8005130525

UNITED STATES
NUCLEAR REGULATORY COMMISSION

In the matter of:

BRIEFING ON SELECTIVE ABSORPTION
PROCESS AS A ALTERNATIVE IN
DEALING WITH KRYPTON IN TMI-2
CONTAINMENT

Place: Bethesda, Maryland

Date: April 25, 1980 **Pages:** 1 - 58

INTERNATIONAL VERBATIM REPORTERS, INC.
499 SOUTH CAPITOL STREET, S. W. SUITE 107
WASHINGTON, D. C. 20002
202 484-3550

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of:
BRIEFING ON SELECTIVE ABSORPTION PROCESS AS A ALTERNATIVE IN DEALING WITH KRYPTON IN TMI-2 CONTAINMENT

Room 550
East-West Towers
4350 East-West Highway
Bethesda, Maryland

Friday, April 25, 1980

The Commission met pursuant to notice, for presentation of the above-entitled matter at 3:17 p.m., John F. Ahearne, Chairman of the Commission presiding.

BEFORE:

VICTOR GILINSKY, Commissioner
PETER A. BRADFORD, Commissioner

P R O C E E D I N G S

CHAIRMAN AHEARNE: I guess we don't go through the Sunshine Act voting to --

SPEAKER: We are not required to vote.

CHAIRMAN AHEARNE: We are not a meeting yet. We may or may not become a formal meeting at some later time.

I, and I guess the, the track is that it -- Congressman Ertel first alerted me to this issue, Mr. Gilinsky also -- and that I guess related to, to both of their initiative and interest, we are now at the stage where we do have with the courtesy of Dr. Cunningham, who has made arrangements for us to hear from a group of individuals from Oak Ridge and DOE about the question of whether there is a more rapid and better and faster way of working on the krypton in TMI.

Vic, did you want to --

COMMISSIONER GILINSKY: I just wanted to say that it was much at Mr. Ertel's initiative that the second look was taken. And I accompanied him down there and -- but it was, I want to underline the, really his initiative.

CHAIRMAN AHEARNE: Who is the lead --

SPEAKER: I, I am, I'm the lead as far as Oak Ridge.

CHAIRMAN AHEARNE: Okay. Why don't you go and introduce --

SPEAKER: But Herb Feinroth is representing Dr.

Cunningham.

CHAIRMAN AHEARNE: Okay, then Herb, why don't you start out and introduce the people and --

MR. FEINROTH: I'll just repeat what Dr. Cunningham told Dr. -- Mr. -- this morning. That was that he wanted to make sure that every opportunity or every, the full resources of the Oak Ridge National Laboratory were made available to answer that.

Earl's questions or any questions you have with regard to the, the system that you're considering as an alternative -- and so he just wanted to make sure that you know that the resources are fully available.

And with that, I wanted to introduce Stan Ahrends, who was the Department of Energy representative at Oak Ridge, who will introduce --

MR. AHRENDS: I'm Stan Ahrends, from Oak Ridge, the Department of Energy. And I was at the meeting with Congressman Ertel and Mr. Gilinsky last Saturday. With me today is Don Trauger, on the right, who is head of the nuclear work at the Oak Ridge National Laboratory; and this selective absorption process is, is under his management.

Bob Brooksbanks, over to my left, is here from Oak Ridge National Laboratory. He's a member of the clinical technology division, and some of you here might know he's been very active up at Three Mile Island, has been handling

the Oak Ridge support to Three Mile Island on a chemical engineering and the environmental aspects of the incident up there and is also a member of the technical advisory group.

He will be making the initial part of the presentation this afternoon, which just as a couple of vuegraphs represents the Oak Ridge position on what to do as far as the decontamination of the, the reactor building --

COMMISSIONER GILINSKY: Stan, I wonder if I could just add another word to, to what I said, just to make a little clearer what the motivation for coming down to see you was. I had had someone take a look at the various options that were displayed in our environmental report.

Gerry Pollack, from Michigan State -- and he thought this one, of the four, was, was the most interesting one, leaving aside how long the, it would take to, to actually implement.

The Congressman got, as you know, interested in this and got to talking. And he started to wonder whether, if one imposed lesser requirements on the system, whether in fact the job could be accomplished sooner; in other words, if one were shooting for a, for a simpler system than has come out of conversation.

And that was basically the approach we took in coming out and talking with you and Bob and others if one did not expect quite as total a cleanup or relaxed various

constraints in terms of the standards imposed on the system, what could the time be driven down to, reasonably?

And anyway, that's, that's all the background for --

MR. AHRENDS: I think that's good background and to directly respond to those questions and the questions that were left with us last Saturday, have Bob Merryman, from Oak Ridge Union Carbide -- he is head of the technical division there, and he originates part of the work with the selective absorption process years ago and is now manager of it again.

He will be making the main presentation, which will be responding to those issues which were left last Saturday, a one-week study; and so he will answer that in detail.

CHAIRMAN AHEARNE: Very good.

And at some point I had, I've asked Bertie Snyder, who is head of our TMI-2 cleanup to come -- and Harold Denton, who is the head of NRR -- and they might have some questions.

CHAIRMAN AHEARNE: So -- Bob, would you start talking?

MR. BROOKSBANK: Okay.

(Pause.)

Well, on the bottom there. The switch in the front, the front and the bottom.

(Pause.)

There you are.

At the onset, gentlemen, let me say that I'm going to keep extremely brief. It only consists of two vuegraphs plus coversheet. But the conclusion that I'm going to draw is that the recommendation from Oak Ridge will be the Benning option is the best option.

And before I do that, I must tell you where I'm coming from and why these statements are being made.

Herb, may I have that first --

Let me point out that early on in the accident the, the reactor itself was changed from that of being a power-producing machine to a greater chemical processing plant. And I wanted to applaud you at this point. And the, the unit operations involved in doing the cleanup on that kind of material is considerably different from what the commercial sector is used to seeing.

Over the past 30 years we became involved rather early, but over the past 30 years we have been handling unit operations of this nature, as you know, in many things and -- so that we were called upon early on to assist in Three Mile Island. Now I am not trying to dwell on these points, but I will read them for you to show what, where we're coming from with regards to involvement.

As Harold Denton knows, we did provide emergency on-site assistance to the contaminated air and water effluent control. We provided consultant conservation to the Kemeny

Commission. And all of those things which relate to the discharge and the health and welfare, protecting the health and welfare of the general public.

We also kept very detailed records and a lot of books on everything that happened, and that's a matter of record. And we also provided involvement reports in chronology form to the Presiden ial Commission.

Now, there are many other areas that the Laboratory provided assistance to the Kemeny Commission, such as instrument diagnostics; but I'll not go into that.

We have provided Three Mile Island with the analytical chemistry service where unique capabilities are mandated. We have provided assistance to the TMI Technical Advisory Group, this group; your information is composed of Ben Russhe, Mark Guise, the former director of, of Savannah River Laboratory, Dick Wa.lace, and myself.

We've provided continuous assistance in the area of high-level water-flow sheet development and verification. Let me point out this point: that we're still very actively involved in this, and over the past two months we have spent upward of $150,000 to assist Three Mile Island in coming up with the characteristics of that flow sheet, in response to NRC's demands we're trying to find out what's going to happen.

