UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
OFFICE OF THE SECRETARY
***

BRIEFING ON LESSONS LEARNED FROM THE NUCLEAR CRITICALITY ACCIDENT AT TOKAI-MURA AND THE IMPLICATIONS ON THE NRC'S PROGRAM

***
PUBLIC MEETING

Nuclear Regulatory Commission
One White Flint North
Commissioner's Conference Room
11555 Rockville Pike
Rockville, Maryland
Monday, May 8, 2000

The Commission met in open session, pursuant to notice, at 10:02 a.m., the Honorable RICHARD A. MESERVE, Chairman of the Commission, presiding.

COMMISSIONERS PRESENT:

RICHARD A. MESERVE, Chairman of the Commission
GRETA J. DICUS, Member of the Commission
NILS J. DIAZ, Member of the Commission
EDWARD McGAFFIGAN, JR., Member of the Commission
JEFFREY S. MERRIFIELD, Member of the Commission

P R O C E E D I N G S

[10:02 a.m.]

CHAIRMAN MESERVE: Good morning.

The Commission is meeting this morning to hear from the staff on lessons learned from the criticality accident at Tokai-Mura and the possible implications of that accident for the NRC's program. This briefing is supported by Commission paper SECY 00-0085, which was made available to the public on April 24th.

I think, as of all us would agree, that as the accident in Japan is revealed, an event anywhere in the world can have implications throughout the world, and I don't mean just the physical consequences just because of the fact that an accident anywhere causes us to need to reevaluate our own programs and activities, make sure that we're comfortable with where we are.

The staff has undertaken such an analysis and what lessons are to be learned from the accident for our own programs.

We will have the benefit on our second panel of an evaluation that was conducted under the auspices of the Nuclear Energy Institute, and then we will have a third panel that will consist of representatives from the Department of Energy who had participated in evaluation of the accident in Japan and also, of course, participated in

evaluation of the implications of the accident for DOE facilities.

We very much look forward to this morning's briefing, and let me see if my colleagues have any opening comments.

COMMISSIONER MERRIFIELD: I just want to say, you know, as we start on in this, at least from my point, ultimately, obviously, it's with some sympathy to the families of the two gentlemen who were deceased as a result of this accident.

Certainly, for my part, I want to put that in the record.

Obviously, this has also been a trying time for our sister agency -- sister agencies in Japan that have been attempting to struggle with this, and certainly, having been in difficulties of our own in years past and having received their support, would want to recognize the fact that we -- we do recognize that they are going through a trying time and would have my sympathy in that regard.

CHAIRMAN MESERVE: Commissioner Merrifield has made a very fair point.

I have just returned from a visit to Japan, and it is -- I'll just report that there's obviously a very aggressive effort underway in Japan to understand the accident, understand its implications, which has very

significant implications for the structuring of their own regulatory program.

As much as we have tried to learn from this accident, it's clear to me that the Japanese have made very aggressive efforts to do the same and are taking a variety of actions to respond to the situation.

Dr. Travers, you may proceed.

MR. TRAVERS: Thank you, and good morning.

As you indicated, Mr. Chairman, the staff is here to provide you with a summary of the events that surrounded the September 30, 1999, criticality accident that occurred at the JCO facility located in Tokai-Mura, Japan.

Additionally, as requested by the President and the National Security Council, the NRC has completed its review of the lessons learned from this accident, reviewed

the criticality safety activities at the major U.S. fuel cycle facilities, and in fact, has verified that existing NRC oversight program, we believe, is adequate to ensure criticality safety at those facilities.

Giving the briefing today is Bill Troskoski. Bill is a Senior Fuel Facility Inspector in the Office of Nuclear Materials Safety and Safeguards and has been coordinating the NRC activities performed over the last seven months in response to the accident.

Bill is the author of the review and lessons

learned Commission paper that was provided to the Commission in April.

Also here with me today are Janice Dunn Lee, who is the Director of the Office of International Programs; Bill Kane, who is the Director of NMSS; Frank Congel, who is the Director of the Incident Response Operations; and Mike Weber, who is the Director of the Division of Fuel Cycle Safety and Safeguards in NMSS, and I'm going to turn the briefing over to Bill Troskoski.

MR. TROSKOSKI: Thank you.

May I have slide one, please?

Good morning.

I am pleased to brief the Commission on the staff's review of the Tokai-Mura criticality accident, the lessons that we have learned as a result of that accident, and the implications for NRC's fuel cycle facility.

Slide two.

This briefing will cover the purpose of NRC's review of the accident, the basic background of the process involved, the root causes identified by the Japanese regulators, and the consequences, both on-site and off-site.

I would then like to highlight the staff's actions taken in response to the accident, followed by a general review of the deficiencies identified by the Japanese

regulatory authorities, and review the implications for NRC-licensed facilities.

Following this, I will discuss several emergency response issues identified by the Japanese and compare these issues against the NRC program.

Finally, I would like to provide the staff's conclusions for your consideration.

I should state at the outset that the NRC staff recognizes that our fuel cycle oversight program can be improved.

Indeed, NRC has been revising Part 70 and last year initiated a process to review our program for fuel

facilities, in concert with the stakeholders.

Nevertheless, we are pleased by the positive conclusions of our assessment.

The next slide, please.

The President requested the Department of Energy and the NRC to conduct a review of U.S. nuclear facilities to assure that a similar accident would be unlikely here.

Even without such a request, we had planned to review the lessons learned from the Tokai accident as part of our continuing efforts to enhance the effectiveness of our oversight program.

To accomplish this task, we reviewed the current safety operations at U.S.-licensed and -certified

facilities, we considered the implications for NRC's oversight program, and drafted a report addressing the lessons learned and implications.

Slide four, please.

By way of background, the accident occurred on September 30, 1999, at the JCO Company site in Tokai-Mura. This is a densely-populated area located about 70 miles northeast of Tokyo.

The accident occurred in the conversion building, shown here at the end of the arrow. The site plan illustrates the general scale of the facility, and please note the zero to 200-meter scale bar shown on the bottom righthand side of the slide.

The nearest residential building is located about 150 meters to the southwest of the conversion building. To the north of that residential building is a lumber yard where several workers were located during the first several hours of the accident.

About 160 members of the public were subsequently evacuated from within 350 meters of the plant, and 310,000 people were subsequently sheltered within 10 kilometers of the facility.

Slide five.

The top portion of this slide is a diagram of the process and written operating procedures as approved by the

Japanese regulatory authorities.

The bottom portion shows the actual procedure that was used during the accident. The accident occurred in the precipitation tank, which is shown about in the middle of the process.

It is important to know that there was no hardware failure involved.

Official reports document that this was apparently

not the first time that JCO employees had deviated from the written procedures without proper authorization in order to increase productivity.

Some other important factors directly related to the accident are that this was the first time the process was run in the last two to three years; of the three operators involved in the accident, two had no previous experience with the 18.8-percent enriched process, and the third operator had only about one or two months' previous experience.

The operators deviated from JCO's revised procedures, which were not reviewed by either their safety department or the regulator, due in part to production pressures.

Slide six, please.

Based on the Japanese investigations, the direct cause of the accident was due to the conduct of the

operations.

Had the facility been operated in accordance with the approved procedures, this accident would not have happened.

Based upon the staff's review of the Nuclear Safety Commission's reports, the root causes were inadequate regulatory oversight, lack of an appropriate safety culture, and inadequate worker training.

Slide seven, please.

Sadly, as a result of the accident, two of the three workers died from radiation exposure. The third worker has been released from the hospital but is still under medical observation.

The doses presented on this slide are estimates, and refinements to the estimates are certainly possible as evaluations continue.

I would like to emphasize two points about this graph.

First, note that the doses to the three operators greatly exceeded the doses to the other people involved.

Second, note that there were more members of the public exposed than workers.

This is very unusual, because criticality accidents are not generally expected to cause off-site exposure. However, in this case, proximity of members of

the public to the conversion building yielded a different result.

The next slide, please.

As the Commission is aware, we activated the NRC Emergency Operations Center during the accident. After we

conducted a preliminary evaluation of the available information both during HP LaserJet Series IIHPLASEII.PRSs diffusion plants to focus the inspectors' attention on what we believed were the potential problem areas.

As a result of the additional inspections, no significant safety issues were identified at those facilities.

We also issued an information notice to the fuel cycle licensees to alert them to what we believed were the potential problems based on initial reports from the government of Japan, the International Atomic Energy Agency visit, and the Department of Energy visit.

Since the accident, the staff has continued to review and evaluate lessons learned to determine implications for commercial nuclear fuel cycle facilities and our regulatory program.

The sources of information included the various reports and briefings provided by the Japanese regulatory authorities, including the Nuclear Safety Commission and the Science and Technology Agency, other agencies such as the

IAEA, DOE, and the Japanese Atomic Energy Research Institute, as well as open news sources.

Next slide, please.

Based on the information developed from the above sources, the staff looked at each program component that was identified as deficient and performed a comparison between the factors that contributed to the accident at Tokai and U.S.-licensed facilities.

The safety evaluation performed by JCO and approved by the regulator assumed that the criticality was not possible.

Also, JCO was not required to install a criticality accident alarm system or develop an emergency plan or provide operator training regarding criticality safety.

U.S. licensees are required to perform evaluations that assume that a criticality is possible. They are required to install a criticality alarm system and develop an emergency plan.

Further, licenses also have individual operator training requirements.

The NRC's oversight program reviews the development and implementation of these program components.

Slide 10, please.

Operations at the JCO conversion facility were not

inspected since 1992.

Operations at U.S. facilities receive periodic announced and unannounced inspections throughout the year.

Procedures are required at both the JCO facility and U.S. facilities.

The NRC oversight program addresses procedure development, review, and approval, including criticality safety reviews, as appropriate, and procedure implementation.

At the JCO facility, inadequate management control is exercised over the startup of the 18.8-percent enriched uranium process.

No steps were taken to ensure that the appropriate safety limits and controls were flowed down to the operators through procedures, postings, and training.

At U.S. facilities, the operating license defines the authorized activities and the management control systems to assure that the appropriate safety limits are developed and implemented.

The Japanese regulatory authorities also noted that there was not an appropriate safety culture at the JCO facility.

Management did not believe that a criticality was possible, and they did not exercise proper control over site activities.

At U.S. facilities, the NRC inspection process provides feedback regarding a licensee's performance.

Inspection findings, event, and other reports are periodically evaluated and trended as part of our licensee performance reviews that are performed periodically for each facility.

As a result of the review that we performed, we identified no gaps in the NRC's regulatory oversight process.

Slide 11, please.

In addition to identifying the specific deficiencies that contributed to the accident, the Japanese Nuclear Safety Commission's report also addressed several performance issues related to emergency response that surfaced during the accident.

They noted that the initial emergency response was complicated by a lack of a criticality accident alarm system, the local population did not receive a timely notification to evacuate the immediate area, there were interface problems between various government organizations, and JCO's communications and emergency response system were not adequate to support what they felt needed to be done.

Slide 12, please.

The staff also considered whether each of these

issues is address by NRC requirements.

As a result of our review, we believe that our regulatory requirements and the NRC's licensing and inspection process provides an appropriate level of emergency preparedness for U.S. fuel cycle facilities.

Our facilities are required to have functional criticality accident alarm systems, and we do inspect that as part of our core inspection program.

Emergency plans are required for the larger facilities.

We do have a reg guide that defines what the content of the plans should be. The emergency plans are reviewed and approved by the licensing function, and they must address issues such as prompt notification of off-site response organizations and they must address the coordination of emergency actions.

