Official Transcript of Proceedings

NUCLEAR REGULATORY COMMISSION

ORIGINAL ACNWT-0148

Title: Advisory Committee on Nuclear Waste
127TH ACNW MEETING

Docket Number: (not applicable)

PROCESS USING ADAMS
TEMPLATE: ACRS/ACNW-005

Location: Rockville, Maryland

Date: Thursday, June 21, 2001

Work Order No.: NRC-276

Pages 355-466

NEAL R. GROSS AND CO., INC.
Court Reporters and Transcribers
1323 Rhode Island Avenue, N.W.
Washington, D.C. 20005
(202) 234-4433

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

+ + + + +

ADVISORY COMMITTEE ON NUCLEAR WASTE (ACNW)

127TH MEETING

+ + + + +

THURSDAY,

JUNE 21, 2001

+ + + + +

ROCKVILLE, MARYLAND

+ + + + +

The Advisory Committee met at the Nuclear Regulatory Commission, Two White Flint North, Room T2B3, 11545 Rockville Pike, at 8:30 a.m., Dr. B. John Garrick, Chairman, presiding.

COMMITTEE MEMBERS PRESENT:

B. JOHN GARRICK, Chairman

GEORGE M. HORNSBERGER, Vice Chairman

MILTON N. LEVENSON, Member

RAYMOND G. WYMER, Member

ACNW STAFF PRESENT:

JOHN T. LARKINS, Executive Director-ACRS/ACNW

LYNN DEERING

JAMES E. LYONS

RICHARD K. MAJOR

AMARJIT SINGH

I-N-D-E-X

P-R-O-C-E-E-D-I-N-G-S

(8:30 a.m.)

CHAIRMAN GARRICK: Good morning. The meeting will come to order. This is the third day of the 127th Meeting of the Advisory Committee on Nuclear Waste. My name is John Garrick, Chairman of the ACNW. Other Members of the Committee are George Hornberger, Milt Levenson and Ray Wymer.

During today's meeting the Committee will discuss the Memorandum of Understanding for Cooperation on Multimedia Environmental Models. We will be working on reports and we will be briefed on the Sequoyah Fields planning and procedures.

Jit is the Designated Federal Official for today's initial session. This meeting is being conducted in accordance with the provisions of the Federal Advisory Committee Act. The Committee has not received any comments or requests for time to make oral statements from members of the public. Should anyone wish to do so please make your wishes known to one of the Committee's staff members. And it is requested that the speakers use the microphones, identify themselves and speak clearly.

Okay, I guess unless there's some other opening remarks, our first agenda item today is on the

Memorandum of Understanding for Cooperation on Multimedia Environmental Models. The Committee Member that's been designated as an elitist on this discussion is Ray Wymer, so Ray, we can proceed.

DR. WYMER: I'm really interested in what you have to say. In particular, if it's possible, you might compare and contrast this with the other computer models that have been developed. Some place along the line we'd like to get into that, so please, commence.

MR. OTT: I don't know if we'll be able to do that today, however, in discussing one of the Working Group proposals later on, that might come up. In fact, it's a little premature. What we're talking about today is the very first steps in this particular activity.

I'm William Ott, the Systems Branch Chief of the Radiation Protection, Environmental Risk, and Waste Management Branch in the Office of Research. It's the longest one in the office.

(Slide change.)

MR. OTT: Let me give you a little background on how we got to where we are today. For the past five or six years, there's been a lot of discussion mostly on a one to one basis between a lot

of the federal agencies that are actively involved in trying to model fairly complex environmental systems.

The Department of Energy has a significant responsibility in this area, the Environmental Protection Agency, the Army Corps of Engineers has a significant responsibility with regard to a lot of military sites that have to be cleaned up and not too surprisingly many of these models have very, very much in common, but each one of these agencies has been going off and developing tools to help them do their assessments on their own. There's been the usual collaboration, the usual consultation at scientific meetings and things like that, but there hasn't been a lot of very direct and intense cooperation or coordination on more than in most cases the bilateral basis.

The last couple of years, that has changed with regard to EPA, DOE in which they're both jointly funding some activities to develop some of these complex tools. DOD has also joined in that effort and we have gone into it as well.

In March 2000, a little over a year ago, there was a workshop hosted by the NRC on Environmental Software Systems Compatibility and Linkage." That was held here. In the evening after

one of those sessions, a lot of the scientists that were here and some of the managers got together and they said this has been a really productive meeting. There were many agencies involved. There were members of the private sector involved in that meeting and they said we ought to do something to formalize this arrangement, keep it going and maybe make it stronger.

So out of that there was a recommendation put together, "The relationship between the federal agencies involved should be formalized." And there was also a statement made that "No one agency or group should be in charge of this collaborative effort towards a unified system." The effort needs to be a collaboration of equals. They didn't want a single agency to be driving this thing with somewhat parochial interests.

(Slide change.)

MR. OTT: That got us started and to a certain extent the staff from the Commission, having had a lot of experience in developing bilateral Memorandum of Understandings with the Corps of Engineers -- not the Corps of Engineers, the USGS and the Agricultural Research Service, took a lead to put together a straw man, so we've been intimately involved in the organizing phase of this MOU.

There's been an ad hoc organizing committee which has been primarily consisting of members of the USGS, excuse me, not USGS, EPA, DOE, Corps of Engineers and NRC and about midway through the organizing effort, both the USGS and ARS who are intimately involved with the other agencies in the group found out about it and said this sounds like a real good idea and we want to become involved, so that original group of four agencies grew very quickly to six in the organizing phase.

(Slide change.)

MR. OTT: Of those six agencies, the MOU was first signed in I believe January or February. Since then five of the agencies have signed. The sixth agency is expected to sign next Monday. The first steering committee was held earlier this week and even though we didn't have that sixth signature yet, we wanted to get started, so we scheduled the meeting and we held it this Monday and Tuesday in the auditorium, again hosting it here at the NRC in Rockville.

Again, other organizations have found out what we're doing and they've expressed interest. We've had contacts from the Natural Resources Conservation Service, the National Oceanic and

Atmosphere Administration, Cooperative State Research Education and Extension Service and the Bureau of Reclamation. At least two of those organizations sent members to our steering group meeting on Monday and Tuesday. We had an attendance of about 30 to 35 people all totaled, over the two days of the meeting.

These are the agencies that are currently involved. For the Environmental Protection Agency, Gary Foley, who is the Director of the National Exposures Research Laboratories. He's headquartered in Research Triangle Park, North Carolina and is the Director of four EPA laboratories in different parts of the country, I believe. There's Athens, North Carolina, one in Columbus and a third one out in Colorado, or fourth one.

The U.S. Army Corps of Engineers, Mark Dortch from the Engineering Research and Development Center in Vicksburg, Mississippi, formerly known as the Waterways Experiment Station.

George Leavesley from the Water Resources Division of the U.S.G.S. He's headquartered out in Denver.

Teresa Fryberger from the U.S. Department of Energy from the Office of Research/EM.

Agricultural Research Service, Dale Bucks.

And I'm the member for the NRC.

CHAIRMAN GARRICK: Is there reason that DOD is not represented at the steering committee level?

MR. OTT: DOD is represented by the Corps of Engineers.

CHAIRMAN GARRICK: Oh, okay.

(Slide change.)

MR. OTT: I'm going to very quickly go through the highlights on the MOU just because you've already read it, but there are certain things and I'll point out a couple things that I don't even have in writing here. Most of this is verbatim from the MOU, but bulletized so that I can, you can focus on small bits of words in there that actually have significant meaning.

The purpose is to establish a framework for facilitating cooperation and coordination among the participants in research and development of multimedia environmental models. The focus of this MOU is research and development.

There is specific language in there to avoid entanglements in regulatory issues. Every agency realizes that much of what we do is because we have to make regulatory decisions or some other kind

of decision, but the entanglements between some of these agencies when they start arguing about nuances and policy can be mind numbing. It can hold things up. So we didn't want to get entangled with those kinds of decisions and that affects one of the things that we're recommending in regard to one of the working group proposals later on.

Software and related data bases -- I didn't put it up there. There it is.

(Slide change.)

MR. OTT: You've got this. It includes development, enhancements, applications and assessments of site-specific, generic and process-oriented multimedia environmental models. It is written very broadly.

The impetus for this MOU came out of people talking about linkages and software, but it was concluded by the organizing committee at a very early stage that cooperation in multi-media environmental modeling should be much broader than just looking at linkages, because there's interest in these agencies that correspond over a wide range of interests. So the language in the MOU was made broad deliberately to encourage and facilitate cooperation across a wide range of issues.

How effective we'll be at doing that, I don't know. There's obviously a strong component in the initial organizers and those participating in the first few meetings that are very, very strongly focused on framework models and on the issues that go with databases and quality assurance and quality control, exchanging modules and that kind of thing. But there is also a strong interest in science behind those modules and improving those modules with better science and better understanding of processes. And of course, it's as they pertain to human and environmental risk assessment.

(Slide change.)

MR. OTT: This MOU is intended to provide a mechanism for the cooperating federal agencies to pursue a common technology in multimedia environmental modeling with a shared technical basis. That does not mean we're trying to develop a single model.

There are a lot of people out there that realize the modeling frameworks that have been developed, each have their own particular advantages and while there's a significant benefit from being able to exchange information and even modules between these frameworks, it's probably not achievable to say that one framework is any better than any other

framework.

We would hope that there would be a convergence in technology such that the module available to one are available to all and you may have a nonproliferation of individual modules. People may focus on specific modules that are best for evaluating a given kind of process or a given type of site condition and in that way we will come to this common technology. But that doesn't mean that we'll just necessarily have a single model.

DR. WYMER: Can you give us a sense of what some of the modules might contain?

MR. OTT: We'll discuss that a little bit later. I'll let Ralph address that. I've got representatives for both first two working groups with us here today. When you get to detail, I'll let them chime in.

The cooperating agencies are to seek mutual benefit from our R & D programs and seek to ensure effective exchange of information between staff and contractors.

You and a lot of other people always ask us do we know what's going on in other federal agencies and we always come back with the same answer. We go to meetings. We meet on a bilateral basis and

things like that. And I think it's always unsatisfactory to you and it's probably always unsatisfactory to us. This MOU gives us a much more robust way of putting together groups that across five or six agencies will be knowledgeable of what's going on in specific areas and I think we'll be able to come to you with a much stronger answer about how well we're doing in canvassing for federal agencies and making certain that we are taking consistent approaches and using each other's information and data.

CHAIRMAN GARRICK: Just in passing, Bill, and in the spirit of plain language, I can't imagine a less communicable term than multimedia environmental modeling. Has there been any discussion of that?

MR. OTT: No, as a matter of fact, there hasn't. The people that are --

CHAIRMAN GARRICK: First, it's difficult to understand what it is, and second, it's easy to confuse with something else that's is entirely different, especially if there's interest in the public understanding of what we're doing.

MR. OTT: It will be almost impossible to change at this point.

CHAIRMAN GARRICK: I understand, but I

just wanted to say that in passing is that --

MR. OTT: I appreciate it. I've struggled with it myself in terms of anticipating questions on what do you mean by a multimedia model. How will you define it and it's not an easy question to answer. But the wording is sort of captured in the MOU right now, so we're locked into it.

(Slide change.)

MR. OTT: The R&D programs referred to include development and field applications of a wide variety of software modules, data processing tools, and uncertainty assessment approaches for understanding and predicting contaminant transport processes including the impact of chemical and non-chemical stressors on human and ecological health."

That's probably the closest you're going to come to a comprehensive decision definition of what we mean by multi-media environmental models.

DR. HORNBERGER: And that doesn't say anything about several media.

MR. OTT: Right.

(Laughter.)

(Slide change.)

MR. OTT: The MOU designates point of

contact within each one of the agencies. Those are the people that I've listed before. These are the responsibilities for the points of contact.

DR. WYMER: So this focuses on transport.

MR. OTT: This focuses on what you have to do to assess the risk to the environment or to human populations from contamination and how you get from contamination to making that risk assessment.

DR. WYMER: Now this specifically says transport.

MR. OTT: It says transport, but that's we get to the --

DR. HORNBERGER: But they mean reactive transport. It is transport, but they include biogeochemistry.

MR. OTT: Yes. It's not design to exclude anything. It's designed to be inclusive, rather than exclusive.

DR. WYMER: It's quite different, say from RESRAD, that kind of stuff, wouldn't even be included in this because it doesn't involve transport.

MR. OTT: RESRAD would be included to the extent that number one, Argonne elects to participate and to the extent that Argonne would like to modularize RESRAD to the point that it could be a

contributor to the process.

DR. WYMER: I see.

MR. OTT: Because what we're now talking about is frameworks that have modular components and could exchange those components. And the people that I've talked to are most interested in the final end of RESRAD, the part dose calculation, the health effects model.

The part that leads up to the health effects model in terms of the calculations of transport and things like that are not much more sophisticated than D & D. It's a very, very simple site model and there are multiple versions of RESRAD currently and almost all of them are monolithic. They're not subdividable into pieces. So if Argonne and RESRAD were to become a part of this, there would have to be a decision made at some point to change the approach, the monolithic approach to it. And I"m not certain that DOE or the RESRAD developers want to do that.

That's something that has to be their decision.

(Slide change.)

MR. OTT: The Committee met on Monday and Tuesday. It actually becomes official on next Monday

when the final signature is obtained. But the points of contact have got responsibilities that probably all of us don't appreciate yet in terms of the additional work that it may entail which is promoting technical coordination, identifying programs of mutual interest, identifying funding for those programs, if they're in the interest of the individual agency and I should point out that the MOU is very specific, that it does not commit any resources other than the individuals that are gong to service on the Steering Committee. Everything that is done after that is because it's in the mutual interest of the federal agencies to participate.

If they decide to allocate funds, it's because they see a benefit from putting funds into a given project. If they put FTEs into it, it's because they determine that FTE should be expended towards achieving the goal of the working group. And there's no guarantee that in any given effort all the agencies will participate. So there are a lot of nuances in there that were done to get cooperation because it becomes much more difficult, as soon as you start committing agencies to funds and resources in years beyond the present year.

We're supposed to assist in arranging for

supplementary interagency agreements, facilitate the coordination and exchange of R & D data and serve as members of a steering committee.

(Slide change.)

MR. OTT: The purchase of the steering committee. This will end my going through the text. That's the purpose as stated in the MOU. Coordinate joint research efforts under the MOU. That's the responsibility of the steering committee.

