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UNITED STATES NUCLEAR REGULATORY COMMISSION'S

ADVISORY COMMITTEE ON NUCLEAR WASTE

DATE: Thursday, May 24, 1990

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UNITED STATES NUCLEAR REGULATORY COMMISSION

ADVISORY COMMITTEE ON NUCLEAR WASTE

20TH ACNW COMMITTEE MEETING

Thursday, May 24, 1990

8:32 A.M.

Nuclear Regulatory Commission

Conference Room P-110

7920 Norfolk Avenue

Bethesda, Maryland

The Committee met, pursuant to notice, at 8:32 a.m., o'clock, Dade W. Moeller, presiding.

PARTICIPANTS:

Dade W. Moeller, ACNW Chairman

William J. Hinze, ACNW Member

Eugene E. Voiland, ACNW Consultant

Richard K. Major, ACNW Staff Member

Charlotte Abrams, ACNW Staff Member

Raymond F. Fraley, ACRS Executive Director

H. Stanley Schofer, ACNW Technical Secretary

B. Browning, NRC/NMSS

J. Funches, NRC/NMSS

Phil Altomare, NRC/NMSS

J. Latz, Center for Nuclear Waste Regulatory Analysis

W. Patrick, Center for Nuclear Waste Regulatory Analysis

R. Adler, Center for Nuclear Waste Regulatory Analysis

A. Whiting, Center for Nuclear Waste Regulatory Analysis

PROCEEDINGS

[8:32 a.m.]

MR. MOELLER: Good morning. The meeting will now come to order. This is the first day of the 20th meeting of the Advisory Committee on Nuclear Waste. I'm Dave Moeller, Chairman of the Committee. We have one other Committee member with us, Dr. William Hinze, and then we have one consultant, Eugene Voiland.

During today's meeting, the Committee will; one, have a briefing by the Center for Nuclear Waste Regulatory Analysis on their systematic regulatory analysis or program architecture effort. Introducing that subject will be Robert Browning, Director of the Division of High Level Waste Management within the NRC.

Then that will take us up till noon. Then the Committee will go into closed session to discuss qualifications of candidates proposed for membership on the Committee and then this afternoon, members of the Committee will meet individually with various members of the NRC staff.

Portions of this session will be closed -- the session on new candidates, for example, as necessary to discuss information, the release of which would represent a clearly unwarranted invasion of personal privacy. The meeting is being conducted in accordance with the provisions

of the Federal Advisory Committee Act and the Government in the Sunshine Act.

Raymond Fraley is the designated federal official for the initial portion of the meeting. The rules for participation in the meeting have been announced as part of the notice that was published in the Federal Register. We have received no written statements, nor have we received any requests from members of the public to make oral statements during today's session.

A transcript of this morning's portion is being kept, and it is requested that each speaker identify himself or herself; use one of the microphones and speak with sufficient clarity and volume so that he or she can be readily heard.

Before proceeding with the opening remarks by Mr. Browning, I have several items that I wanted to mention. One; Dr. Terry Lash has resigned as Director of the Illinois Department of Nuclear Safety and that was effective April 6, 1990. The new Director is Thomas Ortciger.

Two; John Austin as been appointed as Acting Chief of the Regulatory Branch in the Division of Low Level Waste Management and Decommissioning. He replaces Michael Bell, Dr. Michael Bell, who has accepted an assignment with the International Atomic Energy Agency.

Three, in terms of immediate items of interest to

the Committee -- and there are many, of course -- but one is that the Commission plans to issue for public comment sometime this month -- and perhaps Bob Browning can tell us whether it's already been issued, but that's the, quote, "Draft Format and Content Guide for the License Application for the High Level Waste Repository," unquote.

Bob, has that been issued?

MR. BROWNING: No, it has not yet been issued. It's still in the final preparation stages.

MR. MOELLER: Okay. Well, the Committee will certainly want to keep abreast of this and the idea is that it will be issued for public comment and hopefully we can follow that process and offer our own contributions as deemed appropriate.

Four, the NRC staff has submitted to the Commission for possible transmission to EPA, a detailed set of comments on EPA's Working Draft No. 2 of their high level waste repository standards. Again, Bob, have those gone yet to EPA?

MR. BROWNING: No, they are still at the Commission.

MR. MOELLER: Okay, again, that is something that the Committee will want to follow. Any of you who have seen those, do realize -- and the staff made the statement themselves -- the staff is very careful; they say they're

not in conflict with the Committee's position. Translated; that means they agree pretty well with the Committee's position. Their comments are in concert and in agreement fairly well with the Committee's positions.

Another item, just to show some things that are developing that I think the Committee may want to put on our agenda for future meeting; I've noted that DOE has issued a report, quote, "TMI II: Lessons Learned by the U.S. Department of Energy." It's DOE/ID-10276, a report issued in March, 1990.

The Committee is interested, obviously, in decommissioning, and this is a long term followup of cleanup of TMI II. It's far more than a routine decommissioning, but I think there's probably a lot that could be learned from hearing about the lessons they learned and delving into that.

Some other example items that I hope that we can cover at this meeting if time permits: Charlotte Abrams attended the Nuclear Waste Technical Review Board meeting on seismic hazards and the need for a standard review plan. I hope that we'll have time to hear a little bit about that.

Gene Voiland attended the meeting on substantially complete containment. We have good written reports in both cases, but it's always helpful to hear the highlights. Charlotte also reported to us on the exploratory shaft

facility subsystem design requirements document. It would be good, maybe, to hear something about that.

Charlotte also was involved -- or reported to us in a memo of April 25th, of the Nuclear Waste Technical Review Board's technical exchange with the DOE on the ESF Alternative Study. Stanley Schofer wrote us on May the 7th relative to volcanic probability calculations for Yucca Mountain, so there are many items. I could go on, but there are many items that I hope we'll have time to at least discuss during this meeting.

MR. MOELLER: Are there any comments, either from Bill or Gene before I move ahead?

[No response.

MR. MOELLER: There being none, then I'll call on Bob Browning to offer some opening remarks, prior to the presentation by the staff from the Center for Nuclear Waste Regulatory Analysis. Bob?

MR. BROWNING: I thought it might be helpful to set into perspective for the whole Center program that the NRC has as to how the particular presentation by the Center that is going to be given to you today fits into the total picture.

I believe you have three handouts. If you could look at the pie chart, one which I believe is the second in your package, Dr. Patrick will be talking about the program,

basically a snapshot of what's going on now during this fiscal year. I thought it would be of help to you to put in perspective where the effort that he's going to be talking about fits into the total Center -- NRC's expenditures at the Center for fiscal year '90.

The portion that is labelled Research is basically the portion that you got into in depth when you visited the Center. At your request, they focused on the research piece of the work that they were doing.

The technical assistance piece, which is the piece that is under my division's responsibility, is of course the larger piece of the pie at the Center.

The next chart was intended to give you an idea of where we anticipate we will be going in the near future. We don't have anything else farther out on the chart because these are the only two years we're fairly well fixed on.

Fiscal year '92 is still in the budgeting process. Nothing's even gone to the Hill yet, whereas the fiscal year '91 numbers are currently being considered by Congress. Again focusing in on fiscal year '90 you can see that both in the TA area and the Research area the total dollar amounts would be increased.

Then with regard to the piece of the pie at the Center that is --

MR. HINZE: Bob, would it be possible for me to

interject a question?

MR. BROWNING: Sure.

MR. HINZE: What are the long term plans here? Do you have long term plans in terms of the relative proportion of the TA versus the Research?

Is this the way it's headed and will stay that way? Is that the way you envision it?

MR. BROWNING: I think roughly the idea is about a third for Research and two-thirds TA as a rough rule-of-thumb.

Of course it depends entirely on what the jobs that we have to do are. I mean we don't make the jobs to fit the numbers. We make the numbers fit the jobs we have to do, so it will depend on some extent on what the needs are in the future, but that's the rough rule-of-thumb that we would be working towards.

With regards to the principal technical assistance tasks that are in the piece of the pie that I have at the Center, the next chart lists the principle Center technical assistance tasks. Rather than get into each one, I'll point out that the last three are the ones that involve the piece of the Center work that Dr. Patrick will be talking to you about today.

I have with me today Phil Altmeyer on my staff who is what we refer to as the Program Element Manager for

the piece of the technical assistance work that is being done at the Center that Dr. Patrick will be talking about.

That is really all I had to say. I just wanted to kind of set the stage for how the piece that Dr. Patrick will be talking about fits into the total scheme of things at the Center.

MR. MOELLER: Any other questions or comments for Bob on this?

[No response.]

MR. MOELLER: Okay, then we will move ahead. We do have several people from the Center.

Dr. Wesley Patrick, the Technical Director, will be leading off, and I know that John Latz is here, who is the President of the Center. We welcome you.

MR. LATZ: Thank you.

MR. MOELLER: Go ahead and introduce yourself.

MR. ADLER: Bob Adler from the Washington office.

MR. MOELLER: I guess step up to the microphone there. It will help us.

Bob of course is here quite frequently with us.

MR. ADLER: Yes. Bob Adler from the Washington office.

MR. MOELLER: Thank you.

MR. WHITING: Alan Whiting from the Center offices in San Antonio.

MR. MOELLER: Thank you.

Well, Wes, the floor is yours.

[Slide.]

MR. PATRICK: Thank you, Dr. Moeller.

We appreciate the invitation of the committee to come and speak about a particular aspect of the Center's technical assistance work that has been underway now for a little over two years, and that is the portion of the work that is the foundation stone upon which we build all of the technical assistance activities that the NRC has tasked us to do at the Center.

That is a piece of work that is referred to as the "program architecture" and also a more recently coined term that we will be referring to and discussing this morning, the "systematic regulatory analysis."

Our briefing this morning will focus on those two general topics.

[Slide.]

MR. PATRICK: We will be following the briefing charts which have been provided to you in hard copy form as we go along.

MR. MOELLER: Say, Wes, on this, just one comment.

We had seen the words "program architecture," you know, for a number of months now and I've found the words said nothing to me and I am glad to see the change and yet

even the change might still be subject to change.

Who coins these phrases?

I would think a clear statement of what you're doing would help us all -- you know, for each project.

MR. PATRICK: The words, and we'll be defining them as we go along this morning, Dr. Moeller, the words have as their origin the subdiscipline or the integrating discipline of systems engineering.

MR. MOELLER: Okay.

MR. PATRICK: It like most every other field of technical and managerial and scientific endeavor has its own lexicon.

MR. MOELLER: Okay.

MR. PATRICK: This is no exception to that. Those of us who have been around the geological sciences perhaps are more familiar with a whole other set of units and terminologies than what we find ourselves using here in the systems engineering environment.

One of the main purposes of the briefing this morning though is through giving an overview of the systems approach you get at the hear of defining those terms, trying to make them more meaningful to you as a committee so that as you hear them in the future and if further modification of those terms is appropriate we'll be able to speak with a comment language and with a common understanding as to what

these particular words mean.

There will be three basic parts to the briefing.

I would certainly leave it to the committee to determine where in this process is the most appropriate place to break, but perhaps a good breaking point is after the second bullet.

There is a natural, logical break there if timing runs accordingly.

Basically we will speak to the three areas of an overview of the systems approach which the Center is undertaking on behalf of the NRC; a very brief statement of both some accomplishments to date and also looking to the future, some of the broad, general things which we hope to gain out of the systems approach; and then the third area of discussion will focus in on one particular accomplishment, namely the completion of a systematic regulatory analysis, Part 60 of Title 10 of the Code of Federal Regulations.

Under that third bullet it's indicated we'll discuss both the analysis method, the summary of the results and also present to you some recommendations which we have presented to the Staff and have briefed the Commission on the 30th of March of this year.

[Slide.]

MR. PATRICK: The starting point should be an understanding of why it is important to undertake a systems

approach at all. We believe that there are a number of reasons. And the staff believed as well there were a number of reasons for taking this fundamental approach.

That believe was seeded and expressed in the original request for proposal, which was issued for this contract for a Federally-funded research and development center, which is now a resident at Southwest Research Institute.

The bullets indicated here [pointing], and there are some seven in number, give a flavor of the type of program that we are dealing with.

The high level waste repository licensing program is one which is technically very sophisticated. It is complex, both in institutional terms and also in technical terms.

The inter-related components of the program, we feel very strongly, need to be integrated if the health and safety of the public, both in the short term and in the long term, is going to be optimized.

We note here [indicating] several of those components. The process begins with at reactor storage. Continues through the presence and operation of any monitored retrievable storage system, should it be needed. Independent spent fuel storage installations (ISFSIs) at the reactor location.

The geologic repository itself which is certainly the focus of our activities right now. And any transportation systems which may be used to transport waste from the reactor director to a geologic repository. Or as an interim step to an MRS and from there to a geological repository.

The third bullet indicates as does the fourth, some of the infrastructure that surrounds the high level waste program. Namely, the formal administrative law process that is present, which we have had some experience in licensing nuclear reactors. But a unique feature now is that there is a multi-party evaluation process where the principal parties to the process are all funded out of the nuclear waste fund. So we have a case of funding of the interested and affected parties to the high level waste licensing program.

Those speak to some of the institutional complexities. In addition to those, there are a number of committees and boards who have been spoken into existence to play a role in both the monitored retrievable storage system and the repository itself. Some of those are noted here.

Needless to say, there is intense public scrutiny in the program. We feel that that is one reason why a very systematic approach should be taken to the business of licensing a high level waste repository. So that very early

in the process, very early in the program, all of the requirements are established, clearly stated and are there before the public for public interaction, public scrutiny. So that there are no implications or innuendos that rules have changed late in the process. Perhaps because we find that there was something missing in those rules to begin with.

Certainly, the rigors of the schedule indicate that there is very little time in a program such as this to make errors, to go down wrong paths and have to back up and redo the work.

Specifically, Congress has stated that there is a three-year period of time following the submission of the license application during which that application must be acted on by the NRC. A potential is provided for a one-year extension of that three-year period for a cause.

All of those seven factors, and I am sure a number of others, work together to introduce risks into the program from an NRC program management perspective. We are talking here not of health risk so much, as programmatic risk. Things that could slow the process down. Things that could keep us from meeting the Congressionally mandated three-year period of time. Things of that nature.

When we look at a program that is that complex, that has that many parties involved in it, that has such

tight schedule constraints, it seems an appropriate set of conditions to cause us to undertake a rigorous analysis, a systematic analysis using some of the principles that have been developed over the years, and used effectively. In, for instance, the aerospace business where similar complexities, risks and schedule constraints have existed.

[Slide.]

MR. PATRICK:

With that as background then, we have embarked upon under this contract, a systems engineering approach to the licensing process which has five primary features to it. They are indicated here [pointing] on the left-hand column with explanation on the right-hand side.

The first two, mission oriented and requirements base, speak to the matter of taking a top-down systems approach which focuses on the issues at hand that limits to the extent that we possibly can, divergent paths of evaluation and pursuit.

The requirements-based aspect tells us that there are two primary regulations regarding a repository which we need to consider. Namely, NRC's own regulation, Part 60 of Title 10. And then EPA's general standards for the environment which are found in Title 40, Part 191. Pertinent parts of which are incorporated by reference in Part 60.

MR. MOELLER: Excuse me a second. You, of course, are an NRC entity, I guess is the word, and so you focus on 10 CFR 60. But as a result, I guess in reading your material that was provided to us, I did not do this, but as a result of your review, have you come up with specific changes or deficiencies that exist in 40 CFR 191?

MR. PATRICK: We have not yet done a complete and thorough evaluation of Part 191, for a couple of reasons. One, is as you are well of it has been remanded --

MR. MOELLER: Right.

MR. PATRICK: -- and we are not certain what changes are going --

MR. MOELLER: Right.

MR. PATRICK: -- going to be incorporated in the revised rule. We do monitor the development of that. And we have provided comments to staff --

MR. MOELLER: Okay.

MR. PATRICK: -- from our own perspective on it. Particularly, the performance assessment aspects of --

MR. MOELLER: Right.

MR. PATRICK: -- of 191.

MR. MOELLER: Well, it just occurred to me -- well, I guess that is a way of saying it -- but that your analysis might very well be extremely useful in terms of 40 CFR 191. Okay. Thank you.

MR. PATRICK: We have analyzed it. And we will see as we develop it a little bit further in the discussion, particularly the third part of the briefing.

We will see how regulatory institution uncertainties are identified --

MR. MOELLER: Uh-huh.

MR. PATRICK: -- and characterized --

MR. MOELLER: Uh-huh.

MR. PATRICK: -- and dealt with.

Most of what we see in Part 191 appear to be more to the technical side --

MR. MOELLER: Uh-huh.

MR. PATRICK: -- issues dealing with the technical implementability --

MR. MOELLER: Uh-huh.

MR. PATRICK: -- of that stand, rather than any direct or fundamental regulatory uncertainties within the ruling.

MR. MOELLER: Dr. Hinze.

MR. HINZE: I was curious following up on Dr. Moeller's questions. What are your plans for getting further involved in the review of the revisions of -- the second revision -- the EPA standards? What kind of plans do you have? Do you see instructions coming down from NRC to get further involved in these? What can we look forward to

coming out from the Center on this?

MR. PATRICK: Our participation falls into three categories there. One, specifically with regard to the re-promulgation of the standards. We have a role of to-date, and I anticipate that it will continue in this thing, we have a role of rather informal review and interaction with the NRC's staff.

We do not provide a formal commenting. And have not, to-date, provided formal commenting on the rule. When the rule is reissued, I anticipate that we will be asked to formulate, go through, and analyze in detail, that rule.

The second part though, is perhaps a good deal stronger than that. We have several tasks that are looking at particular portions of the implementation of the EPA standard. Things such as the use of expert judgment dealing with technical uncertainty and so forth. There a number of tentative technical positions that examine technical matters that are germane to the implementation of that standard and how it might be developed as time goes on. So that is a second aspect of it.

The third aspect, of course, is how we analyze Part 191 in the context of 10 CRF 60. And that certainly that systematic regulatory analysis will be undertaken as that standard is re-promulgated. So those are three areas in which the Center participates. The second and third of

those being some of our stronger participation, stronger inputs.

MR. HINZE: Is this a general project for the staff, or do you have certain members of your staff that are focused in or will focus in on this?

MR. PATRICK: There are certain members of the staff who are focused in. A primary portion of it comes under our program element for performance assessments specifically.

Dr. Budhi Sagar has recently joined our staff from PNL. He is heading up our involvement within that effort. He is contributing to all three of those areas and is pulling in other staff members as part of the team in a matrix fashion to address each of those items. He will be the coordinator, doer, manager of those activities as times goes on.

He, of course, will be assisted by a number of people in the different technical areas.

MR. HINZE: Thank you.