From those approved emergency plans, licensees are required to develop site-specific implementing procedures. They are also required to conduct periodic drills with the local emergency response organizations and invite the state and local governments to participate if they so choose. At the end of the drills, they hold critiques to identify lessons learned.

The NRC core inspection program reviews emergency planning.

Slide 13.

In conclusion, we believe that the Japanese government has conducted a thorough investigation of the criticality accident at Tokai-Mura.

We believe that the accident root causes are similar to causes of previously criticality accidents that have occurred throughout the world.

The current safety program carried out at commercial U.S. fuel facilities makes a similar accident unlikely, and finally, emergency response plans provide defense-in-depth at U.S. facilities.

That would conclude the staff's formal presentation at this time.

MR. TRAVERS: If I may just make one point of emphasis, Bill mentioned that the U.S. program, in contrast to the Japanese program, includes periodic inspections at fuel facilities.

In fact, at the facilities that have our license for high-enriched uranium, we have resident inspectors, and at the gaseous diffusion plants, as well.

So, we not only have a periodic inspection

capability and program that covers all fuel cycle facilities, but in those instances where high-enriched uranium is licensed for use, we have a resident inspector program.

That concludes our presentation.

16

CHAIRMAN MESERVE: Thank you very much for a helpful presentation.

Commissioner Diaz.

COMMISSIONER DIAZ: Good morning.

I believe that the staff should be congratulated on focusing its studies on what is really important from our perspective, which is the analysis of not the event in itself, which we had no control over, but the results of the events and how can we use it to ensure adequate protection of public health and safety in this country, and I have gone through it carefully, and I am satisfied that every effort has been made to compare situations and make sure that we have addressed those issues.

I think that it appears that we have done a very good job, and I'd like to thank the staff for it.

I have two questions.

The first one is on the actual review that was done for our facilities, and is there any additional action that the staff believes is needed to ensure adequate protection of public health and safety at U.S. facilities at this time?

MR. TROSKOSKI: No additional action is needed. Again, we are revising Part 70, and we are also looking to revamp our program to make it more risk-informed and performance-based, and that will certainly enhance it, and

17

we recognize that we can do a better job with our oversight program in that regard.

As far as there being any immediate safety issue that we needed to take action on or that we need to take action on in the immediate future, no.

We believe that there is an adequate margin of safety at each of the facilities today.

COMMISSIONER DIAZ: All right. Thank you.

The second area is always one of my pet peeves, and it deals with information to the public, and I realize that there are many things that were not under our control in here, of course, it was in the control of somebody else.

However, I still believe that, like the Chairman stated, we need to be able to respond to these situations when they happen, and I will make a comment and then I'll ask the question.

It is obvious -- and of course, Los Alamos has

done a very good analysis, but we have known for a long period of time that accidents at fuel facilities or at research reactors have very limited capabilities to cause public health and safety damage, that the damage is normally -- or the risks are constrained to the area of the facility that -- like in this case shown and like Commissioner Merrifield already pointed out, there was an unfortunate, you know, death of two workers, one is already injured.

There was some, you know, radiation levels registered for people close to the facility, already alluded to it.

However, I always get concerned that one of our missions is to bound these things in terms of what the public health and safety perceptions are, and I was wondering whether, not the first day when we have no information, not the second day, but if we, in our public information, public affairs efforts, did we try to establish that criticality accidents at fuel facilities are bounded by the limitations of the small amount of fuel, the small amount of fission products, all of those things that make criticality accidents things that we worried about but that have never caused a significant public health and safety issue. Did we address this issue? And I don't know who is going to answer that question.

MR. TROSKOSKI: The press release that we issued did not address that, sir.

It was something we were just focusing on the event at the time but we weren't trying to say, hey, our facilities are enveloped by the analysis, we don't expect there to be off-site consequences, if there are we've got an emergency plan there.

We were more just focused on a much more narrow focus on the event at hand because of the high news profile

that it received.

COMMISSIONER DIAZ: As a lesson learned from this, should we be prepared, if there is -- you know, which there could be, because they are not impossible, they are -- accidents do happen -- to address the level of risk associated with accidents?

I think this is a major issue that faces the NRC. We need to be able to bound the risk for the people that we serve, and we need to be able to address it, and I repeat, for criticality accidents at fuel facilities, the public health and safety impacts will always be small, and I will say will, not could. There are limits to what it could do.

MR. KANE: I think your point is well taken,

Commissioner.

I know one of the things that we were dealing with early on was we wanted to also make sure we completely understood what had happened so that tempered, I think, some of our earlier discussions.

COMMISSIONER DIAZ: Thank you, Mr. Chairman.

CHAIRMAN MESERVE: Commissioner Merrifield.

COMMISSIONER MERRIFIELD: Thank you, Mr. Chairman.

Upon reviewing these materials, it would appear to me that, obviously, competitive pressures did play a role in some of the consequences, inadequate staff resources. Obviously, there may be some other cross-cutting factors,

human factors and safety culture, leading to the accident.

Are the inspection programs and the regulatory programs that we have here at the NRC, combined with some of the industry self-assessments -- are they adequate to detect circumstances where there may be deteriorating trends on cross-cutting factors? Could you talk to that a little bit?

MR. TROSKOSKI: I believe they are.

We go out and we look in a number of areas, everything from operations to crit safety to chem safety to health physics, etcetera.

We periodically evaluate the problem reports at these facilities to look for trends.

We bring it all together as part of the licensee performance review process that we do, but aside from that, if we find any potential significant indicator, it's certainly run up the management pole, management chain, very quickly, so that we can take action, especially when you're talking about use of procedures, plant modifications, losing control over the conduct of operations in the facility.

That's something that we look at in detail, both the regions and headquarters, from a number of different perspectives and disciplines.

So, I think we've got -- we would be able to find that out in a timely manner.

MR. KANE: We are sensitive to those issues.

Again, what we measure is safety performance, and we believe that, by doing it that way and having our periodic assessments with the regions of safety performance, that we are able to detect if that turns out to be the cause -- the root cause of change in safety performance, we would be able to pick that up through our inspection program, we believe.

COMMISSIONER MERRIFIELD: I want to take the opportunity to compliment the staff for their hard work on this issue.

As the Nation's leading regulator of nuclear power

plants and fuel cycle facilities, we were obviously inundated from inquiries from the press about this incident, and obviously, as has been mentioned, we tried to respond to those inquiries in a measured and well-informed manner.

Are there any lessons that we have to learn for ourselves about this incident and how we can appropriately act in terms of providing public information about incidents that happen at facilities external to the United States?

MR. CONGEL: Yes, Commissioner. I'd like to briefly describe a program that we are in the process of developing right now and that will be brought up before the Commission shortly.

As a result of Tokai-Mura, as you just mentioned, there was a communication and information requirement placed on us that was different from some of the planning that we

already had in place.

It was also enhanced with the experience that we had during the Y2K rollover; namely, to have the Federal Government coordinated in such a way that we were speaking in a consistent as well as a proceduralized way.

The effort that we are in preparation of is called the One Voice initiative, and it is a direct result of what happened at Tokai-Mura.

Very briefly, the existing Federal radiological emergency response plan calls for a designation of a lead Federal agency, and for foreign events of this sort, EPA is the lead.

Of course, EPA, like all of us, has its principle focus on protection of U.S. citizens, and Commissioner Diaz pointed out, this particular event, although very catastrophic for the workers and potentially affecting the local population, did not have any direct potential impact on the U.S.

So, EPA's role was low-key.

On the other hand, the request for information about facilities similar to those in the United States that would be overseen by us or run by Department of Energy was intense, and we mustered a response that was outside of the scope and planning of the FRERP, and what we are in the process of preparing that you will shortly see is a

coordinated effort using the FRERP as a base and the Federal Radiological Protection Coordinating Committee, which is made up of 17 agencies that have responsibilities in this area, so that in anticipation of such an event, we will have a procedure in place that will address this.

It clearly requires a different coordination than

one that would require protecting American citizens.

That's probably the principle lesson learned, I would say, from our response basis.

COMMISSIONER MERRIFIELD: I think part of our role as an agency in this regard is to make sure that we are providing accurate and timely information to the American public, so they are appropriately informed about these incidents and are able to put them in an educated context.

COMMISSIONER DIAZ: The things that, you know, I tried to address, and Commissioner Merrifield has focused on it again, is, for example, for two days, at least, maybe three days, you could see it in the TV, you know, CNN was calling this, you know, the new Chernobyl, you know, and you know, creating alarm, and I think we need to be ready to bound these things, to say, you know, this doesn't have the amount of fission products, it cannot -- you know, even if the entire mass gets airborne, it's just really not in that category, and I think our capability of, you know, quickly bounding the -- not exactly, because we don't know about it,

but providing some bounding to the potential for public health and safety is a very good function that we must be able to carry out.

Thank you, sir.

COMMISSIONER MERRIFIELD: I think the American people deserve to have accurately and timely information about these accidents, and I agree with the Commissioner.

One last point I would want to make, and then I'll bow out for this panel -- I had an opportunity last week, as some other Commissioners may have, to meet with a delegation of individuals from the Japanese bar association.

They were here to learn more about the way in which the United States regulates nuclear materials, and they were making some recommendations to the Japanese diet about how the Japanese regulatory system may be enhanced, and I mentioned to them, as this Commission has, both publicly and privately, previously, that we believe that having the NRC as an independent regulator, without other external or internal government involvement, enhances our role and our ability to regulate nuclear power plants and nuclear fuel cycle facilities.

I think that is something that Japanese diet is strongly considering at this point in terms of some of the recommendations for modifying their system, and certainly, for my part, I'd want to put in the public record a repeat

of our earlier statements that we believe independence in a regulator of the nuclear industry makes a lot of sense.

Thank you, Mr. Chairman.

CHAIRMAN MESERVE: Commissioner McGaffigan.

COMMISSIONER McGAFFIGAN: I have about three lines of questioning I want to pursue, and one of them has been provoked by the earlier comments.

I was Acting Chairman the day of this event, and we did, as Frank talked about, activate our center on a -- I don't know the right term -- contingency basis.

We knew it didn't affect people in this country, wouldn't affect people in this country, but there was a typical fog of war.

We did not have good information. We were getting it from CNN and from various other folks, and so, it was difficult to know when it was going to be over, how many local residents had been exposed at levels about the, you know, 100-milligram, 1-millisievert public dose limit, and all of that.

One of the people who did the best job in the first couple of days, I think I recall, bounding the accident was actually Tom Cochran of NRDC.

I think he was one of the talking voices on one of these shows, and he was quite complimentary towards the U.S. regulatory system and towards bounding the issue for the

public.

I think we could do a better job, but it was very difficult during those opening hours to have a real sense as to what was going on.

The other thing I'll say about lessons learned -- and this is probably a little -- in my role as Acting Chairman -- Frank talked about EPA being low-key.

I think the person who normally does this stuff at EPA was actually on leave that day, and it was very hard getting a rise out of anybody at EPA.

State was involved.

DOE was involved. DOE was so involved that the first thing we knew that DOE was doing something was when Secretary Richardson made announcements with Mr. Adamov from Moscow, and so, he sort of asserted DOE leadership.

The President made a statement, which we didn't know about until after the fact, we had to get it from OSTP.

So, there was a lot -- this One Voice initiative, I think, is quite important.

I think there -- we have to have a connection with the White House during any event, domestic or international, and we need to make sure that somebody, even if it's on an ad hoc decision, somebody is put in charge of the interagency groups, because I think part of the lack of good communication that day was, you know, if secretaries of

energy and ministers of atomic energy of Russia have to be making statements about it, it must be really, really severe, and so, there were lots of mess-ups that day from our perspective that we can improve on.