(Slide change.)

MR. OTT: Now I'd like to go into what we did on Monday and Tuesday. And I believe we sent the agenda to you. I know Lynn and Andy got copies of the agenda. As the first meeting, we thought it would be appropriate for the agencies to make presentations on what their programs consist of and as I'll repeat here, there was still a very strong focus on multimedia frameworks, the things like frames and MMS and MIMS and all these acronyms that we've got a list of in here which are large systems that allow the interchange of modules and layering of systems and so that you can develop very site specific models from a fairly genetic set of process modules.

We did the same thing in that meeting that I just did here. We went through this list of

highlights. Unfortunately, my computer crashed on Monday night, so I did it without having vu-graphs. Then there were presentations by each participant on their program objectives and plans. They were focused on modular framework activities.

The USGS talked about their Modular Modeling System. The ARS talked about the Object Modeling System that's been jointly developed between the ARC, the NNRCS and the USGS. The Army talked about the ARAMS which is the Army Risk Assessment Modeling System and their Land Management System. The Land Management System is just one of a system they call XMS. There's Groundwater Management System, Surface Water Management System, the Land Management System and they lump them all together and call them XMS, but there's GMS, LMS and SMS. And EPA talked about 3MRA-HWIR and MIMS.

The last discussion was with regard to what is being done by four of the agencies right now, DOE, EPA and the Corps of Engineers, with advice and consultation from NRC. That's on FRAMES. FRAMES is where we have elected at this time to put our resources to replace the effort that we had going forward previously on SEDS.

DR. WYMER: What's FRAMES?

MR. OTT: FRAMES is the PNNL framework for doing modular modeling. It includes the MEPAS model for health effects and Ralph could give you a lot more detail on what's in FRAMES.

We don't have a contract with PNNL on FRAMES yet. We expect to have something in in the next fiscal year.

We discussed the proceedings of the March workshop that I referred to before. That workshop, the proceedings are in draft form. We expect them to be published in I guess a month to 6 weeks. When the Windows proceedings are published, we'll get a copy to the Committee. Gene Whalen made a presentation on it. The proceedings has not been scrubbed. It's very, very faithful to the contributions to the workshop from each one of the individual participants. Each one's contribution is reproduced as it was received aside from minor editorial corrections. There was no attempt made to alter the technical content of any of that work.

(Slide change.)

MR. OTT: There were two working group proposals discussed. The coordinating, the organizing committee decided that fairly early on that working groups would be probably the primary working element

under this MOU and we decided if we were going to have working groups we were going to have some kind of a standard format for proposals. So we drafted a format and very soon got reaction back that this should be a two-stage process because the proposals are coming from one or two individuals and we decided that the final proposal for a working group ought to be a working group product.

So what we have is the -- a Phase I process that puts forward a concept, identifies an area where the agency are each doing their own thing and there would be significant benefit from cooperation and coordination. And they put together their ideas in some kind of an indication of where they think this should go and bring it to the steering committee and the steering committee then decides whether they want to go forward with the working group and if they do, then the working group is comprised of a larger number of people representing all those that are interested from the participating agencies. And they will put together a Phase II proposal which will be a firm description of where the working group thinks it can go over the period of the MOU.

So we had two proposals, two Phase II proposals advanced, one on software system design and

implementation for environmental modeling. This again follows very closely on that March 2000 workshop. It's still talking about software and linkages and how we make these models talk to each other.

The primary proposer in this case was Gerry Laniak from EPA-Athens, Ralph Cady is going to be our participant in that working group.

The second one was on uncertainty and risk analysis. George Leavesley was the proposer. Tom Nicholson -- actually, George Leavesley and Tom are joint proposers on that one.

And this is the one where the difference in concepts between -- on risk between the agencies was considered to be something that we didn't want to get bogged down in. We knew that they needed, each of the agencies needs a certain amount of information to do their risk assessments, but each of the agencies quite often interpret risk differently and we don't want to get into the regulatory dialogue that might accompany that problem. We want to stay with the technical side of it in terms of providing all the information up to the risk assessment.

CHAIRMAN GARRICK: Did you find some agencies that resisted risk analysis period?

MR. OTT: We had actually nobody saying

that they objected to risk analysis, only that -- there was acknowledgement that they don't all treat risk the same way. And everybody agreed that it would be confusing and probably delay progress if they tried to do anything about standardizing an approach to risk.

CHAIRMAN GARRICK: Right.

MR. OTT: So we backed off of that. And that will be in instructions that we send to them. We discussed EPA concerns on peer review and QA/QC.

Very early in the signing process, EPA expressed very strong reservations about the EPA because they thought that the peer review and QA/QC statements in the MOU were not substantive enough. There was a concern amongst the organizers originally that the USGS, Corps of Engineers, NRC, EPA, all have their own peer review and QA/QC procedures.

And we wanted to make certain -- we felt that if we tried to change those in the context of the MOU that we would get severe reaction from any number of agencies unless a given individual agency's view prevailed. So we elected to adopt a fairly general attitude of each agency will continue to do its own.

EPA wanted something stronger because EPA has had troubles with their Science Advisory Board

over QA/QC and peer review procedures for products out of their research program. So this was a concern of theirs from the very beginning and one of the conditions of getting EPA to sign the MOU was that we would consider doing something as a steering group with regard to peer review and QA/QC. So that that was the motivation for the discussion on peer review QA/QC and I'll tell you in a moment what we decided to do about it.

We discussed a bunch of administrative issues, organization of committee, frequency of meetings, how to deal with request to join.

(Slide change.)

MR. OTT: What did we do? The first thing we tried to do in order to make the meeting more palatable for those who were really only interested in doing, listening to the technical side of it and didn't want to deal with the business aspects was he had a business session Monday evening, which was not as well attended as the general session. But anyway, these are the things that we did. And some of this stuff is purely administrative.

In keeping with this idea of not having one particular agency in the lead, we adopted the approach of a rotating chair. We're going to rotate

the chairmanship of the steering committee in the same order in which the agency signed it. Since the NRC signed it first, we are the first chair and I will serve as chairman through December of this year. We will center the service of the chairman on the annual meeting. The MOU requires an annual meeting of the steering committee. And in December, I will turn over the chairmanship to Gary Foley from EPA. Next December, he'll turn it over to one of the other agencies and so on through the process.

The steering committee will meet at least semi-annually, primarily because we have an annual meeting and six months after the annual meeting we have to change chairmen, so it sounds reasonable to have a meeting when we change the chairman.

All those meetings except the annual meeting, we will try to do a telecon. There's a statement in the MOU that the agency should try to make maximum use of electronic communication to try to facilitate this without having to get people all together and travel all over the place. So we're going to see if we can do that. It worked very well with the organizing committee.

We were having telecoms about every two weeks at one point, every two to three weeks and

discussing what was happening in the agencies, assigning procedure, the agenda for the upcoming steering committee meeting. These lasted about an hour. Were usually very productive and it was working very well. Gary Foley from EPA expressed the concern that semi-annually wasn't often enough, especially at the beginning of the MOU, so I said okay, Gary, you and I for the first year can agree to hold meetings quarterly. So we will at least meet quarterly or as needed, which means if something comes up we need to address, then the Chairman will schedule another telecom and we'll deal with it.

Because we've had all that interest from other agencies, because of the way these MOUs are done, if another agency comes in, all of a sudden we have to put together an amendment to the MOU and send it back to the people that signed it to begin with and every time that happened we have to go back for another signature. At least four different agencies talking about coming to us to join, we decided to put together an amendment to the MOU that would allow the steering committee itself to accept additional participants. So we're going to circulate that to the original signers and hopefully after that all we have to do is get a petition or an application from another

federal agency and the steering committee can vote on it and the chairman can sign it and the other agencies can sign it and we're gone. So we did that in the interest of efficiency.

DR. WYMER: I see that this is an inter-agency thing, but is there any consideration to given to foreign participation, those people know a few things too.

MR. OTT: Foreign? There's interest in not only the international, but in the private sector. What we have to worry about is the Federal Advisory Committee Act, so we will welcome participation, but as consultants and advisors and that kind of thing. I don't think that will be a problem, but we hope to get a larger group of technical experts involved from that perspective.

And that sort of leads into this next one, because --

MR. LARKINS: If it's all government employees, it's less of a problem with FACA than if you bring in outsiders.

DR. WYMER: Yes, I see.

MR. OTT: And the working groups will all be required to be only federal employees, but they'll be permitted to have consultants and advisors that are

non-federal employees. That's how we're going to deal with that.

(Slide change.)

MR. OTT: We're going to form an ad hoc group and this one, each of the agencies has agreed to provide a participant for to work on a position statement for the steering group on QA/QC. There was significant resistance to amending the MOU with regard to peer review and QA/QC. So we decided that we'd put together a group and see if we could put together a 1 to 2-page statement discussing peer review and QA/QC. EPA had proposed an amendment, but -- an addendum, but that was not received well by the majority of the members of the steering committee.

Both of the working group proposals were approved, both of them with minor reservations. The one from Gerry Laniak on software system design and implementation was considered to be so broad that it was not--

CHAIRMAN GARRICK: Bill, this is not that we don't like you.

MR. OTT: I understand.

(Drs. Garrick and Hornberger leave for another meeting with Chairman Meserve.)

MR. OTT: The Chairman always come first.

Was considered to be too broad, so we requested that the working group focus and prioritize when they prepare their Phase II proposal.

The working group proposal for uncertain and risk analysis, there was some discussion of this problem on the way individual agencies treat risk and it was decided to approve the Phase I proposal, but that risk be treated as the reason for doing this work, not as something to be debated. So the risk focus will be as a we need to provide this for risk and the discussions will be what we need to do risk, not how to harmonize the various treatments of risk between the agencies.

And they suggested that retitling the Phase II proposal might be appropriate in terms of something like uncertainty and estimation techniques.

(Slide change.)

MR. OTT: Now the next two pages actually go into what's in these two working group proposals in a little bit more detail, not in the same detail as what I provided to the Committee.

Let me point out that these are draft proposals right now, so I did not make them available to the public. The vu-graphs, the part that's here is available out there.

What I did here was excerpt some statements out of the proposal to give you a flavor of what's in them.

(Slide change.)

MR. OTT: The proposal on software system design is addressing design and specification of extensible scheme and if you had problems with multi-media, you might have trouble with extensible scheme as well, for the exchange of data and results between multi-medium, multi-pathway modeling components, thus supporting component of framework interoperability and sharing of components and frameworks. Basically, that means the interchangeability of modules and data.

And one of the primary issues with that interoperability and interchangeability is QA and QC and tracking the pedigree of the data, tracking the pedigree of the analytical techniques.

(Slide change.)

MR. OTT: The areas in system software design that could be included and this is why the Committee decided that this particular working group might be biting off more than it could chew, included GIS linkage, conceptual modeling tools, visualization tools, flexible database connectivity, component

software testing and QA, framework testing and QA, uncertainty analysis tools and analysis reporting tools.

(Slide change.)

MR. OTT: The second working group proposal was uncertainty and risk analysis. And while I know it's been a very strong concern of this agency, and in the Office of Research and to a certain extent MNSS for a number of years, it appears to be coming more important to other agencies out there as well, particularly as they start going from point estimates of parameter and using distributions and looking at the distribution of results.

The goal here was to develop a common understanding of various ways to address uncertainty by identifying, evaluation and comparing sets of existing tools for assessing uncertainty and risk within multimedia environmental model applications. Evaluate newly developed techniques such as the UUCODE developed by Dr. Mary Hill and others; MOCOM developed by Drs. Hoshin Gupta and Louis Bastidas and the GLUE code developed by Drs. Keith Beven and Jim Freer for parameter estimation and uncertain analysis.

(Slide change.)

MR. OTT: Develop parameter estimation

methodologies for use with available digital databases. Establish the degree of applicability to all multimedia models and proposed steps for enhancing general applicability.

(Slide change.)

MR. OTT: As we just approved those two working groups Monday night and we don't have all the people together yet, but I will say that after this -- I'm missing a vu-graph. That's all right.

The last vu-graph only has four words on it. It says opportunity and opportunity was a word that was used a number of times at the meeting. A lot of the people there see this an opportunity that they haven't had before of collaboration with people. Cooperation and coordination are two things that have been lacking in this area for a number of years.

The MOU now gives us a mechanism for ensuring cooperation and coordination and provides an opportunity far beyond that which was envisaged in the March 2000 workshop. In that workshop, we were talking primarily about this linkage of interchange, but in broadening the concept of this MOU, we have provided an opportunity which is much broader than that. And I would hope that would have cooperation in a number of the science-based areas as well.

Of the two working group proposals we have one which is science based in terms of the uncertainty and risk assessment approach and the other one which is technology based in terms of looking at the frameworks and the interchangeability and linkages and the interoperability of the models.

Everybody came away from the meeting saying there are exciting possibilities here. There was a lot of enthusiasm at the meeting. We've had a lot of enthusiasm. I did have it. I'm sorry.

There's been a lot of enthusiasm within our office for the last 6 months. There's been enthusiasm that's been evident on the organizing committee and the telecons. And there was enthusiasm evident in that room and there were a lot of people there that haven't bene part of the organizing process.

And there were people there from other parts of the agencies. There were some negatives. But the negatives were from people that were concerned about you might say protecting their particular bailiwick because when you do this, you're opening the doors to anybody to get access to your models and if you're trying to sell them, you suddenly start to worry that you're affecting your economic viability

and you're worried about other people taking your module and misusing it and essentially affecting its reputation in the public.

DR. WYMER: There's a certain aspect of professional anonymity involved too.

MR. OTT: Right. So there were concerns expressed, but there were far more optimism and far more excitement expressed than there was concern and there was some of the people out there in the audience and we tried to get maximum participation of everybody, not just the steering group and people in the audience were rising to defend the concept and say how valuable they thought it was.

So we're kind of excited. It's the very, very first step in a fairly long road, but we were so excited about it, we wanted to come and give you guys a bird's eye view of what we're doing.

DR. WYMER: Well, we appreciate that. It's a big, big thing, Bill.

MR. OTT: It is. There's no question that it's a big thing. But these agencies are out there doing this and they're doing it independently and these systems don't talk to each other. There are databases that USGS has that would be invaluable to these other agencies. There are modeling capabilities

at USGS. Modeling capabilities that the Corps of Engineers has that we weren't particularly aware of up until a year ago and their capabilities extend to computational tools for preparing environmental impact statements, in terms of doing a broad range of assessments, habitat assessment, standard pollution assessment.