MR. MOELLER: As you move along though, one of your objectives is, is it not, to determine whether Part 60, if implemented, would assure that EPA standards are complied with; am I correct?

MR. PATRICK: I would perhaps want to defer to the Staff on the exact way that I would want to phrase that.

That is correct in its substance. It's important, I think, to recognize that from our understanding, the Staff's view is that Part 60 is complete in and of itself.

The incorporation of Part 191, via 60.112, requires a compatibility between those regulations. So, certainly someone from the NRC side correct me if I'm wrong. I'm trying to clarify that the key, from our perspective and our understanding, is that it is Part 60 that is the document from which the evaluation of the application will be made.

MR. MOELLER: Sure.

MR. VOILAND: 191 is a player to the extent that it is incorporated by reference.

MR. MOELLER: Well, one example, and we've discussed this before with the Staff and I'm sure we've had answers on it, but just as an example of compatibility of Part 60 with 191; 191, of course, has a table and they list specific nuclides and specific quantities the leak rate or whatever you want to call it -- the release of these specific radionuclides to the accessible environment; you shall not exceed the quantities, you know, listed in -- or have a no greater chance of one in something of exceeding those quantities or ten times the quantities and so forth.

Well, at the same time then, in Part 60, you have the release rate shall not be more than one in ten to the

fifth of the quantity of each radionuclide after a thousand years of decay. A question that continues to remain with me is whether those two components are compatible.

My question is; ultimately, will you be looking at items such as that?

MR. PATRICK: Yes, it is our understanding that we will be, and I think it's probably a subject for another entire meeting. I know you've had a number of meeting on this subject. The question is how one treats subsystem performance requirements in the context of overall system performance requirements.

That, incidentally, is an area where we feel there is quite a good analogy to be found in the way in which the aerospace industry, NASA and the private portion of aerospace has dealt with such systems performance requirements. As it turns out, many of our normal intuitive processes of thinking that each of the subsystems, taken together, should sum to one in terms of performance is, as it turns out, not correct, at least from the standpoint of how systems engineers in aerospace have dealt with it.

Typically, subsystems will more than satisfy some higher level requirement with regard to certain aspects of functionality, but any one subsystem may fall far short of being, quote, "compatible," unquote, with a higher order of

standards. It is only when those subsystems come together in combination that they become truly compatible or supportive of the overall system performance requirements.

MR. MOELLER: I agree that that would be a very interesting subject to discuss. Thank you. Gene Voiland has some questions.

MR. VOILAND: It seems that in the description of the technical assistance tasks that there has to be some sort of inherent consideration of the EPA standard. I notice that recently, there was a direct request, essentially modifying the technical assistance associated with the quality assurance to consider the Revision 2 of the EPA standard.

Does this mean that you will conduct an overall complete review, or will it be specifically related to quality assurance? How does this affect the program that you have underway at the present time which embodies looking at the standard and keeping the standard in mind at all times? This was a very recent thing, I think, maybe just May here. Can you comment on that?

MR. PATRICK: Mr. Voiland, I'm not certain which piece of paper you are examining here that is discussing performance assessment in the context of quality assurance? Is that the -- do I have the question correct?

MR. VOILAND: Well, the purpose of this memorandum

is to request assistance from the Center to review Revision 2 of the Department of Energy, Office of Civilian Radioactive Waste Management Quality Assurance Plan. It goes on to say something about that.

MR. BROWNING: Maybe I could help here. I think what you're focusing in on are some of the other principal technical assistance tasks that I had on my sheet. It's outside and kind of independent of the scope of what Dr. Patrick is talking about.

In a perfect world, we would have been through this whole process he's talking about, and then react to what the outside world gives us, but we're not there. We get things and we have to react to them in the absence of having the systematic regulatory analysis thing in place.

Now, to the extent that they can draw on what they've done, they obviously do that, but we can't wait for this process to go in order to react to the documents that either DOE gives us, or EPA gives, or maybe you people -- you know, whatever the outside world gives us, we have to react in the context of what we know at that particular point in time.

If I had had my druthers, I would have had this contract in place ten years ago, have been through this process and then I'd be ready to react. But in the real world, we're trying to catch up. As a matter of fact, just

for your perspective, the so-called delay in DOE's program is a godsend to us in a way because it hopefully will allow us to go do the regulatory analysis work upfront, before we go do a lot of our reactive and proactive work. At least it will help us to get in that position.

You are really kind of focusing in on some of the earlier bullets on my chart. What I'd recommend is that if you could kind of hold off, because you're doing exactly the same thing I do; I want them to apply this to my day-to-day work before it's done.

That's a problem for them because they have limited staff, just like I do, and when you're off reacting to something, you're often not doing this systematic approach. That tension is there within my program element, and it even impacts the research folks to some extent, because they've got a limited staff. I don't know whether that helps or not, but you're doing exactly what I try to do. Why aren't you using this to give me a reaction to that, and they're still in the process of doing the systematic thing that they have underway.

MR. VOILAND: It's a kind of bootstrapping operation?

MR. BROWNING: Right.

MR. PATRICK: If that addresses that, I will pick back up on this slide for what Bob Browning just indicated.

He referred to how so much of what we have to do, both this staff and our's, is react to the nature. This part of the program needs to be and is inherently proactive in the sense that it seeks to identify the sufficient guidance that must be provided to the Department of Energy and provides that guidance in a timely and consistent and coherent manner, as early in the process as possible.

The basis for integration is a key aspect of the systems approach, and integration very often is thought of from a hardware perspective or an informational perspective where one fits the individual pieces of information together in some context. We have found that integration organizationally is at least as important as those sorts of functional integrations.

By that, I mean it's extremely important that the research work and that the technical assistance work; that the reactive commenting on DOE's study plans and SCPs and so forth, and the proactive business of doing a systematic regulatory analysis; that all of those things and the organizations responsible for accomplishing those things, are fully integrated with one another.

Finally, needless to say, it is dynamic in the sense that the systems approach will allow and adapt to -- and in the ideal case -- even examine or identify ahead of time, some of the changes that could occur within the

program.

[Slide.]

MR. PATRICK: With that as a piece general background information on the systems approach that's being taken, I'd like to take, with the next several charts and viewgraphs, the opportunity to explain some of those words that Dr. Moeller had some questions about earlier on, specifically three terms: program architecture, systematic regulatory analysis and the program architecture support system.

The first chart -- and we will be bouncing back and forth to this one as this portion of the briefing progresses, gives a very simple definition of what we mean by program architecture. It is the system description and it is also the framework for the overall program, the NRC High Level Waste Regulatory Program.

The concept of a framework may be helpful to you in understanding what the sense of the architecture is in dealing with these words. We might have called it, instead of program architecture which is the systems buzzword -- we might have called it the NRC Program Framework. An important aspect to recognize is this program architecture, this framework, is not the Center's framework, but it is something that the Center is developing under contract to provide the NRC with a framework which they can use, to the

extent that they see it appropriate, to organize and guide and integrate their own program.

There are three particular aspects of the program architecture, and in the following three briefing charts which have a variety of different shadings applied to them, we'll address each of those three in turn. The first part is the assessment of the statutory and regulatory responsibilities of the NRC by means of what we call a systematic regulatory analysis.

[Slide.]

MR. PATRICK: I direct your attention to a chart which you perhaps have seen in several of the Center's publications over the years. It's a 22 step process which is what we refer to as our program architecture process. I draw your attention to this first unshaded portion of the diagram, going from Steps 1 through 15-A.

This is the part of the program that we refer to as the systematic regulatory analysis.

[Slide.]

MR. PATRICK: If you would skip over the next two charts for just a few moments -- the next two charts that are in your handout -- and take a look at a word chart here on the Systematic Regulatory Analysis, we can see the types of things that are done in those process blocks, from Step 1 to 15-A.

The short definition of Systematic Regulatory Analysis is the process for analyzing the NRC statutory and regulatory responsibilities in a comprehensive, systematic, structured manner -- comprehensive in the sense that it addresses the entire breadth of the regulatory and statutory responsibilities, be it for the repository, transportation, monitored-retrievable storage system or whatever. It is systematic in the sense that it is a top-down approach which begins with the highest order of statutory requirements that are placed on NRC, and proceeds down through its own regulatory guidance documents, down through technical positions and so forth.

It is structured in the sense that it is operated -- the Systematic Regulatory Analysis is operated, controlled and developed using a set of formal, technical operating procedures and supporting quality assurance and administrative procedures which guide the complete conduct of the work. The first step in the SRA portion of the process is identification of the statutory and regulatory requirements.

As I've indicated before, the entire life cycle of the back-in the fuel cycle, the waste portion of the fuel cycle, is addressed by or could be addressed by the statutory and regulatory requirements.

MR. MOELLER: Excuse me. On that one, to be sure

I understand; when you say "identify," it's not that the Center is setting down what the goals should be for the repository? It's that you're extracting from the existing laws and regulations and so forth, what those requirements are?

MR. PATRICK: That is correct, with one exception, which you will see as we go on today in the third part of the briefing. Identification is primarily selecting from those statutes and regulations which currently exist, organizing them in a logical fashion, using a systematic approach, but there is no presupposition that either the statutes or the rules are perfect.

In that regard, there is further work that can be done to identify gaps, omissions, insufficiencies within the current regulatory framework, that perhaps need the further attention of the NRC.

MR. MOELLER: Good.

MR. BROWNING: Wes, maybe at this point, too, while you're talking about the total system, it would be useful for me to point out to the Committee that because of time and resource constraints, plus the level of uncertainty we have about the three basic elements -- the repository, the storage and the transportation, we have directed the Center to concentrate on the repository piece. So, although this approach could be used to look at the whole thing,

right now, because we need to move most quickly, we think, on the repository, and we have the least experience in implementing regulations and requirements in that area, we've asked them to concentrate on that piece. You ought to understand that.

MR. PATRICK: Having identified what the statutory and regulatory bases for the program are, the next step is to go into identifying and evaluating an uncertainties that may exist within those portions of the regulations and statutes that govern, in this case, the focal point, the repository.

Continuing then through reduction or resolution of those uncertainties, development of regulatory and technical bases for guidance documents; that might be the technical basis for rulemaking, a technical basis for developing a staff position. We're doing a number of activities on the technical assistance area regarding a couple of key uncertainties -- substantially complete containment being one of those, one that is of a good deal of interest right now.

We're also examining the technical basis for groundwater travel time in that portion of the regulation. Finally, the last step in the systematic regulatory analysis, is the development of the strategies and the methods that will be used for determining whether or not DOE

is in compliance with the regulations.

MR. HINZE: Excuse me, Wes. In that evaluation, is that synonymous with prioritization? If so, what are you criteria of prioritizing?

MR. PATRICK: Speaking at this stage?

MR. HINZE: That bullet, right.

MR. PATRICK: Prioritization, we feel, is a very important aspect of the entire process. There is perhaps in some ways too little attention paid to prioritization. We also recognize that it's important that one not try to prioritize everything. We found some cases, for instance, where the work itself can be accomplished in a relatively short period of time, and it's not worth dedicating the resources to trying to sort among which of three things should be done in the next six months, when you believe that you can get all three of those done within that six month period of time.

Much of what we see in the program today, though -- there is much more to do than we can possibly accomplish with regard to reducing some of these uncertainties. That brings us to the second part of your question; namely, what criteria should be used? We're currently grappling with the Staff together on that issue. What things might lead you to want to address one uncertainty sooner than the others?

Certainly, risks to the licensing process is an important criterion to use; likelihood of earlier identification of problems at the site is another criterion that is likely to play into the assessment. We basically use three broad categories of criteria. One is a measure of importance. Typically, we have to break that down and examine specific attributes of importance.

Radiological health and safety risk ends up being one of the key measures of importance. The second area is timeliness, and that deals with such matters as lead times needed to conduct the research that will lead to the technical basis that the Office of Nuclear Material Safety and Safeguards will use in building rulemaking. Matters such as that play into that second broad category of timeliness.

The third one is the matter of durability. Staff positions do not have the force of law and therefore may not be sufficiently durable through the licensing process. Rulemakings, on the other hand, because of the public scrutiny to which they are subjected, tend to be very durable means of reducing uncertainties. Those three broad categories; importance, timeliness and durability, are ones which we used a little over a year ago in an early assessment that we did of priorities of uncertainties and the order in which they should be reduced.

I would imagine that those three broad categories will continue to survive through our future prioritization activities. What specifics will come under those three broad categories, is really being debated at this time. What are good measures of importance, for instance?

MR. HINZE: Well, perhaps I'm getting ahead of your story, but we'd be interested in finding out where you are in terms of the prioritization process and what your plans are for the future.

Going back to my original question then, that second bullet really involves a prioritization; is that correct?

MR. PATRICK: As we will see as we go on, we break the broad uncertainty evaluation process down into three steps; first, to identify what the uncertainties are; second, to characterize the uncertainties; to find out how severe they are and so forth. It's in that second stage that one does prioritization. We are just beginning to get into that stage at this point.

The third stage is the actual reduction of those uncertainties. Really, we're kind of at the identification stage and the early phases of the evaluation. As we fully develop the evaluation, you're correct, we will be doing prioritization to the extent that NRC feels that that's needed for those particular uncertainties.

That is pretty much a judgment call in terms of whether they feel the formalism of a prioritization is appropriate for those types of uncertainties. That basically a management decision rather than a technical decision.

MR. HINZE: As a result of your identification, this first stage, are there any items that as you have gone through this, that are obvious, of very high priority, that you have recognized and passed on to the staff?

MR. PATRICK: Yes, we have. We speak to those in the Center report No. CNWRA 90-003. I think one of the pleasing things, I am sure from the NRC staff perspective and also pleasing from our perspective as well, is that many of the high priority high concern areas have been identified independently by the staff in the early years, matter such as water travel time, complete containment and so forth.

Any additional ones which we have identified, we have also passed on to the NRC in the form of that formal document as well as the informal discussions that preceded the issuance of that document by several months. So those have been passed to the staff.

MR. HINZE: I am curious. Did you identify any that were not obvious to the staff as a result of your deep investigation of the CFR?

MR. PATRICK: There were some in Subpart (e) which

was actually that part of the analysis of Part 60 was completed a little over a year ago. There were some in there that had not been identified at the time and are currently being examined.

There are aspects other than just the identification that we feel are important. Single uncertainties are not the only issue as it turns up. When you begin go see clusters of uncertainties dealing with a topic and you begin to correlate those to documents which the Department of Energy is producing. For instance, the site characterization plan.

We found that some of the problems, in fact, many of the comments that we provided to the DOE and staff provided formally in the SCA, many of those comments in our interpretation have, at the heart of them, a misunderstanding of what some of the siting criteria are calling for. So we are seeing those kinds of aspects.

Personally, I would put that in the category of very important observations that DOE and its staff of scientists of extremely bright and talented people, somehow are not finding it clear what the NRC has asked for in certain portions of the regulation. I think that is an important correlation to make, if you will, that the problems of the SCP could very well -- many of those problems in the SCP -- could very well be founded in a

misinterpretation because of ambiguities that exist within Part 60. So I would put that as one of the more important things that we have identified.

Another one that I would put on the list and in a sense begun to be dealt with by the NRC staff, is the relationship of Part 60 to the mining regulations. That is an area which has begun to be addressed by NRC staff.

MR. MOELLER: Well, this raises another question, though, and I had planned to hold it until the end, but it seems appropriate now. Do copies of your reports go routinely -- are copies routinely transmitted to DOE and to EPA?

MR. PATRICK: We submit to the NRC --

MR. BROWNING: On final reports, they clearly will be. We will be giving them the same kind of distribution we would on any contractor new reg report.

There is a lot of draft and informal back and forth to make sure we all understand each other. And that kind of stuff, does not -- it would inundate people with preliminary stuff. And I do not think it would be very useful.

I wonder if I could interject here, just for a minute West, because I think that maybe at the heart of Dr. Hinze's question is, is the resources or are the resources that are being expended on this particular effort, paying

off with regard to giving the staff insight as to where we ought to be focusing our efforts? I think the question is, without question, absolutely yes. There has been a lot -- there is a lot of question within the NRC as to whether this program architecture approach was worth it. Why can't NRC -- it sounds like -- well, gee NRC management ought to be able to do this from the seat of their pants like we normally run things.

I was kind of nervous, in fact, by the effort because in a way it is an independent check as to how well my staff and my management was sizing up the problems and dealing with them. So in a way we were gratified because there was not a large disconnect. But we did get valuable insights, and are still getting valuable insights out of this exercise.

I think you guys have seen it because you started to see products we were generating on our own independent of this process. And they were not very good. I will face up to that. We pulled back the proposed rulemaking on anticipated and unanticipated events when it became obvious to you guys and to us that it was not very good. It was not on the mark.

I think -- that is why I get back to my point that if we had done this first and then be able to work on our stuff, we would have been in better shape. But we could not

wait. We had to start pursuing and dealing with the things that appeared to us from a management standpoint to be the key things we needed to do to get out own act together. And to provide guidance to DOE and to be able to react meaningfully when they did produce something. It is not in sync the way I would like to have it, but we are starting to catch up. This effort is going to help us immeasurably. I do not know whether that helps the comment.

When you go back to our strategy document which we issued in October of 1988, SECY-285, if I recall the number correctly. My memory for numbers is failing whereas Dr. Patrick's is never ceases to amaze me. That strategy document was demanded by our EDO and the Commission in advance of this effort. We said, "No. We want to wait until this effort is done and then do it." They said, "Nope. We want to see what you are doing on your own."

This next cut which is about to come out shortly which is an update to that strategy document will start to show the input from using the product that is coming out of the Center's effort. It will start to show how that is evolving based on this additional input.

I think where you are really going to see it payoff is in the consolidation and the better technical foundation for any rulemakings or any technical positions that we start producing when we can use the results of this

process and fold it into our process.

I think the other thing might be helpful for you in terms of the context of how the NRC staff relates to the Center work. When we were bringing on the line, I think you recalled when I briefed you about the risk I ran where I was cutting off my technical assistance contractors and moving over to the Center. There was a period there where I was very vulnerable. I was going to depend on my own staff to do the reactive work and the pro-active work we were doing. You have seen the results of that. It was good work to the extent that we could do all of that stuff in parallel. But this is going to help us immeasurably. That is why you see rules and technical positions that we previously said we would have by date certain. We are pulling back from that because this exercise is providing us a much firmer foundation for that kind of a work.

MR. MOELLER: Thank you.

MR. BROWNING: Is that enough to answer your question?

MR. MOELLER: Yes. And I was going to offer the comment earlier -- Gene Voiland is our QA expert, and each person defines QA in a different way, but I view the center as almost providing a QA review of the staff's work. Do you see it at all that way, Gene?

MR. VOILAND: I think certainly from the point of

view that it's an individual tack, you might almost look at it from that point of view. It's an overview calculation, if you will.

