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UNITED STATES NUCLEAR REGULATORY COMMISSION'S

ADVISORY COMMITTEE ON NUCLEAR WASTE

May 23, 2006

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON NUCLEAR WASTE

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170TH MEETING

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TUESDAY,

MAY 23, 2006

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The Committee met in Room T2 B3 of the U.S. Nuclear Regulatory Commission, One White Flint North, 11555 Rockville Pike, Rockville, Maryland, at 8:30 a.m., Michael T. Ryan, Chair, presiding.

PRESENT:

MICHAEL T. RYAN	ACNW Chairman
ALLEN G. CROFF	ACNW Vice Chairman
RUTH F. WEINER	ACNW Member
JAMES H. CLARKE	ACNW Member
WILLIAM J. HINZE	ACNW Member

C-O-N-T-E-N-T-S

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8:30 a.m.

CHAIRMAN RYAN: If we could go ahead and come to order, please. Let's start the meeting. We have a full schedule for the next two days. I want to first thank Theron and Jenny Gallo and all those in the staff for reworking the electronics in our room. We have new and improved presentation capabilities, so thanks, Thoran, for all the hard work with the contractors to make it ready, able and capable for today's meeting. Thanks a lot.

The meeting will come to order. This is the first day of the 170th meeting of the Advisory Committee on Nuclear Waste. My name is Michael Ryan, Chairman of the ACNW. The other members of the Committee present are Allen Croff, Vice Chair, Ruth Weiner, James Clarke and William Hinze. During today's meeting the Committee will conduct a working group meeting of low level radioactive waste management issues. Mike Lee is the designated Federal Official for today's session. I also want to recognize Mike Lee for his hard work in organizing and putting together all the many participants for this excellent two-day meeting.

The meeting is being conducted in

accordance with the provisions of the Federal Advisory Committee Act. We have received no written comments or requests for time to make oral statements from members of the public regarding today's session. Should anyone wish to address the Committee, please make your wishes known to one of the Committee staff.

It is requested that speakers use one of the microphones, identify themselves and speak with sufficient clarity and volume so they can be readily heard. It is also requested that if you have cell phones or pagers, you kindly turn them off. Thank you very much. And with that, we'll turn our attention to the agenda. And let me describe what will occur over today's activities. We have some speakers this morning on various topics having to do with low level radioactive waste management, including representatives from the regulated community.

We'll also hear from NRC's current low level waste program challenges, Larry Camper will be here and then some of the historical perspectives from Paul Lohaus and Mal Knapp, who were involved as NRC employees in earlier times and then we'll move to some state compact disposal experience, some other views from industry. Ralph Anderson of the Nuclear Energy Institute will be here and then other new license applicant perspectives as well, with a session at the latter part of the day on stakeholder and public comments on the activities of the day.

Again, if anybody wishes to address the Committee or provide information, we're happy to have you sign up in that time slot and we'll take whatever time is necessary to hear those comments and collect that information. So without further delay, let me introduce the first speakers from the 8:40 to 9:40 session on Existing Low Level Waste Licensee Operational Experience and Prospectus. We have Mr. Bill House from Chem Nuclear Systems and Mr. Tye Rogers from Energy Solutions. So Bill, I guess, you're first up.

I'd ask that through the day that we try and stick carefully to the schedule so with an hour each and with my finishing my remarks about six minutes ahead, you can split up that just over an hour as you see fit and we'll leave time for questions, please, out of your 30-minute presentation. So thanks and without further ado, Mr. House.

MR. HOUSE: Good morning. A appreciate this opportunity to come speak with the Committee about Barnwell site and some things we've done over the years and some of our plans for the future.

CHAIRMAN RYAN: Bill, is your microphone on? I think the Reporter is having a little bit of trouble -- it's hanging out of your pocket.

MR. HOUSE: Okay.

CHAIRMAN RYAN: You may want to adjust that volume a little. Is it okay? Try it out.

MR. HOUSE: Good morning.

CHAIRMAN RYAN: Okay.

MR. HOUSE: Okay.

CHAIRMAN RYAN: Is that okay for the Reporter? And again, I'd just remind everybody that if you do speak, please use your microphone and identify yourself and your organization for the record. Thank you.

MR. HOUSE: Okay, this morning, I would like to give you a brief history of the Barnwell Site, show you the current operations that go on in that facility, talk about the impacts that we've seen from the Atlantic Compact Law, summarize the safety and compliance history of the site, talk about a risk-informed approach that we've generally used over the years and provide some examples of how we've applied that and then suggest some areas for evaluation that might cause some improvements for us.

Some of the key events, the Barnwell Site was originally licensed in '69 for storage and disposal in 1971. In '76 we finalized the current licensed area. All that land was leased to the state -- or was deeded to the State of South Carolina and leased back to Chem-Nuclear Systems for disposal purposes.

In '80 the Policy Act came into play. In '81 we established the closure fund and this is similar to the long-term care fund. It's based on a rate per cubic foot of waste coming into the door. '82, the Southeast Compact started up and South Carolina joined, in '95 we withdrew and then the Atlantic Compact Act took over in 2000.

History of the volumes and some of the peaks and dips, if you will, are keyed to times in history that we're all familiar with. The peak volume in 1980 was nearly two and a half million cubic feet. That's the time of the Low Level Waste Policy Act coming into play. And the three governors of the cited states decided that the load should be shared. In '81 Governor Riley cut our volume in half, if you will, and gave us limits on volume. Then surcharges and penalties started kicking in which caused a reduction in waste. The little bumps are caused by the potential closure of the site. In 1990 everyone shipped their waste and cleaned our their closets, so to speak and then the volume was down. '92 was the same. '95 was the same. We continued to dwindle down in volume until we get to the Atlantic Compact Act which restricts the volume significantly from the early days.

Radioactivity; we've received and disposed of nearly 12 million curies of radioactivity in the waste and through decay it's down to about 3 million curies now as an inventory for the site. And that's just within the operational period here, the 30, 35 years. This is an overview of the site and please note the north arrow is to the left and the colored sections are not only completed trenches, but these trenches have also been kept with the final enhanced cap for closure. That's about 80 acres of trenches that have already been capped in their final configuration, about 105 acres total in disposal area at the site and there's a remaining capacity of about two million cubic feet of waste.

The total volume we've disposed is just slightly over 28 million cubic feet. This is our large trench disposal operation. This trench actually began in 1996 and continues in use today for another year or two until we can finish the closure. It started out as a Class A waste trench and is currently a low dose rate waste trench. We have agreed that segregation of waste classes is done by individual disposal vaults versus trenches as originally envisioned by Part 61. You can note the reactor pressure vessels here on the left, another small one here on -- I mean, on the right and the left.

The Class BC waste trench is primarily the disposal trench for high integrity containers of resins and filter media and they cylindrical disposal vaults are used there to contain those liners for structural stability. The -- if you'll note the walls of these trenches are reasonably steep and if you look closely, you can see the differentiation between native materials that have not been disturbed and the materials that we have removed and recompacted to make the trench walls. That is the initial phase of construction for disposal trenches at the site. We excavate down to sandy clay materials and recompact to the surface. Then go in after that and excavate the trench proper.

The third type trench that we've used at the site is the slit trench we call it. This is for disposal of radiated hardware. These liners can receive 20 to 25,000 curies and dose rates up to

20,000 R per hour on contact. And we dispose of those with typically less than 100 millirem to the crew. Large components that we did see in the previous picture, these shipments either come by barge or by rail and they come up the Savannah River and then they're placed on heavy haul units as you see here, and transported over to the disposal site.

The super-structure that you see here is for stability during transportation but also we leave the main units under the vessel itself for stability during disposal. This is an outer can around the reactor pressure vessel. The interstitial space is grouted and the inside of the RPB is grouted. These large components are evaluated structurally to insure that they meet the capabilities of a concrete disposal vault.

Let's move into another area and talk about the impacts we've seen from the Atlantic Compact Act and that act included that we were economically regulated and the South Carolina Budget Control Board sets the prices for us even though Chem-Nuclear Systems holds the contracts and issues contracts to the customers. The Public Service Commission is somewhat similar in function for us as they are for utilities. In our case, they determine allowable cost, what they deem is acceptable costs and warranted to operate the disposal site. Over the past two or three years, they've formed the Office of Regulatory Staff and this is an agency related to Public Service Commission that does the audits and confirms that our applications for allowable costs and our books inside the company match.

The Compact Act established restrictions in volumes and reductions over time as you can see here, and there's really only been one year that we've met the limit, so to speak. And the economics of waste pricing and the fact that there is a limited volume and a limited amount of low level waste available for disposal is the primary reasons for us not receiving the limited amount.

As we must know, in July of 2008 the Barnwell Site will be restricted to receiving waste from three states; South Carolina, Connecticut and New Jersey. Over the recent years this is the types and volumes activities of waste. They're listed in the table in the order of volume; resins, filter media, being the biggest volume contributor to the site. DAW being next, large components and other equipment have been significant and those volumes include three reactor pressure vessels as you see in the footnotes there.

Irradiated hardware, not much volume, about 1500 cubic feet in 2005, but 450,000 curies received in those 26 shipments. Other minor amounts of solidified liquids and encapsulated sealed sources and devices. Breaking it down to Class B/C waste, these are the receipt volumes for those waste classes from the entities shown here and the Atlantic Compact provides us about 3,000 cubic feet B/C waste and the other 34, 36 states give us 17, 18,000, totals of about 20, 21,000 cubic feet Class B/C waste coming to Barnwell.

So as of July, these are our estimated volumes of Class B/C waste that will not have disposal access, but will be refused access to the Barnwell Site for disposal, a total for what's been coming of about 16,000 cubic feet.

Moving to the technical and environmental regulations, the Department of Health and Environmental Control is our regulatory agency and Henry Porter is here today and he'll speak in detail on those topics and the methods the agency uses to regulate the site. Safety and compliance has been good at the site. We had our last radioactive material license violation in 1983. That's 23 years.

We've had about 16 years without a lost time accident and 1.8 million hours for the crew with no lost time. In year 2002, as part of the license renewal, the Blue Ribbon Panel established by DHEC reviewed our performance assessment, the Radiological Performance Verification, and decided that the methods we used were appropriate and the results were appropriate. They did provide us some recommendations. We went back and incorporated those into the documents and resubmitted it to the agency.

In 2004, shortly after the Department issued their proposed renewed license, the South Carolina Sierra Club appealed that decision and we have gone through the trial with the Administrative Law Judge. The Judge sustained the Department's decision to issue the permit and we will soon go back to the DHEC Board for their discussion and the appeal of the Sierra Club at that level.

With respect to worker safety, we've got a decade of personnel exposures for individuals working at the site. We put together two averages. You can see that there are a number of individuals totally badged and -- but not nearly as many that actually get recorded dose. So if you look at a more conservative, more realistic data, about 200 millirem per year to the average worker and we had some individual highest doses 1.8, 1.6 back in those years. 2002, we had only 11 radiated hardware shipments and it almost takes this number of people, a dozen or so people, to manage that activity and that operation. But that's why the doses overall are lower and the individuals exposed are a low number.

Site performance; the conceptual model of the site has been modeled for 20 plus years. We use actual environmental monitoring data and we've calibrated this model to groundwater flow and direction and travel time. And the materials from precipitation infiltrate through the waste, down to the groundwater table that's moving horizontally and then this flows about 3,000 feet to a spring head and then shortly after it goes to the compliance point where the stream leaves Chem-Nuclear property.

The ERPV, as we call it, includes this site specific calibrated model. We did performance projections out to 2,000 years. The current hypothetical dose to an individual drinking two liters of water from that stream, I'll call it, swamp if you will, is about five millirem and the highest projected dose is 13 millirem per year, and most of that dose is from tritium. Financial assurance mechanisms consist of two approaches; one for closure and post-closure observation at the site. The balance there is about $19 million, sufficient funds to do both closures, we call it, closure at the end of -- after the 2008 time frame, when we go to an end region only period for three states and closure after our assumed 30-year end regional operational period for the Atlantic Compact states.

The long-term maintenance fund is established for post-closure observation, any monies that's not sufficient out of the closure and the -- this also maintains the pace for maintenance and monitoring of the site through the institutional control period. The current balance is about $50 million at the end of 2007 and right now the South Carolina legislature is debating the addition of 64 million to replenish that fund up to the amount that was there say five years ago, when the Governor decided he needed the money more than that fund did.

License 097 started in 1969. It's been renewed seven times. We got three effective amendments and I did bring a few copies of those for the group. The technical requirements are all in Amendment 47. Duratek, Incorporated acquired Chem-Nuclear Systems in the year 2000 and that amendment --

that change of ownership is reflected in Amendment 48. And we received the Increased Security Controls Amendment earlier this year, Amendment 50.

Over the course of these 46, 47 amendments, there are some key events that have caused improvements and changes at the site. We started slit trench operations, high dose rate off-loads in '75 and in the late '70s when all the volume was coming in, we increased the size of the trenches to about 100 feet wide by 1,000 feet long and they're typically about 20 feet deep. And '77 was also when solidification was required for liquids before they were transported to the site. Up until that time, liquids could be brought in and then they were processed there at the site under another operating license and then disposed in the trench.

In '79 increased stability was required. The Department noticed that the resins and filter media in particular the concentrations continued to increase and DHEC established this limit of one micro-curie per cc for radio-nuclides with half lives of five years or greater. And these waste forms required higher stability either by processing or by containerization and what came to be known high integrity containers. In '83 we implemented classification under Part 61 and retained the Class a stable designation which is the upper end of the Class A concentrations.

In 1990 we applied to the Department to have current designs at that time of polyethylene high integrity containers placed in structural overpacks to meet the long term stability requirements and the Agency approved that and we continue to receive the Poly HICs and have basically adapted that overpack design into the current rectangular -- I mean, current cylindrical vault and also designed rectangular vaults for the other waste as you can see by Amendment 46.

The uniform manifest system and tracking system associated with that came into play in '97 and then Amendment 49 is the one that's still under appeal. The two items there requiring analysis of any liquids taken from containers and an annual assessment on closure financial assurance have both been put into place. They've been implemented. Over the years, we've been able to evaluate doses not only to workers at the site, but also workers at the generator locations, sometimes processor locations and have proposed to DHEC the acceptance of certain waste forms and certain containers that did not specifically meet the written criteria and the examples I have here are some small metal fragments were left in an RPB. They were characterized separately as greater than Class C waste. It was only about a curie of radioactivity where the shipment had 10,000 curies overall that met Class C or less than, you know, Class C limit concentrations. So that was acceptable rather than doing the effort it would take to eliminate those small fragments.

DAW with a little bit of transuranic materials again, there was one super-compacted drum as a hockey puck that was inside a high integrity container over-pack. That single puck was greater than the concentration limit for TRU, however, averaged over the entire container was within the allowable concentrations. In-core detectors, the Nickel-63 had considerable curies compared to the concentration limits but the same or similar amounts of curies that had been received in other radiated hardware shipments. Between Chem-Nuclear and the generator, we devised a robust container, if you will, for the containment and disposal of Americium-241 source and that was deemed acceptable.

We evaluated the suspect fuel pens that may have come in from a power plant and in two different hardware shipments. And the results of that mini-performance assessment if you will, was that that 217 curies, even it if was there, would not have an impact on site performance. As general requirements, encapsulation of certain objects are required before disposal and we are able to receive those under another rad material license at Barnwell, do the encapsulation work and then transfer those for disposal. And as I mentioned earlier, we're segregating waste classes, stable and unstable waste now, by individual vaults rather than entire trenches. We do also use the rule of 10 we call it, for averaging irradiated hardware.

And the Part 61 system and DHEC's additional requirements have really worked well for the Barnwell site. It's a good systems approach. Two things; it's not only waste characterization classification, it's proper trenches, proper structural stability and long-term performance afforded to us by the stability of the vaults and also the application of enhanced caps with the 60 mil HTPE liner. So the system works well. There are some areas that might be considered for some evaluation. The Barnwell rule of 10 consists of a requirement to characterize each individual component that will be placed in the disposal container. And as long as the concentrations of -- from component to component is within a factor of 10, those irradiated metals can be chopped up, if you will, placed in the same disposal container and the resultant package meets Class A concentrations that's allowable for disposal.

Now, the two controlling radio-nuclides Niobium and Nickel-63 are the ones that bump the limit, if you will and the Part 61 intruder scenario is really considered to occur. An intruder is there, is on the property, is drilling a well, is finding those materials, is picking them up, taking them back to his well and the probability of that is absolute, is one. Now, some consideration ought to be given that just in the case of the Barnwell site, we've got a 235-acre site. We've got only a small land area that is slit trenches we call them for disposal of radiated hardware. They're disposed either in concrete vaults or they've -- they trenches have had intrusion barriers which are concrete slabs placed over the top and some consideration for the probability of an individual intruder hitting the exact spot of this hardware should be considered.

Sealed sources, we do have a limited averaging in accordance with the BTP for use in the encapsulation media to classify sealed sources. The quantities for some radio-nuclides are specified in the BTP, 30 curies of Cesium-137, for example. And as I mentioned earlier, there is potential designs for robust containers, layers of containment and confinement that should be considered for higher quantities of disposal of some of these sealed sources. This would allow the elimination of some of these from the waste stream and potential harm either advertently or inadvertently.

Scaling factors in Part 61; they work real good. We've gotten to know how to deal with them as an industry. The Vance Study was helpful to actually identify that Tc-99 and I-129 was really concentrations of up to 10^{-4} of what the values were on the manifest. Another educational aspect is that a number of generators early on were using minimal detectable activities as real values. So they've fine tuned some of that to get to more realistic values, still conservative. So these scaling factors are useful. They're reasonable and they're accepted for disposal waste.

Most power plants confirm these on an annual basis and maybe there's some consideration of increasing that frequency or having further allowance as long as operating conditions do not change at the plant. We've gone through a number of special cases, if you will, to do specific evaluations and work with the generators, work with the regulators, to come up with acceptable methods for disposal of the certain radioactive waste and if there were an acceptable process that was laid out by the NRC, that could help provide confidence to us, to the generators, to state regulators, that they're going down the right path to do these specific evaluations. So that is another suggestion and consideration.

CHAIRMAN RYAN: All right, thank you very much. I guess I have a couple of notes or perhaps one key question from each member, so Bill, I'll start with you.

MEMBER HINZE: Bill, other than the intrusion barriers and the over-packs are there any artificial barriers that are used to control the movement of water through the site and into the groundwater?

MR. HOUSE: Yes, the enhances caps we call them are a multi-layered cap that has natural materials and also a 60-mil HDPE liner.

MEMBER HINZE: And is there anything below then? Is there anything below the --

MR. HOUSE: No, no liners at the bottom of the trenches.

MEMBER HINZE: I notice that you mentioned that the bottom of the trench is in a sandy layer. Obviously, that has some significant permeability.

MR. HOUSE: It's not very tight by certain standards, but the materials are native materials. They do contain some fines and some clays. They are permeable enough that we don't have a bathtub effect.

MEMBER HINZE: Are the -- one last question; is the tritium -- movement of the tritium in shrinkage cracks in the clay above the water table or is it a diffused movement of the water?

MR. HOUSE: It's general diffused flow through the soils.

MEMBER HINZE: Thank you.

CHAIRMAN RYAN: Allen?

VICE CHAIRMAN CROFF: Yeah, in one of the slides, you're additional slides, it mentions stabilization media. How much of the waste that you receive is stabilized with cement or bitumen or whatever?

MR. HOUSE: Very little at this point. In the '80s, early '90s, we did get some solidified waste. Solidification increases volume. On the whole, it typically doubles the waste volume and with the economics and cost of waste disposal, most everyone went to dewatering of resins and filter media in high integrity containers.

VICE CHAIRMAN CROFF: When you do your performance assessment, do you take any credit for the barriers, the stabilization that was done in some of the trenches?

MR. HOUSE: No, not really. We're actually considering the concentrations of radio-nuclides that have been seen in the early trenches, in the trench sumps, so right there in the trench itself.

VICE CHAIRMAN CROFF: Oh, okay.

MR. HOUSE: So we're moving from that forward.

VICE CHAIRMAN CROFF: Your source stream is a little bit removed from the waste form, per se, then.

MR. HOUSE: Right.

VICE CHAIRMAN CROFF: Okay, thanks.

CHAIRMAN RYAN: Ruth.

MEMBER WEINER: Thank you for a very thorough presentation. How would your operation have differed if it would have, except for the limiting volumes, if the 1980 Act had not existed but 10 CFR Part 61 did exist? In other words, is there anything you would have done that would have been different except for the reduction in volume that you receive?

MR. HOUSE: I don't believe so. I believe that we did observe the tritium. We found that it was migrating. We tracked it. We modeled it. We continue to monitor it. We've moved to using the concrete vaults to stabilize the cap and the primary barrier to prevent infiltration is that enhanced cap with the liner. So I think we would have gotten there regardless.

MEMBER WEINER: What would you propose doing when you get -- when you're at the detection minimum for any -- in other words, if you're at or below -- theoretically below minimum detectable levels of contamination? How would you treat that? I agree with you that using the detection limit is wrong.

MR. HOUSE: Right.

MEMBER WEINER: But do you have any suggestions as to how to treat that?

MR. HOUSE: We -- as we know, the Vance Study looked at two particular radio-nuclides. And they did extreme count times, et cetera, to get better confirmation of what the actual radio-nuclide measurements were. For certain radio-nuclides, maybe we could do that independently and not have each waste generator doing the extremes of going to lower and lower count times and measures.

MEMBER WEINER: Thank you.

CHAIRMAN RYAN: Jim?

MEMBER CLARKE: Thanks, Bill. Just a couple of questions to follow up on Bill's questions. The cover that you're calling an enhanced cap is the HDPE over compacted native soil, is that --

MR. HOUSE: It's the -- the top soil is removed from the original clay caps that were placed on the trenches. The area is recompacted. There is a bentonite mat that's placed on that natural clay and then the 60 mil liner is placed on top of that. Above the liner is a clean sand drainage layer and then a vegetative layer above that.

MEMBER CLARKE: Yeah, it's pretty much standard RCRA cover. And do all the trenches have that cap or the older ones have it, too?

MR. HOUSE: All the older trenches now have those caps. We've capped about 80 acres of the 105 acres of trenches that we have.

MEMBER CLARKE: Okay, and just a quick question about the monitoring. I know you have a number of groundwater monitoring wells. How frequently do you measure them, the water level and --

MR. HOUSE: Right. We have a total right now of 174 groundwater monitoring wells in the trench areas, around the boundary and offsite and the typical frequency is quarterly and we have some that are offsite that are up to an annual measurement.

MEMBER CLARKE: Thank you.

CHAIRMAN RYAN: I'll forego any questions until later on. Without further ado, let me call on Tye Rogers from Energy Solutions. For those of you that may not know the new name, that's also the facility that was Envirocare of Utah, so welcome, Tye, thanks for being with us today. And thank you, Mr. House, appreciate you being with us.

MR. HOUSE: Thank you.

CHAIRMAN RYAN: Hang around for some questions and be here for the rest of the couple of days, I'm sure.

MR. ROGERS: Okay, as Mike said, our new name is Energy Solutions. I think most of you probably think of our facility as the Clive or Envirocare Facility. We're now calling it the Energy Solution Clive Facility. So if I slip up during the presentation and say Envirocare, please forgive me. I've been working there for over 10 years and it will take me awhile.

But I'll just briefly provide you with a brief history of the Clive Facility. Back in 1950 there was a vitro chemical company that was located in Salt Lake City that produced uranium mil tailings. They actually disposed of those mil tailings just right there in downtown Salt Lake City. In about 1984, in early '80s, they said that's probably not a good idea to have these uranium mil tailings in the middle of Salt Lake, Salt Lake City, and so the Department of Energy and the State of Utah went around Utah and investigated 29 sites and selected the Clive Facility for these tailings due to its very favorable site characteristics.

It gets -- we get less than eight inches of annual precipitation per year. We have over 60 inches of annual evapo transpiration. We have very low permeability clay soils. We have a naturally poor groundwater, something that's very important for out site characteristics. It's -- the groundwater is around 25 feet below grade. It's very brackish. It's -- we get about in some wells, about between 75 to 100,000 total dissolved solids PPM and we have a very stable geology.

Once the vitro tailings were successfully transported to the Clive Facility and disposed, Envirocare purchased the surrounding property around that and got our first license in 1988 to dispose of natural -- of norm.

Some key events throughout our history, in 1984 Utah became an Agreement State. It was specifically for low level radioactive waste in 19 -- or in 2004. Recently, they -- we were granted Agreement State status for 11e(2) material. So now we have just two licenses, radioactive material licenses issued by the State of Utah. In 1986, as we've mentioned, the vitro tailings at Clive and really going through this, the next big item is in 2001. We applied and received a license to dispose of Class B and C low level radioactive waste. That required legislative and governor approval which we did not go and try to get at that time.

2005, Envirocare was purchased by Lindsay, Goldberg and Bessemer, it's a private equity firm in New York and at that time, they made the decision to withdraw the B and C license. And then in 2006, this year, early this year, was the formation of Energy Solutions. It's a combination, a merger of several companies; Scientech, BNG America, Envirocare, and hopefully here in a couple of weeks, Duratek, which would include the Barnwell Facility.

Here's an overview of our site. Right here is our section of land that we're licensed to dispose in. Section 32, that's a designation by Tula County. It's a one-square mile area. The cell that you see or actually to the south there, actually north is pointing down, which is -- anyway, to the south is Section 5. We own about half of the section line there. And also to the north is Section 29. Section 29, we actually went through the process to include that in our license as well this past year. It requires legislative and governor approval as well. We've finished our work and we actually have the license with the Division of Radiation Control but we have yet to request that from the legislature and the governor.

This is the VITRO Embankment that I talked about earlier with the Department of Energy and the State of Utah. That is actually owned and operated by the Department of Energy. They come out once a year and inspect that facility. It's not really a part of our facility. We're the facility around it. It's actually fenced off and we really don't have much to do with that. Our first embankment was to the south of the LARW Embankment. We call it the LARW Embankment. It was -- we were not able to go on all isotopes to the full Class A limit and so we call it Low Active Radioactive Waste Embankment. After that, in 1993, we started our mixed waste area where we were licensed to treat and dispose of mixed waste material.

1994, we got our license from the NRC to receive uranium mil tailings, 11e(2), and then once the LARW Embankment was complete, we licensed another facility, another disposal site our Class A embankment. That embankment can receive concentrations to the full Class A limit. We've now actually moved up to the north and have another facility, our containerized waste facility and large component area. Most of our handling and receiving happens on the east side of our facility. That's where we receive shipments, unload it. It's where we also do our decon and our container return.

Regulatory basis, even though our first license was just a norm license, in the State of Utah that's regulated as low level radioactive waste and so we followed the licensing process outlined in Part 61. As I mentioned Utah's agreement state status as an agreement state and so they have their own rules. It's basically a mirror of the Part 61 rules and I would also add that the Clive Facility is really the only commercial facility that was originally licensed after the establishment of Part 61.

The next couple of slides I wanted to go through the performance objectives that really drove the -- or drive the design of our disposal cell. The biggest one is really protection of the groundwater. In the State of Utah, they hold us to a dose limit of the EPA drinking water standard for groundwater at four millirem per year to any individual member of the public. That's taken out for 500 years for radio-nuclides and 200 years for heavy metals. It takes -- we take no credit for the water as a not-potable groundwater source. It can never be drank and however, we have to protect it as if it's a viable drinking source. The groundwater wells' compliance points are 90 feet away from the tow of waste from ourselves. We assume as Barnwell, that a member of the public is drinking two liters of water per day and they do not exceed the four millirem standard for that, and that's really the main driver of our design as you'll see going forward.

We also have seismic analysis that was and performance objectives that are attached to that. Our cover, we have a -- and I'll get into it after this slide, we'll go into the actual design but we have a system of -- on our cover of clay, of a filter zone gravel and also some riprap rock for -- to prevent erosion. We also have very low permeability clay cover. We have two feet of clay compacted one foot at a time and the permeability we have to meet is five times 10^{-8} centimeters per second.

This is the actual design of our cell. We go down about seven feet and then we build and construct a two-foot liner, one foot at a time. The permeability of that is one times 10^{-6} centimeters per second. We then dispose of the waste in bulk fashion mostly up to about 40 feet above grade and then we have a two-foot radon barrier we call it. It's a clay cover with the permeability as I mentioned before of five times 10^{-8} and then we have a gravel filter zone that's about 12 to 18 inches and then a riprap larger rock to prevent erosion of about 18 inches as well.

Environmental monitoring; as you mentioned, these are the groundwater wells, we have over 90 of them at our site. They surround each of the disposal embankments, not just at our perimeter, so if there is any releases we can identify what embankment it came from. We have air stations, continual air monitoring stations that are surrounding around our facility. They are analyzed twice a week and to insure that we're not having any airborne concentrations leaving our facility, 80 quarterly soil sampling stations that we take and nine sampling vegetation stations.

Safety and compliance; we've done really well throughout the history of Envirocare of Energy Solutions. We have had no really reportable environmental releases. Our average employee doses remained under 15 millirem. Our highest employee dose, I believe happened about five years ago. It was just under 600 millirem and our lower goal that we keep mostly everybody under is about 350 millirem per year. We've operated currently 1.8 million manhours, which is very similar to the Barnwell facility, without a lost time injury and we're highly regulated. We have had over 400 person days of inspections are performed each year out at this facility. They are actually on site most of the time. They have a trailer there. It's very infrequently that you would go out to the site and not have an inspector there on site.

Let's go through our process a little bit on loading. The majority of the waste that we receive at the facility comes by rail. Over 85 percent by volume come by rail. The other come via truck. We do have a rail car rollover facility where the rail cars come into it one-by-one. They take them and then they actually roll the rail car up side down. The waste is unloaded into a pit and then it's taken up to the cell. As I mentioned, we do receive waste by truck. After it's unloaded, we transfer it to the embankment using large dump trucks and then for the bulk soil like material and debris that's under two feet in dimension, we put in two-foot lifts and we contain those lifts. We can receive up to 50 percent debris.

One of the things that we've done recently is on these compactors, they actually -- before we got these specialized compactors, we actually had engineers after each lift was done, go out, test the density, test the moisture and so forth to insure that we need the specs. This compactor has a GPS unit. It also can determine optimum compaction and now the operator has his computer screen and lets him know that he's reached that. It's something that has been good for getting our engineers off the cell and reducing exposure.

For larger debris that can't fit into a two-foot lift, we actually use a controlled low strength material. It's a grout and make grout lifts. They're about four feet high and it's a little bit difficult to see but you can see a monolift of one there. It goes straight across four feet high and they're encapsulated, per se, in those lifts. We also, as I mentioned, have a containerized waste facility. It's actually a separate facility than our other bulk disposal facility. We have different personnel and so forth, different acceptance criteria. This -- the liners that we receive meet Class A limits. The typical dose rate on the liners that we receive is about 15 R per hour.

We also take a lot of large components, steam generators, turbine rotors, press risers, classified tanks. We've actually taken some reactor vessels as well. Our disposal capacity and volumes that we've taken thus far; since this graph shows the volumes that we've received since 1998. 2005, as you can see, we've reached almost 25 million cubic feet. That was a record year for Envirocare. 2004 was a record year as well. In 2006 it will be more in line with the 2003/2004 volumes, probably around 15 million cubic feet. The reason for the 2005 kind of outlier there was the closure of Rocky Flats and also the closure of Fernald and that really contributed most of that significant increase in volume in 2005.

To date, we've disposed of about 122 million cubic feet and that makes up a little over

50,000 curies. We also just on Section 32, that one square mile of land, we have still 700 million of disposal capacity still remaining on -- at the site for disposal. Our financial assurance, as you can see, we have about $57 million that have been set aside for financial assurance for closure and post-closure activities. The closure fund, there's two components to our surety fund, actually three, but we have about 48 million to actually close the facility and then an additional 7 or 8.6 million to -- for long-term monitoring after the site is closed for 100 years.

We've used a variety of different mechanisms; the letters of credit, trust agreements and we're now currently using an insurance policy. One of the things of how we estimate the value that it needs to be, we actually assume that someone is going to come in and close the facility at the end of each year. And we use RS means, we have cost estimators that go in and actually see what it would cost to do that and we update that annually. And so it's not based on a certain dollar per cubic foot that we receive. It's an actual estimate of what it would take to close our facility.

In addition to our closure fund, we have a perpetual care fund. It's similar to the long-care term care fund at Barnwell. We put 400,000 -- it's a flat fee. We put $400,000.00 per year into that account. That is to cover any costs that may be past the 100 years of monitoring even though we just received Class A waste and to cover any other incidentals that may occur during the post-closure period. We've been contributing to that fund since 2001.

Lastly, some of our recommendations; the Part 61, as we all know, it was based on some fairly conservative models and it really didn't look at -- it assumes uniform site specific characteristics. And one of the recommendations that we would like to put out there is to, instead of trying to apply the same concentration limits as you would at Barnwell for Class A or B or C, and then trying to apply it to the same thing, same place as at the Clive facility which you have totally two different site characteristics, that you just put out, basically, these are your performance objectives, these are the things you have to meet, these are the scenarios that you have to model and as long as you can meet those performance objectives, you can apply your own site specific, your own characterization, your own design and instead of -

- in fact, instead of having a table for concentrations, you just have performance objectives and you have certain guidelines to follow to demonstrate compliance with those. And so that you can -- we can implement our different site characteristics, our different cell designs and so forth and try not to apply the same rule across the board over several facilities.

NUREG-1573, that was started there in 1997, lays out some consistent approaches for demonstrating compliance with performance objectives. We would recommend that type of approach. This can also be done, obviously, we know about the provisions of 61.58 for alternate disposal provisions. We can, you know, obviously go that route as well. One of the things that we would recommend with that is as we looked at some of those that have been done in the past, they have been very specific, case by case, very waste stream specific. What would be nice is for a licensee to demonstrate compliance for certain isotopes or several isotopes and demonstrate that with their site characteristics with their cell design, that we meet the performance objectives and do it more of a general. Put it in the license then that we can receive waste up to that concentration limit instead of just limiting it to the Class A table that's in there now.

Some of the problems or examples of things that where we've hit this was -- is we've tried to receive a waste stream from SMUD, a reactor component that had Nickel-63 and unfortunately, it was above the Class A limit but if you look at our site characteristics, our cell design, we meet the perform objective for that but we weren't able to receive it because it's above Class A. The other thing is, is we have another waste stream we're trying to receive that is -- has Carbon-14 in activated graphite. Well, it's slightly above -- as you know in the table, there's two limits for Carbon-14; one for normal materials and then one for activated metal. Well, it's not actually -- and it's slightly above the normal but below the activated metal and we've demonstrated that activated graphite actually behaves more favorably than activated metal -- activated graphite behaves more favorably than activated metal in our embankment but yet because the rule says you can only use this limit, this Point A and it's only activated metal, we're stuck with the lower one.

And so we're still working with the State of Utah to work out how we can do that. And unfortunately, a site -- now this is something we need to work with the State of Utah and not with -- necessarily with the NRC, is when the state became and agreement state and adopted the Part 61 into their rules, the 61.58, they did not adopt that. And so we're actually stuck with the actual table, the actual wording that's currently in Part 61. And like I said, that's something we really need to do with our state, not with the NRC, so we can take more advantage of that provision.

Other recommendations is to use the updated dose models that we've had since the establishment of Part 61. In some there's only slight increases in the concentration levels, but some are fairly significant that would benefit the fills of facilities. And then lastly, try to have a consistent regulation for different waste types. The current system is really, as you know, based more on where it was generated and how it was generated than the actual hazard. We, actually, as you'll notice from our site map, we have a completely different cell for 11e(2) cell than we do for our low level waste cell. Even though the concentrations of uranium are exactly the same in both cells, for instance, we have to have a different cell, a different license, different -- and the cell designs are different and costs are different. You know, and that's basically because of how it was generated, not the actual hazard. And so we would propose looking at the different types of waste that are out there now and try to make it more consistent with the hazard than just how it was generated.

And the last thing that I don't have on here but I wanted to mention is being able to take advantage of the engineered barriers that you've mentioned already in your report. That's something that we see that could help us, obviously, receive more waste that are currently in the B range, Class B range now that would help us move those wastes into the Class A range and be able to receive it in our facility. That's basically it.

CHAIRMAN RYAN: Thanks, Tye. Let me start with a question. Both you and Mr. House talked about engineering barriers, I'll pick up on your last point and take advantage of them. Help us understand a little bit what either of you mean how do you do that? What's the process used to credit in some way and what kind of credit are you trying to give for engineer barriers.

MR. ROGERS: Why don't you start, Bill,

and I'll add my view afterwards.

MR. HOUSE: The enhanced caps, as I said, have a 60 mil HDPE liner. It essentially cuts off any infiltration going through the trenches, through the waste and that should be considered in the modeling and future projections of movement of water and movement of radio-nuclides.

CHAIRMAN RYAN: How about in the packaging end of it with the waste form and the package itself is really what I was focusing on in the last point?

MR. HOUSE: I'm sorry?

CHAIRMAN RYAN: I mean, what do you do in terms of the waste package or the waste form or the combination of those two in terms of credit? What would you advise us to think about there?

MR. HOUSE: We've designed the high integrity containers and say that they have a 300-year life which essentially, by my interpretation means they're going to contain the waste for that 300-year period.

CHAIRMAN RYAN: That would be in accordance with the NRC's BTP.

MR. HOUSE: That's correct, and the associated guidance of the state.

MR. ROGERS: Yeah, that's basically would

I would say. It would be nice -- we have engineered certain types of containers that we take no credit for that we do meet, in fact, in our large component area, our containerized waste facility, that meets the 300-year criteria. We're not able to take credit for any of that. And then if you look at the large components, most of that contamination is on the inside of there a foot thick of steel, and yet, we still can't take credit for that in our model. We assume that it's readily available for -- you know, to be ran to the groundwater.

CHAIRMAN RYAN: So is it fair to say that some of your assessments are actually forced into extreme conservative type scenarios rather than more realistic or risk-informed scenarios?

MR. ROGERS: Definitely.

MR. HOUSE: I'd say that's true. And the results that we have, fortunately, from the projection out to 2,000 years at Barnwell, indicate that there will be compliance. So unless we're forced down that path, there's no reason for us at this point to go back and try to remove any more of those conservatisms.

CHAIRMAN RYAN: Okay, Jim Clarke?

MEMBER CLARKE: Thanks, Tye. I was

comparing your coverages to Bill House's recognizing you're in very different environmental settings. Have you given any consideration to an evapo transfirmation cover? You're in a part of the country where evapo transfirmation exceeds rainfall.

MR. ROGERS: Yeah, you're talking about like a vegetative cover?

MEMBER CLARKE: For the soil.

MR. ROGERS: Unfortunately on that, we don't get any rain water, so it's very difficult to sustain any type of vegetation on there.

MEMBER CLARKE: To sustain the vegetation.

MR. ROGERS: And that's why we would prefer going to that and it would drastically help us with our design but because we get no rainfall to sustain a vegetative cover, we can't do that. And right now, we have to truck water in just for our facility and there's no water source out there that can be used. And I can't imagine trying to put that burden or trying to put that in our surety fund for long term, you know, care to actually continue to truck water out to the facility to water the vegetation but it definitely would be beneficial if we were able to do that.

MEMBER CLARKE: And the other is you have clay but you don't have the HTPE.

MR. ROGERS: That is correct.

MEMBER CLARKE: One of the things the HTPE does in addition to providing defense in depth is that it would mitigate against dessication of the clay. Is that a concern?

MR. ROGERS: We've actually done -- we have very stringent -- once we finish the clay cover we have a very stringent monitoring of that surface before we put our filter zone and then our rock cover. We actually have done evaporate zone depth calculations and measurements to show that it's not evaporating and none of that dessication will happen on the surface of that clay because of the cover on top of that. So the moisture shouldn't change and we had very stringent time frames and daily monitoring of that surface to -- and maintenance of that surface until that's on to insure that none of the dessication cracks occur.

MEMBER CLARKE: Thank you.

CHAIRMAN RYAN: Any questions, Ruth?

MEMBER WEINER: You mentioned that you'd like to go completely to performance objectives.

MR. ROGERS: That would be -- yeah.

MEMBER WEINER: How would that sit with

the legislature that didn't want you to get Class B and C waste? In other words, could you dispose of Class B and C -- B and/or C wastes and guarantee with performance -- that your performance objectives would be met and how do you sell that then?

MR. ROGERS: No, that's a good point. However, my view, there's a couple of things I'd like to say on that is, hopefully, if we demonstrate that we meed the performance objectives, that we wouldn't be calling it B and C. That we could say the A limit is raised to this limit because for our site specific and so there's a new -- just establish a new Class A limit and so since we're still restricted to Class A limits, we would just change the limit based on site performance and site specific.

There is some minor problems with that. There is some language in the legislature about increasing radio-nuclide concentrations, but I think that's something that we can work through. The main thing is that the public wants to know is that are we -- does our cell perform, are we being protective of the environment and our workers. And if we can show that through our performance objectives, there's no reason why we shouldn't be able to take higher concentrations.

CHAIRMAN RYAN: Allen?

VICE CHAIRMAN CROFF: Yes, on your slide on financial assurance, the perpetual care fund, I wasn't clear who holds that fund or where it resides.

MR. ROGERS: Yeah, let me go back. That's a good question. The actual closer fund is held by the Division of Radiation Control or actually the Department of Environmental Quality. The perpetual care fund is actually held by the State Legislature. Now, they have -- due to the problems at Barnwell, luckily this fund happened after that and so they know the -- what can happen to those types of funds, the ratings of those funds, and so they've put statutory language that do not allow legislatures to go and tap into that fund for any other reasons but what it was laid out for.

CHAIRMAN RYAN: Bill?

MEMBER HINZE: Concerning mixed waste, what percentage of the volume of your waste is mixed waste and how is that changing with time and what's your most significant problem in dealing with mixed waste?

MR. ROGERS: First of all, in our mixed waste facility, one of the things I didn't mention is that we do have the -- we do -- because it's both rad and with hazardous we have to comply with the RCRA requirements as well, so we do have the geosynthetic liners and so forth in that cell. It makes up a very small percentage of what we take. Most of the mixed waste that comes, comes by truck. If you look at the mixed waste that's out there, the majority of the mix that we've taken, nearly all have been generated by the Department of Energy. And as some of those sites have now starting to close, the mixed waste volumes are going down slightly.

And we would continue to see them decrease and then level off. Some of the -- probably some of the challenges that we have with mixed waste when it comes into our facility, relying on the generator number one. Some of the waste we get for mixed waste has been treated off-site like a WCS or some other Permafix or something like that. And we take samples and then we dispose of it in our cell before we get our results back. Well sometimes the sampling demonstrates that we haven't treated it as well or it wasn't treated as well off-site and so we've had to dig it up and actually retreat it.

And then some of the difficult things is if you look at some of the Department of Energy's orphaned waste right now, trying to solve ways to actually make them compliance with LDR requirements has been a true challenge with us and continues to be, to try to develop treatment formulas and so forth that we can actually treat some of this waste and get it LDR compliant.

MEMBER HINZE: Thank you.

CHAIRMAN RYAN: Thanks, Bill. With that, gentlemen, thanks again. We'll ask our next two speakers to come up to the front table here, Bill Dornsife from Waste Control Specialists and Steve Romano from American Ecology Corporation. While they're getting organized, I think most folks know that Bill is with the -- was the Director of the Pennsylvania Bureau of Radiation prior to joining WCS and Steve Romano is the Chief Executive Officer of American Ecology Corporation and was previously the Vice President for Corporate Development and President of U.S. Ecology Idaho. Gentlemen, thank you for being with us. We're happy to have you with us. I think let's see, first up will be Bill Dornsife.

While Mr. Dornsife is getting ready, I'd appreciate it if everybody would sign in on the sign-in sheets so we could have a list of attendees. They're at the podium behind me. There's one for NRC staff and one for visitors. So please avail yourself of the opportunity to sign in when you get a chance. Thanks. Good morning, sir. Take it away.

MR. DORNSIFE: Okay. It's a real pleasure to be here this morning. It's been awhile since I've been down at the NRC. I used to make this trip regularly and things have kind of changed in Rockville over the years, like the double gate out back. Interesting how security effects us all. Waste control -- I'm going to primarily just talk about our low activity radioactive waste disposal over the last five years. I think later, Dean Kunihiro is going to talk about our Part 61 licensing effort.

But basically Waste Control Specialists is one of four RCRA facilities that have received major amounts of low activity radioactive waste over the past few years. We are located in West Texas. In fact the road going into our site is actually right next to the border between Texas and New Mexico. We're located about 50 miles northeast of the WIPP facility. So it's a very flat, very arid site out there.

Essentially, in Texas, radioactive waste is regulated -- radioactive material is regulated by two different agencies. The TCEQ, the Texas Commission on Environmental Quality, regulates disposal of radioactive material in Texas and they also obviously, regulate RCRA disposal. And the Health Department regulates material. And the Health Department is also the keeper of the exemption process. So basically the way WCS is authorized to accept this low activity waste is there's an MOU between the two agencies that basically says that if the Health Department has exempted a material it can be disposed of without regard to its radioactive content.

WCS has disposed of now it's probably over 300,000 yards, cubic yards, of low activity waste in our RCRA cell and the average disposal cost has been about two to $3.00 per cubic foot, typical RCRA pricing. For most of the waste that we receive, transportation costs more than disposal. This is a view of our -- a cross-sectional view of our site characteristics. As you can see we have very low rainfall, 15 inches and I believe that evapo transpiration number is actually higher than that. The evapo transpiration is about four times precipitation rate. Basically, it's a very unique site out in West Texas. We have natural red bed clay that has a permeability typically of 10^{-9} that comes to within 20 to 30 feet of the surface.

Actually at the RCRA cell, it's more like 15 feet is the average depth to that red bed clay. Basically, as you can see, you go down through the red bed clay, there are some sandstone lenses. Those sandstone lenses typically have a permeability of about 10^{-7}. They're really sandstone and at the 225-foot zone we have a saturated sandstone. It's saturated but it's non-productive. We can barely get enough water to take samples. And we've recently aged data that the water in that 225-foot zone and indeed it is 15,000 years old, so there is no -- it is the only interconnected bed that we've found in all of our site characterization activities and so it's convenient to use as a monitoring zone. And that's basically where we do our monitoring for the RCRA cell and we also do monitoring for our license facility which I'll talk about a little later.

The only aquifer at about 500 feet, the top -- it becomes saturated again, and then there's an aquifer at about 1,000 feet and that -- the water in that aquifer is non-potable. This is an early picture of our cell. I picked this because it gives you a more vivid indication of the liner system and some of the other characteristics of the site. Basically, as required under the RCRA regulations, we have a double liner, double leachate collection system. Basically, also an engineered cover, there's also a requirement for a three-foot engineered clay layer included in that cover system. There's also deed restrictions that are required under the RCRA regulations.

In fact, one could argue, I think, that in an arid climate, from an engineering standpoint, a RCRA cell may perform better than a Part 61 cell because the possibility of bathtubbing is pretty remote. I mean, we -- even in the open cell there's very little rainfall that even collects in the open cell. The only think, I think that's really different from the RCRA regulations compared to Part 61 is the requirement for government ownership, long-term government ownership. As you're probably aware, there's a 30-year maintenance period required under RCRA. There's no requirement for government ownership, but as you're aware, one license site doesn't have that requirement either.

There's also no perpetual care fund for a RCRA site. There is guarantees for closure and those kind of financial assurances under the RCRA regulations. Our cell, I think the other thing to point out is that in addition to the engineered liner, you can see the red here on the corner is the natural red bed clay. We have, in addition to the liner, actually built a 15-foot layer all the way up to the surface in addition to the engineering. So the liner -- the natural red bed probably begins, you know, halfway down the cell and then up to the surface, there's a 15-foot layer of natural clay.

There are safety assessments that are done for disposal of low activity waste, in particular for NRC exempted waste, and currently we are authorized to take unimportant quantities of source material with less than .05 percent thorium and uranium. And basically, NRC policy requires a risk assessment to be performed for approval of disposal of that material in non-licensed facilities. And basically, we use RESRAD and TSD-Dose, which is a transportation model and it also includes a dose to the worker at a RCRA facility, and we use a one millirem standard typically for both long-term disposal considerations performance and also dose to the site and the transportation worker. Typically, if it comes by truck, the dose to the truck driver is typically the limiting exposure.

We also have performed a conservative dose assessment for all of the waste, all of the exempt material that's been disposed in our cell from Day 1 and I have copies of that risk assessment if anybody is interested. Basically, that assessment shows that the future on-site resident dose is essentially zero. There is no dose to the future resident and obviously, RESRAD goes out to 100,000 years. We've also assumed an oil well drilling scenario which basically gives a 0.4 millirem every 50 years. It assumes that that's a recurring event.