One thing you could say about it is from NRC's perspective, we may be the tail wagging the dog. We're probably the smallest agency involved with the least amount of resources and the most narrowly focused interest in terms of radiation protection.

Two of the other agencies both the Department of Energy and the Environmental Protective Agency also have a radiation interest. But they also have enormous interest in nonradioactive pollutants. And there's a tremendous amount of capability out there just looking at assessing nonradioactive pollutants and as this agency becomes more active in assessing new sites for new activities, for instance, if the reactor program does reinvigorate and we have to start doing substantive impact statements on new sites, then things like the capability that the ARAMS system and the XMS system has with the Corps of Engineers might be a significant benefit to this

agency in terms of the preparation of environmental impact statements.

DR. WYMER: One of the things that comes to mind is from the point of view of the NRC specifically. The question comes up to my mind, at least of what would be the applicability of something like this, the results that come out of something like this to evaluating something like DOE's modeling efforts in the Yucca Mountain repository and will anything come out of it soon enough to be of any use?

MR. OTT: Well, there are a lot of different time frames involved with Yucca Mountain.

DR. WYMER: That certainly is true.

MR. OTT: So there are certain -- some of those time frames we certainly would have results that would be of value, but I sat in last week on the meeting between the NWTRB and the Commission in which they were reiterating their latest annual report on the Yucca Mountain program. And one of their focuses was again uncertainty analysis in the TSPA.

DR. WYMER: Absolutely.

MR. OTT: And the work that we're proposing to do on uncertain analysis and parameter estimation techniques, I would think would be extremely relevant to their concerns. Their concerns

in the high level waste program concerns. I would hope that eventually they would get involved in cooperating with us as a part of this entire effort.

In terms of whether other parts of the program will become of value, it all depends on whether we get as much enthusiasm from other segments as we have from the technology based part of the program.

I have spoken with our USGS contractors in the area of geochemical modeling and suggested that since chemical effects in the near field are a significant factor, not only for radionuclides, but for nonradioactive pollutants, things like heavy metals and those kinds of contaminants, that this might be a very appropriate topic for a working group in terms of figuring out ways of working a more robust treatment of chemical effects into these multimedia models.

DR. WYMER: With something like this, I think it's obvious it's going to get big and therefore ponderous. It will be complex. Is there any thought given to setting it up right at the outset so that it can -- so that a simple -- so it can be used in a graded way, simply so that you don't have to go through the whole complexity of what will eventually

come out.

MR. OTT: It's difficult to say that we've consciously done that. I think the way that we have organized it in terms of working groups, the committee itself, when we reviewed the two working group proposals were very concerned about the feasibility of the proposals and putting it together as a Phase I and Phase II process in terms of concept and then getting a working group together to actually define it and prioritize it, I think will help us make certain that what the working groups attempt to do is feasible.

The steering committee itself is supposed to be a coordinator. I hope that we won't be an impediment. We want to facilitate and help these groups of collaborators to get together and have a reason, a justification for this collaboration. The MOU gives us that and the more people that find out about it, the better and if they go through the steering committee, I think the steering committee will attempt to make certain that the working groups themselves have doable functional statements.

DR. WYMER: There's a very broad -- I'm stating the obvious, but there's a broad spectrum of applications of something like this from the very quite simple to the very complex.

One of the things that is sort of an analogous situation to come out in connection with decontamination and decommissioning activities, that is the SRPs are written in such a way that they cover all possible cases and some of the meetings I've been in where the users have made their comments and say you know, it's complex, how do we -- what part do we use or how do we use it? Do we have to use the whole darn thing or can we use a stripped down version or just what in the world is expected of us. And I think the same thing is going to come up here. And I just wondered if you'd paid attention to that.

MR. OTT: I think it's fairly clear that the concern that's being addressed here is the complex situations. I think when you look at codes like D and D and RESRAD, we as an agency recognize that there are a lot of cases out there that don't require this kind of effort. It's when the site gets large and complex, when the contaminant becomes complex, when it's either distributed non-homogeneously over a significant area or through a significant volume. That's when all of a sudden you start needing very sophisticated techniques to do the analyses.

I think that most people would agree that we have tools to handle the simple situations. And I

would hope that the people that come in with simple situations will continue to be directed to the simple tools.

DR. WYMER: I was going to note as perhaps you need some sort of selection of criteria for the level of tool.

MR. OTT: I would hope that -- I thought that the Standard Review Plan was going to address that in terms of an iterative process and let's start simple and not get complex unless we really have to.

DR. WYMER: One other thing. What is FRAMES?

MR. CADY: I'm Ralph Cady in the Office of Research. FRAMES stands for Framework for Risk Analysis in Multimedia Environmental Systems and it is a framework for linking together individual models of individual media. Now by media, air pathway, air would be one media; groundwater, service water would be other individual media.

DR. WYMER: When you say risk analysis you mean everything that inputs the risk analysis?

MR. CADY: Correct. And so it's a framework for linking individual models for individual components for in this analysis.

DR. WYMER: It's a structure that these

things fit into.

MR. CADY: Correct.

DR. WYMER: That helps a lot.

MR. CADY: Whereas D and D and RESRAD, it's one homogenous model. They're not distinct components and within FRAMES, you would have distinct components, one air pathway model. One groundwater model. So on and so forth and within those, you might select from a series of air pathway models.

And this framework would allow the linkage between the air pathway to the human exposure and so on.

MR. LEVENSON: Let me just follow up on that. Does this question from ignorance, does FRAMES specify what has to be in a model or a module before you would accept it and the context of the question is could I use FRAMES to put together four or five modules, a couple of which have conservation of mass internal to the module and some which do not? Or does FRAMES control that kind of a problem?

MR. CADY: FRAMES itself does not. FRAMES does not require anything about the individual models. If you were foolish enough to put a model that's not as conservative into FRAMES and it allows that flexibility, you could do that. It's not the

developers of FRAMES' responsibility to put the models in. A user can put them in. So you can come up with all sorts of unrealistic models potentially.

Hopefully, we will establish a pedigree, the sorts of things that we envision in there, and so we might have a suite a models that are NRC models and most likely they'll be similar to DOD and DOE and EPA models, but there's nothing to say that a general user out there couldn't put a model that's not as conservative into the system. Essentially, what FRAMES does is essentially it's the connections between models that is controlled by FRAMES. So as long as a model produces data or results compatible with other models in the system, then it could be plugged in

DR. WYMER: Well, the FRAMES is really very descriptive of what it is.

MR. CADY: Correct.

MR. OTT: But there is a significance concern within the community that any component or module that's used be properly pedigreed. In other words, that you know whether it conserves mass or conserves --

DR. WYMER: It's the QA/QC.

MR. OTT: It's the QA/QC issue, right.

And that's one of the things that's a very real concern for all the developers is when they talk about interoperability models, they're also talking about knowing the pedigree about the models and the data, because each independently is important.

DR. WYMER: What is meant by peer review? How will that function?

MR. OTT: It was interesting. In Gary Foley's statement, he very clearly indicated that there's a degree of independence associated with peer review and EPA's concept and there were people that were talking about the QA/QC and peer issue and they were saying well, peer review has to be something that we do all along the way.

And I think in the end, everybody realized, there are two aspects to peer review. There is a peer review aspect that needs to be done along the way in terms of consulting with other experts and stuff. But in the final analysis, you need to go out and get somebody that hasn't been involved with it to do the peer review.

DR. WYMER: Exactly.

MR. OTT: So that concept is there. It's acknowledged. And I'm certain that it will come into the position that is adapted by the steering group

after this ad hoc group gets a chance to sit down and look at the peer review and Qa/QC question.

DR. WYMER: I would hope that we would be able, if the MOU becomes broad enough in terms of the other agencies that we might be able to work out something with say the National Academy to have an interest in performing a peer review function.

MR. OTT: Yes, they did report a while back on peer review within the Department on Energy and so there's some background on that.

You have a dispute resolution --

DR. WYMER: Not yet, we haven't had any disputes, -- well, we did have a dispute to resolve on the QA/QC, but we don't have any specific dispute resolution function. We did discuss whether we wanted to lower the bar for approval of working group proposals. And we did. We lowered it to majority of the members of the steering committee. So as long as four of the participating agency representatives think a given working group proposal is a good idea, it will be approved by the steering group.

Everything else that we did and I assume everything else that we do in the future right now is being done unanimously, and we did approve those two working groups unanimously. There were no dissenters

in anything that we did in the future.

I wouldn't count on it being true in the indefinite future either, but I was surprised. I was expecting EPA to be a little less enthusiastic than they were because of the problems that we had on QA/QC, but they were extremely enthusiastic and it came up afterwards and we're talking about Tom Nicholson about the next phases and that kind of thing and meting next year and I think EPA is going to be a very strong partner in this.

Tony Wolbarst was there both days of the meeting. He's not part of the research side of EPA. He's part of radiation regulatory side of it. He at one time was hoping to do one of the jobs that he wants done and we've been very careful to say that we're not going to do that.

He has a concept called MARMOD-MARPAR which is something that he has discussed with our Deputy Executive for Operations which is a way of harmonizing the positions of EPA, DOE and NRC from a regulatory perspective on the kinds of models that ought to be used and that kind of thing.

They have backed off on their desire of trying to do this for models and are now focusing on being able to do it for parameters, which is probably

much more doable for parameters, which is probably much more doable. They have to define those parameters in terms of scenarios which might be under consideration and there was some discussion of this the other day and I made the observation. Somebody was saying this is MARMOD and this is -- we said no, it's not MARMOD.

And I said this may allow MARMOD. I said if we are successful in this MOU, MARMOD may be possible. If we aren't successful in this MOU, MARMOD is not possible. If the science can't get together and converge, then there's no way the regulators are going to get together and converge.

DR. WYMER: That's for sure.

MR. LEVENSON: Yeah, I've got one comment and a couple of questions. My comment is I think that we really don't need to ask Bill whether the results will be available in time to help with Yucca Mountain since Yucca Mountain's period of compliance is 10,000 years.

(Laughter.)

DR. WYMER: Well, the heat is turned down a good deal after the first 10 or 15.

Two questions, one of which is a very simple one. Has there been discussion in this context

of doing something that may be almost equally important and that is sharing the databases.

MR. OTT: Yes, databases are a part of this effort.

MR. LEVENSON: They are a part of the effort.

DR. WYMER: I think you mentioned that actually.

MR. OTT: It's actually in the MOU that databases are part of this cooperation/coordination.

MR. LEVENSON: The second is somewhat a more complex question because on this kind of an issue I don't have much faith that QA/QC does anything and that is setting the standards in the following context, QA/QC generally makes sure that what you do conforms the specifications. If I specify I need a pressure vessel for 250 psi, QA/QC can assure that that vessel meets that, but it does nothing if, in fact, I really should have had a 500 psi pressure vessel.

And so my question is as part of this activity, is there going to be an effort to identify what should be the minimum contents and I'll get back to my broken record point because for instance in the TSPA some of the modules have conservation of mass,

conservation of energy and some don't. And even those that do have it, aren't necessarily compatible. So I think there's a number of very fundamental things where somebody has got to -- if you don't set standards, then going, plugging modules together, I mean you wouldn't dare plug in somebody else's module, no matter how much it's been QC'd to his standards, unless you know that his standards include the things that you want in your module.

MR. OTT: I don't know how this ad hoc committee is going to come down int he final analysis. There are two concerns that I have. One is that QA/QC over code is different than QA/QC over collecting data and using data.

DR. WYMER: Absolutely.

MR. OTT: And I hope that we are going to address both questions.

But one thing that is clear is that there's a very strong concern about documentation of QA/QC record of both data and models and I would think this kind of a concern about whether a model conserves mass can very easily be put into the QA/QC record. I mean there's no reason why we couldn't adopt the position that says hey, there are certain issues that really need to be addressed and your QA/QC record

should have information on that.

MR. LEVENSON: That's my point. I think for this to really be effective, you'd have to have a standard list of checkpoints because some people would include them in the QA/QC, others won't.

MR. OTT: There was an interesting presentation by Carl Castleton who is with the DOE, not DOE, EPA-Athens office, on QA/QC for models and how they are now building QA/QC checks into modules so that they can check the data as it comes in and look for inconsistencies in the data, establish numerical tests and they said that in several instances this has saved them months of time where in the past they might have taken the data set and just used it as input and then got anomalous results and thought oh wow, there's something wrong with the model.

They did preanalytical QA/QC checks on the data and detected problems on the data sets that were being used to implement the models, corrected them before they got in. It saved them a significant amount of time. So apparently work being done in the modeling community now that's allowing internal QA/QC'ing at the time the models are run, which is an advancement.

MR. LEVENSON: I'm not sure you've

convinced me that that's a good thing to have happened because I know in connection with WIPP, there was a case where the data didn't conform to the model and needed up rejecting 100 percent of the data because the assumption was made that the model was right.

MR. OTT: Well, I think that what you don't want to do, you don't want the automatic checker to throw out data. What you want it to do is identify data so that you can then do a direct check of it yourself. And there are lots of instances where investigators have been known to say well, that data isn't consistent with my concept of what's going on so, I'm going to throw it out.

This was done early -- probably 10 or 15 years ago when some of the initial work on the basalt waste isolation project was being done on container materials and DOE was looking for information on uniform corrosion.

So they throw out all of the specimens, all of the information that indicated that there was localized corrosion. Well, it turns out the localized corrosion was the primary mode of failure.

Yeah, I realize that you can't throw out data automatically, but you can identify data that is inconsistent automatically and then look at it to see

what its pedigree is and to see whether it's good data or not.

DR. WYMER: I'd like to explain as you may be know why John and George ran out. They had a meeting with the Commissioners and as you know, there's not a whole lot of flexibility when you meet with those people.

MR. OTT: I understand that. John said that at the opening of the meeting.

DR. WYMER: Okay. We know what you're going to be doing over the next 5 years now, Bill.

MR. OTT: You know what I'm going to be doing for the next 5 months,

DR. WYMER: Oh, is that right?

MR. OTT: I'm the chairman. I'm the chairman of this operation for six months which may be the worst time to be chairman of this particular operation.

DR. WYMER: But you're not going to get out of it then, certainly.