We do provide trouble-shooting service in the event

that places like Epicore 2 get in trouble; if the decontamination factor decreases, we do assist them in certain operations.

We have been providing input to a recently formed committee that I understand within NRC an understanding that situation at Three Mile Island.

In addition to that, we've done a little work with Senator Hart in providing new information and input as a result of being turned down by the Kemeny Commission.

Next slide.

COMMISSIONER GILINSKY: Bob, before you go from there, how do you tie this to our, the, sort of the question before us?

SPEAKER: Well, I think what he's pointing out is, we've had a lot of background, but he's very familiar with what went on in the reactor and -- very current and, and -- what is that?

MR. BROOKSBANK: Now, this won't take but a minute, but based on our experience, based on our review of the existing documents and the various discussions which, with those people who we consider to be experts in the field of dose assessment and, fully understanding the different alternatives, technical alternatives, that are available for krypton removal, at this time we feel that the best approach to the krypton process would be to prolong, control, venting of the containment atmosphere to the environment.

We'd also suggest that, as this learning is accomplished, that trained independent groups -- and I think this is going on at the present time -- actually measured that background, off the island, and continued safety at the TMI site. Entry into the containment is necessary for equipment maintenance and radiation survey.

CHAIRMAN AHEARNE: Could I ask you a couple of questions on that?

MR. BROOKSBANK: Yes, sir.

CHAIRMAN AHEARNE: When you say the experts in the field of doses, that's meant to give me some sense of --

MR. BROOKSBANK: Yes, sir, Commissioner. When it comes to people with my background, I have two things to go by: one are the MPCs and the regulations that you provide, as a limit. I'd also have to refer to the very specialized field. I have to refer to experts for that information, just back up.

CHAIRMAN AHEARNE: Well, but are you saying that -- is your, are your set of conclusions here that they stay within the MPCs, or are --

MR. BROOKSBANK: Sir, I am not willing to address the subject of dose assessment. What I have done is to defer this question to John Auxier; he's the division director of our safety and -- physics -- and, and has worked on the dose assessment business for Three Mile Island to get his, his

opinion.

I can't address that question.

CHAIRMAN AHEARNE: No, no.

Say again who that was: John --

MR. BROOKSBANK: Auxier, A-u-x-i-e-r.

CHAIRMAN AHEARNE: And he is --

MR. BROOKSBANK: He's the division director of the Oak Ridge National Laboratory Safety and Applied Health Physics Division.

CHAIRMAN AHEARNE: Okay.

Now, when you say a "prolonged" control venting, then what is the -- by the word "prolonged," what did you have in mind?

MR. BROOKSBANK: Over a period of time, based on the same background that you're giving in your environmental assessment.

CHAIRMAN AHEARNE: But for example, in the environmental assessment we have proposed two alternatives, one which was a short and the other which was a long. And do I conclude by your first that you're saying --

MR. BROOKSBANK: I don't make, I don't make the distinction, sir. I just say that in the event that you're going to build the system and take the time to build a safely designed qualified system to do this, it's going to take longer than the venting that's been proposed, regardless of

the --

CHAIRMAN AHEARNE: Okay. Now, on the point number 2, you say venting should be accomplished without increase of the natural background.

I'm sorry I, I, I'm having difficulty with it. But I could see you're saying one of two things. Either you could say that when you vent, the amount vented should be so low that you couldn't detect an increase over the natural background; or two, that you should vent only when you have seen that there is no major fluctuation in the natural background.

Or maybe there's a third interpretation.

MR. BROOKSBANK: I didn't, I didn't make that distinction. That recommendation was made by our folks working in, in, for NRC at the Laboratory. And that merely means that those individuals who have been trained by DOE or NRC, who's ever training them; I'm not sure -- do not detect any, any background.

But those instruments are being given to check.

COMMISSIONER GILINSKY: Bob, could I ask you:

Without necessarily disagreeing with your conclusions here, we're talking about a project which was originally started to deal with precisely the kind of situation we're talking about, or pretty close.

MR. BROOKSBANK: Yes.

COMMISSIONER GILINSKY: Are you saying that that

didn't make any sense?

MR. BROOKSBANK: Oh, no.

(Pause.)

COMMISSIONER GILINSKY: Then how do you connect up the two? Did --

MR. BROOKSBANK: My presentation with what Bob is saying about --

COMMISSIONER GILINSKY: Well, I wasn't addressing myself specifically to precise details of, of, of what we would have to do to employ the technique now. But what I'm asking you, are you saying that it really doesn't -- given these certain amounts of krypton, it doesn't make any sense to have developed techniques to deal with them?

MR. BROOKSBANK: Oh, no. No, sir.

COMMISSIONER GILINSKY: Or is it just the time element in, in employing --

MR. BROOKSBANK: I think the time element, Commissioner, is the thing that concerns me. There's a need to develop better krypton absorption capabilities for the reprocessing sector. And that's how Dr. Merryman's worked that --

COMMISSIONER GILINSKY: But not truly after accidents?

SPEAKER: Oh; oh, yes.

DR. MERRYMAN: It was looked at. If I might make a

comment: it was looked at early on. But for our situation, where the fuel would be in equilibrium -- value when the inventory of the radio -- would be certainly greater than ever it, than the levels ever achieved in the TMI-2 core.

And in addition, the time that has elapsed since the TMI-2 incident has allowed a lot of the -- well, allowed the xenons, for example, that were present, substantially decay.

And I think that certainly in the early days when we consider a mobile unit for dealing with reactor postaccident cleanup situations, the ground rules were fully equilibrated core full inventories and total releases, and fairly quick response time sorts of things, so that the --

COMMISSIONER GILINSKY: And you expect to deal with a variety of isotopes --

DR. MERRYMAN: Well, we have looked at the original work that we did many years ago, sculpting calculations and studies, and conceptual-type studies and designs were based on a response to the incidental event. A few days where the xenons were contributors.

CHAIRMAN AHEARNE: You said the first week is --

DR. MERRYMAN: Yes, that's right. That's correct.

CHAIRMAN AHEARNE: Yes.

DR. MERRYMAN: And it's far different than the situation that exists at this point in time in PMI-2, because of the lowburn-up and then the elapsed time.

MR. BROOKSBANK: That's, that's all I have. Thank you.

CHAIRMAN AHEARNE: Thank you.

(Pause.)

DR. MERRYMAN: I have several vuegraphs that I'd like to show that respond to the request that Congressman Ertel made of Mr. D -- and Commissioner Gilinsky.

CHAIRMAN AHEARNE: Ah. Could I take a moment pause?

(Laughter.)

This is a vote to hold on less than one week's notice.

DR. MERRYMAN: All right.

CHAIRMAN AHEARNE: We are, it is now a formal Commission, you see, because we are now at a quorum of the Commission.

COMMISSIONER GILINSKY: Certainly, in terms of weight.

CHAIRMAN AHEARNE: Go ahead.

DR. MERRYMAN: To give you just a little background, we had, have been involved in this program for a number of years, particularly in a variety of applications, most recently just as indicated here, we've been looking at the fuel reprocessing applications.

We had looked at others up, early on.

During the considerations of cleanup activities

associated with TMI-2, we did have a revival of interest in the possibility of using this particular technology first of all for, in a generic sense, not necessarily in the TMI-2 cleanup, but then most recently as a part of the TMI-2 cleanup itself.