But in terms of bounding it, I think it takes 24 hours to bound one of these things. I really do. I think -- because you just don't have enough information.

So, that was more of a statement than a question.

The thing that struck us all that day, I will tell the public, was how could Japan have gotten to be so different?

We were shocked, because I think, in the first few hours, we heard that STA had not touched this facility since 1992, and we all just were amazed at how different that was, and I think it's a regulatory failure.

I think the Japanese government has decided it was a regulatory failure on their part, was at least part of the problem.

Does anybody have a sense how one can get -- maybe Janice -- how the Japanese regulatory system could get so out of kilter not just with the U.S. but with European, with other regulatory systems?

MS. DUNN-LEE: Well, I don't have a very good answer for you there.

Japan, of course, is a mature nuclear country. We

consider them very like-minded, and we have regulatory cooperation and dialogue with them on a very regular basis, and I think it's a good question. I really -- I don't have an answer for that, how it got out of kilter. It isn't identical.

COMMISSIONER McGAFFIGAN: The charts on 9 and 10 really -- you know, they're meant to say we don't have a problem, but they're really an indictment of the old Japanese system, old Japanese regulatory system.

I mean I'll tell you what I think part of the problem is.

I've followed Japan for a quarter-century, working first at Rand and then in the executive branch and in the Congress, and I honestly think -- and I think they're fixing it -- STA shouldn't have been in the regulatory business.

It's a small entity within a large research ministry. It's about to be combined and become a super-research ministry, and as I understand it, they're going to take most of the regulatory function out of STA and put it in MITI, but they're still leaving some self-regulatory within that large research institution that I fear will get lost, especially given this track record.

So, if there are Japanese members of the public listening, I would strongly suggest you think about, as Commissioner Merrifield already has alluded to, having an

independent regulator regulating all of this stuff and regulating to world standards.

One of the comments in Nucleonics Week recently, a May 4th Nucleonics Week, was why hadn't Japan used, on the industry, more peer review, and the argument was, at least in this article, because open criticism involved in peer reviews does not mesh easily with the Japanese culture, and I think that that's again something -- I know it doesn't mesh easily with Japanese culture, but I would strongly suggest that they try to find a way to build in that sort of thing.

The NEI document that -- I'm going to use the bound version that was on our chair -- and it's good to be criticized from this direction -- suggests that we may have more than adequate regulatory oversight in this country in several areas.

On page 11 of their paper, they suggest that the single uranium conversion plant receives more than adequate regulatory oversight. They suggest the DDPs, you know, have continued intensity of regulation that may be disproportionate to risk.

That's on page 11, and then on page 13, they again suggest that we work to lower the regulatory burden on these sites.

There is, however, a clear opportunity for

industry and NRC, working together, to enhance the regulatory paradigm.

Specifically with regard to the conversion facility and the gaseous diffusion plants, do you believe that we are over-regulating at the moment, that there is excess regulation?

MR. TROSKOSKI: No, sir.

You take a look at the bulk hazardous chemicals at the conversion facility, you fail any one of the large tanks that they have out there, and you look at the impact it will have to the members of the public, that will have an off-site impact.

Unlike a criticality, it will extend miles beyond the boundary.

They have the greatest concentration of bulk hazards, second only to the GDPs, and the greatest hazards at both of these sites are chemical hazards, and these chemical hazards are not something that will cause an

increase in cancer 20 years down the line, they have the capability of killing people immediately.

So, I think we've got, currently, about the right look at these facilities.

So, I would respectfully disagree with our colleagues.

COMMISSIONER McGAFFIGAN: I do want to note -- and

Bill Kane is going to answer -- it's nice to be criticized, in a day like today, for over-regulating rather than under-regulating.

I'm glad we're in this boat and Japan is in the other boat.

COMMISSIONER MERRIFIELD: It's a good thing to be an independent regulator.

COMMISSIONER McGAFFIGAN: Right. It is.

MR. KANE: I think it's a fair question, and Bill touched on some of the things that we have got in the works, so to speak, right now.

I mean I would tick off Part 70 --

COMMISSIONER McGAFFIGAN: I think the new Part 70 --

MR. KANE: -- which is intended to be more risk-informed; independent safety assessments, which are part of that, which have to be developed and form the basis for determining, you know, whether further changes are needed.

Our revised oversight program that we're working on is fully intended to make sure that we're spending just what we need in the right places, and finally, I would say that we're in the process now of reexamining our core program to determine across our core program where the resources should be, and this is -- and this is going to have a -- this is going to be a risk-informed re-look at the

core program.

So, while, at one level, I think Bill's answer is correct, I think, at another level, we always need to examine our programs to make changes, and I believe that we have, with those three initiatives ongoing, I am sure that you're going to see further changes.

COMMISSIONER McGAFFIGAN: My last comment is a compliment to the staff.

Today's Inside NRC mentions the inspections by Region II and Region III at Westinghouse's plant in South Carolina and the hematite facility that's going to be closed in Missouri, and I remember a similar report that I read on the NFS Irwin inspection a few months ago.

I think it's inspections of those sort that are why we have a successful regulatory system. They identify

issues early and make sure that the licensees stay attuned to them, and so, I compliment the staff for their work, and I'd point to, again, the Japanese public, look at those inspection reports and see how our staff does it.

MR. TRAVERS: If I could just make one quick comment, I happen to agree with that; I think inspections are important, and they're particularly important when you think of the changing nature, the dynamic nature of the business.

Very often what we find when we go in on an

inspection is a fairly changed environment, you know, depending on the business at hand at any given point in time. So, it really has, from that perspective --

COMMISSIONER McGAFFIGAN: This is a business that's under stress, because as I think Commissioner Merrifield pointed out, hematite is going to close, there is consolidation occurring in the industry, and we need to be attuned to the pressures that come from that.

Thank you.

CHAIRMAN MESERVE: I have just a couple of small questions.

Your slide 12 -- you had pointed out about your emergency response -- our emergency response drills, and you indicated that they are periodic, and I'd be curious to know how often do we have them.

MR. TROSKOSKI: Biennial. Licensee drills are biennial, once every two years.

CHAIRMAN MESERVE: You indicated that state and local governments are invited to participate but didn't go on to say whether they do participate, and I wondered how active the state and local governments have been in that process.

MR. TROSKOSKI: I cannot tell you which states and local governments participate or don't, although I believe most of them do to some extent, but I couldn't give you the

numbers offhand, sir.

MR. CONGEL: I can answer part of it. The smaller licensees -- there is a high variability, and we can get back to the Commission just what the extent of participation there is, and the bigger sites, particularly the GDPs, there is full government participation, just like it is around our power plant sites.

CHAIRMAN MESERVE: It seems to me that, if there are sites where there are high risks, we ought to maybe be a little stronger than invite, strongly encourage, and if there's Commission involvement to be necessary to help that

along, we'll be happy to do it.

One of the other aspects of this accident that I'd be interested -- and this is information, largely. One of the things that surrounded the Tokai-Mura accident was that they were -- while they customarily were dealing with material fairly low-enrichment, they were -- had material of 18-percent enrichment, and they were not following normal procedures, but it does raise a question, it seems to me, in my mind, about the extent to which we have a process that's like 50.59 that allows our licensees to make changes without prior NRC review, and you might say something about what kind of engagement we would have if, all of a sudden, the licensee were to be dealing with materials of different enrichment than they had analyzed before.

MR. WEBER: Licensees are specifically authorized to possess and process certain enrichment material.

So, unless their license already authorizes them to process a higher enrichment, they wouldn't be allowed to possess that kind of material except, in some cases, small quantities.

With respect to a 50.59 process, the existing regulations in Part 70 allow licensees to make certain changes to their material control and accounting plans, physical protection plans, and emergency response plans, provided that they meet certain thresholds, without getting prior NRC approval, and one of the things the Commission will soon have before it is an opportunity to review what the staff recommends as a final change control requirement in the new Part 70 revisions.

Some licensees already have the flexibility to make those kind of changes under their existing licenses, but the new proposed requirement would allow that -- as consistent with the proposed rule -- would allow licensees in general to have that kind of flexibility.

We think that's a really important regulation, as reflected in the proposed rule, because it allows the flexibility, yet maintains the safety of operations.

So, it's something that has to be implemented quite carefully and in a controlled way.

CHAIRMAN MESERVE: I'd like to thank the staff very much. This has been quite a helpful and informative presentation.

Our next panel will consist of various individuals who had participated in the preparation of the document that was prepared under the auspices of the Nuclear Energy Institute entitled "Assessment of Nuclear Criticality Safety and Emergency Preparedness at U.S. Nuclear Fuel Plants."

Those individuals consist of Mr. John Brons, who's from the institute, and two consultants, Mr. Robert Bernero, who is very familiar to many of us, and Mr. James Clark.

MR. BRONS: I'm Jack Brons, and to my left is Jim Clark, on my right Bob Bernero, as you know, who is somebody is very familiar to all of you.

You're familiar with Bob's experience. Jim has about 40 years' experience in the fuel processing industry and the waste management industry. My experience, similar duration, is primarily in reactors and with some relevant and significant experience in the conduct of assessments.

There is one note I'd like to make about the team as we begin this.

It was our objective when we put the team together to have individuals involved who have extensive knowledge of the fuel processing industry.

That brings with it some potential for conflict of

interest, and I would like you to know that Mr. Bernero has informed us before we began these reviews a continuing interest of some substance with the USEC, the gaseous diffusion plants, and the Mr. Clark has a continuing interest and involvement with NFS Irwin.

We accommodated those interests as we proceeded with the reviews.

Neither gentleman took any sort of a lead role when we were involved in that particular plant that was relevant to them, and so, in terms of discovery of issues and items, until the other two of us had come across something, they did not participate.

I think it's important to disclose that at the beginning, however, we were aware of those potential conflicts.

The review process that we did was put together on the basis of an industry initiative taken promptly after the accident in Japan.

We assembled the team, and then the first assignment for the team -- slide two, please -- was to identify for ourselves the factors contributing to the Tokai-Mura event, and I will not discuss each of the items listed on this slide. It is intended perhaps primarily as an index. I'll refer to some of these areas later on.

But to tell you what we did with them, once we

determined these contributing factors, the team then identified a substantial listing of questions which we needed to address that got us at each of these points.

We provided that package of questions to the

facilities together with an outline of how we would conduct our review.

They, in turn, then provided us with a reading package intended to address these questions that we had prepared in response to these contributing factors, we already read the NRC inspection reports for the two years preceding the event for each facility that was available in the Public Document Room.

When we arrived at the facility, our first part of the review was a very extensive question-and-answer session, then, with management, where we went over this set of questions that is conditioned on this contributing factors, while we tried to probe the degree to which the facility had a wholesome response to the questions we asked.

We then conducted a tour of the facility, visiting all the parts that we considered necessary to review criticality, safety, and emergency planning.

We conducted interviews of operators, supervisors, middle managers, and at the end of the first part of our review, weighing the results of the management presentation, the answers to the questions that we received in the

interviews, and the observations that we had made during the facility tour, we then identified to the facility several areas that we would individually take on and do an in-depth review in order to determine the correctness of our observations or areas where we needed further information.

Then, when we were finished, we provided the facility with a debrief of our observations.

Next slide, please.

It was very clear to us that the fuel processing industry in the United States are clear beneficiaries of the regulatory and standards processes in the United States. The regulations and the standards are observed, and we believe that they provide for fundamental safety.