MR. OTT: We've agreed that -- no, I'm not going to get out of it. I'll be on the steering committee, but at least I won't be the one who has to organize all the meetings and telecons and write the summaries, etcetera, etcetera and so forth. And maybe

next year we'll get the then current chairman Gary Foley to come by and do the same thing and tell you what the MOU has done over the last year.

DR. WYMER: Thanks very much. You have our best wishes and our prayers.

MR. LEVENSON: It's a needed effort.

DR. WYMER: I should say, are there any other questions here? Thanks again.

Well, I guess the next thing on the agenda is the committee goes to work on preparation of reports so that's not too exciting for the audience. And I don't think we need the reporter.

(Off the record.)

CHAIRMAN GARRICK: I'd like to call the meeting to order, please. We're at the point in our agenda where we're going to hear about the Sequoyah Fuels activities from an NRC perspective. This is a project of considerable interest to the Committee because of its many facets and components. It's one that I had some involvement with in the late 1980s and early 1990s and given the fact that it handles quite a variety of material and involves both temperature processes and cold processes such as solvent extraction processes and that they've had waste problems, it occurred to me that this would be

something in terms of a status report that would be of great interest to the Committee and we're delighted to have the staff here to give us an update on it.

The Committee member that has been designated as our lead on questioning is Ray Wymer. I think the gentleman that's going to lead off the presentation is Mr. Shepherd. Is that correct? So you'll introduce yourself and your team and the floor is yours.

MR. SHEPHERD: Thank you. Good morning. I'm Jim Shepherd from the Decommissioning Branch of the Division of Waste Management in NMSS and we're here this morning to talk with you about Sequoyah Fuels. With me is Gary Stirewatt, a certified geologist working with the cradle computer system. We're having a couple of technical difficulties we hope to resolve in a few minutes so we can show you some of the models.

There have been a number of questions I've heard concerning modeling and what has been done to date so I'll prefix the rest of the presentation by saying that when Sequoyah Fuels in 1993 submitted what is called the preliminary plan for decommissioning they included a statement for on-site disposal and we'll talk about that.

As part of that, the staff did a very preliminary no action dose analysis using RESRAD, assuming that everything in the site was available for uptake and we got some very high results. We don't really believe those. It was simply a scoping analysis and I'm not going to talk about those results.

The licensee also submitted a dose analysis in their 1999 decommissioning plan and I'll talk more about that in a few minutes.

More importantly, what we are going to talk about is the three dimensional modeling that we have done to identify potential groundwater pathway flow and the results that could have on a dose analysis. And hopefully our experts will have that up by the time we get to that part of the presentation.

My background quickly, I've been in waste management for about not quite 10 years. I've been with Sequoyah Fuels since 1993. Prior to that I was a consultant where I was both performing and teaching probabilistic risk assessment and human performance analysis to clients primarily in the Orient and before that I worked at Idaho National Engineer Lab where I did some of the risk analysis on the LOFT and other reactors out there. I'll let Gary give you his

background when he gets started.

So our purpose here today is to give you an overview of the Sequoyah Fuels site by way of a brief history, description of the site. There are some interesting current decommissioning issues and to show you what we plan to do to address those issues.

(Slide change.)

MR. SHEPHERD: As you may know, Sequoyah Fuels is a uranium conversion facility. The input is basically yellowcake. The output is basically uranium hexafluoride. They started operating in 1970 through 1993. In 1986, they had an event where they had overfilled a uranium hexafluoride cask because of an error in the way they set up their measurements.

They took it outside, put it in a steam drum, heated it up. As you know, you have six sublimes and once it volatilized it did indeed make room. It ruptured the cask, looked like a big smile. I could just about put my fist through the center of the hole and basically blew 14 tons of uranium hexafluoride into the air.

The result was one fatality, several injuries and significant contamination in the area. Uranium being heavy, it fell out so it didn't go very far, but it did create quite a mess to clean up.

Following that in 1987, General Atomics from California offered to buy the site and I'll talk more of the details of this in a little bit. The NRC approved it.

In 1990, they began excavating around their solvent extraction tanks. They used normal hexanes, so they buried the tanks. They began excavating around those tanks. The NRC inspectors were there and determined there were high concentration in the water on the order of several grams per liter. That resulted in a thing known as the Facility Environmental Investigation, FEI, for short.

Following some other details which I'll talk about, they began operation in 1992. They had an uncontrolled release of NOx from the site. This was caused by a combination of a hardware failure, failure to perform maintenance, plus another human error. As you know the dissolution process of yellowcake and nitric acid is exothermic. Generally, they will put a batch of nitric acid in the tank. They will then meter the powder into it in order to hold down the temperature. In this case, they had inadvertently put about a half a batch of powder in the tank that was thought to be empty. They dumped a full load of acid

on top of it. At that point, there's nothing they can do but run.

They announced two days later they were shutting down or would not restart the main process and that they would shut down complete operations by July of 1993.

(Slide change.)

MR. SHEPHERD: A couple of administrative things as a result of all of this. In August of 1993, they signed what is known as an administrative order on consent with EPA Region VI in Dallas in which they agreed to perform what is called a facility investigation, similar to what the NRC calls site characterization and then they are to identify corrective measures for that. This is similar to our decommissioning plan. The major difference is that in EPA space, the EPA decides what alternative they will use. In NRC space, the licensee basically decides what in turn will be done.

They agreed to remediate all materials that are controlled by Resource Conservation Recovery Act. And we have an interesting one, nitrates, which I'll talk about in a little bit that are not covered by their NRC or RCRA order.

MR. SHEPHERD: In March of 1999, they

submitted the current decommissioning plan and that will then drive what they do for the Nuclear Regulatory Commission and I'm going to talk now how we got to that point.

(Slide change.)

MR. SHEPHERD: The license was last renewed in August of 1985. It was given a 5-year renewal. In July of 1990, they submitted a timely renewal application. One of the things they stated in there is that they would acquire financial assurance at some time in the future before the revised license was issued and there was no mention of any contamination. They started the excavation around the solvent tanks about 3 weeks after they submitted that application and that's when the NRC became aware of large amounts of contamination in the vicinity of the solvent extraction building.

(Slide change.)

MR. SHEPHERD: As a result of investigations by OI, IG, people that even talked to the FBI, they were required to shut down, regroup and they did a phased restart under 24-hour, 7 day a week observation by NRC inspectors which is rather unusual for a materials site.

Despite our oversight, they still had

problems. As I said, they did not perform maintenance in a timely manner. That resulted in the NOx release and their shutdown following that in December of 1992, there was a Commission meeting followed by demand for information that asked how they were going to decommission the site and how they were going to pay for that decommissioning effort. Since they were shut down it wasn't clear that they had any revenue available.

Their response six weeks later was a thing known as a preliminary plan for completion of decommissioning and what they said is we're going to put everything in an on-site cell similar to a mill tailings type cell and we're going to pay for it with a thing called Converdyn.

(Slide change.)

MR. SHEPHERD: Shortly thereafter, when they shut down what is known as the secondary process in which they took depleted uranium from the DOE facilities, converted it from DUF6 to DUF4, it was then sent on to Aerojet who ultimately converted it to the metal penetrators. We have places like Jefferson Proving Ground, North Africa and so on. That was in July of 1993. In August they withdrew their request for license renewal that had been issued in 1990.

As a result of that, the NRC issued a financial order to both Sequoyah Fuels and its third tiered corporate parent, General Atomics to provide financial assurance in accordance with the 1988 Financial Assurance Rule. We used the Sequoyah Fuels estimate from the preliminary plan of $87 million.

(Slide change.)

MR. SHEPHERD: To give you an idea of how this whole organization is structured and what the effect of the restructuring is, it started out as a subsidiary of Kerr-McGee. In 1987, General Atomics formed a subsidiary, Sequoyah Holding and purchased all of the stock in Sequoyah Fuels from Kerr-McGee. They then divided that corporation in two parts, Sequoyah International in which they put the assets, the land, uncontaminated land and so on and Sequoyah Fuels which held only the operating part of the facility. So we end up with, as you can see, General Atomics being a third-tiered parent and not a licensee in this case.

Then they told us that they were going to use a thing called Converdyn. Well, to get to Converdyn, we have to go to General Atomics parents, General Atomics Technology Corporation who formed a subsidiary called Energy Systems. Allied Signal, who

is the parent corporation over the Metropolis Uranium Conversation Facility also formed a subsidiary, Energy Systems, and those two subsidiaries formed a partnership known as Converdyn.

Now Converdyn is the source of money for Sequoyah Fuels. The first flow of money came from the existing contracts that Sequoyah had at the time of shutdown which they transferred both the contract and the material to Allied Signal and they got, I don't know, a few cents on the dollar for having given up those contracts.

Then Converdyn is a marketing company and as they make profits, they basically sent some of that money to Sequoyah Fuels to what is called a standby fee. Somewhat cynically it's a fee for not competing. Sequoyah Fuels is no longer operating all the uranium conversation in this country and was then being done in Metropolis and so Sequoyah Fuels got a little money for, in essence, not competing.

And finally, there's a thing called the added standby where they got a share of the profits after taxes and everything else. So you can see we have an interesting situation in terms of funding.

(Slide change.)

MR. SHEPHERD: When we go to settle the

financial assurance order, the 1988 rule said two things. By two years from the date of this order you will have a formula value for financial assurance which they did. That formula value is $750,000.

The other thing it said was at the time of your next license renewal, you will have full value for decommissioning. As I said a few minutes ago, Sequoyah Fuels withdrew their request for license renewal.

Both of them requested a hearing as a result of the order. Sequoyah said the order does not apply to us because we have not renewed our license. And we do have the $750,000. However, we don't have anything else, so the staff decided that we couldn't get any blood out of a turnip, if you pardon the cliche, so we settled for what they said and what they said was they promised to use their resources judiciously.

We continued negotiating with General Atomics. General Atomics said the NRC does not have the authority to go to a third-tiered corporate parent with what is tantamount to a financial penalty where there's been no allegation of wrongdoing. The staff tried to argue corporate similitude, a thing known as "piercing the corporate veil" to show that the

corporation, Sequoyah Fuels, was so closely controlled by General Atomics that a normal person would not be able to distinguish between the two corporations. It's pretty hard to do when one of them is in Oklahoma and the other one is in San Diego.

We ended up settling. General Atomics said we don't owe you anything, but we will give you $9.5 million just to go away because you're interfering with our ability to do business, with the outstanding order. However, you get to pay the taxes. And ultimately we ended up with a trust fund of $5.5 million to decommission the site.

(Slide change.)

MR. SHEPHERD: Cash flow in the meantime is provided by Converdyn. Converdyn is actually a proprietary arrangement so I can't discuss any of the details with you, but through the three paths that I showed you a few minutes ago, indeed, they have provided the amount of money that they said they were going to. They have plans to provide about another $26 million which is in keeping with Sequoyah Fuels cash projections in order to do decommissioning as they've proposed.

But Converdyn is a business. It is not a financial assurance mechanism. You're all, of course,

familiar with the fuel cycle. Converdyn sits here in conversion. The money revenue business to Converdyn, therefore, is dependent on what goes on downstream. Ultimately, what is the demand. There's a question on total demand. There's also a question on other sources to meet that demand, such as downblending, weapons grade material from the former Soviet Union.

DOE projections for total uranium demand for reactors is less than favorable after 2005. Now these are projections. We don't know exactly what's going to happen. The energy crisis in California has persuaded some politicians to advocate building up nuclear power. As I'm sure you're aware recently in Germany they passed legislation to shut down all of their nuclear plants within 10 years. So we really don't know what's going to happen, but it certainly brings uncertainty to the money available to decommission the Sequoyah Fuels site.

(Slide change.)

MR. SHEPHERD: A little detail on what that might mean. What they have proposed is a restricted release scenario in accordance with the new license termination rule of subpart 10 CFR 20. They're going to put all of the contamination at the site, both nuclear and chemical in a cell that will be

above grade in order to protect groundwater, but it's designed essentially to the mill tailings criteria in appendix A to 10 CFR 40.

The plan that they submitted shows a 20 acre footprint by about 35 foot high cell. Some of the numbers in the cell indicate that that would be the maximum size. If they have less contamination, the cell could be as small as a 10 acre footprint.

In addition, there will be a buffer around that footprint that has a total area of about 100 acres.

Everything else in the current site which is around 635 acres would then be what they call released or unrestricted use. There is contamination in the groundwater, both chemical and nuclear and we'll talk in a minute, hopefully, Gary will be able to show you the --

MR. STIREWALT: We shall, we shall be able.

MR. SHEPHERD: Great. The several levels of groundwater underlying the site. Sequoyah has proposed some limited remediation in the uppermost level that as they remediate the dirt down to a residual concentration, if they encounter a groundwater, they will remediate it. If they don't

encounter it, they will leave it in place.

For the balance, whatever is left in place, they're proposing actually an EPA approach that was developed for chemical contamination known as monitored attenuation. And as we'll see, there are some difficulties with this. One is that it's difficult to show that heavy metals are -- heavy metal concentrations are going down by anything other than dilution and the other thing is how do you actually monitor where the material is.

(Slide change.)

MR. SHEPHERD: To give you an idea of how the contamination came to be where it is, this is a process flow diagram and I'll show you a physical diagram of the facility in a minute.

The first place we had problems was in what is known as the digestion portion, where they bring in the yellowcake, put it in a vat, dissolve it in nitric acid. This is where the NOx release occurred. It's in the main process building. There were a number of spills in that area that went through the floor.

They then took that material and piped it literally across a driveway about 30 feet away to another building known as the solvent extraction

building. They had a number of spills in the solvent extraction building, the worst of which they lost about 1500 kilograms of uranium. I'm not a process person. I haven't done the engineering calculations on how many gallons that would amount to, but it's a lot. They ran a yellow river all the way to the Arkansas as a result of that spill.

Another spill area was denitration. After solvent extraction, they brought it back across the building. Denitration took place in open top tanks, basically heated it up until the nitric acid boils off. They often boiled it over. State-of-the-art of that facility for checking the level in the tank was a dip stick which they didn't always use.

The bottoms from the solvent extraction process known as raffinate was then sent out to the ponds, settling ponds just to the west. It was treated with barium and ammonium. They then called it ammonium nitrate. They had some storage ponds to the south that I'll show you in a minute. They then used ammonium nitrate which you and I go to the hardware store and buy as fertilizer to fertilize their land, both immediately adjacent to the facility and some actually in the next county over. They then either leased that land for grazing of cattle or they grew

hay on it which they harvested and sold as fodder.

