We have a risk due to strontium-90 of three in one million, again, for a hypothetical on-site resident. And it turns out that that is driven entirely by the ingestion of produce. So it would mean that the resident has a garden in their yard, and they're ingesting produce from that garden that's grown in the soil. That actually is quite deep, and they probably wouldn't have -- well, additionally, we have some potential groundwater issues here with carbon-14.

In fact, carbon-14 does show up in groundwater. We have a well located about here that shows traces of carbon-14, but they're well below the drinking water standard, which is 2,000 picocuries per liter. And I think we see less than 10 picocuries per liter of carbon-14.

The alternatives. No further action. I think these are the same as the radium/strontium treatment area. I won't re-explain all of those.

DOE is proposing this and the others -- the monitoring, land-use restrictions. Here the land-use restrictions are limited to a soil-management plan.

Though we're slightly above the one in one million -- we're only at three in one million -- DOE is considering this to be an acceptable risk, and we've seen decreasing downgardient concentrations. Future action can be implemented if needed.

Lastly, we're here at the Eastern Dog Pens. The fences and concrete curbs have been removed, but there is some gravel remaining, and no soil has been removed from this unit.

You can see it overlies UC Davis Landfill Unit 2. There's actually waste trenches beneath it.

Strontium-90 and dieldrin, the pesticide here. When you sum up the risk, you have four in one million. So a hypothetical on-site resident, again, largely driven by ingestion of produce.

And here we have only three alternatives: No further action; land-use restrictions, which is the soil-management plan; and removal and off-site disposal.

And the preferred alternative is land-use restrictions. Very low mass of residual contaminants of concern, and the risk is acceptable.

I guess at this point, VJ, if you want to wrap

things up, or do you want me to?

MR. KOTHARI: Okay. Thanks, Bob, for explaining our plan for the site.

And Bob has presented a lot of information. It may take some time to digest.

And we now consider feedback from you people or everybody and -- because we are here, we can take a letter in the meeting or mail or by e-mail. The address and e-mail are provided on the first page on the box of the proposed plan. So if you have any comments, you can e-mail to us on this -- this information provided here.

And I think the public comment period ends on November 17. In consultation with the support agencies, DOE will make the final decision on the remedy, and the decision and basis will be provided in the record of decision. And the record of decision will include a written summary of the significant public comments or new information received during this period and DOE's responsiveness to the public comments and provided in the log.

I think you can take it.

MS. SULLIVAN: Okay. At this time if you have any questions, since we're such a small, informal group this evening, please feel free to ask either Bob or VJ.

Any questions?

MR. KOTHARI: We can take a break --

MS. SULLIVAN: Well, we're going to do the clarifying questions first, I thought, and then take a break and come back for the formal comments.

Any questions of either of these? Yes.

FEMALE AUDIENCE MEMBER: I had some questions about the removal actions.

So when you do -- when you did the removal actions at those trench areas, what was the goal? To keep going until you've got nothing left or keep --

MR. DEVANY: Well, at that stage in the process, we had developed site-specific PRG'S, I guess I'd call them. We had a slightly different name for them.

But we went through a process, working with the agencies to develop risk-based standards based on -- yeah. So we had targets.

The limitations we ran into with respect to removal actions was that I mentioned we had the on-site laboratory, which was very effective, but we couldn't test for the universe of constituents -- a lot of chemical constituents.

We had pretty good coverage -- very good coverage on radium and strontium. They're also, I think, testing for nitrate and a few other constituents. We have indicator compounds, but when we got the full-sweep data, we did find some of those residuals that we talked about

tonight.

MS. SULLIVAN: Any other questions?

MALE AUDIENCE MEMBER: Yeah. Bob, you were saying on the -- when you were touching on the land-use restrictions, in each case, you said it was going to be a soil-management plan, but there are also going to be restrictions on use.

In other words, not a lot --

MS. SULLIVAN: Yeah. The one area where that is a applied is DSS-4.

So DOE is not proposing land use -- i.e., no residential use -- at the other two areas, which would be above one -- that would be Southwest Trenches.

MALE AUDIENCE MEMBER: Okay.

MR. DEVANY: But, again, those risks were very slight. It was three in a million or very slightly elevated.

MS. SULLIVAN: Okay. Anyone else?

MALE AUDIENCE MEMBER: What happens down the road if UCD removes the building that's on top of the polluted area? What provisions are there to address the issues at that time?

MR. DEVANY: Well, you know, I think that that's a good question.

I think it would be an opportunity for DOE to

lessen their liability. I think it would be -- you know, they would take that into consideration. I think that an option -- because, you know, contingent remediation is always an option, so that if the accessibility comes up with that soil, it might make a lot of sense.

MS. SULLIVAN: Bob, I think VJ wanted to address --

MR. KOTHARI: I think the DOE is still responsible to remove it if that happens but --

FEMALE AUDIENCE MEMBER: Are there restrictions so it doesn't happen? And you have to come to the regulators to actually remove the buildings or change the use. We would know about it, and then we would work with you to clean it up at that time.

MS. SULLIVAN: Okay. Any other questions?