We did not observe any conditions that we considered to be of safety urgency during the course of our review. We had had discussions with senior staff before we conducted this review. We committed to them that, if we had anything that was of safety urgency, that we would bring it immediately to the attention of the facility and then facility would then report to you consistent with the regulations, but none of those conditions were observed.

The team concluded that the facilities are operating safely.

Next slide, please.

Our review was based not upon pure regulatory

threshold, however.

We used as a basement for discernment in the development of our observations and findings at each facilities a standard of best industry practice.

Now, because this team and our review is relatively unique, admittedly, as we did the first few facilities, that standard was based upon the team's experience.

Later in the review and as benchmarked in this report which we've presented to you, the standard is, as I mentioned, not based on a threshold of regulatory or standards compliance but, rather, observed actual superior performance in the industry.

If we have described a best practice in this report, it is not a figment of our imagination or a wish list; it is actually being done.

Now, we have grouped -- I have grouped the factors here for presentation efficiency, and so, I will discuss the observations that we had on items one and two of that list of nine contributing factors, and they generally revolve around the safety culture for operations.

It was clear in Japan that there were some commercial pressures that led to the behaviors that led to the accident.

We found here that safety of operations is clearly

the dominant focus.

All facilities provide some information to their workforce about their commercial situation. We found information in the dining room or the cafeteria or some out on the shop floor.

Our observation and the results of our interviews indicate that that business data is treated as simply that, business data, it's information, and we did not find any evidence that it was dominating operations.

It was very clear that the workers had a clear understanding that they had the authority and the obligation to stop the processes in place if they were uncertain or had a safety consideration.

We found, because part of our questions looked at the flow-down of procedures for consistency with license conditions, that we found that the procedures are consistent with the license conditions for each individual facility, and we found that the facilities are striving for procedural adherence.

They are not all achieving procedural adherence.

We found in some instances that the expectations of management for use of the procedures is sometimes poorly communicated and certainly, in many instances, variously

understood by the workforce.

Now, that said, we did not observe conditions

where people were not following procedures.

What we found instead were situations where the expectation of management might easily be interpreted as the procedure should be open and available as you perform it step by step.

The nature of the operations do not permit that.

The workforce generally performs repetitive efforts, and we have described that in the report, and they generally are certainly intent on following the procedures, but there is a gap between expectations as expressed by management and the actual practice in the facilities.

We have noted in our report what we've found in the way of best practice, and in this area what we would describe as best practice is that there was a very thoughtful policy on the part of management describing how procedures should be used.

Mechanisms were in place to facilitate the use of procedures in that manner. It was well communicated to the workforce, supported, enforced, and the understanding of the workforce was congruent with the expectations of management, and that does exist at some facilities out there.

Next slide.

The nuclear criticality safety program we found to be one marked by uniform adoption of the double-contingency principle.

It is an underlying feature of criticality safety that involves the use of double contingency.

We found a preference for the use of engineered controls throughout the industry; that is, practices which are aimed at eliminating administrative controls, administrative controls being those that are primarily dependent upon human behavior and engineered controls being those which are built into the process.

We found some use of triple-contingency practices out there; that is, where the facility had identified and put in place an additional level of contingency, and the team has noted that that is both a plus and a minus.

In some instances, the application of another layer of contingency confronts the operators with additional sets of data that can promote confusion.

So, the -- while the concept of building in additional layers of safety is an important and valuable one, it must be done in a very thoughtful and rational way or it can cause confusion.

There is also a widespread use and expectation

that nuclear criticality safety postings will be deployed in the plant, and we did find, to some extent, that there is a variable effectiveness to those postings, and in particular, if they come out of the print shop and they are not necessarily printed in the right size or they're not posted

in the right location, then they can't be as effective as they might be.

In that regard, in the area of best practice, we found a number of things, and relative to the postings, where the operations department has a significant control over how those criticality postings are deployed, and the way they're printed and placed in the plant seems to enhance their effectiveness considerably.

Other best practices that we observed were cross-train surveillance.

This is referring to the fact that, at some facilities, radiological technicians have been trained to observe for criticality safety issues or engineers are used to do surveillances for criticality safety issues, and we found that to be a significant plus, and other facilities have very rigorous programs that systematically challenge administrative controls that remain in place.

Next slide, please.

Now, I want to stress, as I leave the nuclear criticality safety area, that it was not this team's objective to review the applications and calculations behind standards and codes used to define criticality measurements.

Rather, our focus was on the management of criticality safety, and so, in this view-graph, I'm discussing or outlining the issues that we discussed or

found relative to areas of management, training, and oversight, items four, five, and six on the index of contributing factors.

We found that the use of event experience from Tokai-Mura was not as aggressive as we would have hoped. We found everyone familiar with the Tokai-Mura event, but in our view, it was an occasion to very forcefully use it to reinforce standards in place, and generally, the event was used as simply communication of an occurrence and information to the workers, rather than a very vigorous, gee, this happened, we want to use it as forcefully as we can.

We also found some weakness in the understanding of criticality and the factors used to control criticality.

We found across the board understanding that criticality is a significant event, we found across the

board understanding that criticality can occur here, but when you get down to defining exactly what a criticality is, many workers were weak in that regard, and that led to a subsequent weakness in understanding the controls that are used relative to criticality; that is, geometry, moderator control, and so on.

They were unable to relate those terms, a term like moderator or spacing, to the physical occurrence of criticality.

Relative to the qualification process, we found, really, two types of qualification processes out there, one which I will call a very formal qualification card, lots of documentation behind the qualification of a worker, and the other being more of an apprentice/journeyman relationship in qualifying and training people.

The team did not observe any significant differences in the results of either of those two processes, but we have suggested to the industry that, where the apprentice/journeyman-type approach be used, that there should be some management oversight processes to review the quality of that work or that effort.

We found supervisory involvement to be very, very good throughout the board. We found active engagement of supervisory personnel and middle management engineering personnel in the plant observing the processes whenever we were there.

In terms of operating procedure control, all of the facilities have a process for controlling changes and allowing the workers to know whether or not changes are -- have been instituted to procedures that they are using.

We find in some instances, however, that the -- where the number of changes is frequent, many of them for administrative reasons or something of that nature, that the processes for raising awareness of changes that are

substantive is weakened.

We looked at configuration and restart control, and we found it was good, and the staff noted to you, our regulations require certain reviews before starting processes.

The requirements for restarting processes or infrequent process are less well-defined in the regulation. Nevertheless, we found that they are widely used in the industry, and the team suggests that that practice, which is not required in most cases by regulation but which is done at all facilities, is a very substantial point that would minimize the likelihood of an event similar to Tokai-Mura's.

In the audits and surveillance areas, we found

that all are being conducted in accordance with their licenses. The results are -- leave room for improvement.

I would summarize what we found by saying that routinely-required audits are producing routine results. The audits which are done for special purposes are producing more worthwhile results.

In terms of corrective actions, we found that the programs -- many of them are diffuse, and it was of some concern to us that the -- there seems to be a built-in deference to NRC results or findings.

If a relatively routine item is identified by an NRC inspector, it may well assume a level of importance that

exceeds a more important issue identified by facility management, and we identified that to the facilities.

In terms of best practices, we found that there were some facilities that had very infrequent operating procedure changes, that they were tightly controlled, that the workforce understands what criticality means and all of the terms involved with control of criticality, and that the qualification processes and use use selected highly-trained individuals and that there are oversight programs supporting management objectives and that those oversight programs engage more than just the functional staff; that is, they take advantage of other people in the plant for oversight.

Next slide, please.

In the area of instrumentation and dosimetry, as you heard earlier from the staff, there are very specific regulations and requirements, and in our review, we determined that all aspects that we received were fully acceptable.

As a result of determining that fairly quickly, we did not perform a sufficient in-depth review in that area to identify what we would call best practices, and so, none are listed in terms of instrumentation dosimetry; it's certainly a very acceptable program that's out there.

In terms of emergency preparedness, we found plans and very good facilities in place at each one of the 10

locations.

The scope of exercises and drills is appropriate to the risks.

We found that, while all of them considered the prospect of criticality as one of the events -- that is, all of them except for the conversion facility, which does not have a risk of criticality -- considered criticality but few had provided full consideration to the notion of an extended criticality; that is, what would they actively do if a

criticality went on for some 19 hours, as it did at Tokai-Mura, how would you stop it, and lastly, there was some weakness that we discovered in terms of understanding how to deal with highly-irradiated staff that might be involved in an accident.

In terms of best practice, we found an excellent emphasis on events with the highest probability and the worst case situation was thoroughly considered.

In the area of regulatory oversight, as the staff noted, there was clearly an element of inadequate regulatory oversight at Tokai-Mura.

We reviewed the inspection reports, we reviewed how they were treated at the facilities, and in our view, the regulatory oversight is sufficient or more than sufficient. We felt that the oversight at the highly-enriched uranium facilities and the low-enriched facilities

is about right. We felt that the oversight at the gaseous diffusion plants and the conversion facilities may be more than is needed.

Next slide, please.

Overall, this was a very unique opportunity, and we've come up with this category which we call results integrated, which goes a little bit beyond our charter. We limited ourselves very much to the focus on the contributing factors point.

Nevertheless, we had three people with a reasonable amount of experience who had completely open access, and we were focused on safety, and we visited all of the facilities one after another.

So, that gave us a view which is not commonly achieved.

We are also very mindful, as your questions earlier have indicated, that the competition and consolidation in the industry makes this a time of transition which is one where there is a need for great vigilance.

We found that the facilities have not, for a variety of reasons, proprietary and in some cases constraints provided simply because of the merger and acquisition activity that's going on, do not talk to each other as much as might be desirable, and there's been some

concern about sharing proprietary information or shielding proprietary information, but we think, in this time of competition and consolidation, that most of the items that we have identified as best practices in this report have nothing to do with the proprietary nature of the processes, and we do believe that there is an opportunity for the

industry to do more benchmarking, which should improve both the efficiency and, along with it, the safety of all these facilities.

When we took some consideration of the facilities themselves and the basic processes, it led us to some consideration of the concept of risk and the regulatory process, as well.

We noted that both management and the NRC, in some areas, seemed to be treating the facilities with programs similar to those used at reactors. So, we would note and were fairly forceful in our report to say these are not reactor.

As you've noted in your discussion earlier, relative to criticality, the risk is almost exclusively on-site. The off-site risk is low, and it is primarily chemical and process risk and is certainly -- these facilities are different enough in their operations that the one size fits all approach to regulation does not seem to fit.

Next slide, please.

Again, coming back to our conclusions, the team noted at the start of this that the consensus was that the regulatory process was sufficiently vigorous and different in the United States that the risk of an accident was relatively lower and that the facilities in the United States could be expected to be operating safely.

Based upon our review, we are able to affirm that view.

Nevertheless, we found some opportunities where we think that there are places where safety or operations can be improved, but we do note that the assumption that is used in the United States -- that is, that criticality can happen here -- is a very sound basis for safety planning and should remain.

That concludes our report.

CHAIRMAN MESERVE: I'd like to thank you all for a very helpful report.

On the one hand, it's reassuring, but on the other hand, you have raised some issues that present some issues for us as we think about these facilities in the future, and obviously, you've raised some issues that ought to be of interest to the organizations that you evaluated in the course of your review.

There's one area where I had -- I want to explore

a little bit further with you -- that I had -- I may not have quite understood your comments.

You indicated that there was a gap in the expectations of management with regard to procedures and procedural compliance and what was really going on. You couple the existence of what you observed with your comments about worker understanding of criticality issues and consequences of purpose of various of the controls, and that combination is not suggestive of a very good situation, and I may have misunderstood the nature of the gap that you perceived, but could you comment further on that?