Then, of course, there was the accident with the US_6 tank shown down in the lower right corner of the screen.

(Slide change.)

MR. SHEPHERD: This is an aerial view of the site looking roughly south along the western side, the left side as you look at it is Highway Oklahoma 10. The Illinois and Arkansas River are off the picture to the right side of the screen.

This is the main process building where many of the spills occurred. This is the solvent extraction building to the west of it where many other spills occurred. The UF_6 explosion cask rupture took place just at the north edge of the main process building. That material was then washed northwest into what's known as the north ditch and emergency basin. These are unlined basins that now have the residue from that accident.

These five ponds to the south are the so-called fertilizer storage ponds where they have some leakage and where they have a high concentration of nitrates.

As a result of the overall operations, this is roughly the area that has high uranium

contamination. In the soil it runs about 50 to maybe a couple of hundred picocuries per gram, higher in the sediments in the ponds. There's 20.304 burial area up in the northern part of the site.

The settling ponds, the sludges there contain most of the radium and thorium on the site. Concentrations in the sludge there are on the order of 300 to 350 picocuries per gram. The sludges right now are roughly 20 percent solids. So there's more water in those ponds than there is sludge which for a no action alternative is a potential problem from a mobility point of view.

Nitrate contamination is moving generally westerly and we'll show you the aquifers and why in a moment, both out of the nitrate or ammonium nitrate storage ponds and also out of what's known as Pond 2. Pond 2 underwent a particle remediation about 1989. The residual contamination in the clay liner in the poind is about 2,000 picocuries per gram. But there's a definite nitrate plume coming out of this poind in several directions.

(Slide change.)

MR. SHEPHERD: This is a physical diagram of the area. Here is the decorative pond just south of the main process building. Here's the sanitary

lagoon in the upper left corner of the picture. We'll use the lagoons as overlays on the GIS system to help you stay oriented.

Wells of particular interest, 25, which is just -- MW 25, we think is picking up material probably from the solvent extraction building spills. MW 14 is in a straight line with the wash down from the cask rupture which took place about here. And the material was then washed over into the north ditch. MW 12, you'll notice there's a thing inside the building known as the subfloor process monitor. They spilled so much material out of the denitration tanks on to the concrete floor and into the sand underlying the building, they actually drilled a hole in the floor, put a pump in it and pumped the liquid back into the process because it had recoverable amounts of uranium.

MW 13, you'll see is an interesting one. There's a thing that the licensee calls a paleo channel that runs down through this area that may be a conduit for uranium moving generally south. MW 13 and MW 18 are approximately in that channel and I'll let Jerry point out some of the differences that we see. As you can see, east and west, they're very close together.

MW 10 is about the bottom of the channel and has one of the highest concentrations in the area. The other wells to the west are at or near background, typically less than 7 and many of them less than 5 picocuries per liter.

With that, I'll let Gary Stirewalt introduce himself and --

MR. STIREWALT: This is a somewhat more informal entrance than I had anticipated. I feel like the Phoenix of Sequoyah has arisen from the ashes or maybe the phantom of Sequoyah.

(Slide change.)

MR. STIREWALT: Actually, Jim had asked me to sort of introduce myself and my background. Maybe rising from what could consider the basement is appropriate because I'm really a hard rock geologist. So geologists know if you work in hard rock basement or nice high grade metamorphic and that's lots of fun, so instead of being a sedimentary guy, my background is hard rock geology and I just spent half the morning of your meeting lurking under the desk preparing for this.

But I would like to thank Theron, Alan and my assistant administrative guy, Kenny, for helping boot stuff up and around. The problem was, I must

clarify and I apologize for what may have been mild mumblings and interruptions in the background, but it was necessary. We moved a very expensive piece of hardware, in fact, and crossed out fingers, well, okay, it turns out that it worked all right.

Okay, anyhow, Jim has done a very excellent introduction and lead in for what I'd like to talk about. I'll make sure I'm alive and up back here and I am. That looks mildly fuzzy to me, Theron. Is that -- is it -- could be my eyes. Is it sort of visible? We're going to be doing some flippings around with it, I think, actually.

I know modeling is kind of an important topic for a whole handful of reasons, but I'd like to start just by saying that really there's modeling and there's modeling.

Many of you, if you think about the concept of modeling, ah, we're going to probably see some nice, neat hydrologic flow and transport code work this morning that's going to talk about how uranium and nitrate might well have moved in a rather complex aquifer system at the site. Well, you aren't. We're going to step back even more basic and actually show you the framework model that those hydro folks are going to have to consider when they start setting

up their flow codes. The site is really rather complex. It's a three aquifer system that we're going to illustrate for you. There's an upper level terrace, a lower shallow and an even lower and deeper deep groundwater system aquifer as labeled qualified name, investigated, studied by the people at Sequoyah. So this is not our terminology, it's theirs, which should clue you in that we are most certainly using their database. That's very important.

We aren't going in and doing anything to generate new data. We're taking the data that they've been able to give us and actually speaking of data, being a visual person, I can't resist. The models that you're about to see, this is the hard copy data base for these models, so there's a fair amount of information to support and back up this.

This actually includes information for both groundwater that I'm going to show you today and some solid stuff that we're currently working on modeling for the individual, some of whom I see are here. We're doing some work on the EIS because they need to see what sort of concentrations exist in the soil. Those might be areas that they, in fact, must dig up to remediate. But again, we're starting with this kind of database.

Now thank goodness, it didn't just come to us in hard copy. We actually got digital information, certainly to the credit of the Sequoyah folks. The database that exists for the groundwater, the MW series wells, the designation that you see here, this is how I know what I"m looking at. These are the groundwater monitoring wells, but database for that exists between 1991 and 2000. So we have again a massive database to work with, which again is exciting and well, there are some frustrations because you don't reformat it into an ASCII file that this particular software package will take. It's called EarthVision. More about that in a moment.

In fact, I think in general, about 95 percent of your time is spent getting the data ready. So once that's done and those of you who -- remember, I'm only a geologist. I'm not a computer jock, but still even computer jocks, they still spend that amount of time getting the data ready. But that's very crucial. It's very important, particularly when we're analyzing data of the type that we have here.

We're looking at variations in uranium and nitrate, specifically because that's what Jim has requested. There may be other elements that were -- we will model later depending on what we might need

for EIS, but we're looking at those in a regulatory arena. That data set is, in fact, three dimensional, so you cannot properly illustrate it for either just simply looking at it to show it to administrators, committees or the lay public as well if you're just using a 2-D like GIS which is very powerful, geographic information system, but that's essentially a 2.5-D.

You can do a series of maps, but what we can do with this particular software product, again, it's EarthVision. It was developed by a company called Dynamic Graphics in Alameda, California. We can actually represent solid, 3-D spatial block models that we can cut, slice, analyze, pull apart, pick apart to look at everything from data distribution and that's what you're seeing on the screen right now and again, I'm going to get back to that in a second. But we can look at everything from the data distribution. We can take those data sets, actually contour them in three dimension so that we can really look, in fact, in 3-D space, real position of X, Y, Z coordinates and a measurement in 3-D space. We can visualize this. Analyze the data, analyze the concentrates, so you can actually visualize the zones or, in fact, volumes because they are volumes. They're 3-D volumes of

concentration.

So what we're doing then with this software package, in fact, I should add one thing. This particular package was developed as I said by Dynamic Graphics. It is well pedigreed. It was developed initially for the oil industry about 15 years ago. It's been used a great deal there. It really is a premiere software package for 3-D geospatial modeling. There are others. But this one, I should add which might be an important point has been QA/QCd for the Yucca Mountain project. So the models that were constructed using this same software, in fact, same version that I'm illustrating, that has passed QA muster at YMPO. And again, that's a pretty important thing. So it certainly has a pedigree. Enough about pedigree.

The reason that we're doing all this, you think, gee, that's a nice pretty picture in back of you. What can we do with it? It really, it obviously provides the means, you know, to sort of cleverly illustrate stuff. You can see that this really is a data distribution in 3-D space. This, in fact, is the entire data set that exists for the month of April 1996 from the MW series wells at the Sequoyah site showing distribution of subsurface uranium in the

terrace aquifer, the shallow aquifer and the deep aquifer. This is the entire data base and again, you can certainly see that this is, in fact, a 3-D data package so you do want to consider it in 3-D.

The highest value in this case happened to have been in the -- and I know I'm looking at a terrace measurement. If there's no designation on the bore hole number, you see MW 014 and what I just flagged, that's a value, a sample taken in the terrace aquifer. In fact, that was the highest for this particular time frame.

So obviously, showing you again in this case, so okay, gee, we can go in and query these data points. Well, I know where I am. I've also taken the liberty of sort of plastering on the top of this the overlays for the basins that Jim illustrated to just kind of give you an idea of where you are at the site. I didn't want to put the buildings on there, because at this scale of the model, it's just simply too cluttered, so I've used the basins and hopefully that will help you sort of think about remember, understand where you were or where you are.

So again, we really are looking at data, three dimensional data and this suite of data, this data base, this data set really is related to the

geological and the hydrological characteristics and these are factors that certainly are deemed important, deemed critical for consideration and decommissioning, including assessment of potential remediation options. So there's some practical reason for being able to use it, not just for an illustration, but actually to show you the kinds of things that we can do with respect to analysis.

So today's goal, obviously, is to show you the software. Well, okay, you're getting a good view of that one behind, but really to kind of involve you to a mild degree, actually in the analysis process, so you can see the kinds of things that Jim and I have literally spent a fair amount of time, shoulder to shoulder, discussing the property models that you're about to see, that we've developed in the computerized risk assessment and data analysis laboratory, CRADAL for short is better for me to -- okay.

So that's kind of the logic for why we think it important and I've also mentioned again the connection with some additional modeling that we are, in fact, doing even as we speak, getting the data set up and formatting for the EIS, particularly contamination in the soil horizon because that's material that they might well have to excavate.

I've defined all the data that we've got, so let's kind of go from this again sort of general illustration that I show you, again, data distributed in 3-D space. Let's -- what I'd like to do actually is walk to the upper aquifer unit, the terrace deposit strictly first. And, as I do that, I would also like to post on the data set that we used to develop the property models for the terrace. This is going to give you again the sort of -- these are essentially just ASCII files, pretty easy to set up, even for a geologist.

And we're looking at uranium, not nitrate in this case. Now this then is the data base that we're dealing with, hanging up in 3-D space that we utilized to develop the property model illustrating subsurface contamination of uranium in the terraced deposit. The terrace, by the way, includes real terrace material as well as an upper unit of bedrock. It contains real terrace stuff, unconsolidated and it also contains unit 1 shale. So the terrace aquifer actually contains terrace and bedrock, but don't be confused by all those facts. It's not necessarily crucial. The point is that what we're illustrating here actually does reflect geology.

DR. WYMER: Does the nitrate sort of map

the uranium or does the uranium precipitate and the nitrate moves independently?

MR. STIREWALT: Excellent question, excellent question.

Actually, I'm glad you asked. I might have preferred you asked in a few minutes, but when we have a chance to look at the nitrate and we're going to do that if Jim doesn't pull me off the stage with his gaff hook, you will see, particularly in the shallow aquifer in the area of the main process building where it looks as if the flow transport pathway for -- it's basically the same pathway as reflected both for nitrate and uranium in that location, which again gives you some good feeling about oh gosh, we really must be tracing this out pretty well and what it should tell the hydromodelers that they're going to need to attempt, if they can step down fine enough, to possibly capture those kinds of flow path and transport, but yes, it's a very good question and I'm happy to say one, in fact, does reflect the other where both occur, particularly in the area of main process building.

Right now, we're just showing uranium, but that's a very, very pertinent question and you helped me make a good point I wanted to make, so I appreciate

it.

Let's -- I talked about the fact that we were stepping into the models and actually building 3-D contours around the data points. Well, okay, let's start to do that then. Let me do it just by clicking a few magical buttons in the EarthVision and if you're watching, you can now see that we have a volume represented that represents everything between 15,000 and greater than 20,000 micrograms.

So these are concentrations, micrograms per liter. And you can see where that sits. You can see it in here and it ought to be clustered around our high data point which is lurking in the middle of that, at hole 14.

Now actually, I mentioned volumes, these are volumes. One thing you can actually do with the software, let me just quickly illustrate this idea. You can really do on the fly volume calculations so what the quick calculation that's show with the software for this concentration, this is in cubic feet, so you can actually do on the fly volume calculation. You can refine that with some other aspects of EarthVision if and when you need to and sometimes you need to. We've used this in other situations where that was -- those -- and actually in

simpler hydrologic situations where the on the fly calculations was really quite literally all we needed, but I'm not going to post that on a regular basis, but the point is we can do that, so, for example, when we do the soils modeling, we'll be able to actually give you volume values, volume measurements that, in fact, the Sequoyah folks are going to have to consider if they're going to excavate that and put it in their disposal cell. That's one of their remediation options.

Let's walk through this a bit more, again, just to show you the concept. Again, we would certainly be expanding our volumes. Again, if you look at the scale on the left side of the screen, you will be seeing what we're representing relative to concentration levels for uranium, for this time frame. And it looks like it's honoring the data pretty well. There's Hold 10 that Jim mentioned. I'm going to show you that relative to that paleo channel in a 3-D illustration in just a moment.

And Jim, I know that you needed 10 minutes after I finished.

MR. SHEPHERD: I can cut it to 5.

MR. STIREWALT: Boy, that's a compliment. But again, what we're beginning to see then is we're

beginning to see a rather definite pattern of where the highs are. Now let me just, lest you think this is a -- we call it a model because it is in the first place, and lest you think, boy this sure looks good. Looks like there are no glitches, no problems. Let me just show you that there do happen to be some extraneous extrapolations.

The more data you have, the better the control is, needless to say. But this area out here, that by our color code indicates ought to be somewhere between 50 and 500 micrograms per liter of uranium. Well, there's no data out there. The algorithm and if anyone is interested I can give you the mathematical basis for that and papers that are written on it that's used in EarthVision minimum tension gridding.

Actually, it picks up the transit it sees within the data points and extrapolates out to that corner. Those could be cleaned up and that would need to be done if we needed to do a good volume estimate for that particular concentration range, but clearly, there's some extraneous extrapolation in the area between 50 and 500.