MR. MOELLER: That's what I meant.

MR. BROWNING: Yes. I think, with regard to something like 285, it clearly is, but from now on, it's going to be an integral piece of the work. So, hopefully, it'll end up being a coordinated effort where we've got input we need to do a first-class job on our rules and our technical positions. It's a very valuable tool which is starting to get to the point where it's really starting to pay off.

MR. HINZE: As I see it, the Center would very much like to, and I can understand that, have a systems approach to this whole problem, and that would call for identification, prioritization, reduction, and so forth. But in some cases, it would seem to me the timeliness problem doesn't permit the luxury of that kind of organized activity.

That's one of the things that I was getting at, is that as one goes through this identification process, that there certainly is an inherent prioritization or evaluation that comes with that identification, and passing that kind of thing on and red flagging particularly critical items early on I would think would be very important to the staff

and to the whole process that we're looking at.

MR. PATRICK: You used the term "inherent." I would perhaps say "intuitive." There is an intuitive sense that one has of what is important and what is not, and certainly when we come upon those things, we do not wait for the next report to come out before we communicate with our sponsors.

MR. HINZE: The structure should not be that formal so that you have to wait for that. That's one of the things I was getting at.

MR. PATRICK: In fact, that's one of the things that one always has to keep in mind in undertaking any type of an approach to any problem, be it systems, engineering or whatever, and that is always to keep in mind that whatever approach you're taking is supposed to be enhancing the process rather than impeding the overall process, and that's certainly something that we're very cognizant of.

Anything else on this matter?

MR. MOELLER: Gene, I guess that the emphasis really here is on a process, this process of going through from start to finish. Hopefully, when you're done with that process, you will have a very sound licensing position that produced a good product. It really doesn't identify the elements, the technical elements that go into that where I think you do the prioritizing.

For example, you can adopt the position that you will look at everything, which isn't very efficient, or you will adopt the position that you will try to restrict those things that are important. But in either case, it seems to me you are going through the same process. Is that a correct understanding of what this is about? I look at this as a process, and somebody else is going to take this process and apply it to the problem.

MR. PATRICK: It is a process. The somebodies, though, are the NRC staff and the Center staff. The process, more than being just something that is completed and delivered and stands on its own, it really is a way of doing business, and that is a concept from Aerospace as well as other parts of the industry that's a very important one.

Systems engineering is an approach to problem solving, if you will, an approach to not only planning and managing the work, but also accomplishing the work. You indicated in your earlier remarks that it does not include technical aspects. Well, that's not so, as it turns out.

This same way of doing work, this systematic approach, this process, has as one of its purposes rooting out those technical issues, and, as indicated here, identifying what are really technical strategies and technical methods for determining compliance with the regulation. So, it has very strong technical components

imbedded within that process.

Just as a chemical engineer's approach to process plant development would have very strong technical components to it, this kind of a systems approach to the regulatory process also fully incorporates those technical components of the program.

MR. VOILAND: Does your organization address those technical components?

MR. PATRICK: Yes, sir, as does the NRC staff. Very strong pieces of the technical assistance work in those areas, starting with the development of the technical basis itself, assessing the feasibility, the doability of implementing certain portions of the standard, be they subsystem requirements or system requirements, finding out how the NRC staff, assisted by the Center, would actually review a license application; what types of codes and analysis methods need to be present judging whether such methods are present and are adequate at this time, and, if not, determining whether DOE should be guided to develop such methods, or if the staff has a role in developing such analysis methods itself.

In most cases, the answer is it's DOE's work to do the full technical development, but in several areas, we have found it appropriate for the NRC and the Center to engage itself in developing some of these analysis methods,

so that we're prepared and knowledgable and able to provide an independent review of the license application as is required by the statutory provisions for NRC.

Does that help?

MR. VOILAND: For the moment.

MR. PATRICK: For the moment.

MR. VOILAND: Okay.

MR. PATRICK: Okay. Just to recap then, we've been talking about the first part of the program architecture, the program frame work, namely the systematic regulatory analysis portion.

[Slide.]

MR. PATRICK: The next two portions we will hit rather lightly this morning. They deal with the program planning, which includes the evaluation of alternatives, trade-off studies, and so forth. It is within that portion of the program that most of the prioritization and evaluation of alternatives takes place, and that's in this unshaded portion indicated here.

Now depending on whether you were brought up with systems engineering, or what particular flavor you were brought up with, you might shade one or two extra blocks or fewer blocks on one side or the other.

I don't want to engage in a debate of those this morning, but the important part is that there is this second

phase after the systematic regulatory analysis has been completed where the normal planning and managing and prioritization functions have to kick in to guide the program so we don't fall back into the extreme case that Mr. Voiland was just addressing, namely, try to do everything, because we know there is not sufficient resources to do everything. There must be some mechanism for focusing, planning and managing those activities and for identifying the alternatives that are most likely to lead to success from a regulatory perspective.

The third area, with a number of thick marks under it -- and we won't go through those in any detail, but this is really the execution of those portions of the program beyond the systematic regulatory analysis. Things that lie out in this area include a variety of technical assistance activities such as developing the analysis methods, developing the detailed compliance determination codes and methods and so forth. Research is conducted out in this portion of the program as well.

MR. HINZE: Wes, I don't exactly know where was are in this discussion at the present time, but I would like to go back, if I may, because I think maybe we're leaving that portion of it. And that is this first stage that -- of identification and evaluation.

Could you give me about 2 minutes of how you

actually -- what were the actual physical means by which you conducted this identification, what kinds of personnel were involved, how was the process of this identification in the evaluation, the in-the-trench type of approach?

MR. PATRICK: I could do that now. I would prefer to defer to the third part of the briefing.

MR. HINZE: Okay.

MR. PATRICK: It is there that we should --

MR. HINZE: Okay. That's why I said I didn't know exactly where we were. But if we're leaving this section, I want to make certain that I understand how it was done.

MR. PATRICK: What we're going to try to do in this front-end portion is really just to lay the groundwork in terms of terminology, and in that final portion of the briefing, when we really get into this particular product of the center, the detailed analysis of Part 60, we should be able, at that time, to have the background behind us and be able to dig in and answer some of the questions regarding how we did it down in the trenches, as you put it.

MR. HINZE: Fine. No problem.

MR. PATRICK: If that would be okay, I would prefer to defer it. Okay?

[Slide.]

MR. PATRICK: The third aspect -- we've talked about the program architecture, the systematic regulatory

analysis, and the third set of words from our lexicon that you will hear and have heard is PASS, the Program Architecture Support System, and that's the computer-based information-analysis and information-management system that we are using to assist us in the conduct of the systematic regulatory analysis, as well as to provide our program planning control integration project management functions which we have at the center.

Most of the use of PASS for program planning integration and management is resides with the center at this time. NRC has their own project-management tools which they use, and those items have not been on line in the system that the center uses.

Just as a matter of convenience and efficiency, the PASS system also incorporates all of the office-automation functions, which includes our library document indexing system, all of our correspondence and our commitments under the contract, and we are making provision to tie this PASS system, this Program Architecture Support System, into the licensing-support system and into NUDOCS.

One item that we jumped over quickly here that is a very important one: Many people ask the question is it necessary to have a computer-based system? And we feel very strongly that it is. Most people who ask the question are interested only in this function, archiving, and this

function, retrieval. But PASS provides much more than a library. Those of you who have had a chance to see it demonstrated recognize that it provides the capability to do such things as searching the regulations and searching the statutes, doing key-word and key-phrase searches, where one can begin to identify the possibility of uncertainties within the regulation, and we can do certain analyses within the very rudimentary system that we have now, and the Version 2, which is being developed over the next several months will enable us to do a large number of our analyses on line.

Another key aspect is that most of the information in this program is interrelatable and should be interrelated, and one of the difficulties that we have found ourselves and one of the observations we would make of a number of people dealing with the program is that because of its complexity, people find it very difficult to see where the pieces fit, to put things into context.

There is an information-management structure called the relational database which provides the technical capability to interrelate all of these various components of the program, be they regulatory, be they technical, be they an analysis method or code or what have you.

MR. HINZE: Excuse me Is that available to the staff, then? Is that on line to the staff in their

computers?

MR. PATRICK: PASS is available in its very rudimentary form now. Frankly, I'll speak for the NRC staff. It's of very limited utility right now, because the rudimentary form was a prototype, and it does not have all of the full features that a full-operational PASS should have.

Mr. Altomare, tell me.

In June or July -- end of June, first of July of this year, we should have Phase I of the Program Architecture Support System up and available to his staff, as well as ours.

You may wish to comment.

MR. ALTOMARE: Yes. We're looking at towards the end of June that the Phase I portion will be up and operational.

MR. HINZE: What's Phase I?

MR. ALTOMARE: Phase I will give us the regulatory text. It will give us what we call the regulatory elements of proof, which is the breakdown of the rule into its fundamental sections. It will give us what we call the technical review components, which is an extension, if you wish, of what we are anticipating receiving from the Department of Energy to help us determine that they have demonstrated compliance with a rule. And it will give us

the compliance-determination methods that are being developed, and those are the methods by which NRC would, by its exercising the compliance-determination methods, determine that compliance has been met.

MR. HINZE: How will the staff use that?

MR. ALTOMARE: Well, obviously, the access to the text, being able to find the information quickly and handily us useful.

The regulation is divided up into what we call regulatory requirement topics. There's about 86 of those. And what those do is relate different parts of the rule to areas that we have primary work in. I mean they are related parts, but the work that we are doing relate to those, so that when we are working in a particular area, as, for example, the mining regulations was mentioned earlier, we can pull up that part of the program, and we can look at what has been developed and what is in there in terms of the regulations.

As the staff, both working at NRC, in our Rockville offices and Bethesda offices, and also, the center staff are working and as information is developed, we are able, through the computer, to be able to look at this information, and so, in a sense, to work together.

So, it improves communication.

So, there are many ways that this will apply and

help.

MR. BROWNING: In a broad sense, the kinds of things they're talking about will ultimately form the foundation for the license application review plan, in terms of an ultimate product. It will also help in the format and content guide formulation.

MR. HINZE: At the present time, then, things like key words or key phrases will be able to be directly to specific aspects of Part 60 and so forth?

MR. ALTOMARE: I'm sorry. You're saying "key words" or "key phrases", sort of a full-text search capability you're referring to?

MR. HINZE: Yes.

MR. ALTOMARE: Well, the system is, I believe, in certain sections, has that capability, but in general, it's more of a structured search.

If you ever get an opportunity, you should see what they've developed in terms of their graphics indexing, if you wish, which is very effective. But primarily, you would not be doing as much of the full-text search as you would going to the data we're interested in for our development of format and content guide information and information we put in our license application review document. That type of information you would get more from the indexing. If you're looking to the rule, searching a

rule, there you might use such things as full-text search.

MR. HINZE: Wes, just to help me, could you give me some examples of some of your relational databases that you envision being part of -- what's the acronym for this system?

MR. PATRICK: PASS.

MR. HINZE: PASS?

MR. PATRICK: PASS.

Help me for a minute. What would help you in terms of an example? Types of information?

MR. HINZE: Yes, types of information, databases. Right. You mentioned relational database, and I'm keen to understand.

MR. PATRICK: Let me go back to this.

MR. MOELLER: When you put that up, in the first bullet, what does "SRA" stand for?

[Slide.]

MR. PATRICK: That's the Systematic Regulatory Analysis.

MR. MOELLER: Okay. Thank you.

MR. PATRICK: I'm running out of slide room.

MR. MOELLER: Sure.

MR. PATRICK: I apologize. I went with an acronym. I've tried to avoid that.

Just to give you an example from one part of the

program, which, I think, will be a good example, because it spans across both NMSS and Research activities and begins to pull in several of the features that have been alluded to this morning.

It's a portion of the regulation that has part of its foundation in the tie to the mining regulations, which we discussed earlier, health and safety aspects from a radiological perspective, which may be impacted by construction, operations from a mining perspective, things which are not normally in NRC's purview.

We go into the regulation itself, search for areas of interest, in this case, dealing with design of the underground space, dealing with rock mechanics, dealing with seismic events, mining regulations and so forth, and through a very structured search of the regulatory information, we're able to find topics, which regulatory topics, deal with those subjects.

[Slide.]

MR. PATRICK: We progress, then, down through the developments that Mr. Altomare alluded to, of the elements of proof within the regulation, and we are, right now, just based on a meeting we had this week with NRC staff, we are in the process of developing the technical review components that will be associated with determining whether DOE's license application with regard to underground mine design

and underground operations is consistent with the provisions of the mining regulations that are incorporated in Part 60 by reference.

Even before we got down to this level of examining compliance with the mining regulations, we found that a technical uncertainty existed with regard to assessing the underground stability under seismic shaking conditions. So as we looked at the regulation and found out how the repository must reform, the underground portion must reform during the operational phase. We began to examine how we would go about assessing compliance with that portion of the regulation. We found that there were no methods available that had been validated, no codes, no analysis methods available, that had been sufficiently well validated, that the NRC would have confidence the DOE's design was sufficient with regard to seismic response.

That technical uncertainty is the basis for a research program that examines both the short-term risk factors dealing with seismic rock mechanics response, and some would say even more importantly, the long-term post-closure performance with regard to seismic shaking of that underground repository. So, you being to see some of the relationships that develop within that portion of the relational database.

The basic regulatory requirement, the logical

interrelationships through "and" and "or" conditions for each of the portions of that regulation, time the establishment or proof or determination of compliance with that regulation to some particular method, assessment of that method, finding it in this case to be likely inadequate for regulatory purposes, and then, down through a chain of trying to determine what an uncertainty reduction method could be, we've launched upon a research project which will examine those matters.

Now not shown on this chart, and not a current capability of PASS, but one which is within its classifications, we will tie in the schedules and budgets associated with these activities into that relational database. So, some from months from now, one will be able to go in and search for regulatory topics that deal with the mining regulation, mining aspects of the underground repository.

As for a listing of any uncertainties that are outstanding and why those uncertainties arose, and it would be able to display for us whether those uncertainties arose directly from the regulation itself, because there was an ambiguity in the regulation, or if they are uncertainties of a technical sort which arose because the staff was unaware of an adequate method for determining or demonstrating compliance with the provisions of the regulation. So that would be specific example of how we tie all of this in

together.

Another item not shown on here, is that all of these determinations, all of these evaluations, all of these packets of information if you will, are supported by a series of reference documents, and those reference documents can be called up through the relational database, and we can look into what we call our technical document index and see, at the very least, header information on what those documents are, and in many cases, with the seismic rock mechanics example specifically, we have reviewed and analyzed well over 100 hundred documents in detail and written summaries on those documents, and have prepared a literature search examining what methods are available and the uncertainties associated with those methods.

MR. HINZE: Who is putting this into computerized format and where are you in the process?

MR. PATRICK: Right now the Center staff is probably the key participant in it. We have worked in some teaming relationships on, I believe, three particular portions of the regulation at this point, where the NRC and the Center staffs met together and developed the meat, the technical substance, which go into these blocks, some of these blocks, and beginning to look at this, this, and this. All of those "this" probably aren't terribly helpful to our stenographer over here, so I will illuminate the reg

requirements, elements approved, compliance determination methods, and uncertainties of both the regulatory and a technical type.

All of that information now is being developed in basically word processing format in a set of templates which can be read by the compute and put into the relational database in the late June-early July timeframe, when the version II, phase I of the program architecture support system is developed. So we're looking at the first availability of information of any substantive nature being late summer, early fall timeframe. And at that point, what our anticipation is, I think from our side and also from the NRC standpoint, is as the database begins to fill, it will become more useful and more usable, and there will be a higher level of interest and a greater number of people working with it to develop further information and put it into the database.

MR. HINZE: This on your mainframe and then the staff networks into your mainframe?

MR. PATRICK: NRC staff networks into our mainframe. It's a IBM mainframe and NRC access it through their IBM 9370 machines.

MR. HOELLER: Go ahead, Gene.

MR. VOILAND: If I understood correctly, you've examined, at least in this one situation, the example that

you gave, a lot of background information, and that compliance determination method then, that you arrive at or examine and the technical uncertainties associated with it, is that essentially a prescriptive kind of a thing? Are you telling DOE this is what you have to do, or are you giving them alternatives? How does that relate to the primary responsibility of DOE of coming up with the facility and justifying the facility? It looks me like NRC is injecting itself into the process of design and production of a product, where it seems to be NRC's position it should be primarily regulatory.

MR. PATRICK: Well, there are two aspects, two parts to the answer. I believe it is correct to say that to properly regulate, which was your second comment, NRC must interject themselves into the process. I think there's no other way to do it with the kinds of complexities and timeframes that I mentioned, and I believe the third briefing chart that I had up. That is pro-activity by its very nature.

Now with regard to the comment of prescription, there is a very strong attempt to avoid being prescriptive if the rule is not already providing such prescription. If the underlying statutes do not provide such prescription. Typically, the guidance takes the form of a staff position, which is even a lesser document, as I

understand it, than a regulatory guide, and what those documents say in the foreword is, this is a method which the staff would find to be acceptable if followed, that the license application applicant does not have to follow that method. This has been one which the NRC staff has done sufficient research evaluation of their own regulatory requirements, that they are providing, that they are interjecting themselves into the process, and saying, here is a way that we would find to be acceptable if you were to come in with this portion of your license application using methods of this nature, addressing criteria of this sort, and so forth. Those try to be very general documents from that perspective.

There's a second point to be made, too, though, and that deals with a nuance which you cannot get from any of these summary charts, and that is that it is DOE's responsibility to demonstrate compliance with these requirements. NRC must determine whether that demonstration has been satisfactory or not. So we refer to DOE as doing a compliance demonstration and the NRC does a compliance determination, the lesser of the two from a standpoint of resource consumption and so forth.

So, what we're addressing here, is a compliance determination method, the method NRC would use to try to evaluate the DOE license application. And we found that we

could not find the methods that would be adequate to the task of evaluating compliance with the rule as written. So there are two components then. There's guidance that you give the DOE. We find it acceptable at DOE, if you came in with a license application that presented these kinds of information, that addressed these kinds of criteria that use methods that produce results with uncertainties of about this level. And the second component is staff's guidance to themselves, which will eventually appear within the license application review planned. And those are the compliance determination methods that staff will use to assess whether DOE has, in fact, complied with the rules. Those are the two aspects that come into play here.

MR. BROWNING: I wonder if I could interject myself here for a minute because I think the thrust of your question relates to an earlier question which is, what visibility do we give to DOE of the concerns and things that are coming out of this? And I do not know the answer myself.

If I could ask a question that we could talk about. Having detected the fact that we do not see anything in the system that would allow us to do our kind of review -- West are you aware that we have communicated that in some way to DOE either through a comment on the site characterization plan -- or you know -- some of our some

other reactive formats?

