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UNITED STATES NUCLEAR REGULATORY COMMISSION'S

ADVISORY COMMITTEE ON NUCLEAR WASTE

April 20, 2006

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

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ADVISORY COMMITTEE ON NUCLEAR WASTE (ACNW)

169th MEETING

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THURSDAY,

APRIL 20, 2006

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The Advisory Committee met at 8:30 a.m. in Room 1 G16 of the U.S. Nuclear Regulatory Commission, One White Flint North, 11555 Rockville Pike, Rockville, Maryland, DR. MICHAEL T. RYAN, Chairman, presiding.

MEMBERS PRESENT:

MICHAEL T. RYAN, Chairman

ALLEN G. CROFF, Vice Chairman

JAMES H. CLARKE, Member

WILLIAM J. HINZE, Member

RUTH F. WEINER, Member

ACNW STAFF PRESENT:

LATIF HAMDAN, Designated Federal Official

I-N-D-E-X

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

(8:30 a.m.)

15) OPENING REMARKS BY THE ACNW CHAIRMAN

CHAIRMAN RYAN: Good morning, folks. Let's come to order, if we may, please. This is the third day of the 169th meeting of the Advisory Committee on Nuclear Waste. My name is Michael Ryan, Chairman of the ACNW. The other members of the Committee present are Vice Chairman Allen Croff, Ruth Weiner, James Clarke, and William Hinze.

During today's meeting, the Committee will be briefed by representatives from the Office of Nuclear Regulatory Research on recent NRC-sponsored activities in the areas of health physics research and will continue to discuss proposed Committee letters and reports from this and earlier ACNW meetings.

Most of that work, I might add, was concluded. We have one remaining letter that we may actually defer to next month if we want to include additional information from this morning's work.

Latif Hamdan is the designated federal official for today's session. This meeting is being conducted in accordance with the provision of the Federal Advisory Committee Act.

We have received no written comments or

questions for time to make oral statements from members of the public regarding today's sessions. Should anyone wish to address the Committee, please make your wishes known to one of the Committee staff.

It is requested that speakers use one of the microphones, identify themselves, and speak with sufficient clarity and volume so that they can be readily heard. It is also requested that if you have cell phones or pagers, you kindly turn them off.

Thank you very much. And, without further ado, I'll turn our attention to our presentation this morning. I think Stephanie Bush-Goddard, Dr. Goddard, welcome. And welcome to Dr. Chokshi. Welcome in your new role as Deputy Director for the Radiation Protection and Waste Management Group in the Office of Nuclear Regulatory Research. We are happy to have you both here. Take it away.

16) NRC RADIATION RESEARCH PROGRAM

DR. CHOKSHI: I want to thank the Committee for having us this morning for this briefly. Actually, it helped my education process in preparing for this because I'm new to both the group and the subject.

And one more thing I would mention about in the NRRI organization for this particular group.

The entire line of management has changed. We are going to have a new office director very soon. The division director is now Mark Cunningham. And our assistant director is Sher Bahadur, Dr. Bahadur. So there are challenges. But, again, I want to thank the Committee for having us and giving us this opportunity.

Stephanie?

DR. BUSH-GODDARD: As you all know, my name is Stephanie Bush-Goddard. I am the Branch Chief of the Health Effects Branch in the Office of Research. And, without further ado, I'll get directly into my talk.

I will be talking about the current goals of the research plan. This was based on a SECY paper in 1994 that laid out goals. I'll also talk about our program overview and our ongoing initiatives, which are largely based from user needs, requests from our different program offices. I'll talk about our new initiatives in looking forward, what we want to do in the intermediate and long term. And I'll also reserve at the end to talk about our regulatory guide effort.

I'll do two things: go into one specific guide, which is one of our main guides that captures some of our overlying issues that we're dealing with

from looking at the impact of the ICRP recommendations; and other issues.

So, as I said, there were four goals back in 2004. We wrote a SECY paper to outline our four major goals. The first one was just to maintain and improve our knowledge of health effects. And this is in collaboration with RSL to look at, for example, the DOE low-dose study program, to look at some of the BEIR VII recommendations that you will be hearing about next month.

And then we're also required to support the development of radiation protection standards and implementation. This is the regulatory guide effort that we're looking at all of the division 8 "occupational health guides" as well as other dose-related guides.

Then we're supporting the rationale for technical bases. And we're also developing technical bases for risk-informed materials applications. These are some F.Y. '06 initiatives, where we're looking at Part 30 and Part 40 to risk-inform them.

So what do we do? As I said, we give support to and receive support from the different program offices and even regions. For example, in the middle block, we have abnormal occurrence report,

which is based from a mandate. The reorganization after 1974 tells us to submit this report to Congress every year.

And we also maintain the REIRS database. REIRS stands for Radiological Exposure Information and Reporting System. We have user needs requests to update and maintain computer codes, two of them being VARSKIN and RESRAD, RESRAD standing for Residual Radioactivity. I will tell a little bit about that.

And then we also have some dose modeling user needs requests. This is on page 5, where we have different contracts to go out and do some MCNP modeling.

Now, all of these are done so that the licensees and also NRC can verify compliance with certain parts of 10 CFR 20. I mentioned the occupational health reg guides. We have some interagency projects with DOE, with EPA. And then we have a lot of miscellaneous things.

So I'm on page 6 if that's okay with you guys. This is actually one of our document that the Commission takes a lot of interest in because it is a report to Congress. It's called our annual report to Congress on abnormal occurrences.

And basically we report what we call AOs

at our unscheduled events. And we base these criteria on things like if a personal received a high or severe exposure to the whole body, we also look at there were major safety degradations for a reactor or a fuel cycle facility. And we report these things to Congress.

Now, we also are in the process of changing the criteria. Some of the criteria is very deterministic. It's a little vague. We're going to more risk-informed criteria, like, for example, with the reactors. We're proposing that we use some of the reactor oversight processes in the criteria. This actually is out for public comment right now and changing the criteria.

To give you an example of what are some of the errors that are reported, this was based on our NUREG that we sent to Congress last year. We talked about there was a uranium hexafluoride release. And this is where they had to evacuate people.

Even some of the employees got reddening of the skin. We also have medical events. Actually, medical events are usually 90 percent of our ROs. We have a diagnostic medical event at the Beaumont Hospital in Michigan. This is where they used a therapeutic dose gamma knife event --

CHAIRMAN RYAN: I just have a question. These are the exposures to the patient, not necessarily a badged worker, or is it just workers?

DR. BUSH-GODDARD: Most of them, yes, are to the patient.

CHAIRMAN RYAN: To the patient?

DR. BUSH-GODDARD: Yes, to the patient. And then I talked about the AO criteria, but we also have these things that we call items of interest that did not necessarily meet the criteria, but they received media attention. And Congress likes to see that we are watching those.

Two examples of those are the misplaced fuel rods at Vermont Yankee and when we had off-site power in Palo Verde. This year we had I think 13 events. And, actually, all of them were medical.

The next thing we do is we maintain a database of occupational and exposure records. And we name that at reirs.com in the process of getting updated to the URL in red.

We have 227 licensees this year. Basically, they submit all of their occupational data to us. We put it in a NUREG. We analyze it for exposure trends. This is a way we can account for trends in workers, workers that might work in

different licensees. So we won't double-count their dose.

We have a Web site where the licensees can submit their dose records and employees can request their exposure histories.

CHAIRMAN RYAN: It's interesting to note that 227 licensees is probably a small fraction of the total number of radioactive material licensees when you consider agreement states.

DR. BUSH-GODDARD: Exactly.

CHAIRMAN RYAN: Is there any discussion on how to capture that information as well?

DR. BUSH-GODDARD: Actually, on my last slide, when I tell you about --

CHAIRMAN RYAN: Go ahead.

DR. BUSH-GODDARD: Okay. It's going to be next.

CHAIRMAN RYAN: Fair enough.

DR. BUSH-GODDARD: And these next three slides are just data, an example of what we capture. For example, last year, as you can see, the actual measurable dose goes down. We have captured the dose from 73 to 2004 for each of the BWR, PWR, and the total light water reactors.

CHAIRMAN RYAN: Just a quick note as a

side note. I think I want to comment and actually compliment this data because we have made of that in our letters to the Commission --

DR. BUSH-GODDARD: Okay. Good.

CHAIRMAN RYAN: -- when we were asked about some trends in tracking and when DOE talked about its potential updated radiation protection standards. The information was very helpful.

DR. BUSH-GODDARD: Okay. Great. That's good to know. And when you talk about how we're capturing agreement states, that's a very good question because, as you can see, this data shows that in 2004, for a example, we had only 93 licensees. And these are not agreement state licensees. These are only NRC licensees. So, in fact, we're not capturing the exposure data from our agreement states.

Just last week, we had a retreat to look at an action item in trying to see how we can get that data from agreement states to analyze it, you know, to see what impact it has on our overall measurable dose.

CHAIRMAN RYAN: And there was a recent paper by Professor Emery from Texas in the "Health Physics Journal." It was interesting. He talked about a specific group that is, I am going to guess, mostly agreement state licensees. And that is the

well logging sources and their users.

DR. BUSH-GODDARD: Yes.

CHAIRMAN RYAN: I think historically we have all recognized that that is a group that has had probably a higher rate of exposures to workers than perhaps other groups have. And he has actually done an analysis of why that is happening and, you know, when it happens with regard to new hiring and training and what periods it happens to coincide with.

He found that as hiring goes up in the oil industry, that's when those accidents actually increase.

DR. BUSH-GODDARD: Oh, okay.

CHAIRMAN RYAN: I'm quoting his paper. So I think that's important. Maybe it's not all agreement state licensees, but maybe there are industry segments where there are important areas where you could turn your expertise on analysis and perhaps improvement. So it's a good thing to think about.

DR. BUSH-GODDARD: Yes, definitely, will do. So that's kind of an example. Like you said, we don't capture everything.

The ingestion data, I just put this up here just to show you that we do capture some

ingestion data, basically. This is power reactors and the nuclides, the number of intakes. A lot of times we highlight the hires' intake of microcuries.

Okay. When you said how you used the data, I wish I knew. I would have a bullet up here and put ACNW, but, like I said, we use it to monitor the ALARA performance of our licensees. We also give it to the United Nuclear Insurers. They determine insurance rates from the dose data. We give it to the IACR, the International Agency on Cancer Research. And then we just look at it. You know, it permits comparison of occupational and public risk. I'm sure, you know, you use it for that.

Going into our user needs requests, one of the requests we had from both NRR and NMSS is to update VARSKIN to make it user-friendly, to make it to be able to calculate different geometries to the skin. And we have done that in the last couple of years.

Now, this system verifying the compliance of 10 CFR 20.1201, which says you can calculate doses up to a range of 10 cm^2, what we're starting to get into is we could only use this code for beta radiation in the different geometries. And now we're going to put a full-time gamma component in it to upgrade to model the point but the line forces in geometries.

Our regions like to use this as a very useful, kind of handy tool for them.

CHAIRMAN RYAN: Just thinking ahead a bit, does that, then, lead us to where we might think about a revised extremity dose view?

DR. BUSH-GODDARD: Yes. Actually, also last week what we were talking about is the ten centimeters, the skin dose, the correct dose to measure? Should we go to deep dose equivalent or something like that? That's on the horizon to kind of look into that. But sites in which you think about it would be very useful.

CHAIRMAN RYAN: Dr. Paperiello in a discussion with us last month pointed out that we're still using NBS handbook from '64, I think it is, from 1959, for an extremity dose basis. So it would be interesting to see how you move that forward.