This assessment is very conservative because it assumes that all of the waste and there's about 60,000 cubic yards of total waste now in our RCRA cell, it assumes that all that waste is exempt material at the maximum allowable concentrations. We've taken other materials besides source material and norm. For example, we take exempted thorium, specific -- thorium articles that are specifically exempted by the regulations and we also take smoke detectors and we've disposed of some tritium watch faces. So all those are calculated at their actual value. But basically, you know, from a performance assessment standpoint, the risk is essentially zero from that disposed material.

Basically, our radiological safety program for the facility is that I think it's important to note that we have a license treatment and storage facility adjacent on the -- right adjacent to the RCRA cell. We have what's called a Class 3 license under Texas regulations and essentially that Class 3 license allows us to store unlimited quantities of radioactive material. Our current limit based on emergency planning considerations is 35,000 curies of transuranic type materials and the other radio-nuclides go up to 2 million curies. So I think we have essentially the largest possession limits of any commercial facility in the country. We also can store transuranic waste. We are authorized to store and treat transuranic waste.

We also are authorized to store 11e.(2) material and you probably are aware we're storing the Fornald 11e.(2) material and we eventually intend to dispose of that in our 11e.(2) disposal facility which is currently undergoing license that's going to be right north of our existing RCRA facility. Because we have a licensed facility, all the workers that handle exempt material are badged as radiation workers and they're covered under our radiation safety program. So their dose is tracked and we really see little, if any, dose from exempt material handling that we can specifically trace to the exempt waste material.

We also, because of the license site, have a complete site environmental monitoring program including essentially our permitted area, which is about 1300 acres. We have air, soil, radon, the whole spectrum of environmental monitoring at that periphery and we also have air, radon, soil and water monitoring around the RCRA cell itself at various locations around the actual RCRA cell.

We also have environmental monitoring occurring at our rail offloading facility. We are capable of taking direct rail from our facility and offloading it from a rail car and then going to our RCRA disposal cell. Essentially, in terms of receipt requirements, the exempt waste is received as industrial waste under our RCRA permit and basically, like all RCRA waste, a waste profile needs to be submitted and WCS needs to approve that profile prior to acceptance of the material. Also the waste is required to be manifested under a RCRA permit. We have a new permit condition that's about six months old that actually requires notification to the Health Department, DSHS, the Department of State Health Services. We have to submit the profile data, the sampling plan, and any characterization data and under that new permit condition, they have 14 days to review it and get back to us if they find any problems.

It's a notification, it's not an approval process per se. Also as part of our process, notification is required prior to shipment and approval is required for shipment and these shipments are tracked typically by the transportation company. We are required under our RCRA permit to do screening surveys when the waste arrives and under RCRA you're required to do fingerprinting which is essentially accepted sampling for 10 percent of the waste, or 10 percent of the container is what it typically turns out to be.

I just wanted to very quickly give you some insight into a process that worked very well in terms of adding a new spectrum of low activity waste that could be disposed of at a licensed facility. Prior to 1999, the NRC, even though source material less than .05 percent thorium and uranium are exempted under NRC rules, NRC required that waste to be disposed of in a licensed facility. WCS recognized that there were many facilities out there primarily a lot of rare earth processing facilities that took ores that had higher than source material content and basically a lot of by-product material was generated that was less than the .05 percent.

So basically, we recognized this as a real good marketing opportunity and we formally requested that NRC recognize the exemption that was in the regulations. And we met with the -- several of the NRC Commissioners and high level staff to convince them this was the right thing to do and it resulted in a policy issued by NRC that basically allows unimportant quantities of source material to be disposed of at non-licensed facilities and a risk assessment is performed as part of that approval process. So I think that's a good example of how you know, there may be other opportunities like this where on a case-by-case basis, material could be added to the list of material that can be disposed.

CHAIRMAN RYAN: Bill, just while you're on that point, could you tell us some of the key technical areas that you covered in obtaining this site specific exemption or risk assessment ordinance?

MR. DORNSIFE: Well, I think, Mike, we didn't do any risk assessments, per se. I think it was more of a legal issue that, you know, basically, you know, you guys call this material exempt, why don't you recognize it as exempt and making that legal argument and then you know, obviously, the layers of additional review and approval that are required, make it a good risk based decision.

CHAIRMAN RYAN: Thanks.

MR. DORNSIFE: I think there's a couple other issues that I'd like to cover in closing. I think it's important to note that alternate low level waste disposal options have resulted in about a million cubic yards of material being disposed of over the last few years and again, priced at about two or $3.00 a cubic foot. I think that's very important because you know, I know of several facilities in Pennsylvania with my experience as being Bureau Director up there, that probably would still not be decommissioned if this disposal option was not available. I mean, basically, these folks were short on money. They had funding problems and this low cost option allowed them to make a decision to move forward.

Also, quite a bit of FUSRAP waste has been disposed of at -- under this program, and obviously that saves the government lots of money in terms of funding that program. Other options have been proposed for ultimate low level waste disposal. You're all familiar with the clearance rule, NRC's clearance rule. I'm sure you're all familiar with the EPA Advance Notice of Proposed Rule Making for allowing disposal in RCRA facilities of low activity waste. In Texas we submitted a Proposed Rule Making that would essentially mirror, to some extent, that EPA rule. It was submitted and basically it got put on hold for a very long period of time because the state asked NRC and EPA for their opinion on this rule making and NRC came back and said, "Well, you know, you may not want to move ahead of the national efforts". Well, we see now that the national efforts are essentially in limbo and our rule is still active but it's really not moving forward. I think one of the interesting things in that rule making, it was a risk based rule making based on one millirem a year, long term dose and many of the radio-nuclides -- it also included transportation by the way in addition to disposal dose, the transportation worker and the site worker.

Most of the non-gamma emitters were unlimited in terms of concentration. So what we decided to use was the exempt levels in the new DoD rules as a default concentration in that proposed rule making. So again, you know, we have not taken that off the burner. It's still in the hopper. We think it's a good idea and any support would be appreciated.

There are some issues, I think that need to be considered, obviously, in low activity waste disposal. There certainly -- as with everything, there's public policy issues and I think the major one, I think there's very few RCRA facilities in the country that really are going to be allowed to utilize this option, either the public nearby will not allow it, the politics, state politics won't allow it or essentially they have regulatory limits that will prevent it from occurring. So there's very few RCRA facilities, I think, that will be able to utilize this alternate disposal.

There are regulatory and jurisdictional issues. I think NORM is a big one, Naturally Occurring Radioactive Material. As you're all aware, the Federal Government doesn't regulate NORM disposal. It's regulation by individual states and there's various levels of exemption. As Steve will tell you, certain states have adopted rules that allow higher concentrations. There's also the issue between NRC and EPA. The two agencies -- I think in the EPA proposed rule making, there was provision that require some NRC approval of the disposal. As we know, NRC and EPA don't always get along together; look at the decommissioning rule. That may be a problem. And in Texas we have the jurisdictional issue of the two agencies.

There are material and control issues. I think the major one is where the material is released. Is it released at this site or is it released at the disposal facility? And I think finally, oh, I think the other thing we found out, if the facility is agreement state licensed, many of the agreement states don't recognize the unimportant quantities of source material exemption that they have in their own regulations, so that policy is really not passed down to the state level. And finally, I think in looking at future options, you know, people say, "Hey, we ought to have wholesale changes in exemption levels". I think you need to recognize that the existing patch system is working and it's working well. Like I said, many facilities have gotten -- have become decommissioned and we've saved taxpayer and other dollars by having these options available.

CHAIRMAN RYAN: Bill, thanks very much. I think in the interest of time, I'd like to ask Mr. Romano to give his presentation. Then we can maybe ask question of both of you. Would that be all right?

MR. DORNSIFE: Okay, sure.

CHAIRMAN RYAN: Okay, great.

MR. ROMANO: Thank you for making time today. I feel like for the last 25 years or so I've been following Bill Dornsife making presentations, so nothing real new about that here today.

I would note before discussing the alternate disposal options and practices, US Ecology, of course, does operate a full service Class A, B and C low level radioactive waste site, a Part 61 site in Richland, Washington. We also have closed two sites, the Sheffield, Illinois site and the Beatty, Nevada site, former sites that have been closed per Part 61, the licenses turned over to the state custodial agency in Illinois and Nevada and actually our company has a continuing role performing maintenance under contract with the state -- the state custodial care agency.

I think it's an important point to make and I'll turn to alternatives in a second because this does show that the full life cycle envisioned under Part 61, does end with a license to the operator being concluded and turned back to a government custodial care agency does work and it is part of the system's approach, it is important to recognize it. And I'll go forward.

This is the US Ecology Idaho site. This is a RCRA site. It's located about 75 miles south of Boise, Idaho in the Owyhee Desert. I'm going to show you a little bit about the facility in a minute but I wanted to give you the aerial here to point out a couple of things. The large excavation at the top is early in the stages of developing the new RCRA disposal facility. I'll show you the design in a minute. The area going down the slide that's somewhat larger is an area that's completing filling. It's nearly complete now. You'll notice a large surface impoundment. That is for drainage. There is no offsite drainage at the site. Everything is drained internally, so that's essentially an evaporation pond for the moisture that collects on the site from rainfall. So during times of the year when there is more rainfall, then it will wind up in those surface impoundments.

Turning to the site characteristics, this is a favorable site, similar to the site in Utah. There are less than 10 inches of average annual precipitation and greater than 60 years of pan-evaporation potential. This particular site is on high ground so there are long flows to points of release. There's virtually no up-gradient surface water drainage area which helps make this internal drainage system work for this particular site.

You'll notice that the groundwater is deep. It's 2800 to 3,000 feet to a confined geothermal aquifer. There is an upper zone that's saturated that is used for monitoring compliance purposes. That is underlain by clay which is what provides the monitoring zone for compliance purposes. There are 35 wells to monitor that saturated zone for compliance purposes. A couple of points to make about this; these are inter-bedded silt sands and clays. The disposal cells are 60 foot below the surface. Onsite clays are used for the bottom part of the liner, and I'll turn to that liner in a minute.

I've talked about the aquifer below the site in the monitoring zone. Groundwater movement is less than five foot per year so it is slow groundwater movement. This is the disposal cell. This is our Cell 15 in construction. I kind of like this picture because you can see the compacted clay layer in the foreground of the picture there. If you'll also look at the cliffs in the distance, those are natural clays. So this is a site that we believe has superior characteristics for isolation of the waste. And then the standard RCRA liner is what is placed over that. I also like this picture because you get a scale to the size of the disposal unit.

This is Phase 1 of a three-phase disposal cell. So this is about a 1.5 million cubic yard disposal area for Phase 1 of the three-phase unit.

We would expect to fill in the range of eight to 10 years for the entire three phases. This is a standard RCRA design. You'll see that the three foot of compacted clay liner, the natural clays that underlie the synthetic system, standard RCRA design. You'll notice the double synthetic liner system with the double drainage systems. One of the advances in RCRA technology in recent years is it was common in the past to use gravely layers for drainage. Experience was these gravels would tend to -- would tend to get clogged up. And so now we use a Geonet. It's worked very effectively.

You have the leachate collection riser pipes. All of the drainage is at a gentle slope down to a collection point that run along the side walls of the trench. So each of the phases would have a separate system for collecting that drainage. Discussing the different types of radioactive materials that this facility accepts, I'm going to summarize this and then go into greater depth in a minute, but to talk first about the permitting. This is a RCRA facility that originally in it's first Part B permit was allowed to take naturally occurring radioactive materials. So this was not something new that was done here. It was done in recognition of some of the NORM waste that occurs in that region of the country.

Our company bought the site in February of 2001 from another company, Envirosource Technologies and one of the first things we wanted to do was take what at that point was a fairly general set of requirements for accepting radioactive material and this was based on a 1999 RCRA permit modification to accept fuse wrap waste. We wanted to take that permit and be more specific about what kinds of radioactive materials we could accept and then maybe the best way to put this is we wanted to take the experience we had at the original Washington site, which we've operated since 1965, and ask ourself the question based on our experience operating the site, based on the risk of the kinds of materials we were accepting, what should we take from the radiological programs at Richland and fit onto a RCRA site. And I would point out, I think the same thing has been done at the WCS site. There is experience and I think what's been shown here is that the industry has been able to take a proactive approach, frankly, with a lack of extensive regulatory guidance, and make some sound risk based decisions on what ought to be done to do safety assessment, to do performance assessment, to do monitoring and to determine that in fact, we are providing safe containment.

So in 2001, several things happened. We felt it was important from public involvement and public understanding standpoint to have a state law in place that made it explicit that we were indeed allowed to accept these materials. That was done, there was a rulemaking cast and there was a RCRA permit modification put into effect for commercial NORM, NARM and I'll cover the specifics in a second NRC exempt items and devices. In 2005, we again modified the permit and at this point we added fission and activation products and I will show you the limits that we have for those. I would note and I'll also walk through this process, that we felt it important that the state agency that regulates the disposal site also have visibility and concurrence in our acceptance of materials exempted from regulation by the NRC. Our logic was the NRC's primary role here is regulating the licensee or it could be an agreement state and the state is the responsible party for regulating the disposal facility for purposes of understanding the overall source term, should also have a concurrence in that process, since the NRC does not have a direct responsibility for evaluating the overall source term at the disposal site as the waste is received.

I would note that RCRA does have public involvement requirements for permit modifications. These require public comment periods, public hearings. These were all held. I would note that for the 2005 Class 2 permit modification to expand the permit to accept certain exempt levels of fission and activation products, that there is -- we had about 50 people come to the public hearing on that modification. There were no adverse comments provided.

Turning to the performance assessment, like the WCS facility we were applying the RESRAD code. We are using site specific information rather than just the default parameters. So we went ahead and developed separate input models for the vadose zone and the saturated zone. We did look at the soil characteristics. The peak dose for the scenarios we looked at was 9.8 millirem per year. At year 326, Carbon 14 was the limiting isotope. We complied with the Idaho standard and Idaho adopted a 15 millirem per year total effective dose equivalent, the standard as opposed to the Part 61 standard and this was based on wanting equivalency with the state's regulation of the DOE Idaho National Laboratory Facility.

The model output was used to develop the isotope limits that are part of the permit and I'll turn to those in a minute. I would note that two things in terms of work credit was taken in our performance assessment modeling. We took no credit for the synthetic liner. We did take credit in the modeling for the three-foot compacted clay liner, which was designed to a specification. We also took credit for radon barrier which is in the cap. There's a requirement that no radioactive materials be placed within the top 11 feet of the lift. There is a cap on top of that so then the radon barrier was a consideration.

Without that thicker cap and the earlier work we had done, we would find that the limiting dose would have been radon gas from a basement excavation scenario.

CHAIRMAN RYAN: Steve, just a clarification question; so if you think about RESRAD, I tend to think about it by itself without any of these considerations to be a pretty conservative kind of a calculation. I think what you're expressing is that you actually looked specifically at your site kind of in the way that Tye Rogers suggested and took some specific issues in credit when you looked at kind of an updated RESRAD calculation. Is that fair enough?

MR. ROMANO: Yes, it is. That's correct.

CHAIRMAN RYAN: Okay.

MR. ROMANO: We had first done the simple run doing the -- using the defaults and then we felt that the site specific information was more useful. And that model was made available to the public. All the model output was made available for public review and there were actually some organizations that had a look at that information.

MEMBER HINZE: Could I ask you, along that same line, how do you validate your modeling? Do you try to attempt to tie this in with the monitoring results and --

MR. ROMANO: We do and in a few minutes, I'll turn to that, but that's an excellent question.

In terms of what our limits are, we have adopted the unimportant quantities of source material limit, the .05 percent by weight. For NORM isotopes, we accept up to 2,000 pCi/g and that is all isotopes all in parent and progeny and equilibrium. Accelerator produced material up to a three-year half life were on a case-by-case basis and the exempt source and by-product material and I'm gong to turn to that in a minute, is the specific fission and activation products for the model.

I'll turn now to -- these are actual tables out of our permit and I'm not going to go through and read all of these but I would make a couple of distinctions. First, this page essentially are generally exempt materials. These are materials and you can see the examples here. I guess actually the scandium has disappeared as something that doesn't show up so much any more. Gas and aerosol detectors, the timepieces and clock illuminators, these are standard references that have been exempted by the NRC for many years and we thought the best thing to do here was just to go ahead and take it right out of the NRC 10 Part -- the Part 30, Part 40 regulations and just put them right into the record permits. There's no doubt in anybody's mind what it is we're talking about.

The other part that becomes different and I'll refer to the bottom of the table here, 30.11, 40.14, these are the sections in Part 30 and Part 40 that provide for case specific exemptions. The process we have in Idaho and based on the model if you look to the right side of the table, fission and activation products, 25 pCi/g for each nuclide present. There are different limits for some other isotopes. You'll see they're below that. And in any case, the same limit applies of not more than 200 pCi/g for what we receive, total activity.

This all tracks back to the output from the models. And I'll come back to the subject in another minute regarding the application exemptions but these are the applicable exemptions for Part 30 and Part 40 that are available. This is a concurrence process. I eluded to this briefly. The approach that Idaho takes and this is specified in our RCRA permit. The first step would be for the licensee to approach the NRC or an agreement state and say, "We have material on a case specific basis, we would like to see exempted. The NRC goes through that. It may approve or disapprove the exemption. There has been guidance issued. It indicates that the NRC and I believe this is December of 2004, but the NRC is able to grant a 20.2002 alternate disposal authorization and that is essentially between the NRC and its licensee, the first stage of the process.

In addition, that coupled is a simultaneous action with a 30.11 or 40.14 exemption then provides the basis for our facility to accept it as non-NRC regulated material. So again, the 20.2002 for the NRC and its licensee, the exemption for the disposal purposes. US Ecology then evaluates itself and prepares a safety assessment. We take our RESRAD model and we take a specific project and the isotopes present. We run that through the RESRAD analysis with the site specific parameters so this is a project specific safety assessment. We then provide that along with the NRC's exemption determination to the State of Idaho. They have the option of rejecting it, requesting more information or approving it and only at that point are we authorized under our permit to take the material.

CHAIRMAN RYAN: Steve, again, sorry for the interruption but that seems like an example where you've taken the licensee's regulator and your regulator and managed the hand-off so that the right information gets through the process so you can get a decision. Is that a fair summary?

MR. ROMANO: It is and when I come to my final recommendations, one of my points is going to be to -- there's more that can be done here, but this was an effort by us to provide some structure to a process that, frankly, in the past had very little. It was very ad hoc in terms of what the NRC staff, who they would talk to, when they would talk to them, who would talk to the state, you know, who in the state would be contacted. And that's not a criticism. This is an evolving application of the regulations. And this is our attempt on the disposal operator's end to provide some -- frankly, some coherence to how the process would work. One of the questions we got from the public and it was a fair one is, you know, what is this process. And we don't believe in black boxes, it ought to all be very transparent and we also, again, as I noted, we want to be in a position where the state can make its own determination as a primary regulator of a disposal site. But this is an area in general where Idaho has come up with its own process, frankly, for the lack of a structured federal process.

I talked a little bit about our attempt to take an appropriate program for this kind of material and put it in place. I won't go into all the details here but I'll touch on a few things. As a WCS, the workers wear TLDs. There's our total dose for the 97 workers was 47 millirems so we feel pretty good about that. That was for all the workers combined. We look at the working level rate on air. We're well below the working level suggested. We borrowed that from the uranium industry. We thought that was most appropriate for the uranium and thorium we were accepting as the primary isotopes.

Swipe surveys similar to what WCS has described, and a continuous particulate monitoring and we have been well below limits. In addition to this, we also do monitor environmental media, semi-annual soil and groundwater through the 35 wells. Also have the passive TLDs at our fence line and the track etch monitoring on a continuous basis. We are gathering source term information on an annual basis. We report the source term. We have accepted to the state and as we have new case specific examples, we revise the safety assessment with the isotope specific information. It's a fairly new program and we are working with the state to find the best way to on a continuing consultative basis evaluate how we can best use this monitoring information to validate the models and update for specific projects.

In terms of the radiological survey programs, again, very similar to what was described for WCS. I'm not going to go ahead and walk through all that but all weights are checked coming in and the conveyances going out again. There are the new DoD requirements in place that were followed and we do use a multi-channel analyzer on the fission product materials. The FUSRAP programs, as I mentioned, this map just shows you a few of the FUSRAP sites that have been served. Industry sites have also been accepted. STMP sites, the Tulsa, Oklahoma Kaiser site is a significant project we're just wrapping up right now. I would note that this particular site has accepted more than a million tons of low activity radioactive material or about 30 million cubic feet of waste. Now, obviously, that is a much larger number than Richland and Barnwell had accepted over a much longer period of time. So the thought I would leave you with is this is not a -- this is not something new. It is not something which is insignificant. It's part of the way the nation is presently handling these low activity radioactive materials at our site and others.

In fairness, I wanted to note that there are other sites that are doing this. Our site in Texas does accept certain materials but at a much lower level than the Idaho site based on it being in a more humid region. Waste Control Specialists, you've heard about. There's a site in California that has accepted these types of materials also and there are other RCRA sites that are seeking to begin accepting these materials. Also, I would note, I'm not going to spend a lot of time on this but for completeness, I thought it was worth noting that 11e.(2) facilities can also take these kinds of materials. You've heard from Energy Solutions. International Uranium in Blanding, Utah has also low activity radioactive material as alternate feed stock and this has also provided a cost effective disposal method. And the numbers that Bill Dornsife used at two to $3.00 per cubic foot is also a good number by our estimation.

Several summary comments, in arid regions particularly we believe that RCRA sites which do not have the bathtub effect issue are a very effective containment method, certainly for soil and debris materials and we do believe that it's equivalent or even superior containment to Part 61 sites. The RCRA Subtitle C system does allow for site specific limits to be placed. There's flexibility to essentially back-fit on an appropriate radiological safety program and we think that's something that's being done. There's always room for improvement and bringing the state of the art forward and you know, we look forward to comments in that regard.

I would note that the NRC statutory authority is there. I would note that operator experience and the regulatory agency's ability to oversee the programs are important. In Idaho our company actually at our suggestion, we provide funding for a health physicist's position. We, of course, have no control over the position but we felt it appropriate that this facility have a fee attached to it to be certain that the RCRA program did have a qualified health physicist to oversee the work that we're doing in addition to the RCRA program staff.

I'll end with some thoughts and recommendations. As Bill Dornsife said, I would second it, the patchwork system, while perhaps not the most elegant, does work. I think I've used the phrase before, it's a dog's breakfast of laws and regulations at times but it's a dog's breakfast we've all learned to eat over the last 20 or 30 years and that doesn't make it bad. It's the nature of how things are. I would counsel against a view that we can't move forward without, you know, somehow rationalizing the whole thing under one umbrella approach.

I think the nation, as a whole, has not made as much progress when it's gone after those big global let's do it all at once kinds of initiatives. There is a lot of flexibility in the regulations. We would encourage the NRC and your committee to evaluate carefully the flexibility that's in those regulations. One thing I would note as a personal comment is I believe more can be done to look at this flexibility as something that's part of providing a solution that's cost effective, that's risk based to preserve the available disposal capacity to make use of it where it does exist and I'm going to step out on a limb for a second and just come out and say it; I think the Commission has made some very positive pronouncements, encouraging pronouncements about looking at this flexibility. I think the -- if the working level or the staff looked at individual case specific proposals, the results would be mixed, in some cases very good, in some cases not so good. I would lay a respectful request to NRC management and to your committee that I think the nexus between the Commission and the working level project managers who would have that case specific proposal land on their desk, that that nexus is perhaps not as -- between the Commission pronouncements and the working levels perhaps not as well connected as it might be and that while I understand there are a lot of major issues that the NRC has to tackle, that I believe it would be fruitful for the staff management to take more of an ownership type of role in evaluating these alternatives, making sure that the staff have the support guidance and that the licensees and disposal facility operators also have the support and guidance to move these kinds of initiatives forward in a way that is transparent, is risk based, is scientifically based to provide solutions for a lot of waste that need not be disposed of through the high prices that otherwise prevail for the higher concentration materials.

CHAIRMAN RYAN: Great, Steve, thanks very much. Why don't we take questions? Bill, why don't you start either questions for Bill or for Steve Romano?

MEMBER HINZE: Pass.

CHAIRMAN RYAN: Okay, Allen?

VICE CHAIRMAN CROFF: Yeah, I've got a question on this slide, the first bullet there. What leads you to the conclusion that the waste containment is superior in a RCRA facility?

MR. ROMANO: I would note that it can be, it isn't necessarily. I would say the desert site where you don't have the possibility for a bathtub effect, where you are providing a good sound right on barrier that I believe the synthetic liner system which is essentially a zero permeability system, can provide a greater level of containment than a site which -- under Part 61 which is going to have some release.

VICE CHAIRMAN CROFF: So you're projecting a very long life for that barrier.

MR. ROMANO: We're projecting a combination, if a site does have the favorable natural characteristics as we believe the Idaho site does or frankly, the West Texas, WCS site does, and you have a natural clay barrier below that, I think our understanding of clay properties over time is sufficient to provide that type of long-term assurance. I would not agree that the synthetic liners offer that kind of assurance.

VICE CHAIRMAN CROFF: Your basis is sort of arid site versus humid site and local conditions, not the RCRA design philosophy versus the Part 61 design philosophy.

MR. ROMANO: Precisely.

VICE CHAIRMAN CROFF: Okay, thank you.

MR. ROMANO: It's specific RCRA sites in an arid environment that have favorable natural characteristics.

MR. DORNSIFE: Just to add, I think there are characteristics of a RCRA liner, like the three-foot compacted clay that probably will survive long term.

CHAIRMAN RYAN: Just for the Recorder,

that's Bill Dornsife and just if you would, when you speak because he can't see your name plate, just tell us who you are, that would be great, that's helpful. Thanks.

MR. DORNSIFE: And in our risk assessment we didn't take credit for any of the RCRA engineering barriers.

VICE CHAIRMAN CROFF: Okay, second, it wasn't addressed explicitly but what do either of you think about the suggestion of performance based disposal criteria that was made earlier this morning?

MR. ROMANO: We agree that makes sense. I think it should be done in combination with isotope specific limits that plug into the -- that flow out of the safety assessment but that, again, is part of, in my mind, a performance bases system.

MR. DORNSIFE: Yeah, I would agree and I think there's also an opportunity to take a look at some of the Class B and C and greater than C in terms of that same criteria. Most of that material is irradiated compounds and so if you do a risk assessment on a radiated compound, it's -- you know, except for the niobium, all the gamma emitters are short-lived, so I think you can very easily show that that material could be disposed of as Class A.

VICE CHAIRMAN CROFF: Okay, thank.

CHAIRMAN RYAN: Thank you. Ruth, any questions?

MEMBER WEINER: Allen asked my question, and Bill Dornsife just answered it, thank you.

CHAIRMAN RYAN: Great, there you go. Jim Clarke.

MEMBER CLARKE: Just a question for both of you picking up, I think, where Allen left off; as one of you mentioned, RCRA Subtitle C requires 30 years of post-closure monitoring and maintenance and financial assurance that that would be done. Bill, you mentioned monitoring, Steve, you didn't give us any detail. I guess it's reasonable to assume that if you've got the right design and it's well-constructed that you're going to get 30 years. I guess my question is, do either of you put in anything for maintenance?

MR. ROMANO: Under RCRA we are required to assume some level of maintenance for that 30-year period.

MEMBER CLARKE: But how do you estimate that?

MR. ROMANO: It's an engineering estimate based on some repairing, you know, monitoring, repairing of trench caps for some period of time. Under the Part 61 system, generally, after about a five-year post-closure period, the estimates tend to ramp down significantly. So from our perspective as one looks, perhaps at the -- you could reasonably ask the question should you look at these sites beyond 30 years and that would be a fair question to ask. I think probably the maintenance aspect at that point would not be significant. The more significant aspect, I believe would be how long you might want to monitor this.

And I think that's something that is worth looking at, whether longer periods are suitable depending on what isotopes are at the facility.

MR. DORNSIFE: And I think also, Bill Dornsife. I think also that you know, there is --30 years is a minimum time. There's nothing saying that that can't be extended with a regulatory agreement and maybe for some of these sites they're accepting -- if you look at heavy metals, I mean, there's no half life.

MEMBER CLARKE: Heavy waste sites as well and you're accepting industrial waste as well. Thank you.

CHAIRMAN RYAN: Okay, with that, we're at our point in the agenda for a break. We will reconvene promptly at 11:00 o'clock. Thank you.

(A brief recess was taken.)

CHAIRMAN RYAN: For the remaining time this morning we'll have three presentations. Larry Camper is going to talk to us about the NRC's current low level waste program and its challenges. And then as I mentioned earlier, we'll hear from Paul Lohaus and Mal Knapp, both retired from the NRC and very intimately involved with the development of 61. So here's some historical perspective of NRC's low level waste program from these two gentlemen.

So, without further ado, Larry, once you're wired up, we'll turn the presentation over to you.

MR. CAMPER: Okay. Good morning.

You've heard a lot of valuable input this morning in terms of operations from site operators and practitioners --

CHAIRMAN RYAN: Oh, I'm sorry. Excuse me. We have a phone call we're going to call in now. I apologize. We need to dial in. Oh, they're on. Okay.

And could you identify who is on the phone, please.

MR. ROSENBERGER: Yes, this is Ken

Rosenberger at Savannah River.

CHAIRMAN RYAN: Good morning, Ken. We can hear you fine. Can you hear the presentations fine?

MR. ROSENBERG: Sounds great, Mike.

CHAIRMAN RYAN: Okay. Thank you.

MR. LEEMANN: Linda Leemann, Hanford.

CHAIRMAN RYAN: All right. And your audio is okay?

MR. LEEMANN: Yes.

CHAIRMAN RYAN: Thank you.

Anyone else?

Welcome, glad to have you with us.

MR. CAMPER: So as I was saying, you've heard a lot of operational concerns, and what I want to share with you this morning is a different sort of operational concerns. It's a programmatic operational concern from the standpoint of the low level waste program within the Nuclear Regulatory Commission and have you factor that into your thinking as well.

I want to thank Dr. Ryan and the members of the Committee for once again allowing us to participate and provide you with an overview. Some of the things you're going to hear from me this morning you've heard in some of our Directors discussions. And we try to keep yo posted along the way, of course.

Some of them will be new but perhaps from a different twist.

I also really want to commend the speakers thus far. One of the things that was central for us as we tried to figure out how to move ahead in the low level waste program is to get specific recommendations. And there were four questions that were provided in advance and each of the speakers thus far has really touched upon some specific things that we, as a staff, in connection with the Committee can think about. So we really do appreciate that from a utility standpoint.

I do want to share with you the status of the low level waste program in terms of challenges that we face and more specifically, some of the concerns or challenges that we have as we try to move forward near term.

Okay. The current program results from a 1996 issues paper and a decision was made by the Commission at that time to put in place something on the order of 5 to 10 FTE to maintain the program.

You might recall, as I'm sure Paul will tell you about in some detail when he and Mal get up, there was a time when the low level waste program was really in a growing we anticipate applications mode and an awfully lot of work was done. But, of course, of over time there was a realization that those applications were in fact not coming and there was a need to maintain the program, preserve the central core knowledge of the staff, be prepared for the future but yet be in a maintenance mode.

Well, of course, budget cuts come along and we go from 10 down to 3 or 4, which is where we are today; 3 to 4 FTE. And those resources are focused primarily upon routine activities, and we've listed a few of them here. Assistance to agreement states, our IMPEP reviews which is a management analysis of how the regulatory programs are being done. A lot of their national work and consideration goes on import/expert licensing. A 20.2002 disposal reviews that's already been alluded to by some of the earlier speakers. And support for other programs, agencies, international stakeholders. And then of course maintaining an awareness of national programs.

And we do work an awful lot on the last point in communications with the General Accountability Office, the Department of Energy, the Environmental Protection Agency, the U.S. Army Corps of Engineers and other groups as well as well that have roles to play on the low level waste front.

Now,, the program finds itself with stakeholders that are both external and internal. And you can see we have this graphic to show that the 3 to 4 FTE, which is small number, get pressed on both sides from these internal/external stakeholders.

Externally, of course, we have the Congress from time-to-time. As you all know, there's interest in further developments regarding low level waste. Senator Domenici, for example, has touched upon this topic.

The General Accountability Office has a study ongoing right now. Had a study which concluded 2004 that we commented upon extensively.

The National Academy of Science, of course, was looking at this in a study.

Industry has a lot of interest in it. You've heard some of that interest expressed this morning thus far about certain of the operators.

The states, of course, have a great deal of interest in the program. Witness, of course, the fact that Washington, South Carolina and Utah regulate the existing sites.

And there are other interests out there as well. There are other stakeholders that have an interest on nuclear issues at large, including low level waste.

Internally, of course, the Commission has a great deal of interest in the low level waste program. The Advisory Committee on Nuclear Waste, of course. Witness the recent white paper as a current example of the level of interest that the Committee has on this particular topic.

And then other NRC programs are affected by what goes in the low level waste arena, not the least of which of course is the decommissioning program. Obviously, a great deal of waste is generated during the decommissioning process. We want to ensure that there are adequate facilities for that waste to be disposed of. And so these other programs do come to bear.

Now, in the midst of all this interest in the program internally and externally certain issues emerge that require the staff attention. Now remember, the staff is pretty much occupied by these routine things that I cited a moment ago as well as other activities. But having said that there are, nonetheless, issues that emerge that require staff attention. These are driven by a number of things. There have been no disposals which have been developed. Of course security issues are now greater than they were prior to 9/11. There is a need to find disposal capacities for certain large volumes of waste that are emerging as a waste stream. The disposal of depleted uranium is an example.

The industry desires greater flexibility and reliability regarding disposal options.

And, of course, the closing of Barnwell to Class B and Class C waste in 2008 is an issue that's getting a lot of attention today.

There may be new facilities of waste streams. We hear a lot these days about new technologies for enhancing the enrichment of uranium, recycling. Those will generate waste streams that we don't deal with right now.

Rather than Class C waste, of course, is an issue that's been around for a long time. There is some movement taking place right now. We're working closely with the DOE staff and others as the Environmental Impact Statement is being developed.

Low level waste storage with the pending closure of Barnwell, one of the things we are doing right now is revisiting all of our old storage guidance, some of which goes back to the 1980s. The last real update occurred in the early 1990s. We are trying to consolidate and update that so that adequate guidance is available prior to the pending closure of Barnwell.

Now, all of this creates a paradox, if you will. The paradox being that we have a very small program with very limited funding.

On one hand there are those who say in industry, and in fact you heard it today with at least two the speakers and I was talking on break one with Steve Romano. You know it's not pretty, but it works. And be careful about how much we disrupt it. The industry has taken a very pragmatic approach to the management of low level waste over the last 25 to 30 years. They have markedly reduced the volume of waste being generated. And when I talk to them, and I try whenever I'm out and about in various meetings and so forth to talk to industry representatives and say how much of a problem is this for you. I get a questionable need. The efficacy question is something they scratch their head about; do we really need to make many changes.

In many cases they don't like the costs. They wish there were more flexibility in costs, but nonetheless their known and they can deal with it, they can plan for it. And the practices and procedures are established.

On the other hand I have a number of stakeholders that look at the existing process, this Committee included, you know it works but it could be better. It could be more risk-informed. It could be more performance oriented. There may be some things that we could do to improve the process absent necessity to open Part 61 via rulemaking, and we can make this thing work even better. And no one would argue that that's a worthwhile goal.

Greater flexibility perhaps is desired, increased consistency over time. You might recall when we commented extensively on the GAO report in 2004 that's one of the points we made; that long term stability and consistency is questionable.

The public in many cases desires to better understand the low level waste process. What will happen to that B and C waste if Barnwell does in fact close? Will it be stored? What about security? What are you doing in terms of making guidance current so that it could be stored safety and securely?

Cost containment. Even though the costs are known and there's not a ground swelled clamoring of concern about those costs, everyone would like to see costs contained.

There are changes going on in the industry that causes people to scratch their head and say "What does all this mean for costs in the future?"

So from our standpoint we're trying to ensure that the regulatory framework that exists is adequate to protect public health and safety, is cognizant of these various views and most importantly for us given our limited resources in this particular part of our program, what are the right issues for us to focus upon and what are those issues that will give us the maximum return on investment for those limited staff resources being invested.

Now, to try to really address that question we are developing a low level waste strategic assessment. To do that we are going through a systematic process to gather information, to distil that information, to try to put it together in a cohesive fashion by scoping the issues first, which is part of the process that we're working with you here today.

To gather the stakeholder input. Obviously, that's occurring and will continue to occur for us in a number of different ways.

We want to factor in what the future needs are as best we can understand them through the interaction that we're having.

We want to try to identify those actions which we should take as a staff and as an organization to position to the Commission to deal with these changes effectively.

We must prioritize our actions. We do not have infinite resources. So it is terribly important that we prioritize what we're going to do.

And then last but not least, we want to develop an implementation plan. And we would plan to develop a Commission paper that we would provide, currently we're scheduled to try to do that later this year.

Now, so what are the objectives as we work our way through this strategic assessment? Well, we want to make sure that the program which has worked well, which has been adequate to protect public health and safety continues to do that. We want to make sure that any changes we make to the program continue to ensure a safe and secure disposal of low level waste.

We would like to continue to play a role in promoting a reliable, stable and adaptable regulatory framework. There have been some suggestions already this morning by some of speaks about certain flexibility that exists in the program, about ways to improve the process that goes on between those who request authorizations under the 20.2002 process, for example, and our staff. I echo those sentiments.

Some of those requests have worked well, some have been not so timely and could have been better. But we need to try to figure out how to do that process better.

We want to make sure that there are no gaps or vulnerabilities in the programs, obviously, as we proceed ahead.

And we want to, of course as is always the case, improve effectiveness and efficiency. I'd like to see all of these requests handled more expediently, as openly as possible. The Commission recently gave the staff some guidance about making the 20.2002 process even more open to the public. We're working to incorporate those changes at this point.

And, again, of course make sure that the limited resources that we have are used effectively.

All right. So to say we're gathering information. This workshop, we worked with Dr. Ryan and members of the Committee and the ACNW staff to put together the agenda, to help develop those questions that you were asked ahead of time.

We're going to be looking very carefully at what the stakeholder responses have been to those questions. There are several members of the staff here today taking notes and we're going to reviewing the proceedings from this workshop and go back and look at those recommendations and factor those into the equation and talk with Dr. Ryan and the Committee over the next few weeks and months as we each work toward putting together information for the Commission.

We want to evaluate that information in some meaningful way so that we can ultimately articulate for the Commission the kinds of recommendations that we got and how the staff went about digesting and analyzing them and coming up with some recommendations.

With regards to decision making, we certainly want to identify the NRC activities that we plan to take. We want to develop a criteria for those and prioritize them.

We need to estimate the resources. You can well imagine with 3 to 4 FTE the strategic assessment alone can burn up an awful lot of resources. And then you have a follow on question of okay, once you've done your strategic assessment, you've identified those activities that will give you the greatest return on investment; they have to be funded. And I want to tell you that right now in the budget process we went forth in 2008 and asked for some additional FTE. And I think it's questionable that we'll get it. I think it is questionable that we'll get it.

So the challenge for us then will be, okay, with limited resources being provided for strategic assessment and follow on, what can we do? I mean, we all live in resource constrained environments all the time. You just try to figure out another way to do it to the extent that you can, and yes some things you cannot do even though you've identified them as a priority. You identify ten items, maybe you do five; we'll have to wait and see.

The end product will be a Commission paper that will, hopefully, coherently set forth the major concerns that we identified, the input from the stakeholder, as I said, resource constraints and what we would intend to do in some priority order.

So then let me just summarize by saying that as everyone in this room knows and understands, there are a number of complex issues out there right now regarding the low level waste industry. We are conducting this assessment so that we can assure that the program is positions for success. I'd define success being that we ensure that we continue to provide a regulatory program that will allow for the safe and secure disposal of radioactive materials and that our processes, while providing the appropriate level of regulatory protection, do not get in the way, they don't slow down the process or not overly burdensome. Rather, they are safe, appropriate and effective.

Stakeholder input is valued, as always, and it will be essential to this exercise, again given the time frame that we're dealing with and the limited resources that we have.

Resources, I've said several times, you know if resources were not finite, I probably wouldn't have some of the concerns that I have and we would try to do everything. But having said that, we will devote those resources to those items which this workshop and which our staff and which the Committee identifies as the highest priority items. And we'll try to proceed forward and continue to communicate with the Committee along the way and make this process as open to the public as possibly can.

So that concludes my formal remarks. And I'll be happy to entertain any questions.

CHAIRMAN RYAN: Great. Bill?

MEMBER HINZE: Larry, you identify several emerging issues and in your later slides you talk about developing criteria for prioritizing them. Part of that is also which are most time sensitive? And I'm wondering if you have any concern or any ideas of where you are going to end up with in terms of which of these emerging issues are most time sensitive to the Commission?

MR. CAMPER: No, not as I speak. We have tried to view this as an open book. I mean if we're really going to do a strategic assessment and gather this information, then we need to be intellectually honest about entertaining the various things that are out there and see what we learn.

Now a couple of them are clearly a priority. And the one that we're already working on is low level waste storage guidance. I mean, our objective is to be positioned with that guidance out there on the street available to users in a reasonable time before Barnwell closes. By reasonable time, I mean something in order of at least six months prior to the closure so that folks can proceed to store hat waste safely and securely.

Another one that's a priority because the Commission has given us a specific assignment to do so is this question of analyzing the depleted uranium waste. Now we chose thus far to address that as part of the strategic assessment. And we actually went back and said to senior management and to the Commission we're going to look at that, we're going to do that, but we're going to do it as part of the overall strategic assessment see how it ranks out. But I think that one is a priority. The Commission asked us to look at that outside of the adjudicatory process. And so they've placed a higher priority on it. And so it will be one that we'll look at I think as being a bit higher. But again, I think if we're really going to do this in meaningful way, we need to have an opened slate and then truly rank them in terms of priority.

MEMBER HINZE: 2008 comes pretty soon.

MR. CAMPER: That's right. Yes, it does. And we're working on that already. I mean that is something that we have already underway.

MEMBER HINZE: Thank you.

CHAIRMAN RYAN: Ruth?

MEMBER WEINER: As I already sensed, you've just heard from the people who manage these sites. And since I'm sure that you've also heard in the past from the generators of low level waste and the people who are generally responsible for the disposal. And if they say "Look, we have a regulation that we have learned to work with that we are working with effectively," why do anything with the regulation?

MR. CAMPER: Well, that's a great question. And let me be very clear about something. We have no plans to open up Part 71. Okay. That is not in our planning horizon at all. Now, that is not to say that there might be others that in some point in time, and you're going to hear I think a very interesting presentation during one of the talks here, there may be those who feel that the regulation does need to opened up to look at the classification scheme for example. But we have no plans to open Part 61.

And frankly, our read of the recent Committee white paper we thought was a very logical way to look at the existing problems that we faced. There is a lot of flexibility that exists within the regulation right now.

We do look at these 20.2002 requests on a case-by-case basis. You know, there was a time when those requests were predominately disposal on site. Well, no one does that anymore because now they have the life determination rule and the dose standard to deal with. So now they involve principally disposal at the very low end of the spectrum to facilities.

There have been disposals that have been successful by reactors in decommissioning, Bib Rock Point to a type 2 landfill.

So I think that the points that have been made by the earlier speakers and the point that is the essence of your question if a very valid point.

Part 61 rulemaking would be a massive undertaking, a huge resource sink, and frankly as you all know as well as I try, when you try to go into a regulation to fix a particular part of a regulation, you have no idea where you're going to end up.

So it's not something that's on our planning horizon right now. And unless we're directed by the Commission to consider otherwise, I don't think we would consider that to be a priority.

MEMBER WEINER: Thank you.

MR. CAMPER: Okay.

MEMBER CLARKE: Just to follow up on that, I think some of us have always wondered if guidance could be vehicle to accomplish some of these things once you identify what they are. And picking up on Bill's question, you probably gave him the best answer we could expect at this time, but I was wondering if you had a time frame in mind for the strategic assessment, when you'd like to have that completed.

MR. CAMPER: Yes. The objective currently is to develop a Commission paper that we would provide before the end of this year. The Commission, of course, would go into deliberation on that, come back with some further instructions to the staff. And then the idea would be during FY '07 and FY '08, which is why I requested something on the order of another 1½ to 2 FTE to help deal with strategic assessment fallout products, we would actually put in place and carry out whatever the Commission direct us to do.

I certainly would envision that there would be some need for further guidance, development. I mean, it would be consistent with what the Commission asked us to do already on 20.2002. We have been taking steps to make that process better understood, to memorialize that process as well as make it more open and visible to the public. We are currently working on updating the low level waste storage guidance for the obvious reasons regarding Barnwell. Many of the recommendations in your white paper called up and were built around guidance changes.

So I would expect, and it's just a speculation on my part obviously at this point in time, but I wouldn't be surprised if the Commission were to ask to do more guidance space. And that would be carried out in the FY '07/FY '08 space and it would be a function of what resources we have to do it, in all candor.

MEMBER CLARKE: Thanks.

CHAIRMAN RYAN: A couple of points just to add some information to your presentation, Larry. Our white paper doesn't have any recommendations in it. It is intended as a strict history document of the history of low level waste regulation. The letter that transmitted it to the Commission, however, does have those recommendations.

I might also add that we've received a lot of very good comments from staff and others on the details of the white paper and had a few, well this date should be there and some changes that will further improve its accuracy. So we've been through that review process. And we're going to issue that as a NUREG document over the next several months. I don't think the detailed schedule is available, but just for everybody's information. There will be a NUREG that will embody what we hope is an accurate and complete history of low level waste regulation up to this point for everybody's starting point.

And we're going to turn to some

information about there here in just a minute.

Also I appreciate the fact that your staff and the Committee and the Committee's staff have worked together on assembling the right folks, the right participants at this working group so we can collectively gather information. I think that's a process where the Committee the being involved with the staff rather than reacting to staff is effective for us in our role of providing recommendations to the Commission and certainly effective for your role in that we're hearing the same information at the same time.

MR. CAMPER: Yes.

CHAIRMAN RYAN: And it allows us to be well coordinated in what we hear and what's said and so forth. So we appreciate that very much.

I don't want to leave anybody out, but I think we want to recognize Scott Flanders and others on your staff who have really been very effective at interacting and lots of other folks, Jim Kennedy and folks past and present who have been involved in low level waste. So thank you very much for that.

MR. CAMPER: Thank you.

CHAIRMAN RYAN: Any other last comments for Larry?

Thanks for being with us. We appreciate you being here.

MR. CAMPER: Okay. Later.

CHAIRMAN RYAN: We'll turn our attention to now some of the historical information. We have, and are lucky to have, Paul Lohaus returning from a short retirement. He wasn't here just too long ago talking about the agreement states program and very successful IMPEP program to oversee agreement state activities and followed by Malcolm Knapp, also preceded Paul in retirement by a little bit, but certainly were very much involved in low level waste.

So without further ado let me welcome Paul Lohaus to the podium. Paul?

MR. LOHAUS: Thank you very much, Mike.

I'd like to thank the ACNW for the opportunity to participate today. And I'd like to state for the record that I'm here on my own behalf.

As Mike indicated, he asked me to talk about the background on development of NRC's low level waste program, background and development on Part 61. And I'd like to use part of my time to also offer some suggestions for considerations.

And one historian was quoted as saying "The only reason to study history, is so that we don't repeat it." And that's a very narrow view. And I think the importance that the Committee sees in looking back on what we did back in the '70s and early '80s is there be perspectives and information that was addressed during that time or processes that were used during that time that could help inform where we are today and also point the way to the future.

Let's just start and talk a little bit about the setting, what I call the setting in the mid-'70s. And at that time the nation was faced with a growing interest among a broad range of stakeholders in the disposal of low level waste. I mean if you look at the list that Larry talked through, the same list of stakeholders were involved at that point in time. You had congressional history, General Accounting Office, public interest group, the states, the generators, the facility operators, industry groups. And I'm going talk to some of these. They all were involved at that point in time in focusing on concerns in low level waste disposal.

And some of the reasons for that:

Site experience. As you're all aware, there were problems that developed at some of the commercial and federal disposal facilities where the compressible nature of waste led to pathways for water filtration, which in turn led to concerns and need for water management programs at some sites. And that prompted a number of subsequent activities.

At the same time, there were increases in shipments of waste to the disposal facilities that were not well characterized and there were an increasing trend in violations in packaging and transportation requirements relative to waste that was being received at the sites.

The NRC set up a task force which published a report on federal and state low level waste programs. Basically that task force had two key recommendations.

One is there needs to be an overhaul and a set of new requirements focused on disposal of low level waste.

And second, there were concerns expressed relative to capacity, future capacity and pointed to the need for what they called a national plan for the disposal of low level waste.

JO and congressional committees became involved. The Joint Committee on Atomic Energy, the House Committee on Government Operations each published a series of reports. And these contained a broad range of recommendations focused on he need for improvements in the practices for disposal of low level waste and the need for new requirements governing low level waste disposal.

The NRDC also at that time prepared an filed a petition for rulemaking which basically called for a complete overhaul in requirements governing disposal of low level waste.