MR. PATRICK: I believe they have seen it in several manners. One is through the interactions on the exploratory shaft work and some of the designs.

MR. BROWNING: Because the earlier we let them know we see a problem that we are working on, if they could be working on at the other end, I think that closes the gap between the guy who has got to make the case and the people who are trying to decide. How will we decide that the case they have made is both a necessary case and a sufficient case which is the kind of thing that we are getting ready to do here?

Now, basically what we are trying to do upfront, before we even get the license application, is what in the world they have done to the process of licensing "X" number of reactors? That was kind of debug it as you go kind of thing. We are trying to debug it in advance and get all of this stuff lined up so that we will not have these diversions and surprises in the middle of the licensing hearing.

MR. VOILAND: I think it is a difficult line to walk because when you say it is not per se prescriptive, that is true. On the other hand, if you tell DOE we find this acceptable, I think in the real world that almost -- that is all they will feed us back.

MR. BROWNING: That is exactly right.

MR. VOILAND: That is right. And what I am concerned with is that some other alternative solution to a problem may simply not be looked at because we already have a go ahead on it. But I certainly would concur that there should not be any surprises to anybody and NRC and DOE ought to be working together all of the time towards acceptable solutions to a licensing problem.

MR. BROWNING: I am personally not too sure as to how well the cross link between us and the DOE is on this whole process. That is something we are going to be working with the new DOE management.

Just for your information, we have had DOE management people down to the Center to brief them on this kind of process. But there is a whole new crew coming onboard now. We may have to do that again. Although my understanding is that Dr. Bartlett is well aware of these kinds of approaches because of his past experience. I do not think there will be any surprise in that quarter. But we probably will issue an invitation to them to come down and hear this, because we do not intend to have any surprises for them.

MR. PATRICK: Although this is a briefing on the technical assistance part of the program, I think it is also important to recognize that there is a level of

communication through the research portion of NRC's program directly between NRC and Center researchers and the researchers at DOE and its contractors where not licensing matters, but technical matters, can be discussed openly and freely.

We have had several such interactions on some of the key technical issues address the flow of liquids and gases in the unsaturated zone and fractured rock masses. In fact we have one of those going on at Los Alamos this week. We have had meetings with the people at Lawrence Livermore and Lawrence Berkeley National Laboratories as well.

I see those as being important areas where the technical substance of the matter can also be addressed so that both parties are aware of the kinds of technical concerns that exist.

Aside from the licensing matters, what we are finding so far is that they at the DOE contractor laboratories are very open to discussing the technical matters just on the merits on the technical substance involved. That provides a forum, I think, where many of these issues can be raised and addressed by like-minded professionals aside from the regulatory requirements.

MR. HINZE: One more West, if I may. Have you considered the utilization of some of the databases and the

computerized work that the DOE is doing and feeding into this? And utilizing some of the data that is already there?

MR. PATRICK: Availability of data has been a key issue from the very beginning of the Center and I am sure it has been a key issue for years and years before that.

Site specific data, in particular, is of interest to us. The DOE has provided the NRC and the Center with copies of its very key databases. The RIB, the Repository Information Base, I believe is the correct acronym and the SEPDB, the Site Engineering Properties Data Base.

The later database is of particular interest to us. We have a tape copy of it up on our VAX machines at Southwest Research Institute and are able to access that and review that information to use it in many regards in our research planning efforts to see the range of properties, for instance, that exist at the Yucca Mountain site and its vicinities. Those have been very useful tools. They have made that information available.

Another key area I would comment on is CODES calculational techniques. We have requested for some of the codes which DOE has developed and has used or intends to use.

MR. HINZE: Have you had any problems with using their databases?

MR. PATRICK: No technical problems whatsoever.

Since we are not inputting to those databases, there is no configuration control issue that I am aware of either.

MR. HINZE: If I understand you correctly, you do not have direct access to their constantly updated databases, but you have copies of their databases. Are these updated on a regular basis? I am always concerned about getting a tape of data and using that for sometime while another database is being updated and you do not have the most recent data.

MR. PATRICK: I do not know what their update cycle is. We certainly are well aware of that problem as well. We intend to have updates. I think one thing to bear in mind though is the current state of the program with the Quality Assurance Stop Work orders that have been in place and are in recent months have begun to be lifted.

There was not a great deal of site-related information which was becoming available in recent months and years. So the currency issue has been shall we say not in the forefront of our minds for the two years that we have been in existence. But we anticipate that that is going to be an issue that has to be addressed. But they are willing to provide tapes as frequently as we have time, interest, an ability and need to analyze those instantaneous on-line access. For me personally, I do not see that to be an issue. If they update their database -- their official

database monthly or quarterly or whatever the cycle is, I think that will be sufficient for our needs. That would be certainly speaking from my own personal perspective, that would be my assessment.

MR. HINZE: So you do have regular correspondence with the data center at Los Vegas?

MR. PATRICK: We communicate through Mr. John Linehan who is the principal contact through the NRC's licensing branch. So any requests we have, we make directly to John Linehan and John and his staff process those requests.

There are, just to let you know where we are going, there are about four briefing charts which I would like to move through rather quickly here. And then we will be at a good breaking point, Mr. Chairman, if that would be acceptable.

MR. MOELLER: Fine.

MR. PATRICK: I alluded to earlier to the difficulty in a program that is this complex of seeing where things fit. And seeing why we do things. And where those things we do fit in the overall scheme of things. The next three charts focus our attention on three very important parts of the NRC program and the information that we are developing and the relationships among those pieces of information that are being provided through the program

architecture support system. These three charts all titled "Relationships Among the Components of the NRC Program and the Systematic Regulatory Analysis."

The un-shaded portion here [indicating], we have spoken a little bit about it. Mr. Alhomare was referring to some of these components that will be available during Phase I of Version II of PASS.

We start with a basic regulatory requirements as they exist within Part 60 in this cases. There are some 86 regulatory topics and associated groupings of text regulation. These in turn, as it turns out, can be quite simple or very complex, depending on the nature of the regulation.

In complex cases, there will be "and," or "or," logical relationships among different pieces of the basic regulatory requirement. So the license applicant may be required to do this and this. Or they can do this. Or some combination thereof. The relational database allows us to interrelate these things in that logical Boulean fashion.

Materials and information at the regulatory requirement and element of proof level, carry the force of law. Those are things that are included directly within the statutes and regulations. What the staff has found that additional information, in many cases, will be required in the license application if they are going to do an adequate

job of evaluating compliance with the regulatory provisions.

This a category of information and it may exist in one or more tiers below the regulatory element of proof. We will refer to those pieces of information as "technical review components."

Taken as a group, the regulatory requirements, the elements of proof together make up the substance of the format and content regulatory guide, which is the primary piece of guidance which NRC Staff gives to the DOE to guide their development of the license application.

MR. BROWNING: Wes, before you take that out, earlier in the meeting Dr. Moeller mentioned that a draft format and content guide is about to be released for public review. It isn't really the draft format and content guide we ultimately expect to have and I think in order to make sure his anticipation isn't greater than what he's going to see, could you show him on that where the cutoff point is and what we ultimately intend to have in the format and content reg guide according to our current thinking using that chart?

MR. PATRICK: I can try to give you my understanding of it.

The evaluations that have taken place so far in developing the format and content guide have fallen into the category that Mr. Browning spoke to earlier.

A content and format guide is needed and, some would argue, has been needed for some time. The program architecture, systematic regulatory analyses have not yet been completed so the full structure development of this element of proof and technical review component hierarchy have not been completed yet using the systematic regulatory analysis but the regulatory requirements are in place.

The logical structure under those are well expressed in documents that we have published to date, and it is the combining of those which is leading to the format and content guide which is going to be published.

There is a wide variety of technical information that is also going to be provided within this draft format and content guide but it will be information which the Staff has gleaned from experience and from the development of other standard format and content guides rather than from a systematic analysis that will be indicated here.

I think in my estimation most of what you will see in the format and content guide will be information at the regulatory requirement and element of proof level that the additional information provided at the technical review component level will be information developed using the expertise of the Staff directly, the NRC Staff, rather than using the systematic formal analysis here.

The other thing that you will see that is not

addressed here is that the regulatory requirements themselves are interrelated at a next higher level up. For instance, the various citing requirements in 60.122 relate to one another and roll up, as it were, to higher level kinds of requirements. The same is true with regard to the subsystem performance objectives and the overall system performance objectives.

The Staff, NRC Staff, has made an attempt to group those regulatory requirements together according to a logical hierarchy. That is a feature which again is not yet fully developed in the systematic regulatory analysis.

I think in fairness you are seeing a hybrid of trying to bootstrap, to use Mr. Voiland's term, bootstrap this process and use what's been learned so far from the systematic analysis and then to use the historical perspective of having developing a format and content guide for low-level waste applications, format and content guide for nuclear regulatory applications, which are functioned well for those particular applications.

MR. BROWNING: In summary, this is a case as he said where we were proceeding down a path to give DOE a product they needed per their last schedule of operation. They needed this kind of guidance a certain number of years in advance of getting the license application to us. Now that that data has slipped out, it allows that product to

have this catch up to it, if you will, and it comes across to budget kind of people like we're filling the time alloted; you know, DOE slips and we end up spending more resources.

In the real world what we're trying to do is to do the job the way it ought to be done rather than the way we were trying to get it done to match the previous schedule, so from my point of view we are not trying to spend resources to fill up the time. No matter how far it stretches out, we're trying to do the job right during the time we've got.

[Slide.]

MR. PATRICK: Let's quickly look at the next couple of slides -- the same basic picture with a different portion of it highlighted.

The clear area shown here now indicates the compliance determination methods at two levels. One compliance determination method which will be used to directly address the elements of proof, that is information that is within the regulation itself as well as lower order compliance determination methods which need to be put in place to make determinations regarding these technical review components which the Staff is going to ask the DOE to come forward with in the format and content guide.

Information is required, information of various

sorts, to execute these compliance determination methods. Remember, these are methods NRC Staff will use. DOE could develop a similar hierarchy for compliance demonstration methods and in fact they have an issues hierarchy and information use hierarchy which takes on much of that flavor.

Now taken together, the compliance determination methods at the various levels and the information requirements are what the NRC will provide in the license application review plan. That is its self-guidance for how it is going to evaluate the license application when it comes in.

For sake of simplicity, and you may not believe this is a simple chart, but for sake of simplicity there are a number of things that are missing from this chart, one of which is a very key component and that is the development of a strategy for compliance determination.

Each one of these compliance determination methods has its own individual compliance determination strategy and those strategies in composite are developed out of what is called the license application review strategy. That's NRC's overall approach to reviewing the license application.

[Slide.]

MR. PATRICK: The third chart focuses on the right hand side, namely the identification and the reduction of

uncertainties that may be present either directly in the text of the regulation, which we would call a regulatory uncertainty, or things which could be present in the text of the regulation or which may arise because of a question concerning the method for determining compliance or the method for developing the information.

Any time an uncertainty of any sort develops, one looks at a variety of uncertainty reduction methods. There is an opportunity to prioritize there, to choose the method that best utilizes available resources, that gives the desired level of durability of solution, and that properly times the work so that the uncertainty is reduced at the proper occasion.

NRC's current strategy is to have in DOE's hands all pertinent guidance within three years of the date of submittal of the license application.

As we look at particularly the higher order of uncertainties the more important, the more impactive uncertainties, those all need to be addressed before that period of three years before license application.

I would point out also that even though for simplicity we show rulemaking as being a particular way of reducing a regulatory uncertainty, as we'll find in the third part of the briefing today, many regulatory uncertainties do not warrant such formal resource

consumptive work as rulemaking. In fact, interpretive rules, technical positions, working directly with the DOE in the formal exchange meetings, all of those are means to reduce the uncertainties associated with ambiguities in the regulations.

The same is true with technical uncertainties. Some technical uncertainties on the other hand may be so important that a rulemaking would be appropriate to put in place prescriptively the method that would be acceptable for reducing or for dealing with that particular technical matter.

Taken together, the clear items here are the uncertainty identification and reduction process which we are going to be addressing in the remainder of this morning's session. The purpose of these charts is to attempt to show how things fit together and hopefully showing some relationships with documents with which you are well aware such as the format and content regulatory guide, the license application review plan, license application review strategy will assist in conveying that understanding.

That is where we begin to see the value, the benefit that is to be had from taking this systems engineering approach.

[Slide.]

MR. PATRICK: There are four specific

accomplishments I would bring to your attention that have come out of the approach so far.

We have done prioritization of the statutes and regulations to focus our attention first on those that are uniquely NRC's responsibilities and then further to focus them in, as Mr. Browning indicated, on the repository regulation as being a prime consideration and concern at this point.

We delineated some 86 regulatory topics and associated regulatory requirements within Part 60.

We have undertaken a process of baselining and establishing that this fundamental systems engineering process is valid, legitimate, useful in developing the regulatory program.

Finally, we have completed an analysis of the regulatory and institutional uncertainties that are present Part 60. That final accomplishment will be the subject of the final portion of the briefing this morning.

[Slide.]

MR. PATRICK: As a final remark in this morning's session, I would like to point out some of the other things that will be coming out of the systematic regulatory analysis that is indicated here. Both the regulatory basis and the technical basis for providing guidance to the DOE will come out of these analyses, so in addition to the more

intuitive process of reading a rule, knowing the literature and understanding that there is some problem out there this is systematically develop the regulatory bases for dealing with uncertainties that exist within the regulations.

The development of compliance determination strategies I alluded to earlier. Those are components of two very important documents. These determination strategies will be based on the content of the license application review strategy, the highest order document, and another document just a notch below it on the hierarchy of documents, a performance assessment review strategy.

Growing out of those strategies will be the compliance determination methods including any review criteria that are appropriate for the NRC to use. These will all feed into the license application review plan, which as I indicated is NRC's self-guidance but also because it is a public document it is one which the DOE will certainly read with hopes of understanding how the NRC is going to review that license application once it is docketed.

The products of the SRA will also include an integrated basis for the review of site characterization documents. We feel that's exceedingly important. It gives us a focus in looking for holes in the site characterization program.

Finally, the technical review components and information requirements, these lower order items which the Staff will need to conduct their review, those will be used in the license application format and content regulatory guide, to a very limited extent in the draft version which Mr. Browning has spoken to earlier this morning but as time goes on that format and content guide will be able to be embellished and further developed to incorporate the results of the systematic regulatory analysis.

Those are my remarks, Mr. Chairman, with regard to the first two briefing topics, namely the overview of the systems approach and the accomplishments to date. The third and final portion of the briefing will address the specific report numbered CNWRA 90-003.

I can proceed or break, whatever your pleasure is here.

MR. MOELLER: This is probably a good place to break. Are there any quick questions prior to the break?

[No response.]

MR. MOELLER: I hear none, so we'll break at this time.

Thank you.

[Recess.]

MR. MOELLER: The meeting will resume. And we will call upon Dr. Patrick to continue.

[Slide.]

DR. PATRICK: Thank you.

The third and final portion of the briefing is going to focus on a recently-completed report that documents the results of regulatory and uncertainty analyses in 10 CFR Part 60.

The scope of that report, and also the scope of the remainder of the presentation this morning, is captured in these five bullets. The identification of those uncertainties -- and it is important to recognize that this review did not include technical uncertainty development, identification, and evaluation -- the process by which we excluded certain uncertainties, groping and categorization of those uncertainties for ease of discussion and for further analysis, correlations that we were able to make between those uncertainties and existing rulemakings and technical positions which the NRC staff already had underway, and then the final portion, some recommended or suggested actions which seem appropriate to take at this stage of the process.

[Slide.]

DR. PATRICK: Keep in mind that the regulatory analysis that we are discussing now is captured in those first several process blocks of the systematic regulatory analysis that we discussed earlier this morning.

The basic analysis method is shown on this slide, the first step being to identify the regulatory requirements, of which we found approximately 86, to delineate the logical relationships between those high-order regulatory requirements, and the basic provisions of those. That would be to develop those, and/or relationships that might exist within the regulatory text, each of the components of the regulatory text comprising a regulatory element of proof.

The third step is to identify the uncertainties, be they regulatory or institutional uncertainties -- we will discuss the definitions of those terms a little bit later -- analyze and develop a rationale for those uncertainties in the context of the available documentation.

This is a very important step, because what we've found in just the two, two-and-a-half years that we have been involved in the program is that a number of uncertainties have been identified in the past, dismissed, reidentified by another group of staff members, dismissed again, and then as the evolution goes on, identified yet again.

This is one of the powers of the relational database that we discussed this morning. We have been able to capture, not only the basic statement of the uncertainty, but also the rationale for either including or excluding

what seemed to be an uncertainty at one point in the analysis, providing direct references to documentation, both formal documentation and informal staff memos, that might exist to support the identification of that uncertainty.

The final step in the regulatory analysis process that we will be talking about this morning was to exclude certain particular uncertainties that we identified in our initial analysis.

As it turns out, because of the backgrounds of individuals involved in analyses, in matters such as that, sometimes the rule appears to be uncertain.

But when other technical experts are brought in to bear, when background documents such as the NUREG 0804, which provides the regulatory history for 10 CFR Part 60, when those things are brought to bear on the analysis, many times we found things that seem to be an uncertainty actually are not.

There is sufficient documented rationale and development in place that we can say no, the Commission has made their intent very clear with regard to this portion of the regulation, and no further action is needed to reduce that particular uncertainty within the regulation.

MR. MOELLER: Well, now, you also said that some uncertainties are there for flexibility?

DR. PATRICK: Yes, sir.

MR. MOELLER: Now, one other thing. Your third bullet is to identify the regulatory and institutional uncertainties, and in the report you cited three types, of course, including technical uncertainties.

And yet I find, whereas you give me examples of regulatory and institutional uncertainties, I don't recall you dealing with the comparable depth in terms of technical uncertainties. Is there a reason for this?

DR. PATRICK: We avoided going into that third category in this particular report, thinking that if we discussed it at any length, people would begin to look for technical uncertainties and would find them missing. So we sidestepped the discussion on it for just that purpose, just to keep the report streamlined and focused on regulatory uncertainties.

We can talk a little bit about that, if you would choose, and if the committee would so desire, as we proceed this morning.

MR. MOELLER: Okay. Well, let's see. You know, I would like to hear a little bit about it.

DR. PATRICK: Okay.

Now, I would like to go back and capture at least one question which Dr. Hinze raised at this point, and perhaps try to address it here, having promised earlier this morning that I would try to do so.

His question was, as I recall, how is this really done, how is this regulatory analysis really done down in the trenches, who did it, how were the people selected, and so forth?

This is the basic method, with regard to selection of individuals to do the work. As I had indicated earlier, they are primarily members of the Center's staff. And people in that category come from several places.