DR. BUSH-GODDARD: Okay. This is just a picture to break up the monotony of the words. We also have a contract with Argonne National Lab that they are maintaining and updating, RESRAD.

And I put this picture here because now we have a RESRAD on site, which is the traditional dose to verify compliance with the decommissioning rules, license termination rule. But they're also going on

to a RESRAD off-site code, where they are putting in an atmospheric dispersion model and things like that.

And, of course, the RESRAD pole has some probablistic features that you're probably familiar with, but that's one of the codes that we also maintain and update.

Going into the dose modeling, again, based on requests from offices in verifying the current needs, we are trying to expertly model doses to the extremities in the fingers. And we are doing this using MCNP. We are trying to determine correction factors because ring dosimeters usually don't model a good geometry in what dose they are getting to the fingers.

We have the radiological toolbox. This is just a compilation of databases that have dose coefficients, conversion factors, and it aids us in doing calculations without having to pull out federal advisory reports 11 and 13 and the radiological handbook and the radionuclide chart of nuclides. It's just a very handy desk reference.

I'm going to go quickly into the regulatory guide effort, but, again, at the end I'm going to spend a little time on specifically one guide that incorporates a lot of the different issues.

As you know, the Office of Research is taking on this big effort to update all of the reg guides. At this moment, the particular office-wide effort is not in our branch. It was in our branch for maybe about a month when we were trying to get a lot of things together.

But basically we're doing this based on a couple of SECY papers in 2004 that ask the whole agency to do a number of things: to update the standard review plan for NRR; to just make the division 8 current, guides current, because a lot of them are 1970s guides.

So what the office did is they looked at all of 352 guides. And they prioritized them high, medium, and low. And the prioritization was based on, you know, was there a users need request or was the guide very old, things like that, were standards updated that now the guides needed to be developed.

They looked at a lot of resources in updating the guides. And, of course, we were coordinating with NRR for the guides, the division 1 guides mainly.

What we have been doing in F.Y. '06 is to develop a database. And this is a database of all of the guides. They have the lead office, the resources

needed to update the guide, where guides need contractor assistance, where they don't, a lot of program management things.

And we also identify new guides. For example, 10 CFR 20.1406 tells us to have a contamination plan and a decommissioning plan in place for new reactors, but we don't have any guidance for that. So NRR is really pushing us to develop guidance for that.

CHAIRMAN RYAN: Just for everybody's benefit, 352 guides covers all categories of reg guides at the NRC. That is the total.

DR. BUSH-GODDARD: Exactly, yes.

CHAIRMAN RYAN: Just wanted to make sure.

DR. BUSH-GODDARD: Divisions 1 through 10. Actually, division 8, the occupational health physics guides, we have about 28 or 30 guides.

Okay. Like I said, the major issues, first of all, we were told to look at division 1. They're the higher-priority guides. And we have a couple of dose-based guides that I will talk about a little later.

We're supposed to also look at the impact of parts 20, 50, and 52 to see if there is consistency among regulatory products. And what I mean by that is

NMSS has incorporated some of the regulatory guides into NUREGs. And there is an issue about should we have NUREGs or should we have reg guides and things like that.

And then we have to coordinate with the standards development team to make sure that when new standards are identified, they're incorporated into the guides. And we're going to coordinate our reviews with ACNW, ACRS. And once we get a detailed schedule, something solid, we're going to send that through the right channels as to when you all need to see a lot of guides.

There have been two guides last year that I think you guys waived because they were very administrative in nature.

CHAIRMAN RYAN: Yes, I recall those.

DR. BUSH-GODDARD: You recall? Okay. One of the interagency agreements we have with EPA, Department of Homeland Security, and other agencies to develop is the MARSAME manual. This is a sister of the MARSAME plus codes.

And basically this is just a NUREG that provides the technical methods of how you measure materials and equipment and if we're using this to demonstrate compliance with the license termination

rule and actually how we can release equipment, where the measurement techniques can be standard across agencies.

CHAIRMAN RYAN: And, again, just for everybody's benefit, is it surface contamination or volumetric contamination kinds of questions?

DR. BUSH-GODDARD: Yes, exactly. Exactly, yes.

I'll spend a little bit of time on the other projects of the branch. We have a spent fuel dispersal project out of Sandia. This is actually a homeland security type of project. And we are just measuring respirable particles from different types of sabotage scenarios.

And also we have memberships with different organizations. ISOE, we give them our REIRS data. We also have a membership with CIRMS at NIST to just keep up with their development.

So that is kind of a program overview of our current research. And, as you can see, we are unique in that we cater to immediate user need requests or we cater to how can I more effectively meet the rule.

So it is not a lot of forward, long thinking types of issues because our resources are put

toward the immediate need of the offices, but we are trying to move into a forward-looking organization.

Some of our F.Y. '06 initiatives, again, are based on user needs requests. We have some issues with the Energy Policy Act. We have even some long-term initiatives, where once our computer codes are in the maintenance mode, once we update all the regulatory guides, we can take those resources and add resources into looking at some long-term projects.

So this next picture is one that I really like. And I put it up here again to be colorful. The reason I like it is it kind of shows where we are as far as mathematical phantoms are concerned.

In 1975, as you can see, this is the MERD and also NRC phantom that we have adopted. But now we have added a couple of more organs. But we are still using the 1975 methodology or graphical representation, I'll say, mathematical representations of the --

CHAIRMAN RYAN: Style.

DR. BUSH-GODDARD: Exactly. And, as you see, in 1999, where the state of art was, you can actually see the bones and the stomach and the liver and you can accurately more model doses to the different organs.

So what we are trying to do is to move from this 1975 model to a more accurate modeling of dose. And we have a contract with Oak Ridge to help us do that.

I like the top picture because it shows, you know, if you would like, we're somewhere in the Neanderthal type of method of doing things, where we need to move over to sitting down at a computer and working things out.

Another initiative, as you know, the Energy Policy Act of 2005 had a lot of things in it. And one thing they wanted the Office of Research to do was to enter into a study with the National Academy of Sciences.

They also developed this alternative technologies task force. So we have people both supporting the contract within National Academy to look at their alternative technologies or when they write their report, what they're going to say, but we also have a person actually on with the working group to identify alternative technologies to radiation sources.

Some other new initiatives. You all are probably familiar with the, I want to say, tritium leak, but it's the contaminated sites that are leaking

tritium and in some instances strontium. We have been requested by the regions to help develop a fact sheet.

This is just not any fact sheet that you might see at OPA, but this is a fact sheet that also trains the regions on some advance topics. Instead of just saying, you know, "We're protective of public health and safety because we use the linear no threshold theory, and that's conservative," what does that really mean? So we can get down to plain language with the public, instead of using a lot of the terms, you know, "probablistic risk" and things like that. So we're trying to take something very technical and just break it down in steps to give training on that.

We're updating the health physics part of the response technical manual, you know, the early and intermediate dose projections, the use of potassium iodide based on the rule that came out about four or five years ago. And, then, the technical basis for parts 30 and 40 we're actually just beginning.

All right. Let me go to looking forward. As I said, we are inundated with a lot of user need requests to require us to respond to everyday needs. However, there are some needs that we have identified that we would like to be more in touch with.

And also we have to be because a lot of the users needs requests, as you notice, we send a lot of things out. You know, we send it to DOE labs and things like that.

But we're trying to bring all of that in house, the dose modeling in house. So just identifying NMSS needs, they need radiopharmacy dose modeling. They constantly need -- because we had an urgent user needs request in January for us to do something very quickly. And it's hard when you're going through a contractor to get anything done very quickly.

DWM wants us to do some probablistic scenarios and some doses to critical populations. The regions and NRR, they need user-friendly codes. They need a toolbox of codes to make them more accessible. They need a toolbox of codes that are more accessible.

And then we also have our needs. We're going into new reactor source terms. We're looking at ICRP recommendations. And we need those skills in house to be able to support those efforts.

So I talked about the impact of the ICRP recommendations. The second bullet is revising the collective dose. I'm not going to say too much about that. I already know how ACNW feels about that. But

these are --

CHAIRMAN RYAN: That's good.

DR. BUSH-GODDARD: These are things that we need to revisit and think about a different way of doing it because a lot of times we're struggling with the gaps between radiation protection science and policy and how can we merge those gaps.

CHAIRMAN RYAN: Fair enough.

DR. BUSH-GODDARD: Okay. We're processing. We're getting into the reprocessing. And I'm told that we need to look at plutonium health effects. We don't have very good data on that.

And I mentioned the advance reactor source terms, going from, you know, thermal reactors, the two-hump fission model to fast reactors and the LNT model.

CHAIRMAN RYAN: I might mention we had scheduled -- and we just moved the date, rather than eliminated it, of course -- the French Academy of Sciences panel members are coming now in, I think it is, October or September. The date is shifted to the fall based on their needs at home. So they're going to come and give a presentation on their report, which, of course, is separate from the BEIR VII report. So that's in the works.

DR. BUSH-GODDARD: Okay. Let me shift to page 28, regulatory guide. I'm going to do two things. I am going to pass this kind of schedule of division 1 for 8 and 10 guides that we have for you to kind of look at; at the same time --

CHAIRMAN RYAN: Oh, thank you.

DR. BUSH-GODDARD: Oh, I'm sorry.

CHAIRMAN RYAN: That's all right.

DR. BUSH-GODDARD: -- to talk about some of the over-arching issues that we're facing. And I'm going to take a look at this guide. It's called calculation of annual doses to man from routine releases of reactor fluence for the purpose of evaluating compliance with 10 CFR part 50, appendix I. And I guess the first revisions would be to cut it down. That's a long title for a guide.

The reason I used this guide is it's important to know the background of how this guide came to be because it uses a very old ICRP dose methodology in how we're trying to maybe move to the current NRC, which is the ICRP 26-30 or event. That's the current NRC, but the current international standard, of course, is ICRP 60. And we're getting ready to even see some more recommendations. We all need to be on the same page, I think, of the history

of NRC and its use of the ICRP recommendations.

So I'll talk about the background of part 50, how it's different from part 20, concerns of a dual system here at the NRC and our licensees, what are our regulatory operations, and our status of next steps.

CHAIRMAN RYAN: One of the things that was pointed out -- and Dr. Clarke, you might be able to help me recall it -- in the working group session that we held a month ago is a disconnect between -- was it part 50, decommissioning questions related to reactor cases, and other decommissioning dose stands as an organ dose-based limit that is still in there versus a more modern one.

That was just one example of several disconnects. You know, the 61 has ICRP 2-base limits. So it will be interesting. I mean, those are real disconnects. You can end up with two different answers if you look at each part.

DR. BUSH-GODDARD: Exactly.

CHAIRMAN RYAN: Okay.

DR. BUSH-GODDARD: Exactly.

CHAIRMAN RYAN: So that's the area you're talking about?

DR. BUSH-GODDARD: Yes, yes.

CHAIRMAN RYAN: Okay. Good.

DR. BUSH-GODDARD: And if you see the next page, for example, part 50 -- and we can say 61 if we talk about -- I'm on page 31.

CHAIRMAN RYAN: Sorry.

DR. BUSH-GODDARD: Actually, page 30 was just a list of the guides that were born out of appendix I in the guide and trying to follow appendix I. The yellow guides, the ones that are in yellow, are kind of a group of guides that calculate different things from airborne effluents to waste treatment systems, a credit dispersion that we're looking at right now. The next three guides are in the system somewhere to be looked at down the line.