Capacity. At that time there were six commercial operating facilities. Three of those sites closed during that time. Maxi Flats, Kentucky, Sheffield, Illinois and West Valley. What that left was an inequity, if you will, in disposal capacity. You basically had most of the capacity located in the western part of the country, yet most of the need for capacity was located in the east.

And the governors began to raise issues relative not only to the concerns in terms of the waste that was being shipped to their states for disposal, the need for change, but also pointed out that they were disproportionately sharing in the overall disposal burden that they argued should be born equitably by all states.

In response, talk a little bit about what NRC did. At that time NRC established a new division, a Division of Low Level Waste Management. A number of folks that are today were involved in that new division. Mal Knapp, for example, was one of the managers that was brought lead change within that new division.

One of the items that the staff did, and what you're going to hear from me is basically almost going to be an echo of what you heard from Larry. What the staff did was developed a low level waste program plan. And that plan is really still, I think, in place to a certain extent today. And I'll touch on a couple of reasons why. But basically what the staff did is the took the sweep of issues, concerns, the views, the site experience, the knowledge of the states and set out and defined what are the key areas that need to be addressed within the low level waste program.

They provided a set of technical studies in policy direction to the staff in terms of what steps should be taken. And I've identified a number of the technical studies. And many of these I think are very familiar to a number of you.

A study of alternative disposal methods that was done by Ford, Bacon and Davis.

Waste form and container work in terms of looking at what can be done to improve waste forms and containers. A lot of that work was done by Brookhaven National Lab.

Siting factors. Worked very closely with the U.S. Geological Survey in terms of the hydrologic and geologic factors that should be addressed in siting of facilities.

Performance assessment, the work that was done by Sandia National Laboratory.

Waste classification. The Ford, Bacon and Davis study and later work that Vern Rogers & Associates did.

Chemical toxicity of low level waste. And also what it set out in that plan was a phased process for developing a new regulation Part 61, a supporting environmental impact statement and a supporting set and suite if implementing guidance. And what you see today in terms of Part 61 and the suite of implementing guidance came out of that low level waste program plan.

There were project plans and schedules and a notice of availability was published in the *Federal Register* to provide opportunity for stakeholder review and comment. And I want to go back and talk a little bit more about that. But importantly, when you look at this document, and I tried to find a copy to show you, it's probably about 20 pages in length. It's a very simple document, yet it really provided the basis for the program and the actions that were taken by staff. And if you look today, as I mentioned, there are some aspects of that plan that are still in play today.

For example, the need to address the lower activity part of the Class A in terms of ensuring there's a good suite of alternatives for handling the low activity waste.

Talk about the low level waste program plan. At the same time the staff published two advanced notices of proposed rulemaking one dealing with development of the waste classification system and a second dealing with Part 61 and the scope of the environmental impact statement.

At the same time staff working closely with the states began drafting what we called a preliminary draft of Part 61. And this turned out to be extremely gratuitous. What this provided was an opportunity for very early stakeholder involvement in the development of Part 61. And I guess I can't stress enough the degree and the extent of stakeholder involvement that was involved throughout this process. And providing copies of that preliminary draft rule to stakeholders, providing opportunity for review and input, what it did is it helped ensure that the right issues were identified within the rule; it helped ensure that the right requirements were there; stakeholders could see that their issues were adequately addressed within the rule; it helped gain ownership for the requirements that it set out. And I think in the end it also helped in terms of support on implementation of the requirements.

I wanted to highlight the three governors. Governor Riley from South Carolina, Governor List from Nevada and Governor Ray from Washington. As I noted earlier they were concerned relative to the increasing frequency of waste being received at facilities within their states which was not well characterized, packages were arriving that were leaking, many had free liquids, there were fiberboard, cardboard boxes. And they came in and met with then Chairman Hendrie and expressed concern and requested specific action on the part of the NRC. And during that meeting Chairman Hendrie identified that the staff had a program plan, was taking specific action to address these areas and provided each governor a copy of the preliminary draft rule. And it was at that point that copies were then very broadly distributed to stakeholders. W e proceeded with four regional workshops with stakeholders to provide further opportunity for input.

And again, I think looking toward to me there's a lot of similarity and a lot of analogy in terms of the issues, the stakeholders and need for involvement. And Larry touched on this as well.

I included a slide on the Part 61 rule. I'm not going to go through the requirements there. I think you all are very familiar with the requirements. But I did want to talk about two, and it's actually the last two. Maybe I should have put those first.

But the first one is section 61.7, the concept section. That section was intentionally added by the staff to provide institutional knowledge about the rule, how it should be interpreted and how it should be implemented. What generally happens when a new rule is published, is the statement of considerations is lost. And the knowledge about what the staff intended is also maybe not clear and is also lost to those in the future. And the concept section in 61.7 I wanted to highlight that. I find myself referring to that because it does provide good insights and good background on what we intended and how the rule should be interpreted.

The other section, and this section has

been mentioned by previous speakers, is section 61.58. This section was also intentionally added by the staff in recognition that knowledge at that time, we're talking about late '70s/early '80 time frame, that knowledge of the staff on waste form properties, containers would change, would further improve. We're going to be gaining further knowledge in the future. That there would be improvements in waste processing and technology which would lead to better waste forms. That there would be increased use of engineered barriers in reliance on engineered barriers. And also that would be emerging waste streams that were not necessarily evident to the staff at that time.

And the thought here is to provide a mechanism that could be used to evaluate specific cases and reflect changes in technology to provide a mechanism where the Commissioner could review and approve alternative waste characteristics and alternative waste classification requirements. And I think to me this is one of the keys in terms of looking to the future in terms of providing one mechanism that could be considered by the staff as helping address specific issues and emerging waste forms as they're identified.

Suggestions. The first suggestion is I

think pretty straightforward and pretty obvious. And if you look at the slide that Larry put up, my sense is exactly the same. The analogy is same set of issues, if you will, that the staff faced in the late 1970s. Not necessarily the same set of issues, but you have a base of stakeholders raising a number of different issues. There is a dichotomy in those issues that are being presented. And the thought is as a part of this is to really define the current setting. What Larry says is to go out and set out, lay out the issues. And quite simply, update the current low level waste program plan that was developed earlier to define the current setting, identify what areas need to be addressed, involve the stakeholders in that process to gain ownership on what the staff should address within that plan. And then establish priorities to carry that out.

I've suggested four areas for consideration in the plan. Waste minimization, processing, interim storage and disposal. There certainly may be others, but my sense is that sort of encompasses the suite of areas that you might face.

Given the limited resources, my sense would be is to focus on issues involving disposal, at least initially as opposed to other areas.

My sense also in looking at Part 61 and sort of going back and looking at the history is that the performance objectives that are set out in the rule address the right areas and they provide an acceptable framework, an adequate framework for ensuring safety, environmental protection and institutional commitment limiting the institutional commitment that is involved in disposal of low level waste.

A couple of suggestions. One area that ACNW has identified and I would agree, the need to update the dose limit. But at the same time I went back and looked at NUREG-1573. And NUREG-1573 very clearly identifies that the newer ISCRP dose analysis methodology should be applied in low level waste performance assessments. So my sense would be is there may not be a need to specifically address this further, although maybe in the strategic assessment the guidance that's set out in current 1573 could be reaffirmed as a position of policy that the new dose assessment methodology, a total effected dose equivalent limit should be used in the dose performance assessments.

Security considerations. Given the sealed sources and some of the higher activity greater than

Class C wastes there may be security considerations, additional security considerations that should be considered.

Given the work that the NRC and the agreement states have done to address safety and security for the higher activity sources, the category 1 and 2 sources, there may not be additional work here that needs to be done. This may already be subsumed within that effort. But this I think could be an area for further consideration within the staff's strategic assessment.

I've also identified the need to address the very low level waste and also the higher activity waste. And a couple of reasons for doing this.

One is as with the performance objectives, and I would add the technical requirements within Part 61, they provide an adequate basis for licensing new low level waste facilities. At the same time I believe the Part 61 classification system which addresses the middle category of low level waste, the Class A, B and C was developed on a risk-informed basis and is serving both generators and site operators well. And my sense is I would caution against reopening that system for consideration. But going back to their low level waste program plan it did identify you need to address the lower activity waste. And part of this was directed at stability. The idea at that time was stability really provides significant benefits in disposal in terms of being able to better predict long term performance and assurance of environmental protection. And the idea would be is that you could eliminate the lower activity Class A waste and deal with those in a different manner and you'd remove them from having a potential effect on the higher activity Class B and C waste.

So I think the idea here is the middle is working. Let's not really address that. Let's look at what we can do with the low end, and there were a lot of good suggestions that were offered today as a part of some of the earlier presentations, and also the higher end. And that may help in terms of addressing the greater than Class C waste, that may also help address some of the other questions in terms of the Class C interface. There may be aspects in terms of looking at some of the factors that were applied in the waste classification analysis for activated metals that under 61.58 could provide an alternative classification for that waste stream that would provide safe, environmental sound and practical disposal. And at the same time looking at the low end, I think you can apply the same there as well to set out a set of requirements that may not be identical to what's in Part 61, but at the same time would ensure safe environmental sound and practical disposal.

Final area. I guess I'm sort of putting my state program's hat on. I look at ACMUI and I see they have state member that adds I think good value to the ACMUI's deliberations. And I'd like to suggest for consideration that you consider adding a state member to the Committee. I mean, to me it's given their role in providing capacity but also the agreement state's role in licensing. You have Texas going through a license review process. California went through one earlier. Utah with their facility. Washington and South Carolina. It's just an idea for consideration.

And that concludes my presentation. I'd be happy to answer any questions.

CHAIRMAN RYAN: Thank you very much.

Just on this last slide a couple of points, I'll follow up if I may, Paul.

One is on the dose limit. I think we all agree that doing dose calculations with the updated models is a great idea. But I think the point is is that 25 millirem to the whole body, 75 millirem to the thyroid, 25 millirem to any other organ with ICRP 2 does mean 25 millirem to the whole body necessarily under the concept of total effective dose equivalent. It's radionuclide mix dependent. So that was really the point is that until you anchor that in the new system what that number means, you got to be careful how you compare it. So that was the point there.

MR. LOHAUS: Yes.

CHAIRMAN RYAN: Because they're really not the exact same number necessarily. They very often are. But with long lived radionuclides they are not.

And just a quick reaction to your last statement, I think the fact that there are so many states folks here today and on the agenda, we sure recognize that this is very much a state issue. All low level waste sites are in agreement states. So clearly that's on our agenda to recognize their value added to our deliberations and our input. So we appreciate your comment there.

Jim Clarke, any other questions or comments?

MEMBER CLARKE: I don't have any questions.

CHAIRMAN RYAN: Ruth?

Great. Well, with that we appreciate your input very much.

And you know one reference that we've talked a little bit about is 61.58. But I really appreciate you pointing us back in detail to 61.7. I think that's an important aspect that we need to refresh ourselves on, hopefully everybody will, to try and eke out that early thinking.

MR. LOHAUS: Thank you.

CHAIRMAN RYAN: Thank you.

And let me introduce again Dr. Malcolm Knapp who is here with us as the most newly retired member of the folks who dealt with low level waste from the NRC. And we're pleased that you could make time to come back and see us.

DR. KNAPP: Well, I'm delighted to be here.

I have to say that I --

CHAIRMAN RYAN: Can we bring your slides up, too? I think we'll need to do that. We'll take care of that while you're talking. Go ahead.

DR. KNAPP: I was going to say I enjoyed being here speaking on the same podium with Paul, because if I can borrow from Mark Twain, between us when it comes to low level waste we pretty much cover the history entirely. Paul knows all that can be known and I know the rest.

I'm going to talk a little bit this morning about strategic assessment and rebaselining as it applies to low level waste. And this was an exercise that the Commission undertook from 1995 to about 1997. It began in August of 1995 and finished with the creation of the first strategic plan, this document right here, which was issued in September of 1997.

The effort was initiated and personally directed by then Chairman Shirley Jackson, who actually was not only the Chairman at this time, but she was the single administrator of the agency. There were so few Commissioners that consistent with the law, she became the single administrator. And she undertook the strategic assessment I think for several reasons.

In part, to create a strategic plan. In part, I think, to get a better handle on what the agency was doing. And in part to fulfill an obligation I think she had to try to position the agency for the century that it was about to enter.

The strategic assessment exercise was largely hers, but yet also came in part from her friend Hazel O'Leary who was then the Secretary of Energy who had done a similar exercise somewhat earlier there.

And to give you a feel for what we did, the exercise took place in four phases. There was the assessment itself, there was a rebaselining which involved the creation of issue papers, the development of the strategic plan that I just held up, and finally the implementation of the plan.

In order to that the Chairman pulled about a dozen senior managers from around the agency, deputy office directors whom I was one, regional administrators Luis Reyes our current EDO was involved. And we also got maybe, oh, a dozen more folks to help us out and Jim Kennedy was one of those. So Jim will bring to this strategic assessment the experience from the last one. And I think a notable staying power, Jim. My congratulations to you. I don't know if congratulations are right, but at least you'll know how we went about it.

We worked on this thing more than half time for the better part of a year. And it was exhausting. We identified 4500 activities that the agency was engaged in, and we looked for issues associated with those activities. We combined them, we organized them, we binned them, we then developed overarching issues associated with the first issues. We then turned those into direction setting issues.

We then provided initial ideas to the Commission or alternatives or options associated with the issues. There were about two dozen direction setting issues in total.

The Commission made initial decisions on the issues. These were then communicated to the public both in writing in a series of meetings. The public responded. The Commission in some cases maintained their initial decisions, in other cases, and low level was one of them, they revised their decisions. And finally issued the strategic plan over a period of about two years.

There were 24 issues in all, not all of them by the way got to the public. Some were internal that simply did not merit public discussion. I think 16 were heavily discussed publicly. And there was one on low level waste. And the stated issue was: What should be the role and scope of the NRC's low level radioactive waste program?

So low level waste got a fairly visible seat at a relatively visible table, one of, as I say, about 16 issues that the public really focused on.

Other issues ran the gamut. There were decommissioning, reactors, materials, international programs, fees. And one you've heard of, risk-informed performance based regulation.

Now, with each one of these issues, and in particular today, the low level waste strategic issues, there were two things that came under the consideration of the planning group. What were the principal factors that affected this issue and what were the options that should be considered given those factors.

This will give you a little insight into what we thought the factors were ten years ago. The principal ones were that it was considered progress in siting new facilities had been slow. But there was optimism. The staff believed that new facilities would be licensed and operating in the year 2000. The staff at that time believed Ward Valley would be up and running in the year 2000. The staff also believed that low level waste disposal and management options were pretty much available.

In some ways some of the things you're hearing are not very different from what you'll hear today.

They believed that there were options

available to people who might not have access. Michigan at that time I think had been denied access for maybe months, maybe a year, and things seemed to be working. There were no catastrophes in Michigan.

So the sense was things were going slowly, but they were not out of control.

There were two other options, two other factors. These first three were considered external factors. The bottom two are internal factors.

There was a government-wide effort at that point to streamline and reduce costs. Maybe there always is, but it seemed a little more intense than usual in those days. And in 1994 the Commission had moved in the direction of significantly cutting back the low level waste program. And in fact, this resulted in a Commission paper SECY-95-201 that considered serious cutbacks, almost termination as one of the options of the program in order to be responsive to costs. This was done, in part, because NMSS had limited resources and they felt they had reached the point where they could no longer trim each program a little bit, but they would simply have to make a hard decision regarding a program and low level waste was the one at that time they felt that was where the decision had to be made.

I think it's also fair to say that this was not just a low level decision, but it went throughout the agency including the Commissioners. As I say, this was under consideration.

What the Commission did in fact was to defer a decision on that sort of a cut so that it could be considered as part of strategic assessment. One of the reasons to that was a very letter by the ACNW, December 29, 1995, strongly advocating that the Commission in fact strengthen and enhance the low level waste program.

So this was the climate that was in front of the Commission at the time that it was looking into DSI-5, what should be the role and scope of the low level waste program. With that in mind, the staff identified six options to be considered. These were brought before the Commission in a Commission paper. They're kind of interesting.

The first five are different. They're essentially starting with the very significant role of low level waste and going down to the point where it will be transferred to EPA.

The sixth dealing with assured long term storage could in fact overlay the first four pretty much.

The first option I think is kind of interesting. "Assume a greater leadership role." This option was one in which the NRC would become a strong advocate for increased low level waste disposal capacity. The NRC getting into a role of advocacy? Why would that make sense?

Well, the fact is it was argued under this option that NRC's job is to protect public health and safety. And a fundamental belief in the Commission was that you needed to have low level waste disposal capacity to ensure health and safety. And therefore, NRC should consider whether they should advocate development of the disposal capacity and do what was needed to do to ensure it. Simply to avoid concerns about storage where things got of hand or the potential for midnight dumping.

The second alternative "Assume a strong regulatory role in the national program" would simply have been a return to the program that NRC had in low level waste a year or two earlier about 1994, which had about a dozen staff associated with it.

Are you hearing echoes of Larry's talk an hour ago?

Retaining the current program would have had about five to ten staff.

Recognizing progress and reducing the program would have been a recognition that most of the developing low level capacity was in agreement states. Agreement states although they were making progress, did seem to be making progress. And given that NRC has limited resources, but the program back to just a few FTE.

The fifth alternative was to transfer it to EPA. To make the argument, again perhaps echoes of this morning, that low level waste disposal had a great deal in common with toxic waste disposal and that perhaps NRC should focus on low level waste management with its materials and reactor licensees, but allow EPA to worry about its disposal: Recognize the similarities between the risks in both types of waste.

The sixth option, which is as I said a moment ago overlies the first four, would be to accept assured long term storage. In 1995 that was about when the idea surfaced that because it was very difficult to site a low level waste disposal facility, it might easier to site a storage facility. As we understood the concept at that time, assured long term storage would be storage without any particular intent of closure. It would be actively managed. It would be not unlike, say, an above ground vault. It would rely on engineered features rather than geology and it would rely on active management.

The idea was that perhaps this would gain more public acceptance than disposal.

The Commission had very mixed feelings about that. The Commission's policy at that time had been strongly that we must dispose of low level waste as promptly as we reasonably can to avoid the risks associated with maintaining them in storage. And so they were not comfortable with exactly how they should deal with that, and that's why that became a direction setting issue.

So these were the alternatives that we offered to the Commissioners. And they selected number two: Assume a strong regulatory role in the national program. Not go so far as to pursue advocacy of waste disposal, but to rebuilt the program to what it had been a year or two earlier.

As I mentioned before, we then took these ideas and the Commission's initial decisions to the public and listened to what the public had to say. And we received a number of comments from the public that we sort of collected them into some major ideas.

Some of the public felt that a strong

regulatory role was a very good idea. I think probably more licensees or potential licensees tended to endorse that role. Some organizations believed that the then current program or less would be appropriate. There were a number of agreement states, and I believe the Organization of Agreement States took that view. I think their belief at the time was that they were struggling to be able to site facilities and they really didn't want NRC taking a strong rule that might perturb what it was they were trying to do. The NRC taking positions they might to react to half way through a licensing proceeding. So they were interested in less activity on the part of the NRC.

A number of people said NRC should advocate its own expertise. While NRC might not advocate increased disposal capacity, NRC should be proactive in taking what it was good at and sharing these ideas both with the rest of the country and perhaps in particular the Department of the Interior where it was hoped that if NRC became active, the Department of Interior might be less likely to have the objections it had to Ward Valley. And that, perhaps, might result in a greater likelihood that the Feds would turn over Ward Valley to California so that it could be built.

People wanted assured storage explored further.

Some things people did not favor. They did not want to transfer the program to EPA. For all its strengths and weaknesses, most commenters felt that NRC had a better, more stable program than they were afraid they might have under EPA. And they did not want NRC to promote new disposal capacity.

There were also a couple of other things that came up out of the meetings. We got a total, I think, of about 49 written comments, 19 oral comments. We did that at three public meetings in Washington, Chicago and Colorado Springs. And there were a couple of other things that arose that really didn't make it into the documentation that I think are worth noting.

Many people wanted a stable regulatory environment. Again, things you've heard today. They weren't particularly concerned about exactly what the regulations said, as long as they had some sense of stability: That if they did it this way this year, they didn't need to worry about it changing next year and leading them into some kind of trouble.

They also wanted, to the extent they could get it, a level playing field so that they would not find out that in this state there were different regulations than that state that could cause problems. Again, issues that were not all that different from some we've heard this morning.

So given this, what did the Commission do? Well, they backed down a little bit. They went to option 3, retain the current program. The SRM that directed the staff to this did not say a great deal about why the Commission made that decision, and I don't think that I should speculate on it. But I can certainly say that it was not inconsistent with a significant amount of the public comment that they received. And it was, in part, responsive to the budget concerns that they had.

That would mean at that point that there should be about 5 to 10 low level waste staff. That staff would do that which was needed in order to handle the low level waste program effectively.

Now, again, the object of this exercise when you got to the third phase was to write the strategic plan. So how'd that come out? Well, actually, they have seven strategic arenas that are documented in this plan, and one of them was nuclear waste safety. And you can read here they wanted to ensure treatment, storage, disposal in a way that did not adversely affect this or future generations.

A lot of these look like motherhood, but I can tell you a lot of time and energy went into crafting the words that you see here.

They had a performance goal 4, low level waste. No releases of radioactivity beyond regulatory limits. That seems pretty obvious. Well, it may be but what they wanted was actually a strategy against which the Commission's performance could be measured so people could decide how well they were doing and they wanted something that could be objectively tested. And that's how they selected that.

What was their strategy? Perform legislatively required low level waste activities. Again, stepping back from significant advocacy; we're going to do that which we are required to do but we're not going to go that much further.

That's the strategic plan. It was issued in 1997. A revised version was issued in 2000 which had some similarities. Another one was issued, I think, in 2004 or '05 which has taken a somewhat different tact and so you won't see many of these ideas in the current strategic plan.

What did I draw from that that might be useful today? Perhaps the first thought, and this may be of some use to the Committee, I'm not sure to be very blunt how valuable the plan was, but the planning process was invaluable. Those of us involved in it got a great deal of training and understanding about where the agency was headed and where we might go next. And so I would probably encourage the ACNW to be involved in the planning process that Larry is talking about. I think it will have a salutary affect all around.

The second thing that I would say if you're going to do this, try to have a really good focus on your end point. With best of intentions, we burned a lot of resources and stumbled early in the game because we weren't exactly sure where we were headed. And the closer you can come to the end point or knowing what the end point is going to look like, the more efficient you can be in trying to get there.

I have one last one. You heard this morning and I'll simply sort of go over it again. It comes in part from what I learned here, in part from my own experience.

I would be reluctant to do a lot of tinkering with the regulation unless I was assured that there was a clear problem or a clear benefit to be gained. I quote from ACNW's December 27, 2005 letter. "Important to identify and evaluate any untended consequences from recommended changes." I applaud that sentence.

I also think that I agree, as you've heard earlier today, with both Bill Dornsife and Steve Romano to ensure that unintended consequences of changes are in fact understood before they are initiated.

That was the exercise, that's what I've drawn from it after ten years.

I would be happy to answer any questions.

CHAIRMAN RYAN: Bill?

MEMBER HINZE: Mal, in terms of the option of assured storage, in reaching the decision regarding that there had to be some exploration of that. How far did that exploration go and can that fit into the current regulations?

DR. KNAPP: I'm not sure the exploration actually went that far. And I may want to correct this date. I think it was May 9, 1996 Dr. Jackson wrote a letter to a gentleman named David LeRoy stating the Commission's position on this. And that letter raised issues more than resolve them. It said that the Commission was concerned about just how long indefinite storage might be that needed to be addressed. The Commission was concerned about whether you'd really want to license this under Part 60, Part 61 or perhaps a new part yet to be written.

The Commission raised concerns about financial assurance.

I don't know, and perhaps Larry or Jim or somebody can tell me, whether additional work was subsequently done where the Commission dug deeper into that issue. I'm not immediately aware of it.

MEMBER HINZE: Thank you.

CHAIRMAN RYAN: Just tell who you are, Scott, so the record will be clear.

MR. FLANDERS: My name is Scott Flanders. I'm Deputy Director of Division of Waste Management, Environmental Protection.

Since that time there has been additional work looking at a isolation facilities. And I think it was about 2003 time frame staff wrote a proposal making a plan forwarded to the Commissions regarding assured isolational facilities. And at that time they looked at information they gathered through surveys of various stakeholders. And it was clear that most stakeholders felt that assured isolation facilities were not necessary, that they felt as though they could manage their waste without the need for assured isolation facilities. As a result of that, the staff received an SRM from the Commission which directed us to continue to stay cognizant of what's going on either by the states -- I think CRCPD was also looking at the need for rulemaking on assured isolation. But to stay cognizant of what was going on in that area and to annually update as to whether there's a need to look at rulemaking on assured isolation. And also whether or not there's a need to look at revising our extended storage guidance. And the result of that SRM has led to some of the work that we need to do as it relates to updating our extended storage guidance. But to date the staff other than this annual look at what's going on around assured isolation, that's all that's done.

So what we've heard from industry really continues to say that there's so much of Mal said before, there's really not a need for assured isolation facilities.

DR. KNAPP: Thanks. Appreciate that update, Scott. Thank you.

CHAIRMAN RYAN: Jim Clarke.

MEMBER CLARKE: Mal, when were the six options presented?

DR. KNAPP: When were they presented?

MEMBER CLARKE: Yes, what time frame?

DR. KNAPP: I'm not sure because I'm not real comfortable with the date stamped on the material. I think it was April 30, 1996 that they went to the Commission.

MEMBER CLARKE: Middle '90s is --

DR. KNAPP: The options were presented in spring/summer of '96. The date stamp is April 30th, but I'm just not comfortable that that's the right date.

The Commission rendered it's initial decision where they picked option 2 I think about in August. And it was the fall/winter of '96 that we went to the public. The meetings were in October and November. And then we began writing up the final stuff and getting into strategic assessment the following year. Actually getting into the strategic plan.

MEMBER CLARKE: Yes. The reason I asked is, and I don't know if feasible to transfer the program to the EPA or not. I suspect it would be difficult. But it's an intriguing option for a lot of reasons. I mean, we heard from two site operators that they feel the RCRA approach could even be more protective. RCRA does have prescriptive designs, but it has a process to demonstrate equivalent performance. And so there's a performance-based piece there.

It would be interesting to see what the geographical distribution of operating RCRA sites is. It would be interesting to see how the other operators feels about that. Again, I don't know if this is worth pursuing or not, but it's --

DR. KNAPP: I wouldn't debate one way or another. I would just note that to do that would require literally an act of Congress. And that means that before you could begin to move in that direction, you would need a lot of enthusiasm in both agencies and you would need a champion in the House and a champion in the Senate. And if you didn't have all of that locked up, I wouldn't even try to go there because all you'll do is burn every resource that Larry has got and not have much results.

MEMBER CLARKE: I'm afraid I'm just relying a little academic interest.

DR. KNAPP: No. One of the things that that evidences, and if you were to look at the whole strategic assessment, the Commission was really looking at a wide range of options. They encouraged the staff to think out of the box, and we did. And in the event that did not appear to be a way that people wanted us to go or a viable way to go. But it did get serious consideration.

And very honestly, you look at what is going on right now and what we heard this morning, and these things are getting closer to what EPA is doing than what Part 61 doing. And so I don't know that turning over the program would be appropriate because of the great legal difficulties, but I think the concept is something I'm going to think more about than I would have three hours ago; I'll tell you that.

MEMBER CLARKE: Thank you.

CHAIRMAN RYAN: Well, it's my turn.

Now thanks again for a great presentation. If you had to pick one or two things and reach into the technical arena to get at what some of the other speakers said, you know what do we address as the highest priorities to say better risk-informed and at least bring solutions to various technical issues, from your experience what would they be?

DR. KNAPP: I may ask your indulgence. I would like to think about over lunch.

CHAIRMAN RYAN: Absolutely. We're going to be here for two days. So if you want to think about that, we can sure get you. I'm trying to get you to think about the same question that Paul basically answered in terms of what he saw are some key priorities and real opportunities to fix.

You know we heard from our speakers this morning on some of the things they're working on and have worked on, and I would appreciate your answer to that question.

DR. KNAPP: Well, certainly one thing I can tell you, I liked a lot of what I heard today about a variety of what I might call creative ways to dispose of waste with very low levels of activity at very reasonable prices. Frankly, that's preceded a lot better than I had anticipated. As you can see from these slides in 1995 we didn't anticipate anything like that. And I would certainly, to the extent that needs encouragement or could be facilitated, I would go with that. But I'd still like to keep my placeholder to answer your question.

CHAIRMAN RYAN: Sure. Absolutely. And I think what I heard was similar to how you summarized it. There are, I don't want to necessarily say creative because that sometimes has a negative connotation, but there are certainly risk-informed approaches to analyze the inherent risks for a particular setting for a particular material and a particular disposition scheme. And when you look at all that in total, it's careful analysis. You can conclude as have been the cases in some of these, that the public health and safety is protected, worker health and safety is protected and the environment's protected. So to me the idea of a process that encourages or even helps outline how those kinds of things, not necessarily the specific examples, but those kinds of things and strategies can be used would be helpful. Would you agree with that?

DR. KNAPP: I would agree very much.

CHAIRMAN RYAN: Okay. Well, thanks.

Ruth, you had one additional question?

MEMBER WEINER: I wasn't going to make a comment, but the question of transferring this to EPA came up and I just wanted to remind everyone that the Waste Isolation Pilot Plant is in fact regulated by EPA. It did take a federal law, the WIPP Land Withdrawal Act. And almost all of the stakeholders in that process didn't agree on a lot, but one of the things that most of us agreed on and worked on the project was that we wished that NRC were the regulator. Partly because EPA regulates a great many different things. NRC regulates the disposition of and management of radioactived materials. And this was the real problem with the WIPP.

So I just put that into everyone's thinking.

CHAIRMAN RYAN: Thanks, Ruth. Appreciate that comment.

With that and no further questions, we will remain adjourned until 2:00 when we'll reconvene from a lunch break.

So thank you all for our morning speakers. We'll look forward to an interesting afternoon as well.

And we thank you all for being with us.

(Whereupon, at 12:22 p.m. the meeting was adjourned, to reconvene this same day at 1: 59 p.m.)

CHAIRMAN RYAN: This afternoon's session, I think, will be an interesting one. We're going to hear from some folks that are involved in state programs. We're going to hear from the Nuclear Energy Institute and also the new license applicant and what issues are faced there. So I think it will be a rich afternoon session.

So without further ado, let me turn it over to Don Womeldorf from the Southwestern Low-Level Radioactive Waste Commission.

Don, welcome. Thanks for being with us.

MR. WOMELDORF: It's a pleasure to be

here. I didn't realize it was going to all on the stream there, so I guess we can ask each of you to take a turn reading a paragraph and then I wouldn't have to say anything.

CHAIRMAN RYAN: It doesn't work quite that way.

(Laughter.)

MR. WOMELDORF: I'd like to go through and highlight a few of the points, anyway, that -- the first sentence, I think sums up pretty well where we are. We're frustrated and have a feeling of futility sometimes, when we think about the developments that lead up to the fact that we do not have waste disposal facility in California. The Policy Act, when it was was passed got some attention--

CHAIRMAN RYAN: I'm sorry. We might need to turn your microphone on or up.

MR. WOMELDORF: It's not on. All right. Is that better?

CHAIRMAN RYAN: I'm not sure yet. Ron will help you out.

Now we're cooking.

MR. WOMELDORF: You know the old story about those of you in the back who cannot hear me, raise your hand. But we'll assume that it's working now.

(Laughter.)

Anyhow, after the Policy Act was passed in 1980, the user's group which is known as the California Radioactive Materials Management Forum, or Cal Rad, and Al Pasternak is here, the technical director. He'll be addressing you tomorrow.

But they got stirring up in the legislature in 1983, got legislation passed that said that California would have a disposal facility for low- level waste. The state was directed to seek compact partners that with or without formation of a contact, the state was to have its own disposal facilities. It was to be privatized, that is, the company was to be selected that would bear the costs of finding and opening a facility and then would become the so-called license designee, and be the operator.

The Department of Health Services, State of California, was to be the lead agency to oversee the company's efforts in locating a facility and ultimately to become the licensee and the regulator. And that legislation was passed with bipartisan support. It was signed by Governor Jerry Brown and I might note in passing that his chief of staff was a fellow that was named Gray Davis and he shows up in the story just a little bit later and not quite in such a positive fashion either.

So a number of firms competed to become licensed designee. US Ecology was the winner in 1985, and Steve Romano, whom you've heard from this morning, was a key member of the project management staff of that company. The state had set some parameters for a site including limits on the amount of rain, annual average rainfall and the population density and that sort of thing. So the company began to look for potential sites in the concentration of the southeastern desert portion of California, which is without much rainfall and doesn't have a whole lot of people in it.

They went through a screening process and developed a short list of a few candidate sites and just about that time, as a matter of fact, it was 20 years ago this month I was just telling someone that I became program manager for the state and so I have personal first-hand knowledge from then on.

So in 1988, US Ecology -- let's see if we can make this whole thing jump here. That's a wrong button. All right, where is our button person expert here? Oh, that button. Okay, different button. Roll it up a ways farther as long as you're rolling here. Keep going, a little bit more. There you go. That's fine. Good enough, thank you.

In 1988, they decided upon Ward Valley, which is a word or term that you heard often, I think, over the years and mentioned two or three times today, as a preferred site. And the State of California agreed with that. It was an area that had very little annual average rainfall and there wasn't anybody living within what, 25 miles, Steve? I've forgotten, but it's a long ways off to where anybody lived.

MR. ROMANO: Unless you count the trailers that people lived in about two miles from there, you are correct.

MR. WOMELDORF: Yeah, just wasn't anybody around. So the company then began its work toward developing the license application, and the state staff then began working toward developing an environmental impact report that's called under the California Environmental Quality Act. And that document would also meet the requirements for an environmental impact statement under the National Environmental Policy Act.

There were lots of public meetings and there were public hearings on all aspects of the process. The League of Women Voters was enlisted to oversee some of those activities. Stakeholders were brought into the process. Transparency was evident throughout. There just wasn't anything that wasn't all out on the table. And our nuclear folks, of course, were heard from and were allowed to participate, but the process continued. The environmental impact documents were certified and license application was submitted and we deemed it complete in 1989. And then after long and thorough review, the license was indeed issued in 1993. And that license was issued in 1993. That's 10 years after the enabling legislation was passed.

And I'm not sure if there's a message here that I should take personally, but I retired form the state on September 1, 1993 and that license was signed about three weeks later, so we have nothing to do with it.

(Laughter.)

So now jumping parenthetically to the situation as with regards to the Compact, I told you that the state was to seek Compact partners.

CHAIRMAN RYAN: You can just use the down arrow, Don, if you want to --

MR. WOMELDORF: I'm sorry?

CHAIRMAN RYAN: You can just scroll down with that.

MR. WOMELDORF: Scroll down, all right. Scroll down goes up, all right.

CHAIRMAN RYAN: There you go.

MR. WOMELDORF: There we go. The state was told to seek Compact partners under that legislation that was passed and so obviously Arizona was the best neighbor to work with because Arizona had not been assigned a Compact place either, and Southern California and Arizona began to work toward getting something going. But there were some objections from Arizona, so that fell apart and then California began talking with South Dakota, which also had not found a home at that time.

While we were working on developing a Compact with South Dakota and then the Arizona people kind of came around and said well, we changed our mind a little bit and ultimately, in 1987 we were able to get the Compact legislation passed that put together California, Arizona, and North and South Dakota since North Dakota was in the same situation as South Dakota. That was ratified by the Congress in 1988.

Now the Compact has been very active since that time. It had its first meeting in 1991 and has continued to be active. Now in our situation, unlike some of the places in the nation, the Compact is not involved in citing or in any way regulating the disposal facilities. So the main action that the Compact Commission has had over the years since its formation has been to keep low-level waste moving out of our four states and into disposal at South Carolina or in Utah.

So now jumping back to California and the disposal facility, the lengthy process that we've had from 1983 to the present has been embroiled in politics at all levels. And when I say all levels I mean local, state, and national. And that's really what's kept the Southwestern Compact from opening a disposal facility, because when US Ecology was granted that license in 1993, it was conditioned upon transfer of the land, the Ward Valley property which was under the management of the Bureau of Land Management in the Department of the Interior.

That land had to be transferred to the ownership of the State of California and we thought it was going to work all right. But there was a change in the White House and the Clinton Administration obviously instructed the Secretary of the Interior not to approve that transfer. And what's really ironic about that is the Secretary of the Interior at the time was Bruce Babbitt. Bruce Babbitt was the former Governor of the State of Arizona.

Arizona, if California did not take its waste, had to deal with its own waste problem. So you know, one would think that Arizona would leap at the chance of getting into a compact disposal facility in California, but Bruce Babbitt was apparently instructed not to allow that to happen. We in California had a very greatly enthusiastic and outspoken Governor in favor of the Ward Valley facility, Pete Wilson, but he was not able to persuade the feds to transfer the land either.

Ultimately, he was succeeded by Governor Gray Davis. And I mentioned, there we go, Gray Davis as having been the Chief of Staff under Jerry Brown. He came in as Governor and he was totally obstructionist as to proceeding with the Ward Valley. You know the term political will. Well, Governor Davis had political won't, and that's the way it worked. He was not about to do anything that would allow that Ward Valley facility to be built. In 1999, he cut off funding for the low-level waste project staff and activity dropped, just plain came to a halt.

In 2002, he signed legislation that

forbids the Ward Valley from being used as the site of a low-level waste disposal facility. Well, ultimately he offended enough people in California so that he was recalled and Arnold Schwarzenegger became Governor. And we had hopes that things would get back on track and we could see things moving along towards developing a facility, but that hasn't happened yet. It's just not become a high priority item in the Schwarzenegger administration.

The only thing that we really can see that Governor Schwarzenegger has done that Governor Davis would not do, he has appointed members to the Commission, and Davis would not do that at all. And one of the reasons this is critical, as I've mentioned before, that one of the main activities of the Commission has been to allow exportation of waste. Under law, it takes a two-thirds vote of the Commission to allow such exportation, and there are seven members of the Commission, so you've got to have five votes in order to let waste go.

The Commission had lost members and was down to only five. So everybody had to show up and everybody had to be in favor before any exportation could take place. So we were very happy to have a couple more members to give the Commission a little bit of flexibility. But that's all that's being done. Nothing has been done by the Schwarzenegger administration to date to move toward fulfilling its statutory obligation to develop a low-level waste disposal facility in California.

It still has that requirement under law, but it hasn't moved to do that. This is an election year and its not likely that anything is going to happen for the next few months either. So what happens now? Well, as it stands now, two-thirds of the states, four party states are going to be faced with a real problem in a couple of years. Class A waste can be sent to Energy Solutions as long as the State of Utah is willing to take it. We hope that they never change their mind on that. So that's not seen as an imminent problem. As you know, Classes B and C waste will have a home at Barnwell only until the middle of 2008, and then we have no promise of any disposal alternative at that time.

Our generators are going to be in a real bind and they're going to have to either discontinue activities that produce such waste, and of course that sounds real good unless you think about what happens to medicine, what happens to research, what happens to industry, if those activities are stopped. Or else they're going to have to store that waste for an unknown length of time. We have just completed a survey of our generators and we find that only about 25 percent say that they are in a condition, in a position, where they can accept waste for storage for a number of years.

As you probably can understand, the ones that are able to store are the big generators, the utilities and so on. And the small ones are the ones who are going to be in a real pickle. One of our Commissioners here with us today, Donna Earley, from Cedars-Sinai Hospital, and she was saying yesterday talking a bit about what the storage to develop a storage facility requirements are. It isn't running down to Home Depot and buying a shed and bringing it back and nailing it together. You don't go through that kind of a simple process. It gets to be exceedingly complex. It's not going to be easy for our small generators to do that.

Several of us met yesterday to discuss a possibility of federal disposal, and if its possible in the future that the Congress came to be persuaded to accept our so-called commercial low-level waste, specifically B and C waste, then the incremental difference between what DOE already produces and ours is going to be about that much probably, you can see it at all. So it's not going to be a significant difference. From the technical point of view, it's not a big deal, but again it's like everything else. It will be a matter of overcoming the political hurdles.

So that includes my remarks. If you have any questions, I'm sure among Alan Pasternak, Steve Romano, and myself, we can come up responses.

Thank you.

CHAIRMAN RYAN: Jim? Ruth?

MEMBER WEINER: Thanks for a very thorough presentation of the Ward Valley problem.

MR. WOMELDORF: You're very welcome and I wish I didn't have to give it.

(Laughter.)

CHAIRMAN RYAN: Bill?

MEMBER HINZE: One question if I might, Mr. Womeldorf, lessons learned. Have you prepared or has anyone prepared a review of the lessons learned during this whole process? I mean you've spoke of a number of the negative points, but there are some positive points to the California situation as well. And it would be interesting to see that documented and I guess I'd like to follow that up with a question that is other than the political aspect of it, what is the one lesson learned that you would take away from your whole California low-level waste experience?

MR. WOMELDORF: Other than the politics, I can't think of anything other than the politics.

MEMBER HINZE: Okay.

MR. WOMELDORF: There's a disposal facility that US Ecology had proposed to license from the standpoint of any criteria ideal. The groundwater, the rainfall, the location, just -- it would be superb. As a matter of fact, our department associate director some years ago said California should be in a position to be able to take of the low-level waste west of the Mississippi. Nobody followed up on that one either.

As to your first question, putting together any kind of a summary, Steve, do you recall anything like that being done? It seems to me the League of Women Voters did something along those lines years ago, but I can't recall specifically.

CHAIRMAN RYAN: Come to the mic, and tell us who you are, please? Thanks.

MR. ROMANO: Sorry about that. Steve Romano. The League of Women Voters did prepare a stakeholder involvement summary that talked about the site-selection process. That was independently documented. Beyond that, I think once it got into the licensing phase, the other key piece of documentation is perhaps the National Academy Sciences study that was a review of, I believe, seven technical issues regarding the technical aspects of the site. It was concluded that the facility could go forward with certain additional monitoring recommendations from the NAS.

The political information, I suppose has been summarized in various technical papers in waste management, but I would add nothing more to what Don has said. It was a political decision on a national level and in fact, at a White House level.

MR. WOMELDORF: Thank you, Steve.

MEMBER HINZE: If you could direct us to that League of Women Voters material, I think we would like to see that.

MR. ROMANO: I'd be pleased to rummage through the files and find it and provide it for the Commission's and for the Committee's information.

MR. WOMELDORF: Thank you, Steve, I appreciate that.

CHAIRMAN RYAN: Well, the $64,000 question, will there be a site in California? Do you see any path forward where a new siting activity could start up or no?

MR. WOMELDORF: It would have to be initiated by some change in the Administration of the State of California. And whether it will come in Governor Schwarzenegger's second term or if it will be the next Governor after him, at this point I cannot even begin to speculate.

CHAIRMAN RYAN: So there's nothing concrete on the horizon, no pun intended.

MR. WOMELDORF: That's correct.

CHAIRMAN RYAN: Well, thanks. That's great insight. We appreciate you being with us.

Next on the agenda we have Henry Porter from the State of South Carolina.

Henry, welcome.

MR. PORTER: Mike and other Member of ACNW, thank you for allowing me the time to present some information on South Carolina's regulatory program and also for allowing South Carolina and I think there are probably some other states to be here and to let you know what we're doing and to have some input into what you all are looking at.

You heard from Bill House today and I'm going to try not to repeat too much of what he said, but there is some overlap in the regulatory program and the history of the Barnwell site. I'm going to talk some about our regulatory program, talk some about low-level waste acceptance at the Barnwell site, and also some about our approvals that are similar to the NRC's 20.2002 approvals that we did.

In September of 1969, South Carolina became an agreement state. Some of the reason why South Carolina became an agreement state at this point was because South Carolina was focused on nuclear industry and there were a number of nuclear activities that were going on in the state or that were planned for the state. The nuclear fuel reprocessing plant that was to be located in Barnwell was being planned and Chem-Nuclear was looking at Barnwell as a location for a low-level waste site. So it was important to the state to become an agreement state to have as much regulatory authority as we could at that time.

In November of 1969, a license was issued to Chem-Nuclear that allowed them to store waste in Barnwell and they did actually start storing some waste at that point. During the interim period between November of 1969 and April of 1971, there were a number of geologic studies and other studies done to support a license amendment to allow Chem-Nuclear to start disposing of radioactive waste. And in April of 1971, the license was amended to allow that.

The next date that I have on here is December of 1982, which is when the NRC published 10 CFR 61. And then in August of 1986 is when South Carolina adopted those requirements of 10 CFR 61 entire regulations. Before that, Chem-Nuclear had become using the waste classification tables so some of the requirements in Part 61 were being implemented before South Carolina adopted that.

The other date that I don't have on here, but that is an important date is 1995 when our state regulations were amended to go beyond the NRC's regulation to require the use of engineered barriers and enhanced caps and an enhanced leachate monitoring system.

A regulatory program, South Carolina has laws and regulations that we use to regulate the Barnwell site. Of course, the facility license. We have a compliance program and we also have an enforcement program.

Our laws of South Carolina has our own State Atomic Energy and Radiation Control Act. It establishes DHAC, the agency that I work for as a regulatory authority. It gives us broad authority to regulate any ionizing radiation or radioactive material. So we look at material that's not -- that's more broad than what the NRC has looked at for disposal at Barnwell.

It requires that DHAC promulgate regulations and our regulations are for the most part similar to the NRC's regulations. It provides a framework for the state ownership of property for nuclear activities which, of course, is a requirement under the regulations for a low-level waste site. And it also requires, interestingly enough, the Department of Commerce to encourage the development of nuclear activities within the state. So our act actually encourages the development of those nuclear activities going back to what I had mentioned at the point that South Carolina became an agreement state.

The second part of our Atomic Energy Act is known as the South Carolina Radioactive Waste Transportation and Disposal Act. And if you remember from Paul's talk, he mentioned that some of what was being looked at in the 1970s and early 1980s was the transportation of waste and waste forms and problems that were being seen with that. And so South Carolina adopted an act which provided for the regulation of the transportation of waste and also gave us authority over the generators of waste.

We have a regulation that regulates the transportation of waste in the state. That regulation also requires that generators have to meet our regulatory requirements that are both in our regulation and in the Chem-Nuclear license and that they have to meet all the applicable transportation requirements.

It requires a notification to the state of any waste shipment that's coming into the state and it requires the disposal facility operator has to report any shipment violations to our agency.

As I mentioned before, our regulations in the state are similar to the NRC's regulations. In some cases, they go beyond what's required by the NRC. They do provide for concentration averaging which is used -- which is allowed at Barnwell for certain waste forms. It includes provisions to accept waste other than Class A, B and C waste or greater than Class C waste and this is similar to what's allowed in 10 CFR 61.58. And we do look at those on occasions and I'll talk about that a little bit more as we get through my talk.

I mentioned that we go beyond some of what the NRC requires in their regulations. We adopted regulations that require engineered barriers and improved leachate monitoring system and if you remember, Bill House talked about the enhance ccaps. That's part of our regulation now. So all of the disposal trenches at the Barnwell site will have to have those enhanced caps.

Also, I mentioned our transportation of radioactive waste that provides us a mechanism to regulate the generators sending waste to the disposal site. The license, it includes 101 conditions. It is the longest license that South Carolina has. There are a number of things that need to be included in a license for a low-level waste site and that's the reason for that. It includes unburied possession limits. It has some general conditions, and these are things like authorized users, the location of the disposal site, those types of conditions.

It has a receipt acceptance and inspection requirements in it. That's where the specific requirements on how the waste comes into the disposal site and what types of inspections have to be done on it. Waste characteristics and waste forums, this is where the waste classification table is included in the license and the license actually further restricts the waste somewhat from the classification tables.

Contamination limits, some general packaging requirements. It includes site design, construction, and maintenance requirements. Included in that is that DHAC has to be allowed to perform inspections on the disposal trenches as they are being constructed, specific requirements for burial operations and environmental surveillance. In addition, there are more than 100 procedures that Chem-Nuclear has that are reviewed by our office and are part of the disposal site license.

The license does allow the use of the NRC's branch technical positional concentration averaging and encapsulation. It's applied for waste other, this actually should say applied for waste that includes sources other than sources on a irradiated hardware. So it would be used for things like filters and those types of media. For irradiated hardware, Chem-Nuclear developed an averaging process that's similar to the branch technical position. It's name is a Barnwell Rule of 10. It's included in Chem-Nuclear's Waste Acceptance Criteria, and it in some cases is more restrictive than the NRC Branch Technical Position.

The interesting thing is that the utilities who are shipping this waste also apply the

NRC's branch technical position, so it actually becomes the more restrictive of the two, either the Barnwell Rule of 10 or the NRC BTP. Sealed sources are reviewed on a case-by-case basis, and there is some provision to allow some concentration averaging over the solidification media.