One, they are members of the Division of the Southwest Research Institute, which is called the Center. Other times, we find that we have to reach out into the institute to get technical expertise, which would not otherwise be available to us in the Center.

And likewise, we reached to two subcontractors which we have, and a number of individual consultants, again, to bring to bear both special expertise and also in these early days of getting staffed up, the raw horsepower that we need to be able to accomplish these analyses.

Training becomes a very important issue, as you might imagine. There are not that many individuals who are intimately familiar with the NRC regulation. So in every case, we have training provided to these individuals. They read the regulation.

They are provided with all of the background documentation, such as the NUREG, which I had alluded to

earlier, as well as a number of other items of information and documents which they will find useful in their analyses.

Aside from training, one of the most important things that we have done is to put in place a series of technical operating procedures, the most detailed of which, the seminal document on how to develop systematic regulatory analysis, is a volume that is some three inches thick, and goes through, in very great detail, how one will address each eventuality, each possibility that one could encounter within the analysis of a regulation.

Now, the basic technical operating procedure in that case is less than 20 pages long. But we have gone to the depth of development of that technical operating procedure so that all possible eventualities, particularly all of those which we have seen to date, plus a few others, have been dealt with in a structured manner.

So that as these staff members begin to analyze particular portions of the regulation, they have at their fingertips not only the training and the background documents for 10 CFR Part 60 in this case, but they also have in their hands a document that was developed by analysts who have had considerable experience already in reviewing and analyzing this regulation.

The analysis process takes place in two basic stages, but it has a number of subcomponents as well.

There is an initial analysis. And that is typically done by a group which will have one lead individual whose technical background is aligned with the regulatory topic, which he or she is being asked to address, has an individual who has a legal background, familiarity with statutes and regulations, and then, typically, a third member who will have an allied technical background, one which is associated with the principal substance or the principal topic of the regulation, but may not be, it will be a supportive technical expertise rather than the central technical expertise.

That kind of a team, then, is assembled to do the analysis, first, of the regulatory requirements, and then of the uncertainties that are perceived to be present within those requirements.

When they have completed their work, for all cases, the work is then submitted a formal program architecture review committee which is similarly constructed to the original committee, having a minimum of three members, one in the principal field, one in an allied technical field and then a person with a legal regulatory background.

So, everything that goes into the database that results from these analyses, that appears in a report such as you have received in this case, everything is reviewed at

least that one time. Now, in a typical case where a report would be developed, there are additional levels of review which would include technical reviews and programmatic reviews by the Center's staff and management, as well one or more reviews by the NRC staff and management before that document is brought forward to the public and presented as a formal report and made available in the public reading room.

So that is the staff aspect, the management aspect of how we, down in the trenches, as you put it, go about doing this work.

MR. HINZE: I have a couple of questions, if I might. In what areas did you feel that it was necessary to go to your subcontractors and consultants and have those deficiencies been removed with the addition of new staff or do you foresee those as continuing?

MR. PATRICK: Okay, in early days -- by that, I mean the first year and year and one half of the Center's existence, the two primary deficiency areas were in the geosciences, specifically hydrology and performance assessment and in the rock mechanical mining field. In both of those cases, we recognized that weakness from the outset. We had subcontractors that were part of our original team, and they were factored in right from the outset and we used them very extensively in that process.

With regard to the second part of your question,

those problems have been largely remedied. We now have a very senior individual who is heading up our performance assessment group. He is also a practicing hydrogeologist for 25 or so years. We also have two rather senior level hydrologists who are on the geological settings staff as well.

We just made our third acquisition in the mining rock mechanics area, so we have three of the four individuals that we will eventually have to provide us long term staffing support there. We still use our subcontractors, but we tend to use them in a little bit different mode, n[illegible]hat we have our own core expertise available within the Center, but those would be the two principal areas.

There are, of course, a number of other areas. For instance, we have not, with the levels of budget and scope of work that we have in place, have not yet seen it necessary to hire a structural engineer, an electrical engineer, a ventilation specialist -- a number of subdisciplines like that.

In those cases, we've found it very beneficial to work with other divisions of Southwest Research Institute. They have a wide range of broadly respected experience in those areas. We have a team of individuals now which we have brought up and trained in the program. They are

routinely working for us as we do analyses within those areas of mechanical/electrical systems and so forth.

MR. HINZE: As you point out, there's a good deal of learning to go along with this process, and I assume that the new people you brought on board have been brought up to speed or are being brought up to speed in terms of the experience from this identification effort?

MR. PATRICK: That's correct. One of the ways that we found most effective for doing that is, even in cases where the primary expertise might be with a new staff member, we will not give that person the responsibility to be the lead member of this analysis team. We will use one of our seasoned senior people in an allied field of expertise to bring that person along and get them trained up through the first several analyses until that person is conversant with the regulations, understands the technical operating procedure and is able to work with it effectively.

MR. HINZE: Bear with me for another question. What kind of iterative procedures did you develop with the staff as you moved through this process? In what way did they lead you or constrain you or give you opportunities and in what way did you interact with the staff in early stages on this?

MR. PATRICK: Did you say iterative?

MR. HINZE: Iteration.

MR. PATRICK: With the NRC staff?

MR. HINZE: Yes.

MR. PATRICK: They, too, have been participants in not only briefings which were intended to be merely informative, I will say, but also in training sessions. They have worked directly with us on a couple of the very key developments of the regulatory basis for technical positions and for rulemakings.

That has been what we call a team relationship where the working is going on shoulder-to-shoulder. We have that type of work going on in the area of substantially complete containment, developing the technical basis there. We have an individual from the engineering staff of Bob Browning's Division of High Level Waste Management.

We've done a similar thing with regard to the regulatory requirements dealing with extreme erosion and the potential for extreme erosion at the site, working with an individual in Mr. Ron Ballard's group, also in Bob Browning's Division. So, those are some examples of the kinds of interactions that we have.

With regard to the iterative nature, the staff has been very heavily involved in the development of process, modification of process and terminology and technical operating procedures and so forth. The Center staff, beginning with the proposal, prepared a process and an

abbreviated procedure for how we would pursue undertaking a systematic development of the regulatory basis, and a systematic elucidation of the regulatory basis for the repository.

They, of course, had an opportunity to evaluate that in the very early days, and since that time, we have worked with them regularly to develop our primary planning documents, where we will propose certain work to be undertaken. In addition to those planning documents, we have these operating procedures which say not just what will be done, but in detail, the manner in which -- the methods we will use for accomplishing the work.

Those technical operating procedures are routinely submitted to the NRC staff, specifically to Mr. Altomare, who is the program element manager, and they review those documents, provide comment to us, and we work with them in an iterative fashion to come to agreement on what the appropriate approaches might be for these particular analyses.

The same thing happens then when a technical document is completed. In fact, typically before the document is completed, quite early in the process, at the stage of developing annotated outlines and things of that nature, we work quite closely with whoever the named project officer might be from the NRC side or project officer a

level below a program element manager within the NRC organization.

So, it's a very interactive process. It tends to be quite iterative in its nature. At it's best, it is collegial and we all, on our side, try to keep it from becoming terribly contractual, although we recognize the contractual nuances and requirements that are in place.

MR. MOELLER: You still, though, have not reached the stage of interchange of personnel; am I correct?

MR. PATRICK: No, sir, we have not, but in our management meeting with the senior NRC staff two weeks ago, I believe it was, we once again addressed that question and it is the impression of both of our staff and their senior staff that it is about time now. We believe that our organization has matured to the point where those kinds of things can begin to be seriously considered.

By seriously, I mean naming names and soliciting interest in a staff exchange. The Center is sufficiently small at this point where we do not favor sending any of our people to Washington for an extended period of time, beyond those people who we already have here in our Washington technical support office. We are much more open to exchanges in the other direction, simply because of our smallness.

We anticipate, hopefully before too many weeks get

away, that we will have identified perhaps one or two people -- start it small, look for good areas where successes can be had in technical exchange and to move forward from there. I would point out that with regard to several of these technical matters, NRC staff has been very closely involved with our staff. The SSC issue, in particular, the cognizant NRC staff member would spend a week or more at a time in San Antonio working with our staff, probably cumulative of, I would guess, four or five weeks total over the last six to nine months, working that problem.

The interactions, even outside of the formal relationship, Chairman Moeller, I think have been quite good, in the engineering area, in particular.

MR. MOELLER: The staff has a very vigorous program of interchange of their people with their regional offices -- you know, field assignments and vice versa, and I am glad to hear this update on your plans.

MR. PATRICK: Thank you.

[Slide.]

MR. PATRICK: The basic analysis process for the uncertainties is a three-stage one. It deals with identification, characterization, and then reduction of those uncertainties that have been identified.

[Slide.]

MR. PATRICK: The flow chart that follows that

word chart shows it a little better in pictorial fashion; indicates here how we start with the statutory and regulatory analysis, looking at the regulatory requirements that are in place.

Stage 1, as indicated above this dashed line, is the portion of the process which is reported in the document which you have in your hands and identified uncertainties, tries to group them into different logical groupings, so that they can be dealt with subsequently, in some logical fashion, and it tries to categorize them according to what type or style of uncertainty it might be.

Those categories, as it turns, out, appear to be precursors for identifying the best method for reducing a particular uncertainty.

Stage 2 is an extremely important one, because it deals with much of the matter that we discussed earlier this morning.

The decision point indicated by the diamond is a crucial one. There are portions of the regulation which have been posed in such a manner to provide the agency and the license applicant with certain flexibilities in how they can address particular provisions of the regulation.

Coming in as independent analyzers of that regulation, those things are not always evident to us as analysts. Furthermore, even where they are evident, those

ambiguities still, in fact, are uncertainties and, we feel, need to be identified. It's just that they do not warrant being disposed with, reduced, and so forth.

And that's what we're speaking of here, having identified particular uncertainties which are intended to provide flexibility in the regulatory process. If that is their intent, we simply document that that is the intent of the agency and take no further action in those cases.

In cases where uncertainty reduction is desired, but it is not a matter that the regulation was intended to provide flexibility, then we go into a process of prioritizing those uncertainties.

This chart indicates that one of the Center's preferred methods, namely analysis using an attribute method -- attributes can be chosen to be few or many in number. They can be chosen to be very specific or quite general in nature. But they do provide a basis for formalizing, to some extent, the prioritization process.

So, the priorities that are selected become no longer a matter of the view, the impression, the personal feelings of a staff member at the Center or the NRC, but they become the result of a formal, visible analysis using a series of attributes or qualities of those uncertainties, which lead to prioritization, or prioritization may be done according to any of a number of bases, as I indicated this

morning.

Typically, when we think priority, we think timing, but there may be other means of prioritizing things, as well.

For instance, the most important uncertainty may not need to be resolved right away. The converse may also be true, that there are some things which need to be resolved more or less immediately which are not of extreme importance now but which, if left unattended, could become very important.

That is why we make provision in our own technical operating procedures to do a variety of attribute analysis, to prioritize these uncertainties according to whatever attributes seem appropriate to ourselves, doing independent analysis, and to the NRC, doing their official staff analyses which they use to support their strategy documents, such as the SECY document, 88-285, which has been alluded to this morning.

That whole second stage of identifying which uncertainties need to be reduced and the order of importance and timing with which they could be reduced is what we call Stage 2 characterization of the uncertainties, and as I indicated, we are just beginning to get into that process right now.

The final stage is the reduction of the

uncertainties, and that's where we identify a number of alternative means for appropriately reducing the uncertainty. By the way, that doesn't necessarily mean eliminating the uncertainty, just to reduce it appropriate to such things as risk factors to the licensing process and then reduce those uncertainties using the appropriate methods.

Now, what I have described here in terms of process method and in terms of where we are at in that process and method, I have been speaking to the general case. It's important to recognize that some of the uncertainties that were identified to be very important very early on are, in fact, being worked down Stage 3 already, things like substantially complete containment, ground water travel time, implementing the EPA standard, and so forth.

Those things have been, in keeping with much of the spirit that I have heard expressed this morning -- if you see a big problem, you know, don't wait a year to publish the report and work on it. Fast-track that through the process. And that's precisely what's been going on in two ways.

We make the NRC staff aware of things which we identify, and second, there are certainly a number of things which the staff had identified a year or more ago and had begun work on already, and we are just fast-tracking our

systematic regulatory analysis to play catch-up, to get the regulatory, statutory basis, technical basis in place to more fully support those rulemakings and technical positions.

MR. BROWNING: We are in the process of doing that right now.

MR. MOELLER: In a month or so?

MR. BROWNING: Should be to the Commission the first part of June or the later part of this month, I think.

MR. MOELLER: Go ahead.

[Slide]

MR. PATRICK: There are basic types of uncertainties which we identify. Although our technical operating procedures have definitions and clarifications that run before a paragraph or more, the simple statements are given here [indicating].

There is a regulatory uncertainty, one that is unclear. What must be done? Or what the NRC is requiring the Department of Energy to do in terms of show compliance?

There is an institutional uncertainty. If there is a lack of clarity as to who is responsible for either making that proof of compliance or for judging, evaluating, regulating compliance with that provision.

There is a technical uncertainty, when it is unclear how compliance with that regulation will be either

demonstrated by the DOE or determined by the NRC staff.

MR. MOELLER: Is that all the technical uncertainties? You said that some of them were there for flexibility. I mentioned that a few minutes ago. Could you give us an example of one of those? Maybe you did and I missed it.

[Slide.]

MR. PATRICK: Well, I was thinking more of regulatory and institutional uncertainties at the time. I know of no institutional uncertainties that are logically present for flexibility.

MR. MOELLER: Okay.

MR. PATRICK: Those primarily are just problem causers. Regulatory uncertainties that may be there on purpose. Perhaps, and this is one that we raised in several cases, perhaps the matter of what constitute an adequate investigation of the site? Some might say that that is there to give the license applicant and the NRC some flexibility in how it implements the regulation.

Given the volume of comments provided in the site characterization analysis, that probably is not a good example of an intended regulatory flexibility. The ambiguity in those words rather than providing flexibility, has caused the NRC staff considerable concern as to the adequacy of DOE's site characterization program.

There are some other areas though, that deal with some of the technical matters that might be there for some particular purpose.

In view of the time, I would, unless you specific questions, like to jump over the two definitions of regulatory and institutional uncertainties. They are there to provide you with some backup material and further explanation of those very simple three definitions that I gave you. If there are no questions on those definitions, we will proceed.

I mentioned that there were two steps early in the identification process that the Center uses to try to logically organize the uncertainties that it has identified.

The first is to put those uncertainties into groups based on the topic or the subject that is involved. This grouping is primarily used as an aid to discussion. But it may indicate, we think it is a very good early indicator, of where a single uncertainty reduction perhaps a technical position or a staff position or even a rulemaking. Well one such reduction method could apply to a wide range of uncertainties and address them all.

The one I just alluded to is a good example. That particular question of what constitutes an adequate investigation applies to all 22 of the potentially adverse conditions which are listed in 60.122. Doing something with

that phrase and a couple of allied phrases, can lead to reduction of -- 24 rather, my quote was wrong -- 24 specific uncertainties could be reduced by a single action, single interpretation of what those words were meant to be or so forth.

[Slide.]

MR. PATRICK: The next two charts summarize the uncertainties -- the groupings of the uncertainties -- that are provided within your -- the document that you have in front of you. I have nothing in particular to say about these. Again, these are provided primarily for backup and for depth if there would be any particular questions dealing with the groupings.

[Slide.]

MR. PATRICK: The second thing that we do after grouping these uncertainties to be able to facilitate our discussion and to get some insights into how we might be able to lump them together for uncertain reduction, we go through a process of categorizing the uncertainties. These provide us a means to differentiate among the broad categories of regulatory uncertainty, institutional uncertainty, and technical uncertainty.

In other words, there are regulatory uncertainties of various types which may lend themselves to different kinds of uncertainty reductions. That is why we grouped

them into these categories. It is important to realize that there is no implication of importance. Nor is there any implication of the need to reduce any of these uncertainties simply because they show up in one particular category.

[Slide.]

MR. PATRICK: The next slide summarizes the categories of uncertainties and the numbers of uncertainties which fell within each of those categories. This in a nutshell is the result -- the summary of the report -- CNWRA-90-003.

A couple of things are important to note here. One is that by far the preponderance of all regulatory and institutional uncertainties identified to-date, fall in the category of need for definition. In other words there is an ambiguity in the phrases that are used in the regulation which could cause DOE or the staff to have differing interpretations as to the depth of analysis, the depths of site characterization and so forth that might be needed.

These may be relatively easy to dispense with. They might lend themselves to being reduced by staff interaction and or by the formal commenting process on such documents as the site characterization study plans and so forth. Twenty-four and I believe there are 43, fell into that category.

The second category which is was a close runner-up

is a category we call omissions. By these we mean the slight gaps in coverage of the rule. Perhaps the rule address a general subject. An example might be, the design of structure systems and components important to safety. It is called out that they have to consider the possibility of fire, but there is no address of the possibility of explosions.

Perhaps NRC like they do in the reactor business, they want to address explosions as well as fires within that portion of the regulation. That would be an example of a gap, an omission that we had found in our regulatory analysis.

Inconsistency is -- we found two cases of inconsistencies within the regulation. These would be places where one portion of the regulation seemed to be saying one thing that was a little bit different than what was said in another portion of the regulation. Or a more common occurrence would be where another NRC rule regulating a similar facility had a more stringent requirement then what Part 60 had. Some questions arise here with regard to such matters as design bases accident, for example.

One of the pieces -- I think that was of key interesting concern to the NRC staff -- is there anything in the rule which is unnecessary? Are there redundancies in there? Are there items being regulated for which the NRC

has no statutory authority and so forth? We found that there were no cases where there was a lack of necessity for the particular provision.

The next area is one which we have not yet completed. It is the only portion of the regulatory analysis of Part 60 which remains to be done, from the standpoint of regulatory institutional uncertainties, namely the test of sufficiency.

These two pieces [indicating] make it an isolation due to the dual task of necessity and sufficiency of everything that is within the regulation. I want to ensure that we are not over-regulating in the first case. Regulating things beyond authority. And in the second case, we need to be sure that the statutory provisions are fully being complied with.

The basis for the sufficiency analysis is what we call a functional analysis where we will examine at a rather high order, all of the functions that the repository must fulfill if it is to protect public and worker health and safety -- radiological health and safety.

The functional analysis is the technical operating procedure. It has been drafted for that. We are having meetings with the NRC staff this week, tomorrow specifically, as part of that interim process we discussed earlier. We will begin those functional analysis very

shortly.

Exceeding statutory authority was one of the particular categories that we examined. Again, we found no cases there. Then we found a couple of questions where there might be an institutional uncertainty. A question regarding agency jurisdiction -- how the NRC would be implementing certain provisions of the regulation. An immediate one that comes to mind there is the matter dealing with the mining regulations.