But going back to talking about ICRP dosimetry, part 50, appendix I and, as you said, part 61, it's based on ICRP. This is the whole body based on ICRP concepts of dose models. This is looking at the critical organ, establishing the maximum permissible concentration to those critical organs.

Now, part 20 was also an ICRP before 1994. But, of course, in 1994, part 20 went to ICRP 26-30. And this is calculating the total effective dose equivalent processing calculating the dose. So, again, as you can see, there are two different types

of methods of how we calculate dose.

Part 50 in 1994 did not adopt that methodology. And they're still using the whole body dose, the doses to the critical organs.

CHAIRMAN RYAN: One flaw in that system to my way of thinking is that it treats different radionuclides differently from a risk perspective. If you have an annual dose and, you know, if I have a tritium intake, let's just pick the number five for the example, I'm going to get the five units of dose in the year of intake.

If I have a five-unit dose from plutonium, I'm going to get five units of dose every year I'm alive thereafter. So the integral dose or the integral risk is much higher.

And I think that's the flaw that ICRP 26 and 30 was aiming to overcome because on of the interesting parts is if a worker does have an exposure to a long and persistent radionuclide in the body, it creates an obligation for every employer that employee sees from then on in. So those should go away, I guess, in my view.

DR. BUSH-GODDARD: And on 32, on page 32, when we talk about the dose rejectives of appendix I, they are more restrictive. However, as Mike pointed

out, the dual system is confusing. That's a great example that you gave. A lot of times it could be a hindrance to our public confidence when we are trying to explain this dual system of how we're reporting dose.

As I talked about, it's very outdated compared to current international standards. Current international standards are actually ICRP 60, which was in 1990, I believe. ICRP-2, where we're using appendix I, I think, was developed in 1959.

CHAIRMAN RYAN: '59?

DR. BUSH-GODDARD: '59, yes. And, you know, this should be updated, just like you said, Mike, to reflect our current knowledge, our better ability to model our internal organs better, the new state of technology.

And the one thing that I bumped up against is that ICRP-2, it's no longer taught in any health physics curriculum. When I came here about six years ago, when people said, "We're using ICRP-2," I was like "ICRP what?" You know, I didn't realize that even exists.

So that's kind of a reverse knowledge transfer. You know, we were so worried about --

CHAIRMAN RYAN: Archival mining.

DR. BUSH-GODDARD: Exactly. Yes, exactly.

CHAIRMAN RYAN: And it's interesting tho think about because I challenge any of you to go on the Web or amazon.com or wherever and find a copy of it. It's hard to find a copy of it.

DR. BUSH-GODDARD: So in looking at the issues and concerns, these concerns are actually across the board of all of the division 8's or any guides that employ these methodologies. We have maybe about 80 percent of our guides are pre-1994. Okay?

So what we were trying to come to grips with into looking at how we are going to update these guides is, should we even consider updating them without first knowing what the Commission is going to do with part 20? You know, should we look at them or should we wait for the ICRP recommendations?

What are the requirements for part 50, appendix I, those are dose-based requirements. Should they just be taken out? Thank you. And should there be two sets of guides? Should we have a current set of guides that are for the current reactors when we go to the new reactors? Should we have another set of guides that are based on newer concepts? So we're trying to have the whole gamut of options to be ready to support the Commission on whatever decision that

they want to do.

CHAIRMAN RYAN: I'm sure some of your folks would help you find the details, but a couple of the staff participated in a working group meeting that we had with a variety of stakeholder representatives when the ICRP recommendations came out, the draft consultation papers.

They noted -- and it was a unanimous vote of the panel -- that adopting these new recommendations, should they be formalized, would not add any value to their radiation protection program. And we reported that to the Commission in a couple of letters, actually.

So I think that's an interesting view to kind of incorporate. And that kind of gets me to my point. As you think about these things, I would challenge you to think about two things. One is, what is the real risk-informed value of making any step in any direction, not that anyone is right or wrong or better or worse than another at this moment? And then, you know, what would be the impact on the regulated community in terms of because I know you think about these things but in terms of having to rework their systems to incorporate that change.

The third is an alternative to think

about. Maybe what you can do is describe how all three work.

DR. BUSH-GODDARD: Okay.

CHAIRMAN RYAN: You know, in the current method, for example, in internal dosing -- again, I know you realize all of this -- is licensee may request and typically with a pretty quick approval, "Well, I want to use ICRP-X for my dose calculations because that's the more updated metabolic model from the radionuclide of interest."

And that's usually something that the NRC and agreement states will say, "Well, yes, that makes a lot of sense," rather than being forced to go back to the oval with the radius in it model or some other kind of metabolic model. And that is a strategy that helps you. You know, you are always playing catchup with the changes in the recommendations. That is a tough job. It's something to think about.

DR. BUSH-GODDARD: Okay.

CHAIRMAN RYAN: Sorry. Go ahead.

DR. BUSH-GODDARD: Going into the options, like I said, I have maybe about four or five options in how we're updating these guides. I'll send it around, the ICRP recommendations, upcoming recommendations, but the first two are easy. We know

about them: maintain the status quo. The point about this is it's more restrictive.

And I'm listening to -- when you said "risk-informed value," you know, from public health and safety, all of them are all so well below any adverse health effects. That kind of throws it out. I think what we're going to really have to look at is what impact it has on our regulatory community.

You know, how much would it cost for our licensees to rework the system? And I think that's where -- not only our licensees but how much it's costing us to have these dual systems. And that is not a health effects-related issue, you know, but I think that is where the rubber meets the road.

And then if we updated to current, part 20, as you know, will be consistent across most licensees. But, again, it's not the most current recommendation, not the most current ICRP recommendation.

I am on page 35. One of the revisions was to combine the regulatory guide process to update 20, 50, and 52. So this is a rulemaking and updating the guides. Of course, this is more cost-effective, but it integrates the current regulatory and technical issues were consistent across licensees.

It addresses the part 50 issue. I want to mention the part 52 design certification because they mention in that 10 CFR part 52 to use the dose criteria in appendix I. So they're actually saying, "Use ICRP-2."

The cons of that, of course, the reg guide could be delayed. And we would need some updated guidance and some other things. We don't want to necessarily update the guide without Commission direction before they decide on part 20.

We are also updating the regulatory guide applicable only to part 52 design certifications. And I put these up here because what we have been tasked to do is to look at new reactors, you know, make our priority, part 52 design certifications. So this was just a pro and a con for that.

The pro again, it allows us to target only upcoming new power plant licensees, which the agency is really putting some more priority resources into, but then, you know, since part 52 again is appendix I, we're back in that same circle of using outdated regulations.

The next option that we're going to talk about is to update the reg guide for only advance reactors. And this is the other end of the totem pole

from not doing anything at all but just looking forward.

And the pro, again, is that we're trying to look forward to see if we can incorporate, if we can have something ready for new reactors. But the con, again, is that we could use a lot of resources for something that may not happen. You know, it may be premature and unnecessary.

One of Dr. Paperiello's favorites is this one on page 38, to just eliminate appendix I, dose objectives, from part 50. This helps because it centralizes all dose limits into part 20. It will simply some elements of the reactor oversight program.

But a con is further -- as I said, licensees are so used to using appendix I, this is a different culture of radiation protection. They would have to rework a lot of their dosimetry systems.

Again, we're also looking at non-rulemaking options. We're looking at writing maybe a policy statement or a RIS, a regulatory issues summary, offering the licensees options to come in for exemptions and things like that. But, as we know, the Commission does not like to regulate by exemptions.

So what are we doing for all of our reg guides? We're assessing the impact on NRC regulations

of the reactor oversight program on licensees. Like you said, look at the risk-informed value, as opposed to what is the impact to the different licensees, where they have to rework their programs.

We're looking at ALARA considerations, backfit, cost-benefit, all of that, and also public confidence, which is actually probably the most difficult to judge and put some type of, you know, pros and cons. It depends on where you are, whether or not dose objectives could be positively looked at as increasing public confidence or negatively.

We're going to get ready to send a paper to the Commission kind of outlining a lot of these issues. And we after kind of get their blessing on the way to go, we're going to come back to ACNW.

Now, in this presentation, I mentioned a lot about part 50 and dose objectives. So what we are maybe proposing -- and that can be the subject of discussion -- is, should we have a full ACNW meeting with a subcommittee of the ACRS because, you know, when we think about dose, we think about ACNW for materials licensees, but a lot of these issues are overlapping.

CHAIRMAN RYAN: Oh, sure.

DR. BUSH-GODDARD: Yes.

CHAIRMAN RYAN: And we can sure work on that decision as we think more about how that will shape up.

DR. BUSH-GODDARD: Okay.

CHAIRMAN RYAN: That sounds like a good idea.

DR. BUSH-GODDARD: Okay. So --

CHAIRMAN RYAN: We actually, I might mention, did that for the working group that we had on the ICRP Foundation documents. We had one of the ACRS members sit in on our panel or with us as we had that panel meeting, and that worked out very well. Dana Powers, Dr. Powers, was the person who took on that responsibility with us.

So we have joint activities with ACRS. And this may be one that, as you point out, is quite appropriate.

DR. BUSH-GODDARD: Okay. So that is kind of the overview of the program, where we are into responding to a lot of immediate needs and how we want to build a lot of the technical capabilities in house so we can adequately address some of the deeper ICRP recommendations, look at some of the different impacts.

But I think it is going to come down to

not necessarily a health effects issue but necessarily a policy issue when it comes down to deciding which way we are going to go.

CHAIRMAN RYAN: Thanks very much. Interesting presentation.

DR. CHOKSHI: Yes. I had a couple of comments, I think. As Stephanie talked about, there are activities, like databases and AO reports, which will continue. And then we want to move in a direction of building some capability. Also, the new reactor licensing, the advance fuel cycling, and issues of knowledge management and succession planning, the office is focusing quite a bit on that.

We had a management retreat two weeks back. And one of the things that I'm -- where I'm going is that we are actually looking at recruiting. This is an opportunity both -- we are looking at the mid-level people with sort of an expertise. We can come in and -- we will be implementing some of these things. And we are also looking at entry-level.

And some of this is a unique opportunity that we have been allowed to go out and recruit very actively. And at entry-level, it's pretty much if you can see somebody who is -- that is a good opportunity to what Stephanie has been saying about, you know, we

can do that. You know, we are beginning to start that process.

CHAIRMAN RYAN: Very good. That sounds encouraging. That's exciting.

DR. BUSH-GODDARD: Yes, very exciting.

CHAIRMAN RYAN: Okay. Questions. Dr. Clarke?

MEMBER CLARKE: Thank you. Just a quick comment, Mike, if I could.

With respect to information systems, there's one with which I am sure you are familiar: the National Library in Medicine. They operate a system called TOXNET. And within that system is something called the hazardous substance data bank, which is I think in my opinion an excellent source of information for chemical hazards, health effects, environmental fate and transport, and a number of other things.

It is my understanding that they have recently made a decision to include in that database selected radionuclides. And that is a fairly recent decision. I just wanted to mention that to you.

DR. BUSH-GODDARD: Okay. That's good to know.

CHAIRMAN RYAN: Thank you. That's all?

MEMBER CLARKE: That's it. Thank you.

CHAIRMAN RYAN: Dr. Hinze?

(No response.)

CHAIRMAN RYAN: Allen?

(No response.)

CHAIRMAN RYAN: Ruth?

MEMBER WEINER: Stephanie, thank you so much for an absolutely excellent overview. I have a couple of questions that occurred to me during your presentation.

