On the right-hand side you see what I suppose you'd call a kind of moon buggy arrangement to recover a cask and pull it into a safe area. That's actually a dummy cask.

I've personally participated in many emergency response exercises in Europe, and I can say these are treated very, very seriously. They involve professionals from the emergency response organizations, fire, police, etcetera, who are very used to dealing with emergency exercises.

And the responses that are tested out are not just the technical response in terms of the teams who come out and do simulated recovery exercises, but also the testing of the management of the exercise itself. We can do table-top exercises on paper and test how we can respond with telephone calls.

But there's no real substitute for going out there in the field and sending people out to remote areas and practicing it in real time. And these are very realistic.

One of the speakers earlier mentioned about the possibility of terrorist attacks and the likely consequences. This has also been studied by COGEMA. One of my colleagues in Transnuclear was responsible for organizing tests with the French military where they attempted to puncture a spent fuel cask, and they've got data to show what the actual possibilities are.

Obviously, the information is classified. But in general, we can say that these are extremely hard and difficult targets to penetrate.

However, in the extreme unlikely event that one was penetrated, techniques do exist to seal the cask and put it in a safe condition. And I have witnessed technicians practicing those techniques on dummy situations.

Next slide, please.

Okay. Let's move on to the lessons learned. The previous speaker mentioned maintenance as a very important area. If you operate a fleet of spent fuel casks, which you are shuffling between reactor sites and reprocessing facilities covering many thousands of miles during their lifetime, it's inevitable that they're going to suffer some kind of minor damage -- paint chips, knocks, scrapes, etcetera.

Very robust objects, but a 100-ton object takes some stuffing when you move it with a crane. So I've seen instances where casks have been bruised and scraped. And in order to keep the fleet in a pristine condition, it's very important to have not just only good maintenance policies but proper facilities to undertake the maintenance.

COGEMA has at the La Hague site its own dedicated cask maintenance workshop. We can take casks and strip them down completely to their individual component parts, repair and upright any superficial damage, and put them in a new condition, something not to be forgotten if you're embarking on a big fleet campaign.

On the logistics side, in the early days of my involvement in spent fuel transports, we used to track the position of the cask by regular contact with the rail companies. I should point out that in Europe the way in which shipments are organized is perhaps different to what you envisage in this country.

From a physical protection point of view, these are not Category 1 shipments. If there is any plutonium involved, such as mixed-oxide fuel or plutonium itself, those are performed with high security vehicles, escorts, etcetera. Spent fuel and high-level waste travels as normal freight. There are no escorts in Europe.

So in order to track closely the positions of the individual casks, trucks, trailers, with the advent of technology we now have satellite tracking. And, in fact, routinely from our headquarters in Paris every single shipment is tracked worldwide, and it's very easy to identify the position at any moment in time of any particular package.

The operations center also serves as a command and control center in the event of any emergency incident.

Okay. One other challenge -- public acceptance. I'm glad we've got members of the public here today. I'd encourage them to ask questions.

Transport is in the public domain. Many of us have worked in nuclear facilities, and we kind of hide behind the fence and the regulations or white coats, whatever. Transport is out there in the public. We owe a duty to them to explain what the safety is about, and that is an ongoing process.

And I'm going to give you an example of what we described as a minor technical problem and how that kind of may be a disruption in our transport operations. This occurred in 1998. The previous speaker referred to weeping, I think, is that -- I would call it sweat out.

It refers to the instance whereby -- I'm not going to go through the numbers. They're straight out of the regulations. But basically, when a cask comes out of a spent fuel pool, it's decontaminated and cleaned down to very clean levels.

The phenomenon of sweat out or leaching is well known, well documented. However, in 1998, the frequency of these incidents led to a temporary cessation of the transports. This was called upon by, actually, the railway company, SNCF, who were not happy about the frequency, which is in the range of about 30 percent.

We can try and put it into layman's terms, what we're talking about. I think it's very interesting to draw an analogy.

Think of non-fixed contamination as wet paint. If a cask has been painted and that paint hasn't dried, if you touch it with your hands or if any equipment touches it, you can remove some of that wet paint and transfer it to the vehicle or to other places. Once it's dry and it's fixed, it is fixed. It will not come off.

We're not talking about leakage of the contents. Unfortunately, this incident was blown out of all proportion, and it was implied at the time that the casks were actually leaking.

The shipments were restarted within France within a small number of weeks. However, in Germany, where the political climate was such that the government were actually considering abandoning nuclear power completely, it took us two years to restart the transportation. So a small incident led to some quite big consequences.

How do we deal with the problem technically? Well, there was a meeting between the French and German governments, high level. They set up a commission comprising of members of the regulatory authorities in those two countries.

They were soon joined by representatives from Switzerland and from the UK, and they undertook a comprehensive review of the problem itself, what was the root cause of these contamination incidents, why we were seeing instances of contamination on rail cars, hot spots on casks, and they looked at it from all angles.

One area they looked at was the actual methods of measuring the contamination. You saw earlier the smear test. What they found was that there are differences in the techniques and the procedures between the individual countries, in some cases differences in the equipment, in the calibration, which led to false indications.

We're talking very, very low levels of contamination. So it's not inconceivable that a consignor will clean the cask, certify it clean, and ship it off. Somebody with a different instrument will measure it and declare that there are hot spots. So that was one area.

The other area they looked at was how to prevent from -- the contamination from taking place completely. Very interesting areas they looked at. Of course, the root cause of the contamination itself is the contaminated pool water.

And they did an examination with ALARA principles. That is to say, looking at what the dose implication would be to the workforce for choosing technical solutions. One solution would be to actually clean up all of the spent fuel pools, eliminate all of the dissolved fission products or the activation products -- cobalt, etcetera.

Technically feasible. Of course, we're not talking cost here. We're just talking technically. Technically feasible.

But from a dose point of view, the collected contaminant particles would be in filters. These filters would have to be handled, removed, disposed of, and it would actually create more of a dose uptake than other solutions to prevent contamination.

They came up with some very innovative methods to reduce contamination actually, such as in the surface of the cask. I'm going to show you a photograph now. But the message I would like to say is that in order to solve a problem like this, which involved different countries, different operators, different languages, different authorities, you really need to have very close collaboration between all the parties concerned. And that's what we achieved.

Next slide, please.

Okay. This is just a photograph showing the conventional cask loading facilities in a pool. On the left-hand side you see a spent fuel cask under water, the lid being manipulated, and on the right-hand side is some of the preparation operations.

Next slide.

This shows a new technique which is used today in many reactors in Germany and in France. What you see under the vinyl cover is a spent fuel cask ready to go into a pool. Underneath that vinyl cover is a stainless steel jacket which covers the finned area of the cask.

So with this dual barrier system and the introduction of clean water between the cask and both the stainless steel skirt and the vinyl cover, you can effectively prevent any contact between contaminated pool water and the cask surface.

Next slide, please.

This just shows after a fuel loading with the lid positioned, washing taking place. So it is possible technically to overcome this sweat out problem by handling procedures.

Okay. Next slide, please.

All right. Just to sum up the experience in terms of quantity, a few more figures for you to look at -- 30,000 metric tons of spent fuel shipped by the COGEMA group worldwide, many, many thousands of cask miles, millions of cask miles in effect.

More recently, we're building up a history of high-level waste shipments almost -- as in terms of high-level waste being shipped to date.

Next slide, please.

And in conclusion, we can tell you that safe transports are possible by careful management. The safety record can be maintained. But I can also say, quite honestly, that the safety culture in the COGEMA companies is very, very strong, right from the top down. The corporate culture of safety and quality and excellence adds to that success record.

But, again, public acceptance is a major issue. We're out there every day shipping fuel. Sometimes we have to talk to people who are concerned about rail shipments, sometimes about truck shipments, sometimes about sea shipments. It could be the other side of the world. We have to listen to them, and we have to respond.

And, finally, I would just like to say that COGEMA is very willing to share this experience with others. Those members of the committee who would like to visit any of the facilities, you're very welcome to do so, if you'd like to contact me through Tim.

I would also like to extend that invitation to all members of the public, but I'm not sure if the facilities are open to the public. They were closed down after September 11th. I see one of my colleagues here. Are they open again? No, not for the moment. So I'm sorry about that.

Thank you for your attention, and I'm now ready for any questions.

MEMBER LEVENSON: Thank you.

Mike, do you have a question?

MEMBER RYAN: I'll ask my neutron question again. If you lose your neutron shield, can you give me some estimate of external neutron dose rates on the surface of a cask?

MR. HUNTER: Again, I'll give a very hesitant answer. It depends on the fuel and the particular cask. The TN 12s -- they have a solid external neutron shield of polyester resin, so it would be very difficult to lose that.

MEMBER RYAN: So you probably even haven't touched on that accident analysis?

MR. HUNTER: In the accident analysis, we do assume that the neutron shielding capability is lost. We do assume that.

MEMBER RYAN: But no, you have no numerical estimate?

MR. HUNTER: No. But in -- if you look in the regulations under Fire Accident Conditions, you are allowed much higher dose rates anyway.

MEMBER RYAN: Sure.

MR. HUNTER: As opposed to --

MEMBER RYAN: The other question --

MR. HUNTER: I couldn't give you a general figure, it varies so much.

MEMBER RYAN: Okay. The other question I have is on the dry transfer situation. If I understood you right, this is actually a dry transfer in the sense of the cask isn't dry.

MR. HUNTER: Yes. It is --

MEMBER RYAN: It's actually hooked up to a pool.

MR. HUNTER: Yes. The photograph that was shown early on was of a system which is operated at La Hague T0 facility.

MEMBER RYAN: Right.

MR. HUNTER: Where the dry cask is hooked up to a dry cell.

MEMBER RYAN: So you're doing air lifts of fuel.

MR. HUNTER: We're doing air lifts, yes. That operates 24 hours a day remotely, very low dose operation. The operation is a very safe system.

It's a similar system in the French 1300 megawatts reactors. In that case, it's actually wet loaded. Dry from the sense that the outside part of the cask is in a dry area, but it's ducked to the underside of a spent fuel pool. So the inside of the cavity is wet.

MEMBER RYAN: Could you talk a little bit more about the experience you have with air lifts of spent fuel? Because I guess that's going to be more in play at Yucca Mountain.

MR. HUNTER: Air lifts, in what sense?

MEMBER RYAN: Contamination control, operational issues, anything of that sort.

MR. HUNTER: Do you mean of airborne contamination?

MEMBER RYAN: Yes. Just, you know, I mean, when you -- I mean, you have to decouple the cask after you load it. You know, I mean, do you have any other special issues with air lifts?

MR. HUNTER: In terms of the draining and the drying of the cavity.

MEMBER RYAN: Yes.

MR. HUNTER: Yes. Well, procedures have been developed over the years -- vacuum drying equipment with filters, etcetera. We don't generally have any particular radiological problems from airborne contaminants from the drying and draining processes.

MEMBER RYAN: Thanks.

MEMBER LEVENSON: John?

MEMBER GARRICK: My colleagues will be glad to know I only have a couple of questions. My second question has four parts to it.

(Laughter.)

CHAIRMAN HORNBERGER: And 16 subparts.

MEMBER GARRICK: That's right.

(Laughter.)

How do you get the heavy cask recovery equipment on site? And what kind of times are required for that for some typical scenarios?

MR. HUNTER: The heavy recovery equipment would be delivered by special trailers. Obviously, it isn't something that you would deliver to a remote area in a number of hours. It might take a number of days.

In terms of emergency response, the first crews who would arrive would do radiological surveys to verify what the condition was. If there's any direct remedial action required, they would be taken by technicians. Engineers would work with simple tools.

The recovery operation can actually take place in a leisurely timeframe, perhaps some days after the event.

MEMBER GARRICK: So there would be an advanced team of some sort in the emergency response sense.

MR. HUNTER: Typically, yes.

MEMBER GARRICK: Yes. Maybe this is a

question that would be addressed to everybody, even maybe the NRC. But one of the things that's been kind of impressive about the last two days' proceedings has been the amount of experience that actually exists in the transport of spent nuclear fuel.

My history of doing risk assessments of nuclear powerplants, we have not been blessed with such a rich database for our analysis.

Now, here is a case where the nuclear industry seems to me is in kind of a unique shape in terms of experience. The problem with it is that it hasn't been very well organized, and there seems to be a tremendous opportunity here to integrate and correlate a handsome database that would greatly facilitate questions from the public on matters of transportation safety.

And I'm thinking here of a capable data-oriented team looking at all of the data and doing some data partitioning of the type that really is useful in analyses. And such partitioning that comes to my mind would be fuel type, cask type, fuel handling, distinguishing fuel handling from transportation, distinguishing storage or interim storage from transportation, empty cask shipments.

I think the opportunity is really a great one to put forth in hands of the industry a database that would go a long ways towards substituting, if you wish, for a great deal of analysis. Is there any institution, organization, in any of your countries or affiliations, and maybe the NRC, that have considered doing just that?

MR. HUNTER: Well, I know there are database type of information that is available at the IAEA in Vienna in certain categories. Certainly, COGEMA itself has archived all of its shipment data, and we'd certainly be very pleased to put that together in the form of a database, form a suitable commercial arrangement.

MEMBER GARRICK: Yes.

(Laughter.)

And maybe the DOE people -- have you had any activities that would be of the type to try to integrate the transportation database into some more meaningful package?

MS. CLAPPER: It's an interesting thought. There is nothing out there that I can refer to that has that type of database.

MEMBER GARRICK: See, the reactor operating experience has gone through some of this same kind of evolution of being integrated and brought together. And the impact of that database has been enormous in terms of making the issues much clearer to the public on the basis of experience.

There is this tendency to say that we're dealing with something that is extremely mysterious, extremely dangerous, and about which we know very little. And here is a case where we know just a great deal. And I would much rather have data answer my risk questions than have to rely on analysis, as much as I love analysis.

And I think the opportunity to do that -- to do just that is here, and that would be one of the bottom lines that I get out of this whole workshop.

MR. HUNTER: If I could just answer that. I think the UK and French competent authorities do keep statistics in terms of incidents for all radioactive packages. They would have to be analyzed to isolate out spent fuel and high-level waste.

MEMBER GARRICK: Yes. Yes. And I think the partitioning here of the data into the right kind of categories would be very important, and also extremely valuable.

MEMBER LEVENSON: Ray?

MEMBER WYMER: Because of the nature of COGEMA's work, you must deal with quite a broad spectrum of fuel types that you have to ship. Can you talk just a little bit about the -- any special shipping problems that arise because of this spectrum of fuel types?

MR. HUNTER: Problems that arise? I think most problems are resolved by long-range planning. I can tell you I've been involved in projects where we've contacted utilities five years before they plan to ship fuel.

And during that five years, we've identified what equipment and procedures they need to have in place in order to make smooth shipment possible. And also, if necessary, develop new baskets to suit the fuel type, obtain licenses, etcetera. So most of the problems have been anticipated.

At a practical level, what tends to happen if you look right across the board of PWR and BWR fuel types, although they are notionally very similar, the details are extremely wide ranging in terms of geometry, the physical nature of the fuel bins, the materials, etcetera. There is a wide range of material out there, and you really have to get down to the very fine detail in order to ensure that you --

MEMBER WYMER: Well, do you not deal with things other than PWR and BWR fuel shipments?

MR. HUNTER: Yes. There are AGR --

MEMBER WYMER: That's right.

MR. HUNTER: -- fuel. I've dealt with Magnox fuel.

MEMBER WYMER: Yes.

MR. HUNTER: In the UK. I've dealt with wet fuel shipments. That is to say, casks partly filled with water. They pose particular problems.

MEMBER WYMER: Yes. Well, some of these fuel types are a good deal more fragile than others, and I wondered if in an accident situation that causes any special considerations.

MR. HUNTER: Well, from my experience of shipping irradiated PWR and BWR fuel, I've never known an instance where fuel has failed during shipment. Routinely when casks arrive at La Hague, the fuel would be sifted, checked, and --

MEMBER WYMER: Well, Magnox are not as rugged as --

MR. HUNTER: Magnox is a different thing because that's corroding all the time.

MEMBER WYMER: Yes.

MR. HUNTER: That's why it has to be reprocessed.

But an interesting instance -- I mentioned minor instances on traffic. I was involved in a shipment in Europe of spent fuel to La Hague, and there was a 50-ton truck -- cask which slid off the road and actually went onto its side and landed in a field. Very little damage, just some paint scraping.

But we took the cask back to the reactor station, which was only a few miles away, and we examined the fuel by taking water samples, because these were water-filled casks, and we found there was no -- it was very robust.

MEMBER WYMER: Okay. Thanks.

MEMBER LEVENSON: George?

CHAIRMAN HORNBERGER: I don't actually have a question. I'd just make a comment, then compliment you. You stated that you wanted to keep us all awake until 5:00, and you did so admirably.

MR. HUNTER: Thank you very much.

(Laughter.)

PARTICIPANT: Now you can go back to sleep.

(Laughter.)

MEMBER LEVENSON: Any questions from the ACNW staff? Question?

MS. GUE: Lisa Gue with Public Citizen, and I do appreciate your indulgence in hearing the public comments that I've made at this meeting.

And the two hopefully brief, since it's the end of the day, comments that I wanted to make are just general, not specific to your presentation, but general to this meeting overall and to ACNW's continued consideration of nuclear waste transportation issues.

First of all, just locating this within the current context, while NRC holds specific responsibility for licensing high-level waste transportation casks for general use, these conversations obviously are happening right now at a time when NRC also holds responsibility in the licensing phase of the two projects -- private fuel storage and the Yucca Mountain Project -- that would initiate unprecedented nuclear waste transportation in this country.

And I think it would be very helpful for ACNW, or the NRC as a whole, to be able to consider these transportation questions in -- within the specific context posed by those projects. And yet the Department of Energy has not put forward the specifics of the transportation plan for the Yucca Mountain Project.

There has been an assumption during this meeting of preferred rail transportation routes. But the Department of Energy has not specified -- has not gone on record with a decision about a mode of transport for Yucca Mountain.

There has been some assumptive statements made about how many tunnels Yucca Mountain shipments would pass through, what other materials might be on trains going to Yucca Mountain. And, again, there has been no specific decisions made about shipping parameters for Yucca Mountain or much less -- much less the modes of transportation.

And in the case of private fuel storage, the information on transportation has been similarly minimized in the environmental impact statement. And this not only does not inspire public confidence -- this tendency of the Department of Energy to apparently conceal this information is how it appears.

It does not only not inspire public confidence, but it also makes specific analysis as to the environmental impacts and public health impacts of transportation impossible. So, again, as I mentioned yesterday, we would be very happy if the committee would recommend that the Department of Energy come forward with some of these specifics and present them for public scrutiny and expert technical scrutiny as well.

And, secondly, I mentioned yesterday that the focus seems to have been, in terms of accident risks, on fire and impact consequences. Of course, there are other regulatory accident parameters that have not been discussed.

In addition to that, I would hope that the committee might consider also the non-accident impacts of nuclear waste transportation, particularly in the context, again, of these large-scale shipments that are planned. And this, again, would require some information about the routes that are to be used.

But given that the casks licensed by NRC do not completely contain radiation, there is a public health impact from repeated close contact with these shipments as they pass by. And there are demographic considerations as to who lives close to the shipment routes.

And as one of the presenters mentioned yesterday, when -- where these shipments might stop if they have to stop, and how often they might be stuck in rush hour or gridlock traffic. So that seems to me -- of course, consideration of the accident consequences is very important. But, additionally, it seems to me the non-accident considerations equally merit your attention.

So thank you again for having me here.

MEMBER LEVENSON: Questions or comments?

MR. SHAFFNER: My name is Jim Shaffner with Parallax. I actually have a question for the speaker.

Given the large reliance on nuclear power in Europe, is the public at large better able to understand the issue than perhaps the public in this country? And thus be less susceptible to some of the arguments of people who are opponents of the endeavor?

MR. HUNTER: It's very difficult to generalize with Europe, because it's a mixture of countries, a mixture of cultures. But certainly, in France --

MR. SHAFFNER: France was what I was specifically thinking about.

MR. HUNTER: -- nuclear power is well accepted. In fact, most French towns, the local mayor would be very happy to have a nuclear power station built in his area, because it brings jobs, it brings economy, etcetera.

I think also the fact that both in France and the UK there has been a concerted effort of public outreach, public acceptance information, that must have helped to allay some of the public fears. We saw yesterday the smash hit CGB train crash, which was done some years ago.

I personally think that was a wonderful demonstration for public acceptance -- a scientific study. I'm not talking about gaps, etcetera. But for the guys in the street to see a train crash into a spent fuel cask, and the cask doesn't leak, is a real demonstration of safety.

MR. SHAFFNER: Are radiation issues -- are radiation education part of the general education curriculum over there, like they are kind of not in this country?

MR. HUNTER: I don't believe so.

MR. SHAFFNER: Hmm?

MR. HUNTER: I don't believe so.

MR. SHAFFNER: Okay.