We'll take a break and come back for public comment, which will be recorded. Okay. Coffee.

(Recess taken.)

MS. SULLIVAN: We're going to go ahead and wrap this up with some formal comments. Ladies and gentlemen, let's get with it so we can get on with it. Okay. All right.

At this point -- first off, if you have not done us the honor of signing in tonight, please do that before you leave.

And at this point, what we're going to do is the formal comments. If you'd like to make a formal comment, please identify yourself when you do and the affiliation that you're associated with.

So with that -- okay.

AUDIENCE MEMBER: My name is Julie Roth, and I'm with the Davis South Campus Superfund Oversight Committee. We are the USEPA tag grant group for the Davis community, and we represent the citizens of the community.

Overall, the DOE proposed plan for the remediation of the DOE areas of the LEHR site Superfund site addresses the near term control of conventional pollutants.

The key issue to DSCSOC and its concerns is how well the proposed plan is implemented during the time that the residual waste is left in the soil at the LEHR site and will remain a threat to the public health and the environment.

This concern over the adequacy of the implementation exists from the time the record of decision is signed, to over the very long period of time during which the residual, known pollutants -- as well as the yet unrecognized pollutants -- left in the soil will be a threat to the off-site waters. There could readily be residual pollutants at LEHR that thus far have not been identified. For planning purposes, the period of time should be

considered forever.

A particular concern is the adequacy of monitoring the groundwater or off-site mitigation to groundwater under the adjacent properties.

Another issue of concern is the adequacy of the implementation of restrictions of future land use at LEHR site to prevent buried pollutants being brought to the surface soils and, thereby, becoming a presently unconsidered threat to the public health and the environment.

Some of the pollutants that are proposed to be left at the site buried under surface soils will be a threat essentially forever. At some time in the future, the soils at LEHR may be brought to the surface by future construction activities that violate the restrictions or the land-use activities at the site. There will be a need for a strong implemented oversight of LEHR-site activities forever. It should not be left to DOE, UCD, USEPA, ETSC, the Water Board to police the LEHR-site activities to conform to the land-use restrictions adopted.

There is no assurance that these agencies will continue to be funded or will implement land-use-activity restrictions essentially forever. As long as there are waste residuals in the LEHR-site subsoils that are a threat to the public health and/or the environment, consideration

should be given to funding independent site oversight to ensure that the public is kept informed of the adequacy of the protection of the public health and the environment.

As discussed in DSCSOC's comments on this plan, there are several potential technical problems with this plan, and a detailed discussion of these issues are provided in the DSCSOC's Web site. These comments are under are technical adviser, Dr. G. Fred Lee's reports.

DSCSOC has a new Web site due to the changes at AOL. The url for DSCSOC is now www.gfredlee.com/dscsoc/dscsoc.htm.

MS. SULLIVAN: Okay. Thank you. Any other formal comments?

MR. WONG: I've got a small comment.

MS. SULLIVAN: You want to come here? It might be --

MR. WONG: I'm Jeff Wong with the State Department of Public Health.

I think it's -- just a small correction is in order. Typographical, maybe. Maybe in the actual plan.

Paragraph -- Section 4.1, the human health risks section, mentions the strontium-90 risk at the Eastern Dog Pens, parentheses, two in one million.

This seems to be an inconsistency because Table 1 lists strontium-90 as one in one million. So I think

there's -- I believe it should be one in a million.

MS. SULLIVAN: I'm sorry. I didn't catch your name.

MR. WONG: Jeff Wong.

MS. SULLIVAN: Okay. Got it.

MR. WONG: The table lists it as one in the numerical value --

MR. DEVANY: Yeah. I believe the table is correct so...

MS. SULLIVAN: Okay.

MALE AUDIENCE MEMBER: So what should it be, Bob?

MR. DEVANY: It -- maybe off record.

(Discussion held off the record.)

MS. SULLIVAN: Okay. Anyone else? Formal comments?

MR. LEE: An issue that --

MS. SULLIVAN: Could you identify yourself --

MR. LEE: I'm Fred Lee, advisor to DSCSOC.

An issue I think that should be understood -- and it may be in the record -- possibly, Bob, you can say something about this -- is that this is just part of the pollution and remediation at the LEHR site; that there is a separate action underway by UCD that will address the rest of the issues, particularly the groundwater pollution issues.

So I think it's important that that be understood, and may be a source of information for those interested that that exists.

MS. SULLIVAN: Okay. Anyone else? Any other formal comments for the record?

Okay. With that, we thank you for coming out on a Thursday evening and safe journey home. Okay. Good night.

(Public hearing ended at 8:33 p.m.)

* * *

STATE OF CALIFORNIA

I, Karen Cosgrove, CSR No. 12425, a Certified Shorthand Reporter in and for the State of California, do hereby certify that the foregoing proceedings were taken down by me in shorthand at the time and place named therein and were thereafter transcribed under my supervision; that this transcript contains a full, true and correct record of the proceedings which took place at the time and place set forth in the caption hereto.

I further certify that I have no interest in the event of this action.

EXECUTED this 3rd day of November, 2008.

_____

Karen Cosgrove