But we've had some discussions with various people, wondering about the possibilities of that and have provided the Department of Energy in January of this year with an estimate they requested of the time and cost to put together a mobile processing unit for the Three Mile Island Two cleanup.

So after considering that in the light of other information, a visit was made from the Congressman and by Commissioner Gilinsky, as you're all well aware, to Oak Ridge last Saturday to have some discussions with us and also to see the test unit, the power-plant unit that has been in operation recently.

As a result of that visit, the Congressman asked first that we make some scoping calculations of decontamination factors, processing times, and so forth -- with, system-sized at our pilot plant level, which is 15 standard cubic feet per minute. At also at 10 times that, which was recommended as a very safe extrapolation.

That is, he was interested in indicating the range of reductions and times and so forth that fall within those criteria.

The Congressman also asked that we make some ball-park estimates of the schedules, the cost, the problems, and so forth, the interfaces -- associated with those two cases: one, using a 15 scf system, perhaps even our test unit itself or portions of it; and secondly, the 150 scf --

But we, we told him that we thought even a rough look off the top of our head sort of thing would require a couple of weeks.

He was interested in an answer today, and so what we agreed to do and tried to do this week, what we've concentrated on this week we've shown in this vuegraph here.

We have, first of all, made the calculations that he indicated, showing various tradeoffs and options and so forth. And one, decontamination factors, flow rates, processing time, and so forth.

We have made an initial evaluation of the applicability of our pilot plant equipment for incorporation into some system for TMI-2. And we have identified primary issues, problems, and so forth in implementing the system, our new system.

(Pause.)

The first point that was raised was the issue of tradeoffs among DFs and the processing time and so forth. That's illustrated here, where the containment vessel activity is plotted versus the processing times of any kind of a

process. And the parameter here is flow rate. Again, the 15 is the pilot plant. We've been concentrated in the 15 to 150 scf --

(Pause.)

I think one conclusion we've drawn from, from this chart just as a matter of, just as a judgment matter, was that --

CHAIRMAN AHEARNE: Now, on -- in this operation, for example, you've got -- if you're using the 15 one, at the end of the lower righthand side, what is that? 175?

DR. MERRYMAN: Yes, 175 days --

CHAIRMAN AHEARNE: Days --

DR. MERRYMAN: -- there would still be over 10 percent, 15 percent, or something like that.

CHAIRMAN AHEARNE: Okay, now. This is on the -- is this a pass to the atmosphere? Or recycling back to the containment?

DR. MERRYMAN: Well, as I, as I can show on this next vuegraph, it's for all practical purposes either one.

This vuegraph shows the same information in a little different way. Here I plotted reactor volumes process versus the containment vessel decontamination factor.

Here the parameter is for some of the lines, is the process decontamination factor. If it's a recycle from containment through the process back to the containment.

And as you can see, for significant process decontamination factors, a hundred or greater, that's substantially the same relationship that exists with an infinitely efficient process. Power was just pumping it right out of the vessel and into the atmosphere, so this upper line is the, is also applicable to a once-through case, even with no decontamination. This is the depletion line for krypton in the containment vessel as a function of reactor volumes processed, for example, on a bleed-and-feed type of operation.

CHAIRMAN AHEARNE: Can I see the previous chart?

DR. MERRYMAN: Certainly.

CHAIRMAN AHEARNE: Well, just as a, as a working number, what, what level of activity do you have to, does it have it to get down to, to get down to MPC?

(Pause.)

Bernie, do you know?

MR. SNYDER: Yes, we're just figuring -- we were just looking at this. The MPC is 1 times 10^{-5} for workers. I believe that's correct.

CHAIRMAN AHEARNE: Well, but this --

MR. SNYDER: And it figures out to 99 --

CHAIRMAN AHEARNE: Well, wait. We're talking 10 to the --

MR. SNYDER: I think it works out about a thousand, hook it up.

MR. SNYDER: Yeah, it's a thousand days with a 15 cfm system.

DR. MERRYMAN: Another way -- yes, for the 15 it's my understanding that on this chart it's somewhere close to 10^5. It's something like 8 times 10^{12} on other decontamination.

MR. SNYDER: Yes. Right. But to put it in perspective, it works out to be 1,065 days from --

CHAIRMAN AHEARNE: Okay. So if you run the hundred days, the 15 cubic foot, you are -- is this, it starts at the roughly 57, 50, 60,000?

DR. MERRYMAN: Yes, sir.

CHAIRMAN AHEARNE: Okay.

So you're down to what? Around 20,000 at the end of a hundred days?

DR. MERRYMAN: Something like that.

MR. SNYDER: We calculated it as just a straightforward exponential case.

We calculated it at 15 cfm. In 64 days you can reduce the concentration about 50 percent, as far as the full time, now.

CHAIRMAN AHEARNE: Yes. Yes. No, I -- yes. This is run time.

Yes.

(Pause.)

Okay. Thank you.

Well, at some point will it be possible to get copies of these.

DR. MERRYMAN: Yes, I think we've got a couple of copies --

(Pause.)

This is a summary of 15, 50, and 150 standard cubic feet per minute and the weeks of processing time required to achieve the indicated removals. And again, this is a summary of what I, what we said earlier.

And I think a point that I'm going to make later, when I talk about the pilot plants: one point is that in our judgment 15 is too low a flow rate to really be -- you've got to have the desire to kind of, kind of impact.

That's a judgment that's based on looking at numbers such as what I've illustrated on these three vuegraphs.

CHAIRMAN AHEARNE: Although actually, I guess that the judgment on whether or not that's an appropriate thing would really won't be ours to --

DR. MERRYMAN: Certainly, I'm, I guess I have to apologize --

CHAIRMAN AHEARNE: No, no, that's okay, Doc -- no.

DR. MERRYMAN: -- if I cross-number a little bit.

CHAIRMAN AHEARNE: Yes. No, I, I just felt obligated to make that point.

DR. MERRYMAN: Both the Commissioner Gilinsky and

Congressman Ertel were very gracious; and Saturday, listening to us recommend the vent case, on more than one occasion. And so I think that's a matter of record. But perhaps a later vuegraph might really be a little more persuasive about the appropriateness of the size of the thing.

Okay. We, we feel like then we have, we view the possible combinations that may be of interest; and so the next thing that we, that we did was attempt to start answering questions of, about project approach and content and scope and feasibility and problems and that sort of thing.

And to do that we, we did look at basic system requirements. Now previously, as I've mentioned earlier, we had looked at a mobile unit at the request of DOE. And that unit was 275 scfm unit. It was fully mobile. We looked at an option where it was to be licensable and another option where it might not be.

The request that was made Saturday was to essentially take another look to see if there are innovative approaches to less than the full complete job, maybe not fully mobile. Well, that's the sort of thing we tried to start addressing this week; and this is a very crude schematic of the selective absorption process.

The spark, the most, in its spartan configuration that we envision as being appropriate for this particular application.

CHAIRMAN AHEARNE: Well, are you going to comment on some of the features of it, or --

DR. MERRYMAN: Yes, sir. I am. Probably more than you, more than you want to hear.

(Laughter.)