MR. HUNTER: You know, radiation is something which people are very afraid of until they go to the hospital. Very quick to take an X-ray.

MR. SHAFFNER: Thank you.

MEMBER LEVENSON: Any other questions? If not, I will declare the workshop at an end and turn the meeting over to our Chairman.

I want to thank all of the speakers and

the audience for their patience and indulgence also.

CHAIRMAN HORNBERGER: Yes. And I will echo that thank you to all the speakers. Excellent day and a half meeting.

I am now going to declare a 10-minute break, and then we will reassemble. The committee will have some discussion about the workshop, because Milt wants us to while everything is fresh in our mind. Ten-minute break.

(Whereupon, the proceedings in the foregoing matter went off the record at 5:07 p.m. and went back on the record at 5:18 p.m.)

CHAIRMAN HORNBERGER: Okay. We're going to reconvene. I anticipate that this will be a relatively brief part of the meeting.

What we want to do is Milt is going to be tasked with preparing a letter report to the Commission on this workshop, and he wanted to make sure that we got down our initial thoughts on what might be in such a letter. And so let's go down the list here, the line here, and just give our preliminary thoughts.

Mike, do you want to start from that end?

MEMBER RYAN: Sure. Really endorsing what

John said about gathering this data in a database I think is probably the principal or one of the principal things we could offer as being helpful.

I was, as John mentioned, very impressed with the international numbers, all are different experience from DOE, DOT, and other points of view. And I think it will be instructive to systematically gather that, so it is available for good analysis to really get a broader integration of the experience to see what maybe true rates are and those kinds of things. So that's one.

I'll defer for the moment.

MEMBER GARRICK: Yes. I think that would be my number one recommendation. The other thing that I think is very important for the letter would be a few highlights of some of the things that came out of the workshop that were of great general interest.

You know, we talked about the emergency response problems associated with the cask, that while it may be leak-tight, it may have lost some of its shielding. And I think that kind of question needs to at least be addressed.

I think the different approaches that are used in the different entities are extremely valuable and need to be highlighted and summarized. I'm thinking of things like the positions of the different groups with respect to things like special trains or dedicated trains.

I thought it was very interesting that the Europeans tend to not only not think in terms of special trains. They don't think in terms of escorts. And there's reasons for these kinds of things, and I think we need to -- it would be important for us to acknowledge that.

So I think that in addition to some sort of a recommendation about taking advantage of this database, because this is one case where probably risk assessments in the sense that I usually would recommend would probably be unnecessary because of the supporting evidence.

And even where it is necessary, the supporting evidence is such that the uncertainties could be pretty minimum. But beyond that, I think highlights of the important lessons learned -- I thought the information that the utilities presented on the problems with the casks was extremely valuable and hasn't been discussed a great deal.

And the practical issues associated with cask handling and cask movement and the distinctions between transporting and handling and the other phases of the whole operation that came out of the two days I thought were -- was valuable.

So I think there's a real opportunity here for us to highlight some information that the Commission would be interested in, in addition to making some recommendations.

CHAIRMAN HORNBERGER: So we have on record that John Garrick recommends an actuarial approach to risk analysis.

MEMBER GARRICK: That will be the first time in my life.

(Laughter.)

The first time I would ever recommend that.

MEMBER LEVENSON: But not often do you encounter something that really has --

MEMBER GARRICK: That's right. Why do a risk assessment when you know the answer?

MEMBER WYMER: Well, I want to -- since it's already been seconded, I'll third the support of John's statement about coordinating, correlating, gathering, and analyzing the transportation data. And you can make a very good case on the basis of just providing a risk-informed background or regulation in this area.

I also thought that there was quite a bit of discussion about public participation, and that people seemed to be -- have made a best effort to communicate with the public. As we all know, that's an extraordinarily difficult thing to do sometimes, but I was sort of impressed by the fact that people seem to be trying, people in the industry.

I thought that also I was encouraged, and think we should make a note of the coordination among the various organizations involved in transportation as ratified by that. The DOT, the American Association of Railroads, and DOE, that this is a good thing and people ought to know that it's being done.

I think we need to pay attention -- I think we ought to make a note and make mention of the fact that there was public concern expressed about areas other than the technical areas at which this specific meeting was directed. We do not apologize for what we did and didn't do.

We stated clearly what our goals were, but that doesn't mean we covered all of the important bases that are out there to be covered. And so we ought to make note of the fact that these people are concerned about routing, which we don't have any input from DOE yet, at least not specific, and some of the other public concerns.

And that's my first crack at observations.

CHAIRMAN HORNBERGER: Let's see. I think these are all good. And I guess I think that it is probably important for us to point out that what we heard on the first day in terms of the shipping casks and the analyses, which, of course, is the real NRC responsibility, indicated to me that our methods of analysis have really improved.

It appears to me that people can do an excellent job on these analyses, and that all of the experience, everything points to the fact that the existing NRC regulations are entirely adequate to do -- to specify a cask that is very robust with respect to realistic accidents, both rail and truck accidents.

And I think that's -- that would be important for us to point out, if, in fact, we go back over the information that we got at the meeting, that's what we include. That's certainly what I took away from yesterday morning's meeting.

MEMBER LEVENSON: Are there any -- any of the other -- any of the rest of you have comments on yesterday's meeting?

MEMBER WYMER: I certainly agree with the statement that George made about the -- there seems to have been a quantum leap in the sophistication of analyses of cask responses to accidents -- accident conditions.

MEMBER LEVENSON: I think there's a small problem. I think improved methods of analysis are available. It wasn't clear to me they're being used.

(Laughter.)

MEMBER GARRICK: I think, Milt, regarding your yesterday -- your comment about yesterday, I think one of the things yesterday that impressed me a great deal was the discussion between Sandia and Livermore, particularly in regard to modeling, and the tradeoffs that you can make between tests and analytical models.

I think there was a very important message there that could be put in sort of the context of how the labs could reinforce each other in terms of one going down one direction and another one going down another direction. And the opportunity that that provides for some sort of effective compromises.

CHAIRMAN HORNBERGER: You're recommending collaboration amongst DOE labs?

MEMBER GARRICK: I'm recommending -- yes, right. Absolutely.

(Laughter.)

CHAIRMAN HORNBERGER: Mike Lee?

MR. LEE: We should only recommend things that are possible.

(Laughter.)

MEMBER GARRICK: Well, I have a habit of bringing up the -- those kind of things.

MR. LEE: No. The only point I was going to make is just acknowledging there's a lot of horsepower in the Livermore analytical capability. And this marriage would seem -- I mean --

MEMBER LEVENSON: Incidentally, Mike, for one of the questions we had raised earlier during the break because of the very efficient staff person on this project located and got delivered here someone from the regulatory side who was involved in licensing the casks. And I'll give you the number -- what happened when the neutron shield is gone.

If both boral and plastic is completely gone, the requirements for licensing is that they have to demonstrate a maximum field of one r per hour at one meter. No neutron shield at all. They're used whether boral or plastic. Any neutron material has gone.

There's no way that it might --

MEMBER GARRICK: And it's limited to an

emergency response issue.

MEMBER LEVENSON: Emergency response and one hour -- one r per hour at one meter.

MEMBER RYAN: Well, I think that's an important element. It was a question that was raised that I just did not have any number in my head, and I appreciate that -- one r per hour in an emergency circumstance is certainly not life threatening, and, you know, that combined with the information that we did have about the lack of breach of casks, I think that's an interesting bounding situation.

Thank you.

I also learned one of the other audience members mentioned to me that that analysis is, of course, as you pointed out with the regulatory requirement, typically in all of the safety analysis reports. And I'm sure for every cask design that's calculated it's just a matter of pulling that together, but that's helpful.

MEMBER LEVENSON: Okay. Tim, think we've got enough to do a letter?

MR. KOBETZ: I just want to make sure that you've got enough on yesterday's from what -- I know that you've got a lot of views on it, too, Milt, so maybe I'll let you --

MEMBER LEVENSON: I've got some notes.

CHAIRMAN HORNBERGER: Let me raise a question. We heard in the fire analysis summary for the Baltimore Tunnel -- and one of the things that at least had gone through my mind was sometimes a presentation of an analysis that is, shall we say, less than realistic, i.e. an infinite supply of fuel burning at the hottest temperature, and then also presenting this threshold temperature of -- is it 1058? 1058? As some magical number when it really doesn't have anything much to do with anything?

And I think that there is -- all I'm questioning is whether we want to make a comment on a presentation issue. We've done this with respect to TSPA and doing unrealistic analyses and perhaps raising the concern --

MR. KOBETZ: The technical basis for the 1058?

CHAIRMAN HORNBERGER: Yes.

MEMBER LEVENSON: Go ahead, Mike.

MEMBER RYAN: George, I was thinking about something similar, and maybe we could broaden it to this question that -- we heard a lot of information. Some of it was very familiar to me and some wasn't, and I took note of the fact that I think it's very important for us to either comment on or consider -- and maybe not comment on -- the notion that it's very important to match the testing with the goal.

You know, if it's a specific technical test to meet a criteria that's very analytic, that's one kind of situation. If it's a system engineering performance demonstration, like a drop, again, against some kind of criteria, that's maybe a second.

And then third is more of a global demonstration of performance like a crash test where perhaps it's more visual than anything else, that something does survive a catastrophic accident -- controlled, but nonetheless a little different slant on it that we might want to talk about those three different kinds of tests, because it seemed to me that sometimes people would very quickly talk about data for one kind of a test in another context and switch back and forth.

And that sometimes is helpful, but sometimes, frankly, is confusing. Maybe we want to touch on that point. I think that's along the lines that Milt has talked around about, you know, what is the appropriate highway crash speed and those kinds of issues.

MEMBER LEVENSON: You know, the 1058

raised an interesting point in the sense that it's an old, old number from previous times for previous purposes prior to attempting to be -- to risk-inform anything. And I think maybe we might consider commenting that as things come into current use that are that old, they really need to be reviewed to make sure that old numbers are neither too high nor too low.

We don't know sometimes which way old numbers are, but we should -- just because it's embedded in a regulation that's N plus one years old, it shouldn't be considered cast in concrete when it's coming into use for new applications that really need to be updated, best estimate today's world.

MEMBER GARRICK: I think you've characterized it well. I think it -- what this committee has tried to be constructive in is advising the Commission on how to interpret the risk-informed regulatory practice business. And I think connecting these kinds of numbers that grew up out of a more prescriptive time --

MEMBER LEVENSON: But it didn't make any difference.

MEMBER GARRICK: -- when it didn't make much difference, and at a time when the approach to licensing was pretty much design basis and the prescribing of critical parameters to making sure that these kind of parameters aren't really causing some obscurity with respect to the implementation of risk thinking.

So I think you've got it -- this to the context that it should be discussed.

MEMBER WYMER: I'd like to make a point again that we made it -- the point strongly in a previous letter, but I think what came out of this workshop discussion yesterday makes it important to say it again, because the question arose again of sorting out the practical safety-related aspects of cask safety and risk on the one hand, and those data that we gather with respect to research areas, the things that we're interested in just to validate the models that we have that go well beyond anything we expect the cask to experience.

That's a very important point. It keeps coming up, and it's a gadfly, and we need to make the point again and try to lay the issue to rest if we can somehow.

MR. KOBETZ: I've got a question with regard to the 1058. Would it be helpful if I got the committee the staff's position on why they use that for the peak cladding temperature?

I mean, they've got the database on that, but I know they are also looking at, is that a number, or should they use something else? So I'll try to find out what information I can on that tomorrow.

CHAIRMAN HORNBERGER: Yes. Okay. That would be good.

MEMBER LEVENSON: You might also ask them why they use 1058 in a shipping cask of old dead fuel, and the use a similar number of over 2,000 degrees in reactor core accidents, where you've got an energy dispersive mechanism. This is just incredible inconsistency.

CHAIRMAN HORNBERGER: I'm actually interested in the number of significant figure. Okay? Why isn't it 1059?

(Laughter.)

MR. KOBETZ: All I can tell you is it's based on some test data. And I can't remember where the testing was from, but I'll find that out for you.

CHAIRMAN HORNBERGER: Okay. Any parting comments here? I'm getting ready to --

MEMBER LEVENSON: Yes, let's part.

(Laughter.)

CHAIRMAN HORNBERGER: Okay. We're

adjourned for today.

(Whereupon, at 5:37 p.m., the proceedings in the foregoing matter were adjourned.)

C E R T I F I C A T E

This is to certify that the attached proceedings before the United States Nuclear Regulatory Commission in the matter of:

Name of Proceeding: 138th Meeting of the Advisory Committee on Nuclear Waste

Docket Number: (not applicable)

Place of Proceeding: Rockville, Maryland

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.

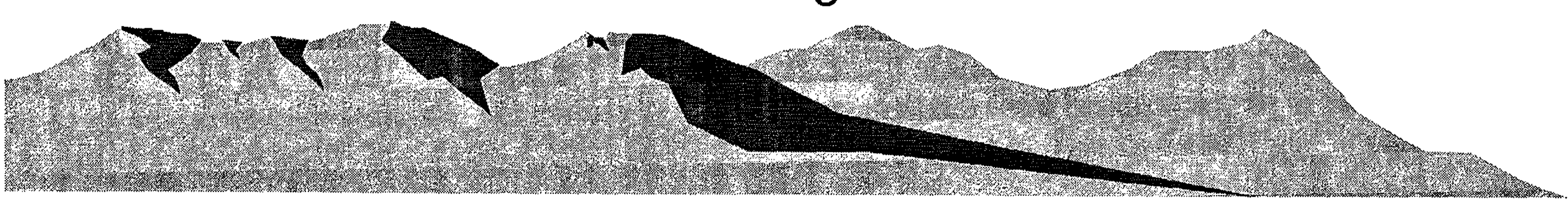
Rebecca Davis

Rebecca Davis
Official Reporter
Neal R. Gross and Co., Inc.

SYNOPSIS OF DOE SPONSORED IGNEOUS CONSEQUENCE PEER REVIEW PANEL INTERIM REPORT

PRESENTATION TO ACNW
20 November 2002

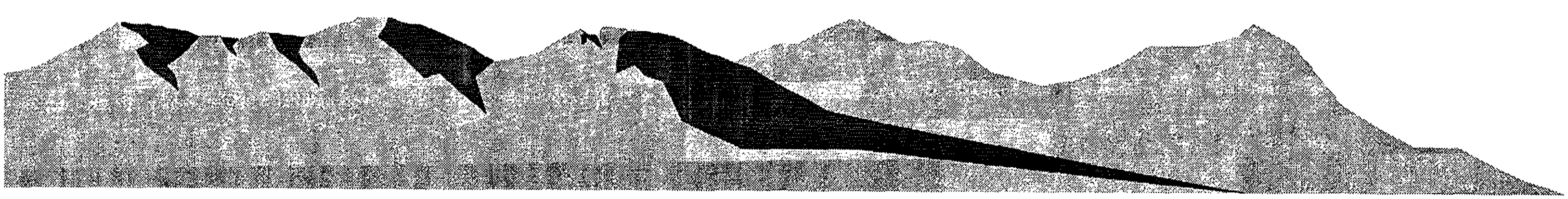
John S. Trapp
NMSS/DWM
JST@nrc.gov/301-415-8063



Background

- Panel formed Spring 2002.
- Tasks.
  - Review the technical basis used to analyze the consequences of igneous events.
  - Recommend any addition tasks that would significantly strengthen program.
- Kick-off meeting 5/21-22/ 2002.
- Interim report 8/23/2002*.
- Public meeting on Interim report 9/5/2002.

*Report can be found at www.ymp.gov/doclist.htm



Primary Activity/Recommendation

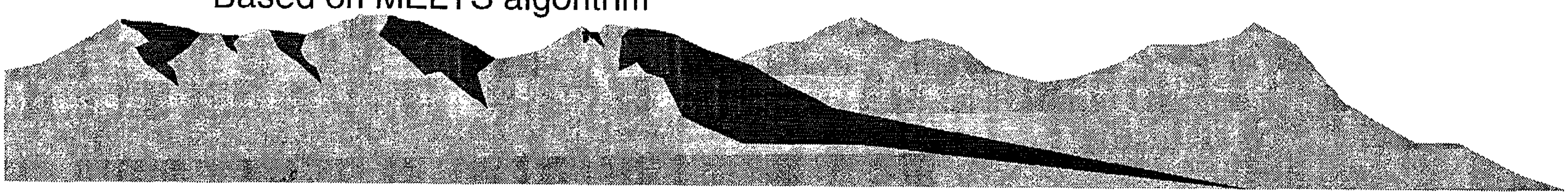
- Main emphasis on magma-repository interactions*, i.e., Woods, et al., 2002.
  - Page 49: "This is the so-called dog-leg scenario, which needs further careful study."
  - Additional DOE modeling is needed to evaluate magma ascent and flow processes.
    - A more comprehensive calculation of magma flow after intersecting a drift is "required."
    - Appendices provide details on mathematics of dike processes.

*Magma-repository interactions subject of IA Agreement Item 2.18

Comments Related to Magma-Repository Interactions

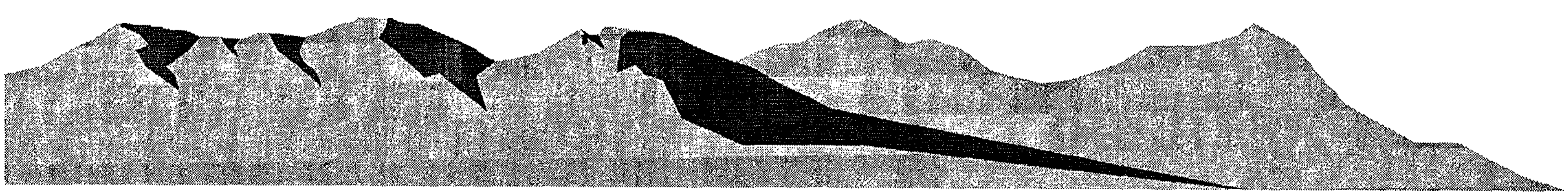
- Panel recognized importance of volatiles
  - Basalts may contain 2.5-4% H_2O*
    - CO_2 should also be taken into account
  - Timing and amount of vapor phase affects magma flow processes
  - Complex mixture of magma, bubbles and solids difficult to model
    - Rapidly evolving material.
  - Suggestions on DOE testing and modeling
    - Sulfur-bearing species should also be considered.
    - Some effort directed to studying composition and phase relationships of amphibole-bearing basalts.

*Based on MELTS algorithm



Comments Related to Magma-Repository Interactions

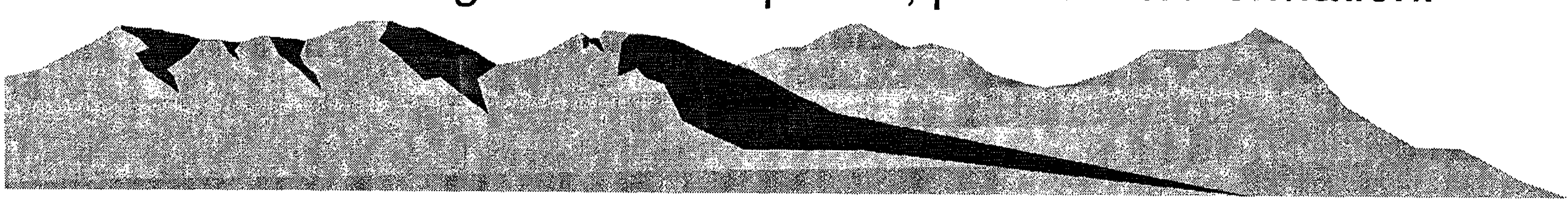
- Much discussion on dike propagation.
  - Concerns with properties of dike tip.
  - Recognition that theory does not account for many observations.
  - Property of magma in dike tip important.
  - State-of-science models are "1 ½"D.
  - Recommendations on DOE modeling and field work.
    - Appendices provide extensive details on mathematics of dike propagation.
    - Explore variations in boundary conditions for 2-D models, rather than develop new, highly complex 3-D models.



Comments Related to Magma-Repository Interactions

- Panel believes conditions at dike-tip less active than NRC model.
  - More models and data needed by DOE.
    - DOE (Gaffney) work may be good first pass at computing mass flux

- Complex state of rock strain, faults, and topography likely affects magma ascent process.
  - More models and data needed by DOE.
    - Consider influence of surface topography, strain response during the thermal period, possible sill formation.



Other Activities/Recommendations

- Possible concerns with redistribution, magma-waste package interactions, and magma-waste form interactions.*
  - More modeling and data needed by DOE.
    - Report notes that these areas are outside the fields of expertise of panel members. Recommendations much less specific, i.e., …."further review by a qualified expert would be worth considering." and "The degree of fragmentation (*of the waste*) might reasonably be the subject of review by other specialists."