MR. BRONS: Certainly, and then I'll invite Bob and Jim to comment.

Many of the facilities are using -- if you talk to the senior management, you will hear the term that we operate by verbatim compliance with the procedures.

Now, that implied to this team -- verbatim compliance implies a perform steps exactly as written mind-set and operation and generally requires open reference to step by step as you are performing the procedure.

When we talked to the operators themselves -- and this is uniform, at all the facilities -- we found a very rapid willingness to say we follow procedures.

There's a clear intent to follow procedures on the part of management and the workers.

So, then, the gap I referred to is what does this statement of management mean? How do they expect it to be carried out? And as we interviewed various managers, we got different impressions of what they mean by verbatim compliance.

As you talked to the workers, you found that they variously interpreted those statements as well.

As I mentioned, what you see in these where you're doing repetitive procedures in most cases is that the workers are trained in the procedures and they perform them without immediate reference to the procedure at any given time.

When you go and look at the items that have been collected by the facility or that are visible in NRC inspection reports, you find a number of instances of procedural -- non-compliance with procedures.

Well, if you have an expectation that it's verbatim compliance and the workforce says that they intend to comply and they are not, it indicates that there is an understanding on the part of the workforce that their charge is to comply with the intent of the procedure.

Now, that's different than verbatim compliance.

So, it's that gap in communication that I talk about and an understanding of how is this procedure to be used and how does a worker perceive it should be used.

CHAIRMAN MESERVE: I guess I'm not following why you don't see a safety concern that arises from that gap in a situation in which, as your report indicates, there is maybe incomplete knowledge by the workers of the consequences of departing from procedures.

MR. BERNERO: I would like to offer something on that.

In the case of criticality safety and worker understanding, for example, we encountered workers who recognized that there was an importance to these criticality safety controls, even when they were very unhappy with them, you know, like restrictions about you can only move one container at a time.

The thing we're pointing out in worker understanding is their understanding of the nature of a criticality or the controlling factors moderator mass and so forth depended too much, in our view, on recognizing the importance because they were told it was important, and it would be very helpful, we think, that the workers understand further why these controls are important.

Now, there is, indeed, an underlying safety question.

You know, you obviously want a well-trained worker to adhere to strict controls for criticality safety and to understand why he or she is doing it, and therein lies a

potential for a weakening of safety control, but our concern with procedure adherence is a much more general things, where very few facilities laid out a coherent structure -- this procedure will be in hand, when you do the thing, you do it and you check off or in some way follow it step by step. This other procedure, you will memorize and you will do it, you know, it will be there on file, you will have training updates periodically, and then, other procedures, you follow an intent or you have more flexibility.

That's a more prevalent problem where we have the management saying tight adherence or verbatim compliance and then the actual practice was more fuzzy.

MR. BRONS: I would take it a step further.

The answer to your question is there can be a safety concern in the issue that we raise.

I would tell you that our observation was, where the steps in the procedure or the requirements involved criticality safety postings, we don't think there was any ambiguity at all, and indeed, those are posted generally, some places not as effectively as others but there for the worker to see it.

There's almost a step out of the procedure, for instance, it becomes this posting.

So, there's less concern from the standpoint that this lack of -- the gap that I describe in procedural --

between expectations and actual performance will affect a criticality safety issue, but they certainly do have issues of procedural non-compliance, because in cleaning a component or something like that, there is a procedure.

The worker follows what he believes to be the intent of it, ends up with a spill of powder or what have you. Well, that is an issue, and it comes from this gap that I talk about.

So, there's an area to work on, but I think it's -- relative to criticality safety, it was not a concern of ours.

CHAIRMAN MESERVE: I have just one other question.

Your report is an excellent one in identifying areas of where there might be some improvements that could be made, identifying best practice, and I'd be curious if you have any sense of the response of the beneficiaries of your study to those recommendations.

Some of them don't necessarily involve us but are ones that I think you would urge the industry to consider, and I'd be curious as to whether you have any insight to the reaction to the report.

MR. BRONS: Yes. Thank you for asking that, because one of the things I forgot to do was acknowledge the fact that we have representatives of all the facilities here, and the response has been excellent.

This initiative was established without a basis that -- we weren't setting up a new organization, so they did not have an obligation to respond to us. Nevertheless, we have heard from all of them.

They've been appreciative of the comments that we provided.

We understand that they have also provided the details of the findings at each facility to the NRC inspectors that visit, so that the individual details have been provided to your staff, and that that has been fed back to the headquarters staff here.

But relative to the facilities themselves, I'm aware of some outreach to INPO, for example, to help some facilities on some items, that that's occurred.

I am aware of some communications between facilities, where they're trying to share practice, and we have had industry discussions about establishing some sort of benchmarking activity and moving ahead with that.

Those plans have not been solidified, but there has been a high level of interest, and we understand that they're taken our recommendations very clearly.

CHAIRMAN MESERVE: Seems to me that would be a very valuable activity.

MR. BRONS: Yes, sir.

CHAIRMAN MESERVE: Commissioner McGaffigan.

COMMISSIONER McGAFFIGAN: I want to join the Chairman in commending you for the report. I think it's excellent work on your part, and I'm glad everybody in the industry voluntarily worked with you.

Your first slide had a list of nine factors contributing to the event, the last of which was inadequate regulatory oversight, but as I read that chart, the first eight almost derive from nine.

I mean if you have an inadequate regulatory oversight, then you're likely to have permitted deviations, tacit approval of procedural deviation, insufficient training, insufficient administrative controls.

A lot of that falls from not having a regulator, and as we know, this facility had not been touched by the regulator since 1992 prior to this event.

Do you all have any sense -- I mean I asked the first panel -- it was not your charter here -- how Japan got so different from not only us but from European practice?

MR. BRONS: Certainly on my part, it is pure speculation.

I personally believe that the root cause is the decision that was made at the time the facility was originally licensed that the assumption would be made that criticality was proscribed by virtue of having procedures in place, and that allowed everybody to say, well, if that's

the case, then we don't need to regulate.

I believe that that's the reason, but I don't know that.

MR. CLARK: I second that. I was stunned that the Japanese could get into this fix, and I came to the conclusion that their belief that it couldn't happen was what led it to happen.

MR. BERNERO: I would just like to add that we all had that same reaction, but then we turned away from further pursuit of it, as our report says.

We tried to focus on these nine contributing factors as the basis for a comprehensive scrutiny of the U.S. facilities and not to try to fully evaluate the Japanese event.

COMMISSIONER McGAFFIGAN: Your report -- as I asked the first panel -- and as I said, I'm happy to be being criticized from being an over-regulating regulatory body when we're dealing with events of this sort, but your report does suggest that, with regard to the uranium conversion plant and the gaseous diffusion plants, we may be over-regulating at the moment.

Do you want to elaborate more on that, and is the new Part 70, in and of itself, with the ISA and all that, going to fix it, or is there more that needs to be done?

You also heard the staff's reaction.

MR. BERNERO: Recognizing what was said about the potential conflict of interest with the gaseous diffusion plants, let me turn to the conversion plant and just note a couple of historical factors that influenced this.

In the old days, when the environmental impact statements were done on fuel cycle facilities, the off-site chemical risk was not a factor, because it was not NRC's jurisdiction.

Then, with the Sequoyah Fuels accident, there was a legal analysis that said, if it's part of your process, you have to consider it, and so, there ensued a great deal of chemical risk regulation.

The gaseous -- the conversion plant has the peculiarity, if you have ever visited it -- I know some of you have -- the radiological risk is basically the ore yard and doesn't get spread, and that hasn't been a matter of contention, but the chemical risk of UF-6 is quite small compared to the chemical risk of hydrofluoric acid which is in outdoor tanks that are massive and so forth, and in fact, the state participation in any emergency exercise is that which would be associated with chemical plant risk, and so, the NRC finds itself, in regulating a Part 40 licensee, to have -- as part of its license application, have an appropriate emergency preparation, and you're regulating chemical risk, and you have a very tenuous connection to the

dominant chemical risk, and so, it does raise a very serious question about the degree of regulation that is appropriate, and of course, that facility gets tourists and inspectors in rather large number, which is -- it's a practical matter of over-regulation.

Calvert Cliffs went through that when they were first licensed, and any reactor near Washington would get lots of tourists, and with the gaseous diffusion plant in Paduca, across the river, I'm sure whoever visits says, well, I'll kill two birds with one stone.

Well, one of those birds -- it gets a lot of those

tourists.

COMMISSIONER McGAFFIGAN: We also have an MOU with OSHA, and we have some responsibilities for looking at the chemical side, don't we? I mean you're suggesting that -- or is there some other regulator who will deal with the chemical risks there?

MR. BERNERO: The MOU with OSHA -- which, by the way, was developed years ago, when I was here. The MOU with OSHA is with regard to worker safety, and the dominant risk -- and I think the staff even said it in the earlier briefing -- is the chemical risk off-site, and if you look at the emergency plans and the seismic analyses, that plant has done seismic analyses, and it's chemical risk, and that's not OSHA.

COMMISSIONER MERRIFIELD: If I can jump in, I used to deal with some of these issues when I was on the Senate environment committee.

Part of it, you know, looking at the glass as being half full or half empty and saying, well, in comparison to the other chemical side of the house, the NRC regulation is too much.

The question of some may be not that we have too much but that others have too little, and I would want to put that out for the record.

COMMISSIONER McGAFFIGAN: I would tend to agree.

Jack, you wanted to say something in addition.

MR. BRONS: Well, I really think that Bob has adequately described the risk side of it.

Just to cover both of those facilities, I really think the issue at the conversion plant is the one that's related more to the tourism.

They just get a lot of visits because they're close to the gaseous diffusion plant, and frankly, that ends up in a pretty substantial number of billable hours, which is surprising.

COMMISSIONER McGAFFIGAN: You're talking about tourism by NRC staff.

MR. BRONS: Yes, sir.

The gaseous diffusion plant -- I think our take on

that would be that the issue is confused by a whole host of legacy issues related to the presence or prior DOE issues there, and our -- part of our contention there was basically, if you look at the inspection reports for the gaseous diffusion plants -- as I mentioned, we looked at two years of reports for each of these facilities.

Frankly, we ultimately, in all honesty, only

reviewed one year's worth of the gaseous diffusion plants, because the volume was so great, just huge by comparison, and when you consider the level of enrichment that's licensed there and the nature of the operation and the nature of the risks, it just didn't seem to stack up.

COMMISSIONER McGAFFIGAN: The problem is -- and again, today's Inside NRC has a separate article about a stand-down at one of the gaseous diffusion plant, the Portsmouth decontamination facility, because of 22 largely self-found safety violations, and they closed it down, and they are going to start up this week, according to the article.

The spokesman for USEC says that these were criticality issues of low significance. It's very difficult to make a criticality event occur, she said. It just goes to show how rigid these NRC requirements are. NRC also stated the safety requirements -- or significance is low.

So, maybe we're finding stuff that is of low

safety significance, but it still seems like, when we send in an inspection team, we find a lot of stuff there, and so, we need to figure out at some point whether the stuff we're finding is significant and it's significant enough that they actually closed the facility down for a few days to try to get all of -- you know, make a complete audit of the things that were wrong before they started up again.

MR. BRONS: Well, there are some threshold questions related to the characterization of criticality safety issues that need to be looked at.

So, the primary suggestion we made -- and it was on my first slide -- is that these facilities are the beneficiaries of a sound regulatory process.

COMMISSIONER McGAFFIGAN: I agree.

MR. BRONS: I don't want this discussion to detract from that.