Our compliance program, this should actually semi-annual license inspections. Our staff would probably like it to see biannual license inspections, but we do two license inspections each year. We also have weekly site inspections that are done by either our engineering staff or our health physics staff, going out on the site with Chem-Nuclear personnel looking at the disposal trenches, watching the disposal operations and generally pointing out areas where we think Chem-Nuclear needs to address things like surface water management, particularly if there are things like capping that need to be looked at and things like that, we look at those during those inspections.

Trench construction inspections, there are generally three inspections that are included in the trench construction, so we do those. Quarterly environmental reports, Chem-Nuclear sample their wells on a quarterly frequency. They submit the reports for that monitoring to us and we review those reports. And then there are special environmental reports that may be done at the direction of our office or may be done by Chem-Nuclear to address certain conditions at the site.

I mentioned new trench construction inspections. This is one of those construction inspections, most likely the initial inspection. We look at the elevations and the bottoms of the trenches to make sure that they are in accordance with the plans that are approved. We look and that includes both the floor elevation. There's a French drain system that runs along the side of the trench. We'll look at the elevation of the French drain. And there are sumps that are included in that.

There are two other inspections. There is a drainage sand that's put into the French drain, and we look at that to make sure that there's adequate sand that's put in there and then a floor sand that's put in the bottom of the trench. And we'll check that to make sure that the depth of that sand is as required by the plans and the procedures that Chem-Nuclear has.

Our on-site inspector checks all of the shipments that come in to make sure that they comply with the transportation requirements. Right here he's checking the gamma-dose rate on the outside of the shipping container. Most likely it's a resonal or filter liner inside of that shipping container. Also, it takes smears to look for removable contamination on the outside of the shipping containers.

And review the manifest and other paperwork that's included with the shipments. Based on this review, our inspector may decide to do a more enhanced inspection of the waste package itself. Chem-Nuclear has facilities where waste packages, depending on the dose rate, can be brought in for a package like a drum. It can be opened and look at the waste form inside the drum. If it's something like a liner or a high-integrity container where we're concerned about excessive free liquid, they have a device that can be used to determine what the amount of free liquid in that container is.

Waste acceptance, we use the waste classification tables. They're in our regulation and in the license, the same ones that are in 10 CFR 61.55. We further restrict transuranic radionuclides. They're restricted to not more than 1 percent of the total activity in a waste shipment and we restrict radium.

We require that the classification has to be based on the higher of either the unprocessed or unconsolidated waste class or the processed or consolidated waste class. So the reason for this is so that we don't have processors that use a lower class of waste to dilute a higher class of waste to make it acceptable for disposal.

We also don't want -- we also want to recognize that during the processing of some waste streams, the waste class may actually go to a higher waste class and do see that for certain types of processing, particularly for processing ion exchange resin. A lot of times the waste class will go from a Class A waste to a Class B waste or from a B waste to a C waste.

Sealed sources, the class is based on the volume or mass of the source. Generally, under the requirements of the license, but we do review on a case-by-case basis the averaging the concentration of that source over a relatively small amount of solidification media that can be used for processing those sources.

As I mentioned, we used NRC's branch technical position on concentration averaging and encapsulation and the Barnwell Rule of 10 and case-by-case reviews for sealed sources.

Greater than Class C waste acceptance. We've had an occasion to go back and look at how many of those we've done recently and we don't do very many of them, but there are instances where Chem-Nuclear has asked to receive something that's greater than Class C. We get about an average of about one a year of those types of requests. If you looked at it probably from a volume standpoint, it's probably less than 5 percent and may even be down in the 1 percent kind of range if you looked at the actual waste itself that would be -- that we're looking at and certainly a relatively low amount of radioactivity.

It's generally driven by radionuclides that are not mobile in the environment. That's one of the considerations that we have. It includes radionuclides like Nickel-63 and Nickel-59, Niobium-94 and Carbon-14 in radiated hardware, generally, Carbon-14 is. The radiated metal which is usually stainless steel and in most cases we require some additional processing or packaging to make these greater than Class C waste acceptable for disposal.

The next area that I wanted to talk some about were our approvals that are similar to the 10 CFR 20.2002 approvals. Our regulation has a provision that's like that provision that allows us to review on a case-by-case basis alternate methods of disposal other than disposal of waste in a licensed disposal facility and we do look at these probably two or three a year. The utilities are one class that we look at. The utilities do some on-site disposal things like sewer sludge and some very low activity resins that they dispose of and on-site landfills that are also permitted by our agency, so we have multiple methods of regulatory control over those facilities.

We use a res-rad evaluation. We're looking at a dose that would result in or a dose to workers and to the maximally exposed member of the public that would be less than 1 millirem per year. It's disposed of in a permanent landfill, so we have a regulatory mechanism that's in place for that landfill. And generally, as I mentioned, it includes things like sewer sludges, resins and we have on some occasions looked at some components that have very low amounts of radioactivity associated with it.

The other type of approval that we've looked at is incineration of oil. Generally, the oil that comes out of the main coolant pumps and other pumps that we used in nuclear power plants and if they're sampled and determined to be at levels that are acceptable for incineration, then we have provided approvals for those and they're generally burned in fossil fuel plants that are owned by the utility.

Other types of these approvals are decommissioning and other types of waste that come from licensed facilities that are not on-site disposals. We also use the same res-rad type of evaluation looking at a dose that would be less than 1 millirem per year. We restrict to no transuranic radionuclides so we don't have any -- there's an attempt there to not have long-lived radionuclides that would go to an unlicensed disposal facility. We do require that that disposal has to be in a RCRA subtitle D type of landfill which is a landfill that has higher controls than just a regular construction and debris type of landfill. Generally, they do have liners in those landfills, the ones that are in South Carolina.

The landfill also has to make an effort and has to want to accept that type of waste. They have to modify their acceptance criteria and that acceptance criteria is approved by our solid waste division within the agency.

And that concludes my talk. I'd be glad to answer any questions that you might have.

CHAIRMAN RYAN: Thank you, Henry.

Jim?

MEMBER CLARKE: Slide 7, had a -- I think you were talking about regulations where you cede to the NRC requirements, the enhanced cap that we heard about this morning and something called improved leachate monitoring system?

MR. PORTER: Yes.

MEMBER CLARKE: What is that?

MR. PORTER: The old leachate monitoring system that was used in the Class A trenches was an unlined trench that was filled with sand. The new leachate monitoring system is a lined trench that we feel like gives us a better representation of leachate that might collect in the trenches and since our performance assessment is looking at the mobility of radionuclides in the trench first, with the understanding that if they're going to -- for them to get out of the trench, they're going to have to first move within the trench. We wanted to have a more robust system for monitoring leachate that might collect in the trenches.

CHAIRMAN RYAN: Thank you. Just a clarification, Henry, the entire trench floor is not aligned, it's just the collection system for the drain.

MR. PORTER: Just the collection system for the drain.

CHAIRMAN RYAN: Which is a relatively small fraction of the total floor area.

MR. PORTER: Yeah, probably not more than about one percent of the area of the floor. And the purpose for that is not to be able to pump leachate that would collect in the bottom of the trench to remove the leachate. It's to monitor what might migrate out of the waste packages and get into the trench itself and then be available to migrate from the trench to the water table.

MEMBER WEINER: How do your regulations on transportation differ from 10 CFR Part 71 and the 49 CFR regulations that apply to Class 7 materials?

MR. PORTER: Our regulations are really in effect the same as those regulations, and we incorporate those requirements in our regulation by reference. Where we go beyond that is requirements for notification to the state for waste shipments. It's not for any radioactive material shipment, but for waste shipments, a 72-hour notification to the state. We also require liability insurance that has to be carried by the generator of the waste. That also names the state as an additional insurer under that.

MEMBER WEINER: To what extent do you think that your transportation regulations, even where they reflect the federal regs, to what extent do you see them as risk-informed?

MR. PORTER: Well, I think that both the NRC's transportation requirements and DoD's transportation requirements are risk-informed. Our requirements, the notifications, there is a class of waste with extremely low activity that doesn't require the notification to our state. So there is really that risk-informed kind of approach to that. But that's really where it's built into our additional requirements, and I think that risk-informed approach is built into the federal requirements too.

MEMBER WEINER: Do you do anything about routing? What routes can and can't be taken beyond the DoD regs?

MR. PORTER: Not generally for the low-level waste. Now we do look at routes that are used for, particularly for spent fuel shipments that come through the state. We have a number of spent fuel shipments that come through the state, maybe as many or more than any other state because of spent fuel shipments that DOE is involved it, it comes through the Savannah River site. We do look at some routing issues there. And we encourage, as the generators develop, there are routing plans that they try to stay away from the more heavily populated areas.

MEMBER WEINER: Final question. I guess this applies to more than just you. Everybody seems to be dealing with this question of waste that has so little activity that it really is, you can't tell it about background. Have you thought of petitioning NRC to reconsider at some kind of below regulatory concern regulation?

MR. PORTER: We've participated in some of the meetings that the NRC has had on their most recent work for rulemaking in that area. But under the allowances in the current regulation, we've been able to up to this point address the waste streams that we've been requested to look at. So I think that the current regulations provide a usable method that we can address those waste streams. It would probably be easier for us as regulators to not have to go and look at each one on a case-by-case basis. But the hurdles to jump through to get a rulemaking may be more difficult than doing those case by case reviews.

MEMBER WEINER: Thank you.

CHAIRMAN RYAN: Allen.

VICE CHAIRMAN CROFF: Yes, in one of your slides you noted a waste acceptance criteria that restricts transuranic and radionuclides and radium. How often does that provision come into play or has it come into play?

MR. PORTER: It probably most often comes into play with waste that's been in storage for a long time. The reason being that Cobalt-60 and Iron-55 are the primary radionuclides that we see in low-level waste that come into Barnwell. They make up more than 75 percent of the radioactivity that's received by curies. When waste has been in storage for a period of time, a lot of that activity decays and you end up with the transuranic activity making up a larger percentage of the total activity.

That's probably where we will most likely see that transuranic concentration exceeding the one percent. We'll occasionally see it in some filter cartridges that come out of spent fuel pools too, but that would probably be the main area that we see that.

VICE CHAIRMAN CROFF: Has the radium part of that come into play?

MR. PORTER: Radium generally hasn't been that much of a problem for disposal mostly because the

State of Washington has generally allowed radium, discrete radium sources, to be disposed of from out of compact generators at the Hanford site. So although we do occasionally have small amounts of radium that are disposed of at Barnwell, there seems to be other disposal sites that can accept that type of waste. So it really hasn't created a problem. At least my understanding is that the industry hasn't seen a problem with that particular waste stream.

VICE CHAIRMAN CROFF: Okay, thanks.

CHAIRMAN RYAN: Phil.

MEMBER HINZE: Your enhanced caps. How prescriptive are your requirements? What is the basis for your requirements? Where is the expertise? What expertise was brought into to develop those requirements?

MR. PORTER: The requirements really are not very prescriptive and we're really looking at something that provides better, I guess, less infiltration of water into the waste zone. We use some of the expertise that we have in our, as far as looking at the caps, expertise that our agency has gained from regulating hazardous waste sites, RCRA-regulated waste sites. And also Chem-Nuclear, when they first designed the enhanced cap that they're using on the trenches now, went really, looked at all of what the industry was using at the time and proposed what they thought was the best design cap based on what the -- really, at that point what the hazardous waste industry was using.

MEMBER HINZE: They go beyond a performed-based requirement?

MR. PORTER: Yes.

MEMBER HINZE: Thank you.

CHAIRMAN RYAN: Just to follow up on Professor Hinze's question, Henry, Bill House mentioned the Blue Ribbon Panel and some modeling activities. Did that tie into the cap, the cap design as well and how it would function over time?

MR. PORTER: They did look at the cap design. That group was primarily tasked with looking at Chem-Nuclear's performance assessment, but because we had convened a group of experts, we asked them to look at several other issues, the design of the cap was one of those and we had them look at some other issues like whether we should use a different technology at Barnwell, whether we should look at other technology that might be used either at other facilities in the U.S. or even facilities that are located in other countries.

CHAIRMAN RYAN: Thanks. In addition, you talked about 101 license conditions at this point. I assume there wasn't 101 on the first license version.

(Laughter.)

If you could give us some insight as to how it grew over time and how various conditions, not necessarily each one, but how did that evolution take place and it sounds to me like there's been sort of a response to the industry or response to waste generators' needs and from what we heard from the other speakers, it seems like you're on a track to address real, practical problems and solve them with license conditions and waste requirements and package requirements and all those kinds of things.

MR. PORTER: That is the case and most of the conditions were incorporated into the license before Part 61 was even developed. And the reason for that was because there were no standards other than just very general standards for disposal facilities. So there were a number of requirements that were incorporated by license condition on the disposal site. And those requirements came out of really two things. One was as DHAC would go down and look at the way the site was operating, we might decide that there was a problem that needed to be addressed and the way to address that was through a license condition.

The industry also was evolving and changing and so the license needed to be able to address the various waste strings that were being generated and they're still being generated by industry. We do look at things on a case-by-case basis for some particular waste streams, and that's because it's difficult to write a license that addresses all waste streams that would come into a low-level waste site.

CHAIRMAN RYAN: I think Mr. House brought some copies of the license and we certainly can make extra copies available. I think it's in the back of the room. So we do have it.

MR. HOUSE: Let me know who wants copies.

CHAIRMAN RYAN: Okay. We can read all 101 conditions and sit for the quiz.

Any other questions? Comments? Any other participants from this morning or the early afternoon session want to add anything or subtract anything or make any other comments?

Okay, we appreciate the two presentations by our state representatives this afternoon.

Let's go ahead and move on, if we can. We're a little bit ahead of schedule which is always good and we'll take a short break after this presentation, but we're pleased to have Mr. Ralph Andersen from the Nuclear Energy Institute to address us on his organization's views on the topic.

Welcome, Ralph. Thanks for being with us.

MR. ANDERSEN: Thank you. Well, I appreciate the opportunity to be here today. What I really want to do is provide you some data for use going forward and summarize how we view the situation. And then talk a little bit about where we think some of the more value-added efforts might be in regard to both the NRC and other federal agencies and the states in conjunction with other stakeholders.

First, I would like to figure out how to use the control.

(Laughter.)

Here we go. Very good. Thank you very much.

Before I start though, I'd like to acknowledge sources for our ideas within the industry that have come to light over the last several years and really influence our thinking on the issue. Always, EPRI has been working to establish more reliable data about our low-level waste and also coming up with a number of technical innovations that actually have had the effect over time of reducing the amount of waste that we deal with.

I especially appreciate the recent Part 2 report that came out from the National Academy of Sciences. I think I can say in fairly simplistic terms that we generally endorse the conclusions and the recommendations of the report. We think it sets a very rational framework for going forward.

We're appreciative of EPA's efforts to try to take a more integrated approach to overall waste disposal and management and we're particularly pleased that the NRC is stepping back, or the staff are stepping back, and trying to propose a more strategic approach to agency actions in low-level waste area, especially in appreciation of competing priorities and limited resources.

And then finally, thank you ACNW for continuing to provide a forum to get a wide variety of ideas and information out in front of us. I find these very helpful to take that information back and factor that into the things that we're doing and the things that we're recommending.

So first, I'll present some data. One of the ways that we analyze and break down waste, I should digress for a second. We have begun annual polling through EPRI of the utilities and obtained that information and then compile it and make it available. So it's more or less an annual update. The data that I'm showing you is pretty much averaged data over the period 2002 to 2004 because what we're trying to do is at this point is just present a kind of a characteristic description of our waste.

One way we've broken down our waste is by functional categories, so I'll go through some of these acronyms with you. GIC stands for Green Is Clean and it's actually referent to the processing and disposal program within the State of Tennessee for very low-level exempt quantities of low-level waste.

DSW stands for dry solid waste, essentially paper, trash and other solid materials.

WSW is wet solid waste, even though the waste at the time of processing is actually try, but essentially is resins and filters, oil, irradiated hardware. And then greater than Class C waste and then MW is for mixed waste.

So what this shows is waste generated and that's the key is that the next slide will show waste disposed. But obviously, the highest generation is of the dry solid waste which generally falls into Class A category as waste and generally represents very low external levels of radiation. In fact, much of it is waste that is barely detectable or even in some cases not detectable, but because of its origin, we just make the presumption that it likely has some contamination.

This is actually waste disposed, so it certainly is more germane to the situation in regards to disposal methods and disposal sites. A couple of comments that I would like to make from this chart is first of all the scale on this chart is about 1/40th of the scale on the other chart, so the first thing you should recognize, this represents a substantial reduction in the overall volumes. As a reference point, on the previous chart the dry solid waste category was about 1.2 million cubic feet. As you see on this chart, we're talking about 50,000 cubic feet ultimately disposed of which is a rather substantial reduction in volume, and likewise for most of the other categories.

So this represents after secondary processing of the waste and most importantly after volume reduction.

Broken down by waste types, one of the things that we've begun tracking for dry solid waste is breaking in the category of waste that has any appreciable contact radiation levels versus that waste that doesn't. And the reason, obviously, why we're doing that is that at least one state, and actually several states, use that as a break point where waste might be available for disposition through other methods and this has to do with the potential of exposure of people handling and disposing of the waste at a site that's not a low-level radioactive waste disposal site.

So I would point out that about half of our dry solid waste in process form actually is less than 1 mR/hour on contact is generally not discernible from background. The overall volume of waste represented here is about 81,000 cubic feet, and that's pretty typical now of our annual waste disposed. Of that, I'll mention again about 25 percent of the overall volume fits that top category which may be amenable for consideration for other disposal options.

About 15 percent of the waste based on those three years of data is Class B and C waste, which of course where we see our future issues. And of course, most of that Class B and C waste falls into the category of the dewatered resins and expended filters, and therefore is characterized as wet solid waste. One of the things we've done, and I don't have detailed data with me today but I'll be happy to bring some to a future meeting. We're still finalizing some of that. So we have been analyzing very carefully the decommissionings that have taken place and the decommissionings that are underway to try to gain a typical understanding of decommissioning waste. I will say at the outset that the ranges are very wide and therefore the numbers that are farthest out in the future here in these estimates and projections have to be treated with fairly large uncertainty bars.

But nevertheless, these represent the mid-range estimates if you simply take the averages, calculate the numbers, multiply them by plants and when they might shut down. These charts take into account the fact that most or all reactors are likely to extend their licenses, and basically what it tells you that operating waste generation for disposal actually will remain fairly constant. It tails down slightly as we complete the decomissionings that are currently underway. But around 2035 is really when we enter into the leading edge of decommissioning of the current fleet of reactors.

And again, there may be several that would occur earlier in time if they either decide not to get a license extension or do not receive a license extension. But during that period, what you see is in terms of volume, is an increase from an average of about 50,000 cubic feet a year of -- excuse me, about 65,000 cubic feet a year of Class A waste moving up to about 250,000 cubic feet a year of Class A waste. And then for the Class B and C waste is where the difference is particularly substantial. It goes from about 10,000 or 11,000 cubic feet a year during the operating regime up to an average annual volume of about 75,000 to 80,000 cubic feet of B and C waste.

The other element we look at it is in terms of dollars. And if you project current benchmark type values for disposal costs, which I always have to remind myself here. These were projected on the basis of $250 a cubic foot for Class C waste and $1,000 a cubic foot for Class B and C waste. Those are disposal costs only. Those don't take into account interim processing or packaging or volume reduction. So those are at the site disposal projections.

This particular data I think is of a special interest because we often talk about corrections that might be made by the marketplace.

Additionally, we talk about impacts that are created artificially by overlay, for instance the Low-Level Waste Policy Act that has affected the marketplace and affected available revenues, and have probably led in a large part to the situation that we have today.

I point out that in the 20-year period from about 2035 to 2055, we're actually talking about an average revenue stream in 2005 dollars, but about $150 million dollars a year or over that entire period you're talking about $3 billion dollar market. I'm a great believer in the society and the system in which we live, and so I have to believe as people look forward to that bulge in the marketplace that that's going to bring forth a lot of new approaches to people that would like to capture some that vary large revenue pot.

So I think to project into the future, we need to remember that not only will trends change that we're tracking, I really believe that the whole environment in which those trends exist is going to change as well. Sometimes it's easy to lose sight of that.

So our situation is not overly surprising. I think we all know it well. In terms of people who have responded to our survey, and by the way we typically average about a 75 to 85 percent response going forward. Virtually everyone disposes of their B and C waste at Barnwell, and most but not, all dispose of Class A waste at Envirocare. Some dispose of some of their Class A waste at Barnwell, and one particular plant, well actually a decommissioning and an operating plant in the Northwest dispose of all of their waste at the Hanford site. That includes one operating reactor and one decommissioning plant.

If you look ahead based on what's currently on the table, what you expect to see after 2008 is that the Envirocare site would continue to accept from their end would continue to accept Class A waste from anyone and would continue to receive no Class B or C waste. At least that's the presumption. Barnwell, if it follows through with the state law, of course would then encompass 13 operating plants, 2 actively decommissioning reactors. Hanford would continue in its current status quo. If the Texas site to be licensed, that would encompass five operating reactors.

The way we kind of summarize that situation for ourselves is that until we begin decommissioning, our waste volumes generated will remain pretty much constant. Our waste volumes disposed won't because we probably won't be disposing Class B and C waste, unless some new solution comes in the horizon. So that if we went back to that other graph that showed a fairly solid line for Class B and C waste, in truth that line could end up being zero. We simply may end up storing all it for some indefinite period of time.

After 2008, more than 80 percent of the plants will lack that option. Of course, 100 percent of the plants lack a greater than Class C option. The disposal site options for Class A disposal may increasingly be restricted, and what that relates to is as these situations change, it's hard to gauge whether particularly if there were a Texas site, and particularly in regard to the Atlantic Compact, whether economics might drive them to decide that they no longer want to permit their Class A waste to be shipped elsewhere.

Remember, it's a two-way street. The recipient needs to be approving receipt of the waste, but also the compact from which waste is exiting has to be approving it exiting it the compact for disposal somewhere else. So that will be kind of an interesting mix to watch too. It's not presumptive that we would continue with the first bullet being accurate. And of course, after 2035, the whole situation changes drastically.

By the way, I should mention in none of those graphs did we factor in the expectation of new plants coming on line, although I will say that the design considerations that are going into those plants will have a strong tendency to have less volume of waste at higher waste categories or said differently, less B and C waste and progressively less upper end-day waste and even less overall waste, at least that's the end both for operation and design characteristics. But nevertheless, those aren't factored in in any way.

Our near-term activities that we see that we would like to see prioritized and we've mentioned these before. They haven't changed considerably, is one to really take a much more aggressive approach to the flexibility that's already built in to 10 CFR 61. You know, there's discussion from time to time about gee, we should go back and do rulemaking and change CFR 61. Our view, and I think it's shared by some of the staff and others is there's really a lot that could be done well in advance of having to pursue an actual rulemaking and we'd really like to explore a lot of those options.

One simple example is updating the dose

metric models and concepts. That's a fairly straightforward thing to do and in fact, the Commission two years ago actually approved that for 10 CFR Part 20. It allows one to use the most current and updated science rather than methods that are somewhat antiquated.

So that would be a simple and a straight forward approach that could be taken. As one would translate the performance criteria to concentration values, for example, it would substantially affect some of those.

Another example, we're doing preliminary work on what radionuclides really drive us into the B and C category and we would expect that later this year, I'd like to think around October-November, we'll have something substantive ready for publication, that it would be, certainly enjoy the opportunity in addition to talk to the staff, go up and talk to the ACNW about that. But some of our earlier information highlighted two interesting examples. One is Nickel-63 which tends to be a very large driver in the Class A waste. It would otherwise be Class A waste, instead being classified as Class B waste.

And in the case of waste that would otherwise be Class C waste that ends up being classified as Class C waste, Carbon-14 is a big driver. Now what's interesting in both of those in the waste classification scheme is that they're both driven by the same scenario and that is for the resident farmer, the ingestion pathway. That's the overwhelming issue on both of those that causes them to fall into those higher tiered categories.

Now what's interesting is some sites, let's just name one out far west of here, but not all the way to the coast, doesn't really provide an environment where a resident farmer could ever get something to grow, even if they tried. Not to mention that the groundwater itself is brackish, so it's somewhat unrealistic as a starting point to expect that a farmer is going to decide to farm where farming can't be done. But additionally, that they're going to produce enough result that they're going to be able to live on that on a year-round basis, which is the ingestion pathway.

If you remove simply that one pathway, if you still allowed the resident farmer, just took the pathway away, for instance, the impact on the calculation in terms of Nickel-63 would be reduced by a factor of about 800. The reduction in the factor on Carbon-14 would be about 100 million. Said simply, if you took both of those away, you effectively would cause a lot of current Class B and C waste to be declassified to Class A waste. So there's a case of using flexibility in Part 61, as intended, to a specific site situation.

Now I do understand that earlier today, there were comments about how specific licenses are set up and hurdles that may have to be overcome, but I'm just talking from a technical or a scientific point of view. One could say in very simplistic terms that we're over-estimating risks and making decisions and expending resources on the basis of factors that vary anywhere from an overestimate of 800 to an overestimate of 100 million and that strikes me as a nonproductive use of resources and effort.

So what we're trying to get through overall with this, of course, is to have more realistic risk assessment and risk management practices. But there's clearly large opportunities in that area that one can take a look at.

We certainly want to pursue an accepted guideline or regulatory guidance, but we really think the way to go here is to propose an industry guideline for robust waste storage. And what we're looking for there is we would really like to standardize our own practices and create a graded approach to waste storage, recognizing that that storage may go on for very, very extended periods of time, including through decommissioning of the plant.

So what we look at is gee, on the horizon, what is the solution to B and C waste disposal. Well, there isn't one at the moment. A lot of ideas, but there is no solution that's really underway.

So we've decided we will use our ensuing time between now and mid-2008 to generate, make available for review and hopefully obtain staff concurrent with guidance that effectively would allow us to store that waste at the site indefinitely. We don't want to be in some iterative process where we're doing this over and over and over again and our thought to a standard is a one-time review should suffice, then the individual licensees can come in behind that and basically take advantage of the one-time review, rather than having each one appear as a completely separate and distinct proposal.

The other things that we need to take into account when we look at it though is the impact of decay over an extended storage. There was a strong reason why Safstore was invented for decommissioning. And it was that it would have the effect of tremendous reduction in dose to people actually performing the decommissioning, if you let the plant simply sit and decay off for a long period of time. Since the time that that thinking occurred, of course, we've come up with a lot of dose reduction technologies that have made that point moot to a certain degree, but in the waste arena, we really want to take a look at this B and C waste we would be storing for 30 years or more and take into account in a much more productive way the effect of radioactive decay. It might even decay itself away from B and C waste, especially if that were in conjunction with Safstore itself which actually turns it into a 60-year or even longer storage period.

And then finally, we also have to give due consideration to what packaging requirements might be ought there in the future. High integrity containers as far as I can tell are an artifact of the site-specific characteristics of the Barnwell site. It's not an inherent container that applies to any site for any waste disposal.

So that's an issue we're going to need to thrash our way through, because obviously we wouldn't want to store things in some ideal fashion where later it would turn out that we couldn't repackage it in a way in which became necessary in the future. Alternatively, obviously, we'd like to store things in a matrix where at least are amenable to dispersion and other kinds of problems.

So we're working on that. We've got an old version that we're basically starting with all over again. EPRI is leading the charge on this effort. We really hope to have a product to bring in to the NRC in 2007.

And then finally, for similar reasons, we want to develop an industry guideline for 20.202 applications that capture the rather large amount of experience that we have with those, both 20.202 and previous applications that have been approved, as well as those that have been rejected. There's lessons to be learned from all of them. The idea we have here likewise, is to create a standardized approach to the application that supports a more efficient review of the application. There's a lot we can find out where uncertainties played a part in final decisions that we might be able to ameliorate by providing much more robust application in the first place.

Also, we want to try to work with the NRC to have a better understanding of how the reviews are actually done. It should be predictable. It should be scrutable. It should be transparent, because what we're aiming at here is that we can get a more efficient agreement on the facts. That's what we're really trying to aim at. Now beyond facts, there are a large number of stakeholder issues that legitimately need to be addressed. But what we don't want to do is continually be going back and arguing about the facts. We'd like to have transparent models that people understand very well how they're done. We'd like to have robust data of high quality that stands the test of close inspection so that we can embark on the point of the stakeholder issues including our own and get down to business on those.

I note that the Commission is moving towards a more transparent process overall. I welcome that and encourage it. But let's at least get through the facts so that we can talk about the larger issues. So that's what we see for the near term that we'd like prioritize and things that we will be working on. For the longer term activities, and longer term can extend anywhere from several years out to geological eras at the rate some things are going, but in any case, where we see some value for some of these longer term efforts is to continue work on the issue of disposal at alternate regulated facilities.

You know, clearly we are caught in a one size fits all approach to waste disposal. If it is radioactive, then golly it goes to intensive 10 CFR 61 waste disposal site, unless otherwise exempted. That's a point that's brought in the various NAS reports and other studies is that multiple waste unfortunately was defined as all things radioactive, which is somewhat different than other types of waste are defined.

In fact, I know of no other category that covers the entire range of thing. There is a difference between household waste, hazardous waste, and toxic waste, for instance. But we do see opportunity here for determining what waste might be available for and what processes might be appropriate for authorizing moving from one set of regulation to another set of regulation. Certainly, the RCRA sites have a high bar that they have to meet for disposal of hazardous waste. That's what we're talking about here is Subtitle C facilities and uranium mill tailing sites. Gee whiz, those just happen to be radioactive waste disposal sites, don't they?

So it would be hard pressed to understand why adding material that's similar in nature to that would present some additional hazard. The update and improve the risk-informed performance base aspects of Part 61. That's a long-term issue, and what I see is that's a logical outfall of some years of work with the flexibility that's already in the rule.

Now hypothetically we might find that there never is really a need to modify a rule, but I do know that as one continually uses resources to explore alternatives, exemptions, and things like that, there's a tendency towards wanting to institutionalize that so that you can take repeated decisions made and turn them into a single decision. So that's what we're allowing for there. We don't see a burning need to jump into rulemaking. We just see that it's a logical outcome of some period of experience with flexibility within the rule.

And then finally facilitating disposal of certain wastes, and I say at federal facilities that's just a term that I use to refer security facilities that provide a higher level of security to address issues that are different from protection of health and safety, Category 1 and 2 sources being an example. And additionally, provide a much more robust approach to institutional controls. So that happens in our current experience to be federal facilities. Perhaps there are alternatives to that, but for now just take it that's what that term is intended to mean is increased security and a more robust approach to institutional controls.

The obvious one that we see is something I think you'll hear more about tomorrow from my colleague Joe Ring, that discrete sources of radioactivity that by their storage, if we're not able to dispose of them are going to create a lot of security issues that will need to be addressed. We simply tack another burden on the inability to dispose of them. And these again would be Category 1 and 2 sources.

Just taking that as a leading example, clearly we need to consider special cases in special ways. A phrase that some individuals from one of the government auditing agencies, I guess we can call it the GAO, actually asks the simple question. They ask "Gee, should we just federalize B and C waste?" I think that's an overly simplistic approach, but the underlying concept isn't a bad one. Essentially we have federalized disposal of spent nuclear fuel for example. We have federalized disposal of high-level waste. We have federalized disposal of greater than Class C waste. So the precedence is already there, it's just a matter of determining where the line should really be drawn and what the appropriate division is in terms of commercial market place and federal institutions.

Our activities in addition to the guidelines that I talked about are aimed at continuing to optimize our own practices. We're having a lot of success with identifying operating procedures and secondary processing that can have the affect of using more waste from the B and C category into the Class A category. Improved data and assessments, you know, we feel there's a lot we can do to help with this flexibility within Part 61. There's a lot we can do with bringing better data to the table for consideration of alternatives. Example again is the Environmental Protection Agency's ANPR.

So we're investing a lot into making a more robust database, figuring out other ways to slice and dice the data that's useful for decisionmaking. And then also doing various technical analyses that can be put forth in lieu of the staff having the resources to be doing them proactively.

And then finally, we see that we can continue to bring our own encouragement and support to what the NAS report highlighted, which is the need for active collaboration between all parties.

Now I typed this slide myself, so I take the full blame. There should have been "and stakeholders" at the end of that last bullet. I'm not content to let the states and the federal agencies go off by themselves and solve the problem. We all need to be there. The collective, all of us, that are represented here, that I think this idea of integration of collaboration is essential because most of the things that we have done in the past and some of the things we're currently contemplating pretty much, in my mind, exhaust the available set of things that we can do within silos. So it is a time where EPA and NRC and DOE and the states and public interest groups and industries and others need to work in a more collaborative fashion toward solution, given that a solution will have to occur because whether you like it or not, the waste exists.

Thank you for your time and your attention. I'd be happy to answer any questions.

CHAIRMAN RYAN: Ralph, thanks very much for your detailed presentation. We appreciate it.

Bill Heinz.

MEMBER HINZE: Storage of waste, Ralph. Do you -- is it possible that centralized sites for storage of waste are as viable as on-site storage?

And if so, is this being investigated by your group or EPRI or is there any activity in that area?

MR. ANDERSEN: I guess I'd say potentially, but the benefits would really have to be demonstrated. The layout of most of the facilities already provides you the existing capability for considerable storage capacity or is amenable to additions that would make that worthwhile.

In the spent fuel area, there's already a certain amount of that in that some companies have chosen one site to consolidate its storage of waste, so there's a case of rather than -- central storage within a company, rather than central storage externally. Some of that might make sense within a company where issues of transfer between licenses is -- you know, the overhead costs and that kind of thing could be dealt with more readily.

As far as centralized storage just generically for nuclear power plants and then I'll talk briefly about non-nuclear, other nuclear facilities -- I'm hard pressed to imagine a centralized storage facility that would provide the same level of safety and security as a nuclear power plant. It's difficult for me to envision the types of interfaces, the emergency preparedness plans, the actual security capability at the facility itself. In addition to the large available staff of monitoring, qualified radiation protection staff and all of that. I worked directly in the radwaste business when I started in this industry in 1973 through 1977. And we actually contemplated things like that at the time.

Believe it or not, we envision some of these kind of issues even way back then when we had five operating low-level waste disposal sites. And what we kept coming back to is those kind of overhead issues that are tremendously expensive whereas at a power plant, for those power plant wastes, they're already built under the operation of the plant. There's not additional security that you put into a factor, additional qualified staff that you have available, for example or an additional emergency preparedness plant to respond to accidents and transients.

So it's worth evaluating, but I'd be skeptical that that would turn out to be a winner for that area. Now for non-reactor facilities, I guess what I would say is this. I would approach that with hesitation because I would hate to be in the mode of endorsing that central storage as a measure that could preclude the nation moving on to solutions, particularly for sources that could represent a risk in security space. It needs to be evaluated carefully. I don't rule it out, but those communities are going to need to speak more to that because again, they'll have to bear the cost of doing that.

That's why I threw that idea out there about taking certain kinds of wastes and looking at accessing federal facilities than just going straight to disposal.

MEMBER HINZE: Thanks for your insight.

CHAIRMAN RYAN: Ruth?

MEMBER WEINER: I was very intrigued by your slide that shows the peak of disposition at around 2035 to 2050. If you could go back to that for a moment?

MR. ANDERSEN: Dollars or the volume?

MEMBER WEINER: They both show the same curve. What kind of change do you envision, let us say if we undertook if the nation undertook reprocessing on a major scale? Because since your maximum volume is dry solid waste, you're going to get some of that from reprocessing, aren't you? Let me just ask the question.

How do you envision that that curve would change?

MR. ANDERSEN: That's one of those different futures that I was alluding to and I'm glad you brought it up. Clearly, if we move forward with the very, very aggressive strategies that have been proposed, it is going to create a whole new perspective on waste disposal because as you say, not all the waste coming out the other end is geologic, repository kind of stuff.

And my thinking there is that it either feeds an even more robust marketplace which was my intent with the single graph, just multiplies those by much larger amounts because ironically that's a similar time frame. We didn't plan it that way.

So it could drive even a much large commercial enterprise to get engaged in that if we decide to go marketplace or alternatively if we go down the opposite road, then what it could do is push towards even more of a notion of all waste disposal falling under some federal oversight.

I'll just offer my own single opinion. I'd rather see the marketplace at work than the Federal Government. I don't want to go to my grave still wondering what happened to Yucca Mountain, for example.

(Laughter.)

MEMBER WEINER: I don't think any of us do. I take it from what you said about the ingestion dose for the backyard farmers scenario that if that were less conservative, more realistic, however you want to put it, that the B and C problem for decommissioning would be largely obviated. Have I read that correctly?

MR. ANDERSEN: Yes, it's very preliminary, but that's the quick run on our understanding of the waste. I don't see any reasons why that would not be true, but it's things like that we look at and we say okay, this is sort of a pilot evaluation to say would it be worthwhile to really put a lot of resource into doing very detailed evaluations like that. The clear answer is yes.

MEMBER WEINER: So that this, if you go back one slide to the other curve, we're not talking about costs, but just talking about -- there. So if you --

MR. ANDERSEN: You could bring that line --

MEMBER WEINER: You would bring it down.

MR. ANDERSEN: Way down and then the other one would go up somewhat. Yes, that could be the effect of that.

MEMBER WEINER: Because I was intrigued by your statement that you in the future plants would generate less B and C waste. Would they really generate less B and C waste or would it only be from this perspective?

MR. ANDERSEN: In terms of the way that lessons learned are beginning to be factored in especially for resin and filter use, that's where we see that the gains are, is that you could potentially even be producing larger volumes relative to our numbers today, but much lesser volumes of B and C waste by designing around that. You can actually do that operationally today. It's very clear if you've got filters accumulating radioactive material, you can decide when to change that filter. And so you're looking for the economic breakpoint when it makes sense to do that. If you design around it though, where you have stage filtration and things like that, you can actually optimize that process. And that's what's being looked at in new designs.

MEMBER WEINER: Thank you.

MR. ANDERSEN: A good hunch that I'd like to make here is there is obscure portion of 10 CFR 20.1406, which only folks kind of recognized was there. And that's the intention of that requirement is that new designs need to factor in exactly these sorts of things to impact waste generation and alternate decommissioning.

CHAIRMAN RYAN: Jim Clarke?

MEMBER CLARKE: Just a comment for what it's worth. I too was struck by your statement that if the ingestion pathway were removed from the resident farmer's scenario, that would have a major impact on waste classification as you were telling me.

MR. ANDERSEN: Preliminary is the word I want to keep using. I want to share it with you even though all the people that do it went through the calculations, they've convinced me at least but consider it preliminary information.

MEMBER CLARKE: As you were telling us that, I was reminded that the proposed revision to the decommissioning guidance do provide for analysis of other scenarios, just for what it's worth.

MR. ANDERSEN: That's actually the experience that drove us to step back and say gee, what about the low-level waste sites precisely for that reason.

CHAIRMAN RYAN: Just a friendly amendment on the change out of the filters, and I know you optimize on these points as well. Worker exposure for multiple change-outs is also part of your consideration I would assume rather than just the economics of how much cubic foot of waste versus a change-out schedule. It's a little bit more complicated than just the waste part. I know you optimize on those things routinely.

MR. ANDERSEN: Thanks for raising that point. Absolutely.

CHAIRMAN RYAN: I just wanted everyone in the audience to know that. The other part picks up on Dr. Clarke's comment. You know, when I first looked at the table many, many moons ago and saw strontium 90 was allowed in concentrations far in excess of cesium, I said what's that all about? Because we were all taught, cesium is not very restrictive and strontium is the most restricted fission product in terms of intakes. Well, it's the external dose rate, the external dose rate conversion factor that drives the cesium concentration down. So that plus the points you've made and what we heard for the rest of today convinces me that a 61 table that's in print and numerical is very much tied to that scenario that created that. And with 6158 and again for all the realism aspects we've heard, there's an opportunity to develop and defend alternatives. You know, your example even though preliminary is one such example, but it seems that that is an effective way to think about it.

What we haven't touched on too much today, and if you can I would appreciate you insights, is that it's not only the radioactive material in a disposal setting with a new scenario of intrusion or interruption of some kind, but also the robustness over time of the content of the material, its packaging, its waste form, the disposal site features like we saw on the photographs from Chem-Nuclear and other places where there's containerization and capping, and you know, I think about intruding into a foot and a half thick of reinforced concrete and I think my drill bit would return a resounding harmonic, you know, that would knock me down if I tried to drill through that.

Inadvertent intrusion is what the 61 says. And inadvertent means I don't know I'm doing it. I would think with some of these more robust engineered systems, you certainly would know that's not clay when you start drilling in. I mean, do you see all these kinds of interesting ideas on the table? Maybe you could comment on that.

MR. ANDERSEN: And I consider this

preliminary approach that we took for instance, and we also have the same reaction when the people doing it came back with the numbers. I mean, first of all we were incredulous and if we worked through that, what we appreciated was the I think that's just scratching the surface.

I think as you say one can begin to postulate forward and say in the past, we've taken advantage of the fact that we had a fairly workable if albeit patchwork low-level waste disposal system. As this becomes less functional, more difficult, more complex, whatever words you want to use, I think it's begun to introduce to us that there are a whole lot of things that were never just worth looking at.

I think you just suggested some of the waste form as a big one in my mind. You know, we moved away from that. We actually were heading that road at the speed of light in the 1970s. I mean, we weren't that far from the glass logs for low-level waste, but you know we had an abundance of waste sites. I recall that 80 cents for cubic foot with no surcharges was pretty much the norm for disposal of low-level waste in 1974, for example.

So there was an incentive there. Well, we need to revisit all that kind of thinking. I agree with you.

CHAIRMAN RYAN: I appreciate that insight. The other aspect of a kind of an early view of the 61 classification is a concentration doesn't necessarily give you a complete insight into risk. You know, I teach class and tell students well, is the high concentration for pick a metal on the table risky? Is it dangerous? Oh, absolutely. It's a very high concentration. So what if it's a nano curie at that concentration in some small device like Strontium-90 eye applicator that an ophthalmologist will use to treat some ailment.

Well, you know, it's quantity in concentration. I think the focus on the concentration tables has in part kind of driven us to think that of that as the risk metric when in fact my own view is that's a part of the risk metric, but it's certainly not dispositive of an entire comprehensive view of the risk.

Do you have any thoughts on that point?

MR. ANDERSEN: Except for taking that comment, I really don't at this point. Now I'll have to go away and think about that.

CHAIRMAN RYAN: When we talk about, you know, for example sealed sources, we look at quantities. We don't necessarily talk about concentration because with a small sealed source the external dose rate is related to the curies present. If we take, on the other end of the spectrum, dilute soils, you know very often the risk of moving a mountain of soil are the risks that are important relative to the transportation questions relative to the concentration of the soil. So again, I think we have to think about both quantity and concentration in the context of a particular example. I circled back around to the idea that a case-specific situation is good.

Now concentrations serve us well for a range. Not the very concentrated and not the very dilute, but over a broader range of typical things you run into particularly in say the nuclear power industry, yes it's pretty adequate to do the job and help with waste characterization criteria and license requirements and all those things we've heard about. Does that seem to make sense to you?

MR. ANDERSEN: Yes, it does make sense to me very much. And like I said, I'm actually going follow up and --

CHAIRMAN RYAN: I appreciate it. Any other comments or questions? Well, we are a few minutes ahead of schedule which is always good this late in the day. Actually, what I was going to do, we can certainly have one question but what I was going to suggest is take a short break and reconvene with Mr. Kunihero from Waste Control Specialists at his appointed hour. We've been in the chair for awhile, but if you want one question now. Sure, tell us who you are and who you're with.

MR. D'ARRIGO: I'm Diane D'Arrigo, Nuclear Information Resource Service. You said when you first ran through your presentation that these charts were based on an assumption of some number of dollars per cubic foot of A and B and C, and I just missed and wanted you to repeat that.

MR. ANDERSEN: Yes, let me look those up again. Unfortunately, age has started to catch up with me in remembering numbers. The assumption for Class A waste was $250 dollars a cubic foot, and this is just the disposal cost, Diane, it's not the shipping or the volume reduction or processing. Just at the site, disposal costs. And for the Class B and C waste, it was estimated at $1,000 dollars per cubic foot.

CHAIRMAN RYAN: All right, with that question answered, thank you, Ralph. We appreciate your insights and your presentation and we'll reconvene promptly at 4 o'clock.

(Off the record.)

CHAIRMAN RYAN: On the record. Okay. Our presenter now is Dean Kunihiro from Waste Control Specialists and, Dean, I think you're going to tell us a little bit about a new license application in the arena of low level waste. So we'll be curious to hear your update and our status and take it away.

MR. KUNIHIRO: Thank you, Chairman Ryan and Committee members. It's certainly a pleasure for me to be here, but for the record, my name is Dean Kunihiro. I'm a Vice President for Licensing and Regulatory Affairs for the Waste Control Specialist Company. As a sole applicant for a low-level waste compact disposal license not only in Texas but in the country, I think it's safe to say that it's an exciting and challenging time not only for WCS but for the State of Texas as well. It's certainly a privilege to be invited to share our perspective with you this afternoon.

The purpose of my presentation is really fourfold. What I would like to do first is to acquaint you with our site and its design, secondly to describe the licensing process that we find ourselves in, thirdly I will summarize administrative and technical review results that we recently completed and lastly I would like share just a couple of observations I have regarding the regulatory framework.

So with that in mind, let me start with an overview of our site and I would like to describe, Susan Jablonski from our regulating agency, TCEQ, has heard this pitch many times before, but I do like to describe our site in terms of what I call the five ideal factors and they are we have a remote site, pleasingly suitable climate, great geology and we believe a design that take advantage of that geology and finally but most importantly in my view is the community support that we share with our local neighbors.

WCSI is located in west Texas on the border with New Mexico. We own 16,000 acres. Although the disposal units themselves will be located entirely within Texas, a portion of our facility does extend into the State of Mexico.

This photograph I'm showing because it does give you a perspective of the climate. It is very arid in west Texas. This happens to be our admin and storage facilities as well as a rail receiving area.

This is another photo of our site looking in the opposite direction to the east and you'll see on the right-hand side of the photo our storage and administrative buildings and just to the left of that are current permitted RCRA disposal cell and just to the left of that is where we propose to locate the federal low-level waste disposal facility as well as the contact facility.

This diagram depicts our regional geology. We are fortunate to sit upon a broad expansion clay formation. The clay formation extends about 800 feet below the surface and it's right here at this location that the WCS site is located and what's important to not there is how close that clay formation comes to the surface of the earth.

This is a more detailed schematic and I'll just briefly describe what we have here. On the surface, we have loose, windblown sand and right below that we have a pretty substantial greywacki layer. For those of you not familiar with greywacki, it is hardened sandstone very much like concrete and if you've ever had to deal with it in your yard, you know what a substantial barrier it is.

Underlying the greywacki is layer of what is referred to as the OAG. OAG stands for ogallala, antlers and gatunia. Those are geologic formations that are comprised of loose sand and gravel. So this is a transmissive zone and below that we have that clay layer and as Bill Dornsife pointed out this morning, it is interspersed with sandstone layers.

And this 225 foot zone, Bill described it and let me elaborate on it. It is a very tight sandstone formation. Its permeability is about 10^{-6}. If I were to hold a sample and pass it around, you would think it is a piece of rock, but it does have microscopic airs paces. They are interconnected and in those air spaces, it is saturated with water.

Then below that, we have the clay formation extending 600 feet to the Trujillo aquifer which is saline water and not potable. So it is this expansive clay formation that is unique to our site and again at our site, it comes fairly close to the surface and when I say fairly close, where we propose to build the low-level waste cells it will be on average 30 to 40 feet below the surface. This is simply a picture, not very good one, of that formation.

And this is another picture of operating RCRA site which shows you the clay that we're talking about.

This is our design. Our design takes advantage of that clay formation. How? We will do so by embedding the waste entirely within the clay so that top level of the waste will not extend above the level of the clay formation. As a result, we're going to have on average a 30 to 40 foot cap which is a substantial cap in the industry and it will provide a very robust protection against intrusion and erosion.

As you can notice from this diagram, it will be engineered and designed so that any water infiltrating through the top layer will be transported laterally into the OAG which will then further transport laterally. Because this clay formation is on average 10^{-9} in permeability, we have great confidence in the ability of our site to totally isolate the material, I'd like to say, forever.

The last actor is community support and I could spend an entire presentation talking about the community support. Suffice it to say, we have enormous community support and frankly SCS would not be in this position were it not for this support. So again, I could go on and on in great detail about the support that we have, but it is unique and I think a very critical factor if we are to be successful or any site is to be successful in their attempt to license a low-level waste site.

Let me now turn to the status of our application. Here you see the various milestones. The application was submitted on August 4, 2004 and the major milestone we completed at the end of March which was to submit the last round to the round of technical questions.

Now what that means in terms of the statutory milestones is laid out in the law that authorizes us to apply for a license. Here you can see that we are about right here in the process. Pending the Agency's review of our last submittal, we expect a draft of our license to be published in the August time frame. We will be given an opportunity to negotiate the terms and the conditions of our license with the Agency at which time it may or may not revise based on our input and feedback, publish a final draft.