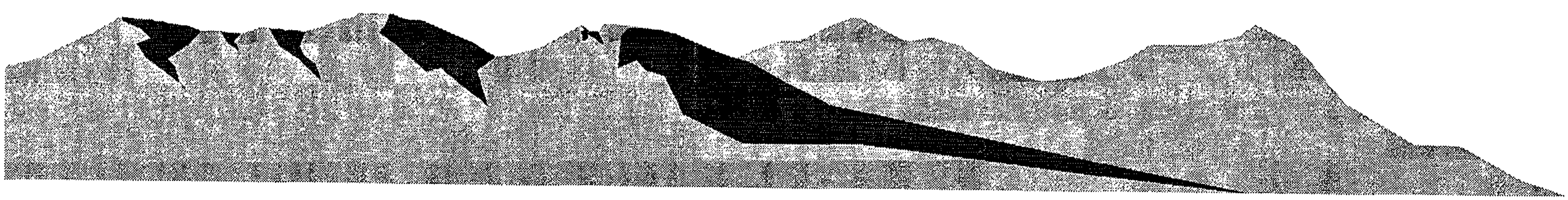
*Redistribution, magma-waste package interactions and magma-waste form interactions subjects of IA Agreement Items 2.17, 2.19 and 2.20

Schedule of Activities

- NWTRB consultants assessment of Interim Peer Review Report available on www.nwtrb.gov.
- Final Peer Review Report due in 2/2003.
- DOE report responding to Final Peer Review, with actions to be taken, due 4/2003.
- Staff will brief ACNW following review of DOE report.

Effects on NRC Program

- Review supports concerns that formed basis of IA Agreement Items 2.17, 2.18, 2.19 and 2.20.
- NRC-sponsored investigations have formed basis for identifying many uncertainties.
- This review, coupled with risk insights, shows the NRC program remains focused on appropriate technical issues.



UPDATE ON THE PROBABILITY OF IGNEOUS DISRUPTION

November 20, 2002
Advisory Committee on Nuclear Waste

Presented by
Brittain Hill
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Center for Nuclear Waste Regulatory Analyses
San Antonio, Texas

NRC Program Manager
John Trapp

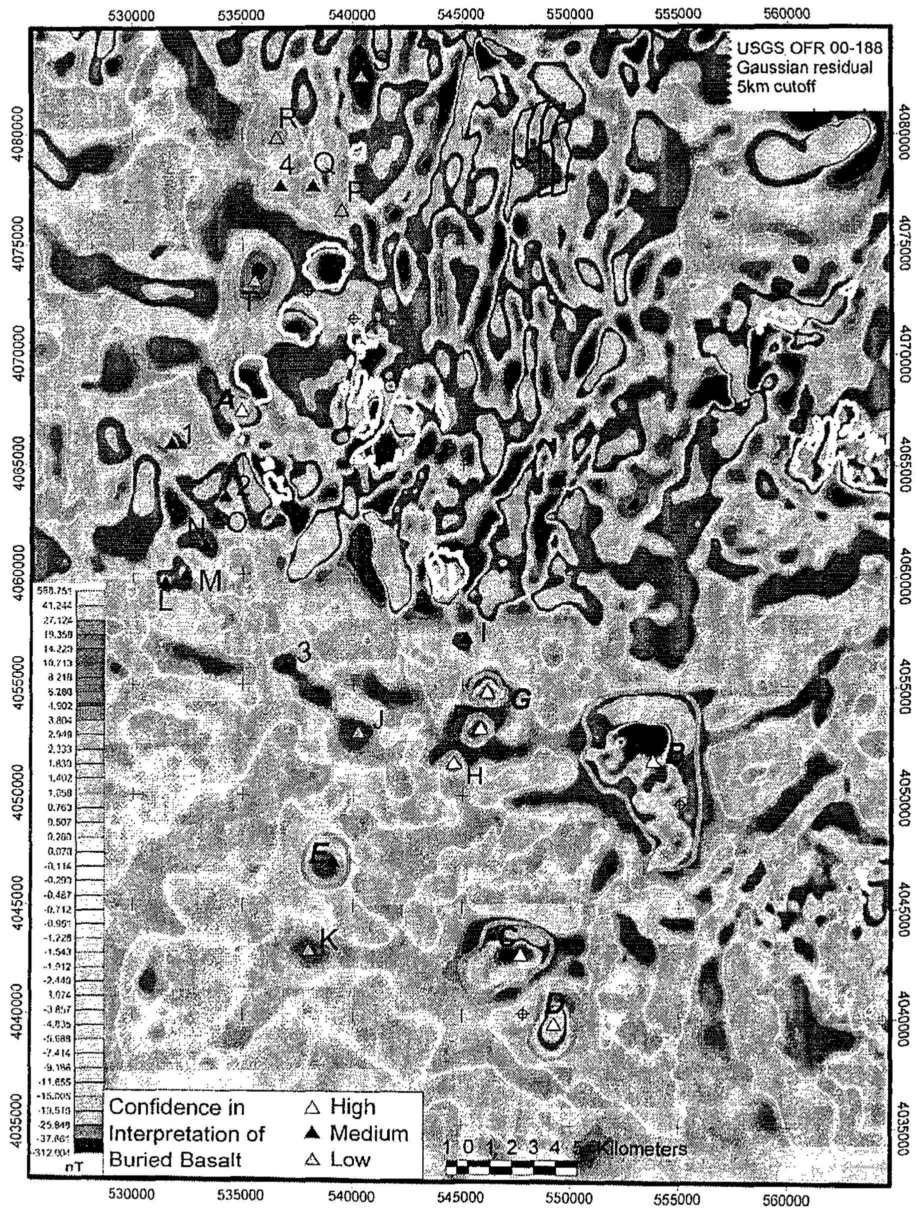
Contributors
C. Connor, L. Connor, P. La Femina,
H.L. McKague, J. Stamatakos

Background

- Magnetic surveys prior to the 1995 DOE Probabilistic Volcanic Hazards Assessment (PVHA) identified 7 anomalies that likely represented buried basaltic volcanoes.
- PVHA experts assigned average likelihoods of 0.2-0.9 that each of the 7 anomalies were caused by buried basaltic volcanoes.
- Recent high-resolution magnetic surveys show at least 17 more anomalies that may represent additional buried basaltic volcanoes.
- Uncertainties remain:
  - Anomalies are present where there is no basalt.
  - Basalt is present where there are no anomalies.

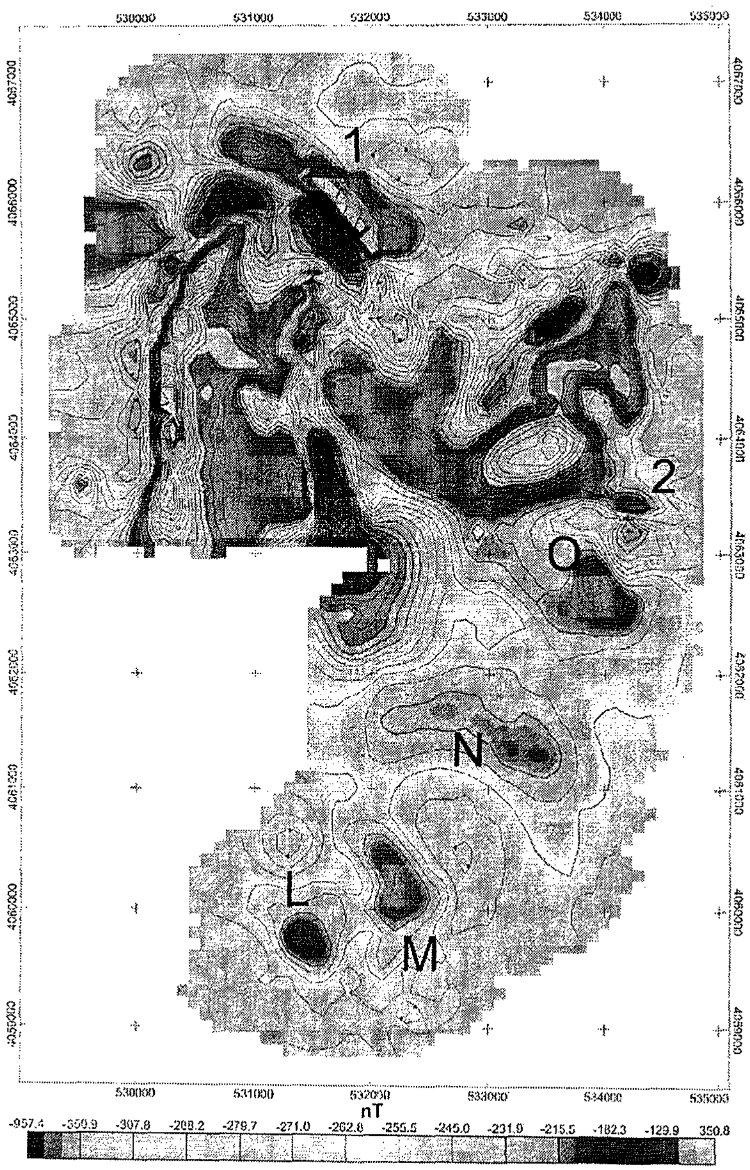
How can Probability Models be Affected by Uncertainties in the Location and Age of Buried Volcanoes, Including Present-but-Undetected Events?

USGS Aeromagnetic Data



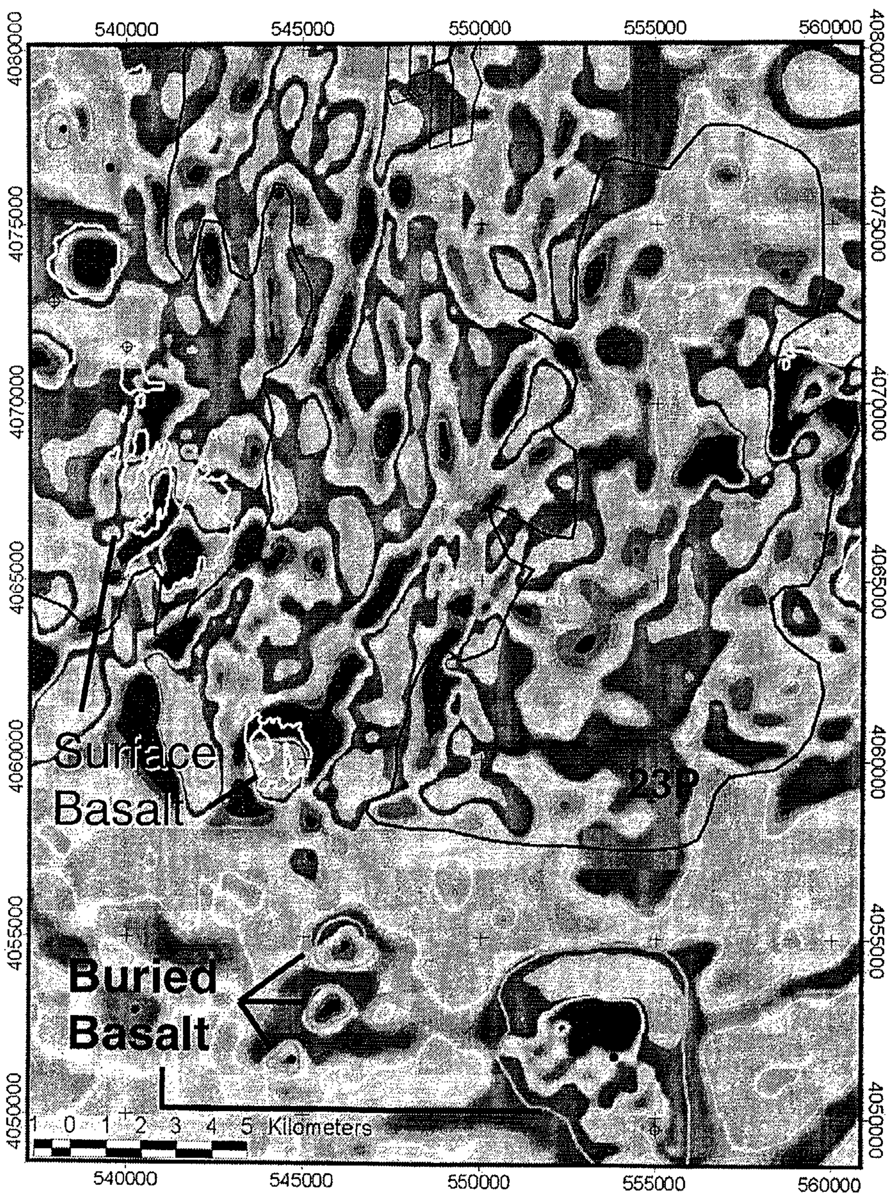
- Residual anomaly map, data from Blakely et al. (2000).
- PVHA = 7 Anomalies (*A-G*).
- 7 additional high-to-medium confidence aeromagnetic anomalies interpreted as basalt (O'Leary et al., 2002; Hill and Stamatakos, 2002).
- 6 other anomalies have low confidence interpretation as basalt.
- Anomalies #1-4 identified with ground magnetic surveys.

CNWRA Ground Magnetic Surveys



- Example from Steve's Pass area, south of Bare Mountain.
- Faulted tuffs and buried basalt beneath 0-to-300-m-thick alluvium.
- Anomalies 1-2 identified by ground magnetic surveys.
- Anomalies L-O can be modeled as buried basalt (O'Leary et al., 2002).
- Ground magnetic surveys around Yucca Mountain identify a total of 4 anomalies that likely represent buried basalt.

Present but Undetected Volcanoes?



Residual anomaly map, data from Blakely et al. (2000).

- Alluvial basins west and east of Yucca Mountain (black outlines) underlain by magnetically noisy bedrock.
- Noisy bedrock may mask magnetic anomaly of overlying basalt, including known basalt locations.
- Nye County drillhole 23P intersects basalt at 400 m depth, no distinct magnetic anomaly.
- Technical basis needed for number of additional volcanoes that may be present but undetected in alluvial basins.

Summary of Magnetic Data

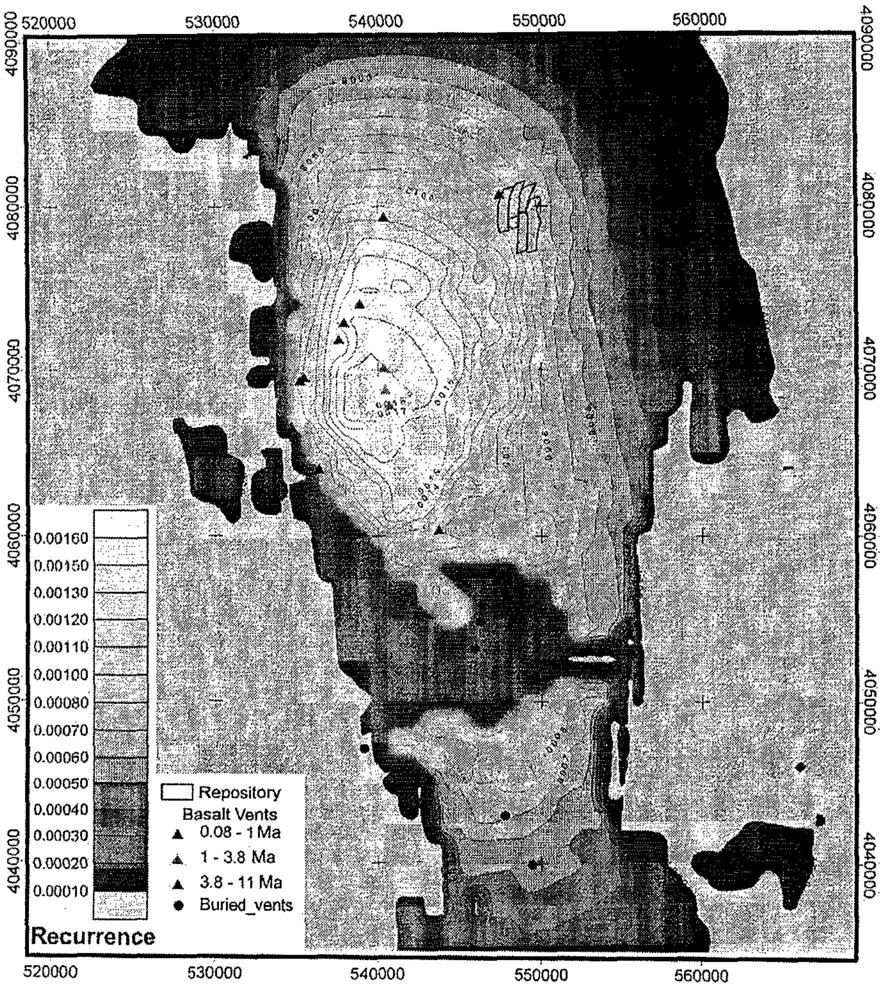
- Approximately 12 volcanoes 0.08-11 Ma in this area.
- 1995 PVHA = +7 Anomalies, 0.2-0.9 confidence for buried basalt.
- USGS Aeromagnetic Surveys = +7 high-to-medium confidence anomalies representing buried basalt.
- CNWRA Ground Magnetic Surveys = +4 basalt anomalies.
- At least 11 magnetic anomalies reasonably interpreted as basalt identified after the DOE PVHA.
- Approximately half of the known basaltic volcanoes do not produce distinct anomalies in the aeromagnetic survey data.
- Buried basalt also exists in areas without distinct aeromagnetic anomalies.

Age of Buried Basalt?

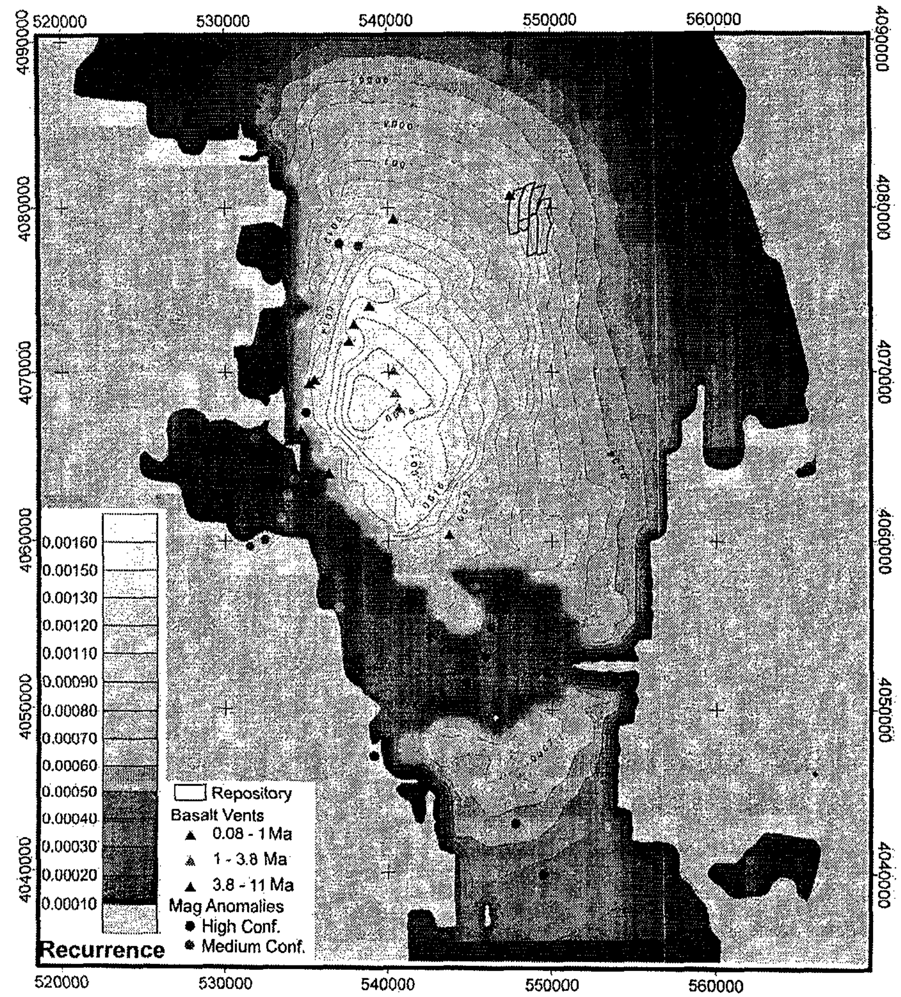
- Modeling of approximately half the anomalies (O'Leary et al. 2002) supports buried basalt 50-300 m below surface.
- Burial (sedimentation + subsidence) rates <0.01-0.1 mm/yr.
- Average burial rates (0.03 mm/yr) and stratigraphy indicate highly uncertain basalt ages of approximately 2-11 Ma.
- Based on characteristics of other Western Great Basin volcanic fields, evaluate alternative hypotheses for uncertainty in recurrence rates due to uncertainty in basalt ages:
  - Uniform recurrence between 2-11 Ma
  - Uniform recurrence between 2-5 Ma
  - 1 Myr episode of intense activity at ~4 Ma

Is 0.08 Ma Lathrop Wells Volcano the end of 0.08-1 Ma episode, or the start of an approximately 1-Myr-long episode?