COMMISSIONER McGAFFIGAN: I tried at the outset -- although I ended up making -- putting too much emphasis here -- I think that the fundamental conclusion of your report is sound, and I think we all appreciate the detail that it's gone into, and that fundamental finding at the outset is a wonderful finding.

Thank you.

CHAIRMAN MESERVE: Commissioner Merrifield.

COMMISSIONER MERRIFIELD: When I visited the

Paduca facility, I did not go to the conversion plant.

COMMISSIONER McGAFFIGAN: You're not a tourist.

COMMISSIONER MERRIFIELD: I will go there separately and alone, and I would say, further, that of all

the places that I have visited as NRC Commissioner, never once have I felt like a tourist.

Let me first turn to -- I don't know what page it is on your slides, because ours aren't numbered, but it's the results relative to safety culture for operations, and it's not mentioned in your slides, nor was it mentioned by our staff -- you know, we obviously -- we talk a lot about a safety conscious work environment and having a situation in which the workers at the plants, whether it's a fuel cycle facility or at a generating station, have a willingness to raise concerns.

One of the issues that isn't here relates to our allegation process.

Now, this has been a bone of contention on both sides.

There are some who feel that we're not as vigorous as we should be in following up on allegations, and there are some in industry who perhaps feel we are too aggressive in following up on allegations, but the process is what it is, and it does provide an opportunity for workers who have disagreement with the way in which the management is

operating the plant to raise that to the NRC and allow our investigation and enforcement folks to take a look into it.

I'm not fully cognizant of the situation in Japan. I don't think they have a system which is quite like ours, but as a general question, do you think that the existence of that allegation process is also a contributing factor to differentiating the safety at our plants from perhaps those in Japan?

MR. BRONS: We did not look into or obtain, to the best of my knowledge, any information about allegations at any of the facilities.

What we did do, though, was ask the workers themselves, and the middle managers and the engineers that we talked to, about how comfortable they were in some of these things that we were told that they were expected to do.

For example, all facilities said our people are free to stop the process whenever they want. Well, one of our questions to the workers was do you feel like you'd be supported if you did that, and I was astonished at the wholesome answers that I got. They were very good. They felt that they would be strongly supported in making a decision to shut down the process.

So, that was a factor in my mind that led me to conclude that we have a very healthy safety environment, but

we didn't get into allegations at all.

MR. CLARK: We didn't specifically talk about allegations, but in the discussions, the interviews, discussions were relatively random. There were some picks by management based upon what time of day or something.

They were very frank. They were generally private. There was no indication that people were holding back anything. They knew, I believe, that we were there to help the facility.

They knew that we would hold confidential our discussions, by name, that we were having with them, and to a person, they were -- seemed to be very comfortable with what they were telling us and the safety of the facility.

Technically, they had a broad spectrum of capability, but you had a sense that they felt safe, that they felt that they could communicate, especially with their supervisors, about any concerns that they might have.

MR. BRONS: We did have one facility where a number of workers -- all three of us experienced in interviews -- raised an issue of concern about one part of the process, and all said that they had raised that to the management, we found, in pulling the string, that, in fact, management had a list of concerns that they had heard from workers, and it happened to be the item that was brought up to us was the top item on the list. Management had it there

to address. There we counseled management you ought to feed back a little better to your people about this list, but it clearly was being heard, and they felt free to bring it up.

COMMISSIONER MERRIFIELD: I think that's very positive. Hopefully, upon our own investigation and discussions with those workers, our inspectors would hopefully get the same kind of answers about a willingness to raise safety concerns.

I'd like to turn to the next results page relative to emergency preparedness.

The third bullet you have talks about the consideration of extending criticality and highly-irradiated personnel.

My reading on the incident at Tokai-Mura -- one of the issues there was the fact that the two -- or the three individuals who were injured, two of whom, as we mentioned, have subsequently died -- there was some confusion about what facilities to take them to in order to receive appropriate medical treatment, and in fact, at least one of the individuals had to be shuttled from one facility to another in a relatively quick succession.

Do we have -- do you think that there is sufficient understanding of how to treat personnel who have

these injuries, and does that follow through -- or do you have any understanding of whether that follows through to

the facilities that would receive those personnel, and are there some things that we need to do to follow up on that to make sure that, if there are individuals who receive, in the unfortunate and hopefully highly unlikely situation that they would receive doses, that we have identified and the licensees have identified facilities to receive those and we have the right plans in place?

MR. BRONS: As I mentioned, this is an area where we felt that there was some weakness, and I'd like to break your question down into two parts.

None of these facilities is located very close to some place that would ultimately manage these people, and so, one of our questions about the treating of highly irradiated personnel was focused on will the interim facility -- because all of them have arrangement with a local hospital, and they generally have trained that hospital in treating people who are contaminated, but as you well understand the issues for persons highly irradiated, where vomit may be radioactive, the fillings in their teeth may be radioactive, there's a dose to the care workers, that may not have been explained to the local receiving hospital.

So, one aspect, we were trying to promote the increased training of the local hospital to deal with that issue.

Relative to the second issue, in almost all cases,

it would require helicopter evaluation to the ultimate facility, and although there were some exceptions, it was our belief that the facilities knew where the people would go ultimately -- that is, what was the teaching or major medical center that was able to care, and our concern was have you really nailed down the transportation arrangements, so we don't have to rely on what we think they know how to do it, and that was our concern.

Now, beyond that, we did not get at all into the qualifications of the ultimate facility to handle radiated people. It's beyond our capability.

COMMISSIONER MERRIFIELD: Mr. Chairman, I think this is an area that we may have identified an action item on which we need to work with our Federal and state counterparts to make sure we've got this well in hand in the, as I said, highly unlikely event that this might occur here.

Thank you.

CHAIRMAN MESERVE: Commissioner Diaz.

COMMISSIONER DIAZ: Yes. Thank you, Mr. Chairman.

Again, I thank you for your good report and your observations.

Let me just look at your -- I think it's page six. It's your contributing factor four, five, six slide, and at the very bottom, it says corrective action programs diffuse

differential to NRC.

A quick statement. I've always stated and I continue to believe and, I think, will continue to believe that, you know, safety is in the hands of the people that do the work, and our interaction is very important in delineating what their actions are, but they do it, and I'm a little concerned with the corrective actions programs diffuse and differential to NRC.

Will you explain what you mean by that?

MR. BRONS: Yes.

The meaning behind corrective action is diffuse is that many of the facilities have a number of internal oversight programs.

Many of them take the results of those individual internal programs and have their own tracking list.

So, there might be an oversight program that's generated by the operations department, and it's got its own list of corrective actions and tracking and follow-through and so on, and then there may be another one from the nuclear safety organization that has its own list of corrective actions and so on, and yet another from the regulatory affairs department, if there was one. I'm just creating a hypothetical case here.

So, when we talk about diffuse, we're talking about those deficiencies being managed in separate programs,

so that it's very difficult for management to identify trends or make cross-comparisons to importance of issues or even prioritize the work for their force.

Now, many of the other facilities have put that into a common system, and that was really what we would describe at a best practice facility, is they have a common corrective action program.

So, that's the term diffuse.

The deferential to NRC is exactly the idea I expressed earlier, and that is that we found, in some instances, where there was a separate corrective action program for NRC-identified items, and if you asked management about the corrective action program that they were tracking and trending and following, that's the one they referred to, and the ones that had items identified by their own staff seemed to be of lesser name recognition and

importance.

COMMISSIONER DIAZ: I think that is an issue that I thank you for bringing it to our attention, and I am going to look forward to our staff to address it sometime.

Now, that's the hard part of my questions.

The next one is just having some fun, and I have to have some fun.

I'm going to go back to this slide in which you talk about the extended criticality, number seven, and you

know, I've been listening intently to you talking about how the operators, you know, train and it's important to have the criticality training, how all these things are, and I just want to get some of the nomenclatures and the issues back into my own frame of reference.

You know, what we call criticality and we will continue to call criticality always starts as a super-criticality issue first and then it becomes critical and then is achieve some low state.

The issue is not whether it's critical or not, because you could be critical at almost zero power. The issue is what is the power level at which it continues to operator, and normally, that's sub-critical, but it could be sub-critical at a very high power level, will radiate, will continue to create fission products, will do all of these things.

So, I think it's important that, when we look at criticality safety, people understand there is a difference between the word I would call criticality and the word power level at which it operates.

You could be, you know -- and I'm sure you all have done it -- you could be critical at a very, very tiny power level, you know, micro-watts, and you can actually look at it, and it is not a big deal.

Now, you can be sub-critical in a power plant or

at a facility, a 3,000-megawatt thermal, and that really will burn you to a crisp.

So, I think it is -- you know, it is this differentiation that becomes important. It is the ability to bring the power level to a known hazardous level that is important.

People keep, you know, getting in the issue of criticality. You look at Tokai-Mura, you know, you will look at it from criticality followed by a small criticality pulse which comes from the delay in neutrons coming down, and then you can see small variations, and it trends down, and the reason it trends down is because there is not enough

to maintain the criticality.

To conclude my statement, at one time I said that criticality is like humility. Once you believe you've achieved it, you've just lost it.

MR. BRONS: Commissioner, your fun taken well, and believe me, the team well understands the term criticality. I think we might be better had we described it in the case of this accident as an extended super-criticality.

COMMISSIONER DIAZ: No, no. It's an extended sub-criticality.

MR. BRONS: But the point I'd like to get to is that what we were looking for is control, and considerations for the control of the event, where the hazard by the

radiation emitted was greater than is tolerable and what methods do you have in place to reduce that hazard to a controlled and tolerable level, and that's what we're pursuing.

COMMISSIONER DIAZ: All right. Thank you, sir.

MR. BERNERO: I would just like to add -- or even to detect that it is at a power level that is potential lethal.

COMMISSIONER DIAZ: Very important. Thank you, sir.

CHAIRMAN MESERVE: On behalf of the Commission, I would like again to express my appreciation to this panel for their work and for their presentation this morning.

Our final panel consists of two individuals who participated in the DOE's work on this same subject, and they are Tom McLaughlin, who is the Group Leader for Nuclear Criticality Safety at Los Alamos, and Jerry McKamy, who is a Nuclear Criticality Safety Specialist, Office of Engineering Assistance at DOE.

Why don't you proceed?

MR. LAUGHLIN: If I could please have the first view-graph, first slide -- and as I look over at your hand-outs, yours aren't in color. You can see the ones on the monitor.

Perhaps on the next view-graph it will make more

of a difference, but let me just say that your staff does have the e-mail file which is -- has the attachment that can be printed out in color, if it makes significant help in the future.

Just a brief comment on this particular view-graph.

The report that's behind this particular cover is close to being printed. It's been close to being printed now for quite a while, and I can only say that it's

unfortunate that it's not out yet, but it is coming, and it's hopefully coming within the next three weeks.

It was ready to be published back in August.

We had been working with our Russian colleagues for the prior several years to get at documented descriptions of their past accidents that had never been documented and described and shared with the rest of the world, and it was at a quadrennial criticality get-together, international get-together that the French were hosting in mid-September at which the Russians made a very large presentation of the information that, indeed, is coming out in this revised document, not knowing that, one week later, the Japanese would have an accident.

There were many Japanese at this international get-together, and so, indeed, I was over in England the next week trying to piggy-back different and sundry trips and

activities, and I was at the Los Alamos equivalent at the time of the accident, and I will comment on something that relates to what Commissioner McGaffigan said a minute ago, namely that, yes, indeed, Tom Cochran put out some good information that surprised me, too.

I have known Tom over the years, and tragically enough, we get our information from CNN, because whether it's Japan or any other country, if we don't quickly release accurate information, the media will improvise.