It is that draft that will trigger a notice for opportunity for hearing and we expect the hearings, administrative hearing process, to begin in December. The law sets out a one year period for the hearings. So we expect them to conclude in the December '07 time frame and it's at that point the administrative law judge or judges will render their recommendation to the Commission for a final decision. So we expect a licensing decision in the early '08 time frame at this point.

As I said, we did complete the administrative and technical review process and I would like to simply briefly summarize the results of that process. The administrative review was comprised of three documented rounds with the Agency and during the course of the administrative review, there were over 300 items that WCS had to address and essentially these requests were for additional information in order to make our application complete. The application was declared complete and we began the technical review which consisted of two rounds and that resulted in over 1,000 or 1,100 comments and questions that again we resolved and responded to finally March of this year.

The result of the reviews, both the administrative and technical, resulted in a substantial document. Our initial submittal was comprised of 12 three-ring binders and at the administrative and technical review process, the document that is currently before the Commission is now comprise of 33 three-ring binders, so a substantial amount of information as a result of these reviews.

It is WCS's view that in spite all of the additional information that we provided the agent, nothing of significance was changed in the document with respect to the characterization of our site and the performance of the site and none of the changes we view to have altered those chapters at all. It is our view that we have satisfied all the regulatory requirements that the site has been confirmed to be protective of the public health and worker safety and the environment and we are reasonably confident that in March time frame of '08 we can expect to see a license approval decision.

Now I'd like to close by making just a couple of observations about the process. First of all, the TCEQ regulations are based on 10 CFR Part 61 and in our view provide a sound regulatory basis. But it's been said that the devil's in the details and WCS's experience found that to be true. In reviewing the documentation both resulting from the administrative and technical reviews, there were over 25 different NUREGs or regulatory guides cited and from the company's view, many of the NUREGs are outdated. Some we believe were misapplied or misinterpreted and as a result of that, I believe the guidance documentation resulted in much of the requirements that we were ultimately required to deal with.

You can call them extra-regulatory. You can call them unanticipated. I think these are judgments and perspectives that are common to license applications, license applicants, and their regulator and I don't think this is unusual and this is not meant as a criticism, but I think certainly the detailed contents of these new regulations drove many of the requirements that, again from a company's perspective, were extra-regulatory.

So that completes my remarks. I would be happy to entertain any questions.

CHAIRMAN RYAN: Dean, just on your last slide, could you give us a couple of examples?

MR. KUNIHIRO: Just a few weeks ago, I went on a cruise to the Mediterranean and one of the documents sitting on my desk was a letter from the TECQ to the Federal Emergency Management Agency and that letter was a transmittal letter. It was transmitting our emergency plan to FEMA for review and that letter articulated the rationale for transmitting that letter to FEMA and essentially, the Agency concluded that the guidance provided in NUREG 1200 which is the fundamental basic review document had required this FEMA review.

I have to tell you having spent over 20 years with the NRC much in the area of emergency planning that I would find it very hard to believe that the Commission meant by that guidance that its licensees' emergency plans were subject to FEMA review. The NRC's extensive EP program is really guided at the reactor program and FEMA reviews the local and state emergency plans affiliated with any particular nuclear plant. But FEMA does not review NRC licensees' plan. So this is tantamount to the NRC reviewing or asking for review of one of its licensees' documents by FEMA.

So that's just one. There are many others, but I think I'd prefer to save them for another day. I haven't given too much thought. It's just that one in particular stands out in my mind because it happened so recently.

CHAIRMAN RYAN: Thank you. Jim.

MEMBER CLARKE: Thank you. I think it's slide 11 that has the conceptual facility design. Here we go. That's a very interesting design as you noted.

MR. KUNIHIRO: It is interesting and it is costly because again, we're going to be digging 40 feet just to get this level, 30 to 40 feet on average and then we have a planned excavation of roughly 60 to 80 feet for the waste disposal volume.

MEMBER CLARKE: So your cover is really below grade.

MR. KUNIHIRO: The cover is below grade. There will be a slight bounding but not substantial. There were certainly not be like Energy Sources above grade.

MEMBER CLARKE: Right, and it's 40 feet.

MR. KUNIHIRO: It will be roughly 40 feet thick.

MEMBER CLARKE: Okay. And this is the fourth cover design I think we've seen today. Your primary hydraulic barrier is the clay?

MR. KUNIHIRO: Yes.

MEMBER CLARKE: And that is compacted clay without a geomembrane.

MR. KUNIHIRO: Because we are applying for a mixed waste license, we will have geomembrane/leachate collection, all the requirements intended to satisfying 40 CFR.

MEMBER CLARKE: But you won't have a membrane over the clay.

MR. KUNIHIRO: I don't recall specifically whether there is a geomembrane in that.

MEMBER CLARKE: Okay.

MR. KUNIHIRO: But I believe there is.

MEMBER CLARKE: And your drainage system is really that rock layer that will convey any infiltration to the OAG.

MR. KUNIHIRO: Laterally, yes.

MEMBER CLARKE: Laterally. Okay.

MR. KUNIHIRO: So it is a substantial cap. It is driven not because we wanted to design a substantial cap. It results principally from our fundamental philosophy that we want to totally encase the waste into that clay formation without having it extend above that.

CHAIRMAN RYAN: Jim, let me call your attention and I don't know what they mean with the evapotranspiration and precipitation is such that there's a net efflux up.

MEMBER CLARKE: Right. I see that. I guess the other question I have is how do you propose to monitor that.

MR. KUNIHIRO: We are going -- We have given a lot of thought to that very question. We will obviously monitor leachate, but because of the impermeability of the surrounding clay this is really the first transmissive zone. So as Bill pointed out, we have proposed this zone to be our monitoring zone and again because of the permeability, it's going to take a long, long time for anything to get to the 225 foot zone.

We have calculated the water transport in this zone because it is a saturated zone and the groundwater travel time is roughly several orders of magnitude less than an inch per year. So it's in the thousandths of an inch per year groundwater travel time in this zone and this is 10^{-6} zone saturated and we have 10^{-9} clay here.

MEMBER CLARKE: Thank you.

MEMBER WEINER: Who owns the land? What's the land ownership?

MR. KUNIHIRO: We own all of the land and our proposal is to transfer ownership to the Department of Energy and/or the State of Texas because the law allows us to build a disposal facility for purpose of disposing Federal Government waste as well as a site for commercial compact generator waste. So the federal waste site will be transferred to the Department of Energy and the compact site will be transferred to the state ownership wise.

MEMBER WEINER: But currently it is private land.

MR. KUNIHIRO: All this is on private land currently, yes.

MEMBER WEINER: How does your -- Thank you. I'm in my mind comparing this to the problems that Ward Valley has and that of course is one of the major things here. You can do what you want with this land within limits I imagine.

MR. KUNIHIRO: But our proposal also necessitates the DOE accepting that property.

MEMBER WEINER: Right.

MR. KUNIHIRO: So just like California's case, it's Federal Government land, but they won't transfer it for their use. So we have to --

MEMBER WEINER: And if DOE did -- For some reason, there was a change in the attitude of the Federal Government and they decided just like in the case of Ward Valley not to accept it, what would the consequences be?

MR. KUNIHIRO: That could be problematic because of the way the requirements for government ownership. So that would be a major impediment.

MEMBER WEINER: How does this compare, the layers immediately below the surface, how does it compare to the geology of the waste isolation pilot plant because you're not very far away?

MR. KUNIHIRO: I'm not familiar with the geology other than the salt region.

MEMBER WEINER: Yeah.

MR. KUNIHIRO: So from one perspective it's comparable in that we're proposing to isolate the waste in a clay formation. The is isolating the waste in a salt formation. Now the salt has different characteristics, but it is completely dry. Because of the permeability of this clay, we consider it to be a dry environment as well and our proposed cap design, we are hypothesizing to preclude water infiltration into the cell.

MEMBER WEINER: Yes, I'm not questioning that. I was just curious because there's greywacki all through that area. You can see it all along the ground. So I suspect it's not too different.

MR. KUNIHIRO: We have only encountered greywacki right at the surface and in some areas, it's fairly substantial, several feet thick and when we opened our RCRA cell, we had to actually dynamite portions of it to break through the greywacki layer.

MEMBER WEINER: Thank you.

CHAIRMAN RYAN: Just one question, Dean.

I look at that rock layer at the top and I think about the idea of why you monitor and obviously you're deep wells and you're monitoring for compliance. I assume some concentration of radionuclide requirement, that kind of thing, but if you were monitoring that rock layer for any water that might infiltrate and might be transmitted out to the sides, could you monitor in a way that where, for example, it was dry and never generated any water, you could say everything's working in these top layers?

I guess what I'm getting at is a concept the Committee has thought about which is monitoring for confidence building in performance as well as for radionuclide concentration limits or whatever might be applicable. Have you thought -- Do you have those kind of plans?

MR. KUNIHIRO: The rock is inserted principally as a deterrent to digging, but I think if we just on the surface were to monitor, we would probably prefer to monitor this sand layer to ensure the integrity of this clay layer.

CHAIRMAN RYAN: Fair enough.

MR. KUNIHIRO: Rather than monitoring this zone here.

CHAIRMAN RYAN: Fair enough. Do you have

those kind of plans?

MR. KUNIHIRO: I'm not familiar with the detailed monitoring of the cap that I could give you an accurate -

CHAIRMAN RYAN: All right. Fair enough. Thanks.

MEMBER CLARKE: Mike -- it sounded like you were not proposing any monitoring of the cap. That the monitoring would be all environmental monitoring in the groundwater. Is that correct?

MR. KUNIHIRO: As I indicated, I'm not sure about the cap monitoring, the details of the cap monitoring or if we have proposed a cap monitoring system.

MEMBER CLARKE: Okay.

VICE CHAIR CROFF: Early on you mentioned you had good support from the community. Who is the community in this area?

MR. KUNIHIRO: We look to the community to be the civic leaders as well as the elected officials. So when I say community, I mean civic organizations, their leadership, as well as all the elected officials. We have a county commission. We have a City of Andrews body. We have letters of support from those bodies as well as letters of support from the elected officials in the nearby communities, Eunice, New Mexico as well as Hobbs, New Mexico. So we have documented support from elected officials.

VICE CHAIR CROFF: I was just wondering what the communities were. Second --

MR. KUNIHIRO: And let me just share with you a fact. We recently completed a survey, a scientifically based random survey asking a variety of questions related to the support or WCS's proposed project and the results of that we found quite frankly surprising because again it was a random survey and that showed 60/70 percent support.

So people out of the clear blue were asked "What do you think about disposing of radioactive waste" and it was surprising the number of -- Because we have not contacted each and every resident in and around the county. But we have had many public meetings, many forums to try to reach out to them, but that's not to say every person is familiar with what WCS is proposing. So we were somewhat surprised and pleased with the results of that survey. When I say public support, there is general acceptance within the community as well as evidenced by this survey we've completed.

VICE CHAIR CROFF: And secondly, in your

performance assessment, where is your point of compliance and what kind of doses do you calculate at that point of compliance?

MR. KUNIHIRO: Our point of compliance is on the boundary of our site, the farmer's scenario. Their water from the 225, even though the 225 foot zone again in our view is not an aquifer, it is not a real useful source, we have dug wells into that zone and it takes a long, long time for water to migrate into it. We pump out for sampling purposes. We have to wait an extended period before we get any kind of water to flow back into those wells. So it is the compliant zone for water extraction.

The farmer and his family typically drinks how many ever gallons and irrigates their fruits and vegetables from this zone and we are still well within the regulatory limits. So we have taken an extremely conservative approach to our performance assessment and yet we were well within the regulatory limits.

VICE CHAIR CROFF: Okay. Thanks.

MEMBER HINZE: Touching upon something that Dr. Weiner asked you. Is there any possibility that the hydraulic gradient is such that this aquifer is headed into the State of New Mexico and therefore, do you not only have to deal with Texas but also New

Mexico in terms of the license application?

MR. KUNIHIRO: Are you talking about this?

MEMBER HINZE: Yes. Do you have any -- As I understand it, this is right on the border with New Mexico.

MR. KUNIHIRO: The border is roughly a quarter of a mile I would say.

MEMBER HINZE: All right. I consider that very close from a hydrology point of view. Is there any chance that you might have contamination going into the State of New Mexico and therefore, that you should consider not only Texas but New Mexico?

MR. KUNIHIRO: Again, with this clay geology --

MEMBER HINZE: All right.

MR. KUNIHIRO: -- literally it won't travel ten feet from the site let alone a quarter mile into New Mexico and yes, we have done that calculation --

MEMBER HINZE: But you are monitoring that aquifer. Let me go on to the human intrusion situation. I recall back in the late '80s, early '90s when human intrusion was really the major factor, major issue, at Yucca Mountain and Congress took this off the table with the Energy Policy Act, I believe, of 1992. One of the reasons there was a lot of problems with the human intrusion was because of the statistics. How do you determine when and how often and frequency of drilling etc. that you might anticipate and certainly WIPP had a major problem with human intrusion. Rip Anderson would testify to that and we are in essentially the same geological regime here as WIPP. What statistics have you used to determine your risk from human intrusion and how have you dealt with it, Dean?

MR. KUNIHIRO: We haven't done any probabilistic analysis. For analysis purposes, we determined that somebody did drill down into the disposal cell and material was brought up to the surface. They were exposed. So we have presumed that circumstance will occur.

CHAIRMAN RYAN: And then your probability is one. When does it occur? A hundred years post closure?

MR. KUNIHIRO: I don't recall the date and time. I think it's shortly after closure.

CHAIRMAN RYAN: Shortly after closure.

MEMBER HINZE: But we heard something about 50 years this morning I believe, a frequency of once every 50 years if I recall correctly. There was

50 years in the presentation by your colleague I believe.

CHAIRMAN RYAN: Right. Bill Dornsife?

MEMBER HINZE: No, a colleague at WCS.

MR. KUNIHIRO: Bill has done a number of assessments and he may have been referring to the one that was done when we asked him to analyze the effects of low activity disposal in our RCRA cell which we have done. They talked this morning at great length about disposing of low activity waste in RCRA permitted facilities which WCS has done. So he has looked at the historical disposals, used that as the source term to do some performance calculations for us and that was just internally for our own purposes. So he may have been referring to that particular assessment.

MEMBER HINZE: Okay. So this is based upon Bill Dornsife's review of the drilling in the area, etc.

MR. KUNIHIRO: No, Bill just assumed that a drilling event occurred and that it occurred recently enough that the source term would be reasonably high as opposed to have decayed away and then you do and it's not a very conservative analysis.

CHAIRMAN RYAN: One of the other comments we heard from Bill House this morning was that it's assumed in his case that the probability of one exists, not only do you drill into the site, but you drill into the Class C waste which is a tiny fraction of the footprint. So an intrusion probability of one into the hottest waste is clearly conservative in that case. I guess my own view is I don't know of anybody in the low level waste arena that's taken a more probabilistic view for most things.

MEMBER HINZE: Thank you.

MR. KUNIHIRO: So as a safe sided conservative approach to our performance assessment, we assumed the probability is one, it did occur and we analyzed it. I don't recall exactly what time in the future it was, but certainly I have to believe it wasn't too far in the future where much of the source term has decayed. So we want to be conservative on our analysis. So I suspect it was shortly, reasonably shortly, after closure of the site, the capping of the site in its entirety.

CHAIRMAN RYAN: I would be remiss if I didn't comment that Dr. Garrick, my predecessor in this chair, would say that over conservatism is not necessarily helpful, but it can even mask risk.

MR. KUNIHIRO: No, it is not, but --

CHAIRMAN RYAN: Sometimes you have to be careful.

MR. KUNIHIRO: For our purposes, it suited us well.

CHAIRMAN RYAN: Any other last questions? Dave.

MR. KOCHER: My name is David Kocher. I'm SENES Oak Ridge and I'm a consultant to the ACNW. Put this slide back up if you could please. The cartoon. This is a different facility from the one that Bill Dornsife talked about this morning. Right?

MR. KUNIHIRO: It is a different facility, yes.

MR. KOCHER: Okay. So this is a radioactive waste facility. This is not a RCRA facility.

MR. KUNIHIRO: Correct. The RCRA facility is not conceptually aligned with this one.

MR. KOCHER: Okay.

MR. KUNIHIRO: We are filling the RCRA cell above this level. We are going above the clay.

MR. KOCHER: So my question is though what are your waste acceptance criteria for this unit and how are they established.

MR. KUNIHIRO: Based on regulatory

requirements.

MR. KOCHER: That's a broad avenue.

MR. KUNIHIRO: It is.

MR. KOCHER: Because the way you're talking here, I suppose the waste acceptance criteria would be based on this drilling scenario through the waste at the end of the day.

CHAIRMAN RYAN: To be fair too, David, this is an application. There is no waste here yet.

MR. KOCHER: Right.

CHAIRMAN RYAN: And the application is in review. So my own -- is the waste acceptance criteria would be developed in the licensing process. I'm assuming that's coming down the line. It's preliminary at this point.

MR. KOCHER: But I wanted to be clear that this is different from the other one because the other facility was restricted to very low activity stuff and I'm guessing that's not the case here.

CHAIRMAN RYAN: Apples and oranges.

MR. KOCHER: Okay.

MR. KUNIHIRO: This is a Class A, B and C low-level waste disposal facility, not a RCRA facility although it will have a RCRA permit because we are permitting it and licensing it to be able to dispose of mixed waste.

CHAIRMAN RYAN: Dean, thank you very much for your time and presentation. We appreciate your insights and having you with us today. Thank you. It's always good to hear about a new application and the progress being made. So thanks for being with us.

MR. KUNIHIRO: It is unique today and we certainly again challenged and excited about it.

CHAIRMAN RYAN: Right. We're at the point in our agenda where we have a time slot for comments from interested parties and folks who are in the audience. So, Mike Lee, have you had any specific request for comment or if there is anybody, hearing none, if there is anybody that would like to make a comment or address the Committee or make their views known, we would be pleased to have them now. Yes.

I would like to ask the folks to kind of just out of courtesy to others limit their remarks in time so we can give everybody that wants to speak an opportunity. Tell us who you are, sir.

MR. PASTERNAK: What's the limit?

CHAIRMAN RYAN: A few minutes.

MR. PASTERNAK: Okay. I'm Alan Pasternak, the Technical Director of the California Radioactive Materials Management Forum, and I want to follow up on

Don Womeldorf's comments about the history of the proposed Ward Valley project. Since Don gave his talk, he and I have had a chance to caucus and review some of the historical milestones and what we figured out was that in 1982, George Deukmejian was elected governor and in 1983, the citing legislations, Senate Bill 342 was introduced. So it was Governor George Deukmejian, not Jerry Brown, who signed that legislation. The legislation was bipartisan. The lead author was a Democrat, Senator Al Alquist from San Jose. The preliminary co-author, primary co-author, was an Assemblywoman at that time, Assemblywoman Marianne Buregeson, a Republican from Newport Beech.

The bill received the required two-thirds vote in each House because it was urgency legislation. You see at that time there was a sense of urgency about getting on with disposal. After all, it was three years after the passage of the Low-Level Waste Policy Act of 1980 and that was three years later. There was a sense of urgency. Here we are 26 years later and in some quarters, we lack that sense of urgency.

What happened 20 years later when Gray Davis was Governor is another historical, political story which I won't get into today, but I think it's illustrative of the kinds of changes that we see in the political environment and the ability for political leaders to come together across the aisle and negotiate and reach a common solution here today as it was then. Thank you.

CHAIRMAN RYAN: Thank you, Alan. Any other comments? Yes please, sir.

MR. JANATI: My name is Rich Janati. I'm the Nuclear Safety Program Manager for the (Inaudible.) DP Radio Protection. I also represent the Operation Compact Commission. Sure. Two quick comments. One is related to the concept of engineered barriers. As some of you since the early 1990s, Pennsylvania has been promoting the concept of engineered barriers and particularly being able to take credit for engineered barriers in the performance assessment of a low-level waste disposal facility.

We heard from Energy Solutions this morning that this concept could potentially help the Clive facility to accept higher classes of low-level waste. So I believe that this issue has some urgency to it and should be given high priority.

The other comment that I have is related to guidance on storage. We've heard the Nuclear

Regulatory Commission and the industry representative that they are working on a guidance document on storage of low-level waste and I was wondering if these two efforts to some extent are, if they are communicating, coordinated and hopefully we're not going to see two documents that are totally different as far as concept and recommendations and guidance.

CHAIRMAN RYAN: You're actually tying the barrier question with the guidance question together and you would like to see how they relate. Is that a fair summary?

MR. JANATI: No, the barrier question, the reason I raised it, is that it is important.

CHAIRMAN RYAN: Right.

MR. JANATI: If a facility that already exists and have accepted ways could potentially accept higher classes of waste by taking credit for engineered barriers, then obviously this issue should be given some -- It's significant and should be given a high priority.

The concept of storage, storage is a different issue. My concern is the industry had the regulatory agency working on two guidance documents and not communicating, potentially not communicating, working on two documents in parallel and we see two documents that are potentially very different as far as recommendations and guidance. I'm not saying that that's the case, but that's --

CHAIRMAN RYAN: I guess you're just offering a caution to make sure that --

MR. JANATI: Consistency.

CHAIRMAN RYAN: Okay. Thank you, Rich. Appreciate it. Any other comments or questions? Sorry. Who else? Yes, Susan.

MS. JABLONSKI: Dr. Ryan. My name is Susan Jablonski and I'm with the Texas Commission on Environmental Quality and I just wanted to, based on the questions and the definite interest in the Texas process, we are the regulator on this site, I just wanted to make a couple of points of clarification.

The application before us is for a full A, B, and C low-level waste disposal facility as well as a waste controls request in the acceptance of waste as well. So we think that our interesting is there's a RCRA application for the mixed waste portion which should be coming shortly from the Applicant to the Commission. So we have jurisdiction both over the low-level waste disposal as well as the RCRA component of the mixed waste that they plan to accept.

There was a question from Ms. Weiner on

the ownership question and there are some unresolved land ownership questions on this site. Waste Control does own the surface rights of the facility but not all of the mineral and the question of "ENFE" is definitely on the table for us and one of the considerations in the review.

There is a condemnation allowance under Texas regulation that the Applicant has requested, but they are also requesting exemption from two of the rules which are the state or federal ownership prior to accepting waste as well as the use of surface use agreements in lieu of ownership of the mineral rights. So I don't want to forget that that is an issue that the NRC has weighed in with the State of Texas and it's one that is still definitely on the plate of consideration on the site. So there are land ownership issues that are unresolved.

MEMBER WEINER: Thank you for that comment because those issues can significantly affect the processing of the application and the application itself.

MS. JABLONSKI: Absolutely.

CHAIRMAN RYAN: Susan, let me add that the Committee recognizes that with an application under review, things can change and we certainly don't hold anybody to anything in particular today recognizing that your review is ongoing, but we appreciate the snapshot of at least the work in progress to date and make it clear on our record that we recognize those things are subject to change as an license application is during your review process.

MS. JABLONSKI: Absolutely.

CHAIRMAN RYAN: So we appreciate your being here with us and for the Waste Control Specialists folks and Dean to make the presentations just to give us that snapshot today. So thanks very much. Other comments?

MS. D'ARRIGO: Diane D'Arrigo, Nuclear Information Resource Service. Regarding the discussion earlier, I think it was when Mr. Anderson was speaking, about changing the concentrations of radionuclides based on risk informing, we would have concerns about any changes that move in the direction of reducing the amount of protection. In other words, if you want to use risk informing to improve protection of the public, then that's fine. But if you're going to move in the direction that goes the other way which in 10 CFR 20 two-thirds of the isotope concentration went up and in the DoD regs, if the concentrations went up for a majority of the nuclides we would say that we should not reduce the amount of protection that already exists.

And secondly, when during risk informing there is information coming out which is not included in the health regulations that has to do with the health effects of radiation on children and on the more vulnerable parts of the population, we can't assume that the existing risk levels will be the same in years to come and we are seeing that in some cases radiation is more harmful. So we shouldn't move in a direction of reducing. It looks like you wanted to say something.

CHAIRMAN RYAN: Okay. Thanks for your comment. We appreciate your view. Any other questions, comments, observations? Yes.

MR. TOKAR: My name is Mike Tokar. I just wanted to --

CHAIRMAN RYAN: Could you tell us you're with please? Most of us know you.

MR. TOKAR: I'm a so-called special government employee in more ways than one. I was a former NRC employee and I retired about three years ago, but I'm back as an retired annuative consultant.

CHAIRMAN RYAN: That's great. Thanks.

MR. TOKAR: Anyway, in former life, I

worked on low-level waste on Hicks and waste worms and so when I heard the discussion this morning about structure stability I realized that there's a need for clarification about the meaning of that term because I think some folks have a misunderstanding about it and I sort of have a case of deja vu all over again like Yogi Berra because I provided this clarification to the ACNW, I think, about 15 years ago. So I'm at a 15 year periodicity here and I think 15 years from now somebody else is going to have to take up the slack because I don't think I'm going to be around.

But if you look at 61.7, that section of the Part 61 that Paul Lohaus was talking about his morning, it describes what structural stability of a HCCA waste form is supposed mean and it simply says that a structurally stable waste form has to have physical, retain its gross physical identity over that 300 year period of time. In other words, you could have a colander or a sieve and they could it could meet the definition of a high integrity container in that context.

Again, the reason for the structural stability requirement was simply to provide structural stability of the trench so that it didn't subside and you didn't get a bath tub. So that's what that whole thing was all about. It has nothing to do with retention of the radionuclides whatsoever except in a very indirect sense. I wanted to make sure I got that on the record so people didn't walk away from here with a misunderstanding of what the meaning of that term was.

CHAIRMAN RYAN: Sure, but in addition, I think it's true for example that the high integrity containers and others have actually gone beyond just that simple definition of structural integrity.

MR. TOKAR: Right. They certainly are providing more retention capability than what the regulation actually requires in that sense, but that wasn't that term was supposed to mean.

CHAIRMAN RYAN: I appreciate that. That's actually a good clarification. Thanks. Any other comments or questions? Hearing none, I think we will adjourn our record in our formal session for the day. The Committee is going to take up some letter writing activities which you're more than welcome to stay for, but you'll take a short five minute break to let everybody who wants to depart depart and then we'll convene directly thereafter. Off the record.

(Whereupon, at 4:50 p.m., the above-entitled matter was concluded.)

CERTIFICATE

This is to certify that the attached proceedings before the United States Nuclear Regulatory Commission in the matter of:

Name of Proceeding: Advisory Committee on Nuclear Waste 170th Meeting

Docket Number: n/a

Location: Rockville, MD

were held as herein appears, and that this is the original transcript thereof for the file of the United States Nuclear Regulatory Commission taken by me and, thereafter reduced to typewriting by me or under the direction of the court reporting company, and that the transcript is a true and accurate record of the foregoing proceedings.

Katherine Sykora
Official Reporter
Neal R. Gross & Co., Inc.

CHEM-NUCLEAR SYSTEMS, LLC

William B. House
Vice President, Regulatory Affairs
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A Duratek Subsidiary

SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
Radioactive Material License
Supplementary Sheet

License Number 097
Amendment Number 50

Chem-Nuclear Systems, LLC
Barnwell Waste Management Facility
740 Osborn Road
Barnwell, S.C. 29812

TO ADD:

101. The licensee shall comply with the requirements described in the SC Department of Health and Environmental Control letter dated November 30, 2005 and attached document entitled **"Increased Controls for Licensees that Possess Sources Containing Radioactive Material Quantities of Concern."** The licensee shall complete implementation of said requirements within six (6) months from the issuance of the license amendment or the first day that radionuclides in quantities of concern are possessed at or above the limits specified in Table 1 of the attachment, whichever is later. Within 25 days after the implementation of the requirements of this condition, the licensee shall notify the Assistant Director, Division of Waste Management, Bureau of Land and Waste Management, in writing that it has completed the requirements of this condition.

For the South Carolina Department of Health and Environmental Control

Date of Issuance November 30, 2005

By:

Henry J. Porter, Assistant Director
Division of Waste Management
Bureau of Land and Waste Management

SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
Radioactive Material License
Supplementary Sheet

License No. 097
Amendment No. 48

Chem-Nuclear Systems, LLC.
Barnwell Waste Management Facility
740 Osborn Road
Barnwell, South Carolina 29812

In accordance with the letter with attachments dated April 18, 2000, signed by Regan E. Voit, President, CNS and Robert E. Prince, President and CEO, GTS Duratek, Inc., letter dated June 12, 2000, signed by William B. House, and section RHA 2.15, Regulation 61-63, Radioactive Materials (Title A), South Carolina Radioactive Material License No. 097 is hereby amended to recognize the change of ownership:

TO CHANGE:

1. Chem-Nuclear Systems, LLC.
   Barnwell Waste Management Facility
   740 Osborn Road
   Barnwell, South Carolina 29812

For the South Carolina Department
of Health and Environmental Control

Date of Issuance June 16, 2000

By:
Virgil R. Autry, Director
Division of Radioactive Waste Management

DHEC 812 (11/81)

SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
RADIOACTIVE MATERIAL LICENSE

Pursuant to the Atomic Energy and Radiation Control Act, Section 13-7-40 et. seq. of S.C. Code of Laws of 1976 as amended and Supplements thereto, and the South Carolina Department of Health and Environmental Control Regulation 61-63 Radioactive Material (Title A), and in reliance on statements and representations heretofore made by the applicant, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer radioactive material listed below; and to use such radioactive material for the purpose(s) and at the place(s) designated below. The license is subject to all applicable rules of the South Carolina Department of Health and Environmental Control now or hereafter in effect and to any conditions specified below.

Amendment No. 47 amends

LICENSEE		3. License Number
1. Name	Chem-Nuclear Systems, LLC. Barnwell Waste Management Facility A Subsidiary of Waste Management, Inc.	097 in its entirety
2. Address	P.O. Box 726 Barnwell, S.C. 29812	4. Expiration Date July 31, 2000

5. Radioactive Material (Element and Mass Number)	6. Chemical and/or Physical Form	7. Maximum Radioactivity and/or quantity of material which licensee may possess at any one time.
A. Any Radioactive material excluding source material and special nuclear material.	A. Dry packaged radioactive waste except as authorized in this license.	A. 50,000 curies
B. Source material	B. Dry packaged radioactive waste except as authorized in this license.	B. 60,000 pounds
C. Special Nuclear Material	C. Dry packaged radioactive waste except as authorized in this license.	C. 350 grams total of ^{235}U or 200 grams ^{233}U or 200 grams of plutonium or any combination of these provided the sum of the ratios of the quantities does not exceed unity.

8. Authorized Use:

A., B. and C.

Radioactive material as low-level radioactive waste may be received, stored, and disposed of by shallow land burial. The licensee shall not receive an annual volume of more than one million, two hundred thousand (1.2 million) cubic feet of waste per calendar year; however, the licensee is authorized to increase the volume in ten (10) per centum increments; provided that the Department is notified in writing no later than thirty (30) days in advance of such increases.

Unless otherwise authorized by the Department, only radioactive waste consigned for burial shall be received at the location specified in Condition No. 9 of this license. The maximum radioactivity and/or quantity of radioactive material indicated in Item 7. A, B, and C applies to the above ground activities.

General Conditions

9. Unless otherwise specified, the authorized place of use is a site located approximately five miles northwest of Barnwell, South Carolina, in the Seven Pines School District, Red Oak Township, Barnwell County, South Carolina within the boundary of the land area described in Lease agreement dated April 6, 1976, as amended.

10. The licensee shall comply with the provisions of Department Regulation 61-63, Radioactive Material , (Title A), Part I - General Provisions; Part II - Licensing of Radioactive Materials; Part III - Standards for Protection Against Radiation; Part VI - Notices, Instructions, and Reports to Workers; Inspections, and Part VII - Licensing Requirements for Land Disposal of Radioactive Waste; Department Regulation 61-83, Transportation of Radioactive Waste Into or Within South Carolina.

11. Unless otherwise specified in this license, the licensee shall make no changes in the internal safety audits, Safety Review Board, ALARA Review Committee, Site Criteria, or Procedures, governing these specific activities without approval from the Department.

12. Operations authorized by this license shall be conducted in accordance with Chem-Nuclear Systems, Inc. procedures and subsequent revisions and additions approved by the Department. However, the licensee may upon notification to the Department but without Department approval, make minor changes to these procedures provided that:

    A. The change does not affect requirements of any other license condition in this license;

    B. The change does not increase the potential for personnel exposure;

    C. The change does not diminish operational safety;

    D. The change does not increase the potential for release of radioactive material to unrestricted areas; and

    E. - The change does not reduce the licensee's record keeping and reporting system.

    The licensee shall maintain records of these changes including evaluations which provide the basis for the change.

13. The licensee shall ensure that all site personnel have satisfactorily completed the training program requirements as specified in the Chem-Nuclear Systems, Inc. Barnwell Site Training Program. Changes and additions to the program shall be submitted to the Department for review. Time intervals for personnel indoctrination, training, examinations, certification, retraining specified in Procedure S20-AD-004, "Barnwell Radioactive Waste Burial Site Personnel Training" shall not be changed without Department approval.

14. Operations shall be conducted by or under the supervision of: Mark S. Whittaker, (RPO), James W. Latham, Joseph J. Still, William B. House, Michael J. Benjamin, Ronald E. Versailles, or other individuals designated by the licensee's Radiation Protection Officer upon successful completion of the licensee's training program and approval by the licensee's Safety Review Board.

15. The licensee shall to the extent necessary, continue the employment of all personnel involved in the operation of the Barnwell Waste Management Facility in accordance with all requirements in the license and applicable

regulations and, in the event replacement of employees becomes necessary, only individuals of comparable qualifications and experience will be hired.

16. A documented weekly inspection of site operations and the restricted area of the site for compliance with applicable conditions of this license shall be conducted by a named designee in Condition 14 or an individual appointed by a named designee and approved by the Department.

17. The transportation of radioactive materials and radioactive waste within the State of South Carolina shall be in accordance with applicable regulations of the U.S. Department of Transportation, the U.S. Nuclear Regulatory Commission, ~~Section RHA 2.22~~, Department Regulation 61-63, Radioactive Material (Title A), and Department Regulation 61-83, "Transportation of Radioactive Waste Into or Within South Carolina".

18. The licensee shall maintain all records and shipment manifest pertinent to the transportation, receipt, and disposal of radioactive material at the location specified in Condition 9 of this license until authorization is given by the Department for transfer or disposal of such records.

19. The licensee shall maintain records for each shipment of waste disposed of at the site. The records shall conform with the requirements of RHA 7.32, Department Regulation 61-63, Radioactive Material (Title A).

20. A monthly site receipt and burial activities report shall be submitted no later than the 10th day following the month to the Director, Division of Radioactive Waste Management, Bureau of Land & Waste Management, S.C. Department of Health & Environmental Control, 2600 Bull Street, Columbia, South Carolina 29201.

21. Except as specifically provided otherwise by this license, the licensee shall possess and use radioactive material described in Items 5, 6, and 7 of this license and conduct site operations in accordance with statements, representations, operating procedures, and disposal criteria, heretofore made by the licensee or his authorized representative in application for and subsequent to issuance of S.C. Radioactive Material License No. 097, and amendments thereto.

Receipt, Acceptance and Inspection Conditions

22. The licensee shall not accept radioactive waste for storage or disposal unless the shipper has completed the required information for the waste shipment on the U.S. Nuclear Regulatory Commission Uniform Low-Level Radioactive Waste Manifest Forms 540 (Shipping Paper), 541 (Container and Waste Description), and 542 (Manifest Index and Regional Compact Tabulation) as applicable, or approved equivalent forms.

23. The licensee shall not accept radioactive waste for storage or disposal unless the generator of such waste has a valid, unsuspended Radioactive Waste Transport Permit issued by the S.C. Department of Health and Environmental Control.

24. The licensee shall not accept radioactive waste for storage or disposal unless the shipper has provided a properly executed Department Form, DHEC-803, Radioactive Waste Shipment Certification Form, Part I and II. Shipments consisting of more than 75 cubic feet or containing more than one (1) curie shall also be accompanied by a properly completed and executed Department Form, DHEC-802, Radioactive Waste Prior Notification and Manifest Form. Changes to the shipment identification number on the forms may be made by the licensee, provided that the Department is

notified of the change no later than the last day of the month for which the shipment was originally scheduled. Forms shall not be carried over more than one month.

25. The licensee shall only accept radioactive waste shipments for storage or disposal which have been inspected by a representative of the Department. The licensee shall assist the Department in inspection, sampling and analysis of the waste as deemed necessary by the Department to ensure compliance with the requirements of this license.

26. Notwithstanding other conditions of this license, the licensee shall not accept radioactive waste for storage or disposal unless he has received advanced written notification of any waste shipment containing unusual hazards or potential hazards including but not limited to, physical, gaseous, chemical, pyrophoric, or excessive removable contamination on the disposal containers shipped inside casks or excessive internally contaminated casks, and unexpected high radiation levels at the disposal container surfaces.

27. The licensee shall immediately notify the Department or the Department's on-site representative of any waste shipments where a violation of applicable regulations or license conditions has been found.

28. The licensee shall notify the shipper and the Department when any shipment of radioactive waste or part of a shipment has not arrived within 60 days after the advance copy of the shipment manifest or shipping papers was received by the licensee.

29. The licensee shall notify the shipper when it has been determined that a radioactive waste shipment or part of a shipment cannot be accepted for disposal by the licensee.

30. The licensee shall acknowledge receipt of the waste within 7 days of its acceptance for disposal by returning a signed copy of the shipment manifest or shipping papers to the shipper. The licensee shall indicate on the returned copy of the shipment manifest or shipping papers any discrepancy between the waste description listed on the manifest or papers and the waste materials received in the shipment.

Waste Characteristics and Waste Form Conditions

31. The licensee shall not accept any radioactive waste for storage or disposal unless the shipper has marked each disposal container, as specified by the licensee, to identify its classification as either Class A, stable or unstable (S or U), Class B, or Class C waste, and certifies that the waste materials have been classified and prepared in accordance with the following waste classification table:

SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
Radioactive Material License
Supplementary Sheet

License Number 097
Amendment Number 47

Waste Classification Table

RADIONUCLIDES	CONCENTRATION LIMITS IN CURIES/CUBIC METER* Class A	Class B	Class C
Table I (long-lived)			
C-14	≤ 0.8		≤ 8
C-14 in activated metal	≤ 8		≤ 80
Ni-59 in activated metal	≤ 22		≤ 220
Nb-94 in activated metal	≤ 0.02		≤ 0.2
Tc-99	≤ 0.3		≤ 3
I-129	≤ 0.008		≤ 0.08
	CONCENTRATION LIMITS IN NANOCURIES/GRAM		
Alpha emitting transuranics with half-life greater than 5 years	≤ 10		≤ 100
Ra-226	≤ 10		≤ 100
Pu-241	≤ 350		≤ 3500
Cm-242	≤ 2000		≤ 20000
	CONCENTRATION LIMITS IN CURIES/CUBIC METER*		
Table II (short-lived)	Class A	Class B	Class C
Total of all with half-life less than 5 years	≤ 700	> 700	
H-3	≤ 40	> 40	
Co-60	≤ 700	> 700	
Ni-63	≤ 3.5	≤ 70	≤ 700
Ni-63 in activated metal	≤ 35	≤ 700	≤ 7000
Sr-90	≤ 0.04	≤ 150	≤ 7000
Cs-137	≤ 1	≤ 44	≤ 4600

*curies/cubic meter is equivalent to microcuries/cubic centimeter

A. The concentration of a radionuclide or radionuclide mixture may be averaged over the volume of the waste and, if used, the solidification agent or matrix if the waste form is a homogenous mixture. The concentration of radionuclides in filters/sealed sources encapsulated with a solidification agent or matrix shall be averaged over the volume of the filter/sealed source not the solidification agent. The volume of packaging, containers, liners, or overpacks shall not be included in this calculation, nor shall the volume of the waste mixture be artificially increased with the addition of non-dispersible solids or objects even if considered as waste.

If expressed in units of nanocuries per gram, concentration may be averaged over the weight of the waste and, if used, the solidification agent if homogenous, except in the case of encapsulation of filters which shall be over the weight of the filter. The weight of packaging, containers, liners, or overpacks shall not be included in this calculation, nor shall the weight of the waste mixture be artificially increased by the addition of heavy, non-dispersible solids or objects even if considered as waste.

B. The waste is Class A if none of the listed radionuclides are present.

C. There are no upper limits in Class B waste for the first three radionuclides listed in Table II.

D. There are no Class B values for the first nine (9) radionuclides listed; their presence classifies the waste as either Class A or Class C according to their concentrations.

E. The waste class for mixtures of radionuclides is determined by deriving for each radionuclide the ratio between its concentration in the mixture and its concentration limit in the table and adding the resulting ratio values for each radionuclide group. All limits used in the calculation must be for the same waste class. The sum of the ratios for each group must be less than or equal to 1.0 or the waste is of a higher classification than that used for the calculation.

F. If Class C limits are used in the calculation and the sum of the ratios for either group is equal to or exceeds 1.0, the waste is not acceptable for disposal without prior written approval from the Department.

G. If the concentration of any single radionuclide exceeds Class C values in the table, the waste is not acceptable for disposal without prior written approval from the Department.

H. Concentrations for C-14, Ni-59, Ni-63, and Nb-94 in activated metal must be evaluated for any irradiated metal component, filters and filter material associated with spent fuel pools.

I. Waste containing radium may be accepted only if the requirements of condition 44 of this license are met.

32. A. Unless otherwise specified in this license, the licensee shall not receive any liquid radioactive waste regardless of the chemical or physical form. Absorbent materials may be placed in packages of dry, solid waste to absorb unintentional and incidental amounts of liquids. Further, liquids in the interstitial spaces of transport casks and containers shall be removed to the extent practical.

B. Solidified or dewatered radioactive waste shall have no detectable free standing liquids in excess of one-half percent (0.5%) by waste volume of non-corrosive liquids per container.

C. In lieu of the requirements of paragraph B. above, solidified or dewatered waste containing non-corrosive liquids in excess of one-half percent (0.5%) by waste volume, and less than on percent (1%) non-corrosive liquids by waste volume, may be received and disposed of in high integrity containers approved by the Department.

33. A. Unless otherwise specified, the licensee shall only receive aqueous liquids and other applicable waste forms which have been solidified or otherwise stabilized with one of the following solidification media:

a. Vinyl Ester Styrene
b. Cement
c. Bitumen (see Subparagraph E. below)
d. Vinyl Chloride

B. Solidification media and processes used to stabilize Class A aqueous liquids and other Class A wastes containing isotopes with greater than five (5) year half-lives having a total specific activity if all these isotopes of 1 microcurie/ cubic centimeter or greater, and all applicable Class B and C waste, shall meet and have been evaluated in accordance with the "Stability Guidance" requirements of the U.S. Nuclear Regulatory Commission's Waste Management Division, Technical Position on Waste Form, (Revision 1), dated January 1991, or other evaluation criteria or methods specifically approved by the NRC or the Department.

C. Solidified Class A aqueous liquids and other applicable waste forms with a specific activity of less than 1 microcurie/cubic centimeter, shall meet the requirements of the "Solidified Class A Waste Products" of the NRC Technical Position on Waste Form, (Revision 1) dated January 1991.

D. Other solidification media and processes shall be acceptable for which a topical report has been prepared and received approval from the U.S. Nuclear Regulatory Commission with concurrence from the Department or approval by the Department.

E. The licensee shall only receive for disposal, full formula, oxidized bitumen (asphalt) solidified waste, which is a free standing monolith as received for disposal, and certified as such by the waste generator.

34. Except as specifically provided in this license, the licensee shall not accept liquid radioactive waste packaged in absorbent materials, or where absorbent materials have been used to absorb liquids rather than properly solidified with an approved media.

35. Regardless of the waste classification of Condition 31, and unless otherwise authorized by the Department, the licensee shall not receive evaporator bottoms or concentrates, residues, sludges, or other waste which may contain free standing liquids, unless they are solidified in accordance with Condition 33, and meet the requirements as specified in Condition 32. Evaporator bottoms or concentrates which contain no free standing water and are not free flowing are acceptable for disposal when processed by a method specifically approved by the Department.

36. The licensee may receive resins and filter media in a dewatered form provided that the free standing liquid requirements of Condition 32 and the requirements of Condition 38 are met.

37. The licensee shall not receive containers of ion exchange resins or filter media (dewatered or solidified) unless records of complete radiological analyses (quantitative and qualitative) are provided. The records must specify the specific activity of each radionuclide expressed in microcuries/cubic centimeter and transuranic radionuclides in nanocuries/gram.

38. Regardless of the waste classification of Condition 31, ion exchange resins and filter media containing isotopes with greater than five (5) year half-lives having a specific activity of all these isotopes of 1 microcurie/cubic centimeter or greater must be stabilized by solidification in accordance with Condition 33 and meet the free standing liquid requirements of Condition 32.B. However, in lieu of solidification, the Department will authorize disposal of these waste forms meeting the free standing liquid requirements of Condition 32.C. in approved high integrity containers or other approved methods of stabilization.

39. Unless specifically provided otherwise, the licensee shall dispose of all classes of wastes in concrete overpacks or vaults which are approved by the Department and provided by the site operator. Void spaces within the waste and between the waste and its packaging shall be reduced to the extent practicable, but in no case shall less than eighty-five percent (85%) of the capacity of the containers be filled for all waste classes unless placed in a High Integrity Container. The licensee may allow a variance from this condition in certain instances, but only after receiving a written justification from the waste generator prior to receiving the waste shipment. Variance justifications and approvals shall be maintained for review by the Department.

40. Radioactive waste containing transuranic radionuclides within the limits specified in Condition 31 are acceptable provided that the transuranic radionuclides are evenly distributed within a homogeneous waste form and are incidental to the total radioactivity. Incidental in this condition is defined as not more than one percent (1%) of the total activity. This license does not authorize the receipt of disposal of components or equipment primarily contaminated with transuranic radionuclides on vehicles, equipment, or components, with contamination limits in excess of those specified in Condition 55.

41. Household or industrial smoke or gas detectors containing Americium-241 foils which may exceed the transuranic radionuclide limit specified in Condition 31 of this license may be accepted for disposal provided the entire detector is received for disposal.

42. The licensee shall not receive or dispose of sealed sources or special form radioactive materials containing more than 5 curies of radioactive material with half-lives greater than 5 years except in a container which provides long term containment. Such containers are subject to approval by the Department. Irradiated metal components which have similar characteristics of special form radioactive materials are subject to Department review for disposal container requirements.

The licensee may accept the following sealed sources and maximum total activities provided that the sources are encapsulated with a minimum of four (4) inches of cement on all sides having a minimum compressive strength of 2,500 pounds per square inch.

Radionuclide	Maximum Total Activity (microcuries)
C-14	100
Ni-59	100
Nb-94	0.01
Tc-99	10
I-129	0.01
Radionuclides in Condition 31. Table II	10^7

43. The licensee shall not receive toluene, xylene, dioxane, scintillation liquids which exhibit hazardous properties or other organic liquids or solids with similar chemical properties except as specified below:

A. Containers which have contained any of the liquids mentioned above are acceptable for disposal after treatment as specifically authorized by the Department.

B. The ash and/or residue from the incineration of these wastes are acceptable in accordance with Condition 45 of this license.

44. Unless otherwise authorized by the Department the licensee shall not receive any radioactive waste containing Radium except for:

A. Radium contained in solid homogeneous waste forms in which the Radium activity is incidental (incidental is defined as not more that one percent of the total activity) and the concentration of Radium has not been technologically enhanced or,

B. Radium contained in the following devices: self-luminous dials, hands of dials, timepieces, compasses, and electron tubes provided that the entire device is received and buried, or

C. Radium contained in biological research waste, or

D. Radium sources specifically approved by the Department.

45. The licensee shall not receive radioactive waste in the forms of incinerator ash or powder which may be dispersible unless solidified with a media specified in Condition 33 of this license, or packaged to prevent dispersion as specifically approved by the Department. In lieu of solidification, these waste forms may be received in high integrity containers approved by the Department, provided the waste is rendered nondispersable with a binding matrix.

46. Radioactive waste containing chelating agents between 0.1 percent and 8 percent by weight in the waste as received for disposal shall be in High Integrity Containers or shall be stabilized by solidification with a media specified in Condition 33 of this license or an alternative method specifically approved by the Department.

47. The licensee may only receive gaseous radioactive materials of Krypton 85, Xenon 133 and Tritium for burial provided they meet the following criteria:

A. For Krypton 85 and Xenon 133:

a. Burial containers must be U.S. Department of Transportation specification cylinders or U.S. Nuclear Regulatory Commission approved sealed sources.

b. Internal pressure of containers may not exceed 1.5 atmospheres.

c. Total activity of containers shall not exceed 100 curies each.