This is essentially the same vuegraph on here; I've tried to divide that into its major subsystems: the feed preparation subsystem, krypton separation subsystem, product treatment subsystem, product storage subsystem, solvent treatment subsystem, vent gas treatment subsystem, and gas maintenance subsystem.

Now, what I'd like to do next is go through each of these and list some of the issues and some of the major hardware items and so forth, again recognizing that this is just a cross-cut after about a week of looking at it again, and I will point out a couple of places where this differs from the system we looked at earlier --

The feed preparation subsystem is the first one in that group. This is where the gas enters from the reactor building. The primary function is to filter, drive, and press through the meter in the feed gas. Major equipment items are banks of heater filters, reversing heat exchangers for taking the bulk of the water out, gas compressor, gas cooler, and its associated refrigeration system, molecular sieve beds, for appropriate finishing of the drying the bar

storage things which I'll mention in a second. The process of the operator requirements are to then provide cool gas at approximately minus-30 degrees F. and 150 pounds, which is part of the conditioning under which the krypton is absorbed in the unit.

One consideration that entered our thinking is that because of the possibility of treating it under perhaps other radionucleides we think the design consideration would be the collection and the containment of all the water that is removed; and that's the few hundred gallons that's going to be taken from this gas stream.

The molecular sieves also might be contaminated, might become contaminated during its operation; and that is the, that particular hardware design might also require that kind of consideration.

CHAIRMAN AHEARNE: Given the amount of water we have there already and all of the resins and everything we're collecting, and yet there's no --

(Pause.)

DR. MERRYMAN: Certainly, a water tank is not a, not a formidable, particularly formidable task. But again, if you don't think of --

CHAIRMAN AHEARNE: Sure. No. Right.

DR. MERRYMAN: -- you need it, why, you'd shut down the --

The heart of the process is a krypton separation column, where the krypton is removed from the gas concentrated.

There the, our tentative thinking is that an appropriate design criteria would include a, a target decontamination factor for that column of 10^2 and a concentration factor on the order of couple times 10^4, at least I mentioned before.

CHAIRMAN AHEARNE: What are the factors for your pilot project?

DR. MERRYMAN: We've achieved, in the pilot plant we've achieved another factor of 10 on the decontamination factor. The concentration factor there is about as good as we've seen routinely. There is a margin; only we didn't execute our level of decontamination.

CHAIRMAN AHEARNE: Why -- well, what makes this end up only a factor of a hundred in this crude spartan system? Why do you lose the factor of 10?

DR. MERRYMAN: Well --

CHAIRMAN AHEARNE: Those are the conservative estimates.

DR. MERRYMAN: The conservative estimate. And it's also one of the charts that I showed earlier indicated that if it's a recycle situation, the significance between 10^2 and infinite decontamination factor is varied insignificantly.

So it's almost a nonissue once you get about 10^2 for the recycle.

CHAIRMAN AHEARNE: Yes.

DR. MERRYMAN: The next subsystem that I'd like to answer is the vent gas treatment subsystem. This subsystem occurs between the krypton separation problem and either the vent or, or the reactor if the recycle is, is employed.

Here, particularly in the case of recycle, the primary consideration is removal of small amounts of -- vapor, refrigerant 12, difluoro-di-cloro, which might be recycled. So one difference between this, this particular design we've been looking at this week and the one we looked at earlier in the year is that we have a more elaborate system than the earlier one.

This one is more the straightforward approach, and you just put it in a condenser to achieve a bulk of the removal with this associated refrigeration system. And then we're supplementing that with molecular sieve beds to remove remaining traces, and the operating design point is to get that to, a part per million or less.

(Pause.)

The solvent treatment system, the function there is a straightforward, is just to pump up the solvent, cool it, meter it, and purify it prior to returning it to the absorber column. The solvent loop is a closed loop. Here this particular design that we're looking at now is very simple, in that the purification unit is simply the molecular sieve bed.

We don't anticipate the long enough run times or substantial enough burdens of other contaminants or to really get much beyond that for that particular case. Other versions have fairly, can have very elaborate systems --

Again, though, one consideration is disposing of those sieves. There's a possibility of some accumulation --

(Pause.)

Getting now into what I think is one of the more uncertain areas of this whole business, look at what happens with the krypton as it comes off of the hollow. Again, the concentration factor is on the order of 2 times 10^4. So krypton, for example, might be increased from one part per million to 2 percent in the stream going off --

The remaining material in that stream is primarily xenon and carbon dioxide. One issue is that if it's a once-through application, and if the link-up gas into the reactor is air, atmospheric air, then there will be a fair amount of carbon dioxide that will continue to be introduced into the system. It should be dealt with.

Here an approach was assumed that would basically concentrate the krypton further, with one step of cold trapping preceded by some molecular sieve trapping to remove the refrigerant-12 vapors. That is very important from the technical standpoint, because of uncertainties associated with the radiolytic decomposition of R_{12} if it's contained in

storage cylinders for long periods of time. The uncertainty stems from the unknown, unstudied, perhaps corrosion implications: chlorine and steel.

So that's, that's the reason for the incorporation of a molecular sieve trap to remove those vapors. A little background to that chart: this is a rough understanding of what the present inventories might be in that contaminant in terms of cubic feet of total krypton.

CHAIRMAN AHEARNE: If you eliminated that cold trap, would that assist in any way in the system? Put aside for a minute -- let us assume for a moment that there is no problems with radiolytic decomposition and corrosion. And you see, you don't need that.

DR. MERRYMAN: The molecular sieves would -- provided you take care of the refrigerant vapor -- the cold trap sort of provided to remove most of this. The implication in removing most of the xenon and carbon dioxide is to reduce the storage containers that might --

(Pause.)

It's an uncertainty. As I can point out later, the criteria for storage of the krypton 85 is one of the main uncertainties in my judgment, because as I've illustrated here, it penetrates back into the design of the system itself. So it's not just a question of do I order one cylinder or 10 cylinders or a hundred cylinders? It's associated with do we

need this kind of trap or some other kind of trap? But there will be an obvious simplification when you have one less item to, to fool with. But that's not a particularly decisive one.

I think a couple of points that this makes, first of all, if the system is once-through, then there is an argument for either using something like nitrogen just make a -- to avoid the CO_2 introduction. Or perhaps if areas require to, equipment taking out CO_2 prior to putting it in to the reactor.

This also is an argument for the continuous recycling case, I suspect.

CHAIRMAN AHEARNE: I guess if you get enough refill of the project, Jim, then at some later stage you'd have to recycle through the -- in order to get the atmosphere of -- atmosphere.

DR. MERRYMAN: I'm sorry; I didn't hear.

CHAIRMAN AHEARNE: If you use nitrogen as a makeup, are talking about makeup into the containment?

DR. MERRYMAN: That's one possibility that --

CHAIRMAN AHEARNE: Yes, but then you, then you, you've traded one problem of entry to another problem of entry.

MR. FEINROTH: Again, you don't have as much storage to worry about in the design of the system as long as you can perhaps design a simpler substorage system.

Later on, you just will take some nitrogen with air so you'd have the oxygen.

CHAIRMAN AHEARNE: Yes.

MR. FEINROTH: That's the only way you could.

(Pause.)

DR. MERRYMAN: Again, this is just a --

(Pause.)

The product storage, the class area there, really unknown in my judgment. I would assume it would be something like metal containment or the shielding and improving for rather long-term protection in the storage.