Small Effect on Spatial Recurrence Rates

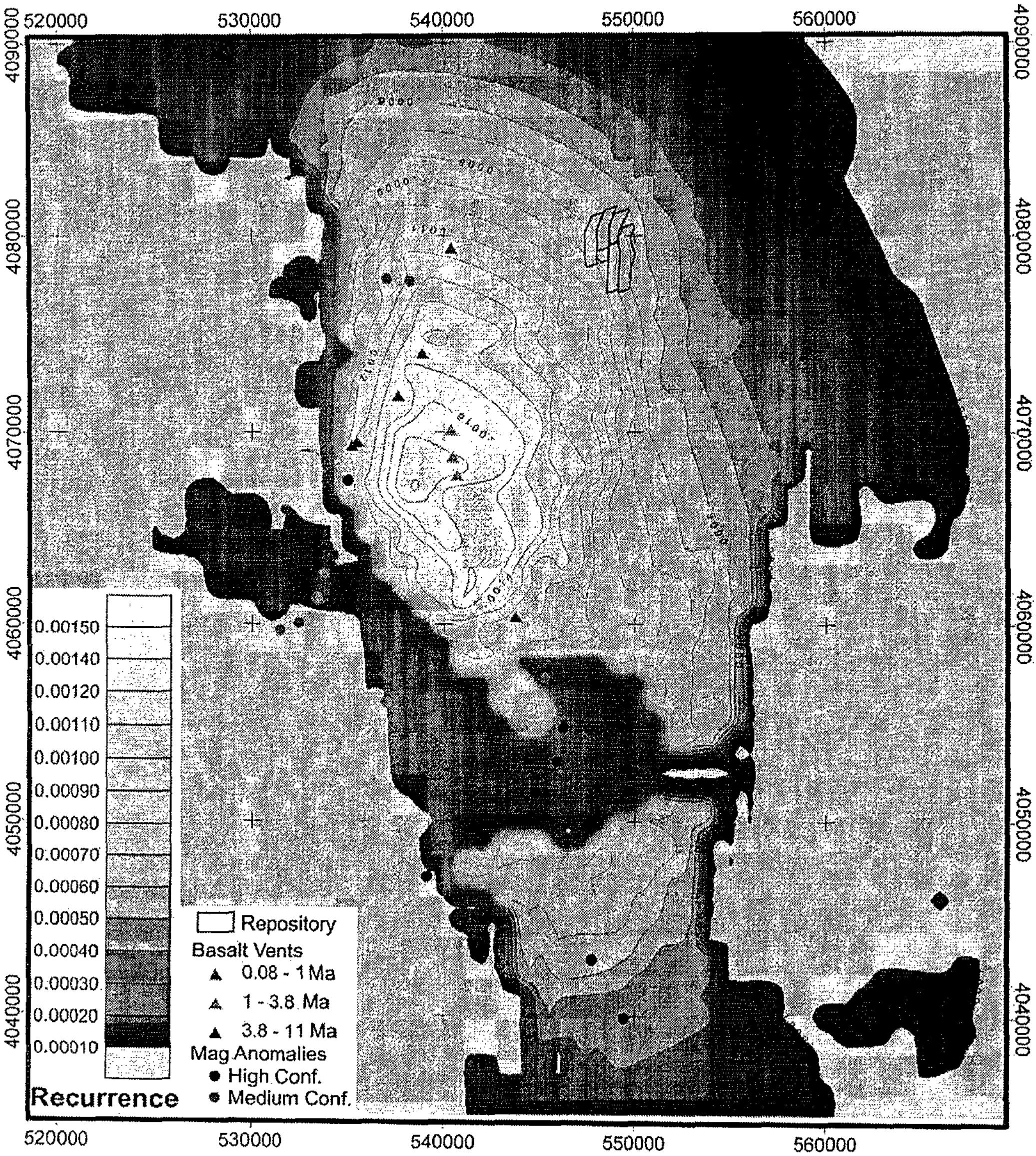


Example: Point Events
4 Miocene, 9 Pliocene, 5 Quaternary;
Recurrence = 2 volcanoes/Myr
P[disrupt] = 1.1x10^{-8}/yr



Anomalies = Basalt 2-11 Ma:
18 volcanoes + 11 anomalies;
Recurrence = 3 volcanoes/Myr
P[disrupt] = 1.4x10^{-8}/yr

Large Effect on Temporal Recurrence Rates



Anomalies = Basalt 2-5 Ma:

14 volcanoes + 11 anomalies;
Recurrence = 5 volcs/Myr;
P[disrupt] = 2.2×10^{-8}/yr

1 Myr Episode of Activity,
Anomalies = 4 Ma basalt:

9 volcanoes (4 Ma)
+ 11 anomalies (4 Ma);
Recurrence = 20 volcs/Myr;
P[disrupt] = 8.6×10^{-8}/yr

Need to Evaluate
Full Range of Models
for Current 10^{-8}-10^{-7}/yr

NRC Path Forward

- IA 1.02: DOE will examine the new aeromagnetic data for potential buried igneous features and evaluate the effect on the probability estimate.

- Review of September 26, 2002 Letter Report will consider:
  - Uncertainty in the number and age of potential volcanoes.
  - Changes in alignment lengths, event definitions, conceptual models.
  - Effects of present-but-undetected volcanoes.
  - Need to update the PVHA elicitation or for numerical model validation.

- Continue modeling and interpretation of aeromagnetic and ground magnetic data.

- Evaluate the effects of new information on the full range of NRC probability models, which currently give annual probabilities of 10^{-8}-10^{-7} for volcanic disruption.

Other Considerations

- E.I. Smith and C.-H. Ho (Univ. Nevada) continue to develop and publish process models for spatio-temporal recurrence rates.
  - Recurrence rates 11-15 volcanoes/Myr.
  - Working on new temporally nonhomogeneous probability models.

- Uncertainties in buried basalt interpretation can be reduced with:
  - Direct drilling of anomalies.
  - Low-altitude aeromagnetic survey optimized for volcano detection.
  - Ground magnetic surveys.
  - Detailed modeling of existing magnetic data.

Conclusions

- 11 basaltic volcanoes can be reasonably interpreted from existing magnetic survey data.
- 13 known volcanoes dated, 17 likely buried volcanoes not dated.
- Alternative interpretations of potential ages for the 11 new events result in ~1x to ~8x increases in NRC spatio-temporal probability models for point-source events.
- Additional basaltic volcanoes likely remain present but undetected in alluvial basins west and east of Yucca Mountain.

Transport Safety In The U.S. and Internationally

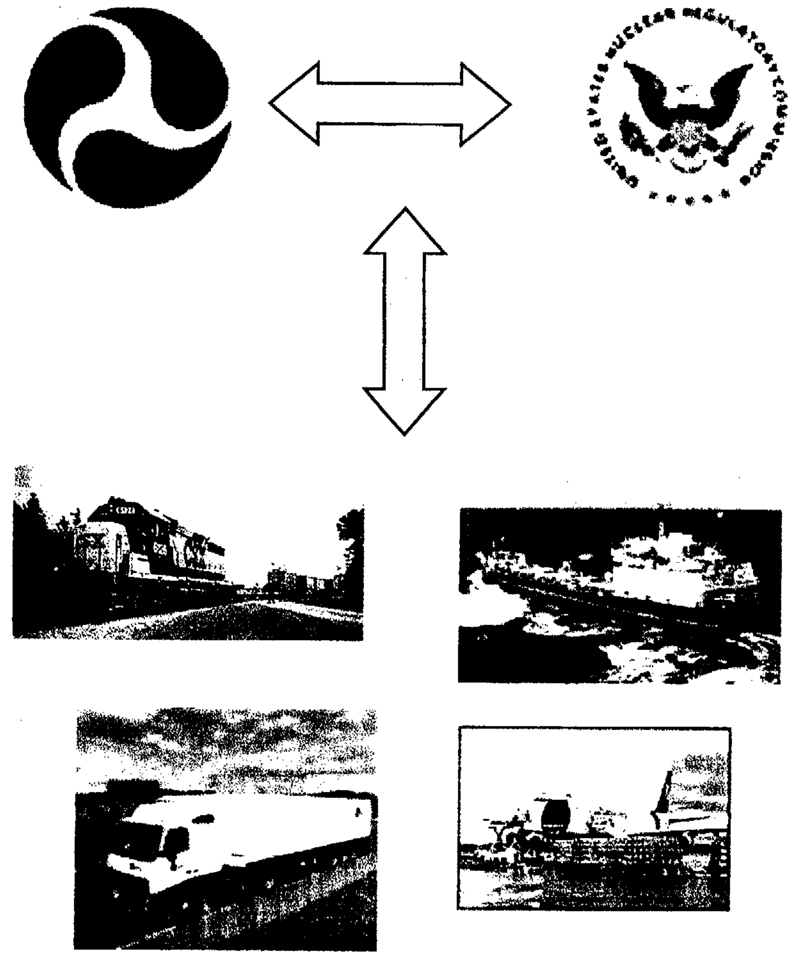
Rick Boyle
U.S. Department of Transportation
Hazardous Materials Safety

Overview

- Regulatory Overview
- Regulatory Issues
- Transportation History
- Transportation Incidents
- Programs of Interest

Regulatory Overview

- **RSPA and NRC develop RAM Packaging and Transport Standards**
- **Modal Authorities develop operational standards and conduct CA programs**
- **Operators/Shippers comply with all of the above.**



Regulatory Issues

- Security and safeguard requirements
- Mode and Route selection criteria
- Public Participation
- Training (operator, shipper, emergency response and governments)
- Technical issues: radiation protection; contamination limits; air and sea transport

Transportation History

1400 1600 427,000 Kg

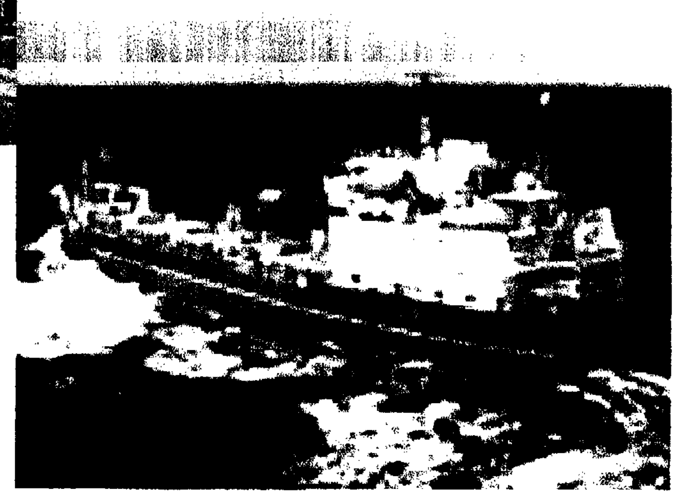
- **1979 to 1990: 89% of the shipments (27% of the tonnage) of SNF were by highway.**
- **Legal weight trucks (300 kg of SNF)**
- **Security and safeguard requirements as defined by NRC**
- **Route selection as defined by FMCSA**

Transportation Incidents

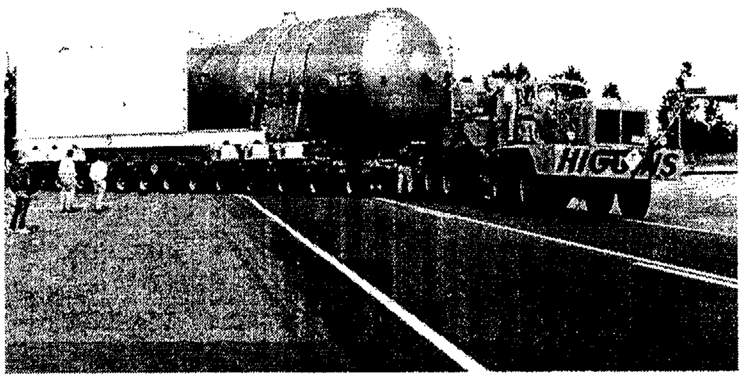
1.6 Million Miles Traveled - 8 Accidents – No releases

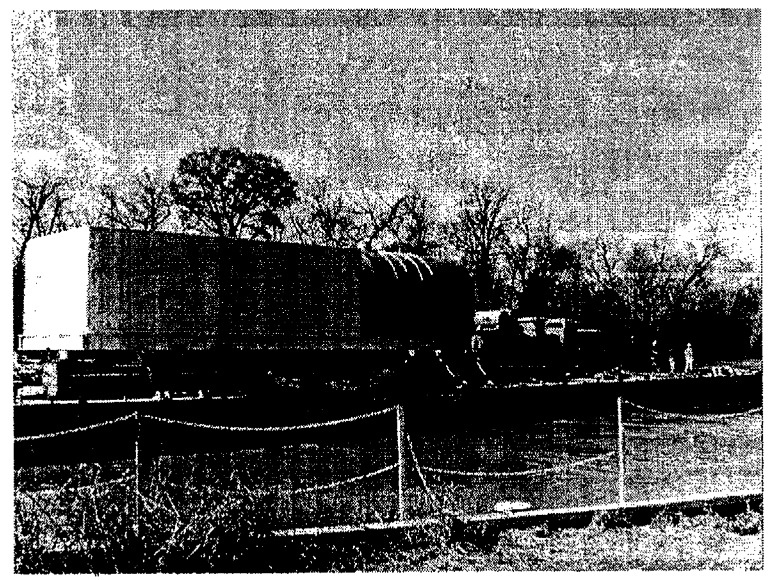
- 12/8/71: Truck accident in TN
- 3/29/74: Train yard derailment in NC
- 2/9/78: Truck collapse in IL
- 8/13/78: Trailer deck failure in NJ
- 12/9/83: Truck separated from trailer on IN/IL/TN border
- 3/24/87: Train collided with car at crossing in MO
- 1/9/88: Train derailment in Nebraska
- 12/14/95: Train derailment in North Carolina

Programs of Interest: Research Reactor Fuel

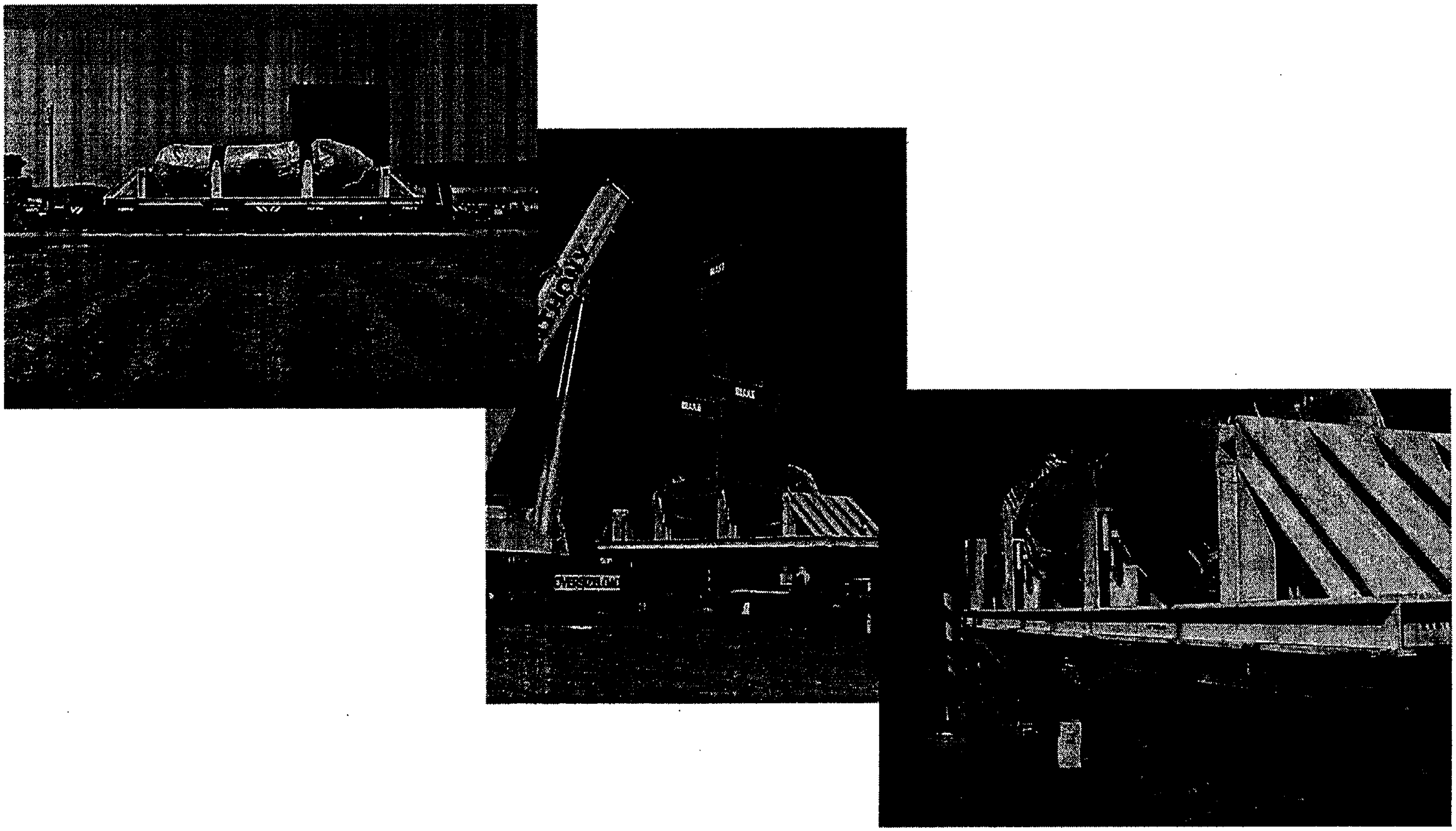


Programs of Interest: Transport of Large Components

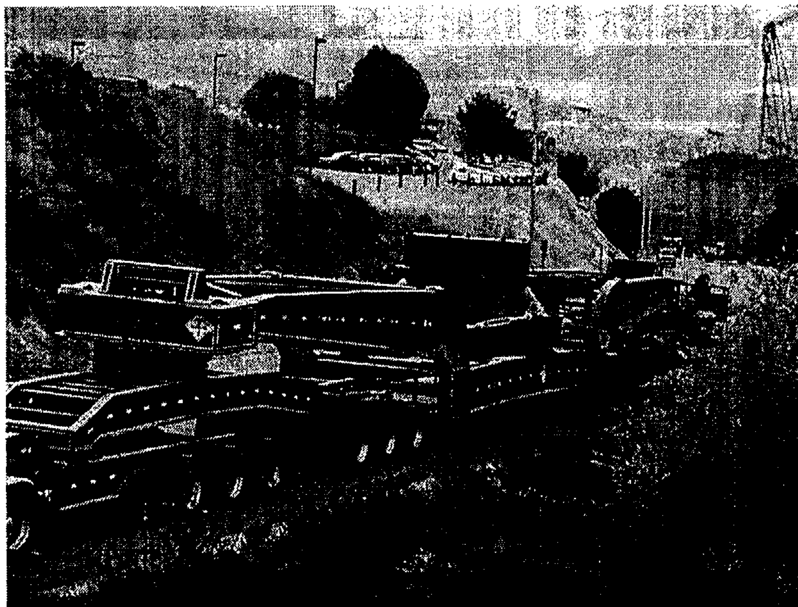


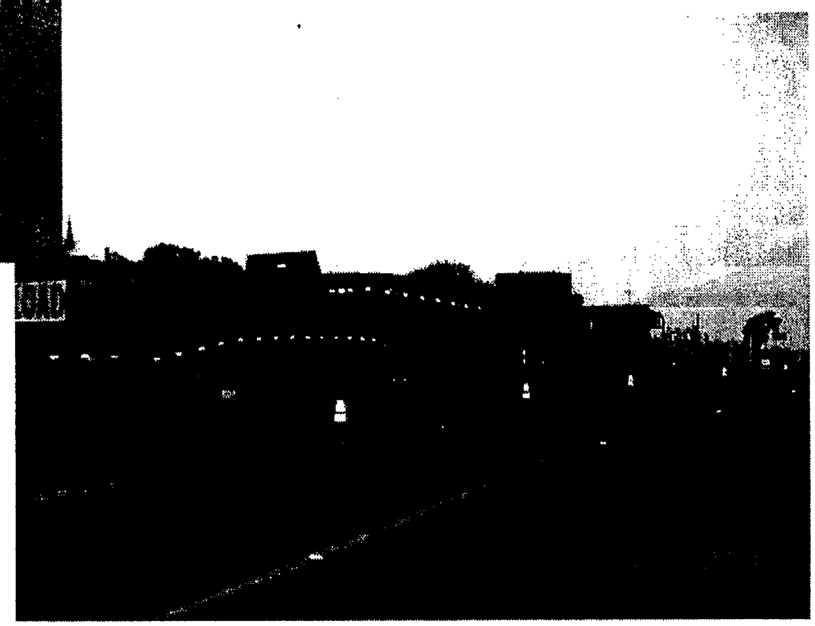


Programs of Interest: Transport of Large Components

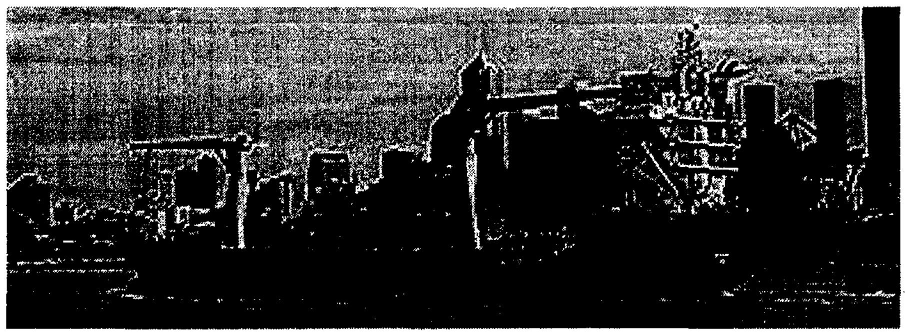


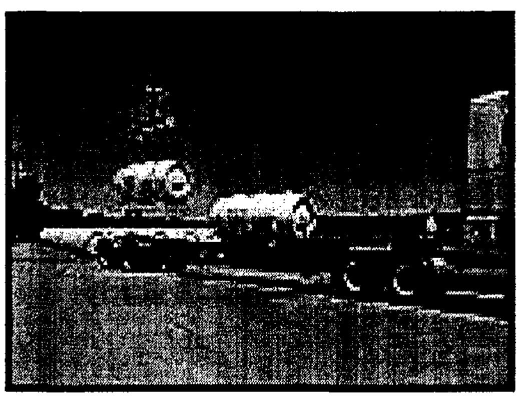
Programs of Interest: Long Distance Heavy Haul