There was no need for the media to have improvised if the Japanese had shut down their reaction, but they did not do that as quickly as they could have. That's another story.

On the next view-graph, we just look at briefly the historical portrayal of the accidents as they have occurred. There have been 22.

We'll say more about the statistics on them, but I think the interesting feature is that we, the United States, and Russia both had a significant learning curve, and we learned.

In other words, we both had like one accident a year for 10 years.

Yes, they might have had nearly twice as many as us, but perhaps statistics on a factor of two really don't tell us a whole bunch.

But during the mid-'50s to mid-'60s, we both had like one accident a year for 10 years. I have had many long conversations with my Russian colleagues, and it's interesting, the very, very similar situations that we both encountered in our countries.

The one accident in England is at the British Nuclear Fuels site. That was 1970.

Then, of course, the Russians did have a more recent accident than we have had in 1997, insignificant consequences to that accident, but still, it did occur, and very little publicity, too, you might notice, because it was not much earlier than the Japanese accident, very little publicity, and then, of course, the Japanese accident.

So, in this report and what I am going to share a few words on a little bit later are, indeed, data and information that are gleaned from our awareness of 22 accidents, not just one accident, not just the Japanese accident, and it's interesting and probably not to be unexpected that the Japanese accident didn't tell us anything startling new.

Yes, it's always a unique event. Any accident will be. There are always some characteristics that are a little bit different than the other ones. But indeed, many of them have very similar out-falls, very similar consequences, and so, indeed, most of the comments that I

will be making have to do with the pulling together of information from all 22 accidents.

COMMISSIONER DIAZ: Mr. Chairman, the accident in Argentina -- you don't consider it in here?

MR. LAUGHLIN: There are two categories of criticality accidents. I don't believe that that's in the packet that is going to come up on the view-graph, but yes, Commissioner Diaz, as you're well aware, in this report, there are two parts.

In fact, there are three parts, but the first two parts have to do with the two varieties of criticality accidents.

The first variety is those that occur in process facilities such as the JCO facility. A second variety are those that occur in the research reactor and critical experiment arena, where you intend to get critical, where that is your goal, and therefore, we do differentiate the regulation of those.

One is reactor safety in this country; one is criticality safety.

That's not necessarily the case in Russia. They don't differentiate the regulation of them that way.

COMMISSIONER DIAZ: Thank you.

MR. LAUGHLIN: Yes, sir. So, indeed, Argentina is described in here.

COMMISSIONER DIAZ: Okay.

MR. LAUGHLIN: In the full report.

The next view-graph, please.

Here, indeed, we just comment on a few of the statistics of the accidents, 22 total. I'll also bring in the point that, indeed, almost all of them have been with solutions.

There was one metal, the 1978 accident in Russia was with metal, and while that's extremely unlikely just because it's much more difficult to control solutions than it is to control metals, I think we have benefitted significantly from the fact that there has been one metal.

One, it has helped us to reach people who previously might have had the mind-set, it just can't happen. There have been, unfortunately, nine fatalities. It was seven prior to the Japanese accident.

And then this next bullet on exposures, public exposures -- this was also mentioned by various of the commissioners at some level, namely that these are not going to ever be held threatening to the public if we have the public where they're supposed to be, outside the fence if you will.

These are a worker health and safety issue.

We all know -- and I don't want to belittle -- that, indeed, the public can be scared, the public can have

ill health because of concerns, but not from the direct radiation exposure, and where it says manageable levels only in one accident, that is, indeed, the most recent accident in Japan, and that was, in my mind, preventable in the sense that they could have shut the reaction down much sooner than they did, but that's the politics of what goes on, not the technical issues.

The environmental contamination, as we have all understood, was negligible. Tragically enough it wasn't zero, and therefore, the local farmers could not sell their produce, and there were lawsuits, and that's understandable.

None of the criticality accidents will be damaging. Commissioner Diaz made this very clear, that the consequences of a criticality accident are always going to be benign from that point of view, and I will comment that, indeed, comments were made about providing reasonable bounds for these accidents.

We have that information. We understand these accidents enough to appreciate what those reasonable bounds are.

There have been a series of experiments that I'm sure, Commissioner Diaz, but perhaps others, you are aware of in the past in this country, the cube experiments in France, the crack in Silene experiments.

They provided us those fission rates and those

first spike yields, etcetera, that we can then use to extrapolate to our own facilities to understand what reasonable bounds might be.

Let's go on to the next.

I have broken down the accidents and distilled the lessons learned from all of these 22 into three view-graphs; one is general, and the next two get more into operator issues and then supervisory and managerial and regulatory issues, but on this very first view-graph, I do want to stress that, indeed, there haven't been any accidents associated with single failures.

In other words, it wasn't that we had all of our eggs in one basket and the basket broke. It has been a combination that was very difficult, obviously, to have had the ability to foresee ahead of time, and that has led to the accident.

The second comment has already been made by, I believe, one of the people prior to me, that, indeed, no accidents primarily attributable to hardware failure. Hardware failure might have been associated as a contributor at a lower level but not even a major contributor to any of the accidents, and it's been the human element, people misunderstanding, the people miscommunicating, the people doing things that maybe they thought they weren't going to hurt themselves but were knowingly out of bounds that has

led to the accidents.

It's the human element that has been associated with that.

On the next view-graph, we will take a look at the operator-related issues, and while I have phrased these a little bit differently, more in question form, to the operator, I think you get the message, namely the operators truly understanding what might be very obvious to us.

In other words, I work routinely with people who write procedures, I work with process supervisors, I work with the operators back at Los Alamos, and it's very common that the operator would interpret a word differently than the supervisor, might say it's clear what I meant, it's very obvious.

When you look at the thesaurus of the English language, there are typically 30 or 40 words that might be associated with any one word, and so, we have to make sure that not only do we write it to what we think is clear but then we get feedback and we get confirmation that the operators understand the words exactly as we meant them.

Do we work only according to written procedures?

Several of the past accidents have been associated with people getting information, for example, over the telephone from the analytical laboratory on concentrations and misunderstanding words or passing information from one

operator to the next about please come help me out, I have to go here, here's where I'm at, you take over, etcetera, and not having a clear hand-off, and indeed, do the operators know the consequences?

Clearly, all three of these were associated with Tokai-Mura, again not to be unexpected. These are commons ones I've distilled.

In your handouts, I gave you a much longer listing of all of the various and sundry causes and lessons learned, and I say in your handouts, not in the ones that are the direct replica of what's on the screen here but in the information that I passed as more background briefing material that will be in the report in greater detail, but these are a distillation of some of those larger numbers of lessons learned and causes, statements.

So, indeed, it's important that the operators understand the consequences, and I think we've all heard -- and it's encouraging -- that, indeed, people don't hesitate to pull the emergency stop on the train, if you will. They understand and follow the stop-work policy.

So, if we can have the next one, then, we will go into regulatory issues, we'll go into supervisory and management issues, and here I guess I might -- and maybe it's just semantics, but I think I would word it differently or I would discuss it differently if I was saying, if we had

the right regulations in place maybe in Japan or if they were doing it like we were doing it, would this accident have been prevented?

Well, perhaps, but I would say, at least at Los Alamos, if a regulator comes in and more than one time in a hundred can find something that's truly significant out of bounds, then yours truly should be fired.

If things aren't being done safely that I have control over, then, indeed, if I am not the first line of defense and the most important line of defense, nobody is, but that's perhaps more a philosophical issue -- again, supervisory, management, regulatory issues.

This is -- the first bullet is the major learning curve from the '50s and '60s.

We were working with large process vessels to get a job done in both countries, and a very -- at least perceived to be an extremely important job then, of course,

and we relied largely on concentration control and people not getting out of bounds on that concentration control and solutions, and indeed, that's not as foolproof as working with limited-diameter vessels, etcetera, and so, indeed, we did have a series of accidents there.

We have learned that lesson, and to a large extent, we have written that out of the way we do business. It will never be perfect.

You don't process low-level waste in two-liter bottles. You'll never do that economically, and so, at some point, you must rely on concentration control, but to a large extent, we've solved that one.

Make it easy to do the job right. This was a classic with the Japanese accident. It was difficult to get the job done efficiently, effectively, economically according to the procedure.

If you followed the procedure, it was going to take you a lot longer, it was going to take you a lot more consternation.

It might have been physically a lot more difficult just to get it done, and indeed, if you're the person who's in charge or if you're the regulator, when was the last time that you got out on the floor and observed it, or at least, if you don't get to the floor very frequently because you're the regulator, can only show up once every so many months or so many years, do you at least ask the supervisor when was the last time you saw the job done properly, of course, and again, do you know that the operators understand the consequences, do they understand the concept of criticality? That was obviously not known in Japan.

I believe that's the last view-graph. If there's another one, I'm going to be surprised.

I certainly welcome questions.

CHAIRMAN MESERVE: I'd like to than you for a very helpful presentation.

Why don't we turn to my colleagues and see if they have questions.

Commissioner Merrifield?

COMMISSIONER MERRIFIELD: I don't have any questions. I would say I also appreciate, I think, a very good presentation and certainly look forward to the report when it finally comes out.

I have one comment I want to make, and it's not related directly to the presentation you all made, but we have as an agency and we have as a country a very good relationship with the Japanese.

We have a bilateral arrangement with our Japanese

counterparts; it is one that we've had for some time; it is one that we have that is very close; and it's one that we value.

We've had a lot of pointed questions today and we've had concerns that have been raised.

For those not familiar with this process, this is our tendency of doing things.

I wouldn't want our Japanese counterparts to take it in the wrong way. Certainly, it's not intended as a lecture upon the Japanese nor simply to make them feel as if, you know, we're the United States NRC and we know

better.

I think there's a spirit of really trying to get to the bottom of this, trying to understand if there are ways in which we can improve our own process, and for my part, I believe that there is an open willingness to work with the Japanese to the extent that we can, to the extent that they're open to this, to helping them improve their process.

Ultimately our goal -- and we know we share that with our Japanese counterparts -- is to improve health and safety, and anything we can do to help them in that regard, I think we ought to try to do so.

Thank you, Mr. Chairman.

CHAIRMAN MESERVE: Commissioner Diaz.

COMMISSIONER DIAZ: It's a pleasure to see you, and I'm going to deviate from my normal processes and tell you that I agree with your presentation, with all your points, and I want to thank you for it.

CHAIRMAN MESERVE: Commissioner McGaffigan.

COMMISSIONER McGAFFIGAN: I'm not sure I'm going to agree with all the points, but let me start.

You twice during your presentation criticized the Japanese for not shutting down the reaction as quickly as they should have.

Could you elaborate more on what your view is that

they should have been able to do during that extended period?

MR. LAUGHLIN: My pleasure. And let me also support Commissioner Merrifield's comment.

We, indeed, have worked closely with our Japanese colleagues in incorporating the write-up of their accident into this report.

As I mentioned, it was ready to go to press last August, and then, last September, we had the accident before we could get it to press, and so, we stopped the press, and

we have, indeed, incorporated the most recent information in there.

I also will say that we had a delegation from Japan -- and I'm sure they visited you folks -- I want to say in January.

It was a delegation of eight or 10 folks, and a couple of them -- I say this not to imply anything good, bad, but a couple of them had military uniforms on and they were from the defense side of the house, I believe, but it was a mixed committee, and I addressed them also just exactly on this issue, because they pointed out that I had made the comments, and they said, well, what would you do, and I looked at the gentleman with the military uniform on, and I said clearly you shut the reaction down by draining the tank, now surely you could figure a way to do that, and

he smiled and said I understand.

This is not high-tech physics.