If those are pressurized cylinders, which is what has been looked at for the most part over the years, then compression would be required and, of course, the appropriate cylinders and storage gas and what not.

The gas makeup we talked about previously, and so I won't dwell on it. This is the issue --

It might be nitrogen, in which case you would have to do something lighter. Or it might be the absorber recycle.

CHAIRMAN AHEARNE: Wait!

(Brief discussion.)

(Laughter.)

(Pause.)

DR. MERRYMAN: This last vuegraph in terms of a statement of just what this process might look like is just

really it's not a very specific one. It just says that once a design is selected, obviously you have to --

SPEAKER: The power is out.

DR. MERRYMAN: -- the various utilities.

Okay. With that background, then, we did take a, a look at the second question that was asked last week; namely, just how applicable might the pilot plant itself be for this particular task?

One of the first things we did was to look at the subsystems and hardware items that I have shown you in the previous charts, and then --

CHAIRMAN AHEARNE: Let me back off one step:

One suggestion had been: could you just pick up your pilot plant and move it up -- and install it?

MR. PENNINGTON: That's what this is going to look at.

CHAIRMAN AHEARNE: Well, but --

DR. MERRYMAN: This vuegraph --

CHAIRMAN AHEARNE: -- this would be the availability of the whole pilot plant, is my question.

MR. PENNINGTON: When he says portions of the pilot plant would be needed in the application at TMI, what would be missing if they did that, is what this is. What would be missing in TMI --

DR. MERRYMAN: You mean, what wouldn't be needed?

MR. PENNINGTON: No. What else would be needed --

DR. MERRYMAN: Let me try to explain what this, what this is.

MR. PENNINGTON: Okay, I'm missing some too.

DR. MERRYMAN: This is what would be required, in our judgment, for this spartan system of TMI-2. This is what we don't have, no; and the X is what we do have in our pilot plant.

CHAIRMAN AHEARNE: In other words, if you cannibalized your power plant.

DR. MERRYMAN: If you cannibalized your power plant, all you would get is -- and you would get that for the 15 SCFM case.

CHAIRMAN AHEARNE: Yes.

DR. MERRYMAN: As was indicated with an X, here.

CHAIRMAN AHEARNE: I'm sorry, Bob. I really missed something. Let us suppose that you weren't putting in a spartan system. If you had, if you hooked up your pilot plant, you need these additional items -- they're not in your pilot plant.

DR. MERRYMAN: These things do not exist. The pilot plant is an experimental --

CHAIRMAN AHEARNE: All right, that was --

DR. MERRYMAN: It only has approximately half of the --

CHAIRMAN AHEARNE: I see. Okay. Fine. That's

what I was going to say.

DR. MERRYMAN: And I might point out also that in terms of the larger system, larger than 15, the only thing that we have is, that would be applicable that you could cannibalize, so to speak, would be some of the instrumentation. Admittedly, some of that is --

CHAIRMAN AHEARNE: Now I have to start reading the chart, because I was more interested --

End T-1
Tape 2:

DR. MERRYMAN: For the most part. That means that once we get it dry, we don't need to have a lot of those drying systems, for example, so we don't have the reversing heat exchangers. We don't heat filters. We have no requirement for that. We don't need the elaborate feed preparation subsystems. We don't have any vent gas treatment, since we just recycle back in.

The solvent treatment that we have is complete in terms of its major components. On the other hand, the product treatment, product storage is that we don't have anything of that capability; nor do we have anything that speaks to maintaining the makeup into the reactors.

(Pause.)

Okay. And so, I guess the concerns, then, we ended up with about relocation of the pilot plant to TMI-2 and incorporation of the test unit as part of the krypton removal system there are summarized here.

First, as we said a moment ago, only half of the things that you would need for the TMI-2 application are even available in our pilot plant. Some of what is available, particularly the refrigeration systems are old, some of them go back to the first pilot plant which -- I assume the -- probably started up in 1968 --

CHAIRMAN AHEARNE: But the fact that they're, that they're old is that being you have concern about the continuing working, or --

DR. MERRYMAN: Yes, absolutely. I would, if I had to pinpoint the, the availability problem with our particular hardware, that would be the --

CHAIRMAN AHEARNE: Are you saying that when you run your pilot plant, you have problems with it, or --

DR. MERRYMAN: We have -- in the past, that's been a frequent -- if I had the list of things that we've had the most frequent trouble with, that was far and away the main item.

That is important in the experimental environment, I would definitely, I'd recommend the old units that we have for any kind of -- what kind of -- when you run your pilot plant, do you -- for what period of time do you run it continuously?

We, for the most part, start it up or run it for the most part five days a week. The start-ups and shut-downs

for each weekend.

CHAIRMAN AHEARNE: Twenty-four hours a day, 25 days.

DR. MERRYMAN: Yes, 24 hours a day.

CHAIRMAN AHEARNE: Okay.

Now, on typical weeks then, what is the percentage of the time that's up?

DR. MERRYMAN: I can't answer that.

CHAIRMAN AHEARNE: Just, just rough.

DR. MERRYMAN: Large, large availability.

CHAIRMAN AHEARNE: Well, then, the refrigeration system is getting old, if you're taking it down that much.

DR. MERRYMAN: If they're lifted out and moved and all that.

There's a weak spot that we, when we tried to just say --

CHAIRMAN AHEARNE: Yes. Yes.

DR. MERRYMAN: Yet a lot of this comes down to just engineering judgment.

CHAIRMAN AHEARNE: Sure. Sure.

DR. MERRYMAN: And we looked at it and took our best shot at it, why, that's sort of how that should happen.

CHAIRMAN AHEARNE: Now, the third bullet means --

DR. MERRYMAN: The third bullet says that other items that might be available, such as the column itself, at least as to the extent that we know --

CHAIRMAN AHEARNE: I see. Yes.

DR. MERRYMAN: -- what the critical path is, don't appear to be the pacing item.

CHAIRMAN AHEARNE: Right. So you could get --

DR. MERRYMAN: So we don't, we don't see any schedule advantage.

CHAIRMAN AHEARNE: Yes.

DR. MERRYMAN: From some of the initial vuegraphs I've showed, we've, again our judgment 15^5 rate is lower than what we would argue or consider to be a practical minimum. We think maybe 50 would be about as low as we would consider as a minimum.

And certainly, I don't think that anyone could assert cost statements.

(Brief discussion.)

DR. MERRYMAN: And the system is not designed for relocation. I might elaborate on that. There are a number of sample parts and thermocouple wells and things like that.

CHAIRMAN AHEARNE: That is a question I had. I, I, in reading through your, your proposal, it was clear that you had at some stage in mind building a system that could go from place to place.

DR. MERRYMAN: Yes.

CHAIRMAN AHEARNE: I wasn't sure to what extent in putting your pilot plant together you would use that philosophy.

DR. MERRYMAN: To no extent. To no extent.

(Pause.)

Well, our bottom line conversion, then, is that we have, we just don't see that the pilot plant itself is useful in this particular situation.

CHAIRMAN AHEARNE: What, I just don't read that fast.

Oh, that's the same -- okay.

DR. MERRYMAN: Yes. Yes. I'm sorry.

CHAIRMAN AHEARNE: I thought you had put on a new slide.