I noticed you're still using a backyard farmer scenario. We had a discussion in one of our working groups on decommissioning of encouraging people to use a more realistic scenario.

Has your group given any thought to -- I know you have a lot to think about and a lot to do, but have you given any thought to moving to guidance on more realistic scenarios?

DR. BUSH-GODDARD: Yes, Dr. Ruth. In fact, we have -- I say "Dr. Ruth" instead of Dr. Weiner.

MEMBER WEINER: No. That's fine. Stephanie has been calling me Dr. Ruth for six years now.

DR. BUSH-GODDARD: In fact, we just had a

letter report that looked at different land use scenarios: The urban, rural, semi-urban/rural paper that got different probabilities.

For example, I think we took New Jersey. And in ten years, what was the probability of downtown, say, Newark, for example, being a resident farmer type of area? And, of course, that's a very, very low probability, exactly, exactly.

And so we actually went through and took out some of the pathways that you would have for the backyard resident farmer. And, of course, the doses went down. So we are in the very early stages of looking at what you just talked about.

MEMBER WEINER: That's really very good. I would commend you on that.

This is just a question. In your RAD toolbox, do you use FGR-13 or are you still using 11 and 12?

DR. BUSH-GODDARD: I believe that we have all three of them, but I have to -- oh, no 13, no.

MEMBER WEINER: No 13. Are you thinking of going to 13?

DR. BUSH-GODDARD: Yes. I think we are thinking about updating the dose conversion factors, yes.

MEMBER WEINER: Thank you. On reprocessing, I notice you talk about the UF-6 release. And UF-6 is, of course, primarily a chemical hazard less than a radiological hazard. To what extent do you get into looking at chemical hazards? I know this is not really a responsibility of NRC, but there is so much overlap. And in reprocessing, you have serious chemical hazards to look at.

DR. BUSH-GODDARD: That's true, yes. As you said, that is not necessarily a responsibility for the NRC. And in the past, as you know, we haven't looked at a lot of chemical effects. Now they're reprocessing.

Reprocessing is very new. And in just discussing our long-term plans, which I'm necessarily not a part of, but we are looking into even hiring chemical engineers and actinide scientists and things like that to look at the effects.

I don't know if we have -- that's in another group. And I don't want to say too much about it. So if you want to know more, I'll be more than happy to kind of maybe give you what we're looking for in the future, but I don't want to --

MEMBER WEINER: Well, if it's another group, then --

DR. BUSH-GODDARD: Okay. Yes, that's another group.

MEMBER WEINER: -- that's another group.

DR. BUSH-GODDARD: Okay.

MEMBER WEINER: I wanted to, finally, point out that in updating your reg guides, only for new reactors, that creates an enormous problem. But you might look at what some other agencies have done.

EPA, for example, has a sliding scale regulation for auto emissions, which is based on age. And they have done this without any particular agony on the part of users.

Of course, you know, there are lots and lots of cars. And the users of automobiles are not as closed a group as nuclear reactor licensees.

But other agencies have gone this route to have one set of guidance for older facilities and another for newer facilities. And I think you might take a look at what has happened to some of that.

Finally, I would like to say that I certainly appreciate what you said about education. We move ahead faster in the universities in what is taught than the regulatory agencies do. And this seems to create a problem all along the line.

Again, thanks for your presentation.

DR. BUSH-GODDARD: Thank you.

CHAIRMAN RYAN: Thanks, Ruth.

Boy, it's a jam-packed morning we have had so far. We have covered an awful lot of ground. You have got a lot of challenges ahead of you.

Have you thought about ideas of do you just stop thinking about 10 or 11 divisions of reg guides and think up a new approach? Have you kind of decided you have to update the reg guides or --

DR. BUSH-GODDARD: I think we've decided we have to update the reg guides, but we are looking into reorganizing the divisions. You know, division 1 I think is power reactor, division 2 research, division 3 fuel cycles, on and on and on.

And the reg guide that I took a lot of time on was actually reg guide in division 1, but it's basically how you calculate doses, which is also division 8 reg guide. So there are some cross --

CHAIRMAN RYAN: There is a bit of overlap when you really get right down to it.

DR. BUSH-GODDARD: A lot, yes.

CHAIRMAN RYAN: Now, you know, air sampling is in a number of places.

DR. BUSH-GODDARD: Exactly, yes.

CHAIRMAN RYAN: And so it sort of begs the

question, is the guidance designed to be detail and prescriptive or is it designed to be generic and more technique and calculational focus, rather than "You must do this. So here is a range of things you could use, and any of these are fine" sort of approach?

DR. BUSH-GODDARD: I've seen it. The 28 guides in division 8 that I'm looking at, they're all across --

CHAIRMAN RYAN: All of the spectrum.

DR. BUSH-GODDARD: Exactly, all the spectrum. It's interesting to think about, and it's a tough question. I don't have an answer to offer you, but --

DR. CHOKSHI: And I think it's historical evolution. Those guides were developed as needs. And now it's time to look at that holistically and see maybe we can do --

CHAIRMAN RYAN: One other comment about ICRP, you know, that I think about -- I mean, I spent a good part of my career as a licensee, so having updates come down from an agreement state or from NRC, you know, it causes a lot of work and time and money -- is what is really the value to radiation protection.

I think getting away from two and going to

something that is committed dose made a lot of sense to me because it gets rid of this inequity question for radionuclide A versus B. It also gets over the hurdle that if you send a worker to a new employer, the new employer might have a very expensive obligation to monitor bio assay, you know, if he has got a body burden or something, ICRP-2.

So that made an awful lot of sense. But when we're tweaking little things from one -- I mean, you know, I think Dr. Clarke described his foundation document as incremental or evolutionary, rather than revolutionary. That's what he said.

Again, we got the views that there was no value added because there really wasn't a lot of change. In fact, there was one distinct negative. Dr. Powers pointed out that, you know, the current terminology and structure of ALARA in our system would be completely turned upside down by the just language from constraint and limit and guide. You know, they are all twisted around from the way we use them in the ICRP document. So that would add no value.

Now, where does that lead you to the end of the day? You know, we stuck with five rem per year and didn't go to two, and there are lots of reasons why.

We sort of pick and choose what we want to use. So are we drifting away from "a wholesale incorporation" of ICRP or are we adopting and adapting things that make sense to us from the international community?

That's a different sort of structure from saying, do we follow ICRP or do we integrate ICRP, thinking as we deem it appropriate for our needs? So somewhere along the line, it's really the NRC's view of the world, not ICRP's, that we're really thinking about.

And dose models are going to be updated. ICRP is going to keep writing reports of one sort or another and on into the next millennium probably.

So, you know, I guess I'm leading to a question. What is the plan for the next go-around on all of this, when ICRP has the new round of documents? I mean, are you structured and staffed and capable to once you get through this round think about how do we institutionalize this updating process?

That's a tough question.

DR. BUSH-GODDARD: That's a very tough question and --

CHAIRMAN RYAN: You don't even have to answer it --

DR. BUSH-GODDARD: Okay. Thank you very much.

CHAIRMAN RYAN: -- if you just want to think about it.

DR. BUSH-GODDARD: Everything that you said we are definitely thinking about.

CHAIRMAN RYAN: Okay. Good.

DR. BUSH-GODDARD: We don't have any solid answers.

CHAIRMAN RYAN: Yes. I know you are, but it's just interesting to share it and hear that you are on that page.

And, finally, I guess, is there anything that we can think about or should think about in terms of this manpower question? Dr. Paperiello in his comments to us made a very pointed comment or two about the fact that health physics manpower in the agency as a whole is dwindling pretty rapidly. And I see the farewells every time in the newsletter.

There are lots of folks I know who are retiring from the health physics and related sciences rank. So we also know and I'm sure you know it, too, that there aren't nearly as many schools, --

DR. BUSH-GODDARD: Exactly, yes.

CHAIRMAN RYAN: -- health physics programs

at any level, particularly the graduate level. So Ph.D. health physics graduates or Master's degree health physics graduates are getting smaller.

I mean, there are some outstanding programs that are robust and larger than most, Texas A&M and others, a few of those, but if you can think of anything we should turn our attention to in that area, don't hesitate to ask.

DR. BUSH-GODDARD: Okay.

CHAIRMAN RYAN: It's interesting to think about.

DR. BUSH-GODDARD: Well, exactly what you said. We do, I think, have a health physics shortage. And I think you may in light of that -- the Health Physics Society had a 2004 report, I think, about where were the shortages and what we need to do.

We are, I think, beefing up a little bit to try to bring in health physicists and also support programs through, like, for example, the DOE health fellowship and the NRC health fellowship. They've begun again. Well, not health physics fellowship but fellowships to support. So I think as we shout a little bit more, hopefully we'll get more support in that area.

CHAIRMAN RYAN: Is there any merit to

thinking about for the perhaps junior staff, health physics folks who are here, actually making, you know, a course for the American Board of Health Physics certification part of their activities here; in other words, bring the classroom to NRC headquarters, rather than try and send people off one at a time?

DR. BUSH-GODDARD: No, there's not been any concerted effort here, but I know that every year, the armed forces university -- I don't know the exact name of it, but I know they have a health physics course.

CHAIRMAN RYAN: Yes. I'm thinking of something a little bit more formal than perhaps a chapter class, which tends to be relatively short duration but something where somebody could -- I am thinking ahead, even collaborate with the university and offer college credit or credit towards a Master's degree or something that really makes it high-powered, of more value.

DR. CHOKSHI: I know that in the other nuclear area, in a city of Maryland, we are in the process of doing that.

CHAIRMAN RYAN: I see.

DR. CHOKSHI: So that is a good situation. We need to do that, yes, --

CHAIRMAN RYAN: It's something to think about.

DR. CHOKSHI: -- look at something like that, yes.

MEMBER WEINER: If I could add a comment to that effect? Some of the national laboratories provide their employees with 32 hours a year for education. And I think some courses, even postgraduate courses for people with Ph.D.'s or people with Master's degrees could help with this.

It's 32 hours to study whatever you want. And I think all they need is some encouragement in this area.

CHAIRMAN RYAN: Any other questions or comments?

MR. WIDMAYER: Derek Widmayer with ACNW staff.

Dr. Goddard, in preparation for this meeting, the Committee had a couple of questions which they asked me to look into. And I think your presentation this morning went a long way towards answering those questions. So I wanted to thank you.

DR. BUSH-GODDARD: You're welcome.

MR. WIDMAYER: One of the things that I found when I was researching this area was an answer

to an SRM from NMSS, where they have identified high-priority guidance documents within the nuclear materials and waste safety area. And, actually, the attachment is eight pages of guidance that they recommend needs to be worked on.

And I guess I was wondering, could you address, how does the bureaucracy work? I mean, it looks like these are things that NMSS is going to work on, although there are reg guides that are listed. And so I got a little bit confused as to how this effort coincides with your effort. So if you could address that a little bit?

DR. BUSH-GODDARD: I don't think I'm familiar with that. Is that a SECY paper or --

MR. WIDMAYER: It's a response to a staff requirements memo for a --

DR. BUSH-GODDARD: Oh, okay.

MR. WIDMAYER: It looks like Sher --

CHAIRMAN RYAN: Dr. Bahadur, do you want to just come up and tell us who you are? And you know the drill.

DR. BAHADUR: Sher Bahadur, Assistant Division Director of the newly developed division called Division of Fuel, Engineering, and Radiation Protection -- Radiation Research. It's a mouthful,

and I'm just trying to remember that.

MR. WIDMAYER: What's the acronym?