MR. MOELLER: And now there are 43 here and these are -- you know -- we had heard the number, what 86 or something?

MR. PATRICK: There are 86 basic regulatory requirements.

MR. MOELLER:

MR. PATRICK: And within those 86 requirements there are 43 uncertainties.

MR. MOELLER: All right. So this all in the uncertainties?

MR. PATRICK: All of them with the exception of this test of sufficiency.

MR. MOELLER: Right, where it may change.

MR. PATRICK: Some reg requirements have no uncertainties. Some have as many as three or four uncertainties. There are three uncertainties that are

common to all of the siting criteria dealing with the adequacy of the investigation, the adequacy of the evaluation of the data, and the other one escapes me.

MR. MOELLER: Okay.

[Slide.]

MR. PATRICK: How do these measure up against what the staff was currently doing before they ever got a center involved to do an independent analysis?

We did several correlations to evaluate in very broad terms how the uncertainties the Center had independently identified and evaluated matched up against the technical positions and the rulemakings that were already on the books in NRC's strategy document, SECY-88-285.

We found that five of the nine tentative rulemakings that NRC had underway correlated with regulatory and institutional uncertainties that we had identified here. The other four fell in the category of either dealing with matters that were outside of the review that we did, or in most cases, they dealt with technical uncertainties, rather than the regulatory uncertainties that we evaluated here.

Fifteen of the tentative technical positions which the NRC staff had evaluated correlated with the uncertainties that were here.

That's interesting from a couple of perspectives.

One, that's a fairly high ratio of correlation. But number two, it says that several, 15, or a number of our uncertainties, correlated with 15 positions that were taken to be basically technical in nature by the NRC staff.

I'd defer to Mr. Linehan to comment as to whether there is a cause-effect relationship here or not, but NRC, I believe, has begun to recognize that many of the topics that they were trying to deal with in technical positions really had a strong regulatory overtone, or at least, an undertone.

So, they are now moving to terminology here, and you'll see it in the updated SECY paper, of dealing with staff positions, I believe is the term that is now being chosen, to recognize that not all of the uncertainties that are being dealt with are primarily technical in nature. They may have something to do with a nuance or the interpretation of the language within the rule; hence, more regulatory in nature. And the general term, "staff position", will be used to recognize this.

Did you have any comments?

MR. MOELLER: Well, now there are 33 here. Where are the other 10?

MR. PATRICK: Okay.

We're looking at apples and oranges here.

MR. MOELLER: Okay.

MR. PATRICK: Here we're comparing 5 rulemakings

that may correlate with one or more uncertainty with 13 TPs that may correlate with one or more uncertainty.

MR. MOELLER: Okay.

MR. PATRICK: This last one is where I'm doing the other comparison. There are 13 uncertainties of those 43 which are uncovered.

MR. MOELLER: So, 30 are in the first two groups.

MR. PATRICK: They are in this first two.

MR. MOELLER: Right.

MR. PATRICK: But to some extent, they are being addressed by existing technical positions or rulemakings.

We'll get back to this matter in just a moment in terms of some of the recommendations.

The fact that 13 of the uncertainties did not correlate with rulemakings or technical positions does not necessarily mean that they should have correlated with those technical positions or rulemakings.

Certainly, some of those may fall in the category of being uncertainties which the NRC would choose not to reduce, to keep in place as intended flexibilities within the regulations.

[Slide.]

MR. PATRICK: The last two charts are some suggestions which we carried forward in our report to the NRC staff and which the Commission was briefed on at the end

of March.

First, it's vitally important that we conduct a sufficiency analysis as early in the process as possible, to make sure that the regulation is fully compatible with the functions that the repository is going to perform.

Second, we think it's very important that we determine both the necessity, or the desirability, and the importance of reducing these uncertainties; the first step, of course, being to identify those which are intended to be present to provide the agency and the license applicant with some flexibility in how they go about designing, constructing their repository facility.

The third item on that chart, to identify and implement appropriate uncertainty-reduction methods.

[Slide.]

MR. PATRICK: Dealing a little more specifically with that last bullet on that page, where the uncertainties correlate with an existing rulemaking or technical position -- and we saw that there were 5 such correlations here and 15 here -- it seems appropriate to evaluate whether those TPs and rulemakings, soon to be staff positions and rulemakings, whether they will appropriate reduce the uncertainty or whether they're merely tangentially or topically addressing that uncertainty.

That level of analysis has not been done. We just

correlated them topically.

This is a key area where some of these bootstrapping activities that Mr. Browning spoke to earlier can really begin to be of value to both the Center staff and the NRC staff. By doing a thorough statutory and regulatory analysis at the front end of a staff position or rulemaking, one can find out, by examining these groups and categories of uncertainties -- one can find out where several uncertainties may be able to be dealt with in a single uncertainty-reduction method, getting much more bank for the buck, as is colloquially said.

Now, in cases where there is no correlation at all, it seems like there are three evaluations that are appropriate: One, make a determination of any further action is needed, either because this is an intended flexibility or because the uncertainty is really not that important, it does not generate that high of risk to the licensing site-characterization process. If the answer is yes, further action is appropriate, then to initiate some level of regulatory action, be that an interaction between the NRC and the DOE staff, be it a formal letter, a rulemaking, a staff position or whatever might be appropriate. And finally, there is a possibility, even for these that are not correlated, that they could be brought up and included in the scope of some existing regulatory action

that's already underway by the NRC staff.

Those suggestions conclude my remarks this morning, and I'd be happy, in the remaining time, to address any other questions that you might have.

MR. MOELLER: Bill or Gene, do you have additional questions?

MR. HINZE: Well, I might ask for clarification here.

In Volume II of your report, there is a name attached to the discussion of these uncertainties. Could you identify who has listed there? Is that the lead person in the group that is signing off? Miklas and Wilbur seem to be very prominent in the listing.

MR. PATRICK: Yes.

The question is directed to Volume II of the report that we have been discussing here in the second part of the briefing.

Throughout our database, we provide the name of the individual who did that particular portion of the analysis and the date when that analysis was conducted, and that's part of our own internal authenticating and quality-assurance process that take place.

MR. HINZE: Is that the lead person?

MR. PATRICK: That is the name of the lead individual who was responsible for that analysis.

MR. HINZE: I may have missed it, but I don't find Wilbur in the list of your staff. Who is Wilbur?

MR. PATRICK: Robert Wilbur is a member of another division, Division Six of Southwest Research Institute, and we have relied upon him very heavily from the outset. His degrees are in electrical engineering, interestingly enough, and that is giving him a very strong systems perspective to the entire process.

He has had a good deal of experience in other regulations from the nuclear industry, ones dealing with nuclear power plants and so forth. He was certainly new, in the early days, to repository regulations, but he had a very strong background in the regulatory perspective. And he was one of the early people that we brought onboard and used in that capacity.

The other name that you will see quite frequently in this particular Volume is Mike Miklas. Mike used to be out in one of the other divisions of the Institute. We found that we were using him so heavily, that he was so valuable to us and would continue to be on an ongoing basis that we have transferred him into our Division.

He is a geologist with some Master's degree work, also, in climatology and other aspects of the geosphere and atmospheric sciences. So, he comes with a very broad geosciences background to the program.

MR. HINZE: And Wilbur is available to the Center on a continuing basis, then, in an on-call situation?

MR. PATRICK: That's correct. And that's one of those cases where we have a continuing need, we do not have a 100-percent need.

Backing up a little bit about some of the contractual constraints, the Center cannot use its people for anything other than this contract. So, once we transfer someone into the Center, they have to be 100-percent billable to this particular contract, and Mr. Wilbur does not fit that criteria at this point.

MR. HINZE: And how long has this process been underway in the Center? How long has this program been underway?

MR. PATRICK: The development of the fundamental processes and procedures date back to nearly the beginning of the Center. About January of '88, I believe -- January or February of '88, we really began in earnest trying to develop the Program Architecture Support System and put in place the fundamental technical operating procedures for doing the program architecture work.

The analyses that led to the document that you have in hand were focused on two 4- to 5-month periods of time, one leading up to the time when the site-characterization plan was issued. We initially focused on

the review of Subparts B and E of 10 C.F.R. 60, to prepare us to review the site-characterization plan, which came in in December of '88. And the second was approximately a 4-month effort which focused our activities leading up to this report, which was issued in March of this year, or February of this year.

MR. HINZE: Mr. Browning has provided us with your principle technical assistance tasks, and this is one of six. Can you give us some rough idea of what proportion of the effort, for example, in this past year was put into this one of six?

MR. PATRICK: Over the past year, this is work which falls within the Waste Systems Engineering and Integration part of the program. That's Mr. Phil Altomare's program element.

MR. HINZE: So, that's the last three bullets, then.

MR. PATRICK: Yes. That's actually the last three of those bullets.

In dollar terms --

MR. HINZE: I don't want dollars.

MR. PATRICK: I'm trying to think of ways of expressing the proportions.

MR. HINZE: Is this a majority of the technical assistance?

MR. BROWNING: It's budgeted about $1 1/2 to $2 million of my piece of the pie.

MR. HINZE: Is that 50 percent of the technical assistance?

MR. PATRICK: About one and a half to two-eighths.

MR. HINZE: About 25 percent was related to this task, about 25 percent of the technical assistance.

Thank you.

MR. MOELLER: Gene, any questions?

MR. VOILAND: In considering these uncertainties, what consideration was given to the pertinence of the uncertainty to risk?

Fundamentally, a regulation is aimed at protecting the public, which means controlling the risk.

You have discussed a whole bunch of uncertainties here rather generally. Did you evaluate the importance of these in terms of risk, or is that another portion of the project?

MR. PATRICK: That is one of the key aspects of the prioritization process. We purposely restrained ourselves at the identification stage from trying to prejudge what was and was not important for a couple of reasons.

One, things that seem important to you or I may or may not be important to others, and likewise, things that

may seem unimportant to use may, eventually, in the licensing process, become very important.

So, we have constrained ourselves from making those judgments early in the process. That has enabled us to do a very broad identification of uncertainties and to establish the rationale for why we think they are uncertainties or why we'd dismiss them as uncertainties, so that that will always be in the record.

That rationale can be challenged, but it cannot be said that NRC didn't think of this, NRC overlooked this uncertainty, be it technical or regulatory or managerial.

MR. VOILAND: The next stage might be, then, the application of risk analysis.

MR. PATRICK: The role of formal risk analysis in prioritizing -- that raises an interesting question, and part of it -- and I think the part that is very consistent with what the Office of Nuclear Materials Safety and Safeguards has been stated, both to their own internal staff in terms of direction, to us as a contractor, and to the DOE as a license applicant, performance assessment ought to be done early and often, and that is the analog to probabilistic risk assessment in the repository business, would be the performance-assessment activity.

I see a very strong role that it could play in gleaning out which of these are most important. How one

factors that in directly into a prioritization is certainly something that we'll have to grapple with in tomorrow's session, the beginning, and I'm sure, several days thereafter.

But that is the key issue, I would certainly agree with you -- risk to public, risk to worker from a radiological perspective. That has to be the focus of the work.

MR. MOELLER: I think, with that, we'll bring the session to a close.

Let me thank Dr. Patrick, especially, for his presentation.

I found the material provided to us prior to the meeting, plus your presentation itself, to reflect a lot of hard work and some very interesting observations.

I find that what you are doing is beginning to tie things together and to help us look at as a system and to understand where the weaknesses are, certainly, from a regulatory perspective.

So, we appreciate it very much, and we look forward to continuing to have such interactions in the future.

MR. PATRICK: Thank you, Sirs.

MR. MOELLER: Let me thank Bob Browning and the NRC staff for also being with us.

With that, then, we'll bring today's program to a close.

The Committee will go into closed session briefly, and then, as I mentioned, we will be resuming tomorrow morning at 8:30.

Thank you.

[Whereupon, at 11:50 a.m., the meeting was adjourned.]

REPORTER'S CERTIFICATE

This is to certify that the attached proceedings before the United States Nuclear Regulatory Commission

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NAME OF PROCEEDING: 20th ACNW Committee Meeting

DOCKET NUMBER:

PLACE OF PROCEEDING: Bethesda, 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.

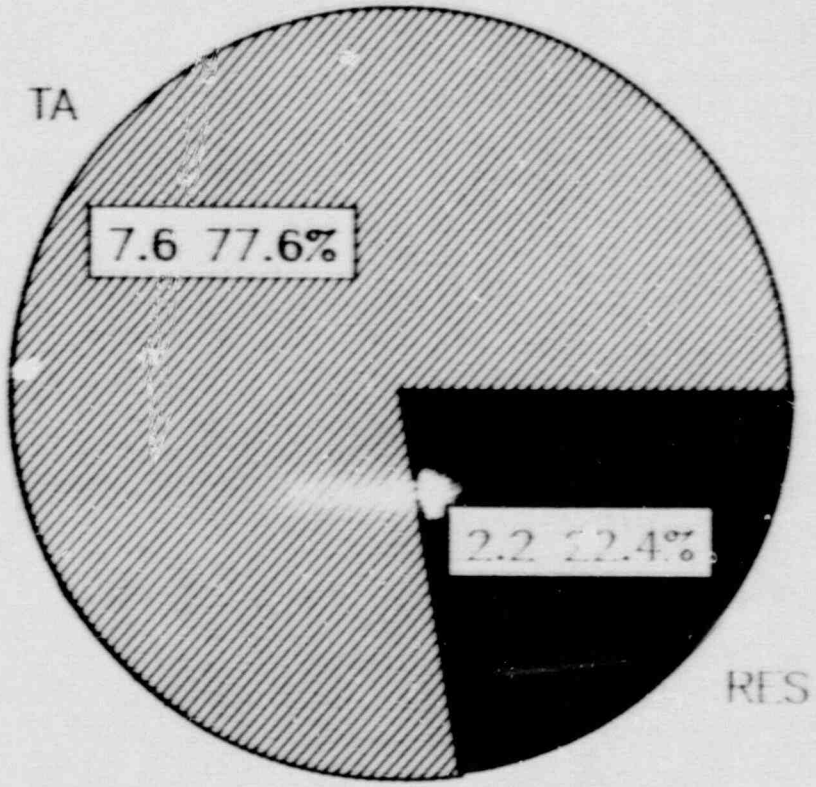
Marilyn Watkins

Official Reporter
Ann Riley & Associates, Ltd.

Principal Center Technical Assistance Tasks

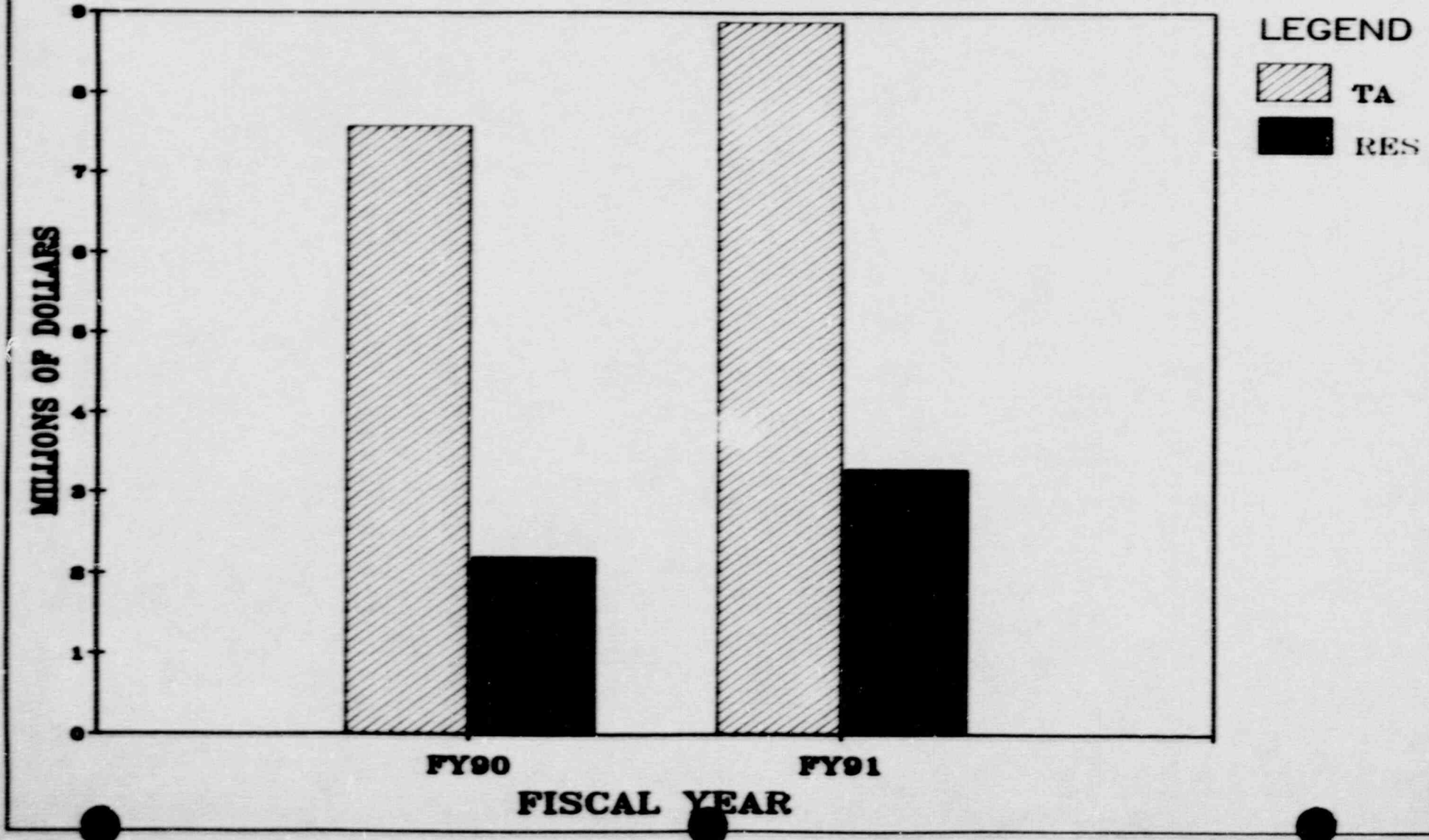
- Performance of Prelicensing Reviews and Evaluations of DOE submittals and activities
- Performance of Quality Assurance Audits of DOE
- Development of Performance Assessment Capabilities
- Development of Basis for Rulemakings, Technical Positions and Other Regulatory Products
- Development of Technical Assessment Capabilities and Methods
- Identification of Regulatory and Technical Uncertainties

PLANNED
CNWRA FY90 EXPENDITURES
(RES/TA in Millions of Dollars)



FY90

PLANNED
CNWRA FY90-91 EXPENDITURES
(RES/TA)