COMMISSIONER McGAFFIGAN: No, I understand, and it may say something about the Japanese preparedness. My recollection that day is that there were e-mails coming out Japan looking for boron injection machines. They were flailing around for a while trying to figure out what to do, and it may be that -- but I know boron injection machines is one of the things that they were looking for that day, and I think DOE was looking to see if they could help. You probably were in the middle of it.

MR. LAUGHLIN: But you didn't need that. All you needed to do was drain the bank, and all I can say is, if it were to happen tomorrow at Los Alamos, I may not get involved in draining the tank either, because it will be at a decision higher than me, and it was at a decision much higher than the local folks, plus I think it was their mentality to say, well, we have informed our federal government, now it's up to them to tell us what to do, and so, it was a political decision.

COMMISSIONER McGAFFIGAN: You heard the NEI task force. You heard our staff pat themselves on the back with those two view-graphs that showed how different our regulatory system was from the Japanese regulatory system. You heard NEI say that the beneficiary in this country of

regulatory controls and standards organizations, and you sort of down-played that.

That may not be surprising coming from DOE where you self-regulate, but how do you replicate within the DOE system and how do you maintain over an extended period of time, in the absence of regulatory controls from the outside -- you have ES&H; and they're represented here, but you don't

have routine inspections, you don't have resident inspectors, you deal with highly-enriched materials. How does that work over time?

MR. LAUGHLIN: One can say that these accidents are very infrequent, of course, and all I can say is maybe one shouldn't get too proud about 42 years without an accident. They can happen.

We had one back in '58 that led to a loss of life, and there have only been two losses of lives in this type of accident in this country. So, we're not, clearly, proud of that, but let me just speak with another hat on.

This says Los Alamos National Laboratory. I happen to be the chairman of a national consensus standard writing committee, ANS-8.

ANS-8 is responsible for the care, feeding, promulgation, retirement, etcetera, of all criticality-related standards in this country.

The Nuclear Regulatory Commission and the

Department of Energy both subscribe to every single one of those ANS-8 standards. There are about 16.

Again, I am the chairman of that committee. I have been for about 10 years now.

I believe that they are the basis for our track record in this country, and worldwide. There are a very few -- there are three right now -- international standards in criticality safety, but even those three, which have more recently become international standards, are patterned directly on the U.S. national standards, because that was the template. They have come first.

And so, the United States has been very advanced-looked, very advanced-working and -planning in the regulatory climate, and I think it's a recognition that these, indeed, if they are followed, can provide for safe, efficient operations, where I think that your staff, NEI tend to maybe depart somewhat, and we have the same departures within the Department of Energy, so it's not that you're any different than we are in that regard.

It's the detailed implementation. We can all subscribe to the basic standards. The words in there are very general, they're rather high-level, but they do provide good common sense guidance.

So, we live to the same guidance you do at Los Alamos versus Nuclear Fuel Services versus Babcock & Wilcox

or whomever, and we try our very best to implement that in the spirit of which the words were written, but we live to the exact same regulations, and I will repeat -- and this

may be something that we can agree to disagree on -- if we are not implementing those standards as intended and doing it well, then a regulator coming in infrequently is very unlikely to keep me away from the accident, very unlikely. If I rely on regulators coming in, I don't care at what frequency, or even an in-house regulator, I am derelict.

COMMISSIONER McGAFFIGAN: I agree that you have the first responsibility. I think that's true for all of our licensees.

I think, at least for some licensees, having an occasional inspection and having to present for approval significant changes for license amendments and that sort of thing and having extra eyes look at it is a useful part of the process, but that's --

MR. LAUGHLIN: And we do that, too, at Los Alamos.

COMMISSIONER McGAFFIGAN: Okay.

COMMISSIONER DIAZ: May I just get in here?

I think, you know, the existence of the regulatory framework is indispensable, whether it is the NRC or DOE or Los Alamos.

I have done many criticality experiments at Los Alamos, with probably the most difficult substance of them

all, uranium hexaflouride in vapor form, between 93 and 97 percent enriched, and I can attest to the fact that I was, you know, having to subscribe to very strict procedures of how to do it and how we will not go critical until we wanted to, which is the issue of control that the gentleman brought up.

When we wanted to go critical, we, of course, did not go critical, we went super-critical, because that's the only way we could know we're going to be around criticality, but multiple times, you know, the procedures were there, the controls, you know, calling double-jeopardy, and they were present, and that was something that I think, you know, we do very well within, you know, our country, it is the prevention of criticality.

We learn and we do it very well, with very strict procedures.

CHAIRMAN MESERVE: I'd like to ask you a question that isn't really directed so much at your slides as at other activities that arose out of the accident at the Department of Energy.

Is it my understanding that you had done an evaluation of all of your facilities?

I'm curious whether there any weaknesses that were observed at the DOE facilities in this area that have implications for our sites?

Are there any insights that came from your review of your array of facilities, of course, which we do not regulate, that we ought to know about and bear in mind?

MR. McKAMY: We are currently finishing up our report, which is a summary of the five site reviews that we did. I'm going to touch on that a little bit. And right now we're in the process of going over all of the site self-assessments. So, those results are coming in. So, we haven't yet looked at them all.

Probably, as you've seen from the five site reports that we have released -- you touched on some things like operator understanding of the controls and the basis for the controls.

There's nothing new in our reports that you haven't already touched on. They basically cover some of the same ground.

CHAIRMAN MESERVE: If there are no further questions, I'd like to thank this panel and the ones that preceded it for --

MR. LAUGHLIN: I apologize. I believe my colleague here has something that he would like to make as a presentation, and I think that, because I asked for questions after my part, that I gave a misimpression there.

MR. McKAMY: I was just going to walk you all through the department's improvement initiatives that you

just mentioned real quickly, if you have time.

CHAIRMAN MESERVE: How long would it take? Can you keep it to five minutes or so?

MR. McKAMY: I'll keep it to five minutes, yes.

Really, what I intended to do was just walk you through the elements of the improvement initiative and not go into a lot of the detailed results.

The three things that I'd like to discuss here real briefly are the improvements that we initiated as a result of the department's implementation plan that was a response to the Defense Nuclear Facility Safety Board Recommendation 97-2, and the two features that are important -- they're all important, but two that are key are the initiatives to formally train and qualify the criticality safety analysts around the contractor doing this kind of analysis.

We have a formal qualification plan that we are in the process of implementing for the contractor criticality safety analysts, and we also have a formal training qualification program now in place for the DOE field office personnel whose job it is to oversee those contractors, and those are two initiatives that we began in 1997.

Another element that's important is that we are going to require attendance by the Federal staff and a large percentage of the contractor criticality safety staff an

advanced criticality safety course that we developed at Los Alamos, and the purpose of that is to give criticality safety practitioners, the practitioners in the field and also the regulators, if you will, hands-on knowledge of critical experiments.

Most haven't had such experience in the past, and so, they can go to Los Alamos, actually perform some critical experiments in a controlled way, get some hands-on knowledge and feel for how things go critical, those very procedures that you talked about, and also, that dovetails real nicely in the syllabus with actually performing criticality safety evaluations of a facility at TA-55.

So, they get to look at experiments and then do a real-life application.

So, we're going to provide that experience.

So, those are two elements we had as a result of the department's response to 97-2.

The second thing I'd like to mention briefly is we held a department-wide workshop on criticality safety self-improvement, and the thrust of that workshop was to improve contractor and DOE self-assessments.

We provided detailed lines of inquiry to senior department managers and senior contractor managers to ANSI ANS-8.19. It's one of the standards Tom told you about. It's a mandatory standard in the DOE orders, and it's the

administrative practices standards for criticality safety.

The expectation was to encourage the contractors to go out and improve their self-assessment methodologies to cover in detail each one of the elements in the criteria in a systematic way that are contained in the ANSI 8.19.

We also gave out guidance for assessment of the field office criticality safety programs that were derived from DOE policy 450.5 -- that's the oversight of line management, safety oversight policy -- so that the field programs could assess their ability to do oversight and criticality safety, and that happened in August of 1999.

The final element we also promulgated was criticality safety performance measures for use by contractors and local DOE and monitoring improvements in criticality safety, so that you measure how well you're doing in crit safety.

And finally, the last element was, on November 3rd, the Deputy Secretary issued an initiative that had five new elements in it, and that's some of the ones you

mentioned.

One of the elements was a high-level screening review of five key facilities. Again, those five reports are out.

We're currently reviewing the summary results from those reviews, and those should be released this month, and

those five facilities were DOE Y12 plant, the Los Alamos PF-4 area and TA-55, Hanford, HB Line, and Outside Canyons, and we also looked at Hanford PFP, and we looked at Rocky Flats Building 371, and those areas were primarily selected because they were the ones involved with fissile solution processing, and those typically have the higher risks of criticality accidents. So, that's one initiative.

Another initiative was to direct all of the sites to do detailed self-assessments according to the criteria we issued at the workshop, meaning walk through every one of the ANSI 8.19 criteria using the lines of inquiry that we promulgated there and to develop the corrective action plans for any weaknesses that they have and then provide those to headquarters for review.

Also, the sites were all directed to develop performance metrics for criticality safety and provide those to headquarters.

The fourth task was to do a headquarters review of those corrective actions and those self-assessments and then to write a final report to the Secretary later this year, and then the final task was to look at relocation of TA-55, which is the critical experiments facility, where our advanced training course goes on, as well as other missions to support national security and nuclear safety.

So, those are the department's criticality safety

improvement initiatives, or at least major elements.

CHAIRMAN MESERVE: Thank you very much.

I'd like to suggest that, as you have various of the products that you've described completed, whether you could make sure that you send them to our staff so we can gain the benefit of all the work that you've done.

MR. McKAMY: You bet.

CHAIRMAN MESERVE: With that, I'd like to thank this panel and --

COMMISSIONER McGAFFIGAN: Mr. Chairman, I could ask one question? His presentation provoked a thought. This really goes to Mr. Laughlin.

The DNFSB 97-2 report he's just reminded me of was quite critical, especially of the loss of knowledge about criticality issues within the department. How did you get

in that state? I mean there is a regulator. It's maybe not the NRC, but there is a regulator who is pointing out what was a significant weakness.

MR. LAUGHLIN: There are perhaps a multitude of reasons.

COMMISSIONER McGAFFIGAN: You have to give the 30-second version.

MR. LAUGHLIN: More managerial, perhaps, that anything else.

You are seeing turnover of the corporate logo at

many sites on a year or two-year basis. There is a desire to get a contract award fee and then leave, in my mind.

We are seeing many things that are associated with lack of stability in who is in charge of that entity, and therefore, they are saying, well, we'll hire the criticality staff, we'll hire the people to do the job, but if you don't know the skeletons in the closet, you're at a significant disadvantage.

You need people who are interested in staying there for the long haul, and we have lost that, to a large degree, within the department, and it's very undesirable, but it's a fact.

COMMISSIONER McGAFFIGAN: Thank you.

CHAIRMAN MESERVE: Let me just say on that point that I participated in a

National Academy of Sciences study in 1986 where we pointed out to the department that they were losing their criticality expertise and that they ought to do something about it, and they haven't.

Okay.

I'd like to thank you very much.

I also would like to echo some comments that Commissioner Merrifield made that we do have very important relations with the Japanese. They are relations that are ones that are of great benefit to our agency, and there were

lots of rather blunt and direct comments that were made today. That was not intended to be critical, it was not intending to be piling on, it was really to make sure that we have a candid appraisal of the situation, and we all benefit from that.

With that, we're adjourned.

[Whereupon, at 12:26 p.m., the briefing was concluded.]