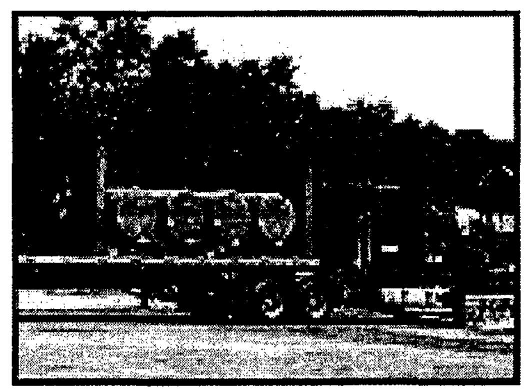




Programs of Interest: Transport of Front End Mat'l







Contact Information

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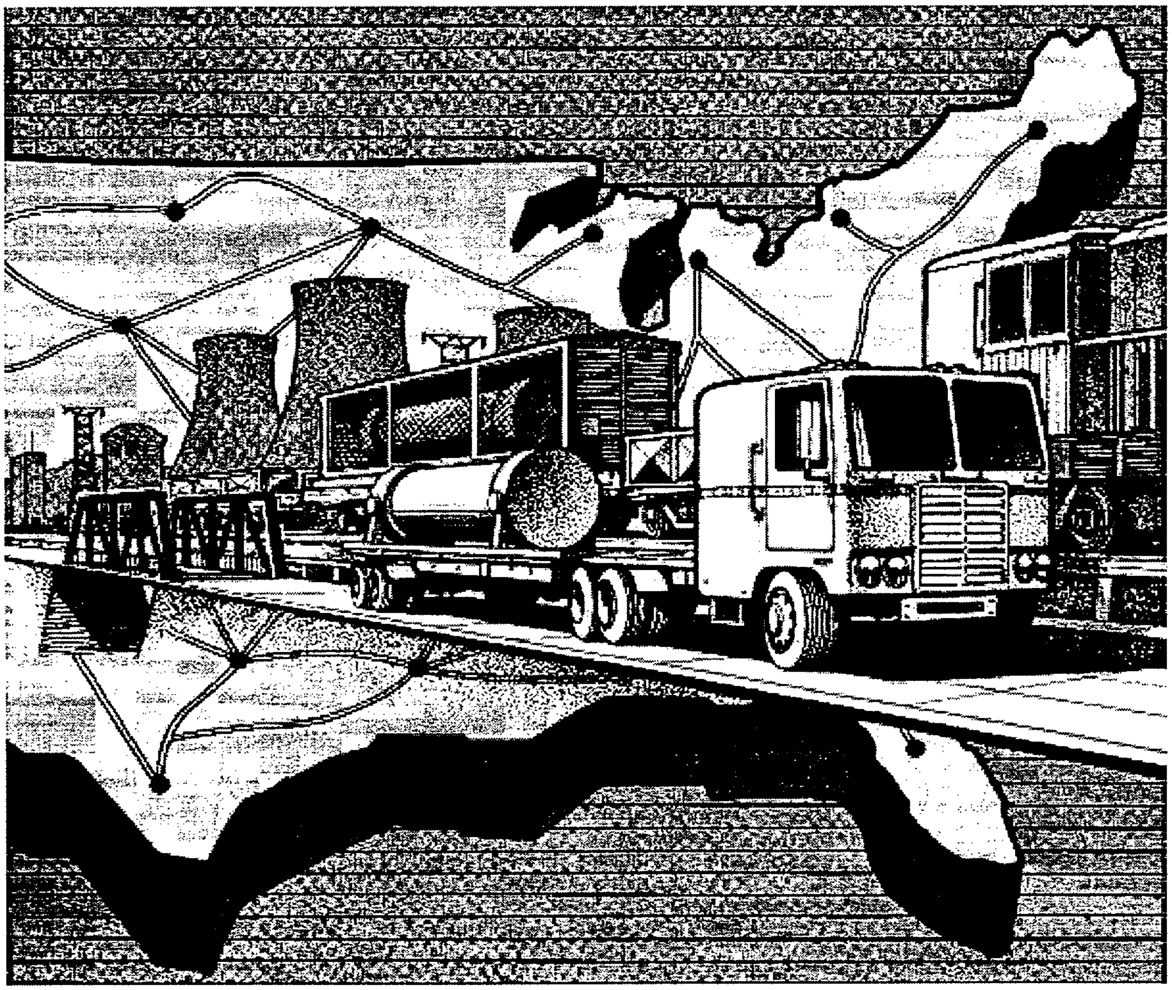
- Phone: 202-366-2993
- Fax: 202-366-3753
- Email: rick.boyle@rspa.dot.gov

Spent Fuel Transportation Experience Domestic and Worldwide



Transportation Working Group
Workshop
Session II

November 20, 2002

TABLE OF CONTENTS

ADVISORY COMMITTEE ON NUCLEAR WASTE
TRANSPORTATION WORKING GROUP WORKSHOP
NOVEMBER 19 & 20, 2002,
TWO WHITE FLINT NORTH, AUDITORIUM, ROCKVILLE, MARYLAND

Contact: Tim Kobetz (301-415-8716, tjk1@nrc.gov)

-PROPOSED SCHEDULE-
NOVEMBER 20, 2002

	Topics	Presenters	Time
I.	Opening Remarks	M. Levenson, ACNW	12:30-12:35 p.m. (5 min)
II.	Transportation Safety in the U.S. and Worldwide		
a.	Summary of DOT Experience with Spent Nuclear Fuel Shipments	Rick Boyle, DOT Kevin Blackwell, DOT	12:35-12:55 p.m. (20 min) Presentation Time 12:55-1:15 p.m. (20 min) Presentation Time 1:15-1:45 p.m. (30 min) Discussion Time
b.	Summary of DOE Shipping Experience		
	i. Waste Isolation Pilot Plant	Alton Harris, DOE	1:45-2:05 p.m. (20 min) Presentation Time
	ii. Foreign Fuel	Maureen Clapper, DOE	2:05-2:25 p.m. (20 min) Presentation Time
	iii. Navy Fuel	Don Doherty, DOE	2:25-2:45 p.m. (20 min) Presentation Time 2:45-3:30 p.m. (45 min) Discussion Time
	BREAK		3:30-3:45 p.m.
c.	Summary of Utility Experience	Robert Kunita and Steven Edwards, Progress Energy	3:45-4:15 p.m. (30 min) Presentation Time 4:15-4:45 p.m. (30 min) Discussion Time
d.	Summary of International Experience	Ian Hunter, Transnuclear/ Cogema	4:45-5:05 p.m. (20 min) Presentation Time 5:05-5:25 p.m. (20 min) Discussion Time
e.	Public Comments		5:25-5:45 p.m. (20 min) Discussion Time
f.	Committee Discussions	Milt Levenson, ACNW	5:45-6:30 p.m. (45 min) Discussion Time

FRA Experience with Spent Nuclear Fuel Shipments by Rail

Presentation to the Advisory Committee on Nuclear Waste Transportation Working Group Workshop

November 20, 2002

Kevin R. Blackwell
Federal Railroad Administration

1

SNF Rail Transportation

- Approx. 1300 SNF shipments have been transported by rail over the past 40+ years
- 5 accidents/incidents have occurred involving SNF packages by rail
- All were of minor severity in nature

2

SNF Rail Transportation

- None resulted in loss of package integrity or contents
- History to date of the rail transportation of SNF strongly indicates that the packages can be transported safely over the nations rail system.

3

Some Past SNF Rail Movements

Campaign			Moves
PG&E	CA to NY	1969-71	15
Monticello	MN to IL	1984-87	29
Cooper Station	NE to IL	1984-89	30
TMI	PA to ID	1986-90	23
Shoreham Plant	NY to PA	1993-94	33

4

3

C01

Current SNF Rail Movements

Campaign			Moves
CP&L	NC & SC	1989-Present +	130
DOE FRRF	SC & CA	1994-Present +	19
DOD Naval Nuclear	Various to ID	1959-Present +	Approx 400

5

Future SNF Rail Movements

Campaign			Moves
West Valley	NY to ID	Potentially 2003	1
Interim Private Fuel Storage Initiative	Various to UT	Potentially 2004-2005	50/yr EST.
Yucca Mountain	Various to NV	Potentially 2010	130/yr EST.

6

SNF Rail Transportation

- Universal Concerns
  - Safe Transport
    - Package integrity, radiation levels and rail carrier operational control
  - Secure Transport
    - Measures to thwart sabotage/potential terrorist threat

7

Safe SNF Rail Transportation

- While FRA's confidence factor in the integrity of SNF packaging is "high", risk management principles dictate that the continued safe rail transportation of SNF is also a function of the integrity of the rail transportation system as a whole.

8

FRA's SCOP
(Safety Oversight Compliance Plan)

- Therefore, in addition to rail carrier inspection programs/procedures and routine FRA safety oversight inspections, FRA developed it's SCOP Policy for SNF & HLRW shipments.
- Focuses safety oversight inspections

9

SCOP Summary of Contents

- SCOP contains focused safety oversight enhancements in areas of:

Planning	Inspection
Training	Miscellaneous oversight

- Addresses 21 separate tasks in 6 categories
  - Operational Integrity
  - Emergency Response
  - Route Infrastructure Integrity
  - Highway-Rail Grade Crossing Safety
  - Security
  - Miscellaneous

10

FRA's SCOP (cont.)

- SCOP is a living document
- Will undergo periodic review, evaluation and updating, as necessary – is currently in process of being updated.
- Provides for flexibility in keeping pace with new rail safety developments and technologies
- Current version available at www.fra.dot.gov/safety/hazmat.htm

11

Secure SNF Rail Transportation

- DOT addressing security concerns as they relate to the transportation of all hazardous materials
- FRA working closely with the AAR and rail industry on security related issues particular to the rail industry
- DOT Rulemaking: RSPA Docket HM-232 "Hazardous Materials: Security Requirements for Offerors and Transporters of Hazardous Materials", Notice of Proposed Rulemaking, FR of May 2, 2002 .

12

SNF Package Transportation Companion Issue

- Dedicated Train Study
  - Congressionally mandated study comparing the safety of transporting SNF & HLRW in dedicated rail freight consists vs. regular rail freight consists
  - Study expected to be completed and provided to Congress in early 2003.

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Informational Websites

- These FRA sites may provide additional helpful information:
  - www.fra.dot.gov/safety
  - Safetydata.fra.dot.gov/OfficeofSafety

14

Waste Isolation Pilot Plant
Shipping Experience

Advisory Committee on Nuclear Waste
Transportation Working Group Workshop

November 20, 2002

Alton D. Harris, III
U.S. Department of Energy

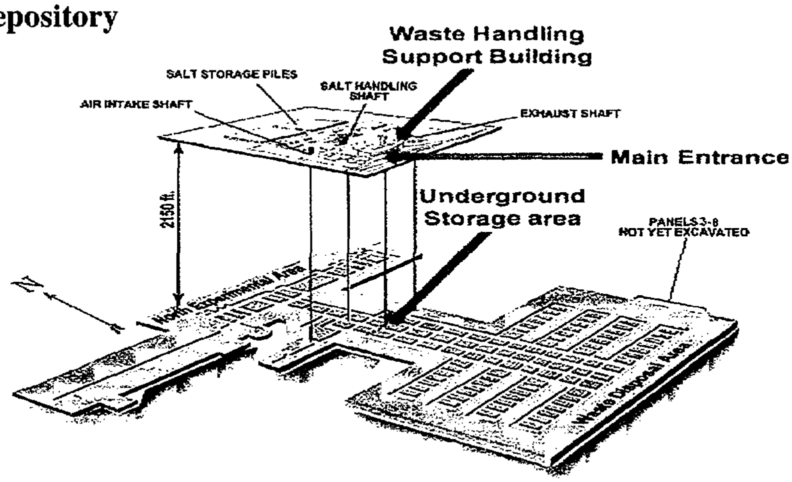
Discussion Topics

- WIPP Mission
- Packagings
- Shipping Experience

2

WIPP Mission

Permanent isolation of up to 6.2 million cubic feet (~176,000 cubic meters) of defense generated transuranic waste in a geologic repository



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Transuranic Waste

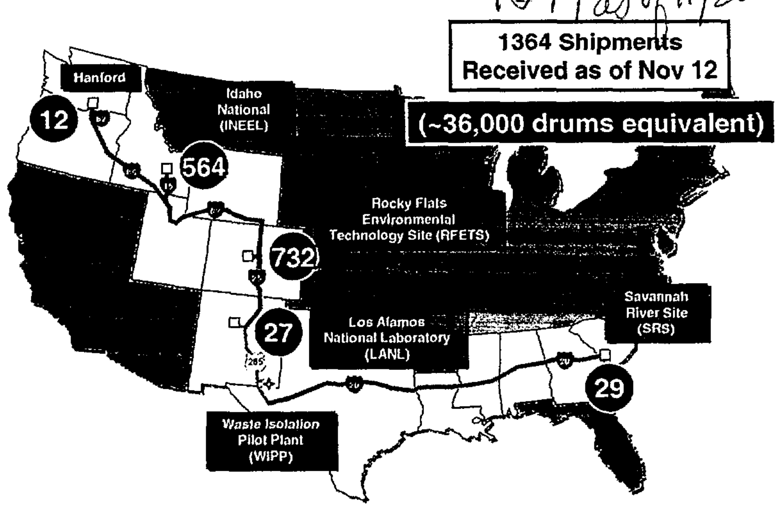
4

Mission in Terms of Shipments

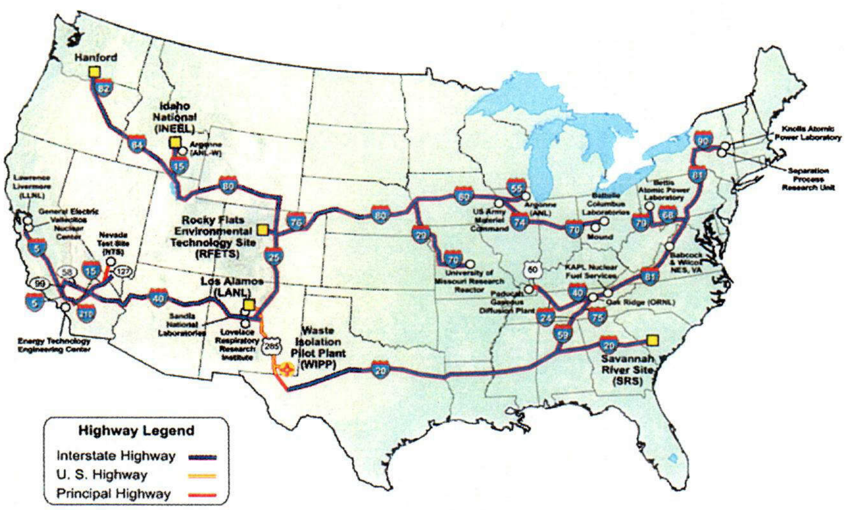
- **17,000 to 20,000 shipments over estimated project life to the year 2034**
- **DOE plan to accelerate cleanup of sites calls for achieving 34 shipments per week (2003-2013) to complete the bulk of these shipments**

Waste Shipment Status

1374 as of 11/20



Shipping Routes



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WIPP Packagings

Contact-Handled Transuranic Waste Packaging

- **TRUPACT-II** — **67 -> 81 Fleet Size**
- **HalfPACT** — **0 -> 15 Fleet Size**
- **TRUPACT-III** — **TBD Fleet Size**

Remote-Handled Transuranic Waste Packaging

- **RH-72B Cask** — **4 -> 12 Fleet Size**
- **CNS 10-160B Cask** — **1+**

8

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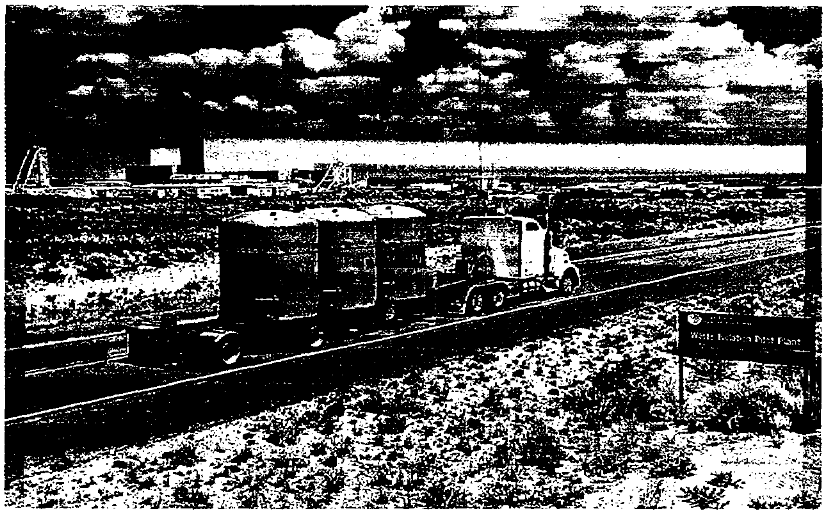
C03

TRUPACT-II



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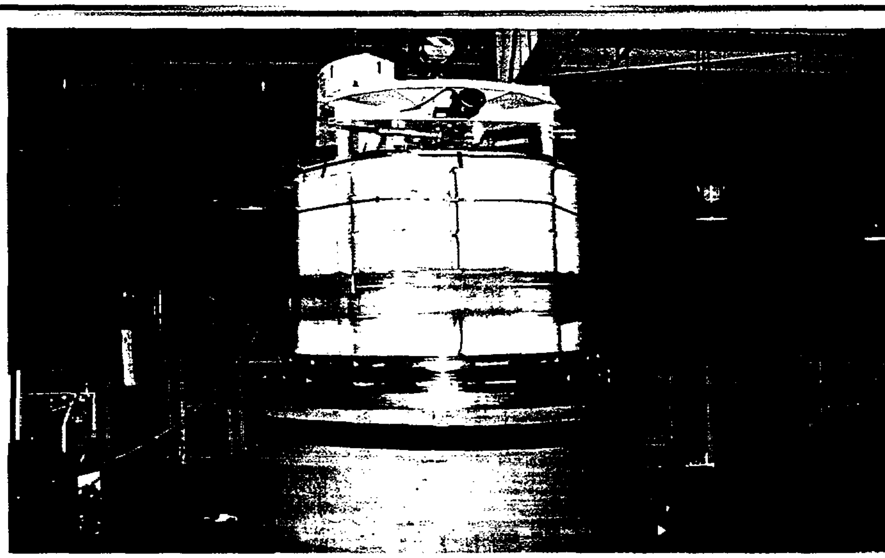
Drums Lowered into TRUPACT-IIs



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HalfPACT and TRUPACT-IIs

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RH-72B Cask

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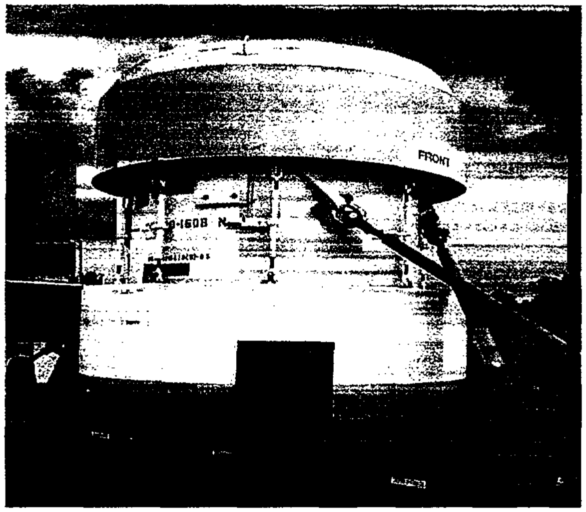
CNS 10-160B Cask



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Packaging Performance

- Packaging has performed as expected.
  - Two minor traffic accidents with no loss of containment
- NRC has approved several DOE requests to increase the packaging contents and operational constraints

14

Foreign Research Reactor Spent Nuclear Fuel Acceptance Program

An Update for the

Nuclear Regulatory Commissions'

Advisory Committee on Nuclear Waste

Presented by

Maureen Clapper, Program Manager

November 20, 2002

Items for Discussion

- Background of the Foreign Research Reactor (FRR) Spent Nuclear Fuel (SNF) Acceptance Program
- Status of the fuel Acceptance Program
- FRR SNF Shipment planning and execution
- Lessons Learned, Issues & Challenges

16

Background of the FRR SNF Acceptance Program

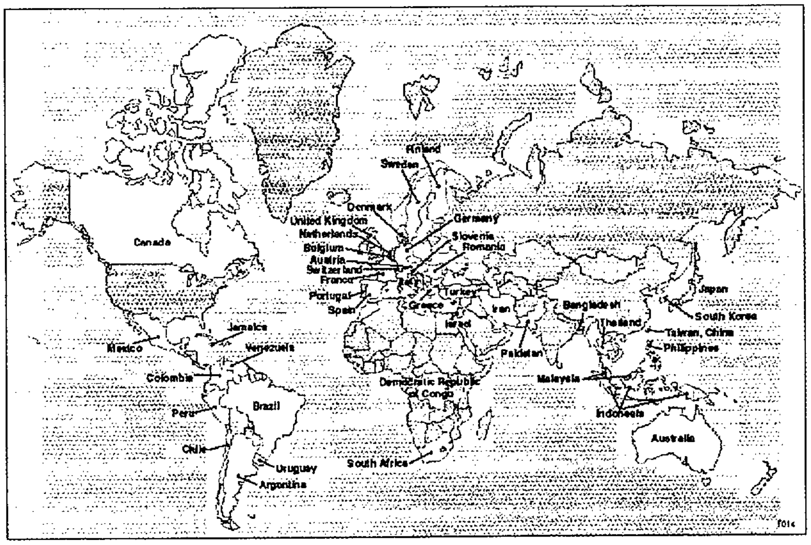
The FRR SNF Acceptance Program evolved from "Atoms For Peace"

- Partner countries agreed not to develop nuclear weapons in exchange for U.S. enriched uranium for research purposes.