DR. BAHADUR: We call it -- the acronym is such that I don't want to say it. It's called DFER. And the division was formed when I was away to India. So I had nothing to do with the name.

It's a good question, Derek. The NMSS has come up with their priority of reg guides. NRR has also prepared a similar list for the reg guides they want to review.

Right now we are in the budget process. And one of the steps in the budget process is the universal prioritization, where each office brings their wish list and then reconcile with all of the offices, and then the resources are doled out accordingly.

Right now we are going through that process. And we haven't yet merged our lists. And once that happens, then whatever comes to the higher priority reg guides will be taken by the respective officers.

Office of Research is responsible for all the reg guide development, with the leg work to be done by various offices. And we are in that process right now.

CHAIRMAN RYAN: Sher, that's real helpful. What we did after hearing Carl's presentation last month, we sort of said, "Well, we really don't have enough information."

We get a lot of kind of management-level comments and suggestions from Carl on things that were on the radar screen. Of course, we have heard in detail this morning an excellent presentation from Dr. Bush-Goddard on the details of that. And the research that Derek was doing was trying to gather the story. So your comments that it is on the radar screen and in this year's budget process is helpful.

I think what we are aiming toward is writing a letter on both presentations to give our view on where some emphasis might be and to offer some insights, the things I've mentioned to you, really, this morning. So that's probably where we will head.

DR. BAHADUR: We look forward to your comments on that, then.

CHAIRMAN RYAN: Sure. Okay. And just looking ahead, we'll probably read out a revised letter. We read out kind of the first part and got that organized. And we'll do it probably next month. So we'll keep you up to date on that.

DR. BAHADUR: If you can provide any more

information in either you letter on Dr. Paperiello's presentation or on Dr. Bush-Goddard's presentation, then we can provide that to you, even after this session.

CHAIRMAN RYAN: That would be great. I think our goal is to provide an understanding of the full story, you know, so that the Commission recognizes that we know and have commented on what is on the plate and then what we think might be helpful for their insight.

DR. BAHADUR: Also on the knowledge management and the success planning, we can provide some more information as to where the agency and the office is doing in terms of training, in terms of hiring new people, mentoring the newer staff, and then downloading the knowledge from the people who are on the verge of retirement.

CHAIRMAN RYAN: That would be great. Actually, that would be very helpful if we could comment on that. If we had that to comment on, that would be great.

DR. BAHADUR: Okay.

CHAIRMAN RYAN: Thank you.

Anything else?

(No response.)

CHAIRMAN RYAN: All right. Well, thank you folks very much. We appreciate you being with us and look forward to seeing you again soon.

CHAIRMAN RYAN: Any comments or questions?

Oh, yes. If you would, please, there are attendees' lists, I think, at both doors.

PARTICIPANT: No, it wasn't. And I had it going around.

CHAIRMAN RYAN: Oh, I'm sorry. There are two: one for gusts and visitors and one for NRC staff. If you would just please pencil your name in, that would be great. And we'll pass that around.

Any other items of business?

(No response.)

CHAIRMAN RYAN: Well, with that, I think we're adjourned for the record. Is there any other business for the record? Derek? Michelle?

(No response.)

CHAIRMAN RYAN: All right. We'll close the record here.

(Whereupon, the foregoing matter was concluded at 9:40 a.m.)

CERTIFICATE

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

Name of Proceeding: Advisory Committee on Nuclear Waste 169th Meeting

Docket Number: n/a

Location: Rockville, MD

were held as herein appears, and that this is the original transcript thereof for the file of the United States Nuclear Regulatory Commission taken by me and, thereafter reduced to typewriting by me or under the direction of the court reporting company, and that the transcript is a true and accurate record of the foregoing proceedings.

Katherine Sykora
Official Reporter
Neal R. Gross & Co., Inc.

Regulatory Guide Revision Effort for Divisions 1, 4, 8 and 10

The Health Effects and Waste Research Branches of the Radiation Protection, Environmental Risk and Waste Management Directorate (RPERWMD) is proposing a revision of guides included in: 1) **Division 1**, Power Reactors, 2) **Division 4**, Environmental and Siting, 3) **Division 8**, Occupational Health, and 4) **Division 10**, General Guidance.

In 2004, the Health Effects and Waste Research Branches of the Radiation Protection, Environmental Risk and Waste Management Directorate (RPERWMD) developed a working group with representatives from NRR and NMSS to initiate an effort for revising Division 8 Regulatory Guides (RGs). The Working Group developed a prioritization list.

However, due to new issues that were developed since 2004 and further discussions with representatives from other offices, the RPERWMD, is planning to reestablish the working group with representatives from the program offices to reevaluate the priority indicated by RPERWMD and shown bellow.

Completed Revision Division 8 Regulatory Guides

FY 2005

In FY 2005 RES/RPERWMD revised RG 8.7, Instructions of Recording and Reporting Occupational Radiation Exposure Data

Proposed Revision of Division 8 and Other Regulatory Guides

FY 2006

In FY 2006 RPERWMD will be completing in 2006 RG 8.38, Control of Access to High and Very high Radiation Areas

Other Proposed Division 8 Regulatory guides to be performed in 2006 include:

RG - 8.34 - Monitoring Criteria and Methods to Calculated Occupational Radiation Doses

RG - 8.9 – Acceptable Concepts, Models, Equations, and Assumptions for a Bioassay Program, Combined with 8.26 – Application of Bioassay for Fission and Activation Products, 8.32 – Criteria for Establishing a Tritium Bioassay Program, 8.20 – Application of Bioassay for I-125 and I-131, and 8.36 – Radiation Dose to the Embryo-Fetus

RG - 8.4 – Direct Reading and Indirect Reading Pocket Dosimete4s combined with 8.28 Audible Alarm Dosimeters

The following guides are suggested for deletion

RG - 8.2 – Guide for Administrative Practices in Radiation Monitoring
Included in Regulations

RG - 8.6 – Standard Test Procedure for GM Counters
Included in ANSI standards, and industry provides information on GM

Also, RES will review guides Included in NUREG's such as;

NUREG 1736 - NRC: Consolidated Guidance: 10 CFR Part 20 - Standards for Protection Against Radiation (NUREG-1736)

RG - 8.18 – Information Relevant to Ensuring that Occupational Radiation Exposures at Medical Institutions will be as Low As Reasonable Achievable

NUREG 1556 - NRC: Consolidated Guidance About Materials Licenses - Program-Specific Guidance About Fixed Gauge Licenses - Final Report (NUREG-1556, Vol. 4)

RG 8.23 – Radiation Safety Surveys at Medical Institutions

RG 8.33 – Quality Management Program

RG 8.39 – Release of Patients Administered Radioactive Material

Proposed Continuation of Division 8 Regulatory Guides from FY 2006 to FY 2007

RG - 8.1 – Radiation Symbol (Part 20 and ANSI N2.1 -1969)

RG - 8.8 – Information (New Part 20)

RG - 8.10 – Operating Philosophy for Maintaining Occupational Radiation Exposures As Low As Is Reasonably Achievable

RG - 8.11 – Instruction Concerning Prenatal Radiation Exposure (Part 20)

RG - 8.19 – Occupational Radiation Dose Assessment in Light-water Reactor Power Plants – Design Stage Man-Rem Estimates

RG - 8.21 – HP Surveys for By product Materials at NRC-Licensed Processing and Manufacturing Plants

RG - 8.22 – Bioassay at Uranium Mills

RG - 8.24 – HP Surveys During Enriched U-235 Processing and Fuel Fabrication

RG - 8.27 – Radiation Protection Training for Personnel at Light-Water Cooled Nuclear Power Plants

RG - 8.29 – Instruction Concerning Risks From Occupations Radiation Exposure

RG - 8.30 – HP Survey sin Uranium Mills

RG - 8.31 – Information Relevant to Ensuring that Occupations Radiation Exposures at Uranium Recovery Facilities Will Be As Low AS IS reasonable Achievable

RG - 8.34 – Monitoring criteria and Methods to Calculate Occupations Radiation Doses

Propcsed Division Regulatory Guides for FY 08 and Beyond

RG - 8.5 – Criticality and Other Interior Evacuation Signals

RG - 8.13 – Instruction Concerning Prenatal Radiation Exposure

RG - 8.15 – Acceptable Programs for Respiratory Protection

RG - 8.25 – Air Sampling in Work Place

RG - 8.31 – Information Relevant to Ensuring that Occupational Radiation Exposures at Uranium Recovery Facilities Will Be As Low As Is Reasonable Achievable

RG - 8.32 – Criteria for Establishing a Tritium Bioassay Program

RG - 8.35 – Planned Special Exposures

RG - 8.36 – Radiation Dose to the Embryo/Fetus

RG - 8.37 – ALARA Levels for Effluents from Materials Facilities

Division 1 Regulatory Guides

In 2005 a Working Group was established to evaluate the revision of regulatory guide 1.109, 1.111, 1.112 and 1.113 – Light Water Reactor Radiological Effluents (might incorporate 1.21.) The Working group has made recommendations that will be reviewed further process.

Program Review of the Health Effects Branch in the Office of Research

Presented to:
The Advisory Committee on Nuclear Waste
April 20 2006

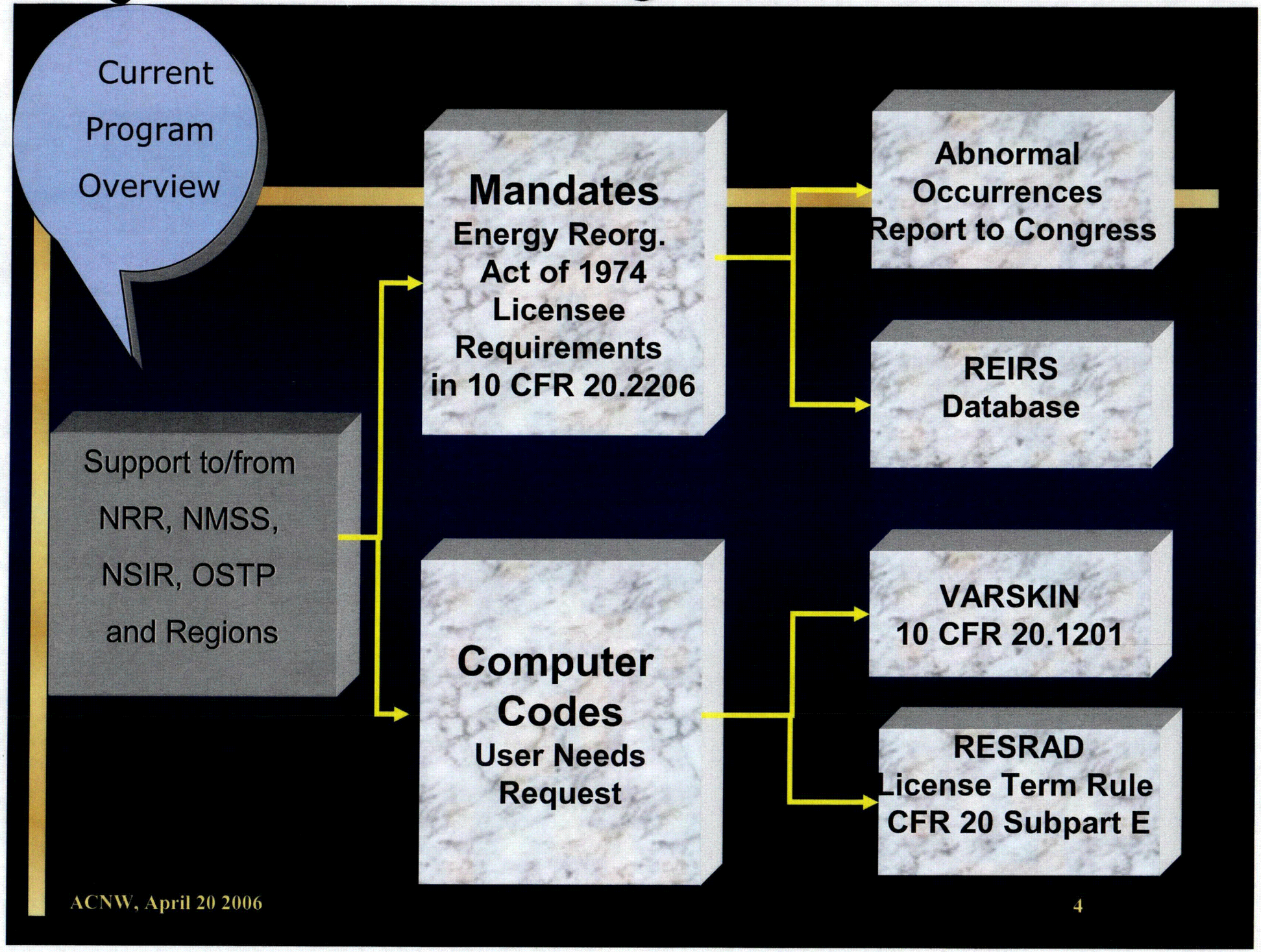
Presented by:
Stephanie Bush-Goddard, Ph. D.
With input from Staff