So again, lest you think -- remember, we call it a model because it is and unless you think it's flawless and perfect, it really does require some

geo knowledge of the site and some of the basic geo principles, not just to use the software best, but to really go in and carefully work with the data and in fact, that's where we start with the raw data and sometimes you detect, I mean these things were assembled and written down and recorded by humans, so you will often find little glitches in the data base. And the Sequoyah folks to their credit have been absolutely exemplary. Any quite literally errors we found in their data base, because of transcription, they have, generously, and in a very, very timely manner, I think Jim would agree, corrected, without any hesitation. So they've really been on top of that.

DR. WYMER: Let me ask, since you're going to run out of time before -- let me ask you a question on the fly here.

MR. STIREWALT: yes.

DR. WYMER: Does the soil contain limestone, dolomite or clay? What kind of a dirt have you got?

MR. SHEPHERD: A lot of clay.

MR. STIREWALT: It's clay.

DR. WYMER: Not a lot of limestone or anything like that?

MR. STIREWALT: No, not at the site. In fact, there's no limestone on the site per se. The interesting thing about the soil category, as the SFC folks have defined it, their soil material includes everything down to all but refusal when they were doing sampling. That means in point of fact within their sampling intervals that are quote soil, they really have friable, weathered bedrock as well, but basically no carbonate. There's carbonate in the region, but not at the site and it's essentially clay rich.

DR. WYMER: Okay, thanks.

MR. STIREWALT: Let me show you just quickly the concept of paleochannel. That's the direction that you're walking out. These highs are sort of related to things we think we know we have sources for. These are, in fact, it appears sitting in the paleo channel.

Let me just show you that right quick again with the 3-D model that we set up. What we did was we took their data. This is a vertical exaggeration of 5, but if I get it at the right angle, you can see within this area that there really is in the bedrock surface itself, there really a small channel, a gully, not the Grand Canyon by any stretch

of the imagination, but even at a 1 to 1, another vertical exaggeration you can still see this.

Okay, and what I have done is I have flagged the bore holes that Jim mentioned. Let me just pull those out for you. The highs that were sitting back up in the terrace deposits are shown thusly. Jim mentioned some of the holes that bracket it, 7.3 and 19.57 and 2.8. The one at the quote headwaters at 9.4. Let me squiggle those off. And the two that are high, and 18, it's 8400 and 10, it's 4700.

Now this is information that the Sequoyah folks and I think wisely so used. Think hey, gosh, you know, we must have movement there down some potential paleo channel. Lo and behold, they collected information on that surface, literal elevation of that surface. That's in their data base. That's where these values came from and when it's modeled, it turns out that those highs, I'm not kidding you, fit right where they should in the bottom of that paleo channel and it's darn narrow as Jim implied just a moment ago. It's darn narrow.

Jim, there's a lot of things I could continue to do. I'm now 5 minutes over. That gives you your 5 minutes. We did not get a chance --

MR. SHEPHERD: We've got until 12:30.

MR. STIREWALT: Have we? You never give a talker more time when he likes to talk anyway.

Okay, what I need to do though since there was this version running, actually the software is initially set up to run on UNIX, on an SGI box. This is running on an NT. This is their first version. They've got to keep up with the Joneses or the Gateses, if you wish, but this is now set up to run, just the EV viewer, not the calculation, on an NT and there was some hardware glitches, things kept freezing up quite literally.

When I tried to mount everything and have -- what we had planned is we're going to have dual views. We're going to have nitrate on the left, uranium on the right and of course, we'd be glad to do that on the high powered UNIX work station at some stage, if anybody would like to wander up and see it, but let me particularly since Dr. Wymer inquired, let me just pull up very, very quickly, the values for nitrate. Again, same year, same sampling time frame, just to show you what this looks like. And it's at least easy to pull it up.

Okay, what I want to do, in fact, just to make the case for what appears to be some degree of

continuity, I want to jump immediately to the shallow aquifer system. This is what we're looking at now. Now remember, we're looking now at nitrate, same time frame. Maybe to help you locate, I should quickly post or I shouldn't -- I should say I will quickly post those same location points.

Now again, I'm going to ask for your imaginative recall for a second, but you certainly remember -- well, hopefully, or perhaps, that we were getting those uranium hives over in exactly the same location as we're getting the trends that the model illustrates for nitrate, again and Jim and I would interpret this as a strong suggestion that these things are moving along similar pathways. Now one thing that, of course, the geochemist would jump in here and say hey, wait a minute, hold it, hold it. It looks like there's retardation on the uranium. It's not moving quite as rapidly. I'd say that's probably true. The area on Pond 2 is, boy, this is just beautifully instructive. I got to take 30 more seconds and post the data, Jim. I can't resist.

First you find it in the data set and you get the right one. But it's really intriguing that again, and Jim, I know you're going to pounce on me if I say something that you don't feel is accurate or

appropriate which I do at times. But the interesting thing is that we saw from the Pond 2 area migration basically south, west and north, every direction but east for the nitrate within the shallow aquifer system. There's a curious hole in there though. See that really low spot, 14A and remember I know I'm in the shallow aquifer because it has the A designation. That's strangely low when I realize it's surrounded by points that point of fact you'll see what I'm flagging are really considerably higher.

Jim might want to speculate on logic there too, but at least I wanted to show you the nitrate, particularly as a follow up to your excellent question. In this area, there's a strong suggestion that we're getting highs in nitrate, basically in the same position.

CHAIRMAN GARRICK: What's the threat to the lower aquifer? You mentioned earlier, I thought, that there was -- you --

MR. STIREWALT: You mean the connection between --

CHAIRMAN GARRICK: Yes.

MR. STIREWALT: Well, that's also an extremely pertinent question. There's an indication from the models and I think again Jim and I agree on

this, that there may well be a vertical connection between the terrace and the shallow, not so much with the deep values there, at least for this particular time frame, even though they're somewhat above background. They're still quite low. Less than 10 micrograms per liter for uranium, but now that connection could be through the fractures in the intervening areas that are not sampled which, in fact, I didn't illustrate because I was so excited about the other stuff, but the way that the sampling sequence is done, the terrace system is sampled.

There's a nonsampled interval that, in fact, corresponds to an aquiclude, Unit 1 sand, between shallow, next sampled interval terrace so that means that if that connectivity exists, and there's some suggestions that it might, that it's actually penetrating that aquiclude. It could be moving along fractures. It's a pretty good sandstone. It could also be moving along some of the borehole connections which make beautiful pathways under many conditions. But their indications, I think, from the data and Jim concurs, that there may well be a connection between the terrace across that aquiclude that's a sandstone down into the shallow, but not across the next aquiclude into the deep.

Good question. Good point.

MR. SHEPHERD: Let me say a couple of things on that. Unlike what a lot of us learned in Geology 101, at this site we have interlaced layers of sandstone and shale. The sandstone is the aquiclude and the shale is the water-bearing layer.

There are several sandstone layers in what's called the shallow aquifer and it's not until we get down to what's called Sandstone Unit 4 that we have the aquiclude between what is called the shallow and the deep. That is roughly 85 feet below grade. And we don't believe that there's been any migration of either nitrates or uranium below the 85 foot level.

There are a dozen holes in that aquifer which if you look at the data there will be wells with a B designation on them.

In addition to the MW series wells which were installed during the Facility Environmental Investigation in 1990 and 1991, there's a whole other series of wells that Kerr-McGee began drilling back before they constructed the site in 1969. Many of those wells were actually plugged in 1994, 1995 because they were known not to give accurate data. Some of the problems were they were screened across multiple zones. In one case the sandpack went all the

way from the surface to the bottom of the hole. There were no seals whatsoever.

So there are some wells that we know provided some amount of conduit. There were about four or five dozen geotech borings made during construction of the site, although the exact location of which was not documented, at least we've never found it and the indications are they were never plugged.

So there are probably halfways between what is called the terrace, which is everything above Sandstone unit 1, and the shallow which was from Sandstone 1 down to the top of Sandstone 4 that may be artificial rather than fractures in the layers themselves.

There may also be just simple discontinuities in the sandstone and the shale that allow things to go back and forth.

CHAIRMAN GARRICK: So what is being done about this?

MR. SHEPHERD: Well, this model has provided us with some insights and every time we look at it we get a few more. As I said, what Sequoyah Fuels had proposed is called Monitored Natural Attenuation. One of the requirements in the EPA

regulations says that you identify and monitor the center of the plume. When you saw the nitrate coming west out of Pond 2 and all of a sudden there's a zero there with several thousand on either side of it, that has some very interesting implications for how do you know you're actually monitoring what's going on?

The answer is and I'll get to another approach that the Sequoyah has proposed, but physically, we have not agreed to what the residual concentration in the soil is. Sequoyah Fuels has verbally discussed with us alternatives for remediation, one of which would be to consider actually excavating down to Unit 1 shale, just taking out what we really call the terrace aquifer, removing all of the liquid, backfilling that with dry material and building their cell on top of that.

This kind of information will be a factor in their ultimate decision. To their credit, what they have done is they have hired a consultant, Shepherd-Miller from Colorado Springs.

MR. STIREWALT: Yes.

MR. SHEPHERD: To actually go in and do a mod flow type model and an MD 3-D transport model. This, in my opinion, is far better than doing things like probabilistically varying Kd and RESRAD because

who cares what Kd is when we don't know where the plume is.

So that kind of model, then once we have the location and the concentrations identified, we can put a RESRAD calculation at that point. It raises some very interesting questions on dose calculations of as you saw, there was a distribution. There's uranium in certain places. There's thorium and radium in certain places. There's nitrate in certain places. How big an area does it really take? This is rural Oklahoma. We believe the resident former scenario is, in fact, appropriate. The nearest resident is a half a mile away. There's one other that's about a mile away to the south and the next one is about two miles.

CHAIRMAN GARRICK: Now where's the river, how far are you from the river?

MR. SHEPHERD: The Illinois River runs north and south about three quarters of a mile to the west of the site. From the grade level of the main process building, down to the pool level of the river is about 100 feet vertically. I said pool level. At that point the river is actually considered by the Corps of Engineers as to be the top of the reservoir. The Arkansas River, the waterway is a navigable waterway maintained by the Corps of Engineers.

So the Corps owns well, sort of owns the property from Sequoyah Fuels boundary to the river. The other player is the Cherokee Nation. If we go back to the treaty of 1865, the Nation has rights to the river bottom, reaffirmed in 1965, but nobody has yet defined exactly what the river bottom is and how far it extended because certainly the river moved when they built the reservoir. So I think the politically correct definition is the land is maintained by the United States for the benefit of the Nation administered by the Corps of Engineers.

DR. WYMER: I'd sort of like to move into the questions. We're about halfway into it, up to this point.

MR. SHEPHERD: Please. I've got some other pieces of presentation, but I can work those into the questions as we go.

DR. WYMER: One observation, you talk about part of this set being under restricted release category. I think --

MR. SHEPHERD: If I could talk about -- as soon as you finish your question, I'll talk about what they're proposing for institutional controls and how they're going to restrict the areas.

DR. WYMER: Okay, that would be good.

Restricted release where you have a cell still on site is kind of a strange restricted release. I thought you talked about putting a lot of dirt into a cell on site and yet that's --

MR. SHEPHERD: That's right.

DR. WYMER: Subject to restricted release. That can't really be true for that?

MR. SHEPHERD: Yes.

DR. WYMER: For the cell.

MR. SHEPHERD: 20.1403, 10 CFR 20.1403 is a dose based rule. It says for restricted release that areas outside the institutional control boundary will have a calculated dose of no greater than 25 millirem.

DR. WYMER: Right.

MR. SHEPHERD: Inside the institutional control boundary, they will have, assuming the boundary scale, the calculated dose will be less than 100 millirem.

DR. WYMER: Right.

MR. SHEPHERD: What Sequoyah is proposing, by their calculations will be less than 100 millirem on failure of the institutional controls.

Now what we're dealing with here is natural uranium. That's all there is at the site is

natural uranium and it's decay products.

DR. WYMER: Well, we usually think about restricted release is the site that maybe some industry could go into and do something on, under the realization that it is restricted release and sort of a brownfield.

MR. SHEPHERD: We can build that mental image. The regulations are absolutely silent on the uses of restricted release. The only thing they say is there has to be an institutional control.

The other regulations are obscure on the radon calculation. Now dealing with natural uranium in the short term, 1,000 years, we don't have a radon problem. However, as we all very well know, radon will build in, but you're not going to get a peak dose from radon to the 75,000 to a quarter of a million year time frame.

What the statements of consideration for the rules say is for outdoor areas, radon is not an issue because it will be dispersed in the air. The only time radon is an issue is in indoor areas and therefore the restrictions would be, if you build there, you have to comply with the EPA, building regulations to preclude build up of radon within enclosed areas. But we're talking about a situation

where we now have failed institutional controls. Why would somebody fail institutional controls and then go comply with EPA regulations?

It gets a little weird. But the cell design that Sequoyah is using has a clay cap radon barrier, similar to that used in the mill tailing site that in fact will limit the calculated radon migration through that cap to about less than 10 percent of the part 40 limits.

DR. WYMER: One of the things that --

DR. HORNBERGER: And that cap will surely still be functional at 75,000 years.

MR. SHEPHERD: Oh, absolutely. It's going to be covered with rock. And the rock won't rust.

DR. WYMER: One of the things that we said we were interested in, in the past, not necessarily for you people here, was we wanted to see the application of things like RESRAD and D and D to complex sites. When you've got a complex site here there's no question about that. It looks to me like there's for a complex site there's a very strong modeling component that sits right at the heart of things before you even think about using RESRAD and D and D.

MR. SHEPHERD: I believe that's true. My

personal opinion, not necessarily my boss's opinion, my personal opinion is that D and D is not a value at these sites. D and D was designed as a screening code for sites that had minimum contamination. If they passed the screen, they were done.

DR. WYMER: Right, that's true.

MR. SHEPHERD: If they could pass D and D, I wouldn't be the project manager. They'd still be over in fuel cycle.

RESRAD is basically a point release code. It does not handle simultaneous ground, existing groundwater and existing soil concentration at the same time.

Now, if you're smart and you understand the code, you can fool it and do multiple runs and figure out how to add that together, but basically, RESRAD says you tell me what the input concentration and then I will calculate the dose for a variety of land uses.

In this case, figuring out what the concentration at the uptake point is, is much more difficult than anything that RESRAD needs to calculate after that.

DR. WYMER: Questions? John?