B. For Tritium:

a. Only sources approved by the U.S. Nuclear Regulatory Commission or an Agreement State may be received for disposal.

b. The source/device must be received intact.

c. The internal pressure of the source/device shall not exceed 1.5 atmospheres.

d. Sources/devices must be packaged to prevent breakage.

e. The maximum activity per disposal container shall not exceed 1000 curies.

f. Devices requiring stabilization based on waste classification (using the volume of the source/device only) must be placed in a high integrity container or encapsulated with an appropriate stabilization media.

48. A. Unless otherwise authorized, the licensee shall not receive for storage nor disposal any mixed low-level radioactive waste defined as waste that satisfies the definition of low-level radioactive waste specified in the Low-Level Radioactive Waste Policy Amendments Act of 1985 (P.L. 99-240), and contains waste that either (1) is listed as hazardous waste in Subpart D, 40 CFR 261, or (2) causes the waste to exhibit any of the hazardous waste characteristics identified in Subpart C, 40 CFR Part 261.

B. The licensee may however receive waste that has been treated by acceptable methods to render it nonhazardous and therefore not subject to the jurisdiction of the Resource Conservation and Recovery Act (RCRA). Waste which may contain discrete quantities of hazardous or toxic materials may be evaluated for disposal by the licensee and such evaluations provided to the Department for consideration of approval.

49. The licensee shall not receive radioactive waste that is readily capable of detonation or of explosive decomposition or reaction at normal pressures and temperature, or of explosive or exothermic reaction with water.

50. The licensee shall not receive radioactive waste which contains or is capable of generating quantities of toxic gases, vapors, or fumes harmful to persons transporting, handling or disposing of the waste. This does not apply to radioactive gaseous waste packaged in accordance with Condition 47 of this license.

51. The license shall not receive or dispose of any pyrophoric material or flammable solids. These materials contained in waste shall be treated, prepared and packaged to be nonflammable and the final waste form rendered nonpyrophorid and nonflammable prior to transportation and receipt.

52. The licensee shall not receive or bury oil or petroleum based materials in any physical form. However, this does not prohibit the receipt and disposal of waste containing incidental or trace amounts of oil or petroleum based materials which have been absorbed, provided that the amount of absorbed oil and petroleum based materials does not exceed one percent (1%) by waste volume in a container.

53. The licensee shall not receive radioactive waste containing hazardous biological, pathogenic, or infectious material unless treated to reduce to maximum extent practicable the potential hazard from the materials. In addition, radioactive waste containing biological, pathogenic, or infectious material shall be doubly packaged in new or properly recertified containers which meet the general packaging requirements of DOT as follows:

A. First, the inner container having a capacity of 55-gallon or less shall have a water tight liner at least 4 mils thick hermetically sealed after filling.

B. The biological material shall be thoroughly layered in the inner container in a ratio of thirty (30) parts biological material to at least one (1) part slaked lime and ten (10) parts absorbent, which shall be agricultural grade 4 vermiculite or medium grade diatomaceous earth, or other adsorbents that have received approval from the Department by volume. The addition of formaldehyde is strictly prohibited.

C. The closure on the inner container shall be a standard lid with securely attached ring and bolt. Lever locks are not acceptable.

D. Unless otherwise authorized by the Department, the outer container, which shall have a volume of at least 1.5 times the inner container shall be filled initially with at least 4 inches of absorbent material, specified in B., the inner container in an upright position, and the remaining volume filled with the absorbent material, then securely closed and properly sealed.

54. Unless otherwise authorized by the Department, the licensee shall receive Special Nuclear Material (SNM) as authorized in Conditions 5, 6, 7, and 8 of this license in 55 gallon or larger containers only. Any SNM shipment in which there is evidence that SNM is missing or that the waste packages have been tampered with in transport shall be received by the licensee and safely stored pending notification to the Department. The licensee shall not dispose of such packages unless authorized by the Department.

Contamination Limit Conditions

55. For receipt at the Barnwell Site, all shipments shall comply with contamination control limits as prescribed in U.S. Department of Transportation Regulations, 49 CFR 173.443.

Enclosed radioactive material transport vehicles used solely for transporting radioactive materials and marked "For Radioactive Material Use Only" and accessible surface of transport casks and trailer shall not be released from the site if contamination limits exceed the following:

A. Fixed contamination of 10 mR/hr on contact with the interior surface or 2 mR/hr at 1 meter from the interior surface.

B. Removable contamination of 2200 dpm/100 sq. cm. Beta-gamma or 220 dpm/100 sq. cm. Alpha. This applied to interior and exterior surfaces.

C. Fixed contamination of 0.5 mR/hr on contact with any exterior surface.

Internally contaminated (fixed or removable) shipping casks released from the site are subject to applicable shipping regulations of the U.S. Department of Transportation. The licensee shall also inform the recipient of such casks in advance of the contaminated nature of the cask. Records of such notifications shall be retained for review by the Department.

56. Vehicles used solely for transporting radioactive material and ar not marked "For Radioactive Material Use Only" shall not be released from the site if the contamination limits exceed the following:

A. Fixed contamination of 0.5 mR/hr at any accessible surface.

B. Removable contamination of 2200 dpm/100sq. cm. Beta-gamma, or 220 dpm/100sq. cm. Alpha.

57. Vehicles or items for unrestricted use shall not be released from the site if the contamination limits exceed the following unless specifically authorized by the Department:

A. Fixed contamination of 0.1 mR/hr at any accessible surface.

B. Removable contamination of 220 dpm/100sq. cm. Beta-gamma, or 22 dpm/100sq. cm. Alpha.

58. The licensee shall perform decontamination on vehicles, equipment, or components, with contamination limits in excess of those specified in Condition 56 in a controlled environment.

59. The licensee shall not use its vehicle wash-down facility for any vehicles or equipment with removable contamination limits in excess of those specified in Condition 56 unless specifically approved by the Department.

General Packaging Conditions

60. All radioactive waste shall be packaged and loaded in accordance with applicable U.S. Department of Transportation Regulations, U.S. Nuclear Regulatory Commission Regulations 10 CFR Part 71, the requirements of this license, and the disposal site criteria.

61. Unless otherwise authorized, all radioactive waste shall be received and buried in closed containers. Containers which have been altered, and solidification or encapsulation media intended to serve as containers or container closures, are not acceptable unless approved by the Department. Loose radioactive waste and solidification residuals within shipping casks are prohibited.

62. The licensee shall not receive any package to be used as the final burial container that is corroded to the point of degradation or damage. Any package used as the final burial container shall be of such material construction that there will be no significant chemical, galvanic, or other reaction among the packaging components, or between the packaging components and the package contents.

63. The licensee shall, to the extent practicable, repair or repackage any damaged package used as the final burial container if such packages are approved for acceptance by the Department.

64. Prior to burial, the licensee shall, to the extent practicable, remove all liquids from waste packages found in excess of allowable limits if such packages are approved for acceptance by the Department.

65. The licensee shall not receive shipments of radioactive materials unless appropriate lifting devices of sufficient length has been provided and securely attached to containers and palletized shipments within a cask.

66. The licensee is not authorized to open any packages at its facility, except for the following:

A. For purposes of repairing or repackaging damaged containers.

B. For purposes of inspecting to insure compliance with this license.

C. For purposes of returning outer shipping containers.

D. For purposes of confirming package contents.

Site Design, Construction and Maintenance Conditions

67. Construction of waste burial trenches shall be in accordance with CNSI Procedure S20-AD-008, "Trench Construction" Class A waste trenches will be constructed in accordance with Drawing No. B-215-D-0004, "Class A Trench

Construction Details." Class B/C waste trenches will be constructed in accordance with Drawing No. B-215-D-0007, "Class B/C Trench Construction Details." Any changes to these drawings, specifications, or procedures must have approval from the Department before implementation.

68. The licensee shall not begin construction of any trench prior to approval of the Department as to location, trench bottom elevation and intended use.

69. The licensee shall not initiate burial operations in newly excavated trenches until the Department has inspected and approved the trenches. An initial inspection will be made by the Department upon completion of excavation of the trench, excavation for the infiltrate detection and monitoring system, and drainage ditches adjacent to the trench. An intermediate inspection will be made by the Department after the infiltrate detection and monitoring system has been complete. A final inspection will be made by the Department upon completion of construction. Trench backfill and completion shall be performed in accordance with CNSI Procedure S20-AD-008, "Trench Construction."

70. Construction of slit trenches shall be in accordance with CNSI Drawing No. B-215-D-0011, "Slit Trench Construction Details." Trench backfill and completion shall be performed in accordance with CNSI Procedure S20-AD-008, Trench Construction. An initial inspection shall be made by the Department at the completion of excavation, and final inspection shall be made at the completion of construction before burial begins.

71. A. Backfilling shall be performed for each trench design in accordance with CNSI Procedure S20-AD-008. Completed trenches shall at no time be used for stockpiling large volumes of earth not withstanding provisions for a final grading plan.

B. The licensee shall design trench covers to minimize to the extent practicable water infiltration, to direct percolating or surface water away from the disposed waste, and to resist degradation by surface geologic processes and biotic activity.

72. Open trenches to include trenches under construction and partially filled trenches shall be protected to prevent runoff water from entering trenches. Radioactive waste shall not be placed into trench areas where water has accumulated. Burial of radioactive waste into trenches with unusual amounts of water shall immediately cease until the origin of water has been determined and corrective action taken.

73. The licensee shall use proper surface water management techniques on the site to insure that:

A. Erosion is minimized.
B. Surface runoff is directed away from the trenches.
C. Accumulation of standing water is minimized.
D. Standing water in the immediate disposal area is prevented.

74. All monitoring wells, sumps, shall be sufficiently capped or covered to prevent the introduction of extraneous material or infiltration of water. All well and sump pipes shall be protected from damage.

75. The licensee shall, at least monthly, perform an inspection of completed trenches and capped areas in accordance with CNSI Procedure S20-OP-007, "Completed Trench Inspection Procedure", to ascertain any erosion, settling, cracking, subsidence, or loss of ground cover grasses and make corrections immediately. Documentation of the inspection findings and all repairs even if the repairs were performed as a routine maintenance

function shall be made and incorporated into a permanent record and submitted with the stabilization plan for final site closure.

76. The licensee shall initiate closure and stabilization measures as each trench is filled and covered. Interim or final grades shall be established at no more than one year following final trench burial operations. Completed trenches shall be continuously and properly maintained to control erosion. Active waste disposal operations must not have an adverse effect on completed closure and stabilization measures.

77. The licensee shall use any reasonable means, including but not limited to fencing and security personnel, to prevent unauthorized entry into the restricted area of the site.

78. The boundaries and locations of each disposal trench shall be accurately located and mapped by means of a land survey. Temporary trench boundary markers and trench identification markers shall be erected upon completion of backfill operations until permanent markers are installed.

79. A series of markers, one at the end of each completed trench and on each corner, shall be installed upon completion of the seeding of trench covers. End monuments shall be constructed of granite. Trench corner markers shall be constructed in accordance with CNSI Drawing No. B-215-C-0010. The following information shall be reported to the Director, Division of Radioactive Waste Management, Bureau of Land & Waste Management, S.C. Department of Health and Environmental Control, 2600 Bull Street, Columbia, S.C. 29201:

A. Total activity of radioactive material in curies total amount of source material in pounds, and total amount of special nuclear material in grams in the trench.

B. Date of completion of the burial operations; and

C. Volume of waste in the trench.

Burial Operation Conditions

80. Unless specifically authorized by the Department, the licensee shall not exhume previously buried waste.

81. All waste shall be placed in vaults which will provide additional structural stability. Structural evaluations for large components may be submitted to the Department for review and with concurrence from the Department will not require disposal in a vault. The licensee shall construct the vaults in accordance with procedures, drawings, standards, and a quality assurance plan that have received approval from the Department.

82. The disposal trenches and vaults shall be designed and constructed to meet the following objectives:

A. to minimize the migration of water onto the disposal trench.

B. to minimize the migration of waste or waste contaminated water out of the disposal units.

C. to detect water or other liquids in the trenches.

D. to provide for temporary collection and retention of water and other liquids for a time sufficient to allow for the detection and removal or other remedial measures without the contamination of groundwater or the surrounding soil.

E. to facilitate remedial methods without disturbing other disposal trenches.

F. to provide reasonable assurance that the waste will be isolated for at least the institutional control period.

G. to prevent contact between the waste and the surrounding earth, except for earthen materials used for backfilling within the disposal unit.

83. Wastes designated as Class C pursuant to Condition 31 of this license, shall be disposed of so that the top of the waste is a minimum of 5 meters below the top surface of the cover or shall be disposed of with intruder barriers that are designed to protect against an inadvertent intrusion for at least 500 years. Such intruder barrier designs must be specifically approved by the Department.

84. The licensee shall handle and emplace packages of radioactive waste in disposal trenches in such a manner that maintains packaging integrity during handling, emplacing, and subsequent backfilling. Waste packages deposited in trenches shall be protected from any adverse operations which may cause damage to them.

85. The licensee shall emplace disposal vaults in such a manner to minimize voids between vaults and permit voids between vaults to be filled with earth to reduce future trench subsidence.

86. The licensee shall be a "Registered User" of all licensed casks delivered to the site containing radioactive waste for disposal.

87. At least one health physics technician shall be present during all waste handling, offloading, and disposal operations.

88. The licensee shall maintain radiation levels at the edge of the open trenches at or below 100 mR/hr.

89. Licensee personnel shall wear appropriate protective clothing, apparatus, and gloves at all times while handling or disposing of radioactive waste.

90. Vaults shall be covered within six (6) months of being filled with waste unless otherwise approved by the Department.

91. The licensee shall bury containers of Krypton 85 and Xenon 133 gaseous radioactive materials in upright positions within concrete overpacks or vaults. Each gas container shall be disposed in different overpacks or vaults unless otherwise authorized by the Department.

92. Unless specifically authorized, the licensee shall not store any package containing radioactive waste for a period greater than six months from the date of receipt of the package prior to burial. Radioactive waste shall not be stored in the trench area or an open environment for a period greater than ten (10) days from receipt, and shall be protected from damage and inclement weather conditions.

Environmental Surveillance Conditions

93. The licensee shall conduct an on-site monitoring and environmental monitoring program capable of detecting the potential contribution of radioactive material and hazardous constituents from the site to the environment. The monitoring program shall be performed in accordance with CNSI Procedures

94. Should any samples taken from the monitoring wells, or air samples reveal increases in the concentration of radioactive material which were determined prior to commencement of the burial operations, the licensee shall perform further surveys to determine whether or not the increase is due to the land burial operations. The licensee shall notify the Director, Division of Radioactive Waste Management, Bureau of Land & Waste Management, S.C. Department of Health and Environmental Control, within 48 hours of any such increases.

95. The licensee shall submit results of all scheduled environmental sampling and analysis to the Department quarterly.

96. Monitoring wells shall be placed outside the trenches but in the trench area. Specific locations shall be determined through consultation. All wells shall be grouted, sealed and capped.

97. As radioactive material buried may not be transferred by abandonment or otherwise, unless specifically authorized by the Department, the expiration date of this license applies only to the above ground activities and to authority to bury radioactive material wastes at the site specified in Condition 9. The license continues in effect and the responsibility and authority for possession of buried radioactive material waste continues until the Department finds that the plan established for preparation of the Barnwell Site for transfer to another person has been satisfactorily implemented in a manner to reasonably assure protection of the public health and safety and the Department takes action to terminate the licensee's responsibility and authority under this license. All requirements for environmental monitoring, site inspection, maintenance and site security continue whether wastes are being buried or not.

98. The licensee shall develop a site closure and stabilization plan that addresses, as a minimum, the following performance objectives:

A. Bury all waste in accordance with the requirements of the license.

B. Dismantle, decontaminate, as required, and dispose of all structures, equipment, and materials that are not to be transferred to the site custodian.

C. Document the arrangements and the status of the arrangements for orderly transfer of site control and for long term care by the government custodian. Also document the agreement, if any, of state or federal governments to participate in, or accomplish, any performance objective. Specific funding arrangements to assure the availability of funds to complete the site closure and stabilization plan must be made.

D. Direct gamma radiation from buried wastes should be essentially background.

E. Demonstrate by measurement and/or model during operations and after site closure that concentrations of radioactive material which may be released to the general environment in ground water, surface water, air, soil, plants, or animals will not result in an annual dose exceeding an equivalent of 25 millirems to the whole body, 75 millirems to the thyroid, and 25 millirems to any other organ of any member of the public.

F. Render the site suitable for surface activities during custodial care. Planned custodial care may be limited to activities such as vegetation control, minor maintenance, and environmental monitoring. However, use of the site surface for activities such as parking lots may be planned. Final conditions at the site must be acceptable to the government custodian and compatible with its plan for the site.

G. Demonstrate that all trench elevations are above water table levels taking into account the complete history of seasonable fluctuations.

H. Eliminate the potential for loss of site or trench integrity due to factors such as erosion, surface water, wind, subsidence, and frost action. For example, an overall site surface water management system must be established for humid sites to drain rainwater and snowmelt away from the burial trenches. All slopes must be sufficiently gentle to prevent slumping or gullying. The surface must be stabilized with established short rooted grass, rock, riprap, or other measures. Trench caps must be stabilized to minimize erosion, settling, or slumping of caps.

I. Demonstrate that trench markers are in place, stable, and keyed to benchmarks. Identifying information must be clearly and permanently marked.

J. Compile and transfer to the Department complete records of site maintenance and stabilization activities, trench elevation and locations, trench inventories, and monitoring data for use during custodial care for unexpected corrective measures and date interpretation.

K. Establish a buffer zone surrounding the site sufficient to provide space to stabilize slopes, incorporate surface water management features, assure that future excavation on adjoining areas would not compromise trench or site integrity, and provide working space for unexpected mitigating measures in the future. The buffer zone must also be transferred to the custodial agency. The buffer zone may generally be less than 300 feet but not less than 100 feet.

L. Provide a secure passive site security system (e.g., a fence) that requires minimum maintenance.

M. Stabilize the site in a manner to minimize environmental monitoring requirements for the long-term custodial phase and develop a monitoring program based on the stabilization plan.

N. Investigate the causes of any statistical increases in environmental samples which have occurred during operation and stabilization. In particular, any evidence of unusual or unexpected rates or levels of radionuclide or hazardous constituent migration in or with the groundwater must be analyzed and corrective measures implemented.

O. Eliminate the need for active water management measures, such as sump or trench pumping and treatment of the water to assure that wastes are not leached by standing water in the trenches.

P. Evaluate present and zoned activities on adjoining areas to determine their impact on the long-term performance of the site and take reasonable action to minimize the effects.

SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
Radioactive Material License
Supplementary Sheet

License Number 097
Amendment Number 47

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99. An interim site closure and stabilization plan, assessment of current operating practices, and the long term care plan for the site shall be submitted for review one year prior to the expiration date listed in Condition 4 of this license. The plan shall be consistent with Condition 98 of this license and shall include demonstration that funds are being set aside or other measures being taken are adequate to finance site closure and long term care. The plan shall also include preliminary estimates of costs, environmental impacts, data needs, personnel needs, material and equipment needs, planned documentation and quality assurance, and detailed plan for trench locations and elevations, expected capacities, planned surface contours, and buffer zones.

Date of Issuance June 9, 1997

For the South Carolina Department
of Health and Environmental Control

BY: [signature]
Virgil R. Autry, Director, Div.
of Radioactive Waste Management

ENERGY

Energy*Solutions*

Clive Disposal Facility

Tye Rogers

ANCW Meeting

May 23, 2006

History

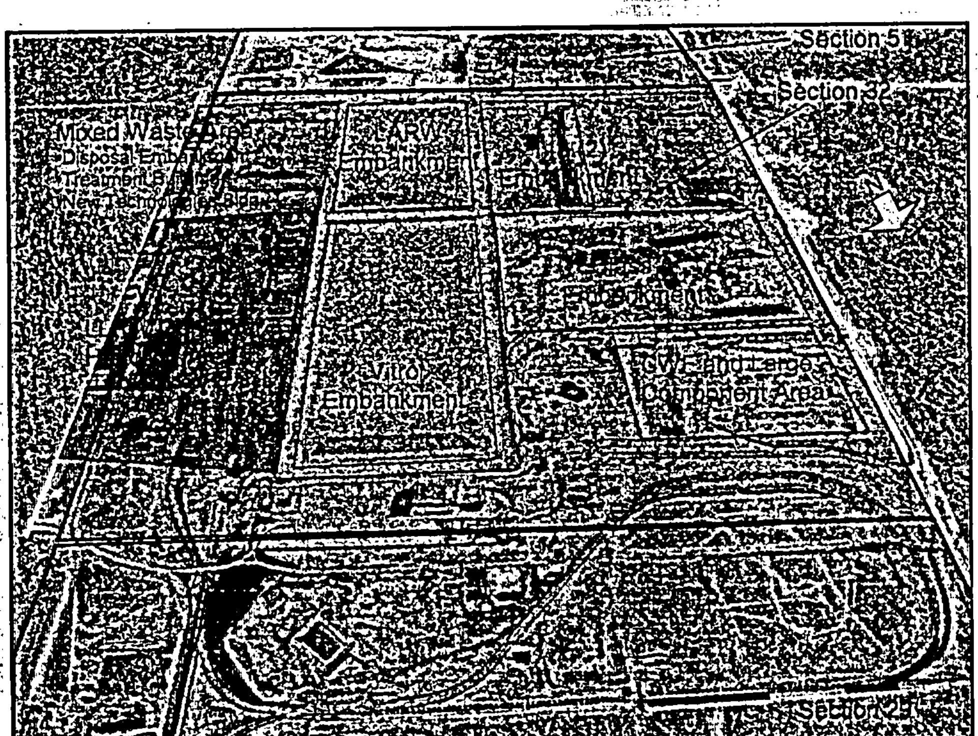
ENERGY

- Site approved by Department of Energy for disposal of Vitro Tailings in 1984. Selected through detailed EIS process of over 29 sites.
- 2.5 million cubic yards of uranium mill tailings moved from Vitro to facility.
- Location exhibited the most suitable hydrogeological, ecological, and economical characteristics for waste disposal.
  - Approximately 8 inches of annual precipitation
  - Over 60 inches annual evaportranspiration
  - Low permeability clay soils
  - Natural poor quality groundwater
  - Stable geology
- Envirocare acquired the surrounding property for the development of a Low-Level radioactive waste disposal facility.
- Began in 1988 disposing of Naturally Occurring Radioactive Material (NORM)

ENERGYSOLUTIONS

Clive Site Key Events

- 1984 – Utah became Agreement State (Revised in 2004)
- 1986 – Disposal of Vitro Tailings at Clive
- 1988 – Received NORM License
- 1991 – Received LARW License
- 1993 – Received MW Permit
- 1994 – Received 11e.(2) License
- 2000 – Received Full Class A LLRW License
- 2001 – Received Class B and C LLRW License
- 2001 – Received CWF License
- 2005 – Envirocare was Purchased by LGB and Withdrew B & C License
- 2006 – Formation of EnergySolutions



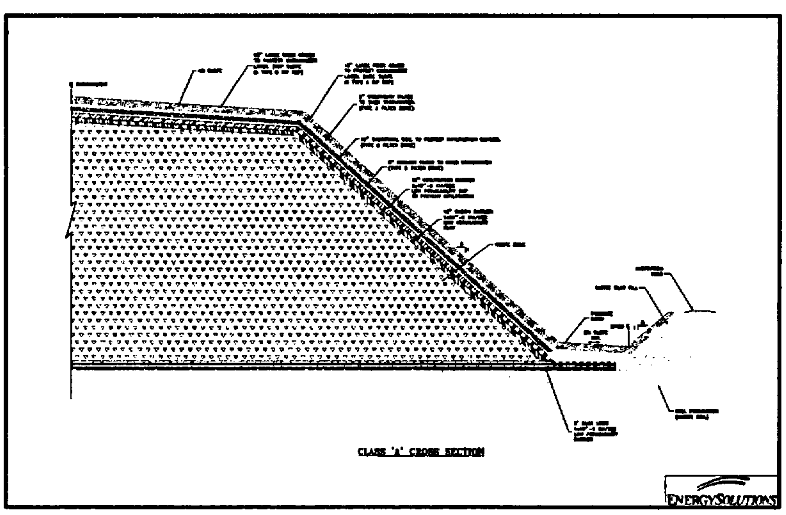
Regulatory Basis

- 10 CFR 61 – Licensing Requirements for Land Disposal of Radioactive Waste
- Utah Administrative Code R313 – Administrative Rules on Radiation Control
  - Utah is an Agreement State
  - Mixed Waste also regulated under 40 CFR and UAC R315
- Clive facility is the only commercial facility originally licensed after establishment of 10 CFR 61

- Protection of the General Public
  - 10 CFR 61.41 dose limits 25 mrem whole body, 75 mrem thyroid, 25 mrem other organs
  - Utah also applies 4 mrem groundwater limit
    - 500 year evaluation for radionuclides
  - 200 year evaluation for heavy metals
  - No credit taken for non-potable groundwater
- Ensure Structural Stability
  - Static safety factor ≥ 1.5
  - Seismic safety factor ≥ 1.2
  - Minimize total settlement

- Ensure Cover Integrity
  - Mitigate differential settlement – maximum distortion in cover 0.02 feet/foot
    - Inherent safety factor of 3
    - Settlement monitoring program
  - Prevent erosion – riprap rock armor
  - Probable maximum flood (>1000 year event)
- Minimize Infiltration
  - Low-permeability cover – clay 5 x 10^{-8} cm/sec
  - Clay covered by drainage rock, sacrificial soil (freeze/thaw protection), and erosion barrier
    - Freeze/thaw evaluated as 500-year event
    - Erosion barrier designed for 1000-year life

Cell Liner/Cover Design



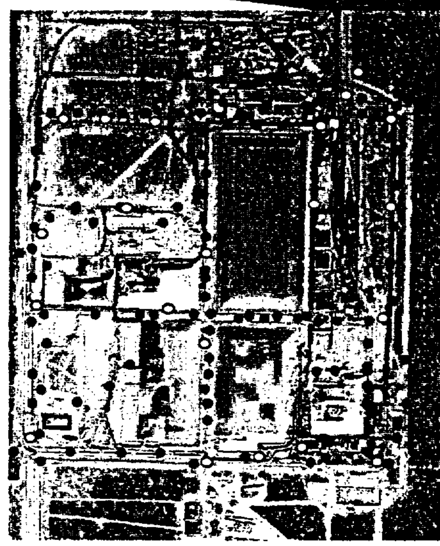
Environmental Monitoring

Groundwater
- Naturally brackish aquifer
- Twice the salinity of the ocean
- Over 90 monitoring wells

Air
- 30 Continuous air monitoring stations plus dozens of air sampling stations at work locations throughout the facility

Soil
- 80 Quarterly Sampling stations

Vegetation
- 9 Sampling stations



Safety and Compliance

- During operation have remained under all regulatory environmental requirements specified in 10 CFR 20, 40 and 61.
  - No reportable environmental releases
  - Average employee annual dose has remained under 15 mrem TEDE
  - Highest employee annual dose has been under 600 mrem TEDE
- Have operated for over 1.8M man-hours without a lost time injury
- Over 400 person-days of inspections are performed each year by regulatory agencies
  - 14 Full Time State Inspectors – Onsite Trailer
  - Annual DOE and NUPIC (utility group) Audits

Bulk Disposal Process (Soil/ Standard Debris)

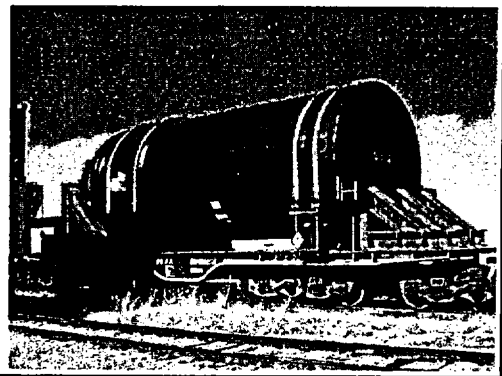
- Unloading
- Transfer to embankment
- Soil/Debris lifts compacted
  - 2 feet thick
  - Up to 50% debris
- Lift approval tracks location of waste by GPS
- Controlled Low Strength Material

Containerized Disposal Process

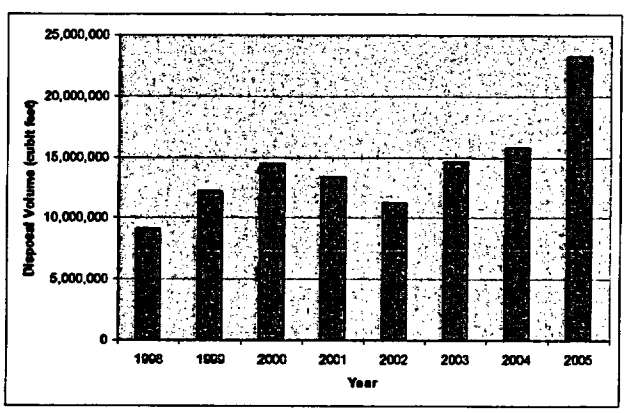
- Disposal in designated portion of Class A footprint
- CW Facility Scheduling and Acceptance separate from Bulk Facility

Large Component Disposal

- Legacy waste & Commercial Power
  - Steam Generators
  - Turbine Rotors
  - Pressurizers
  - Classified Tanks



Clive Site Disposal Volumes and Capacity



- Disposed 122M cubit feet total to date (50,000+ Curies)
- Have over 700M cubit feet disposal capacity remaining

ENERGYSOLUTIONS

Financial Assurance

Closure and Post-Closure Financial Assurance			
	Surety Funding		
	Closure	Post Closure	Total
Embankment			
LARW and Class A	$30,821,361	$5,262,600	$36,083,961
Mixed Waste	14,278,411	2,671,684	16,950,096
11e(2)	3,748,297	731,096	4,479,393
Total Surety Amounts	$48,848,069	$8,665,380	$57,513,449

(1) The term LARW is used by the company to indicate Class A or exempt wastes with low level of radioactivity

- EnergySolutions has used Letters of Credit, Trust Agreements and is currently using an Insurance Policy
- Perpetual Care Fund – Fund established for monitoring past 100 years after closure and incidentals ($400,000/year)

ENERGYSOLUTIONS

Recommendations

- Performance-Based allowing for site specific characteristics
  - NUREG-1573 (1997)
- Alternate Disposal Provisions (10 CFR 61.58)
  - More general approvals
- Use of updated dose models (ICRP 68)
- Consistent Regulations for Different Waste Types
  - Current system is based more on generation then hazard

Low Activity Waste Disposal At Waste Control Specialists

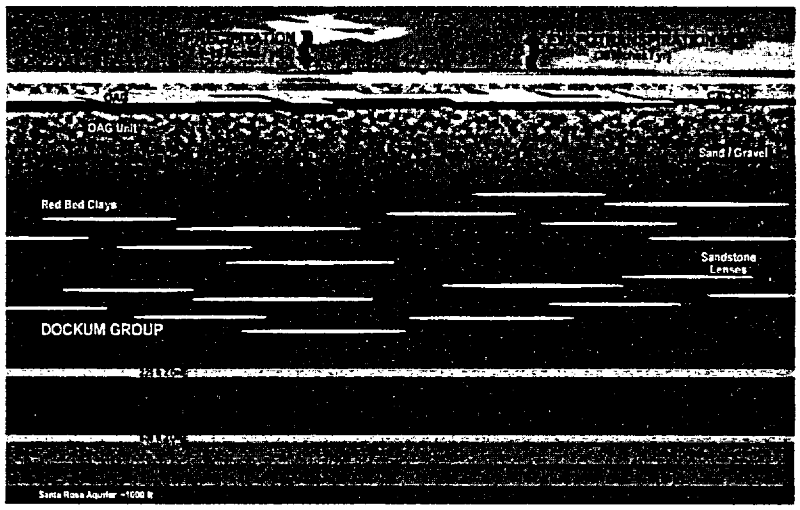
William P. Dornsife
USNRC ACNW Meeting
May 23, 2006

Radioactive waste (material) is regulated by two different agencies in Texas; Department of State Heath Services (DSHS) and the Texas Commission on Environmental Quality (TCEQ)

Low Activity Radioactive Waste:
Authority: Materials that are exempt under Texas regulations
Bases: MOU between DSHS and TCEQ states that material exempted under DSHS rules can be disposed without regard to radioactivity

WCS has disposed of about 300,000 yd^3 (8.1 million ft^3) of low activity material in RCRA disposal cell at an average disposal cost of about \$2 to \$3 dollars/ft^3

WCS has superior site characteristics and unprecedented local support



WCS RCRA Disposal Cell

Safety Assessment

- For NRC exempted waste a RESRAD and TSD-Dose assessment is performed prior to approval – use 1 mem/yr standard including site and transportation workers
- A conservative dose assessment has been performed for disposal of all exempt material in the WCS RCRA landfill
- The results of this assessment are as follows:
  - Future On-Site Resident - zero mrem/yr during first 100,000 years
  - Inadvertant intruder (well drillers) – 0.04 mrem every 50 years
- This assessment conservatively assumes that all of the waste in the RCRA cell is exempt (about twice the actual volume disposed) and all exempt waste streams are at their maximum allowable concentrations

Radiological Safety Program

- Licensed treatment and storage facility in RCRA permitted area
- All workers that handle exempt material are badged as radiation workers and covered under site radiation safety program
- Complete site environmental monitoring program is conducted for licensed facility, including air, radon, soil, and water monitoring around RCRA cell and rail offloading area

Exempt material receipt requirements

- Exempt waste is received as industrial waste under RCRA permit and requires approval of waste profile by WCS
- New permit condition requires notification to DSHS (including profile, sampling plan, and characterization data) – DSHS has 14 days to review
- Notification is required prior to shipment and waste shipments are tracked by transportation company
- Screening surveys and fingerprinting is required for all exempt waste prior to acceptance by WCS

Case Study of Unimportant Quantities of Source Material Exemption by USNRC

- Prior to 1999, NRC required that source material < 0.05% at licensed facilities had to be disposed of as licensed LLRW.
- WCS recognized that many facilities, especially rare earth ore processors, under going decommissioning, had lots of this potentially exempt material.
- WCS requested that NRC formally recognize that this material is exempted from licensing and, using risk based decisionmaking, could be disposal of at non-licensed facilities.
- WCS met with NRC Commissioners and high-level management staff to discuss this concept.
- NRC adopted as policy that unimportant quantities of source material could be disposed at a non-licensed disposal site after NRC approval of a site specific risk assessment.

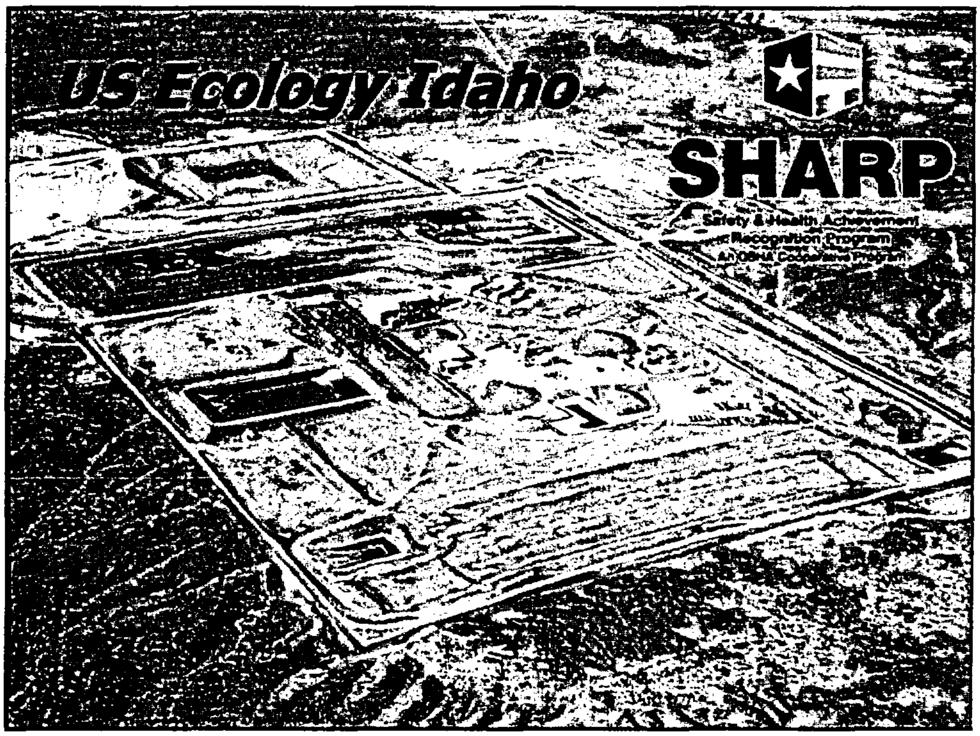
Other issues

- Alternate low activity waste disposal options have resulted in disposal of over 1 million yd^3 of LAW over the past five years at an average price range of about \$2 to \$3 per ft^3. Decommissioning of many sites have been accelerated, including many on the NRC priority list, as well as saving millions of tax dollars for cleanup of FUSRAP sites.
- Other options for alternate LAW disposal have been proposed.
- Several issues will need to be considered
  - Public policy issues
  - Regulatory and jurisdictional issues
  - Material control and release issues
- In looking at future options, care should be taken not to preempt the existing so-called "patchwork" system, since it has been working.

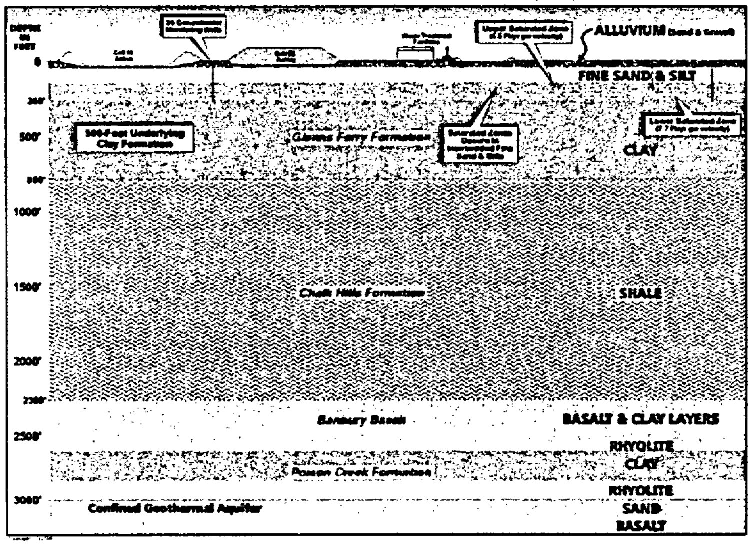
Alternative Disposal Options & Practices

ACNW Working Group Meeting
May 23-24, 2006

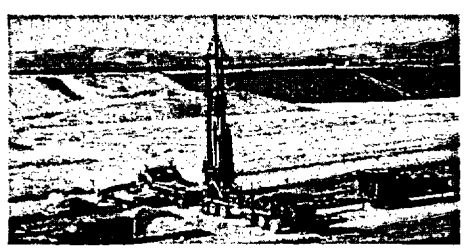
Steve Romano, President and CEO
American Ecology Corp. / US Ecology Inc.



Grand View, Idaho
Site Characteristics

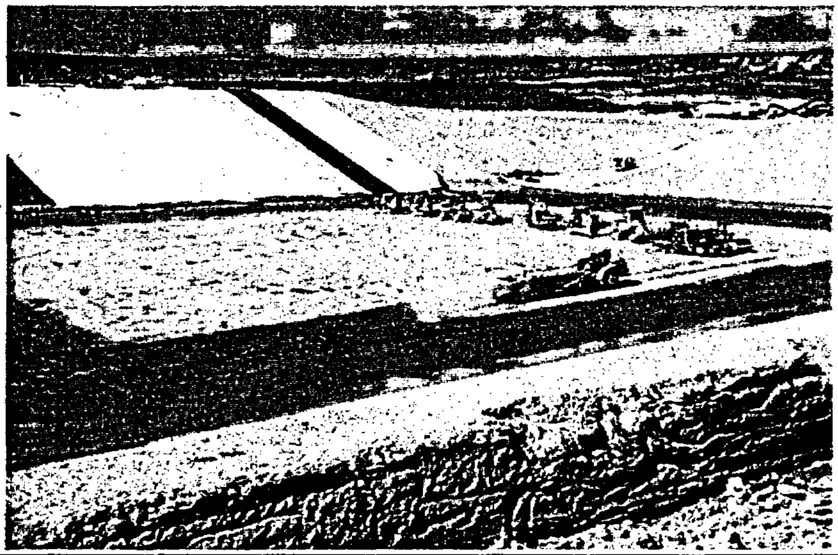


Subsurface Profile

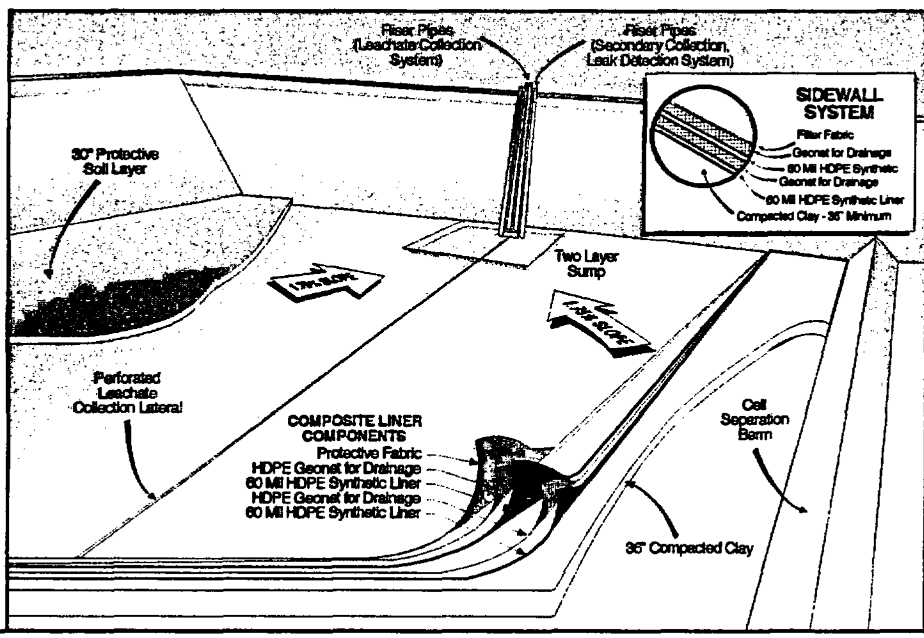


- Predominantly interbedded silts, sands & clays
- Disposal cells excavated 60 feet below surface
- On-site clays used for bottom liner
- 2,800-3,000 feet to geothermal regional aquifer
- Monitored saturated zones 200-300 feet below surface
- Extremely slow groundwater movement

US Ecology Idaho
RCRA Lined Disposal Units



Idaho Disposal Unit Design



Idaho Radioactive Materials Authorizations

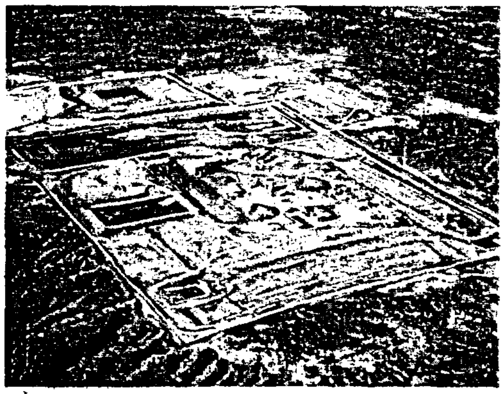
- 1999 RCRA Class 1 permit mod for FUSRAP waste (NORM in original RCRA Part B permit)
- 2001 legislation, rulemaking & RCRA Class 2 permit mod for commercial NORM, NARM and NRC exempt items & devices
- 2005 RCRA Class 2 permit mod for NRC exempt fission & activation products
  - Requires state concurrence with NRC exemption & US Ecology safety analysis
- All permit modifications in accordance with RCRA public involvement requirements

Idaho Performance Assessment & Safety Analysis

- RESRAD code applied using site-specific information
  - Soil
  - Vadose zone
  - Saturated zone
- Peak calculated post-closure dose 9.8 millirem/year at year 326 (C-14 limiting isotope)
- Complies with Idaho post closure dose limit of 15 millirem/year per IDAPA 58 Title 01 Chapter 10.020(c)
- Model output supported development of isotope limits in permit

Grand View, Idaho Radioactive Material Acceptance Criteria

- Unimportant quantities of source material (U & Th)
- NORM <2000 pCi/g (parent & progeny in equilibrium)
- Accelerator produced <3 year half-life
- NRC exempt source & byproduct material, including low activity fission & activation products

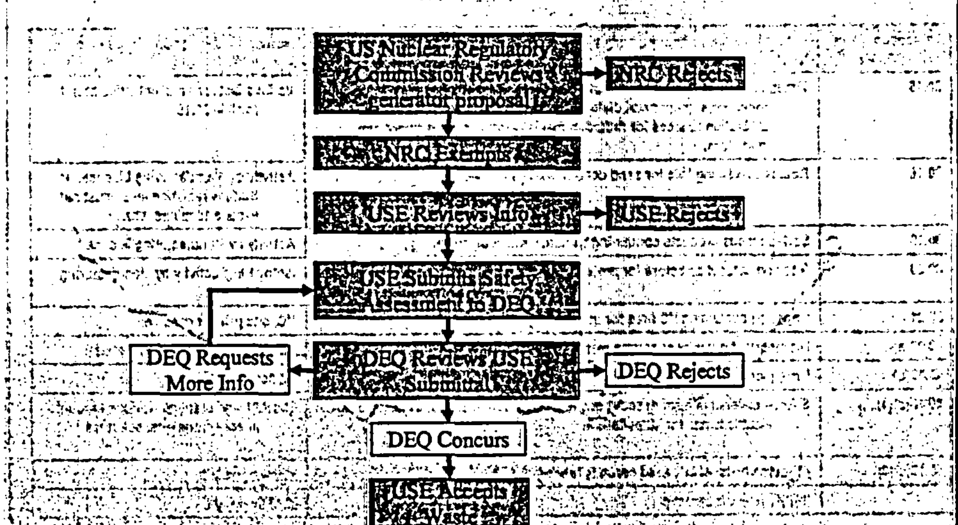


General & Specifically-Exempted Waste Acceptance Criteria

Exemption 10 CFR Part*	Product, Device or Item	Isotope, Activity or Concentration
30.15	Timepieces, lock illuminators, balances, auto shift quadrants, marine compasses, thermostat dials & pointers, internal and external calibration sources for radiation measurement devices, spark gap irradiators.	Various isotopes and activities as set forth in 30.15
30.16	Resins containing ^{46}Sc for sand consolidation in oil wells	Activity by Manufacturing License. Surface radiation level must not exceed 10 millirem/hr.
30.19	Self-luminous products containing tritium, ^{85}Kr, ^{3}H or ^{147}Pm	Activity by Manufacturing license
30.20	Gas and aerosol detectors for protection of life and property from fire	Isotope and activity by Manufacturing license
30.21	Capsules containing ^{14}C urea for *in vivo* diagnosis of humans	^{14}C, one µCi per capsule
40.13(a)	Unimportant quantity of source material: see table above	≤0.05% by weight source material
40.13(b)	Unrefined and unprocessed ore containing source material	As set forth in rule.
40.13(c)(1)	Source material in incandescent gas mantles, vacuum tubes, welding rods, electric lamps for illumination	Thorium and uranium, various amounts or concentrations, see rules
40.13(c)(2)	(i)Source material in glazed ceramic tableware	≤20% by weight
	(ii)Piezoelectric ceramic	≤2% by weight

	(iii) Glassware not including glass brick, pane glass, ceramic tile, or other glass or ceramic used in construction	≤10% by weight
40.13(c)(3)	Photographic film, negatives or prints	uranium or thorium
40.13(c)(4)	Finished product or part fabricated of or containing tungsten or magnesium-thorium alloys. Cannot treat or process chemically, metallurgically, or physically.	≤4% by weight thorium content.
40.13(c)(5)	Uranium contained in counterweights installed in aircraft, rockets, projectiles and missiles or stored or handled in connection with installation or removal of such counterweights.	Per stated conditions in rule.
40.13(c)(6)	Uranium used as shielding in shipping containers if conspicuously and legibly impressed with legend "CAUTION RADIOACTIVE SHIELDING – URANIUM" and uranium incased in at least 1/8 inch thick steel or fire resistant metal.	Depleted Uranium
40.13(c)(7)	Thorium contained in finished optical lenses	≤30% by weight thorium, per conditions in rule.
40.13(c)(8)	Thorium contained in any finished aircraft engine part containing nickel-thoria alloy.	≤4% by weight thorium, per conditions in rule.
30.11	Diffuse material such as contaminated soil, rubble, pavement, etc. As determined by specific NRC or Agreement State exemption and alternate disposal approval and/or IDEQ authorization and related safety determination.	1.Fission and activation products - 25 pCi/g for each radionuclide present 2.Transuranics** - 0.1 pCi/g, each TRU 3.^{3}H - 1000 pCi/g 4.^{129}I - 0.01 pCi/g 5.^{99}Tc - 1.0 pCi/g 6.^{14}C - 10 pCi/g 7.^{40}K - 818 pCi/g The sum of the concentrations of all radionuclides present shall not exceed 2000 pCi/g.
30.14, 30.18, 40.14	Other materials, products or devices exempted from NRC regulation by rule, order, license, license condition or letter of interpretation may be accepted as determined by specific NRC or Agreement State exemption and alternate disposal approval and/or IDEQ authorization and related safety determination.	As set forth in rule

Idaho's NRC Exempt Waste Concurrence Process



Radiological Safety Program: Occupational Monitoring

- Worker TLDs
  - Total 2005 dose for 97 workers monitored: 47 millirem
- Working level radon in air
  - Orders of magnitude below .2 working level (Kusnetz method)
- Weekly removable contamination swipe surveys
  - No action levels exceeded
- Continuous air particulate monitoring
  - Orders of magnitude below allowed limiting intake for Th-232

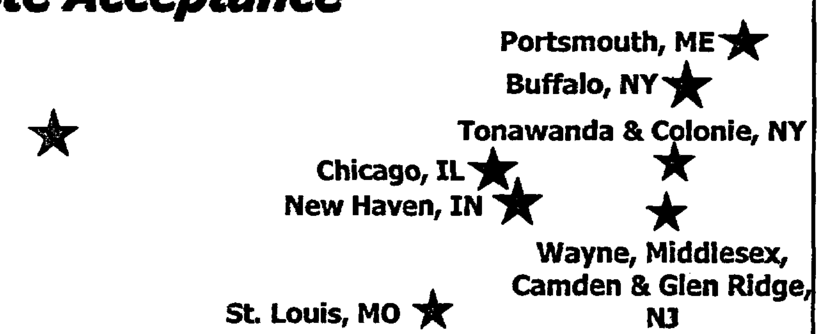
Radiological Safety Program: Environmental Monitoring

- Semi-annual soil & groundwater sampling
- Continuous passive gamma TLD monitoring at fence-line analyzed quarterly
- Continuous track etch radon monitoring analyzed quarterly
- Continuous air particulate air monitoring (high volume air sampling) analyzed quarterly
- All monitoring results well below regulatory investigation levels, including EPA drinking water standards

Radiological Safety Program: Operational Procedures

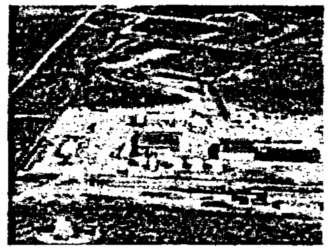
- Inbound truck and railcar loads
  - Detailed gamma dose rate surveys
  - Outside container contamination swipe surveys
  - Select load fission product surveys (multi-channel analyzer)
- Post off-loading
  - Contamination swipe and dose rate surveys
  - Return to service per Table 9, DOT 49 CFR 173.443

Idaho Site FUSRAP Waste Acceptance

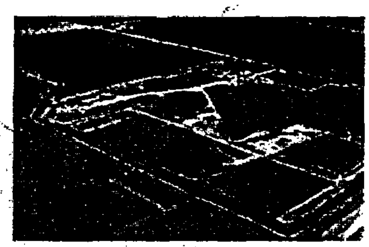


More than 1 million tons of low activity radioactive material from government & industry disposed since 2000

Other RCRA Subtitle C Sites Accepting Radioactive Material



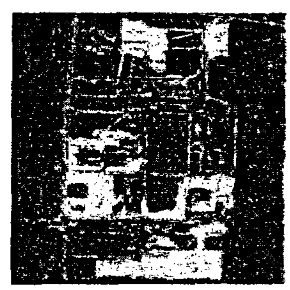
★Clean Harbors - Buttonwillow



Waste Control Specialists★

US Ecology Texas★

Utah 11.e(2) Mill Tailings Sites



- Tooele (Energy Solutions)
- Blanding (International Uranium)

ACNW WORKING GROUP MEETING ON LOW-LEVEL RADIOACTIVE WASTE MANAGEMENT ISSUES

At a 2005 briefing of the Nuclear Regulatory Commission, the Advisory Committee on Nuclear Waste (ACNW or the Committee) agreed to examine some of the issues surrounding the lack of progress in the National commercial low-level radioactive waste (LLW) program. As a first step, the Committee undertook the development of a background or *White Paper* to examine the history and current status of commercial LLW disposal in the United States. The White Paper also examined and reviewed the approach used by the NRC staff to develop its LLW regulations at 10 CFR Part 61.