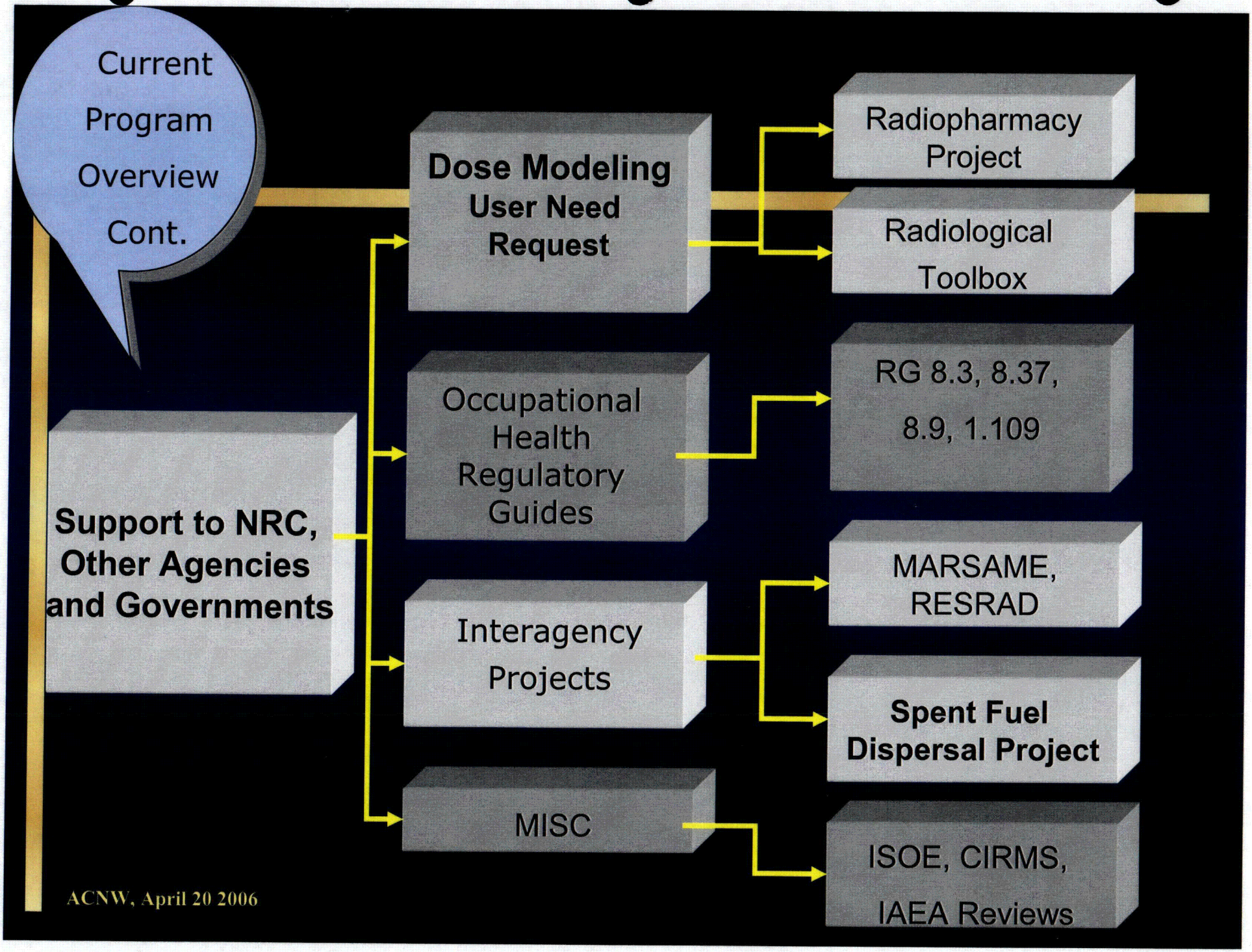
Briefing Outline

- Current Goals of the Research Plan
- Program Overview
- Ongoing Initiatives
- FY 06 Initiatives
- Resources
- Looking Forward
  - Intermediate and Long Term Needs
  - Modifying the Research Plan

Four Major Goals for More Robust Research Program

- **Goal No. 1:** Maintain and Improve Knowledge of Health Effects
- **Goal No. 2:** Support Development of Radiation Protection Standards and Implementation
- **Goal No. 3:** Support Rationales and Technical Bases
- **Goal No. 4:** Develop Technical Basis for Risk-Informing Materials Applications


Current Program Overview
Mandates
Energy Reorg. Act of 1974 Licensee Requirements in 10 CFR 20.2206
Abnormal Occurrences Report to Congress
REIRS Database
Support to/from NRR, NMSS, NSIR, OSTP and Regions
Computer Codes
User Needs Request
VARSKIN 10 CFR 20.1201
RESRAD License Term Rule CFR 20 Subpart E


Current Program Overview Cont.
Dose Modeling
User Need Request
Radiopharmacy Project
Radiological Toolbox
Occupational Health Regulatory Guides
RG 8.3, 8.37, 8.9, 1.109
Support to NRC, Other Agencies and Governments
Interagency Projects
MARSAME, RESRAD
Spent Fuel Dispersal Project
MISC
ISOE, CIRMS, IAEA Reviews
ACNW, April 20 2006

Per Energy Reorganization Act of 1974 Abnormal Occurrence (AO) Report to Congress NUREG - 0090

- **Product:** Annual Report to Congress on Abnormal Occurrences
  - AOs are unscheduled incidents or events significant from the standpoint of health and safety
- **Criteria based on**
  - Moderate/Severe Exposures and/or Major safety degradation
- **Proposing a change in the Criteria**
  - Consistent with Strategic Plan
  - 10 CFR Part 35
  - Based on Accident Sequence Precursor Program and Reactor Oversight Process
  - .....to make more risk-informed

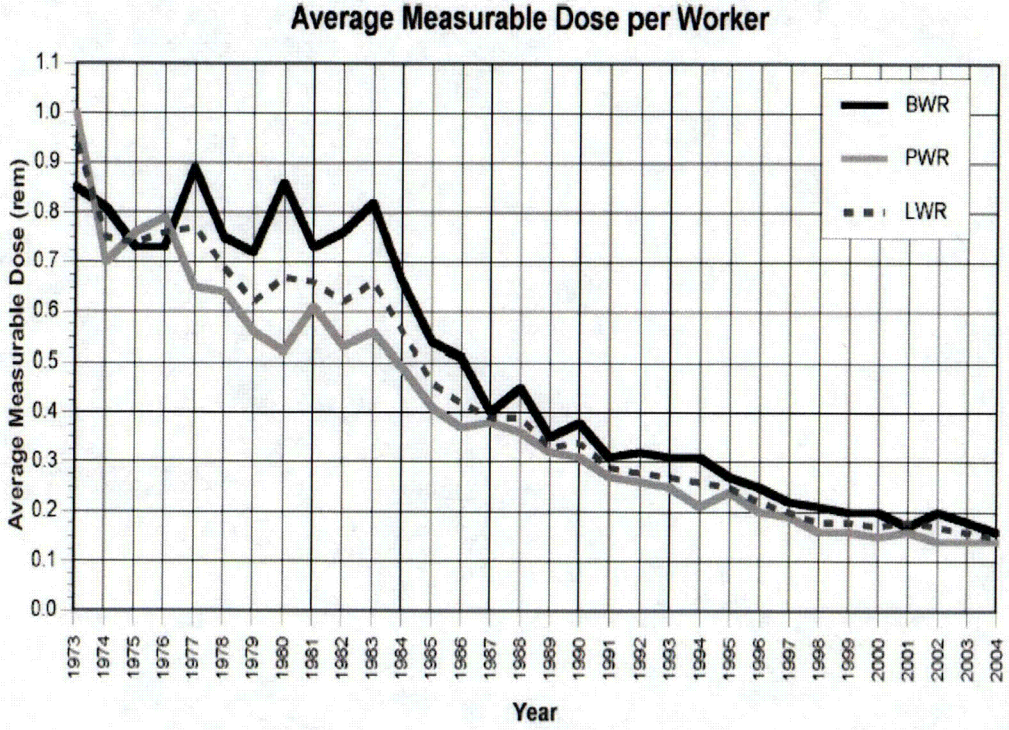
Example of AOs that are reported

- Uranium Hexafluoride Release at Honeywell Specialty Chemicals, Inc in Metropolis Illinois
- Diagnostic Medical Events at William Beaumont Hospital in Royal Oak, Michigan
- Gamma Knife Event at Radiosurgical Center of Memphis Tennessee
- Examples of Items of Interest
  - Vermont Yankee Misplaced Spent Fuel Rods
  - Loss of Offsite Power at Palo Verde

Regulatory Requirements
Exposure Information and Recording System
reirs.com, www.nrc.gov/reirs
NUREG - 0028

- **Product:** Annual Report and Database
- **227 Licensees** (120,000 + dose records) entered annually
  - Data analyzed for dose exposure trends
  - Adjusted to account for duplicate reporting of transient workers
- **REIRS website**
  - Allows secure electronic submittals of exposure data
  - Allows workers to request lifetime dose histories

REIRS Data


Average Measurable Dose per Worker
Average Measurable Dose (rem)
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
BWR
PWR
LWR
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
Year

REIRS Data

TABLE 3.4

Annual Exposure Information for Industrial Radiographers
2002 - 2004

Year	Type of License	Number of Licensees	Number of Monitored Individuals	Workers With Measurable Dose	Collective Dose (person-rem)	Average Measurable Dose (rem)
2002	Single Location	15	112	55	4	0.08
	Multiple Locations	85	3,308	2,787	1,725	0.62
	Total	**100**	**3,420**	**2,842**	**1,729**	**0.61**
2003	Single Location	12	97	45	4	0.07
	Multiple Locations	95	2,821	2,496	1,725	0.65
	Total	**107**	**2,918**	**2,541**	**1,729**	**0.64**
2004	Single Location	12	146	45	3	0.07
	Multiple Locations	81	3,046	2,721	1,564	0.57
	Total	**93**	**3,192**	**2,766**	**1,567**	**0.57**

Ingestion Data

TABLE 3.7

Intake by Licensee Type and Radionuclide Mode of Intake – *Ingestion and Other*

2004

Mode	Licensee Type	Program Code	Radionuclide	Number of Intake Records*	Collective Intake in Microcuries**	Collective Intake in Microcuries (sci. notation)
Ingestion	Power Reactors	41111	AM-241	5	0.000	3.28E-04
		41111	CM-242	5	0.000	1.26E-06
		41111	CM-243	5	0.000	1.13E-04
		41111	CO-58	4	0.119	1.19E-01
		41111	CO-60	**6**	**0.778**	**7.78E-01**
		41111	CS-137	4	0.011	1.12E-02
		41111	PU-238	5	0.000	2.29E-04
		41111	PU-239	5	0.000	7.79E-05
		41111	PU-241	5	0.003	3.44E-03

NOTE: The data values shown bolded and in boxes represent the highest value in each category.