PROGRAM ARCHITECTURE AND THE SYSTEMATIC REGULATORY ANALYSIS

Briefing to the
Advisory Committee on Nuclear Waste

by the
Center for Nuclear Waste Regulatory Analyses

May 24, 1990

BRIEFING TOPICS

- OVERVIEW OF SYSTEMS APPROACH
  - Program Architecture
  - Systematic Regulatory Analysis
- ACCOMPLISHMENTS TO DATE
- REPORT ON RESULTS OF UNCERTAINTY ANALYSIS
  - Regulatory Analysis Method
  - Summary of Results
  - Suggest Follow-on Activities

NWPA ESTABLISHES THE HLW REPOSITORY LICENSING ENVIRONMENT

- TECHNICALLY SOPHISTICATED AND COMPLEX
- SEVERAL INTER-RELATED COMPONENTS – AT REACTOR STORAGE, MRS, GEOLOGIC REPOSITORY, TRANSPORTATION, ETC.
- FORMAL ADMINISTRATIVE LAW PROCESS
- MULTIPLE-PARTY EVALUATION AND APPROVAL PROCESS
- INSTITUTIONALLY COMPLEX – NEGOTIATOR, MRS COMMISSION, TECHNICAL REVIEW BOARD
- INTENSE PUBLIC SCRUTINY
- RIGOROUS SCHEDULE – 3-YEAR REVIEW OF LICENSE APPLICATION

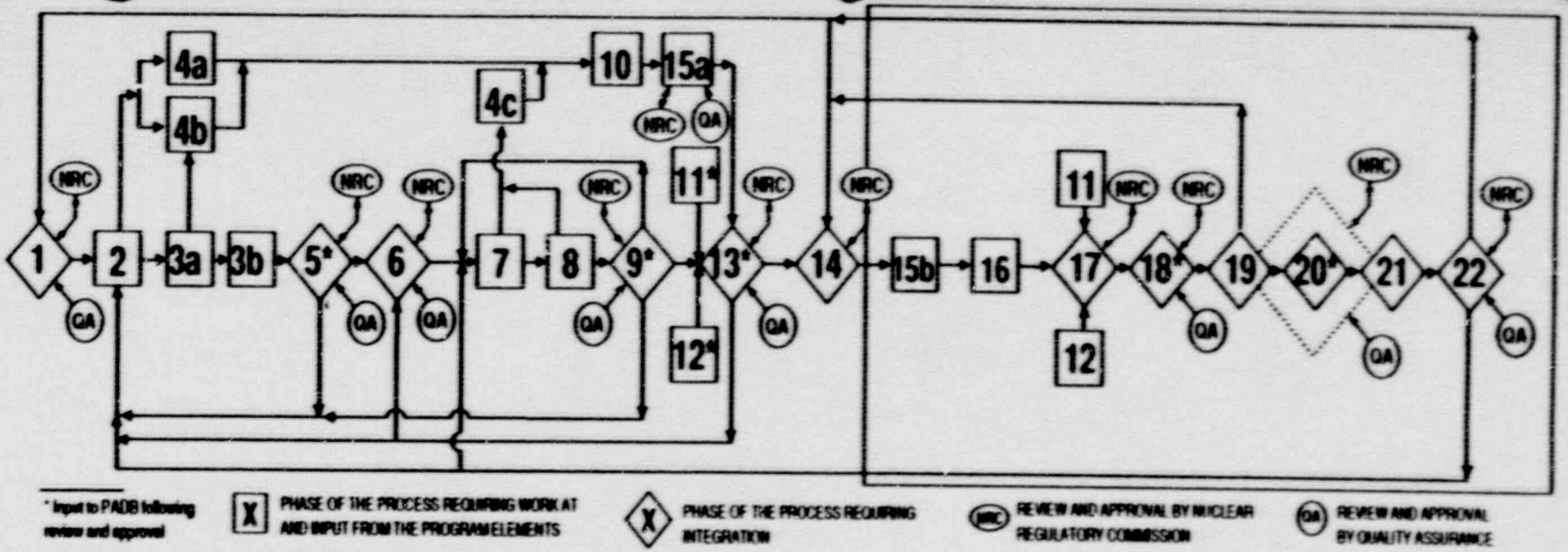
THESE FACTORS INTRODUCE RISK INTO THE NRC PROGRAM

SYSTEM ENGINEERING: APPROACH

- MISSION ORIENTED – NWPAA FOCUS
- REQUIREMENTS-BASED – 10CFR60 AND 40CFR191 PRIMARY FOR REPOSITORY
- PROACTIVE – SUFFICIENT AND TIMELY GUIDANCE TO DOE
- BASIS FOR INTEGRATION – ORGANIZATIONAL AND FUNCTIONAL
- DYNAMIC – ADAPTS TO CHANGES

PROGRAM ARCHITECTURE: SYSTEM DESCRIPTION AND FRAMEWORK FOR THE NRC HIGH-LEVEL WASTE REGULATORY PROGRAM

- ASSESSMENT OF STATUTORY AND REGULATORY RESPONSIBILITIES BY MEANS OF THE SYSTEMATIC REGULATORY ANALYSIS
- PROGRAM PLANNING, INCLUDING EVALUATION OF PROGRAM ALTERNATIVES AND RISKS
- PROGRAM EXECUTION AND MANAGEMENT
  - Implementation of Plans
  - Formal Development of Technical Positions and Rulemakings
  - Development of Technical Assessment Capabilities and Analysis Methods
  - Conduct of Reviews and Audits
  - Conduct of Research
  - Cost and Schedule Control
  - Integration and Statusing of Progress of Work



1. Identify Potentially Applicable Statutes and Regulations
2. Analyze and Identify Regulatory Requirements
3a. Identify Regulatory Elements of Proof and Define Logic Structure
3b. Identify Technical Review Components and Define Logic Structures
4a. Identify and Correlate Institutional Uncertainties
4b. Identify and Correlate Regulatory Uncertainties
4c. Identify and Correlate Technical Uncertainties
5. Review, Revise and Integrate Regulatory Requirements, Regulatory Elements of Proof, and Technical Review Components
6. Select Subset of Regulatory Requirements for Further Analysis Based on Time-Critical Nature
7. Identify Basic Approach for Compliance Determination Methods
8. Identify and Correlate Information Requirements for Compliance Determination
9. Review, Revise and Integrate Compliance Determination Methods and Associated Information Requirements
10. Define NRC Composite Uncertainties; Identify Uncertainty Components
11. Obtain DOE "Issues", Compliance Demonstration Methods, Information Needs, Uncertainties and Uncertainty Reduction Methods
12. Obtain State, Tribe, and Other Affected Parties "Issues", Compliance Evaluation Methods† , Information Needs, and Uncertainties
13. Identify and Correlate Information Requirements for Uncertainty Reduction; Rank NRC Composite Uncertainties
14. Define Composite Information Requirements; Make Initial Selection of Composite Information Requirements for NRC Action; Identify Other Action Agencies
15a. Analyze Alternative Uncertainty Reduction Methods, Draft the Postulated Uncertainty Reduction Language (PURL) for Recommended Rulemakings, and Submit to NRC for Review.
15b. Define Alternative NRC Programs for Each Composite Information Requirement, Uncertainty Reduction, and Compliance Determination
16. Develop Costs, Schedules, and Lead Times for Alternative NRC Programs
17. Analyze and Perform Tradeoffs of Alternative NRC Programs
18. Recommend Overall NRC Programs Including Overall Research Program Plan
19. Develop and Display the Network and Critical Path for Each Regulatory Requirement
20. Develop and Display Network for Total Program
21. Control and Document Program Structure and Changes
22. Conduct the NRC program

†It is assumed that at least one affected party will request information to perform an independent "compliance evaluation".

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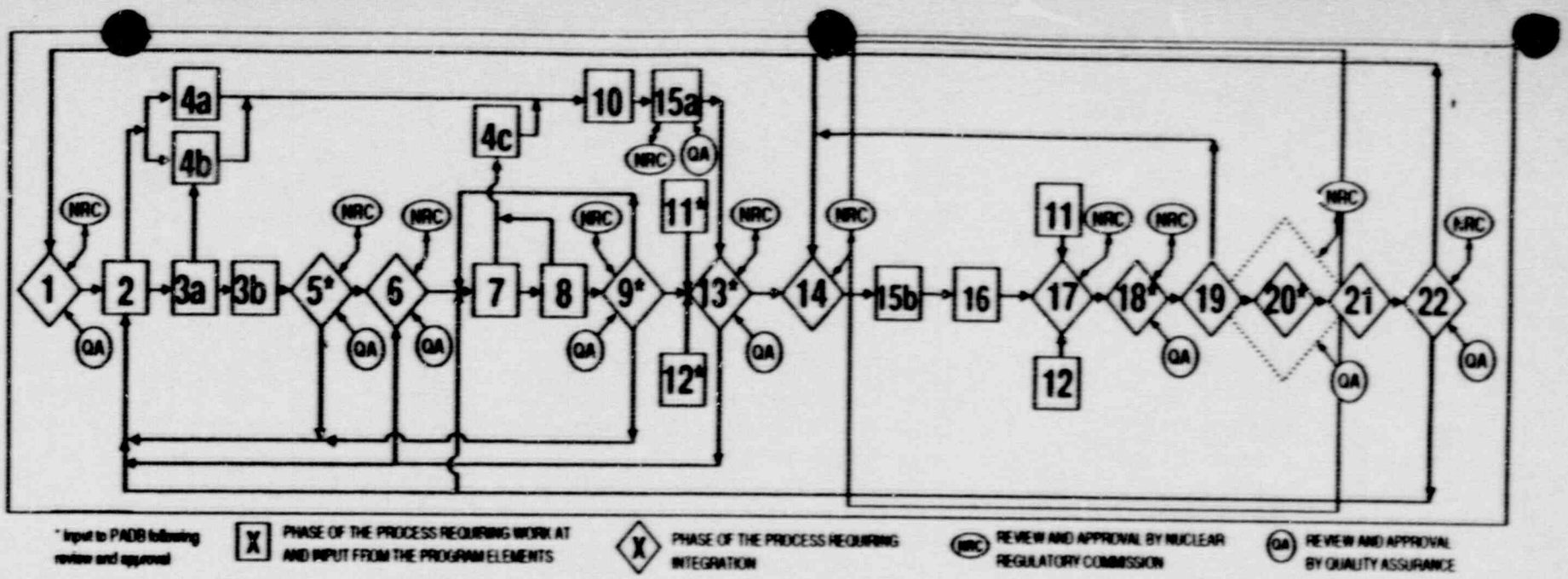
PROGRAM ARCHITECTURE PROCESS DIAGRAM



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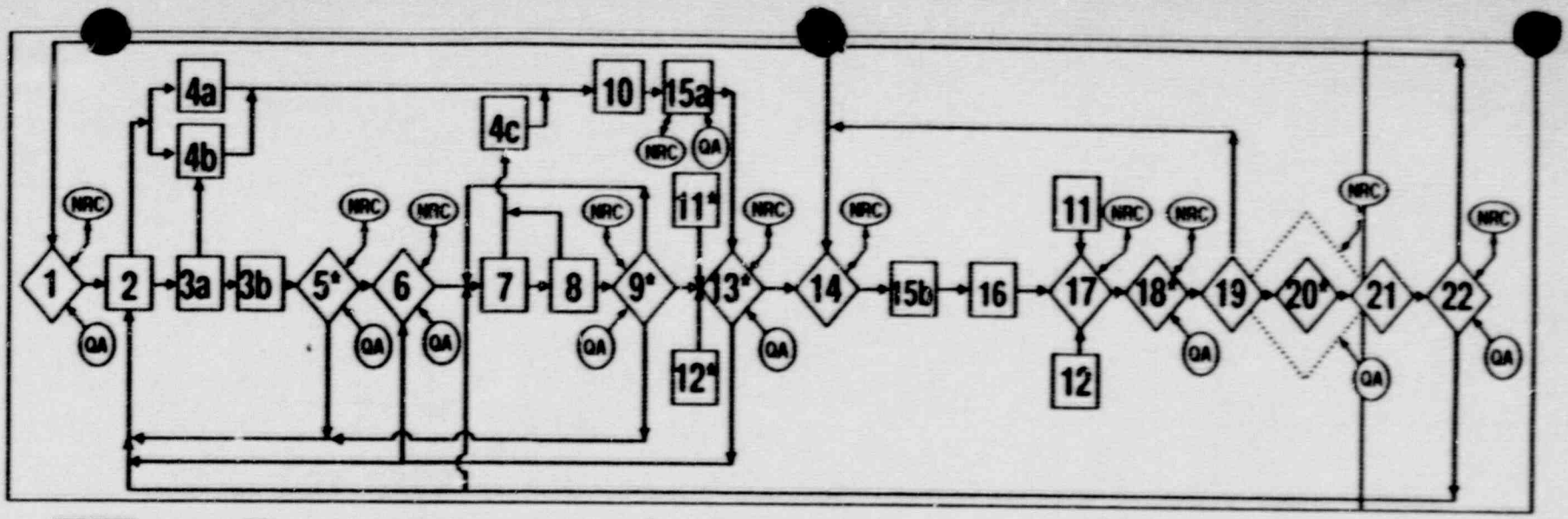

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PROGRAM ARCHITECTURE PROCESS DIAGRAM

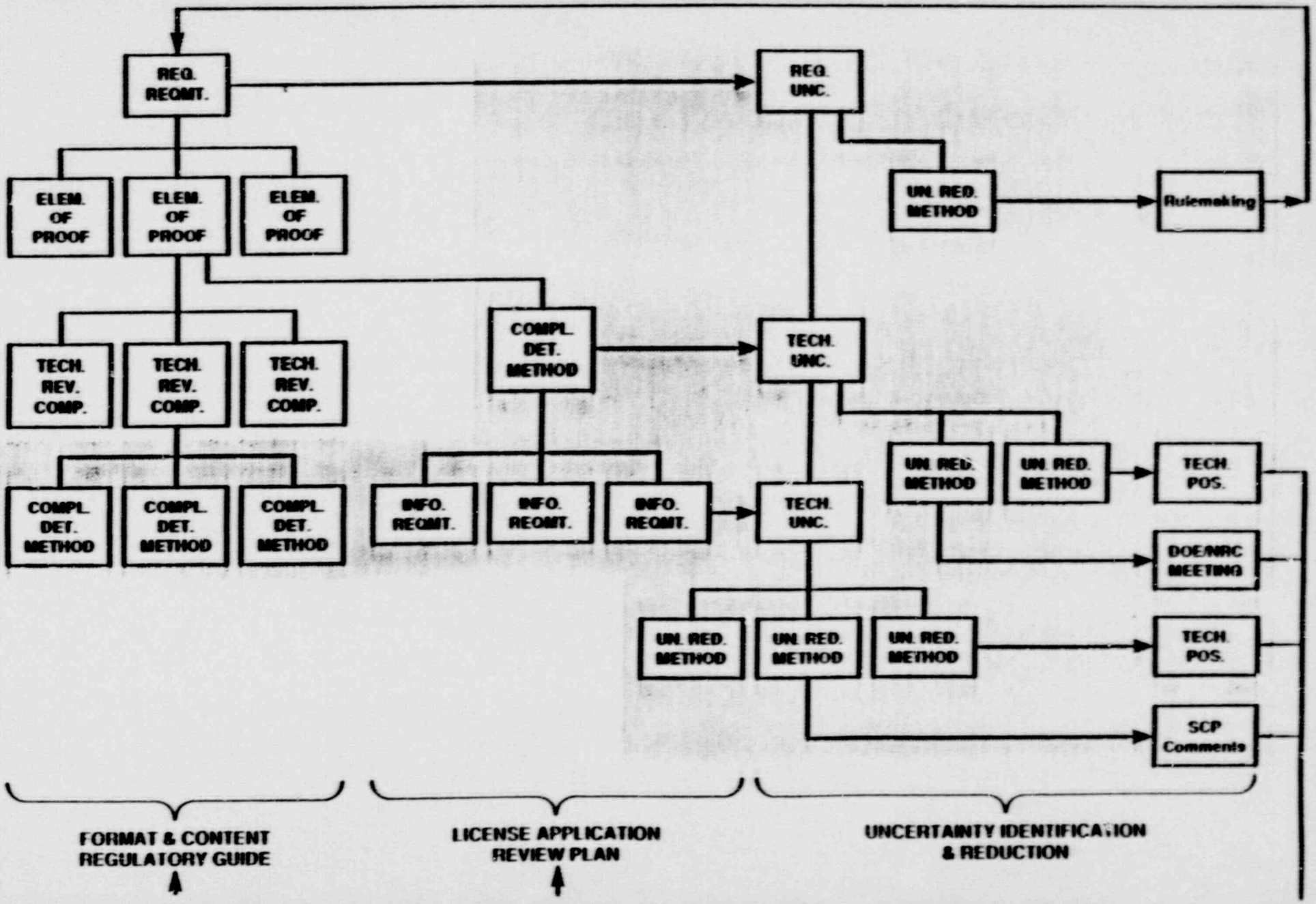
SYSTEMATIC REGULATORY ANALYSIS: PROCESS FOR COMPREHENSIVE, SYSTEMATIC, STRUCTURED EVALUATION OF NRC STATUTORY AND REGULATORY RESPONSIBILITIES

- IDENTIFICATION OF STATUTORY AND REGULATORY REQUIREMENTS
  - Repository
  - ISFSI and/or MRS
  - Transportation
- IDENTIFICATION AND EVALUATION OF UNCERTAINTIES
- REDUCTION/RESOLUTION OF UNCERTAINTIES
- DEVELOPMENT OF REGULATORY AND TECHNICAL BASES FOR GUIDANCE DOCUMENTS
- DEVELOPMENT OF STRATEGIES AND METHODS FOR COMPLIANCE DETERMINATION (LICENSE REVIEW)

PROGRAM ARCHITECTURE SUPPORT SYSTEM: COMPUTER-BASED INFORMATION ANALYSIS AND MANAGEMENT SYSTEM

- COMPUTER-ASSISTED DEVELOPMENT OF SRA
- INFORMATION ANALYSIS, INTER-RELATIONSHIP, ARCHIVAL, AND RETRIEVAL
- PROGRAM PLANNING AND INTEGRATION
- PROGRAM MANAGEMENT (COST/SCHEDULE CONTROL)
- OFFICE AUTOMATION
  - Technical Document Index
  - Correspondence and Commitment Control
  - Link to LSS and NUDOCs