President Dwight D. Eisenhower

17

U.S. Provided Enriched Uranium to 41 Countries



FRR SNF Acceptance Program

- Goal: to recover nuclear materials which could otherwise be used in weapons
- Strategy: play a key role in the civilian nuclear fuel cycle--high enriched uranium is potentially weapons-usable; get this material out of the cycle
- Implementation: U.S. accepts eligible spent fuel. Many reactors can convert directly to low enriched uranium fuel (not weapons-usable). Research reactors are used for medical, agricultural, and industrial applications.

18

C04

Reason for the Policy

- Reduce the threat of nuclear weapons proliferation while enjoying the benefits of nuclear technology.
- Reduce, and eventually eliminate, high enriched uranium (HEU) from worldwide commerce.
- Allow time for the countries with spent fuel (both high and low enriched) to resolve their own disposition.
- Allows reactor operators to eliminate long term liability associated with spent fuel management and disposition.

U.S. Research Reactor Spent Nuclear Fuel Acceptance Policy

- Research reactor spent nuclear fuel containing uranium enriched in the U.S. will be accepted from 41 countries and managed in the United States.
  - Originally estimated 20 metric tons (5 tons of HEU)
  - Includes aluminum-based and TRIGA research reactor spent fuel and target material
  - Based on correspondence with the eligible countries/reactor facilities, anticipate about half of this material will be made eligible for return (not participating, slower burn-up, alternatives)
- 10-year acceptance policy (May 13, 1996 to May 13, 2006)
  - Provides time for reactor operators to develop own solutions
  - Fuel irradiated during the 10-year window will be accepted over a 13-year period

Status of the Fuel Acceptance Program

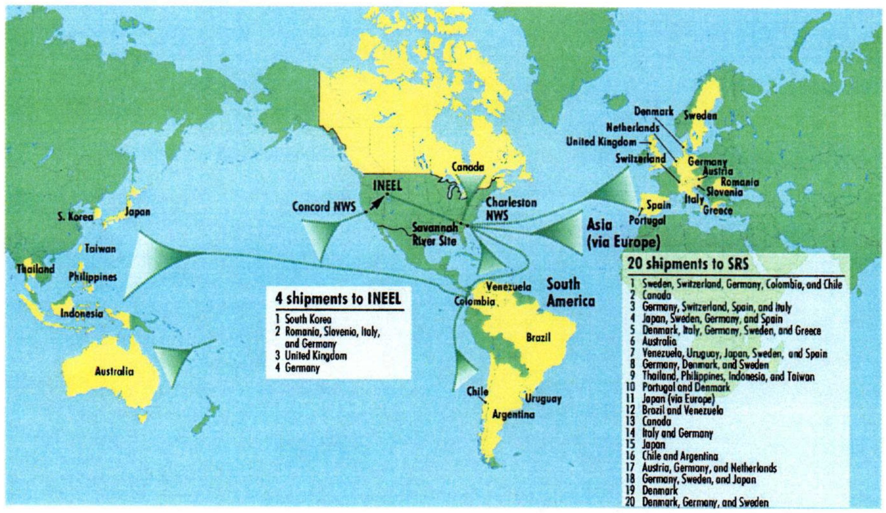
DOE Continues to Receive FRR SNF Shipments

- 25 shipments completed to date (Most recent: 8 casks on 09/27/02)
- 5,537 spent fuel assemblies, from 27 countries, have been accepted to date
- 3 cross-country shipments completed to date, one west coast shipment completed to date

- After 9-11, planning was under continuous, tight scrutiny of upper level DOE management. DOE remains in close contact with Federal & State Law Enforcement Agencies, naval installations, Coast Guard, and the NRC while shipments are underway.

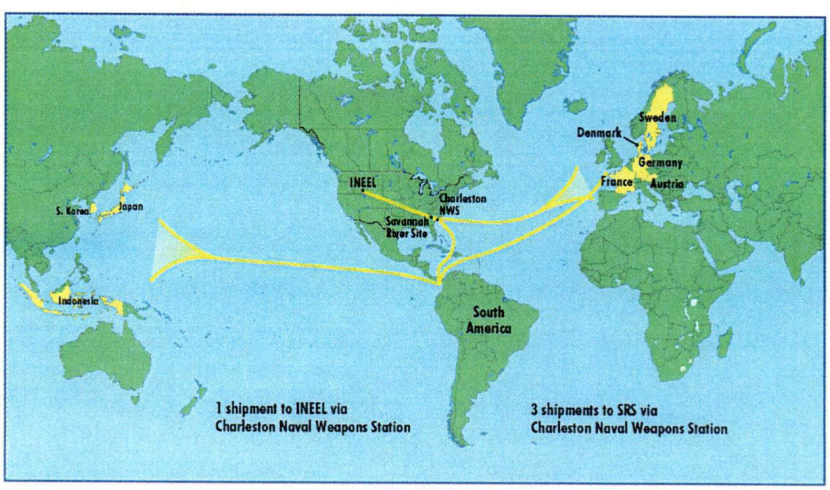
20

FRR SNF Shipments to Date



Shipments Planned

August 2002 - August 2003 (tentative)



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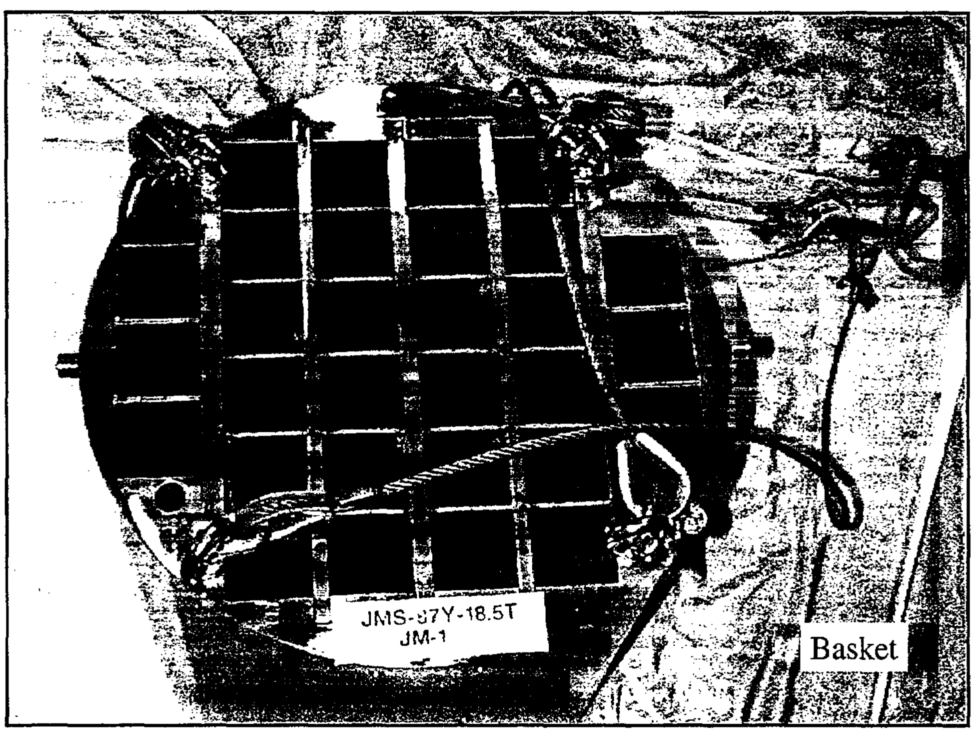
C05

FRR SNF Shipment Planning and Execution

DOE/DOT/NRC

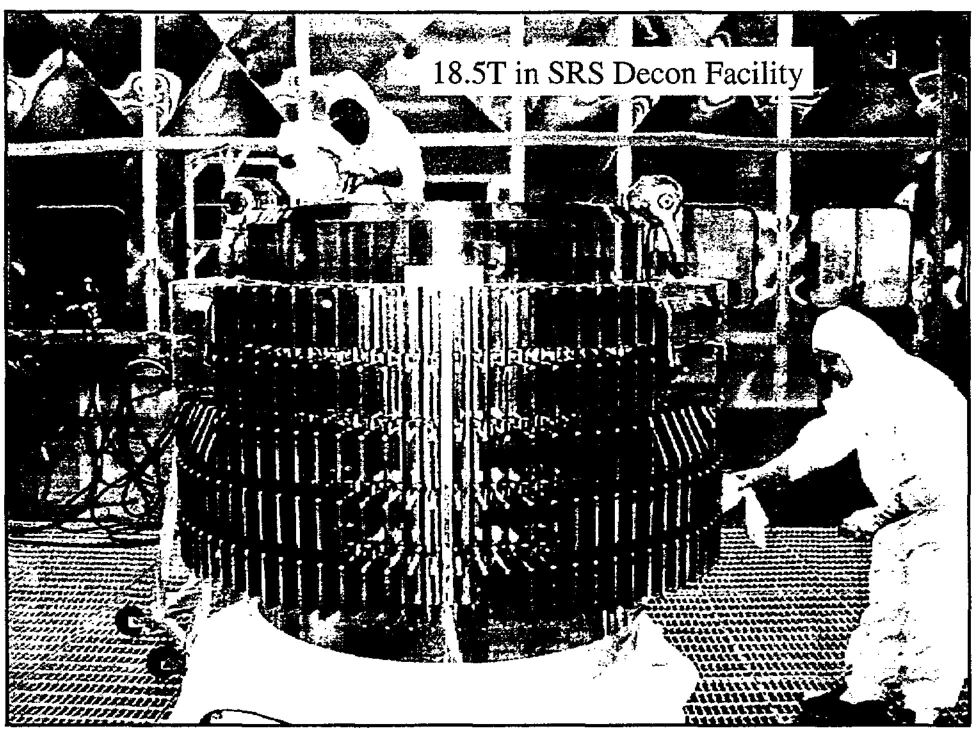
- FRR SNF Program enjoys strong and positive working relationships with DOT and NRC
  - Licensing of transportation casks
  - Identification of suitable transportation routes
  - Route approval
  - Oversight of transportation activities
  - Support during shipment execution
  - Transportation planning and stakeholder outreach
- DOT and NRC play a critical role in the successful implementation of mission critical DOE shipping campaigns


18.5T cask basket removed


JMS-87Y-18.5T
JM-1
Basket

FRR SNF Shipment Planning

- Fuel casks arrive at naval installations and are transported to SRS or INEEL based on fuel type
- Receipt of TRIGA fuel on East Coast occurs about once a year and results in a cross-country transport to INEEL
- Route selection governed by NRC and DOT regulations require shipper to minimize radiological risk
- Minimizing time in transit minimizes radiological risk



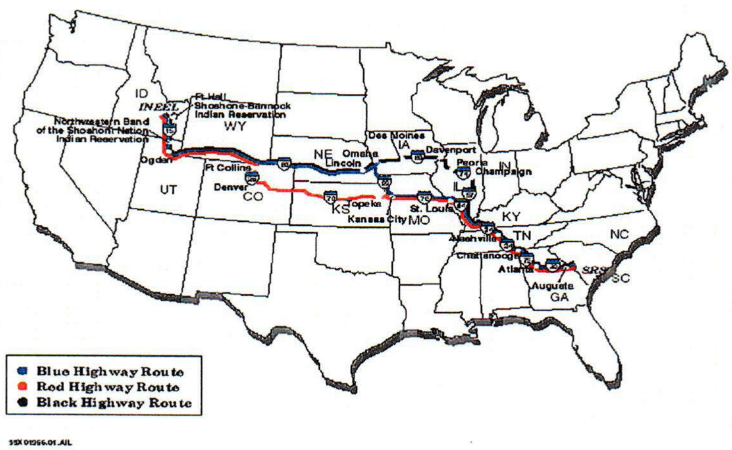
Cross-Country Shipment Key Facts (contd.)

- Highly interactive campaign involving extensive communications among all levels of government
- High level of public/media awareness
- Campaign planning and execution similar from shipment to shipment, although some approaches and participants are different

Cross-Country Shipment Planning

- Year-long advance planning process to: work with foreign countries on timing, licensing issues; collect data on the fuel; select and schedule casks; select transportation services contractor
- Cross-Country Transportation Working Group (CCTWG) formed and tasked with developing and maintaining a transportation plan for completing cross-country shipments of FRR SNF in a safe, efficient manner.
- Route evaluation and selection process occurs for each cross-country shipment
- Transportation and security plans developed for each shipment

Highway Routes Selected for Cross-Country Shipments of FRR SNF



•Three potential routes, identified in 1999, are re-evaluated for each successive shipment campaign.

Chronology of Cross-Country Shipments

- First completed in August 1999
  - 5 vehicles; 1 cask per vehicle enclosed in ISO
  - 446 TRIGA rods from Romania, Slovenia, Italy, and Germany
- Second completed in July 2000
  - 1 vehicle; 1 cask
  - 90 TRIGA rods from the U.K.
- Third completed in July 2001
  - 3 vehicles; 1 cask per vehicle
  - 126 TRIGA rods from Germany
- No TRIGA scheduled for 2002
- 2003? Considering Rikkyo, Japan

Cross-Country Planning Considerations

- DOE requests data on road conditions and planned construction and takes this into account in evaluating routes through every potential corridor state.
- DOE will work with States and Tribes to identify and resolve, where possible, construction, congestion, timing, escort and training issues to ensure safety.
- DOE will work with state/tribal officials to address planning, safety, response and stakeholder concerns.

FRR SNF Lessons Learned, Issues & Challenges

Cross-Country Shipment Lessons Learned

- Inspections, escort link-ups, avoiding rush hours are time-sensitive events if details do not go as planned (cascading effects)
- Several planning areas need to be more clear, consistent, and timely (route approvals, change in plans, information dissemination, e.g. change in designated rush hours not disseminated to DOE)
- Dates/times/ship names are considered ***Safeguards Information*** per NRC regulations; equivalent measures do not necessarily apply in foreign countries

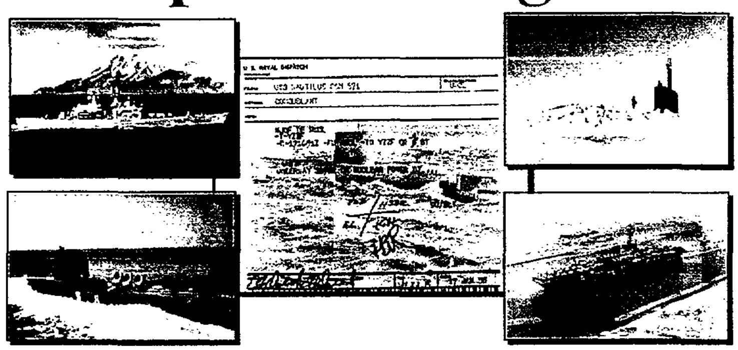
Current Issues and Challenges

- **Identifying certification needs and getting technical information from research reactor operators to support reviews early in shipment planning process**
- **Cooperative planning with States and Tribes has been good, but is changing in the new security climate**
- **Security issues abroad may affect shipment schedules and configurations (e.g. when/where ship can pick up)**
- **Yucca Mountain debates/decision in Congress have raised awareness for all SNF transportation**
- **Numerous requests have been received from Reactor Operators to extend the expiration date of the Acceptance Policy; the United States has no plans to extend the policy at this time**
- **Geographic challenges: scheduling is becoming more complex as fuel is deinventoried**

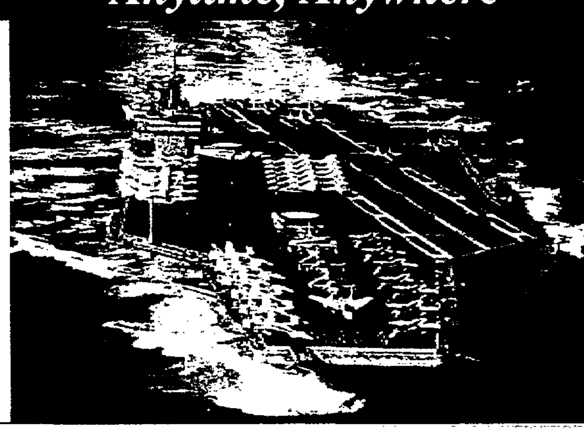
Cross-Country: 2002 and Beyond

- **SNF has been shipped safely in the U.S. by DOE and by private entities for over 40 years**
- **DOE elements at Headquarters and the Field recognize CCTWG has been and will continue to be successful**
- **Every shipment is unique and reveals new opportunities for improvement**
- **Federal agencies continue to undergo bottom-up Safeguards & Security reviews-we expect new ways to work, new interactions**
- **Cooperative planning will enable DOE, States, and Tribes to adapt to changing circumstances**

United States Naval Nuclear Propulsion Program



90,000 TONS OF DIPLOMACY
Anytime, Anywhere



"When word of a crisis breaks out in Washington, it's no accident that the first question that comes to everyone's lips is: 'Where is the nearest carrier?'"

President Bill Clinton

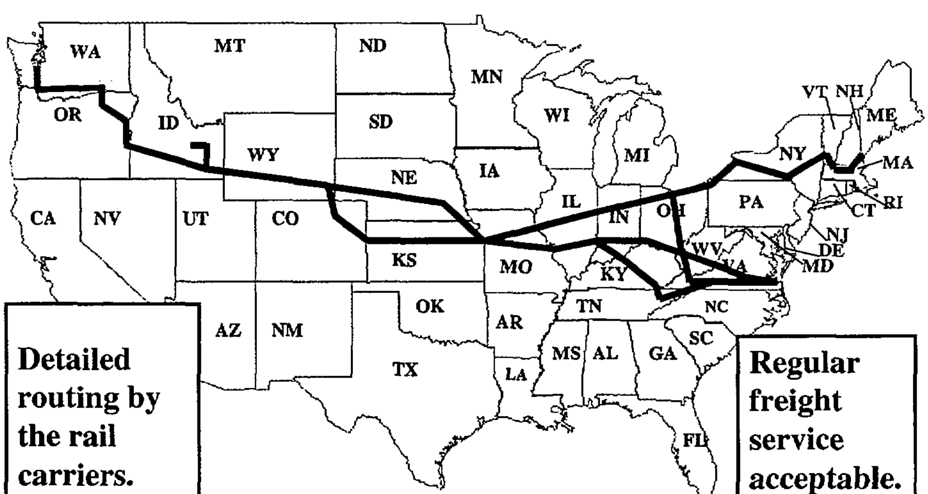
NAVAL SPENT FUEL CYCLE

Upon refueling/defueling, all naval spent fuel is transported by rail to NRF, INEEL for examination to confirm that the fuel operated satisfactorily and to gain information for:

- optimizing the performance of current fuel and reactors

- the design of new fuel designs with improved performance, such as longer lifetimes

TYPICAL NAVAL SPENT FUEL SHIPPING ROUTES



Detailed routing by the rail carriers.