(Brief discussion.)

DR. MERRYMAN: Well, so then we began to look at, okay, propped with them, I guess if we back up, we began to look at the third question that was raised: what are some of the issues, concerns, and so forth, associated with, with doing a new system or perhaps a new one that, of a larger size, or maybe even for 15 cubic foot per mirute size; and so these are some of the issues that we've been able to turn up just in thinking about it for the last few days.

I might say that in, in my judgment these types of issues require resolution or some kind of guidance or at least some kind of roadmapping through them before any credible or responsible estimate can be provided on cost and schedule for a situation such as this.

First and foremost is the criteria for the krypton 85 storage. I don't know pressure constraints, the curie constraints, the -- basic design assumptions are, are not available, as far as I'm aware.

The second -- it's a very important point -- concerns the basic objectives and criteria which govern the project scope, schedule, and so forth --

SPEAKER: Is Section 8 of the ASME Code adequate? Or does it have to --

What is the target DF for the containment building? Is it the 8 times 10^4? Or what? What are the regulatory requirements? Does this have to be all of the hardware categories and so forth?

Just the kinds of things that, that are important in projecting a credible real-world type of, type of schedule. Almost equally important are assumptions and so forth regarding responsibilities for the tech spec and for the design, for the approval cycle procurement, instruction, and operation and the interfaces of known potential participants involved: DOE, NRC, architect engineers, the utilities, and so forth.

Procurement is always of considerable concern because it tends to be the thing that you don't have under your entire control.

Now, what this is, is a very cursory thing based on just a few days' evaluation, a very cursory look at what

our current experience is, through our regular procurement actions. And buying some of the hardware that is included in the major equipment items.

CHAIRMAN AHEARNE: Yes. So that's -- let's take the heater filters. You have 10 to 12 months.

DR. MERRYMAN: That is our current experience, and combine them for normal --

CHAIRMAN AHEARNE: But how much of that is the contractual process?

DR. MERRYMAN: There's, there are several weeks of that. I can't say precisely, but --

CHAIRMAN AHEARNE: Would you give me a rough estimate on these off-the-shelf items that you'd be getting?

Are they especially constructed?

DR. MERRYMAN: No, these are commercially traded heater filters perhaps -- I don't know to what extent, you know, that there are shades of differences. But generally, they're commercially produced items. We use them, several varieties of them in our operations.

CHAIRMAN AHEARNE: So in theory you could get them a couple of weeks.

DR. MERRYMAN: I think in practice that was achieved down in Three Mile Island, in --

CHAIRMAN AHEARNE: Now, that then also holds true for any of these long-lead hardware items. Is it that a lot

of it is contractual?

DR. MERRYMAN: The point, I think, that I was -- the only point that I was trying to make is that, okay --

CHAIRMAN AHEARNE: These are problems that have to be looked at, yes.

DR. MERRYMAN: You begin to get an idea of where you need to start working and being --

CHAIRMAN AHEARNE: Right.

DR. MERRYMAN: Certainly, the heater filter thing would be one that you would want to get out and work, because its maximum pressure would be another one.

Well, let me finish this one quickly. I understand that there may be some uncertainty as to the exact composition of the reactor building atmosphere. And to the extent that there might be sleepers in there, why, that would be well to know that.

We're also building issues. In the short time available, why, there is no way for me to really address that.

But -- so the final, I guess the final report that I have is that what we, what we then did was, was try to think next about the approach that might be taken to go about providing the spartan system on a type of project schedule, project approach that was not, not necessarily orthodox but a, the elements of a crash program.

I have not had time, our organization has not had

time to flesh this out and say, "This means that the theoretical minimum is next to once."

But were we to make that kind of an estimate, it would involve these kinds of assumptions. First, the first thing we would recommend would be to go out and find what is available, borrow the standard items and their availability, and actually wait on phrasing the design flow rate until we canvas the availability of hardware and seeing just what the availability is.

And then, on that basis, choose between something like 50 and 150 --

So the first thing would be to just go out and try to see what some of the procurement problems would be. The second thing would be -- and perhaps, let me mention, in this first phase some options might be placed to keep items available.

Then the second phase would be to actually compare the checklist and then select the design flow rate and initiate design and form the procurement --

The second thought is that it would be appropriate, it would be necessary under a crash program to negotiate all procurements and contract, rather than to go through the process. Go out with money in hand --

And then the minimum, and I think there are, there are a lot of the time uncertainty is related to the applicable

codes and standards. But certainly I think the minimum that any company like ours would, would recommend is, is one that we feel comfortable with for a, the safety of our own systems and people; and that is, of the accepted industrial standards for housing these materials. In other words, coded pressure vessels as appropriate, not necessarily nuclear stamp; but certainly, we wouldn't compromise below, anything below accepted industrial standards --

Now, the big uncertainty there again is this krypton storage, which I, I'm sure you have a far better feel than I do about what might be required there with codes and so forth.

We, the thought to avoid is the idealistic, perhaps, comment about no regulatory process delays. But the point is that in a, for a crash program to be successful, determined and consensus effort would have to be continually applied in that direction.

And then, as I've indicated earlier, some simplifications do result from forsaking the idea of making the system mobile and perhaps applicable to other situations. So I guess, in conclusion, the information we reviewed Saturday for Dr. Gilinsky and Congressman Ertel, which we had previously provided to the Department of Energy, is that for the mobile unit, complete mobile unit, 275 SCFM capacity -- these are the kinds of cost and schedule estimates that we came up with earlier this year -- or a unit that is not completely mobile

and of a capacity and range of a hundred CFM, plus or minus 50, we don't have an answer yet on what that might be.

But the minimum time here for the crash program, not licensable but we estimated this.

CHAIRMAN AHEARNE: Yes. Now, in that, let's take the 1½ to 2 years, what does that assume in your crash program? Does that still assume a significant portion of, let's say, 8 to 10 months?

DR. MERRYMAN: No, it's a negotiated procurements; the scheduled reductions -- and I don't -- I'm not at all claiming that there might be it. But the scheduled reductions to the extent that they would occur would result from the smaller unit -- and I don't think that's a first-order type of -- would come from a reduced complexity. We don't have the same type of vent gas treatment system, but some items would be, would be left out.

It would not be a completely mobile unit. And in addition, rather than just negotiating the procurements there might be some opportunities which --

CHAIRMAN AHEARNE: Yes. Yes.

DR. MERRYMAN: It's hypothetical, now, to trade money for time or something -- but this is as far as we were able to.

CHAIRMAN AHEARNE: How long do you think it -- and I don't know which is the right person to ask -- now long do

you think it would take to do that estimate? For the non-mobile hundred plus-or-minus 50 crash program.

MR. FEINROTH: Nonlicensable?

CHAIRMAN AHEARNE: Nonlicensable.

MR. FEINROTH: What does that mean?

CHAIRMAN AHEARNE: Well, it's your turn.

(Laughter.)

CHAIRMAN AHEARNE: He defined the set of parameters and then he made an estimate on them.

DR. MERRYMAN: To do an estimate comparable to the one we did earlier this year would, even on a rough cut basis, would take at least a couple of weeks --

COMMISSIONER GILINSKY: Let's see: I thought you did the other one on two days, or something like that.