The LLW White Paper, a draft of which was forwarded to the Commission on December 27, 2005, is organized into three parts. Part I provides an historic perspective of past programs for the management and disposal of commercial LLW. Part II describes NRC's commercial LLW regulatory framework, which is currently defined in Part 61. Part III summarizes past ACNW advice in the area of commercial LLW. Lastly, the ACNW's December 2005 letter also identified a preliminary list of areas where Part 61 might be better risk-informed to improve the effectiveness of the current regulatory framework.[1]

In addition, the ACNW 2005 White Paper identifies several emerging staff initiatives as well as other on-going activities by outside organizations and agencies that could potentially have a bearing on the management of commercial LLW. Among the most important of the NRC initiatives is a strategic assessment of the LLW regulatory program, which is being conducted by the Division of Waste Management and Environmental Protection (DWMEP) staff. The ultimate objective of this strategic assessment is to identify and prioritize activities that the staff can undertake to address vulnerabilities in the current regulatory framework, while also factoring in and addressing future needs and changes that may occur in the nation's commercial LLW management system. The need for a strategic assessment stems from the fact that the NRC staff faces a number of challenges in the LLW program area. These include, but are not limited to, the need to update its LLW storage guidance, increase transparency in processing LLW disposal requests from licensees, and plan for a greater-than-Class C disposal facility licensing review. The ACNW's efforts to examine how Part 61 can be risk-informed are complimentary of the staff's broader effort. For its part, the NRC staff sees the ACNW activities as important input to the ongoing strategic assessment of the LLW regulatory program.

As a continuation of the Committee's LLW program review, as part of its 170th meeting, the ACNW will be sponsoring a fact-finding meeting with industry representatives and stakeholders on May 23-24, 2006, at NRC headquarters in Rockville, Maryland. This Working Group Meeting will provide a forum to allow the Committee to collect important stakeholder information regarding areas where Part 61 might be better risk-informed as well as provide authoritative information that the NRC staff can consider in its strategic assessment of the LLW regulatory program.

The specific purposes of this ACNW May 2006 meeting therefore will be to:

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[1] See http://www.nrc.gov/reading-rm/doc-collections/acnw/letters/2005/ for a copy of the ACNW's December 2005 Commission letter and White Paper.

- Obtain current information on commercial LLW management practices.

- Identify emerging LLW management issues and concerns.

- Solicit stakeholder views on what changes to the regulatory framework for managing LLW should be recommended for Commission consideration.

- Solicit stakeholder views on actions the NRC can take to ensure a stable, reliable and adaptable regulatory framework for effective LLW management.

- Identify specific impacts, both positive and negative, of potential staff activities.

The NRC Executive Director of Operations' February 24, 2006, letter to ACNW, commenting on the draft 2005 White Paper, noted that the paper is an excellent point-of-departure for the ACNW Working Group Meeting to discuss these broader issues being examined by the NRC staff. The ACNW particularly wants to discuss with a broad range of stakeholders the specific impacts of potential future NRC actions, including risk-informing areas of Part 61, so that the staff can prioritize its limited resources to most effectively provide the greatest return on investment.

The anticipated outcomes from this Working Group Meeting are to:

- Compliment the earlier December 2005 ACNW letter concerning LLW management.

- Provide input to a new (second) letter to Commission addressing stated purposes above.

- Provide useful input to on-going NMSS strategic planning effort in the area of commercial LLW regulation and management.

Consistent with aforementioned purposes, an meeting agenda has been developed supported by invited panelists and speakers. See Attachment 1. To aid in the discussions, meeting participants will be asked to consider some questions that have a bearing on the issues of interest to both the ACNW and the NMSS staff (see Attachment 2).

Directions to the NRC headquarters complex can be found at the following Internet site:
http://www.nrc.gov/who-we-are/locations/hq.html

For further information concerning this meeting, please contact:

Michael P. Lee
ACNW Staff
301/415-6887
mpl@nrc.gov

TUESDAY, MAY 23, 2006, CONFERENCE ROOM T-2B3, TWO WHITE FLINT NORTH, ROCKVILLE, MARYLAND

ACNW WORKING GROUP MEETING ON LOW-LEVEL RADIOACTIVE WASTE (LLW) MANAGEMENT ISSUES – DAY 1 (OPEN)

8:30–8:40am **Greeting and Introductions**
The ACNW Chairman Dr. Michael Ryan will state the purposes and objectives for this Working Group Meeting. He will also provide an overview of the planned technical sessions for Day 1 and introduce the invited panelists and speakers.

Purpose of ACNW LLW Working Group Meeting. The purposes of this ACNW Working Group Meeting are to:
- Obtain current information on commercial LLW management practices.
- Identify emerging LLW management issues and concerns.
- Solicit stakeholder views on what changes to the regulatory framework for managing LLW should be recommended for Commission consideration.
- Solicit stakeholder views on actions the NRC can take to ensure a stable, reliable and adaptable regulatory framework for effective LLW management.
- Identify specific impacts, both positive and negative, of potential staff activities.

SESSION I: CURRENT LLW PROGRAM STATUS

8:40–9:40am **Existing LLW Licensee Operational Experience and Perspective Discussion**
Bill House/Chem-Nuclear Systems
Tye Rodgers/Energy Solutions

9:40–10:40am **Alternative Disposal Options and Practices**
Bill Dornsife/Waste Control Specialists (Texas)
Steve Romano/U.S. Ecology (Idaho)

10:40–11:00am ***BREAK***

11:00–11:30am **NRC's Current LLW Program: Challenges**
Larry Camper/NRC Division of Waste Management and Environmental Protection (DWMEP)

11:30am–12:30pm **10 CFR Part 61: Historical Perspectives on NRC's LLW Program**
Paul Lohaus/NRC (retired)
Malcolm Knapp/NRC (retired)

12:30–2:00pm ***LUNCH***

SESSION II: CURRENT FRAMEWORK FOR MANAGING LLW AND OPERATIONAL ISSUES

2:00–3:30pm **State/Compact Disposal Experience**
Don Womeldorf/Southwestern LLW Commission
Henry Porter/South Carolina Department of Health and Environmental Control

3:30–4:00pm **LLW Definitions and Decommissioning Experience**
Ralph Anderson/Nuclear Energy Institute

4:00–4:30pm	**New License Applicant Perspectives** Dean Kunihiro/Waste Control Specialists
4:30–5:30pm	**Stakeholder and Public Comments**
5:30pm	Adjourn Day 1

WEDNESDAY, MAY 24, 2006, CONFERENCE ROOM T-2B3, TWO WHITE FLINT NORTH, ROCKVILLE, MARYLAND

ACNW WORKING GROUP MEETING ON LLW MANAGEMENT ISSUES – DAY 2 (OPEN)

SESSION III: INDUSTRY PANEL DISCUSSION

8:30–8:40am	**Greeting and Introductions** ACNW Chairman Ryan will provide an overview of the planned technical sessions for Day 2 of the Working Group Meeting, and introduce the invited panelists and speakers.
8:40–11:00am	**Industry Roundtable Discussion.** Moderator: Michael Ryan/ACNW Mark Carver/Entergy (Mississippi) Julie Clements/U.S. Army Corps of Engineers Henry Porter/South Carolina Department of Health and Environmental Control Joseph Ring/Harvard University School of Public Health Steve Romano/U.S. Ecology (Idaho) Bill Sinclair/Utah Department of Environmental Quality
11:00–12:30 pm	***LUNCH***
	SESSION IV: PERSPECTIVES ON NRC STRATEGIC ASSESSMENT
12:30–3:00 pm	**Panel Discussion.** Moderator: Michael Ryan/ACNW Mike Elsen/Washington State Department of Health Scott Flanders/NMSS DWMEP Bill House/Chem-Nuclear Systems Susan Jablonski/Texas Council on Environmental Quality Alan Pasternak/Cal Rad Forum
3:00–4:30pm	**Stakeholder and Public Comments**
4:30–5:00pm	**Closing Remarks** By Dr. Ryan.
5:00–5:30pm	**ACNW Working Group Meeting Impressions– Discussion of Letter Report** By full Committee.
5:30pm	Adjourn Day 2

ATTACHMENT 2

ACNW 2006 WORKING GROUP MEETING ON LLW MANAGEMENT ISSUES: QUESTIONS FOR WGM PARTICIPANTS

The ACNW has been asked by the Commission to broaden its focus on LLW issues and work with the staff to determine the adequacy of NRC's technical bases to meet future challenges. These challenges include Department of Energy's evaluation of disposal options for greater-than-Class-C (GTCC) LLW, risk-informed waste classification schemes, and other opportunities to risk-inform Part 61 guidance and improve LLW licensing. The ACNW will use the information gathered at this working group meeting to formulate further recommendations to the Commission.

The following questions are intended to stimulate a dialogue among stakeholders, industry representatives, the ACNW members, and the NRC staff. The intent of this dialogue is to identify possible improvements in the NRC guidance and regulations that apply to the management of commercial LLW. This dialogue should begin with the preliminary recommendations from the ACNW's December 27, 2005, Commission letter, and the draft LLW White Paper. Information specific to improvements that can better risk-inform LLW management practices for the treatment, disposal, and classification of LLW will also be especially useful.

WGM Questions

1. Are there actions (regulatory and/or industry initiated) that can/should be taken in regard to specific issues such as:
   - GTCC (particularly sealed sources) - storage, disposal, tracking and security
   - Class-B and -C LLW – disposal availability and cost
   - Depleted uranium – disposal options
   - Extended storage of LLW
   - Low-activity waste/VLLW disposal options
   - On-site disposal
   - Waste dilution
   - Other (please specify)?

2. What actions could be taken by NRC and other federal and state authorities, as well as by private industry and national scientific and technical organizations, to optimize the current management of commercial LLW and improve the future outlook?

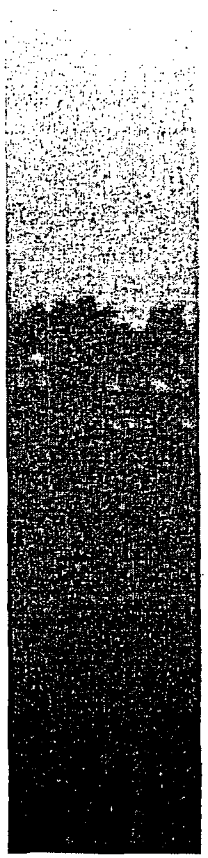
   Which of the following investments are most likely to yield benefits:
   - Changes in regulations
   - Changes in regulatory guidance
   - Changes in industry practices
   - Other (please specify)?

3. What are the key safety and cost drivers and/or concerns for your organization relative to LLW disposal?

4. What unintended consequences might result from the postulated changes identified in response to question no. 2?

5a. Assuming the existing legislative and regulatory framework remains unchanged, what would you expect the future to look like with regard to the types and volumes of LLW streams and the availability of disposal options for Class-A, -B, and -C, and GTCC LLW five years from now? Twenty years from now? What would more optimistic and pessimistic disposal scenarios compared to your "expected future" look like?

5b. How might potential future disposal scenarios affect LLW storage and disposal in the United States, in terms of:
- regulatory system reliability, predictability, and adaptability
- regulatory burden (including cost), and
- safety, security, and protection of the environment?



NRC'S LLW Program

ACNW Working Group Meeting on
LLW Management Issues
May 23, 2006

Larry Camper, Director

Division of Waste Management and Environmental Protection

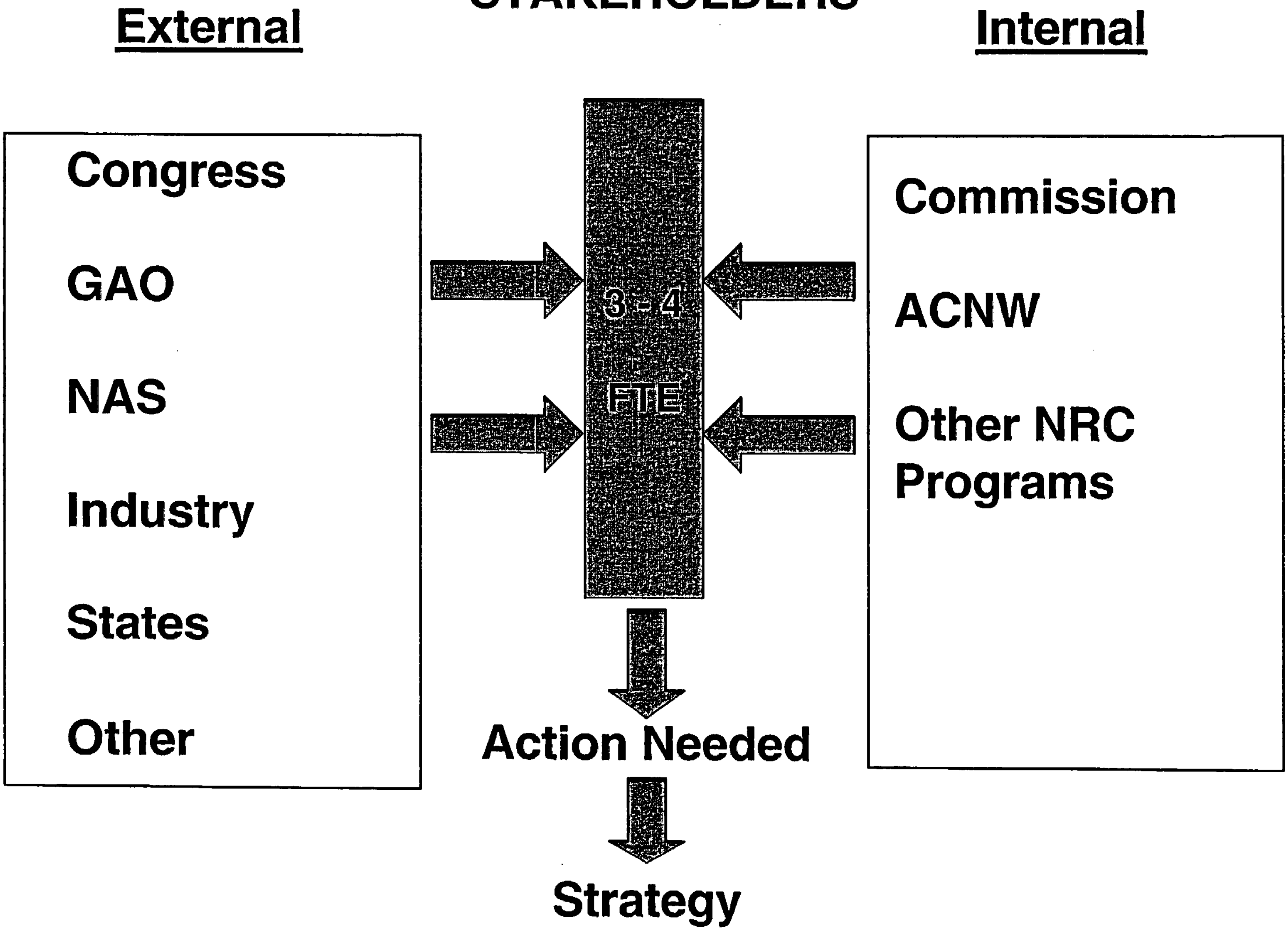
Office of Nuclear Material Safety and Safeguards

U.S. Nuclear Regulatory Commission

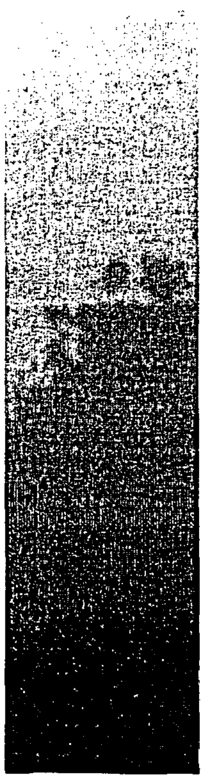
CURRENT PROGRAM SCOPE

- Current LLW program reflects Commission decision on 1996 "Issues" paper
- Decision to maintain program at 5-10 FTE, but current program at about 3-4 FTE
- Resources primarily focused on
  - Assistance to Agreement States
  - IMPEP Reviews
  - International Work
  - Import/Export Licensing
  - 10 CFR 20.2002 Disposal Reviews
  - Support to Other Programs/Agencies/External Stakeholders
  - Maintaining Awareness of National Program

STAKEHOLDERS



EMERGING ISSUES



- GTCC – (Disposal/Sealed Sources/Security)
- Disposal of Depleted Uranium (DU)
- Extended LLW Storage
- LAW/VLLW Disposal
- Potential Closure of Barnwell in 2008
- New Facilities/Waste Streams

LLW PARADOX

Industry

- Pragmatic approach
- System is working (reduced volumes, e.g.)
- Questionable need
- Known costs
- Practices and procedures established

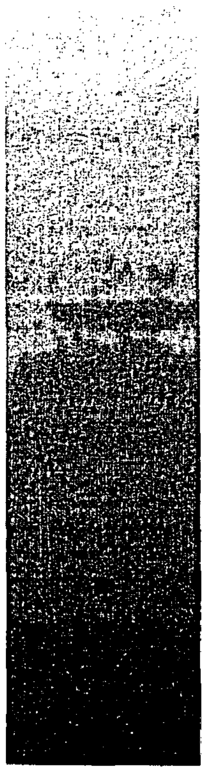
Other Stakeholders

- More risk-informed
- Greater flexibility
- Increased consistency
- Better public understanding
- Cost containment

Regulatory Framework

Right Issues & ROI

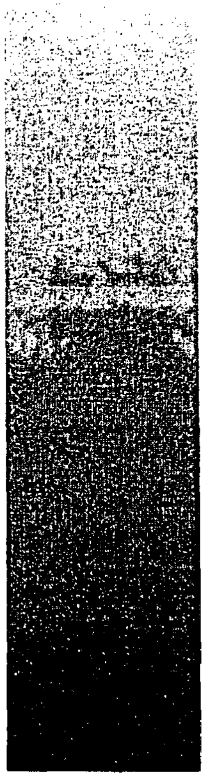
LLW STRATEGIC ASSESSMENT



- Scope the issues
- Gather stakeholder input
- Factor in future needs
- Identify potential NRC actions
- Prioritize
- Develop implementation plan

OBJECTIVES

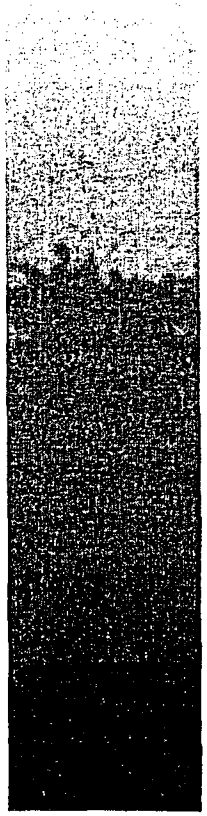
- Position the LLW Program to meet current and future challenges
  - Ensure safe and secure disposal
  - Promote a reliable, stable, and adaptable regulatory framework
  - Address any gaps / vulnerabilities
  - Improve effectiveness and efficiency
- Ensure that limited resources are used effectively



PROCESS

- Information Gathering
  - Major Undertaking: Workshop
  - Stakeholder responses to workshop questions of particular interest
- Information Evaluation
  - Analyze stakeholder/staff inputs
- Decision Making
  - Identify NRC activities, develop criteria and prioritize
  - Estimate resources/time required
  - End product: Commission paper

SUMMARY



- Numerous complex LLW issues on the horizon
- NRC staff conducting an assessment to ensure the LLW program is positioned for success
- Stakeholder input is valued and essential to this exercise
- Finite resources require right choices

10CFR PART 61
Historical Perspectives on NRC's LLW Program

Paul H. Lohaus

ACNW Working Group Meeting on LLW

May 23, 2006

1

OVERVIEW

- Background on NRC LLW Program
- Background on Development of 10 CFR Part 61
- Suggestions for Consideration

2

BACKGROUND ON NRC LLW PROGRAM

- THE SETTING: MID 1970's; Broad Public, Public Interest Group, State, Federal Agency, Congressional, and Industry Interest and Involvement
- HIGHLIGHTS
  - Site Experience
  - Task Force Report on Federal & State LLW Programs
  - GAO/Congressional Reports
  - NRDC, Petition for Rulemaking
  - Capacity (Six Sites; Three Closed)
  - State Governors

3

BACKGROUND ON NRC LLW PROGRAM

- NRC ACTIVITIES
  - LLW Program Plan
  - Two Advanced Rulemaking Notices
    - Waste Classification
    - Part 61/Scope of EIS
  - Preliminary Draft of Part 61 Rule (FR Notice)
  - Governors Ray, List, and Riley meet with NRC Chairman
  - Four Regional Workshops

4

BACKGROUND ON NRC LLW PROGRAM

- LLW Program Plan-NUREG-0240
  - Addressed setting issues/areas.
  - Provided technical and policy direction to staff
  - Technical Studies of: alternative disposal methods, waste form and containers, siting factors, design & operations (e.g. covers), performance assessment, waste classification, chemical toxicity, phased Part 61 rule, supporting environmental analyses, implementing guidance...
  - Project plans and schedules
  - Notice of Availability

5

PART 61 RULE

- Licensing Requirements/LLW Disposal Facility Life Cycle
- Four Performance Objectives for Land Disposal
- Technical Requirements for Near Surface Disposal
- Waste Classification System
- Waste Transfer and Manifest System
- Reserved Sections for Alternative Disposal Methods
- Section 61.7- "Concepts"
- Section 61.58 "Alternative Requirements for Waste Characteristics, and Classification"

6

SUGGESTIONS

- Update LLW Program Plan to Define Current Setting and Establish Priorities
- Plan Should Include Waste Management and Disposal
  - Waste Minimization
  - Processing
  - Interim storage
  - Disposal
- Limited Resources-Focus on Disposal

7

SUGGESTIONS

- Part 61 Performance Objectives Provide Adequate Framework for Addressing Safety, Environmental Protection, and Institutional Commitment
  - Update Dose Limit
  - Security Considerations?
- Need to Address "Very" LLW, and Higher Activity Greater than Class C Waste
- Add State Member to ACNW

8

STRATEGIC ASSESSMENT AND REBASELINING 1995-1997

ACNW May 23, 2006 Malcolm Knapp 1

STRATEGIC ASSESSMENT AND REBASELINING

PHASES:

1. STRATEGIC ASSESSMENT
2. REBASELINING AND ISSUE PAPERS
3. STRATEGIC PLAN DEVELOPMENT
4. IMPLEMENTATION

ACNW May 23, 2006 Malcolm Knapp 2

STRATEGIC ASSESSMENT AND REBASELINING

DIRECTION SETTING ISSUE 5:

WHAT SHOULD BE THE ROLE AND SCOPE OF THE NRC'S LOW-LEVEL RADIOACTIVE WASTE PROGRAM?

ACNW May 23, 2006 Malcolm Knapp 3

STRATEGIC ASSESSMENT AND REBASELINING

FACTORS:

- PROGRESS IN SITING NEW LLW FACILITIES HAD BEEN SLOW
- STAFF EXPECTED NEW FACILITIES TO BE LICENSED AND OPERATING BY 2000
- LLW DISPOSAL AND MANAGEMENT OPTIONS WERE AVAILABLE FOR GENERATORS.
- GOVERNMENT-WIDE EFFORT TO STREAMLINE AND REDUCE COSTS
- ACNW DECEMBER 29,1995 LETTER

ACNW May 23, 2006 Malcolm Knapp 4

STRATEGIC ASSESSMENT AND REBASELINING

SIX OPTIONS:

1. ASSUME A GREATER LEADERSHIP ROLE
2. ASSUME A STRONG REGULATORY ROLE IN THE NATIONAL LLW PROGRAM
3. RETAIN CURRENT PROGRAM
4. RECOGNIZE PROGRESS AND REDUCE PROGRAM
5. TRANSFER LLW PROGRAM TO EPA
6. ACCEPT ASSURED LONG-TERM STORAGE

ACNW May 23, 2006 Malcolm Knapp 5

STRATEGIC ASSESSMENT AND REBASELINING

SIX OPTIONS:

1. ASSUME A GREATER LEADERSHIP ROLE
2. ***ASSUME A STRONG REGULATORY ROLE IN THE NATIONAL LLW PROGRAM***
3. RETAIN CURRENT PROGRAM
4. RECOGNIZE PROGRESS AND REDUCE PROGRAM
5. TRANSFER LLW PROGRAM TO EPA
6. ACCEPT ASSURED LONG-TERM STORAGE

ACNW May 23, 2006 Malcolm Knapp 6

STRATEGIC ASSESSMENT AND REBASELINING

COMMENTS GENERALLY

- FAVORED:
  - STRONG REGULATORY ROLE
  - THEN CURRENT PROGRAM OR LESS
  - ADVOCATING NRC'S OWN EXPERTISE
  - EXPLORING ASSURED STORAGE
- DID NOT FAVOR
  - TRANSFERRING PROGRAM TO EPA
  - PROMOTING NEW DISPOSAL CAPACITY

STRATEGIC ASSESSMENT AND REBASELINING

SIX OPTIONS:

1. ASSUME A GREATER LEADERSHIP ROLE
2. ASSUME A STRONG REGULATORY ROLE IN THE NATIONAL LLW PROGRAM
3. ***RETAIN CURRENT PROGRAM***
4. RECOGNIZE PROGRESS AND REDUCE PROGRAM
5. TRANSFER LLW PROGRAM TO EPA
6. ACCEPT ASSURED LONG-TERM STORAGE

STRATEGIC PLAN – NUCLEAR WASTE SAFETY

GOAL: Ensure treatment, storage, and disposal of wastes produced by civilian use of nuclear material in ways that do not adversely affect this or future generations

PERFORMANCE GOAL: No offsite release of radioactivity beyond regulatory limits from low-level waste disposal sites

STRATEGY: We will perform legislatively required low-level waste activities

ACNW Presentation--May 23, 2006

Don J. Womeldorf
Executive Director, Southwestern Low-Level Radioactive Waste Commission

California's experience in developing a low-level waste disposal facility is an exercise in frustration and, to a large extent, futility. When the LLRW Policy Act was passed in 1980, the user's group, the California Radioactive Materials Management Forum, known as CalRad, initiated action which led to 1983 legislation that directed that California would have a disposal facility. The State was to seek Compact partners but with or without a compact, would have a disposal facility. The program was to be privatized in that the State was to seek a developer whose task it would be to become the so-called license designee and to do the work, and bear the costs, of coming up with a disposal facility. The California Department of Health Services was to be the State lead agency, tasked to oversee the company's efforts and ultimately to become the licensor and regulator. The legislation passed with bipartisan support and was signed by Governor Jerry Brown.

Several firms competed to become license designee. US Ecology was chosen in 1985. The State set some parameters for a site, including factors such as limited annual rainfall and population density, and the company then began its efforts to locate potential sites. It focused its efforts on the southeastern desert area of California, with obviously little water and without the dense population of much of the State. Through a screening process it developed a short list of a few candidate sites.

US Ecology in 1988 decided upon the Ward Valley, an area in San Bernardino County, as its preferred site. The State of California concurred with the choice. The site was on federal land, administered by the Bureau of Land Management, in an area with only a few inches of annual average rainfall and miles away from any residents. The company began its work toward developing the license application and the State as lead agency began work toward producing an environmental impact report under the California Environmental Quality Act, which document would also meet the requirements for an environmental impact statement under federal law, the National Environmental Policy Act.

There were public meetings and public hearings on all aspects. The League of Women Voters was enlisted in the work. Stakeholders were brought into the process. Transparency was evident throughout. The antinuclear interests were heard from. The environmental impact documents were certified. The license application was submitted and deemed complete in 1989, and after long and thorough review, the license was issued in 1993, 10 years after the enabling legislation was passed.

In the meantime the State was working on the charge in the initial legislation that instructed the State to seek compact partners. Negotiations with Arizona fell apart when there were objections from that state. California then began progress toward a compact with South Dakota. About that time things began to change in

Arizona, and in 1987 compact legislation was passed that allowed formation of the Southwestern Low-Level Radioactive Waste Disposal Compact including as party states Arizona, California, North Dakota and South Dakota. It was ratified by the Congress in 1988. The Commission has been active since its first meeting in 1991, but is not involved under law in developing or regulating a disposal facility for the compact region. Its main action over the past several years has been to keep low-level waste moving out of the region and into the facilities in Utah and South Carolina that will accept it.

Getting back to the California disposal facility, the lengthy process from the 1983 legislation to the present has been constantly embroiled in politics at all levels. That is what has kept the Southwestern Compact region from opening a disposal facility. When the license was granted to US Ecology, it was conditioned upon the land being transferred from federal ownership to State of California ownership. That did not happen because the Clinton administration apparently instructed the Secretary of the Interior not to approve the transfer. It is ironic that the Interior Secretary was Bruce Babbitt, former Governor of Arizona, which state would benefit from completion of the Ward Valley facility. California's governor at that time, Pete Wilson, was outspokenly in favor of the Ward Valley facility, but was not able to persuade the federal government to transfer the land.

Governor Wilson was succeeded by Governor Gray Davis, who had been Governor Jerry Brown's chief of staff and was obstructionist as to proceeding with the Ward Valley project. In 1999 he cut off funding for the low-level waste project staff and activity stopped. In 2002 he signed legislation that forbids the Ward Valley from being used as the site of a low-level waste disposal facility. He was recalled and succeeded by Governor Arnold Schwarzenegger, but low-level waste disposal has not yet become a high-priority item in the current administration. Governor Schwarzenegger has appointed members to the Commission, which Governor Davis failed to do, .but nothing has been done toward developing a disposal facility for the region.

As to the current situation, the Southwestern Region's four party states, like some two-thirds of all states, are going to be faced with a problem. Class A waste can be sent to EnergySolutions as long as Utah is willing to take it, so that is not an imminent problem. Classes B and C waste will be accepted at the Barnwell South Carolina facility only until mid-2008 and there is no promise of any disposal alternative after that time. Generators will have to discontinue activities that produce such waste, which is of limited possibility, or the waste will have to be stored. If the Congress can be persuaded to instruct the Department of Energy to accept so-called "commercial' low-level wastes, the incremental difference above DOE's own waste would be insignificant. The technical aspects of DOE's accepting that waste would not be of any great magnitude—again, it will be a matter of overcoming the political difficulties.

* * *

ACNW Working Group
May 2006

Henry Porter, Assistant Director
Division of Waste Management

South Carolina Department of Health & Environmental Control

D H E C
PROMOTE PROTECT PROSPER

Overview

- History
- South Carolina Regulatory Program
- LLRW Waste Acceptance
- 20.2002 Approvals

D H E C
PROMOTE PROTECT PROSPER

History

- September 1969 – South Carolina becomes Agreement State
- November 1969 – Storage License issued to Chem-Nuclear
- April 1971 – Chem-Nuclear Licensed to dispose of waste.
- December 1982 – NRC publishes 10 CFR 61
- August 1986 – South Carolina adopts 10 CFR 61

D H E C
PROMOTE PROTECT PROSPER

South Carolina Regulatory Program

- South Carolina Laws and Regulations
- Disposal Facility License
- Compliance Program
- Enforcement

D H E C
PROMOTE PROTECT PROSPER

Laws

- South Carolina Atomic Energy and Radiation Control Act
  - Establishes DHEC as Regulatory Authority.
  - Requires that DHEC promulgate regulations.
  - Provides framework for state ownership of property for nuclear activities.

D H E C
PROMOTE PROTECT PROSPER

Law

- South Carolina Radioactive Waste Transportation and Disposal Act
  - Provides for regulation of the transportation of waste in the state.
  - Requires notification to the state of shipments of radioactive waste
  - Requires that Disposal Facility Operator report shipment violations to DHEC.

D H E C
PROMOTE PROTECT PROSPER

Regulations

- Similar to NRC regulations
- Provides provision for concentration averaging
- Includes provision to accept other than Class A, B, & C Waste (similar to 10 CFR 61.58)
- Exceed NRC requirements by requiring the use of engineered barriers, improved leachate monitoring system, and enhanced caps.
- South Carolina Regulation for Transportation of Radioactive Waste – provides mechanism for regulation of generators.

D H E C
PROMOTE PROTECT PROSPER

License

- License includes 101 conditions
  - Unburied possession limits
  - General Conditions
  - Receipt, Acceptance and Inspection
  - Waste Characteristics and Waste Form
  - Contamination Limits
  - General Packaging
  - Site Design, Construction and Maintenance
  - Burial Operations
  - Environmental Surveillance
- More than 100 procedures

D H E C
PROMOTE PROTECT PROSPER

License

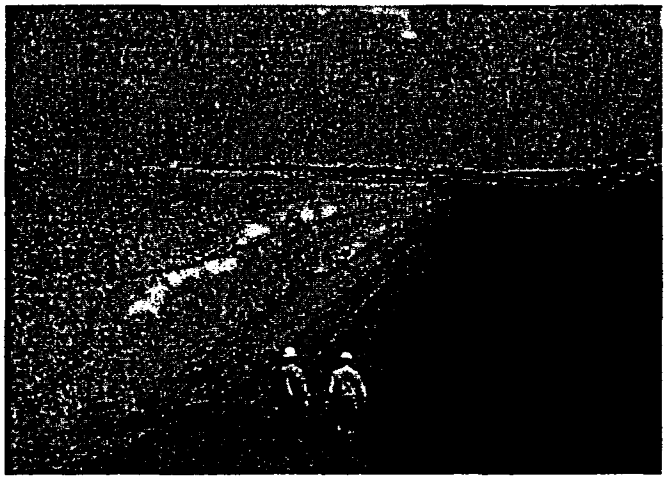
- Allows the use of the NRC BTP on Concentration Averaging and Encapsulation for waste other than sources and irradiated hardware.
- Barnwell Rule of 10 for Hardware (NRC requires BTP).
- Sealed sources on case-by-case approval.

DHEC
PROMOTE PROTECT PROSPER

Compliance

- Bi-annual license inspection.
- Weekly site inspection.
- Daily inspections by on-site inspector of waste shipments.
- Trench Construction Inspections.
- Quarterly environmental reports.
- Special Environmental Reports.

DHEC
PROMOTE PROTECT PROSPER



New Trench Construction Inspection

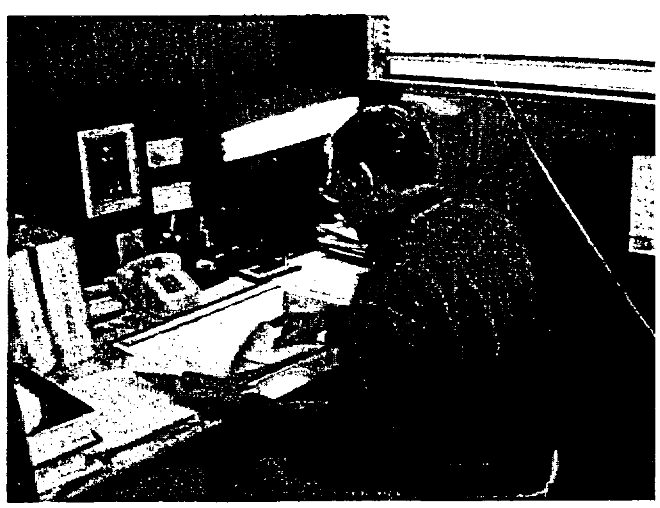
D H E C
PROMOTE PROTECT PROSPER

DHEC Shipment Inspection

D H E C
PROMOTE PROTECT PROSPER

DHEC Shipment Inspection

D H E C
PROMOTE PROTECT PROSPER



DHEC Review of Manifest and Associated Shipping Documents

D H E C
PROMOTE PROTECT PROSPER

Waste Acceptance

- Waste Classification Tables (10 CFR 61.55)
- Further restrict transuranic radionuclides and radium.
- Require classification be based on higher of either unprocessed/unconsolidated waste class or processed/consolidated waste class.
- Sealed sources - Class based on volume or mass of source but allow exceptions.

D H E C
PROMOTE PROTECT PROSPER

Waste Acceptance

- Allow concentration averaging

  - NRC BTP on Concentration Averaging and Encapsulation
  - Barnwell Rule of 10 (WAC)
  - Case-by-case review for sealed sources.

D H E C
PROMOTE PROTECT PROSPER

Waste Acceptance

- GTCC Waste Approvals
  - 10 CFR 61.58
  - Generally driven by radionuclides that are not mobile in environment
  - Include Ni59, Ni63, Nb94, C14
  - Irradiated metal (usually stainless steel)
  - Require some additional processing or packaging.

D H E C
PROMOTE PROTECT PROSPER

Regulation 61-63, RHA 3.28 Approvals

- Like 10 CFR 20.2002 approvals
- Utility onsite disposals
  - RESRAD evaluation dose < 1 millirem/yr
  - Disposed of in permitted landfill
  - Sewer sludge, resins, components
  - Incineration of oil

D H E C
PROMOTE PROTECT PROSPER

Regulation 61-63, RHA 3.28 Approvals

- Decommissioning and other wastes
  - RESRAD evaluation dose <1 millirem/yr
  - No transuranics
  - Disposal in a Subtitle D landfill
  - Landfill must modify acceptance criteria

Discussion

Contact Information:

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E-mail: porterjh@dhec.sc.gov

Enhancements to Safe and Economical Disposition of Low-Level Radioactive Waste (LLRW)

Ralph Andersen, CHP
Director – Radiation Safety & LLRW
Nuclear Energy Institute

NEI
NUCLEAR ENERGY INSTITUTE

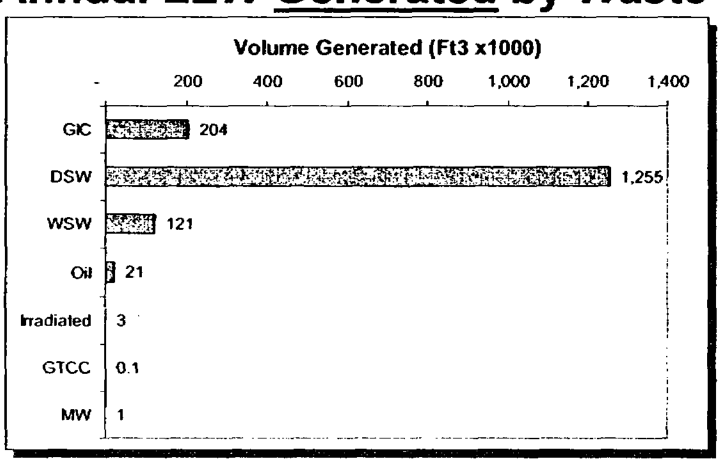
Acknowledgements

- EPRI - establishing reliable data and developing technical innovations.
- NAS - providing a rational framework for improving the regulatory system.
- EPA - promoting an integrated approach to radioactive and non-radioactive waste disposal
- NRC - initiating a strategic planning effort to prioritize agency activities and resources
- ACNW – documenting an historical perspective and providing a forum for scoping issues and actions

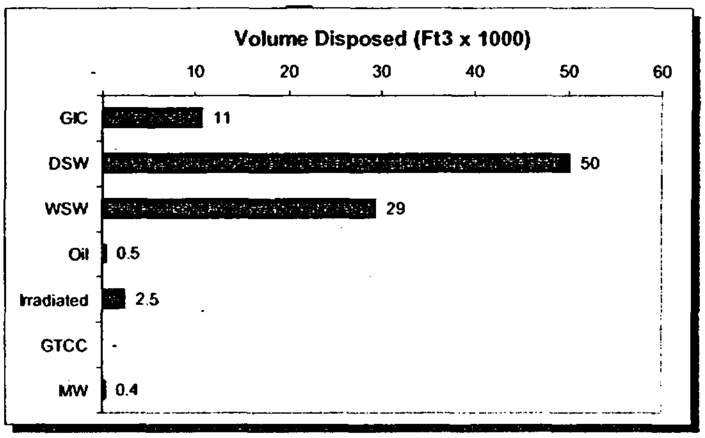
NEI

DATA

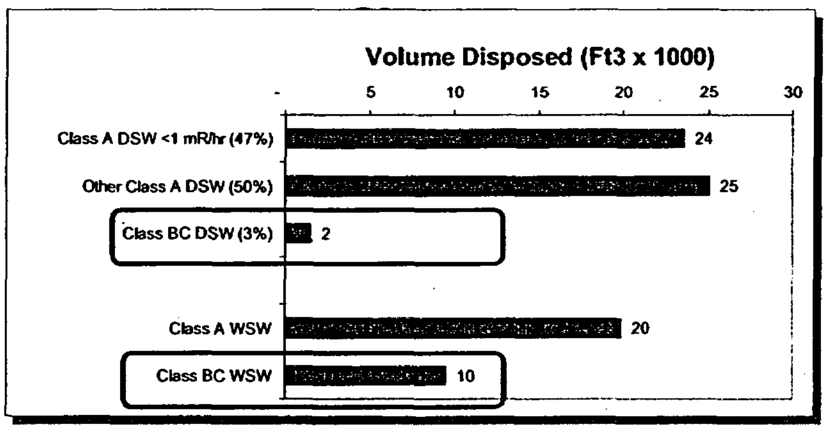
Operating Reactors: Annual LLW Generated by Waste



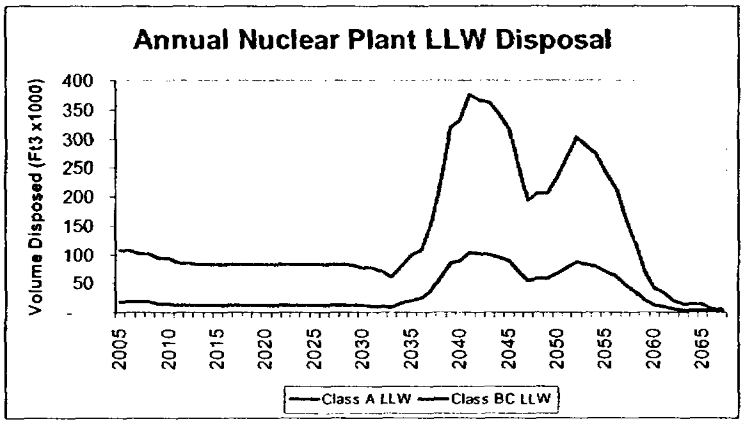
Operating Reactors:
Annual LLW Disposed by Waste



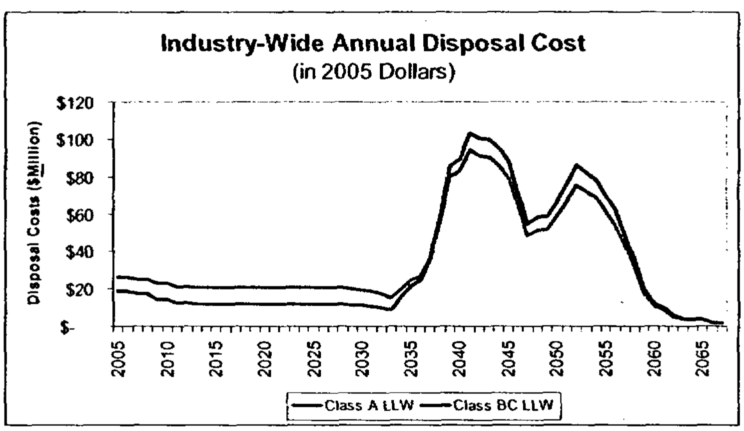
Operating Reactors:
Annual LLW Disposed by Waste



LLW Distribution in 21st Century (Assumes Life Extensions for All Reactors)



Industry-Wide Annual LLW Disposal Costs



SITUATION

Current Disposal Site Use by Operating Stations

- Respondents using Barnwell (Class ABC): 98%
- Respondents using Envirocare (Class A): 93%
- Respondents using Hanford (Class ABC): 2%

Waste Disposition Options After 2008

- Envirocare = Open access to all generators
  - Will accept all Class A waste; no Class BC waste
- Barnwell (Atlantic Compact) = Restricted access
  - 13 operating + 2 actively decommissioning reactors
- Hanford (Northwest Compact) = Restricted access
  - 1 operating + 1 actively decommissioning reactors
- WCS (Texas Compact) = Restricted access
  - 5 operating reactors

Summary

- Annual waste volumes/classes will be relatively constant through 2035
- After 2008, more than 80% of the plants will lack option for B, C, GTCC disposal
- Disposal site options for A disposal may increasingly be restricted
- After 2035, volumes will greatly increase for all waste classes

Near-Term Activities

- Flexibility within existing Part 61 (61.58)
- Guideline or guidance for robust waste storage
- Guideline or guidance for 20.2002 applications

Longer-Term Activities

- Enable for disposal at non-Part 61 disposal facilities (e.g., RCRA/UMTRCA)
- Update and improve RIPB aspects of Part 61
- Facilitate disposal of certain wastes at federal facilities