Regular freight service acceptable.

742 CONTAINERS SAFELY SHIPPED
(3/8/57 - 11/20/02)

NAVAL SPENT FUEL SHIPMENTS ARE SAFE

- Nature of the fuel
  - Rugged
- Shipping containers
  - Robust
- Shipping practices
  - Escorts

Very Small Risk - Much Less Than Other Accepted Risks

NAVAL SPENT FUEL CHARACTERISTICS

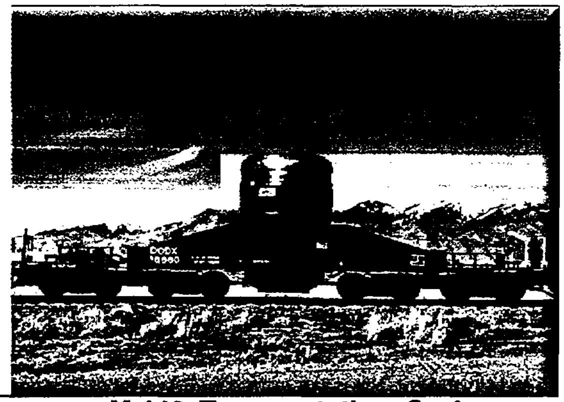
- Solid metallic form - not flammable, not explosive
- Built for combat - battle shock
  - well over 50 g's
- Contains fully all long-lived radioactivity (fission products)
- Safe to operate in close proximity to sailors on warships during combat
- Not RCRA hazardous

Bottom line: Well-suited for safe transport and storage for long periods.

NAVAL SPENT FUEL SHIPPING CONTAINERS

- **RADIATION LEVELS**

Dept. of Trans Limits:	**200 mr/hr on contact 10 mr/hr at 6 feet**
Typical M-140 Levels:	**3 mr/hr on contact . 1 mr/hr at 6 feet**



M-140 Transportation Cask

- **14 INCHES SOLID STAINLESS STEEL**
- **350,000 POUNDS**
- **TYPE B NRC CERTIFIED**

TYPE B SPENT FUEL SHIPPING CONTAINERS

- **Designed, manufactured, and certified to severe accident survival standards**
- **Equivalent of at least 60 foot drop onto reinforced concrete surface**
- **Other sequential accidents including fire, immersion in water and puncture**
- **Engineering performance standards result in very formidable, robust containers**
- **Will survive real world severe accident conditions**
- **Scale model testing and full scale crash demonstrations have confirmed that the design standards are stringent, and the techniques used to analyze the containers are effective**

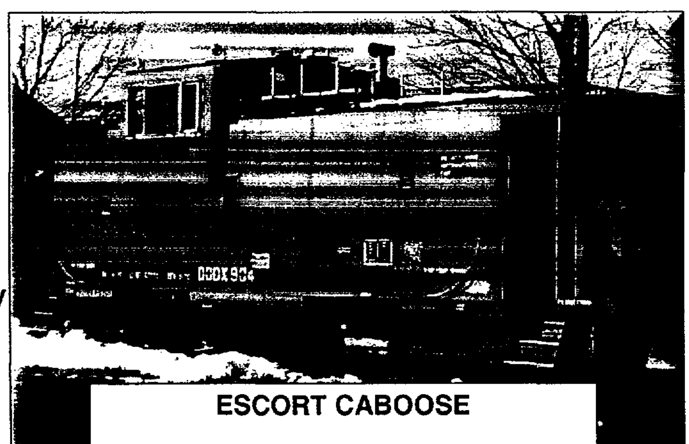
NAVAL SPENT FUEL SHIPPING PRACTICES

BASED ON:

- **Rugged contents, formidable containers - low risk**
- **Efficient operations at reasonable cost**
- **Classified national security shipments**
- **Years of success tempered with flexibility and constant improvement**

NAVAL SPENT FUEL SHIPPING PRACTICES

- **Government-owned railcars, inspected and maintained**
- **Advance arrangements with rail carriers**
- **Location and status constantly monitored - satellite tracking**
- **State liaison, briefings, and emergency response outreach**



ESCORT CABOOSE

➡ **Escorted by specially-trained Navy couriers**
- ♦ **On-board traffic managers**
- ♦ **On-board first responders**

EMERGENCY RESPONSE - ACCIDENT/DERAILMENT

- **Robust shipping containers provide a formidable barrier to release of radioactive material or significant radiation level increase, therefore *EMERGENCY RESPONSE PRIORITIES ARE*:**
  - **Emergency first-aid**
  - **Summon assistance**
  - **Prevent further injury/damage**
  - **Verify radiological condition**

- **Navy couriers assist Incident Commander in:**
  - **Crowd control**
  - **Communications and public information**
  - **Initial response actions, e.g., safety boundaries.**

SECURITY EMERGENCY RESPONSE
(Attempted theft, sabotage, etc.)

- **Do what is necessary to resolve the situation with the following objectives:**
  - Notify security contacts and request assistance
  - Ensure safety of material being shipped
  - Ensure DODX railcars not moved without proper authority
  - Attempt to minimize malicious activity
  - Ensure any attempted theft is identified and thwarted or controlled
  - Ensure the well-being of the Navy couriers is maintained
  - Promote shipment resumption as quickly as possible

- **Railroad police officials have participated in NNPP shipment security emergency exercises; ongoing liaison**

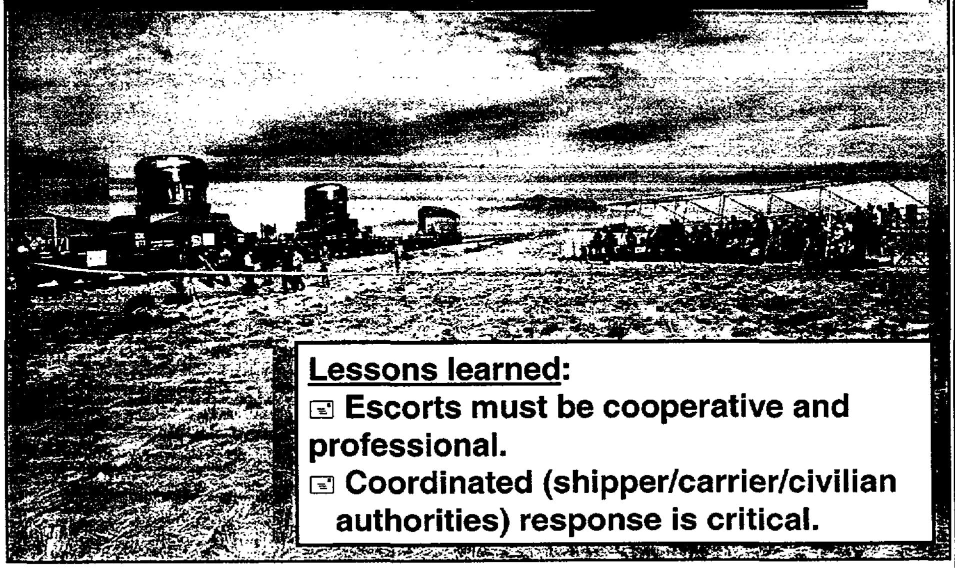
TERRORIST ATTACK

- M-140 container has walls 14 inches thick, stainless steel
- Even a shaped-charge explosive will not cause container to explode since the contents are solid metallic material
  - penetration created would be small
  - amount of radioactivity released would be small
  - absence of fire means no dispersal mechanism
- Thus, consequences of terrorist attack likely to be small

EXERCISE BACKGROUND

- SINCE 1996 EXERCISES ON THE EAST AND WEST COASTS AT SHIPYARDS AND INEEL
- OUTREACH AND EMERGENCY PLANNING FOR NAVY SPENT FUEL SHIPMENTS
- STATE, LOCAL, TRIBAL AND FEDERAL REPRESENTATIVES INTERACT WITH ESCORTS AND EACH OTHER
- OPPORTUNITY TO EXERCISE EMERGENCY RESPONSE, INCLUDING REMOTE COMMUNICATIONS

ACCIDENT EXERCISES



Lessons learned:

- **Escorts must be cooperative and professional.**
- **Coordinated (shipper/carrier/civilian authorities) response is critical.**

SUMMARY OF UTILITY EXPERIENCE

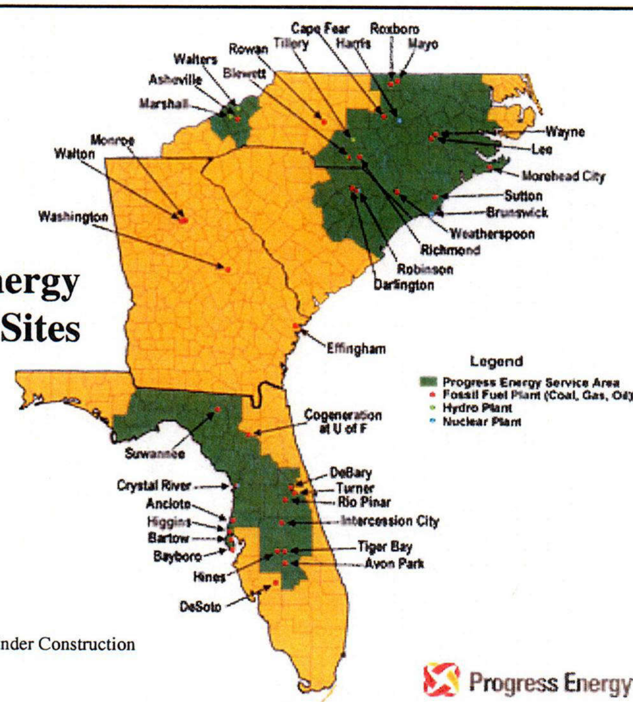
ACNW Transportation Working Group
Rockville, Md.

Bob Kunita

November 20, 2002

Progress Energy

Progress Energy Generation Sites



Includes Operating/Under Construction

2

Progress Energy

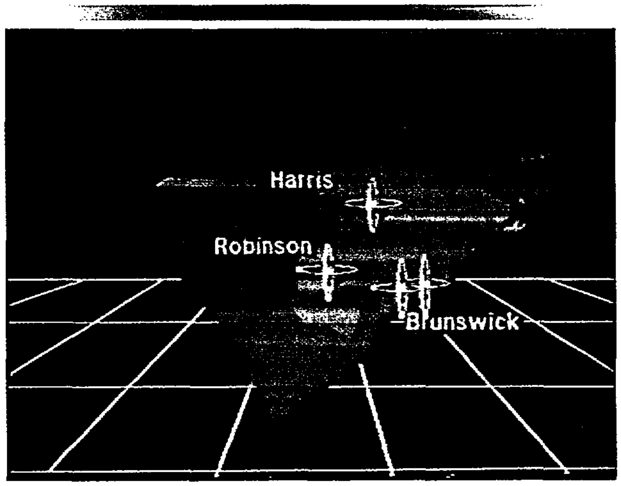
PROGRESS ENERGY REACTORS

	Commercial Operation
Robinson Unit 2 (PWR)	1971
Brunswick Unit 2 (BWR)	1974
Brunswick Unit 1 (BWR)	1977
Crystal River Unit 3 (PWR)	1977
Harris (PWR)	1987

3

Progress Energy

NC / SC NUCLEAR PLANTS



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Progress Energy

POOL CAPACITY EXPANSIONS

- Robinson Unit 2
  - 1976 rack addition
  - 1983 rerack
- Brunswick Units 1 and 2
  - 1977-78 rerack, 1984-87 phased rerack
- Harris
  - 1992, 1997 phased addition of BWR racks
  - 2001 pool C added BWR and PWR racks

5

Progress Energy

SHIPMENT HISTORY

	Years	# Trains	# Miles	# Assemblies
RNP-2 to BNP-1	1977 – 80	23	4,163	160
RNP-2 to BNP-2	1979 – 81	21	3,801	144
RNP-2 to HNP	1990 - present	32	4,224	444
BNP-1 to HNP	1989 - present	46	9,522	1,460
BNP-2 to HNP	1990 - present	37	7,659	1,265
		159	29,369	3,473

6

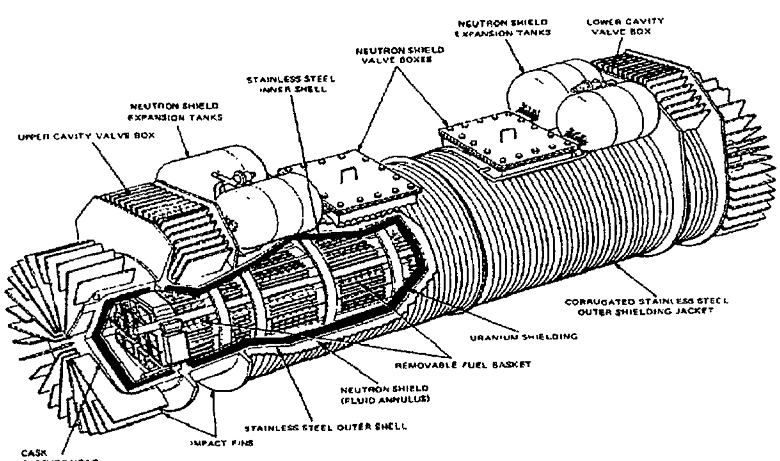
Progress Energy

DETAILED PROCEDURES

- Program
- Interfaces Agreements
- Cask Annual Inspection
- Cask Handling / Loading / Unloading
- Fuel Selection
- Advance Notice
- Routine / Emergency (En route)

Progress Energy

SPENT FUEL SHIPPING CASK

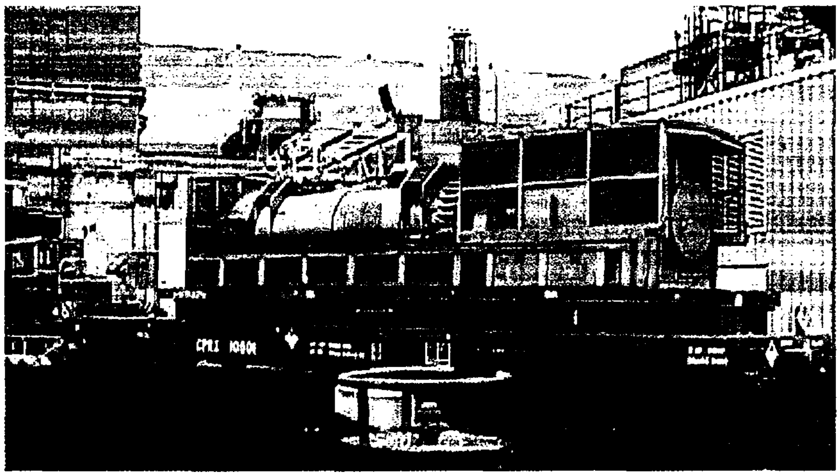


IF-300 Irradiated Fuel Shipping Cask

Progress Energy

41

CASK ON RAILCAR



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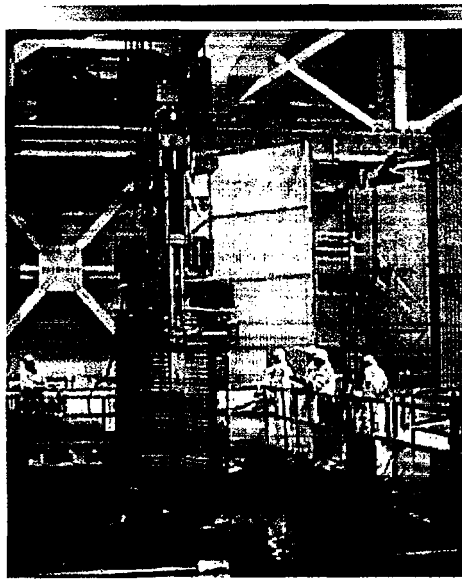
Progress Energy

CASK INTO / OUT OF POOL



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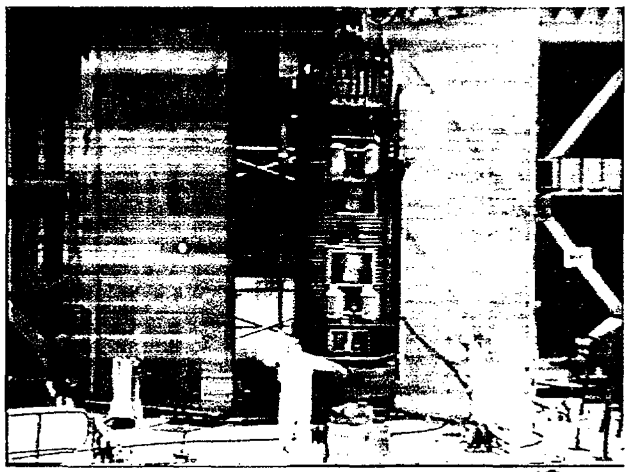
Progress Energy

CASK DECON



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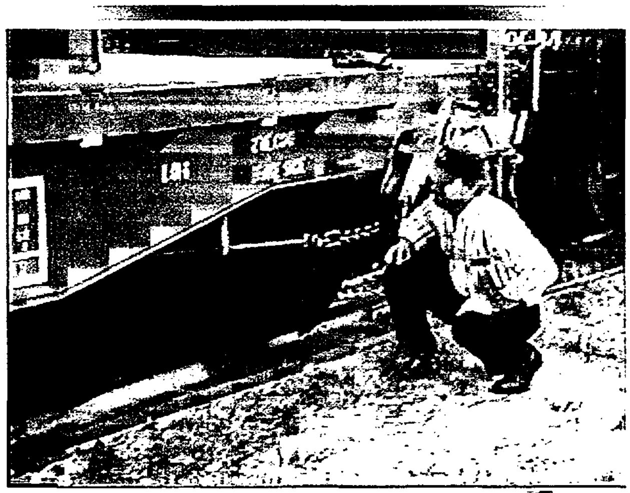
Progress Energy

FRA (US DOT) INSPECTOR



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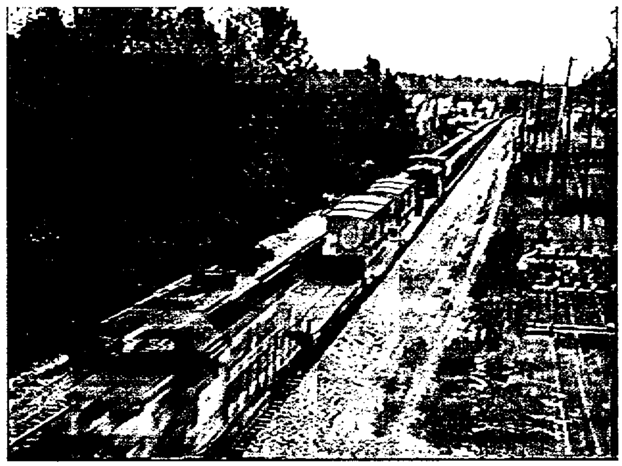
Progress Energy

RAIL SHIPMENT



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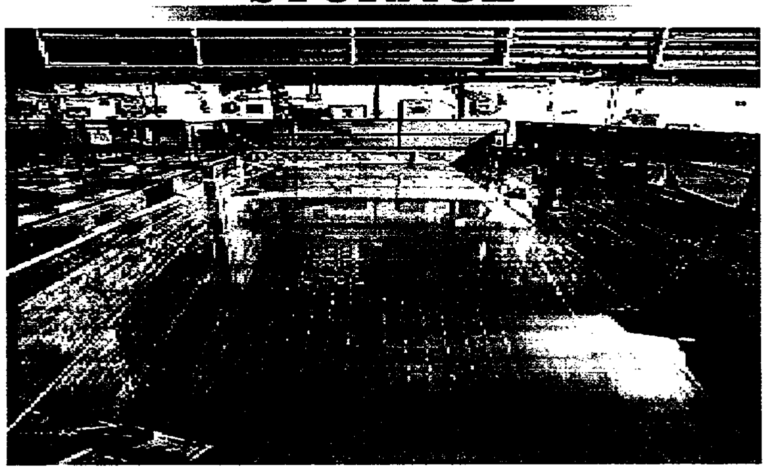
Progress Energy

TEMPORARY POOL STORAGE



14

Progress Energy

SHIPMENT ORGANIZATION

- Shipment Manager
- Shipment Communicator
- Shipment Escorts
  - Senior Escort: radiological expertise
  - Mechanic Escort: working experience on shipping cask
- Plant Response Coordinator & Team
- Response Manager

EMERGENCY RESPONSE INFORMATION

- Shipping Papers
  - Exclusive Use Shipment
  - Label: Radioactive Yellow III
  - Placard: Radioactive
  - Orange Panel: 2918 (loaded) or 2982 (empty)
- Pre-departure Rad Survey Results
  - Escorts have a copy

CASK EXPERIENCE

- Cask Weeping
  - Cesium leaching from surface pores
  - Function of temperature, dew point, etc
  - Caustic decon solutions TSP, Blaze-off, etc
  - Mild critic acid solution solved problem

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CASK EXPERIENCE (Cont.)