DR. MERRYMAN: We, we -- in reviewing the, the record of that, of that time -- we did it a, took a little bit longer than that. We made a lot of the design drawings and that sort of thing. The basic design assumptions and the proper days, and then the cost estimators took a little time.

COMMISSIONER GILINSKY: Could I ask about those costs? I notice in our report it says four to ten million dollars, and it says "Staff estimate." I assume that means NRC Staff. I just wondered how your 10 or 15 got translated into our four to ten.

Do you have any idea how that, how that went?

DR. MERRYMAN: Well, one issue in the time thing is that we understand that there have been some regulatory guides for reactor clean-up gas-driven systems that have come out recently or something. And I'm certainly not familiar with them, but I'll look at them before I --

CHAIRMAN AHEARNE: Well, fine. Let's see if I can break it into pieces.

I recognize it's a very rough rule of thumb type numbers. The actual designing of the, of this mobile system is to -- nonmobile, rather -- to the point where you would be all that you could forgive to go out and negotiate the equipment.

Is that a period of weeks? months? days? what?

DR. MERRYMAN: Oh, okay. We, it's a period of a few months. I think the, the first days of the project -- again, I'm speaking to a great extent on the basis of the projects that we estimated earlier. But the first phase, the tradeoffs and options and the finding out what is available and so forth, would take a few months.

And I believe that's the same response we were provided last week in terms of making up the list.

CHAIRMAN AHEARNE: I mean, so, so that's one piece.

Now, once you've decided the things that you did and recognize that some of it can be going on on a sequential basis, what is the rough range of time you think that it takes

to buy all of that? or collect everything?

Again, are you talking days? weeks? months?

DR. MERRYMAN: Well, it'd be months. But I, to me that is the biggest uncertainty, and I'm not prepared to say what that might be, because of the uncertainty about the assumptions that we would base that estimate on.

CHAIRMAN AHEARNE: Okay, now -- and again, recognize that some of this can be done sequentially and some can be done effectively.

What do you think is -- you've got all the equipment on the site, based upon your experience of putting this stuff together or working with it.

How long does it take to actually get it up and running?

DR. MERRYMAN: Well, I think the, the assumption that you provided about the sequential nature of all of this, the parallelism that exists is a very crucial one here, because we would envision that in any project like this one would do a, take a modular approach and get subsystems assembled and tested and so forth just as rapidly as they could be.

And from the time when the last piece of hardware was available to weld up the remaining piping and activate the system and so forth, I think in a real all-hands type of effort would -- one might be able to do that in three to four months' time. Under idealized conditions related to who does

the welding and all of that --

COMMISSIONER GILINSKY: What assumptions are you making about who's going to be doing all this? When you, when you give us these numbers.

DR. MERRYMAN: Okay. Let me speak to that. The concern I have in really providing a concrete estimate is that our experience base is all I have to go on.

CHAIRMAN AHEARNE: Sure. Now I recognize that.

DR. MERRYMAN: And that is for a situation where we have enormous shock capabilities and DOE shops there, and we got all kinds of qualified welders and all of that. And I have no idea, you know, I'm not saying that the situation might be better or worse if I were down out in the field someplace. I'm just ignorant of what those conditions are. I don't, I don't know whether one --

CHAIRMAN AHEARNE: In other words, your estimates are based upon your, your own --

DR. MERRYMAN: My estimates are based upon my own experience base, and I, I do have concerns about the extrapolation in the situations that I don't know anything about.

I, I think they're, they're useful perhaps in providing one point on the curve. But I don't know whether to scale up or scale down or, or, or what.

But I think that's an honest opinion of what, what it might be, given the circumstances that prevail in our --

COMMISSIONER GILINSKY: You see any technical problems in the, in the, in the physical scale?

DR. MERRYMAN: In science and engineering and uncertainties and -- no, I think the technology's, is well established and has been demonstrated fairly vigorously.

COMMISSIONER GILINSKY: For this factor of 10 that you --

DR. MERRYMAN: Oh, yes. I, I have, I would have no reservations about that, a factor of 10.

(Pause.)

CHAIRMAN AHEARNE: And you've had previous chance to question him. Do you have any --

(Laughter.)

Did you have any questions come to mind?

COMMISSIONER BRADFORD: You used one phrase that struck me. You talked about sleepers in the containment. What do you have in mind?

DR. MERRYMAN: Well, again, I was just trying to indicate what one of my uncertainties -- I don't know what's in there.

COMMISSIONER BRADFORD: I understand, but it, it isn't a concept I've run across before. What, what led you to think that there might be anything in there that we should know about?

DR. MERRYMAN: Nothing particularly led me to.

It's just that if there is something in there, I would like to know what it is. And I think Bob --

MR. BROOKSBANK: May I address that?

DR. MERRYMAN: There's a better person --

MR. BROOKSBANK: In the, in looking at this system for this time removal, there are other isotopes which may appear. We have not had the benefit of looking at all of the, the analyses which have been generated on the containment atmosphere.

Now, let me tell you about a sleeper in, in the water treatment system.

In the high-level water treatment systems, once you get rid of the seasoning, the thing that becomes predominant is mainly the antimony 125. That's a sleeper that needs to be handled in that process.

On the plugged surfaces that we have removed from Three Mile Island, we are finding on one plug, the lower plug, the teluriums -- what's going to happen to these?

The teluriums probably became airborne during the accident. They probably may not come off again. We know that there's an abundance of iodine 29, probably --

COMMISSIONER BRADFORD: Would it locate -- where will it locate in this system? He doesn't underline. That, that's a sleeper.

(Pause.)

So I asked the question just because what was behind it was a concern as to whether any of these secrets ought also to be concerned, as concerned in, in the case of the vending options. Have you got anything that we didn't over there?

MR. BROOKSBANK: I am going to Three Mile Island tomorrow for a review on the, the high-level water potions. And at that time I will be picking up the data, relative to all of the gas samples that have been taken that they'll let me have.

But I, we have not -- Oak Ridge has not --

CHAIRMAN AHEARNE: There's no doubt they'll let you have it, is there?

MR. BROOKSBANK: They will let me have it. I'm a member of the Technical Advisory Group. Yes, they will let me have it.

COMMISSIONER GILINSKY: I -- oh, I'm sorry. I, I, I just wondered whether there was anybody here from NRC who could speak to the storage question. Perhaps Harold could. And the other point is the worker exposures. That could be reasonably expected. Operation of the system. The, there's an estimate in the environmental report. And we raised this earlier, and I wondered whether any NRC people, who I think came up with those numbers. Or were those your numbers?

DR. MERRYMAN: No, they were the NRC numbers, as far as I know. And I have no basis to challenge --

COMMISSIONER GILINSKY: I'd be curious to know what lies behind them.

MR. VOLLMER: Well, that means the occupational exposure for the selected deserve --

How do we review classification systems? System -- the estimates of the amount of time that the workers would have to get involved in the process for maintenance and things of that nature and for surveillance and stored item, once that was accomplished.

And they are estimates accordingly. Actually, the two electrical absorption systems would not come out and be a size and occupational exposure --

For example, the --

These estimates are simply made by people who are familiar with the lab concepts --

Such operations can be accomplished with minimization of operator exposure. That's exactly the thing.

CHAIRMAN AHEARNE: Harold, do you have anything?