Industry Activities

- Continued optimization of industry LLRW management practices (e.g., through EPRI evaluations and process changes)
- Improved data and assessments
- Encourage and support collaboration and coordination between federal agencies, the states,

Waste Control Specialists LLC

Licensing a Low Level Radioactive Waste Disposal Facility… an Applicant's Perspective

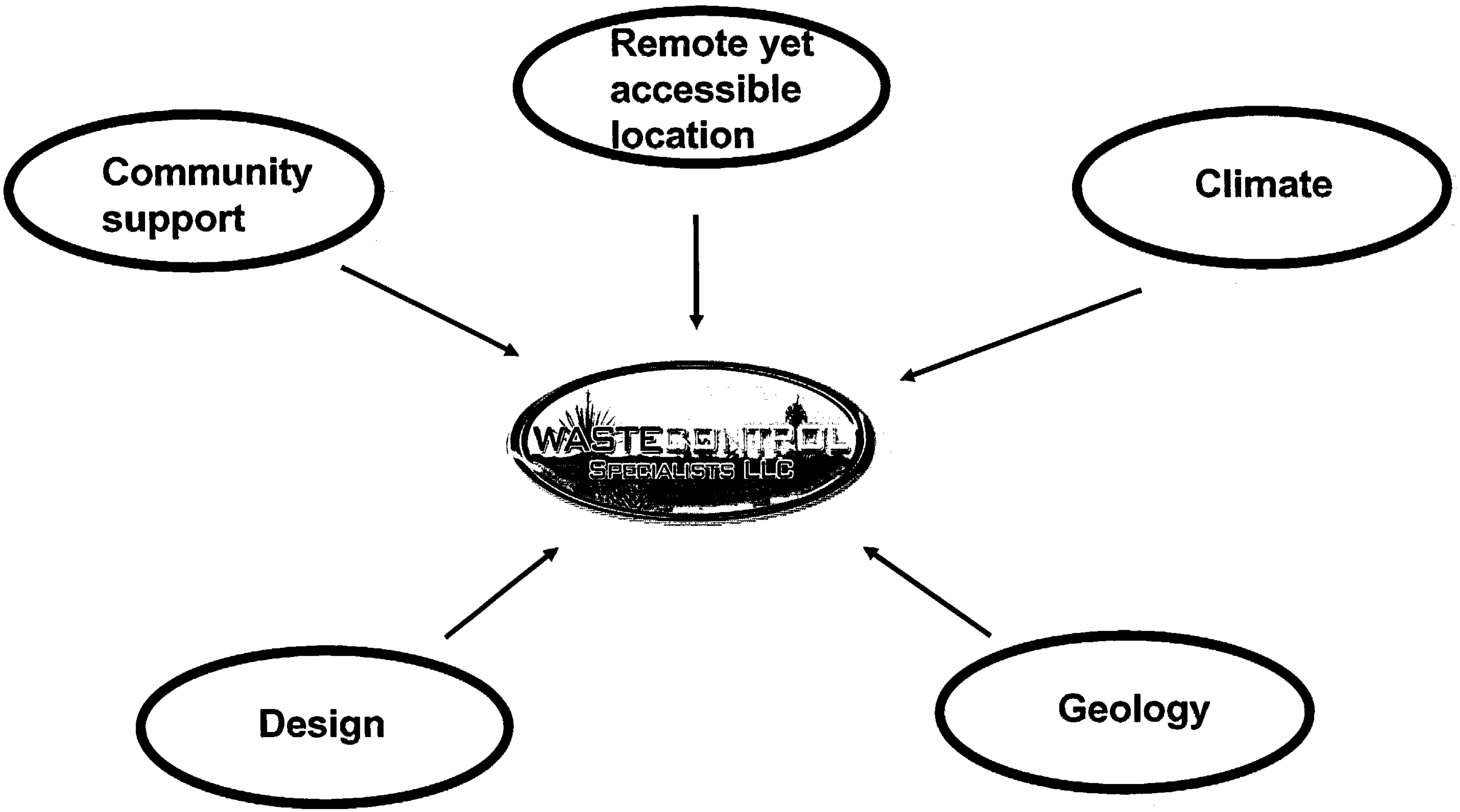
Dean Kunihiro

Waste Control Specialists, Senior VP, Licensing and Regulatory Affairs

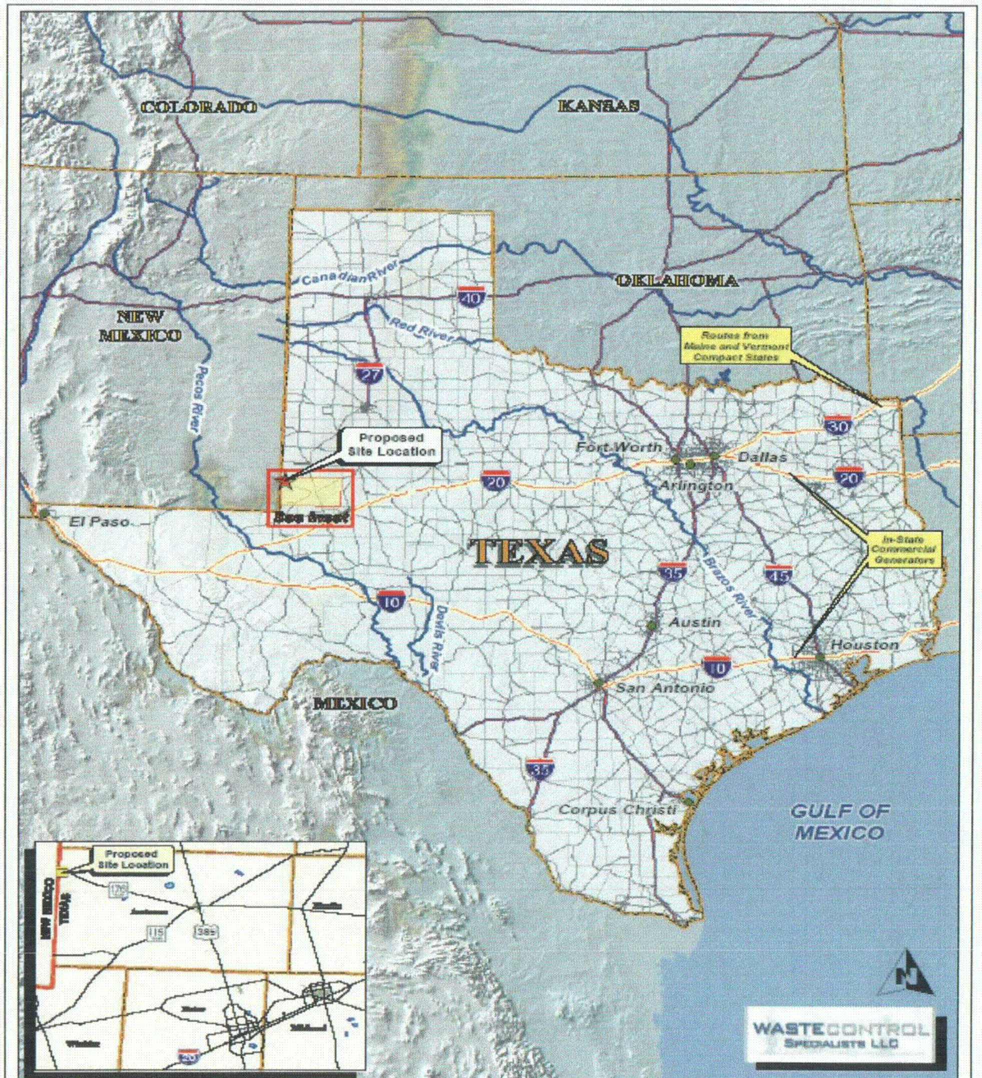
ACNW Meeting, May 23, 2006

Overview of the Proposed WCS Low-level Radioactive Waste Disposal Site

Site Characteristics
"5 Ideal Factors"



Remote Location



LLW Transportation Routes

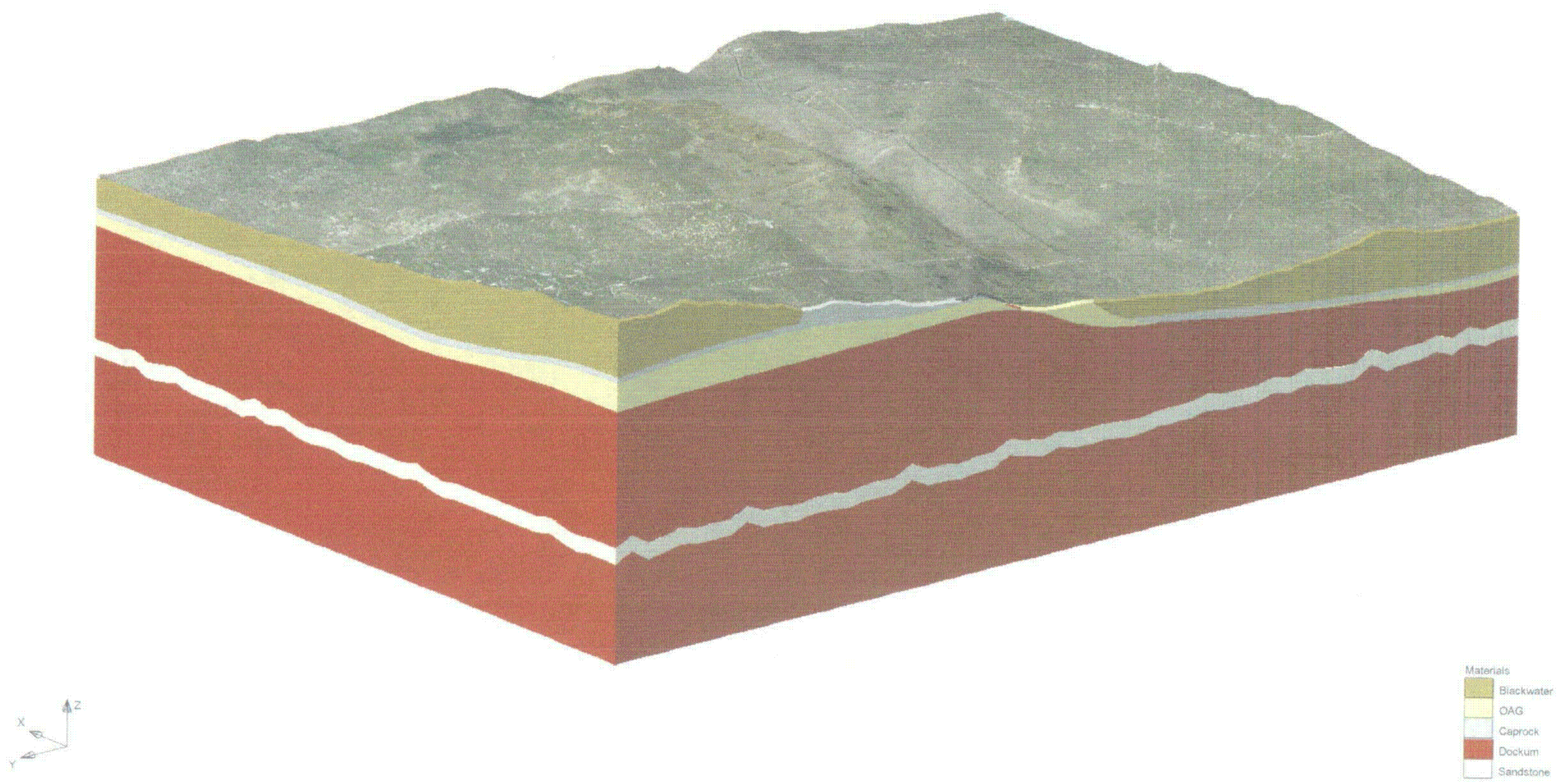
Arid Climate (West)

Arid Climate (East)

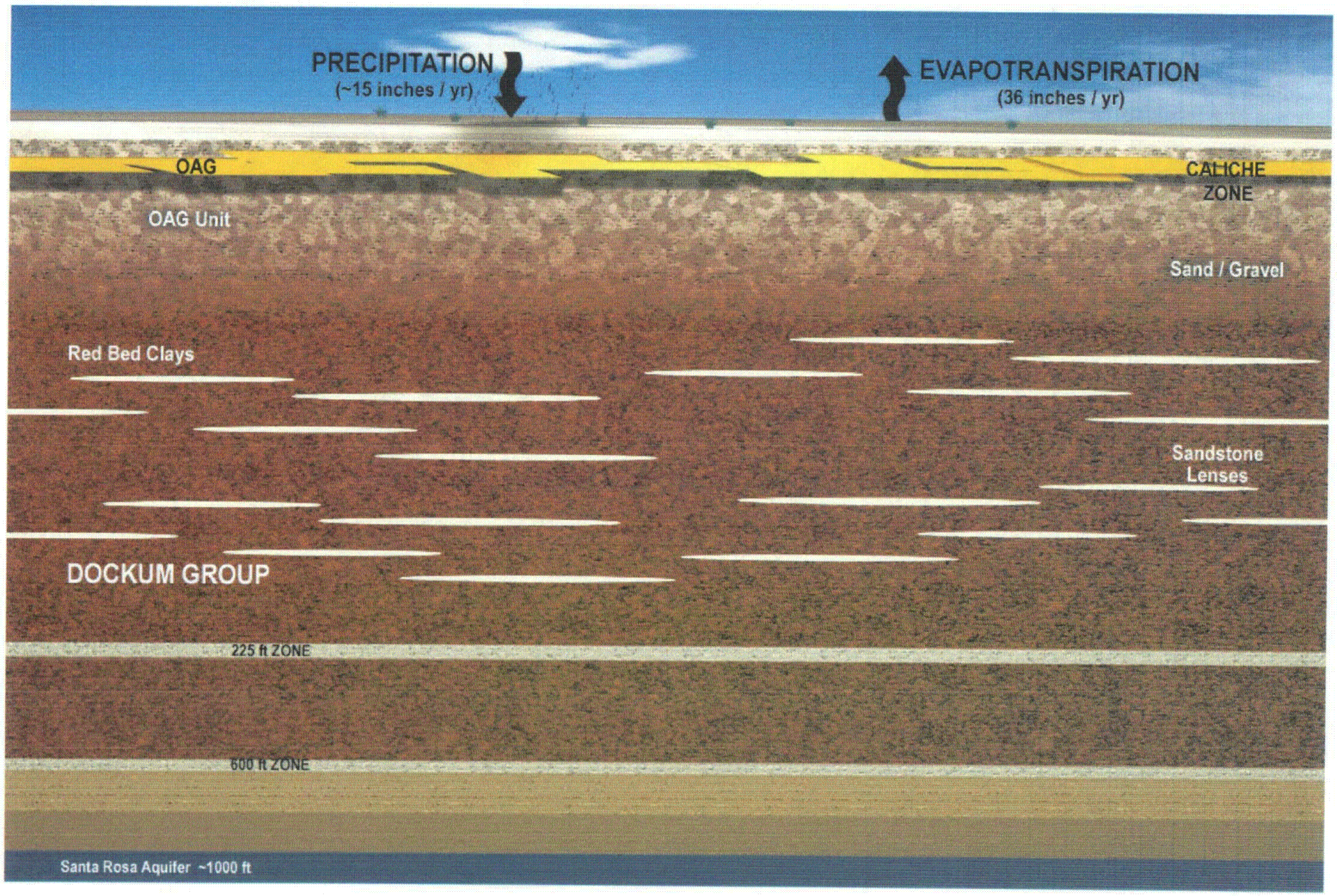
WASTE CONTROL SPECIALISTS LLC

WASTE CONTROL SPECIALISTS LLC

Geology

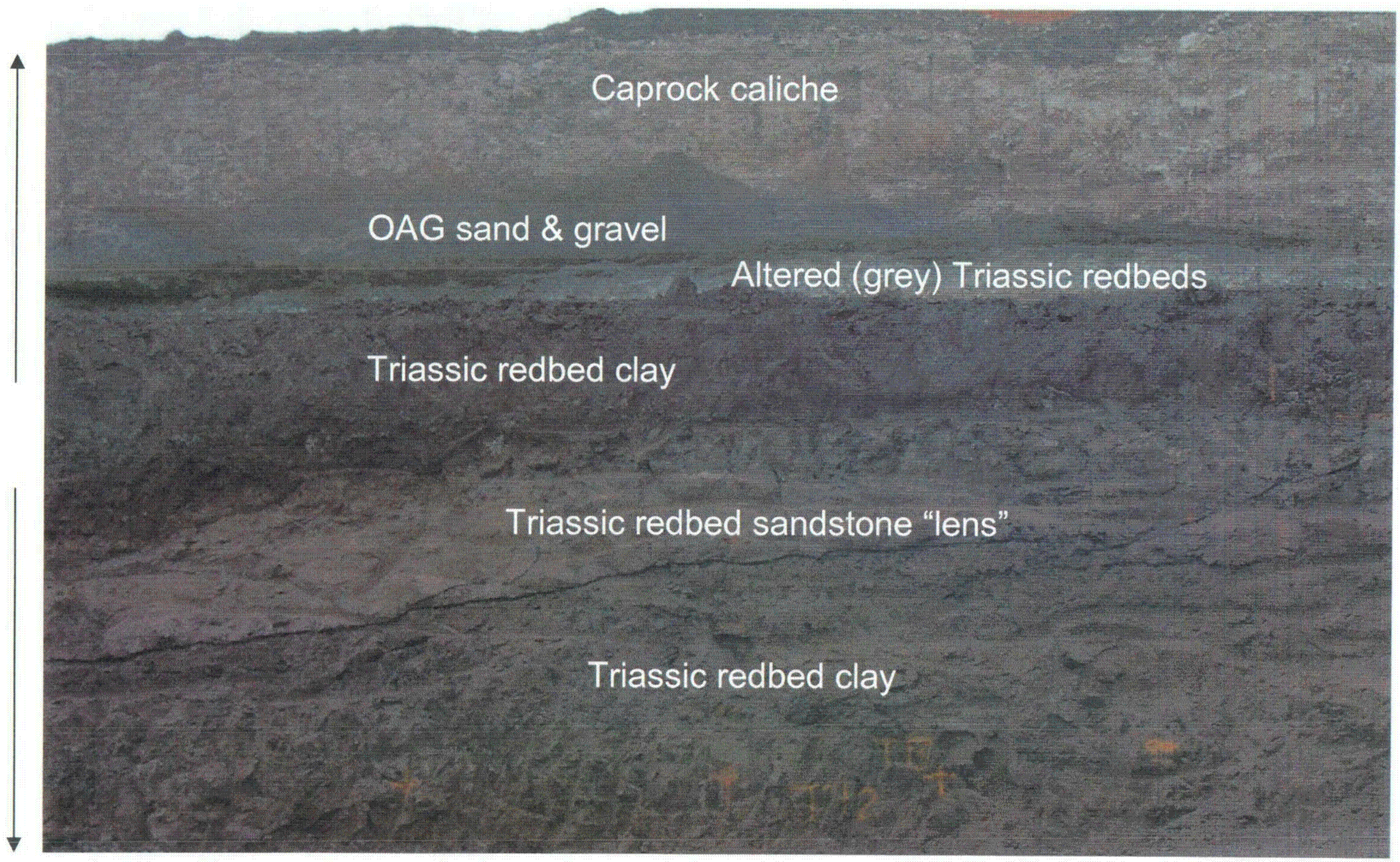


Geology



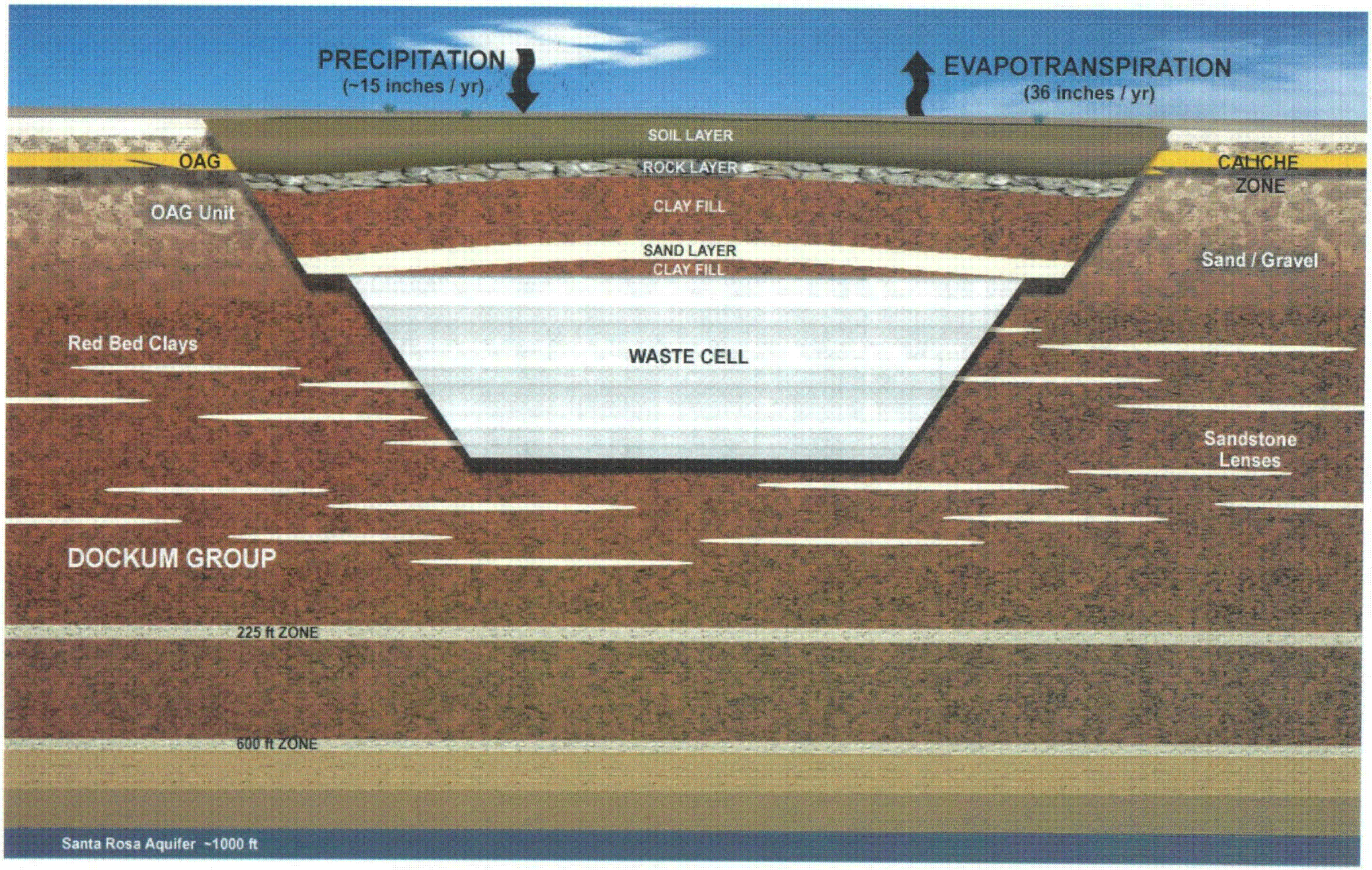
PRECIPITATION
(~15 inches / yr)
EVAPOTRANSPIRATION
(36 inches / yr)
OAG
CALICHE
ZONE
OAG Unit
Sand / Gravel
Red Bed Clays
Sandstone
Lenses
DOCKUM GROUP
225 ft ZONE
600 ft ZONE
Santa Rosa Aquifer ~1000 ft

Geology


Caprock caliche
OAG sand & gravel
Altered (grey) Triassic redbeds
Triassic redbed clay
Triassic redbed sandstone “lens”
Triassic redbed clay

Geology

Design


PRECIPITATION
(~15 inches / yr)
EVAPOTRANSPIRATION
(36 inches / yr)
SOIL LAYER
ROCK LAYER
CLAY FILL
SAND LAYER
CLAY FILL
WASTE CELL
OAG
OAG Unit
CALICHE ZONE
Sand / Gravel
Red Bed Clays
Sandstone Lenses
DOCKUM GROUP
225 ft ZONE
600 ft ZONE
Santa Rosa Aquifer ~1000 ft

Community Support

Waste Control Specialists LLC

Status of the WCS Low-level Radioactive Waste Disposal License Application

Milestones Completed

•License Application submitted:	August 4, 2004
•License Application declared Administratively Complete:	February 18, 2005
•Public Meeting, Andrews:	March 31, 2005
•License Application declared Most Meritorious:	April 26, 2005
•Response to Second Technical Notice of Deficiency submitted:	March 31, 2006

Waste Control Specialists LLC

Statutory Milestones

January 1, 2004 – Publish Notice for Potential Applicants

180 days

June 2004- Begin accepting applications for 30-day period

30 days

July 2004 – End of 30-day period for applications

270 days

April 2005 – Selection of most meritorious application

July 2004 – Review for administrative deficiencies

45 days

Sept. 2004 – Administrative notice responses and review

180 days

March 2005- Public meetings in potential host counties

May 2005- Technical Review of Selected Application

450 days

August 2006- Publish Initial Draft License (IDL)

Sept. 2006- Applicant Review of IDL

30 days

Oct. 2006- Publish Final Draft License

31 days

Nov 2006- Publish Notice of Draft License & Opportunity For Hearing

45 days

Dec. 2006- Begin Administrative Hearing Process

365 days

Dec. 2007- Proposal for Decision Issued

90 days

March 2008- TCEQ Commissioners Issue License or Denial

Administrative and Technical Review Process

Waste Control Specialists LLC

Summary

- Administrative Review
  - –3 documented rounds
  - –Over 300 items requiring supplemental information

- Technical Review
  - –2 documented rounds
  - –Over 1100 comments/questions

Waste Control Specialists LLC

Summary Cont'd

- Extra Ordinary LA
  - Initial Submittal- 12 Volumes
  - Final Application- 33 Volumes

- Most critical chapters remain Chapter 2, Site Characterization and Chapter 8, Performance Assessment

- None of the changes or additions significantly alters the results and conclusions presented in these chapters.

Waste Control Specialists LLC

Summary Cont'd

- LA satisfies all regulatory requirements and demonstrates the proposed facility to be fully protective of public health, worker safety and the environment

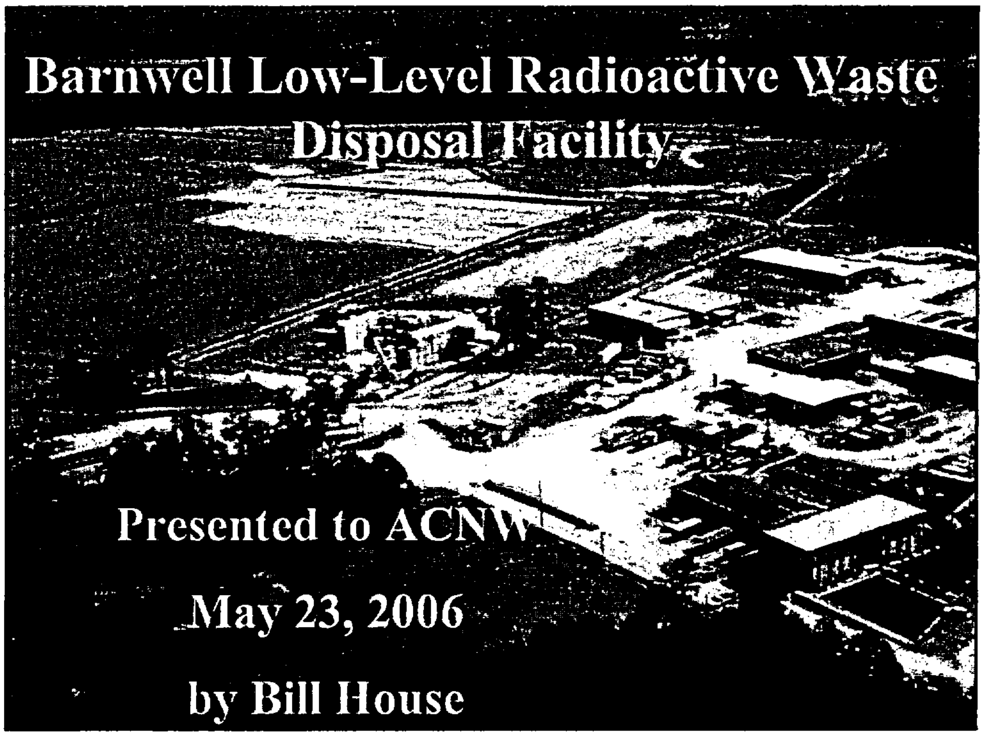
- WCS remains confident LA will be approved.

Observations

Observations

- TCEQ regulations, based on 10 CFR Part 61, provides a sound regulatory basis

- Reviews relied heavily on “NRC guidance” documents
  - Approximately 25 different NRC NUREGs or Regulatory Guides cited
  - Many Outdated
  - Many Misapplied/Misinterpreted



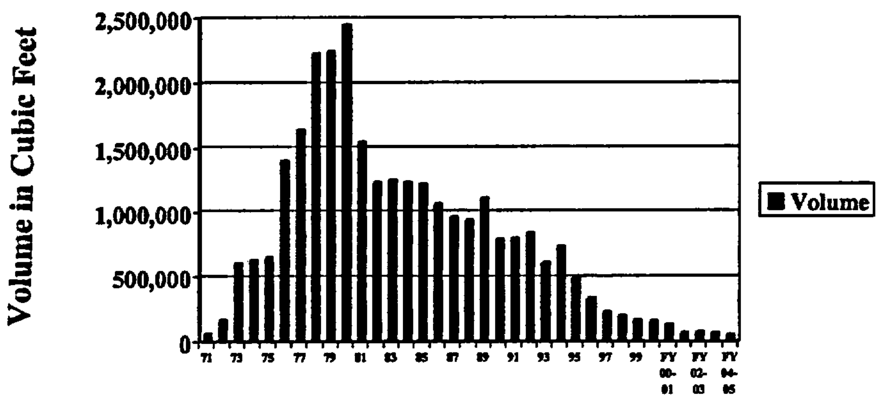
Barnwell Disposal Site Presentation Overview

- Brief Site History
- Current Disposal Operations
- Atlantic Compact Law Impacts
- Safety and Compliance Summary
- Risk-Informed Approach
- Suggested Areas for Evaluation

Barnwell Site Key Event Dates

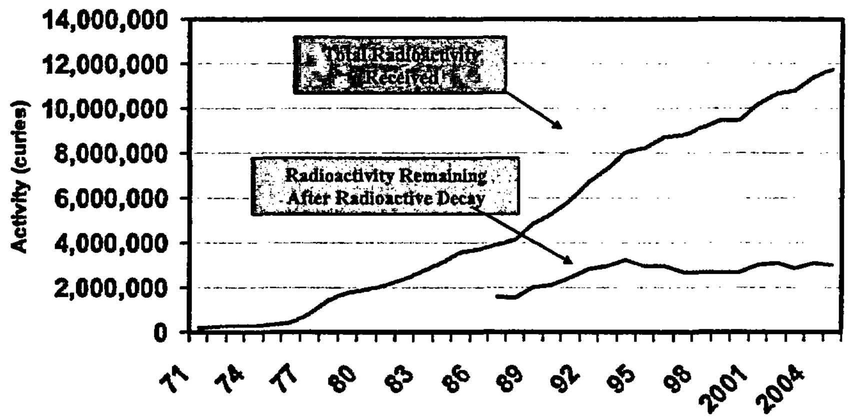
- 1969 license to receive and store LLRW
- 1971 license to dispose LLRW in 17.2 acres
- 1976 lease amended to 235 acres
- 1980 US LLRW Policy Act passed
- 1981 decommissioning fund established
- 1982 SC joins Southeast Compact
- 1995 SC withdraws from SE Compact
- 2000 SC joins Atlantic Compact

Barnwell Disposal Volumes



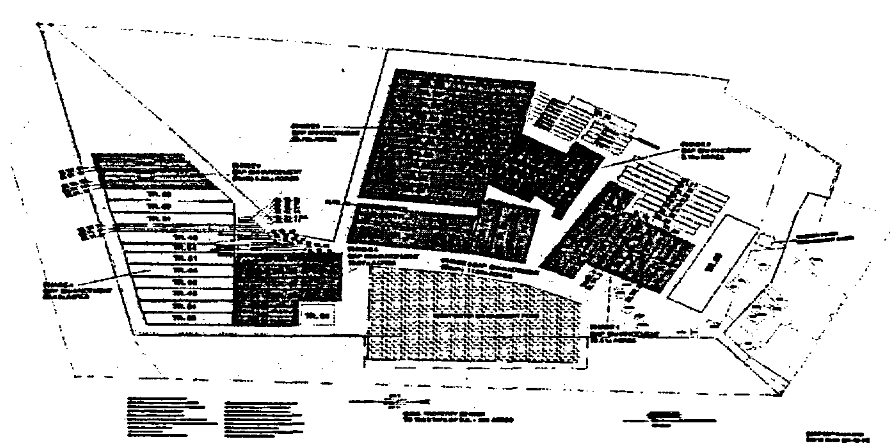
Duratek

Barnwell Radioactivity



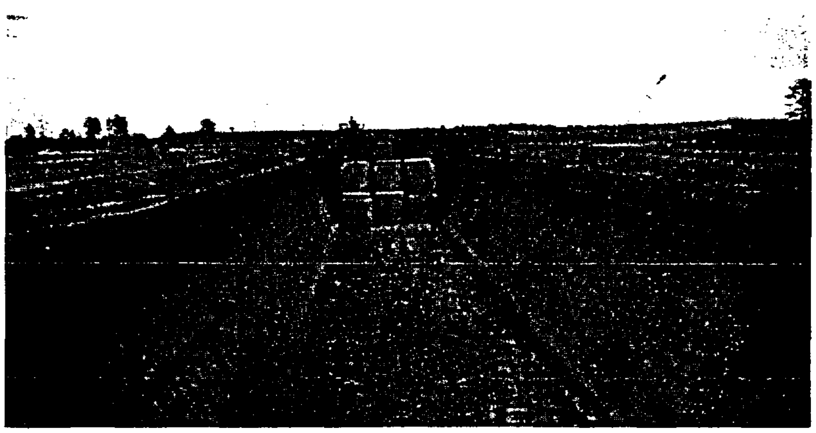
Duratek

Barnwell Site Configuration



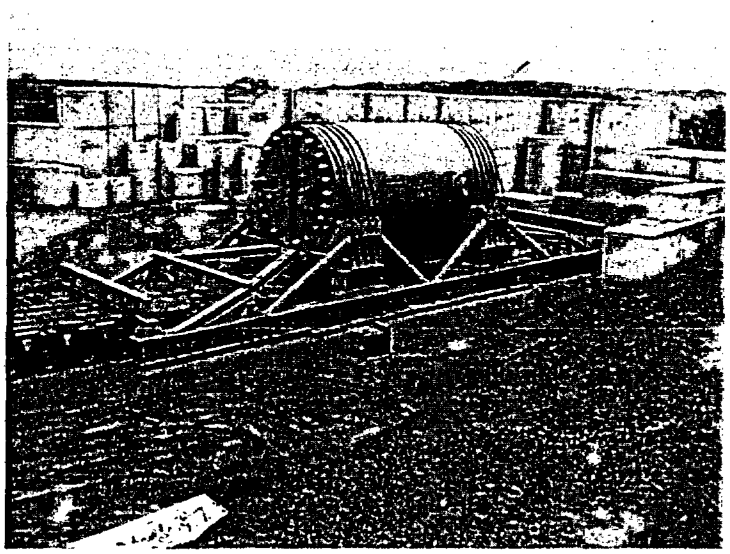
Disposal Trench in 2004

Class B/C Trench



Irradiated Hardware Disposal

Large Component Disposal



Atlantic Compact Act Economic Regulation

Duratek

- SC Budget and Control Board
  - Sets prices for waste disposal
- SC Public Service Commission
  - Determines allowable costs
- SC Office of Regulatory Staff
  - Detailed audits of actual costs

Duratek

Atlantic Compact Volumes

	Volume Allowed	Actual Volume
FY 2000-2001	160,000 cu ft	125,989 cu ft
FY 2001-2002	80,000 cu ft	57,763 cu ft
FY 2002-2003	70,000 cu ft	65,656 cu ft
FY 2003-2004	60,000 cu ft	59,516 cu ft
FY 2004-2005	50,000 cu ft	43,260 cu ft
FY 2005-2006	45,000 cu ft	(thru Apr.) 30,528 cu ft
FY 2006-2007	40,000 cu ft	
FY 2007-2008	35,000 cu ft	

•Members: SC, CT, NJ. No out of compact waste after FY 2008.

•NJ and CT allowed no more than 800,000 cu ft total

Duratek

Barnwell Site Waste Volumes Forms and Activities

	2003			2004			2005		
Waste Types	Ship	CuFt	Ci	Ship	CuFt	Ci	Ship	CuFt	Ci
	#			#			#		
Resins/Filter Media/Filters	260	37,640	21,027	208	27,358	20,790	173	23,419	12,288
Dry Active Waste	86	11,500	47,869	86	12,358	242	55	8,861	23,233
Reformed Residue	23	2,767	7,635	35	4,225	13,913	59	6,685	15,188
Equipment & Components*	19	14,903	33,497	20	10,398	33,911	7	1,624	14,527
Irradiated Hardware	26	1,439	465,638	16	920	231,590	26	1,498	452,060
Solidified Liquids	10	1,473	297	5	519	57	3	493	28
Sealed Sources, Devices and Gages	19	830	66,770	18	985	1,032	19	433	369
Totals	443	70,552	642,733	388	56,763	301,535	342	43,013	517,693

* 2003 volume includes 9,536 cu.ft. for the ME Yankee RPV and 2,830 cu.ft. for the Big Rock RPV
2004 volume includes 7,507 cu.ft. for the CY RPV

Duratek

Class B/C Waste Disposed (cu. ft.)

	FY2001/2002	FY 2002/2003	FY 2003/2004	FY 2004/2005
	Class B/C	Class B/C	Class B/C	Class B/C
Atlantic Compact	5,819	4,495	11,942[2]	2,894
Texas Compact (2 states)	809	1,081	909	1,127
34 States w/o Access 2008	16,055	24,694[1]	20,524[3]	16,923
Totals	22,683	30,270	33,375	20,944
Totals w/o RPVs	22,683	20,734	23,038	20,944

[1] Includes 9,536 cu.ft. for the ME Yankee RPV
[2] Includes 7,507 cu.ft. for the CY RPV
[3] Includes 2,830 cu.ft. for the Big Rock RPV

Class B/C Waste without Disposal Access after June 2008 (cu. ft.)

	Class B	Class C	Total
Utility	9,200	5,320	14,520
Non-Utility	600	870	1,470
Medical	30	20	50
Projected Total	9,830	6,210	16,040

Barnwell Disposal Site Technical Regulatory Structure

- **SC Department of Health and Environmental Control**
  - Division of Waste Management; Bureau of Land and Waste Management
  - Licensing and technical regulatory authority
  - On-site DHEC inspector
  - License compliance inspections
  - Waste Transport Permit issuance

Duratek

Barnwell Site Safety and Compliance

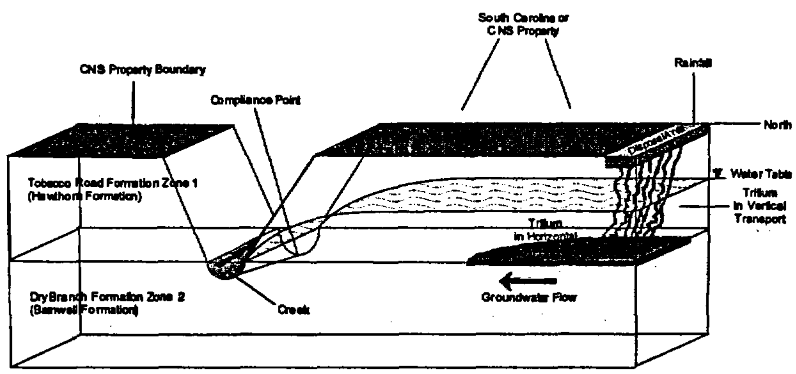
- **1983** last radioactive material license violation
- **1993** last lost time injury (1,842,262 hours)
- **2002** DHEC and Blue Ribbon Panel agree with site performance assessment
- **2004** SC Sierra Club appealed DHEC decision to renew the operating license
- **2005** Administrative Law Judge upheld DHEC's decision to renew the license

Duratek

Barnwell Site Worker Radiation Exposures (Rem)

Year	Total Annual Dose	Highest Cumulative Individual Dose	No. of Workers	Average Annual Dose	No. of Workers	Average Annual Dose
			(only with recorded dose)		*(all monitored workers)*	
1996	7.140	0.586	54	0.132	148	0.048
1997	4.228	0.539	38	0.111	168	0.025
1998	6.018	0.534	42	0.143	123	0.049
1999	8.929	1.154	62	0.144	129	0.069
2000	10.811	1.785	57	0.190	91	0.119
2001	12.858	1.628	55	0.234	117	0.110
2002	3.049	0.597	15	0.203	81	0.038
2003	6.538	1.370	31	0.211	138	0.047
2004	4.946	0.836	25	0.198	130	0.038
2005	4.824	1.050	20	0.241	72	0.067

Barnwell Site Conceptual Performance Model



Barnwell Site Performance Assessment (ERPV)

- Environmental Radiological Performance Verification part of license renewal reviews
- Site-specific, calibrated groundwater model
- Actual long term environmental data (25 yrs)
- Performance projected for 2000 years
- Maximum projected hypothetical dose at compliance point is 13 mRem/yr
- Mostly H-3 with < 1 mRem/yr from C-14
- Accepted by DHEC and Blue Ribbon Panel

Barnwell Site Financial Assurance Mechanisms

- **Decommissioning Trust Fund**
  - For closure activities and post-closure observation, maintenance and monitoring until exhausted
  - ~ $15 million used for enhanced capping
  - ~ $19 million balance sufficient for Closure(s)
- **Extended Care Maintenance Fund**
  - For the remainder of post-closure observation and the maintenance and monitoring throughout the institutional control period
  - ~ $ 50 million balance commited by 2007
  - ~ $ 64 million more proposed in SC budget

Barnwell Site License No. 097

- **License renewed seven times since 1969**
- **License amended 49 times since 1969**
- **Three effective amendments**
  - Amendment 47 has the technical requirements
  - Amendment 48 ownership change to Duratek
  - *Amendment 49 appealed by SC Sierra Club
  - Amendment 50 has increased security controls

Barnwell Site License Amendments / Improvements

Amd.	Date	Improvements / Changes
12	12/75	Established slit trench criteria
15	7/77	Allowed larger trenches and required nearby cluster wells. Required solidification of liquids before receipt
26	10/79	Required increased stability (processing or HIC's) of higher conc. >1uCi/cc, T1/2 > 5yr
36	11/83	Part 61 waste classification w/ Class A Stable and segregated trenches

Barnwell Site License Amendments / Improvements

Amd.	Date	Improvements / Changes
45	1/90	Required concrete vaults for Poly HIC's
46	8/95	Required concrete disposal vaults for all waste classes and enhanced caps on all trenches.
47	6/97	Implemented NRC Uniform Manifest and database requirements. Incorporated SNM and associated disposal requirements.
49	Prop.	Requires analysis of liquids removed from disposal containers and annual financial assessment of closure funds.

Examples of Risk-Informed Decisions on Waste Acceptance

- Metal fragments in RPV (1.1 Ci vs. 9,990 Ci)
- DAW w/ TRU, in one puck of HIC overpack (0.016 g)
- In-core detectors w/ Ni-63 (3,110 Ci vs. 9,010 Ci)
- Americium-241 source encapsulated in HIC (50 mCi)
- Suspect fuel pin segments (217 Ci vs.~ 20,000 Ci)
- Encapsulation of contaminated components after transport to the disposal site
- Segregation of waste classes by vaults rather than trenches
- Irradiated component averaging within factor of 10

Suggested Areas for Evaluation

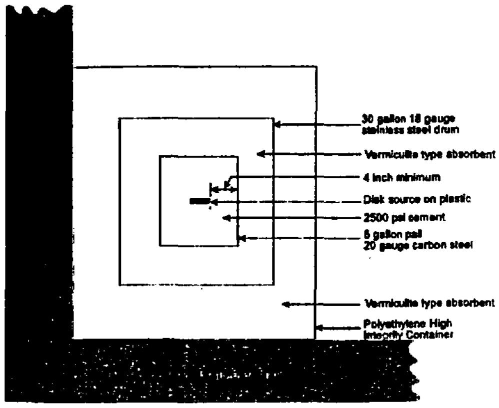
- **Irradiated Hardware**
  - Barnwell "Rule of 10"
  - Controling Radionuclides Niobium-94 and Nickel-63
  - Considerations of intruder scenario and probability of occurrence
  - Consideration for characterization over the disposal container
- **Sealed Sources**
  - Limited averaging with encapsulation media allowed
  - Generally accepted quantities / disposal container (30 Ci of Cesium-137)
  - Consideration for robust disposal packagings

Suggested Areas for Evaluation

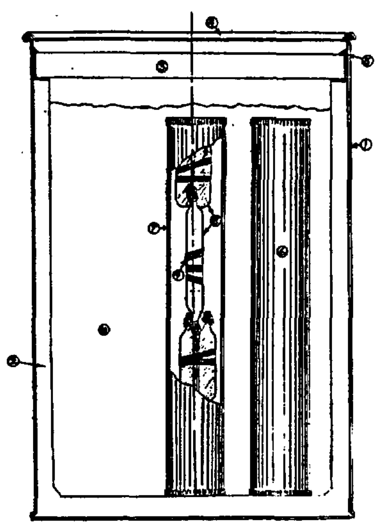
- **Scaling Factors in "Part 61 Analysis"**
  - Reasonably accurate and accepted
  - Typically confirmed annually
  - Consideration for less frequent confirmations
- **Guidance for Evaluation of Special Cases**
  - Establishment of simple process to follow
  - Establishment of acceptable criteria
  - Consideration for ALARA for waste generators, processors, disposal site operators, public and environment

Additional Topics

Americium Source Packaging



Tritium Source Packaging



NRC Approved Low-level Waste Topical Reports
September 15, 1995*

Docket No.	Vendor	Topical Report
WM-12	WMG, Inc.	Computer Code (RADMAN)
WM-45	VECTRA (NuPac)	HIC (Ferralium/FL-50)
WM-53	VECTRA (ABB Inc)	Computer Code (WASTRAK)
WM-81 Rev 2.1	Chichibu	HIC (concrete/Poly)
WM-82 Rev 1	Diversified Tech. (DOW)	Solidification (Polymer)
WM-85 Rev 2.1	VECTRA (NuPckgng)	HIC (Ferralium/Enviralloy)
WM-83	General Electric	Solidification (Polymer)
WM-90	Wastechem	Solidification (Bitumen)
WM-93 Rev 1	SEG (LN Tech.)	HIC (Stainless/Poly)
WM-102	Adtechs (USEclgy)	Solidification (Bitumen)
WM-105	Diversified Tech.	Solidification (VERI)
WM-107	Chem-Nuclear	HIC (Concrete/Poly-lined)
WM-109	Vance and Assoc.	Computer Code (V&A 3R Stat)

*No current NRC review process in place

SC DHEC Approved High Integrity Containers

Certificate No.	Manufacturer	Container Type
DHEC-HIC-PL-001	Chem-Nuclear	Polyethylene liner series
DHEC-HIC-PL-002	Philadelphia Electric Co.	Poly Drum
DHEC-HIC-FRP-003	Chem-Nuclear	Fiberglass PV
DHEC-HIC-PL-004	Nukem	RADLOK-55 poly drum
DHEC-HIC-PL-005	Nukem	RADLOK poly liner series
DHEC-HIC-PO-006	Chem-Nuclear	Polyethylene overpack series
DHEC-HIC-PL-007	Nukem	RADLOK-200 poly liner
DHEC-HIC-PL-008	Nukem	Barrier-55 poly lined drum
DHEC-HIC-PL-010	Nukem	NUHIC poly liner series
DHEC-HIC-PL-011	Adwin Equipment	Poly drum
DHEC-HIC-PL-012	Nukem	Polyethylene liner series
DHEC-HIC-ML-013	Nukem	Ferralium steel liner series
DHEC-HIC-PL-014	Nukem	RADLOK-500 poly liner
DHEC-HIC-CL-015	Chichibu	Cement reinforced drums
DHEC-HIC-ML-016	Nukem	Barrier-Plus poly/steel liner series
DHEC-HIC-PL-017	Scientific Ecology Group	Poly overpack series
DHEC-HIC-ML-018	Nukem	Stainless steel QCEP container
DHEC-HIC-ML-019	Avantech, Inc.	Stainless steel, water jet cuttings

Other High-Integrity Containers which have been specifically approved by the department

SC DHEC Approved Stabilization Media

- Vinyl Ester Styrene
- Cement
- Bitumen*
- Vinyl Chloride

*Full formula oxidized bitumen