* An intake event may involve multiple nuclides, and individuals may incur multiple intakes during the year. The number of intake records given here indicates the number of separate intake reports that were submitted on NRC Form 5 reports under 10 CFR 20.2206.

** A microcurie is one millionth of a Curie.

Example of Data Uses

- NRC can effectively monitor ALARA performance
- United Nuclear Insurers to determine insurance rates
- International Agency on Cancer Research
- Permits comparison of occupational and pubic risk

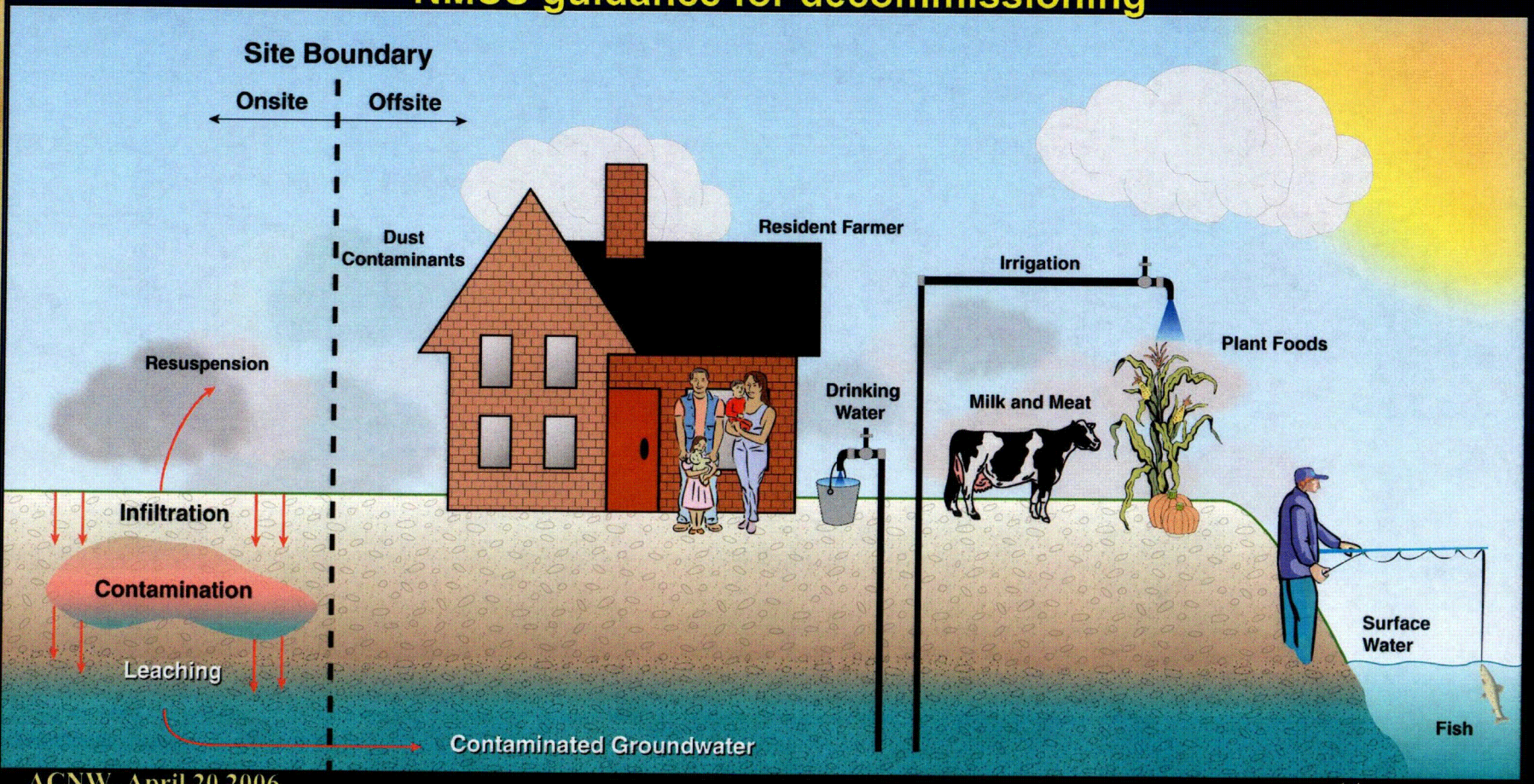
Computer Codes - VARSKIN

- VARSKIN –
  - **Purpose:** Calculates Skin Dose
    - Calculate doses to area smaller than 10 cm2
    - From six different geometries: point, disk, cylinder, sphere, slab, syringe
  - **Uses:** assist in verifying compliance with 10 CFR 20.1201
  - **Future Upgrades:**
    - Photon Dose model only point source modeling
      - Upgrade to different geometries

RESRAD FAMILY OF COMPUTER CODES

Purpose: **Calculates doses for restricted/unrestricted use**

Uses: **assist in verifying compliance with Part 20 Subpart E and support NMSS guidance for decommissioning**



Dose Modeling

- **Radio pharmacy Project**
  - Monte Carlo Neutron Proton to model dose to hands and extremities
  - determine correction factors for ring dosimeters
  - Uses: assist in verifying compliance with 10 CFR 20.1201
- **Radiological Toolbox**
  - Nuclear decay data, Dose coefficients
  - Used for Dose estimation, Interpretation of bioassay data

Office of Research Regulatory Guide Effort

- **Purpose - revise to current regulations, codes and standards**

- **Based on SECY 04-0144 and SECY-04-0030**
  - RES reviewed 352 guides
  - Prioritized H, M, L
  - Estimated Resources to Update
  - Addresses updating all Division 8 Regulatory Guides
  - Coordinate with Updating the Standard Review Plan in NRR

- **FY 06 Work**
  - Developed Database to prioritize based on current issues
  - Identified new guides that need to be developed
    - Based on 10 CFR 20.1406

Regulatory Guide Development

- Major Issues
  - High Priority: Division 1 – Power Reactors
  - Part 20, 50 and 52 Impact
  - Consistency among Regulatory Products
  - Coordinate with Standards Development
- Coordinate with ACNW/ACRS for reviews

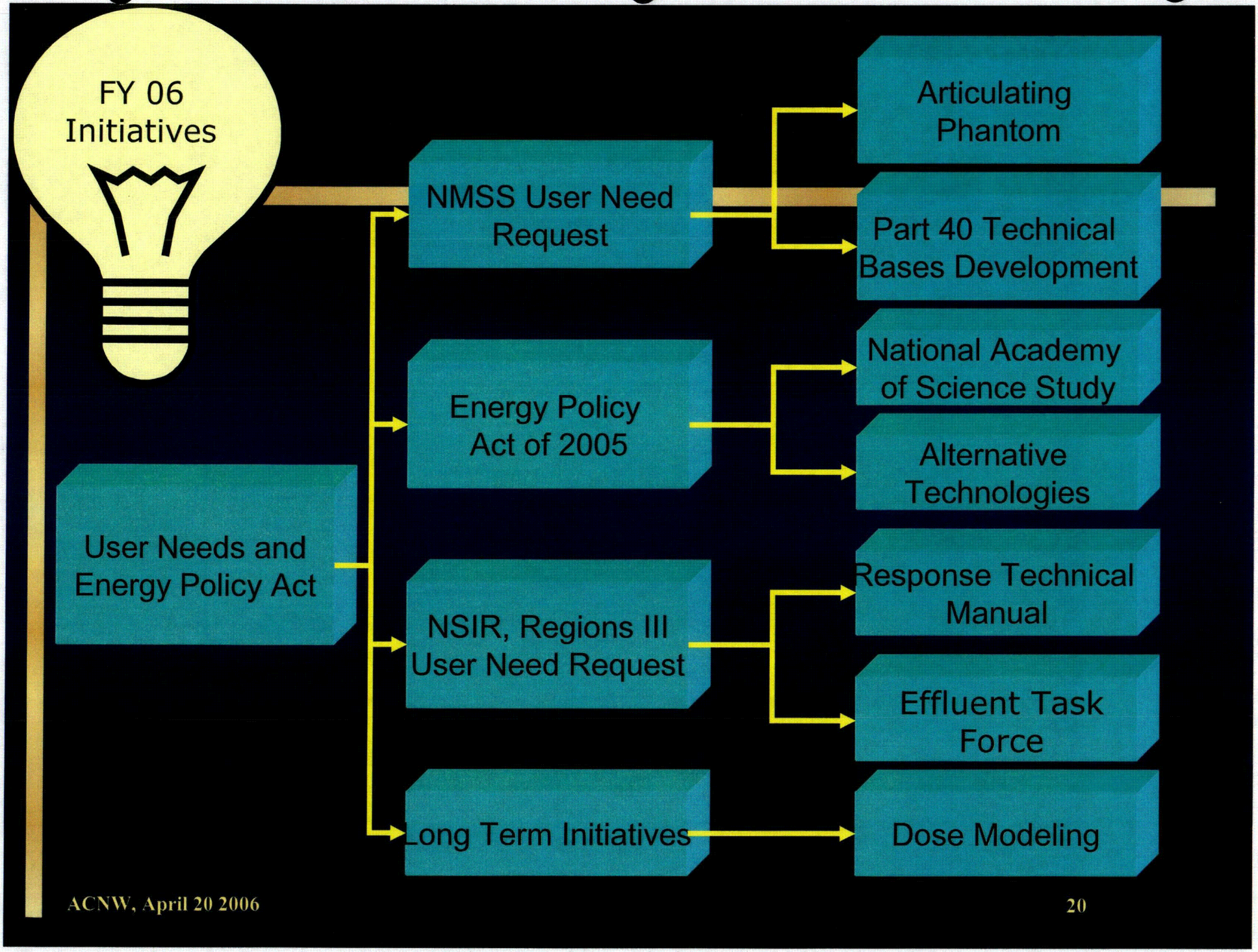
Interagency Agreements

- **MARSAME** – Multi-agency Radiological Survey and Assessment of Materials and Equipment
- Purpose: NUREG report that provides technical sound methods and process for measurement of materials and equipment
- Uses: to demonstrate compliance with regulatory requirements