MR. SHEPHERD: One more thing. We had

another site, Nuclear Fuel Services in Erwin, Tennesee that also has severe groundwater contamination and soil contamination, primarily with highly enriched uranium. They process naval fuel. They also have some natural material, so they've got the whole gamut and also some transuranics of plutonium, americium and so on because they did some MOX fuel studies some years ago.

DR. WYMER: That site is still open, isn't it?

MR. SHEPHERD: That site is still operating, but they are decommissioning portions under the unused part of the site in the timeliness rule. The area that's called the north site which used to be a 20.302 burial area. They have exhumed and they are now trying to remediate that for a restricted use.

They did two things. They persuaded the staff that the groundwater, drinking water pathway was not viable for the shallow aquifer. Because of the poor qualify of that water and the ready availability of high quality water from the city, from the adjacent river, from the spring that used to be the city water supply in the immediate vicinity, doing a RESRAD analysis, putting in the proposed derived concentration guideline limits, I calculated very,

very large numbers. So I took this to performance assessment.

They did an analysis and said basically RESRAD is wrong. The stuff that is in the ground and in the groundwater today has been there for roughly a quarter of a century and it's not going to get any worse than that because you can't add contamination. So when you take the numbers that they have and the calculations that they did and came up with doses of a few 10s of millirem per year, said if RESRAD calculates something different from that it's because RESRAD doesn't really have the ability to take into account, in this case, the simultaneous soil and existing groundwater contamination.

So RESRAD is a good code for what it does, but for complex sites it has some serious limitations. It wasn't designed as a transport code.

CHAIRMAN GARRICK: Considering the now absence of surface source and the dynamics of the plumes and the diminishing concentration. Have you projected this out in time?

MR. SHEPHERD: Not yet.

CHAIRMAN GARRICK: To see kind of what happens?

MR. STIREWALT: Could I say one thing

about that? What is planned with that, exactly that thought in mind, the flow codes that Jim mentioned, the consultant for Sequoyah is using, he'll be doing essentially 3-D flow transport and there are means by which you set those data files up and ASCII files. You put them back into EarthVision and actually do a 3-D model of that time period as predicted by your code.

If you have enough of those, we have an excellent data base from 1991 to 2000, put in whatever they do at 5010 and you can actually assemble those together in EarthVision and animate so that you can actually visualize to assist the analysis with that kind of thought. So the current thought is actually pull data from the forward modeling that will be done and analyze those in EarthVision.

CHAIRMAN GARRICK: I see, I see.

DR. WYMER: George.

DR. HORNBERGER: I'm curious about how the contaminated groundwater now interfaces with first of all the NRC regulations and second of all, how EPA gets involved here because monitored natural attenuation is an EPA concept. For uranium, it would be dilution and furthermore, if EPA is involved, how does therefore millirem per year groundwater standard

enter into this?

MR. SHEPHERD: EPA, at this site, is very interesting. The biggest problem with EPA is the nitrates which clearly are moving to the west toward the site boundary and also to the south towards the proposed institutional control boundary. However, nitrates are not regulated under RCRA. They're under Clean Water Act.

The order at the site is a RCRA order. We have a site specific memorandum of understanding between NMSS and EPA Region 6 to coordinate our regulatory interaction. And I get along very well with my counterpart in Region 6 and up to now we haven't run into any insoluble problems. Because of the difficulty or potential difficulty in finances that I talked about briefly, Region 6 of EPA is determined to treat this site as a potential CERCLA site and they are doing a CERCLA type analysis.

And the kicker would be if Sequoyah Fuels fails to comply with the RCRA order, they would then go under CERCLA for a CERCLA review. Because of the very low population density in the area, as you know, there's two parts to the CERCLA hazard ranking, how much stuff is there and who's going to be affected, who's going to be affected is almost zero in the

ranking system.

We don't believe that it will likely make the national priority list in which case federal EPA would step out of the picture. It will go to the State of Oklahoma because they're both CERCLA and RCRA authorized.

I didn't answer your question about how the four millirem interfaces. We don't know yet.

DR. HORNBERGER: So EPA hasn't turned the RAD portion over to you?

MR. SHEPHERD: No, like I said, they're doing right now a complete risk analysis for both chemical and radiological. Interestingly enough at NRS they issued a RCRA permit to remediate the shallow groundwater which is another reason we agreed not to regulate it under our part of the cleanup. But they included the nuclides under the RCRA order.

DR. HORNBERGER: Just from looking at some of the maps, it doesn't appear as if you have migration toward the Illinois River, so what are the discharge points for the three aquifers involved?

MR. SHEPHERD: Generally, they surface within the site boundary. Certainly, the terrace aquifer surfaces within the site boundary. They said it was like 100 feet from the main process building

down to the Illinois.

The piezometric head of the terrace aquifer is about two feet above the bottom of Pond 2, the large one on the western border. The next aquifer, the bottom of the next aquifer is, we believe, somewhere on the hill. We've had some highly qualified geologists standing there, scratching their heads, wondering exactly which sandstone unit they were standing on.

The consultant to Sequoyah is actually out doing some of additional field work to try and make a scientific determination of that.

We currently believe that unit 4 sandstone goes under the river. So whatever would go in would be above that.

DR. HORNBERGER: So given where you stand now, what do you see as the biggest challenge for decommissioning? Is it the groundwater or is the soil?

MR. SHEPHERD: The biggest challenge I see is the institutional control requirements. What the decommissioning plan said is because of the long-lived nuclides which you can interpret the statements of consideration that even though it says 1,000 years, if we have long-lived nuclides, we're leaning towards the

durable institutional controls. Sequoyah said we would like a party like Department of Energy to do this, to cover about 100 acres which would surround the sale. The sale is proposed to be about the main process building up to cover an area around the ponds.

Beyond that, they would have groundwater restrictions for the amount of time it took the nitrates to reach drinking water levels which they estimated about 200 years, which is interesting because we have indications that the uranium may well follow the nitrates, so we're into how do you demonstrate compliance and do we need to keep the institutional controls and the license in place for 200 years. We don't have an answer to that question yet. And they said if there are other things that are needed.

The physical remediation is not difficult. You get in with a backhoe and you scoop it up. If you get in the water, you pump the water and you treat it and you put the treated stuff in the cell and you let the clean water go.

The real problem is the institutional controls. When we asked the State, the State said we don't know how to spell Sequoyah, we never heard of it before. It's a federal problem, don't call us.

The Cherokee Nation said we have an interest in this area because we believe in protecting the land, this is part of the Cherokee Nation. I won't bore you with the story with the "Trail of Tears", but there's a 14-county nation in Oklahoma where the Cherokee Nation has some authority and this is within that boundary. It's near the southwest corner. They said we do not have any interest of becoming the owner of this land.

The Corps of Engineers, who owns the adjacent property also wrote a letter said we don't have anything within our rules that said we could take over title to this property. That leaves us back to Department of Energy.

Sequoyah came in in January and said well, if you look at the words in Atomic Energy Act, Section 11(e)(2) it says ore is anything from which you extract source material. We extracted uranium, the yellowcake that we brought in the door was about 60 to 65 percent uranium, we ran a solvent extraction process just like they do at the mill and our output is 95 percent plus uranium. Therefore, we're operating just like a mill. Milling is a function that's not a location. We think you ought to call our material 11(e)(2).

That question right now I'm writing a Commission paper that we're going to go to the Commission and basically ask for a policy. Ore is not well defined. The people from uranium recovery said we've always maintained a physical separation between the mills essentially in the west and the rest of the processing essentially in the east part of the country, but that's certainly not a regulatory basis for a decision.

So we're really going to go to the Commission. One of the residual problems they say 80 percent of the waste certainly there's -- the hexafluoride, both the depleted and the natural waste that is clearly not 11(e)(2) in any case, if they propose putting that material into the cell as well as the RCRA material, there's a little bit of arsenic and some copper residual from the solvent extraction process.

DR. WYMER: They're talking about putting it in containers of UF_6 into the cell?

MR. SHEPHERD: Not at this point in time. There is UF_6 residual in some equipment. They believe they flushed it out as well as they can. There are process leaks over the time. If you walk through the building you can see a little yellow shadow here and

there on the cable trays.

DR. WYMER: Of course, that's not UF_6.

MR. SHEPHERD: But there may well be UF_6 stuck in some of the piping, but again, once they cut the piping open it will probably --

DR. WYMER: That's right. When you have air and water, it's no longer UF_6.

MR. SHEPHERD: Although we've seen some cases where it will actually skin enough to hold a pocket under some conditions, but those would be relatively small.

DR. WYMER: I would think.

MR. SHEPHERD: There is some depleted UF_4 in barrels that in the opinion of Sequoyah Fuels belongs to the Army. They said we're a processor. We don't own this stuff and the Army says well, we don't want it. You guys can have it. No problem.

DR. WYMER: I guess we were right in saying this was a complex site.

MR. SHEPHERD: It is.

DR. WYMER: Milt, you got any questions?

MR. SHEPHERD: The reason they proposed 11(e)(2) is that that would give them DOE ownership under Mill Tailing Recovery Act title 2.

The other option is Nuclear Waste Policy

Act, Section 151(b) that authorizes, but in no way compels Sequoyah Fuels, Department of Energy to take sites like Sequoyah Fuels.

We are working on a Memorandum of Understanding with Department of Energy to facilitate transfers under Section 151(b). That MOU is not in place. We're hopeful that it will be there soon. Even if it is there soon, that doesn't guarantee any specific site would be transferred under 151(b).

So we have a lot of uncertainty in both paths and the biggest problem is how do we get institutional controls.

DR. WYMER: The MOU is a broader thing that just --

MR. SHEPHERD: Yes, the MOU will -- well, I could let Robert answer that, but basically the MOU is a vehicle by which sites could be transferred, not a transfer of specific sites. Is that close enough?

DR. WYMER: Okay, all right, well, we probably ought to saw this off. It's been, to me, certainly very interesting. We did, as I said earlier, we specifically requested this presentation because we were interested, but our interest was focused at that time of the request on the application of the RESRAD code and DOD to a complex site and

you've certainly expanded our vision of what's involved here.

So I think with --

MR. SHEPHERD: I thank you for your attention and I hope I brought some ideas that will give you something to think about.

DR. WYMER: Thank you very much.

MR. SHEPHERD: Any time you want to learn more on Sequoyah or in particular on GIS, just let us know. We'll be more than happy to --

CHAIRMAN GARRICK: All right, thank you very much.

I think this ends the part of our briefing that has to be on the record and so we can move to our miscellaneous discussion. We may want to talk a few moments before we think about lunch because we may want to meet through lunch and adjourn later, such that people have the choice of either eating or leaving.

(Whereupon, the proceedings went off the record.)

CERTIFICATE

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

Name of Proceeding: ACNW 127th Meeting

Docket Number: (Not Applicable)

Location: 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 & Co., Inc.

SEQUOYAH FUELS

HISTORY AND STATUS

1

PURPOSE

- TO PRESENT AN OVERVIEW OF SFC
  - HISTORY AND DESCRIPTION OF THE SITE
  - CURRENT DECOMMISSIONING ISSUES
- IDENTIFY PLANNED STAFF ACTIONS

2

SFC HISTORY

- URANIUM CONVERSION FACILITY '70-'93
- SIGNIFICANT OPERATIONAL EVENTS
  - 01/86 UF_6 CASK RUPTURE
  - 11/87 SALE TO GENERAL ATOMICS
  - 08/90 SX CONTAMINATION; FEI
  - 11/92 NOx RELEASE AND END MAIN PROCESS
  - 07/93 DU SHUTDOWN (END ALL OPERATION)

3

SFC HISTORY

- 08/93 SIGN EPA ADMINISTRATIVE ORDER
  - PERFORM FACILITY INVESTIGATION
  - IDENTIFY CORRECTIVE MEASURES
  - REMEDIATE RCRA MATERIALS
- 03/99 SUBMIT DECOMMISSIONING PLAN TO NRC

4

PRIOR OPERATIONS 1/3

LICENSE RENEWAL

- LICENSE LAST RENEWED 08/85
- RENEWAL APPLICATION IN 07/90
  - FINANCIAL ASSURANCE "TO BE ACQUIRED"
  - NO MENTION OF CONTAMINATION
- SX EXCAVATION 08/90
  - UNDERGROUND SOLVENT TANK AREA
  - U CONCENTRATION IN SEEP ~7 g/l

5

PRIOR OPERATIONS 2/3

SUBSEQUENT EVENTS ,,

- 1991 STOP AND PHASED RESTART
- 11/92 NOx RELEASE AND SHUTDOWN
- 12/92 D F I
  - HOW TO DECOMMISSION SITE
  - HOW TO PAY FOR IT
- 02/93 P P C D
  - ON-SITE CELL
  - CONVERDYN

6

PRIOR OPERATIONS 3/3

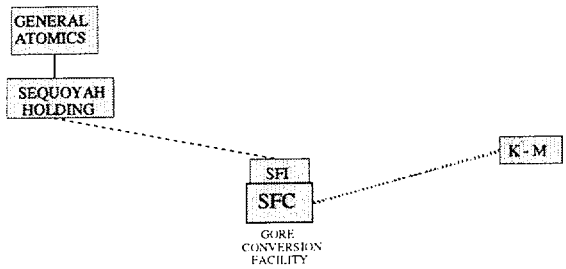
SUBSEQUENT EVENTS 2/2

- 07/93 10 CFR 40.42 NOTIFICATION
- 08/93 WITHDRAW RENEWAL REQUEST
- 10/93 FINANCIAL ASSURANCE ORDER
  - TO SFC AND PARENT, GENERAL ATOMICS
  - PROVIDE $87 M PER FA RULE OF '88