RELATIONSHIPS AMONG COMPONENTS OF NRC PROGRAM AND SYSTEMATIC REGULATORY ANALYSIS



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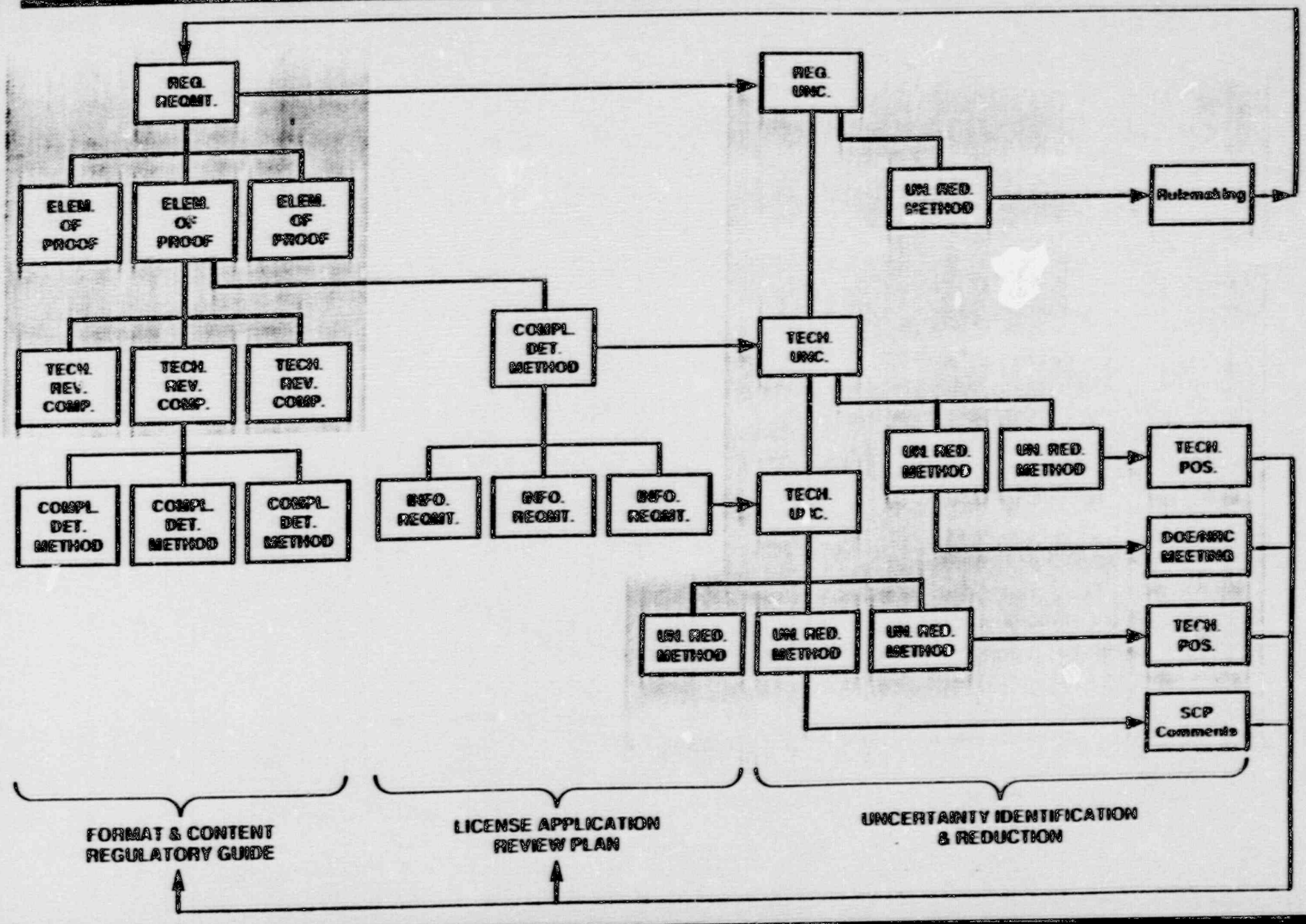

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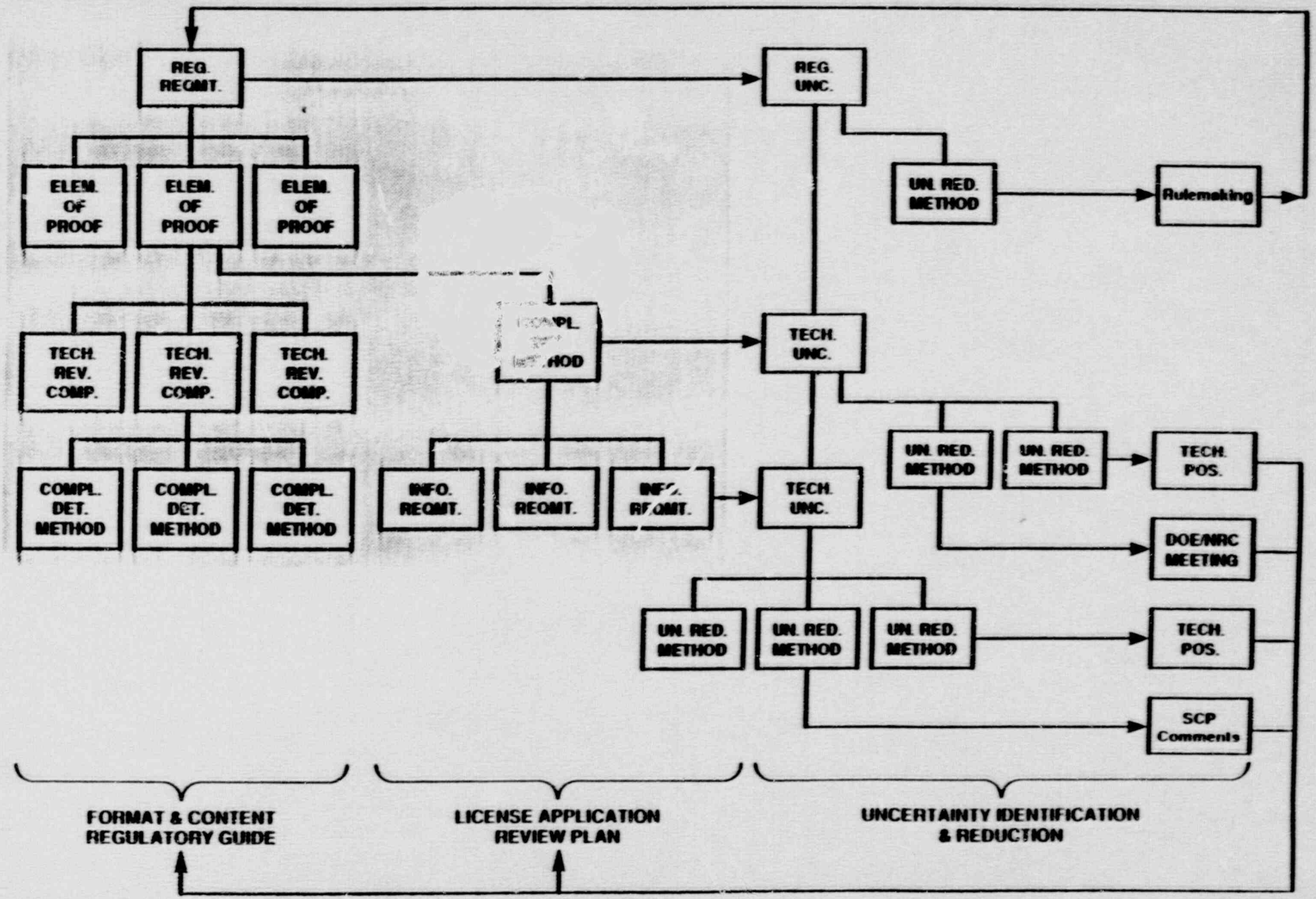


SIGNIFICANT ACCOMPLISHMENTS – SYSTEMS ENGINEERING

- PRIORITIZED STATUTES AND REGULATIONS
- DELINEATED REGULATORY TOPICS AND REGULATORY REQUIREMENTS IN 10 CFR PART 60
- BASELINED PROGRAM ARCHITECTURE PROCESS AND PROCEDURES
- COMPLETED ANALYSIS OF REGULATORY AND INSTITUTIONAL UNCERTAINTIES IN 10 CFR PART 60

PLANNED PRODUCTS OF SRA

- REGULATORY BASIS FOR REGULATORY GUIDANCE PROVIDED TO DOE
  - Technical Positions
  - Rulemakings
  - Regulatory Guides
- TECHNICAL BASIS TO REDUCE REGULATORY AND TECHNICAL UNCERTAINTIES
- COMPLIANCE DETERMINATION STRATEGIES BASED ON:
  - License Application Review Strategy
  - Performance Assessment Review Strategy
- COMPLIANCE DETERMINATION METHODS, INCLUDING REVIEW CRITERIA, THAT WILL COMPRISE THE LARP
- INTEGRATED REGULATORY AND TECHNICAL BASIS FOR REVIEW OF SITE CHARACTERIZATION DOCUMENTS
- TECHNICAL REVIEW COMPONENTS AND INFORMATION REQUIREMENTS FOR LICENSE APPLICATION FORMAT AND CONTENT REGULATORY GUIDE

SCOPE OF UNCERTAINTY REPORT

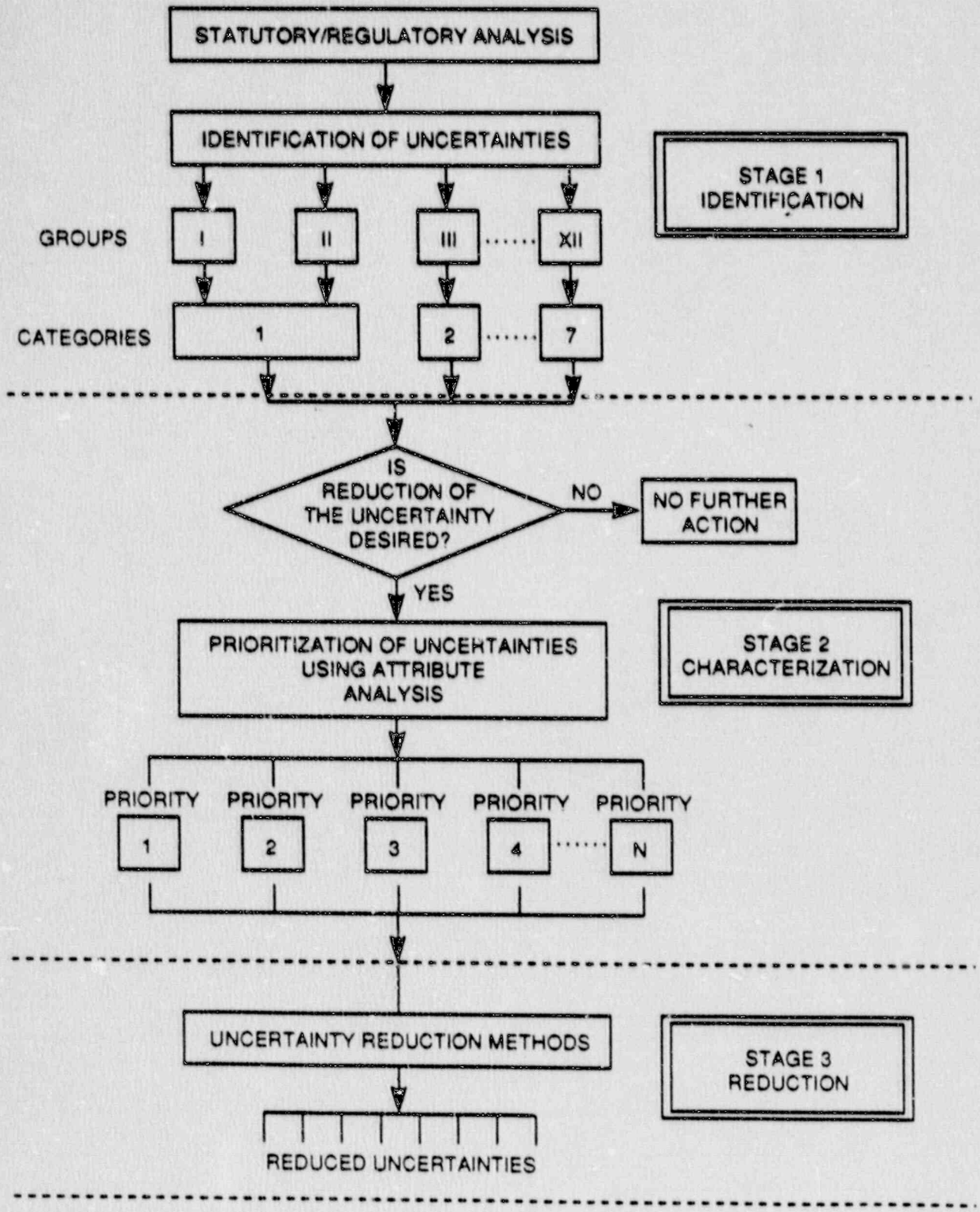
- IDENTIFICATION OF REGULATORY AND INSTITUTIONAL UNCERTAINTIES (TECHNICAL UNCERTAINTIES NOT ADDRESSED)
- EXCLUSION OF UNCERTAINTIES
- GROUPING AND CATEGORIZATION
- CORRELATIONS WITH RULEMAKINGS AND TECHNICAL POSITIONS
- RECOMMENDED ACTIONS

REGULATORY ANALYSIS METHOD

- IDENTIFY REGULATORY REQUIREMENTS
- DELINEATE LOGICAL RELATIONSHIPS OF REGULATORY ELEMENTS OF PROOF
- IDENTIFY REGULATORY AND INSTITUTIONAL UNCERTAINTIES
- ANALYZE AND DEVELOP RATIONALE FOR UNCERTAINTIES IN CONTEXT OF AVAILABLE DOCUMENTATION
- EXCLUDE UNCERTAINTIES AS APPROPRIATE

THREE STAGE PROCESS:

- UNCERTAINTY IDENTIFICATION
- UNCERTAINTY CHARACTERIZATION
- UNCERTAINTY REDUCTION


STATUTORY/REGULATORY ANALYSIS
IDENTIFICATION OF UNCERTAINTIES
STAGE 1
IDENTIFICATION
GROUPS
I
II
III
XII
CATEGORIES
1
2
7
IS
REDUCTION OF
THE UNCERTAINTY
DESIRED?
NO
NO FURTHER
ACTION
YES
PRIORITIZATION OF UNCERTAINTIES
USING ATTRIBUTE
ANALYSIS
STAGE 2
CHARACTERIZATION
PRIORITY
1
PRIORITY
2
PRIORITY
3
PRIORITY
4
PRIORITY
N
UNCERTAINTY REDUCTION METHODS
STAGE 3
REDUCTION
REDUCED UNCERTAINTIES

THREE TYPES OF UNCERTAINTIES

- REGULATORY – UNCLEAR WHAT MUST BE DONE
- INSTITUTIONAL – UNCLEAR WHO IS RESPONSIBLE
- TECHNICAL – UNCLEAR HOW COMPLIANCE WILL BE DEMONSTRATED

REGULATORY UNCERTAINTY

" . . . LACK OF CLARITY . . . AN ESSENTIAL REQUIREMENT HAS BEEN OMITTED, OR WHEN REQUIREMENTS . . . DETRACT FROM . . . OR DO NOT CONTRIBUTE TO THE REGULATORY PROGRAM . . . . "

INSTITUTIONAL UNCERTAINTY

"... LACK OF CERTITUDE REGARDING THE ROLES, MISSIONS, ACTIONS, AND SCHEDULES OF AGENCIES WHICH HAVE REGULATORY REQUIREMENTS THAT AFFECT THE HIGH-LEVEL WASTE REGULATORY PROGRAM ...."

UNCERTAINTY GROUPS

- BASED ON TOPIC OR SUBJECT
- PRIMARILY AS AID TO DISCUSSION
- MAY INDICATE WHERE ONE UNCERTAINTY REDUCTION COULD BROADLY APPLY

SUMMARY OF UNCERTAINTIES BY GROUP

- GROUP I: GENERAL ADEQUACY OF SITE CHARACTERIZATION
- GROUP II: ANTICIPATED/UNANTICIPATED PROCESSES/ EVENTS
- GROUP III: IMPORTANT TO SAFETY CONSIDERATIONS
- GROUP IV: EBS PERFORMANCE
- GROUP V: RADIOLOGICAL SAFETY CONSIDERATIONS
- GROUP VI: RETRIEVABILITY CONDITIONS

SUMMARY OF UNCERTAINTIES BY GROUP (CONT'D)

- GROUP VII: CONDITIONS FOR CONSTRUCTION AUTHORIZATION AND LICENSE
- GROUP VIII: MINE AND NONRADIOLOGICAL SAFETY
- GROUP IX: CONDITIONS LAND ACQUISITION/CONTROL
- GROUP X: QUALITY ASSURANCE AND INFORMATION REQUIREMENTS
- GROUP XI: COMPLIANCE WITH EPA STANDARD
- GROUP XII: EMERGENCY PLANNING CRITERIA

UNCERTAINTY CATEGORIES

- FURTHER DIFFERENTIATE AMONG SUBTYPES OF REGULATORY AND INSTITUTIONAL UNCERTAINTIES
- GIVE EARLY INSIGHTS INTO UNCERTAINTY REDUCTION METHOD
- NO IMPLICATION OF IMPORTANCE OR NECESSITY OF REDUCTION

SUMMARY OF UNCERTAINTIES BY CATEGORY

• NEED FOR DEFINITION	24
• OMISSION	15
• INCONSISTENCY	2
• LACK OF NECESSITY	0
• INSUFFICIENCY	0*
• EXCEEDS AUTHORITY	0
• QUESTION OF AGENCY JURISDICTION	2

*TO BE DONE

RESULTS OF CORRELATIONS

- 5 TENTATIVE RULEMAKINGS CORRELATED WITH UNCERTAINTIES
- 15 TENTATIVE TECHNICAL POSITIONS CORRELATED WITH UNCERTAINTIES
- 13 UNCERTAINTIES DID NOT CORRELATE WITH RULEMAKINGS AND TECHNICAL POSITIONS

SUGGESTIONS FOR FURTHER ACTIONS

- CONDUCT SUFFICIENCY ANALYSIS
- DETERMINE NECESSITY AND IMPORTANCE OF REDUCTION, INCLUDING PRIORITIZATION
- IDENTIFY AND IMPLEMENT UNCERTAINTY REDUCTION METHODS

SUGGESTIONS FOR FURTHER ACTIONS (CONT'D)

- WHERE UNCERTAINTY CORRELATES TO RULEMAKING OR TECHNICAL POSITION – EVALUATE WHETHER IT WILL BE APPROPRIATELY REDUCED
- WHERE UNCERTAINTY DOESN'T CORRELATE – EVALUATE NEED TO:
  - Take Any Further Action
  - Initiate Regulatory Action
  - Modify Scope Of Existing Regulatory Action