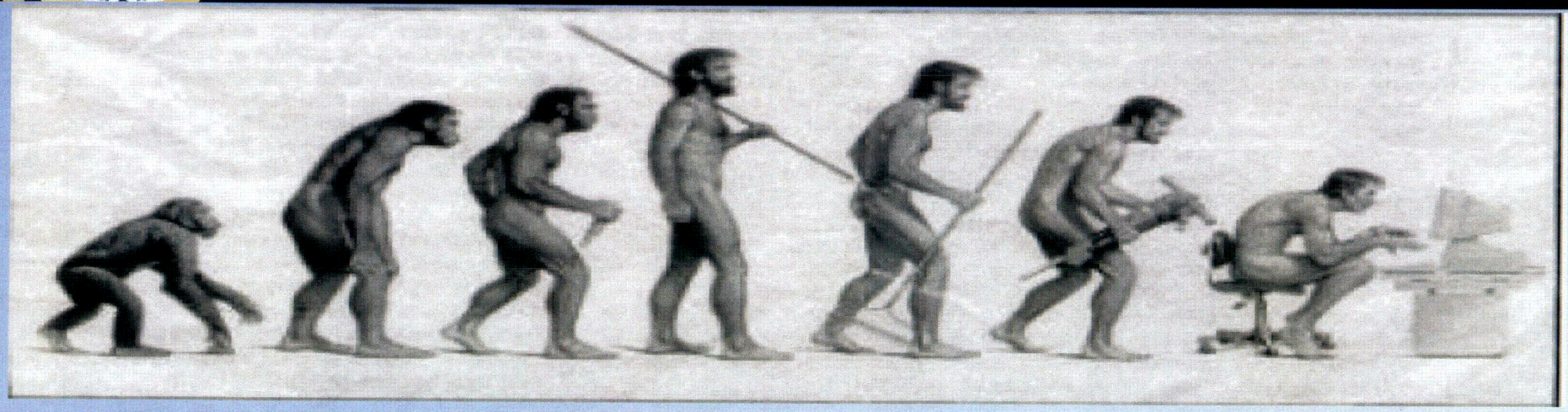
Robert Meck

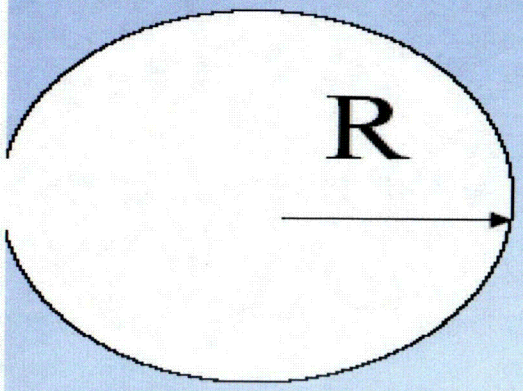
Other Projects of the Branch

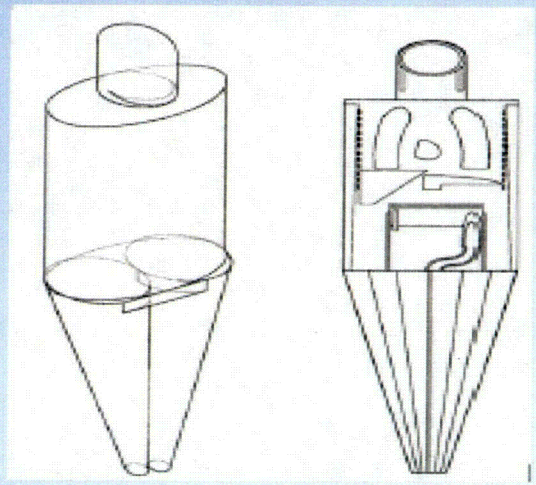
- Spent Fuel Dispersal Project
  - Purpose – measure aerosol particles produced from spent fuel
  - Realistic Data for possible Sabotage Scenarios
- Memberships
  - ISOE
  - CIRMS

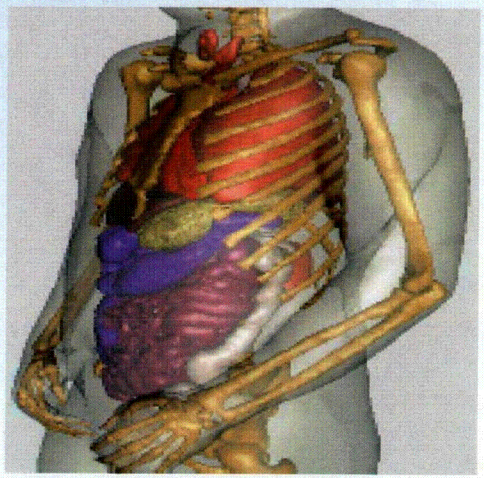

FY 06
Initiatives
User Needs and
Energy Policy Act
NMSS User Need
Request
Energy Policy
Act of 2005
NSIR, Regions III
User Need Request
Long Term Initiatives
Articulating
Phantom
Part 40 Technical
Bases Development
National Academy
of Science Study
Alternative
Technologies
Response Technical
Manual
Effluent Task
Force
Dose Modeling

Modify Mathematical Phantom – User Need Request









1959 1975 1999

Energy Policy Act of 2005

- National Academy of Science Study
  - Identify current uses of radioactive sources
  - Goal is to identify alternative or lower risk source
  - Product: Report to NRC and Congress in 2007
- Alternative Technologies Task Force
  - Multi-agency Workgroup to identify alternative Technologies to radiation sources

Other New Initiatives

- **Communication Health Risk from Groundwater Contamination**
  - **Product:** Fact sheets and training in communicating health risk to the public
- **Update Response Technical Manual**
  - Early and Intermediate Dose Projections
  - Ingestion Pathway
  - Use of KI
- **Technical Basis for Part 30 and Part 40**

LOOKING FORWARD

Needs of the Agency

Future Goals/Vision of the Branch

Modifying Research Plan to Address Immediate, Intermediate and Long Term Needs of the Agency

- **Immediate Dose Modeling**
  - **NMSS/INMS** – Accurate in -house Dose Modeling
    - Radio pharmacy Industry
    - Internal Dosimetry
  - **NMSS/DWMEP** – More Realistic Pathway Analysis
    - Probabilistic Scenarios
    - Doses to Critical Populations
  - **NRR/Regions**
    - User Friendly PC Dose
    - Toolbox of Computer Codes for Inspectors
  - **Office of Research**
    - New Reactor Source Terms, Impacts on Dose

Intermediate and Long Term

- Impact of new ICRP Recommendations
  - Updating Part 20
- Revisiting Collective Dose
- Reprocessing
  - Plutonium Health Effects
- Advance Reactor Source Terms
- LNT Model

Goals Health Effects Branch

Goal: Centralized repository for Radiation Protection Issues

- **Continue Current Program**
- **Provide for periodic discussions thru:**
  - HP Working Group
  - Knowledge Transfer
- **Dose modeling codes**
  - Centralized base
  - Long term maintenance, support
  - Validation of estimates
  - With TTC, provide standardized training of codes
- **Contract Management for Advanced Scientific Needs**
- **Effectively address the gaps in Radiation Protection (Science) and Policy**

Regulatory Guide 1.109

"Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I"

Outline

- Purpose:
  - Update/Revise Regulatory Guide 1.109
- Background on Part 50 Appendix I
- Different from Part 20?
- Concerns of Dual System
- Regulatory Options
- Status/Next Steps

Demonstrating Compliance with Part 50 Appendix I

- Main document is Reg. Guide 1.109
  - Doses from radioactive effluents during routine operations
- 1.111 – atmospheric transport of airborne effluents
- 1.112 – calculating radioactive source terms for waste treatment systems
- 1.113 – estimating aquatic dispersion of both routine and accidental releases
- 1.110 – cost-benefit analyses for radwaste systems
- 4.15 – maintaining radiological effluent monitoring programs
- 1.21 – guidance on submission of reports

Background, Appendix I

- **Part 50, Appendix I, published in 1975**
  - ICRP-2 dosimetry and ALARA
  - Consistent with prior version of Part 20 (before 1994)
  - Dose for whole body and different organs
- **The current Part 20, published in 1994**
  - ICRP-26/ICRP-30 and ALARA
  - Dose is expressed as total effective dose equivalent (TEDE)
- **Current Part 50 Appendix I still incorporates ICRP-2**

Concerns

- Dose objectives more restrictive than Part 20, HOWEVER
  - Use of a dual system could be confusing
  - Outdated compared to current international standards
  - Should be updated to reflect current knowledge
  - principles based on ICRP-2 are no longer thought in current health physics university curriculum

Issues

- Should revision be considered without first updating Part 20 to Current or upcoming ICRP recommendations?
- Requirements for Part 50, Appendix I?
- What constraints are associated with Part 52 design certifications for the next generation of reactors?

- Should there be one set of guides?
- Two sets of Regulatory Guides?
  - Revised guidance would addressee new reactors
  - Current guidance would address existing fleet
  - Licensees would have the options

Options

- Maintain Status Quo
  - Pro – more restrictive
  - Con – Outdated, Dual System at NRC
- Update to Current Part 20
  - Pro – consistent across most licensees
  - Con – not the most current recommendations

- ICRP 60 - Issued in 1991
- Upcoming ICRP Recommendations

Combine Revision of Regulatory Guide with Rulemaking Process to Update Part 20, 50 and 52

- **Pros**
  - Integrates current regulatory and technical issues
  - Addresses the implications on Part 50 licensees and Part 52 design certifications
- **Cons**
  - Could be delayed beyond 2007
  - Updating now without a Commission decision on Part 20 might lead to misdirected efforts and wasted resources
  - Updating now and not redefining Appendix I dose objectives would result in unworkable guidance

Update Regulatory Guide and Part 50 Appendix I with Applicability only to Part 52 Design Certifications

- **Pros**
  - Targets only upcoming new power plant license applications
  - Offers voluntary implementation for plant designs already certified
  - Leaves current guidance intact for existing fleet of operating reactors
- **Cons**
  - Part 52.63 places specific constraints on new requirements to existing certifications
    - Implication is that Agency cannot impose new requirements on plant design certifications listed in Part 52

Revise Regulatory Guide 1.109 and Basis of Appendix I Dose Objectives, with applicability only to reactor designs and plant applications not currently listed in Part 52, nor currently under staff review.

- **Pros**

- Targets only future design certifications and power plant license applications
- Leaves current guidance intact for existing fleet of operating reactors
- Forward thinking and proactive

- **Cons**

- Option would apply only to the next generation of plant designs
- Justification needed in initiating an action now that would apply to yet unspecified plant designs
- Could be premature and unnecessary

Eliminate Appendix I Dose Objectives Requirements from Part 50

- **Pros**

- Centralizes all dose limits and dose objectives into the requirements of Part 20
- Simplifies the scope and implementation of plant technical specifications
- Simplifies some elements of the Reactor Oversight Program
- Minimizes efforts and costs to NRC and licensees

- **Cons**

- Results in different culture of radiation protection for reactor licensees
- More restrictive than Part 20
  - could be perceived as a relaxation of NRC requirements

Update of Regulatory Guidance via Non-Rulemaking Options

- **Sub-option 1:** Define the equivalence between Part 50 and Part 20
- **Pros:** Used for Part 63 and requires no rulemaking
- **Sub-option 2:** Issue a Regulatory Issues Summary (RIS) offering voluntary implementation of Part 20 dosimetry concepts in complying with Appendix I dose objectives
- **Pros:** RIS offers the most flexibility and simplest option
- **Cons for both options:**
- Utilities would be required to submit requests and obtain approvals
- Regulating licensees by exemptions or special provisions.
- Staff would need to assess impacts on current/future Part 52

Status/Next Steps

- Assessing the Impact
  - On NRC Regulations and the Reactor Oversight Program
  - On Licensees
  - ALARA Considerations
  - Backfit Considerations
  - Cost-Benefit Considerations
  - Public Confidence
- Secy Paper to Commission
- Joint meeting with ACNW and sub-committee of ACRS?