7

CORPORATE STRUCTURE 1/3

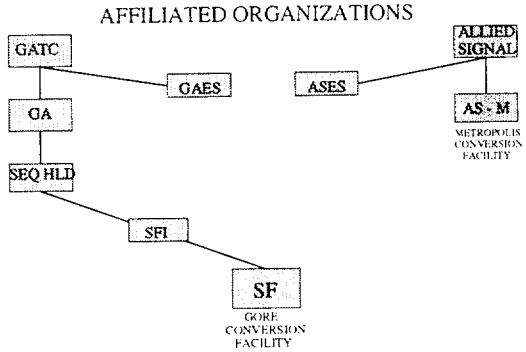
THE PRINCIPALS



8

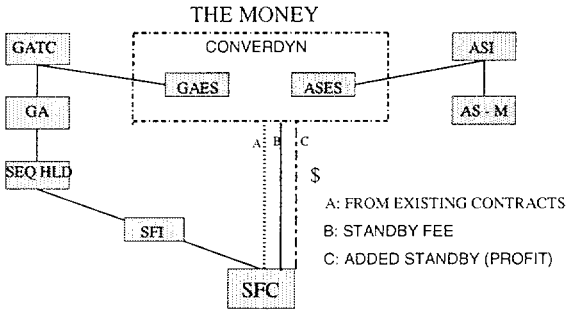
CORPORATE STRUCTURE 2/3

AFFILIATED ORGANIZATIONS



9

CORPORATE STRUCTURE 3/3



10

SFC DECOMMISSIONING 1/4

FUNDING -,

- SETTLEMENT OF 1993 NRC ORDER REQUIRING FULL FINANCIAL ASSURANCE
  - SFC HAS $750K LOC AND PROMISES PRUDENT RESOURCE USE
    - LIMITED ACTIVITIES AND REDUCED STAFF
    - CURRENT SFC CASH ASSETS ARE ABOUT $9 MILLION
  - GA PROVIDES $5.4 MILLION TO TRUST FUND

11

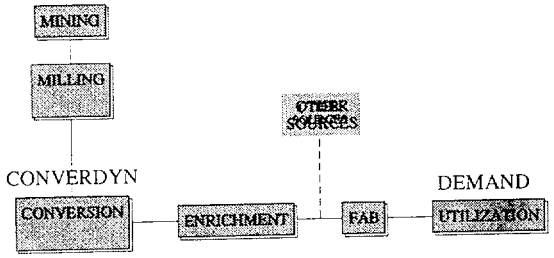
SFC DECOMMISSIONING 2/4

FUNDING 2-

- **CONVERDYN**
  - HAS PERFORMED AS PLANNED (~ $45 M)
  - **PLANS** TO PROVIDE ABOUT $26 MILLION MORE THRU 2005

12

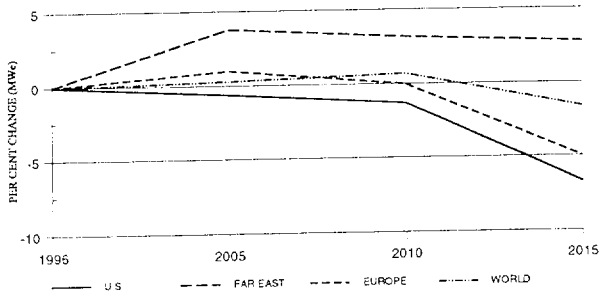
FUEL CYCLE



13

U DEMAND

DOE PROJECTIONS - 1997



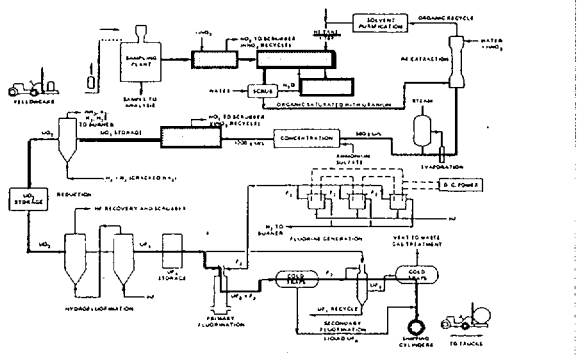
14

SFC DECOMMISSIONING PLAN

- RESTRICTED RELEASE PER 10 CFR 20.1403
  - ALL CONTAMINATION IN ABOVE-GRADE CELL
    - 10 CFR 40 APP. A (MILL SITE) TYPE DESIGN
    - 10-20 ACRE FOOTPRINT + BUFFER
  - BALANCE OF SITE *UNRESTRICTED*
- GROUNDWATER REMEDIATION
  - LIMITED TERRACE LEVEL REMEDIATION
  - REST MONITORED NATURAL ATTENUATION

15

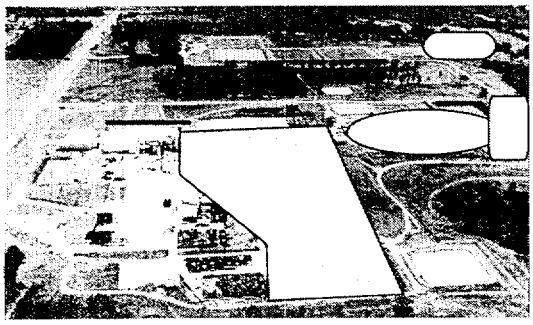
SFC PROCESS



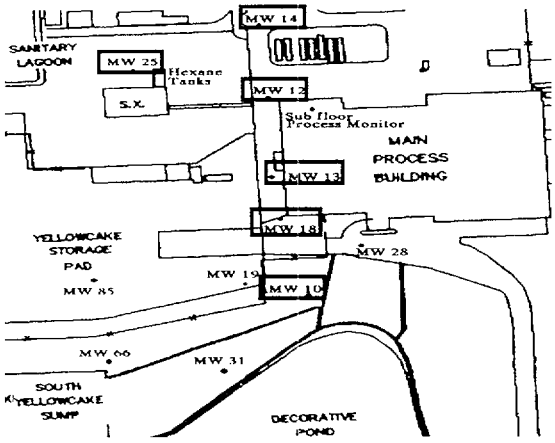
16

DESCRIPTION OF SITE

AND CONTAMINATION



17



18

G

I

S

19

SFC DECOMMISSIONING PLAN

- INSTITUTIONAL CONTROLS
  - IC PARTY "LIKE DOE"
  - INSTITUTIONAL BOUNDARIES (~100 ac -- 40 ha)
  - BALANCE OF SITE WITH WATER RESTRICTIONS
    - ~ 200 YR RESTRICTIONS IN NITRATE AREAS
    - OTHER IF NEEDED

20

AEA 11(e)(2)

- SFC PROPOSES ~80% OF WASTE IS 11(e)(2)
  - MILLING IS A FUNCTION, NOT A LOCATION
  - SFC FRONT END PROCESS IS SAME AS AT MILL
- NON-11(e)(2) DISPOSAL NEEDED
- APPROVAL WOULD MANDATE DOE OWNERSHIP UNDER TITLE II OF UMTRCA

21

SFC DECOMMISSIONING 3/4

COST

- NRC EIS: APPROXIMATELY $950K
- SFC DIRECT DECOMMISSIONING COSTS
  - EIS BUDGET $1.2 MILLION
  - REMEDIATION $22 MILLION
  - POST-CLOSURE $2.2 MILLION
- SFC INDIRECT COSTS: ~ $65 MILLION

22

SFC DECOMMISSIONING 4/4

SCHEDULE

- SFC DECOMMISSIONING SCHEDULE
  - SFC PLAN
    - REMEDIATION 2000-2003
    - POST-CLOSURE MONITORING 2004-2005
  - CURRENT NRC PLAN
    - PUBLISH FEIS (08/03)
    - ISSUE LICENSE AMENDMENT (04/04)
    - TERMINATE LICENSE (12/08)

23

NRC STAFF ACTIONS

- TECHNICAL REVIEW OF DECOMMISSIONING PLAN
- EIS TO EVALUATE ENVIRONMENTAL IMPACTS
- REVIEW 11(e)(2) QUESTION
- APPROVE D-PLAN
- PARTICIPATE IN HEARINGS, AS NECESSARY

24

MAJOR MILESTONES

- PUBLISH DEIS 8/02
- COMPLETE SER 11/02
- HEARING TBD
- PUBLISH FEIS 8/03
- ISSUE AMENDMENT 4/04
- TERMINATE LICENSE 12/08

25

ISSUES

- NO INSTITUTIONAL CONTROL PARTY
- LIMITED AVAILABLE MONEY
- GROUND WATER REMEDIATION
  - RESIDUAL CONTAMINATION LEVEL
  - LONG TERM MIGRATION -- POTENTIAL DOSES
- COORDINATION WITH EPA

26

THE END

27

Interagency MOU on Research and Development of Multimedia Environmental Models

William R. Ott, Assistant Chief, RPERWMB
Office of Research, US NRC

June 21, 2001

Telephone: 301-415-6210 E-mail: WRO1@NRC.GOV FAX: 301-415-5385

Background

- For the past six years, discussions on coordinating activities between DOE, NRC, EPA, and later DoD have occurred.

- In March, 2000, a workshop was hosted by NRC on "Environmental Software Systems Compatibility and Linkage."

- A recommendation was "The relationship between the Federal agencies involved [in the workshop] should be formalized." Also, "No one agency or group should be 'in charge' of this collaborative effort towards a unified system." The effort needs to be a collaboration of equals.

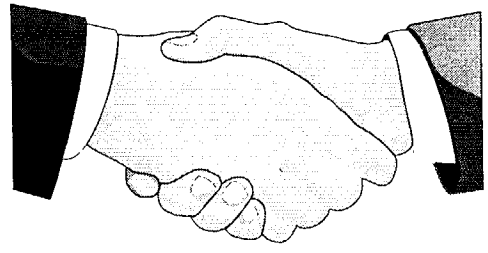
- An MOU on Research & Development of Multimedia Environmental Models has been developed by an ad hoc organizing committee with representatives of six Federal organizations. Five have signed and the sixth signature is expected on June 25, 2001.

- First Steering Committee meeting was held June 18-19, 2001, at NRC headquarters in Rockville, MD.

- Other organizations have expressed interest
  - Natural Resources Conservation Service
  - National Oceanic and Atmospheric Administration
  - Cooperative State Research Ed. And Ext. Service
  - Bureau of Reclamation

US Army Corps
of Engineers®

USDA



USGS

Interagency Steering Committee Members

U.S. Environmental Protection Agency - Gary Foley, NERL

U.S. Army Corps of Enginers - Mark Dortch, ERDC

U.S. Geological Survey - George Leavesley, WRD

U.S. Department of Energy - Teresa Fryberger, ORD/EM

Agricultural Research Service - Dale Bucks, ARS

U.S. Nuclear Regulatory Commission - William Ott, RES

Highlights of MOU

PURPOSE: To establish a framework for facilitating cooperation and coordination among the "participants" in

- **research and development (R&D) of multimedia environmental models,**
- **software and related data bases,**

including

- development
- enhancements
- applications and assessments of site-specific, generic, and process-oriented multimedia environmental models

as they pertain to

- human and environmental risk assessment.

THIS MOU IS INTENDED TO PROVIDE a mechanism for the cooperating Federal Agencies to pursue a common technology in multimedia environmental modeling with a shared technical basis.

The cooperating agencies:

- **seek mutual benefit from their R&D programs,**
- **seek to ensure effective exchange of information between staff and contractors.**

"The R&D programs referred to include development and field applications of a wide variety of software modules, data processing tools, and uncertainty assessment approaches for understanding and predicting contaminant transport processes including the impact of chemical and non-chemical stressors on human and ecological health."

DESIGNATED POINTS OF CONTACT WILL:

- Promote technical coordination.
- Identify joint R&D programs of mutual interest (e.g. working groups) and funding.
- Assist in arranging for supplementary interagency agreements for R&D.
- Facilitate the coordination and exchange of R&D data and technical information.
- Serve as members of a Steering Committee.

PURPOSE OF STEERING COMMITTEE:

Coordinate joint research efforts under the MOU.

Summary of Steering Committee Meeting

- Discussed highlights of MOU.
- Presentations by each participant on their program objectives and plans. (Focused on modular framework activities.) (USGS Modular Modeling System; ARS-NNRCS-USGS Object Modeling System; Army Risk Assessment Modeling System and Land Management System; EPA 3MRA-HWIR and MIMS; interagency cooperation on FRAMES.)
- Discussed proceedings of March 2000 workshop.

- Discussed two working group proposals
  - Software System Design and Implementation for Environmental Modeling - Gerry Laniak, EPA/NERL, Athens & Ralph Cady, NRC/RES
  - Uncertainty and Risk Analysis - George Leavesley, USGS & Tom Nicholson, NRC/RES
- Discussed EPA concerns on peer review and QA/QC.
- Discussed and resolved administrative issues (organization of committee, frequency of meetings, how to deal with additional requests to join, etc.).

Actions of Steering Committee

- Approved rotating chair in order of signing. Period of service one year centered on annual meeting to be hosted by organization of chair. (NRC-EPA-COE-USGS-DOE-ARS)

- Steering Committee will meet at least semiannually by telecon (in addition to annual meeting) or more frequently as needed but will meet quarterly for the first year.

- The Steering Committee will seek authority from the original signers to accept additional members without going back to the original signers.

- An ad hoc group will be formed to develop a position for the steering group to cover the peer review and QA/QC concerns raised by EPA. Gary Foley, EPA, will draft instructions for the ad hoc group and circulate to the Steering Committee for review. Each participant will provide a representative to the ad hoc group.

- The working group proposal for "Software System Design and Implementation for Environmental Modeling" was approved with the reservation that the Phase II proposal should be focused on discrete lines of investigation and prioritized.

- The working group proposal for "Uncertainty and Risk Analysis" was approved with the reservation that risk should be addressed as the context for which uncertainty must be addressed but that regulatory policy on agency approaches to the definition of risk should not be debated. Re-titling the Phase II proposal may be appropriate.

Phase I Working Group Proposal:

Software System Design and Implementation for Environmental Modeling

Scope of proposed activities:

Design and specification of extensible schema for the exchange of data and results between multi-media, multi-pathway modeling components - thus supporting component or framework interoperability and sharing of components and frameworks.

Areas in system software design that could be included:

- GIS linkage
- conceptual modeling tools
- visualization tools
- flexible database connectivity
- component software testing and QA
- framework testing and QA
- uncertainty analysis tools
- analysis reporting tools

Phase I Working Group Proposal:

Uncertainty and Risk Analysis

Scope of proposed activities:

Develop a common understanding of various ways to address uncertainty by: identifying, evaluating and comparing sets of existing tools for assessing uncertainty and risk within MMEM applications; evaluate newly developed techniques such as the UUCODE developed by Dr. Mary Hill and others, MOCOM developed by Drs. Hoshin Gupta and Louis Bastidas, and the GLUE code developed by Drs. Keith Beven and Jim FREER for parameter estimation and uncertainty analysis. Develop

parameter estimation methodologies for use with available digital databases. Establish degree of applicability to all MMEMS and propose steps for enhancing general applicability.

CONCLUDING REMARKS

OPPORTUNITY

COOPERATION

COORDINATION

EXCITING POSSIBILITIES!!!