- USQ
  - Part 71 vs Part 50 configuration
  - Head not fully secured to body; valve box covers removed
  - Potential doses far below Part 100 site boundary limits
  - NRC IN 99-15
- Seal Surface Machining / Welding
  - Machine body seal surface & head mating (1995)
  - Weld repair gouge / buff scratches (1999)

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CASK EXPERIENCE (Cont.)

- Cocked head recovery
  - Broken head cables (designed to break)
  - Bent guide pins
  - Few studs replaced
- Pool cleaniness
  - Borated pool (PWR plants)
  - BWR fuel crud
  - IN 97-51

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TRANSPORT EXPERIENCE

- Crossing accident (1990)
  - Auto struck locomotive on empty shipment
  - Cosmetic damage to railcar ladder
- Empty cask car derailment (1995)
  - Old unused plant spur; buried ties degraded
  - Car upright but off track

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TRANSPORT EXPERIENCE (cont.)

- Attempted boarding (March 2002)
  - Law enforcement in pursuit of two young individuals from boot camp
  - One boarded shipment flatcar; one failed
  - Departed after escort challenged
  - Four law enforcement vehicles at train in few minutes

21 Progress Energy

TRANSPORT EXPERIENCE (cont.)

- Caboose battery
  - Charged by old friction driven generator / rectifier
  - Generator replaced by diesel generator
  - Backup battery set installed
- Train wheels (Oct-Nov, 1996)
  - Straight plate wheels replaced by curve plate wheels

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TRANSPORT EXPERIENCE (cont.)

- Rail cars inspected
  - 30 days
  - Shop inspection
- Site track inspected
  - Annual
  - UT

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TRANSPORT EXPERIENCE (cont.)

- FRA inspections
  - Shipments inspected by FRA (US DOT)
    - Hazmat Inspector
    - Motive Power Inspector
  - Locomotive inspection
  - Rail car air brake test
    - Leaks at compression fittings
    - Hard piped car airlines

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TRANSPORT EXPERIENCE (cont.)

- When does shipment begin?
  - Decision impacts interface of site emergency plan, HP, security, etc with shipment plan, escort duties, state warning points, etc.
  - NRC / DOT interface
  - Locomotive connects & shipping papers provided to carrier [ANSWER]

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CURRENT PROBLEMS

- High burnup fuel (>45 GwD/Mtu)
  - Need closure (Rx burnup vs store/ship)
  - ISG 11 Rev. 2
  - Robinson rods at ANL
- 10CFR71.13 Previously Approved Packages
  - Allow bootstrap to current regs.
- New Part 71

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Progress Energy

QUESTIONS ??

Progress Energy

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ADVISORY COMMITTEE ON NUCLEAR WASTE
TRANSPORTATION WORKING GROUP
WORKSHOP
NOVEMBER 19 & 20, 2002

International Experience

Ian Hunter
Vice President Transnuclear, Inc

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SCOPE OF PRESENTATION

- > COGEMA TRANSPORT ORGANIZATION
- > SCALE OF OPERATIONS
- > COGEMA CASK FLEET
- > TRANSPORT SAFETY RECORD
- > CHALLENGES AND LESSONS LEARNED
- > CONCLUSIONS

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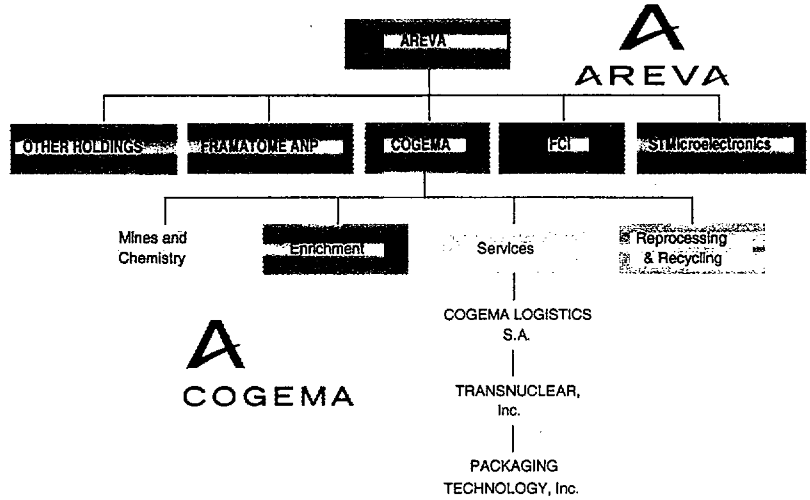
CORPORATE ORGANIZATION



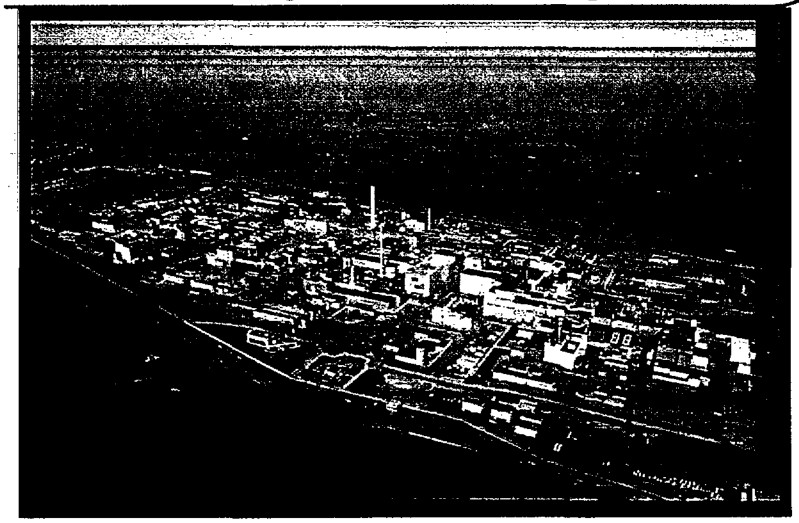
IN 2000, THERE WERE 437 COMMERCIAL NUCLEAR UNITS OPERATING IN 38 COUNTRIES

> Units per country	Nuclear electricity generation
▪ USA 104	20%
▪ France 59*	75%
▪ Japan 53*	36%
▪ UK 33*	29%
▪ Russia 29*	14%
▪ Germany 19*	31%

* Reprocessing generates transports of spent fuel and HLW

> Cumulative worldwide total around 250,000t of spent fuel
- 70% is in some form of interim storage
- 30% has been reprocessed to date (around 75,000t)

COGEMA La Hague Reprocessing Plant



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A COGEMA SPENT FUEL POOL

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COGEMA TRANSPORT EXPERIENCE

- Over 1000 ' back-end ' shipments per year
- 268 shipments of spent fuel and HLW in 2002

Nb of annual transports	1999	2000	2001	2002
French spent fuel	157	191	145	185
European spent fuel	9	12	44	61
Vitrified waste (incl. Japan)	6	11	20	22
PuO2 and MOX (incl. Japan)	150	149	187	175
Low Level Waste	643	684	757	700
Total	**965**	**1047**	**1153**	**1143**

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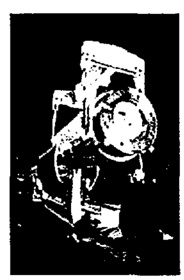
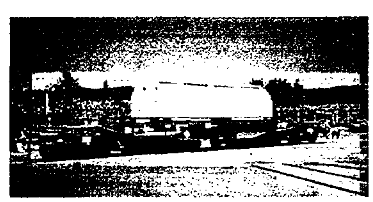
COGEMA LOGISTICS LAND TRANSPORT FLEET

> 50 Heavy Transport Casks



> 10 Special Heavy Haul Trailers



30 Dedicated Railcars

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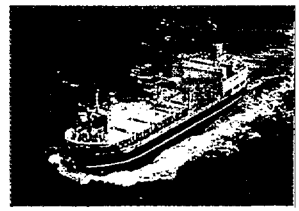
MULTI MODAL TRANSPORTS



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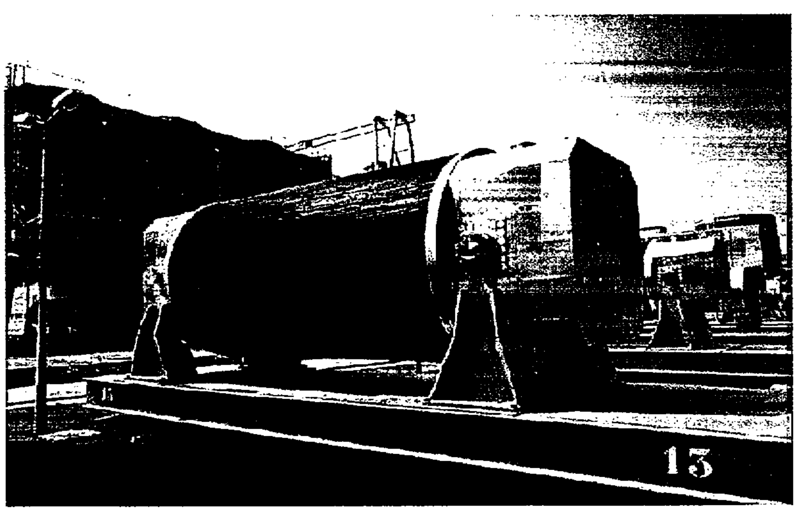
TN 12 SPENT FUEL CASK



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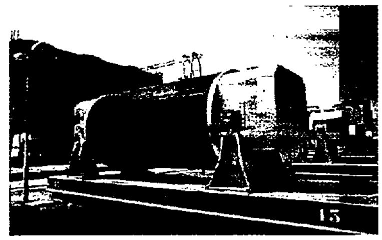
TN 12 CASK FAMILY MAIN FEATURES



> A 100t cask with a capacity of;
  - 12 PWR SFA < 1 year cooling
  - 32 BWR SFA < 1 year cooling
> Forged steel construction
> Removable basket for operational flexibility
> Finned external surface with high heat load capacity
> Stainless steel cladding on all exposed surfaces
> Special features to interface with dry loading facilities

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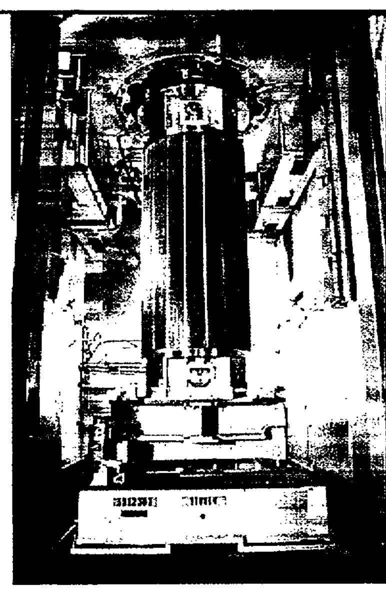
DRY TRANSFERS OF SPENT FUEL



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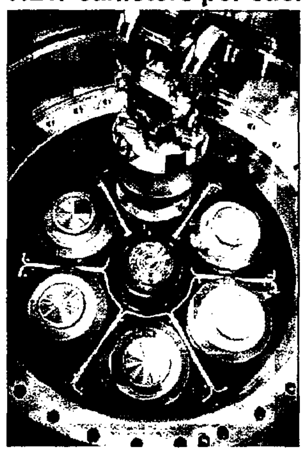
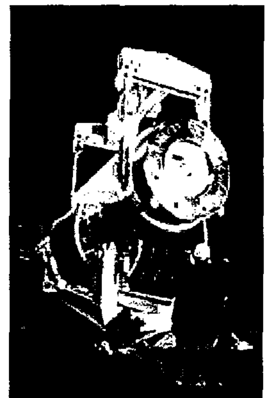
HIGH LEVEL WASTE CASKS

- ❑ Vitrified residues (HLW) are transported in heavy casks
- ❑ Up to 28 HLW canisters per cask

HLW Cask Loading Operations





TN 28 V HLW CASK

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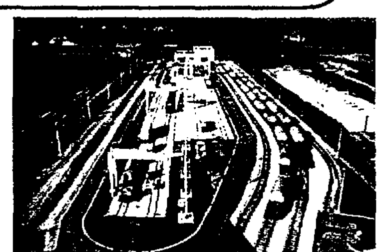
TRANSPORT INFRASTRUCTURE IN FRANCE

- ❑ Two terminals operating at Valognes and Orsan.
  - ✓ Valognes, the world biggest terminal dedicated to the transport of casks.
- ❑ Sea port facility for maritime transports at Cherbourg.
  - ✓ Dedicated crane for heavy casks



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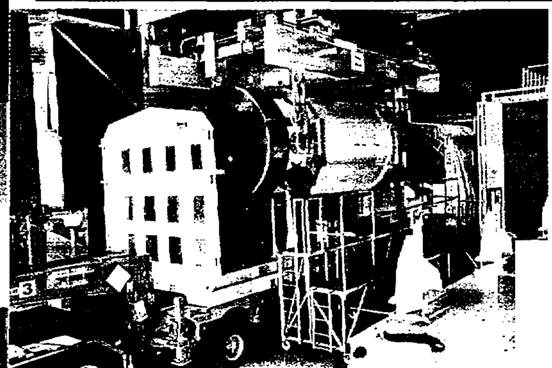
VALOGNES OPERATIONS



TN 52 DUAL PURPOSE
CASK USED FOR
ROUTINE TRANSPORTS

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TRANSPORT SAFETY RECORD

> In over 30 years of international spent fuel and HLW transports, casks have covered millions of miles by truck, rail and sea but there has never been an accident resulting in the release of radioactive contents.

> Traffic accidents have occurred but in most cases the damage was of a minor nature and confined to the vehicle.

> Safety from normal operations has been evaluated and public dose uptake has been shown to be insignificant.(NRPB)

> This safety record demonstrates the adequacy of the international transport regulations.

> The lack of serious accidents does not justify complacency and COGEMA takes a responsible attitude by preparing accident recovery plans.

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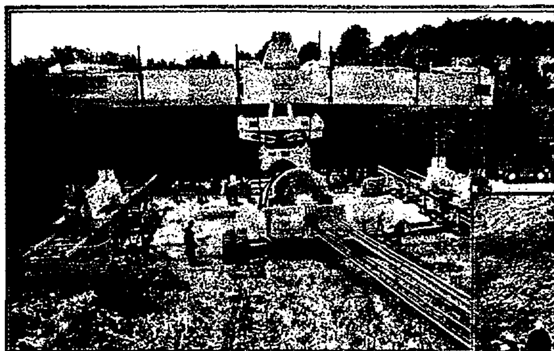
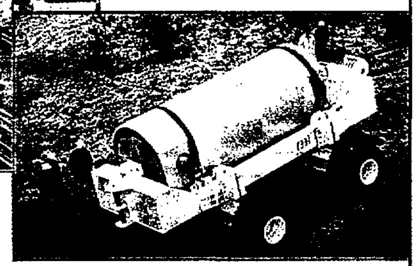
HEAVY CASK ACCIDENT RECOVERY





Emergency response preparations

Equipment designed and tested for recovering 120t casks

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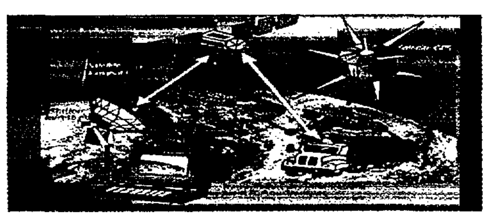
CHALLENGES AND LESSONS LEARNED

> Special maintenance facilities have been developed to keep the cask fleet in pristine condition.

> Logistics demands led to the development of satellite tracking systems.



> Public acceptance is an important issue.

> Even minor technical problems can disrupt transports.

>Contamination problems in 1998

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CONTAMINATION EVENTS

> Regulatory limits for non-fixed contamination on transport casks;
  > 4 Bq/cm2 beta/gamma and low toxicity alpha
  > 0.4 Bq/cm2 for all other alpha emitters
  > Average measurement over 300cm2
> Occasional incidents are well documented.
> In 1998 , frequency of incidents in France led to a temporary cessation of transports.
> Risks to the public were insignificant but 4 EU states collaborated to establish causes and seek remedies.

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LESSONS LEARNED FROM CONTAMINATION INCIDENTS IN 1998

> Monitoring techniques needed to be harmonized for all cask users to achieve consistent contamination checks.
> New techniques were developed to reduce in-pool contamination of cask surfaces.
> Decontamination methods were optimized for both efficiency and reducing operator dose uptake
> Close collaboration was needed with a wide range of agencies
  > Safety Authorities in different countries
  > Health and Safety experts from different utilities
  > Trucking and railway companies, unions

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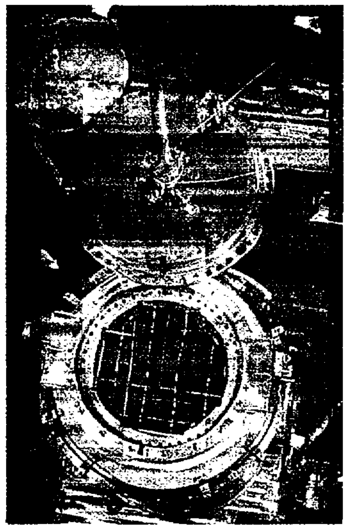
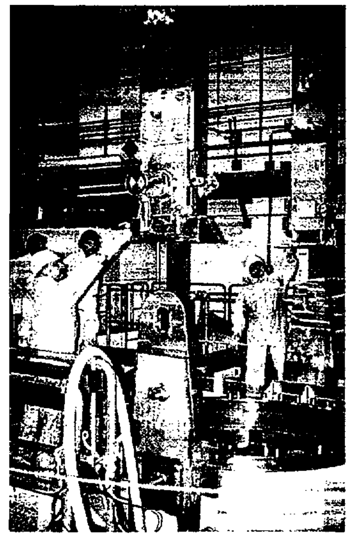
MONITORING CASK OPERATIONS





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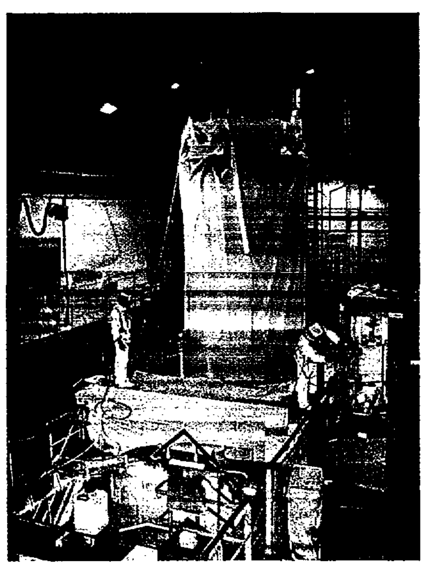
WRAPPING A CASK PRIOR TO POOL IMMERSION



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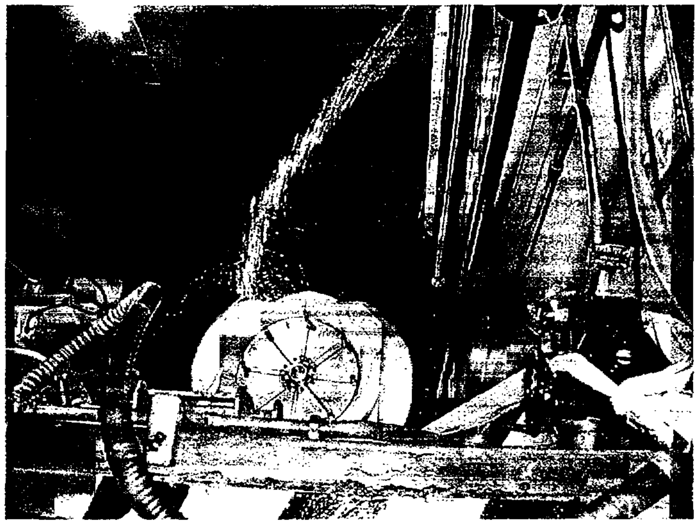
CASK WASHING AFTER LOADING



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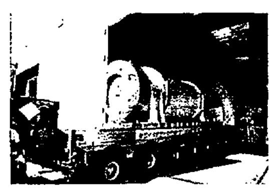
THE COGEMA EXPERIENCE



The COGEMA group has safely transported Spent Fuel from world-wide customers:

30 000 MTHM **over 30 years**

Transportation of Vitrified Residues Canisters (HLW):

900 tons of HLW **(1800 canisters)**

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CONCLUSIONS

COGEMA GROUP EXPERIENCE

> Safe transports can be achieved by careful management of a transportation system.

> Millions of cask miles accumulated without any accident involving the release of the radioactive contents.

> This safety record is impressive but not an excuse for complacency.

> Continued vigilance ensures that high standards are applied to all parts of the transport system.

> Public acceptance is a major issue.

> COGEMA is ready to share this experience with others.

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