MR. DENTON: Well, I want to congratulate Bob on an excellent presentation on one week's preparation at that --

He's really pulled together a lot of real useful information.

I guess I can only add that, based on personal experience, that even a crash program, it's quite obvious, takes so much longer to really implement it and we guess,

based on the best expert knowledge we can get.

CHAIRMAN AHEARNE: Do you have any questions you want to ask?

MR. DENTON: No.

CHAIRMAN AHEARNE: Bernie?

MR. SNYDER: No, no questions.

CHAIRMAN AHEARNE: Herb?

MR. FEINROTH: Well, before I left Rudy Cunningham this afternoon, I asked him how he felt or how his department would respond to the question of a, a position today, having hopefully done his work, as compared to earlier February, when we sent a letter to Mr. Dircks.

And I guess after reviewing this whole thing with Oak Ridge, our position, our feeling is pretty much the same as it was in that February 5th letter.

COMMISSIONER GILINSKY: I wonder whether there is anyone who knows if, something about the storage issue.

CHAIRMAN AHEARNE: The storage issue in --

COMMISSIONER GILINSKY: What would we do with the krypton? And what sort of standards would apply? And what, have we given any thought to the question

MR. VOLLMER: Actually, the assumptions we made were that we would put them in pressed gas bottles. We would have to dilute it, but you would have a shielding, particularly the cooling problem was too concentrated in a number of

pressed gas bottles. And perhaps use some sort of method to seal off the, the valving of that, and then monitor it, store it and monitor it.

I think we did not look at any fancy or extraordinary measures to store the gas. They may be required; we just didn't look at it.

CHAIRMAN AHEARNE: Did you essentially end up assuming that it would be stored on site?

MR. VOLLMER: We did assume that it was stored on site; we didn't feel that the shipment off site without a great deal of additional study was something that we cared to enter into.

MR. DIRCKS: I'd like to comment on that. Since taking over from Dick, I've had some conversations with our waste management.

I don't think there's anyone here from waste management, but --

CHAIRMAN AHEARNE: Well, yes, there is in -- well, one of us had. He's looking around.

Bill?

(Laughter.)

COMMISSIONER GILINSKY: He's transcended that.

MR. DIRCKS: Well, if I may, just to reflect on the conversation I've had with Bob Browning on this subject as to the feasibility of, of -- or the acceptability of storage in

the waste facility of gas of this nature.

And the, the preliminary thinking is, at least, is that it will take a lot of study and review before anyone could be willing to suggest putting it into one of the available restorage facilities.

They don't know, they do accept -- I understand they accept extremely low-level gas -- but nothing like this is --

COMMISSIONER GILINSKY: Have we found out this issue over the past few months in any serious way, the storage issue?

MR. DIRCKS: The storage issue? Well --

Where are you going to store it? The problem is that the South Carolina people will not take materials that will -- take Three Mile Island material, period.

But secondly, you're dealing with the Governor of Nevada. And he -- I think it would have to be a matter of negotiating with the governor out there. I think that's why Dave was talking about leaving around the site.

COMMISSIONER GILINSKY: I guess what troubles me a little bit here -- I'm going to preface by saying that I don't know what the right way is to handle the krypton and I'm not -- it's not clear to me that this is or isn't the right way to do it.

But -- but we've been saying that, you know, if

only there were a way that would allow us to get the krypton out in some reasonable period of time, money is no object. Various others have said that when we want to employ that, that method. Now we seem to be saying that even if there were a way to do this, God, what would we do with it?

Now, if that was the case --

MR. DIRCKS: That's part of the problem as far as myself; it's really true.

COMMISSIONER GILINSKY: Yes, but if that were the -- I mean, that sort of makes all these options kind of just so much crank turning.

MR. VOLLMER: But, Vic, I think that was me. It's quite clear to everyone that --

I myself raised the problem of --

COMMISSIONER GILINSKY: Well, I know you did. No, you did. I, I -- that's fair enough. I remember your doing that. But that didn't seem to me to be the, the predominant sentiment at the time.

Do you remember it differently?

CHAIRMAN AHEARNE: Somewhat, but --

(Pause.)

SPEAKER: That isn't the major reason why we were staffing --

CHAIRMAN AHEARNE: The point that had been made that Bill had pointed out, that we have a lot of difficulties

finding any place to put any waste. But that there did not seem to be any large problem with storing on the site. That had been the point that had been made at the -- but that was not a strong negative factor against going to the cryogenic or to the sector absorption. That's as I, as I remembered it.

MR. DENTON: I think the main factor was time. If we could have found a way to get to the bottom in a very short period of time, it doesn't have to say that things are for a year. We would really have it soon if we could get unlimited access to the containment.

CHAIRMAN AHEARNE: Because you always could do something else. Yes.

MR. DENTON: You could get it out of the containment in a short period of time, we'd have a little bit of time to think about long-term storage or where to release it.

CHAIRMAN AHEARNE: That's more what I --

(Pause.)

I notice that Congressman Ertel has come. I don't know whether he'd like to make some comments. We had mentioned at the beginning that a lot of this effort was, was due to your initiative at getting the look and perhaps --

CONGRESSMAN ERTEL: I really haven't any comment. I was just, I reflected somewhat on the meeting that we had this morning. And I don't know if you had the same presentation that we had or not.

CHAIRMAN AHEARNE: Well, let me ask two other people.

COMMISSIONER GILINSKY: I think it --

CHAIRMAN AHEARNE: Oh, I was told --

COMMISSIONER GILINSKY: -- is pretty much the same presentation, a little shorter.

(Laughter.)

CONGRESSMAN ERTEL: I gave these few points that are different, but --

Because I thought some of the things we heard this morning were somewhat, were not realistic. And I don't know if you've asked the same questions or not in relation to those projections as time.

COMMISSIONER GILINSKY: I think a lot of the questions, at least on the time, did get asked -- or the crucial questions. And I think the answer is essentially the same, in terms of what it would take if you had the equipment.

CONGRESSMAN ERTEL: Because, you know, so many of time frames were drawn out because of unrealistic, I think, delays. And, you know, we've gone through many of these --

Like, for instance, I was reflecting on the vue-graph that Mr. Merryman brought -- about, if we were to take the existing system at Oak Ridge and move it up -- well, maybe that doesn't work particularly. However, when I look down that chart, he shows the things that weren't there.

Well, true; they aren't there.

But the things that are there which could be adopted, say you find the 15 gallon per minute -- there are only two things that had to be added that weren't there, except the containment, the ultimate problem we're going to have anyway, the containment of krypton gas as concentrated. We'll have that, regardless.

So that's common to most anything. So I just think that was not somewhat misleading on that vuegraph.

Also the vuegraph that eight to ten months' procurement for a --

CHAIRMAN AHEARNE: No, we, we covered that.

CONGRESSMAN ERTEL: Did you now? Unrealistic --

COMMISSIONER GILINSKY: Yes. No, I think John was asking a lot of your questions --

CONGRESSMAN ERTEL: Good, I'm glad somebody is.

COMMISSIONER GILINSKY: Without, without prompting.

CONGRESSMAN ERTEL: Without any progress in there.

SPEAKER: Well, I'm glad to hear that.

DR. MERRYMAN: Well, again, not to debate the point particularly; but I think before you even know where to concentrate your efforts, you need to have some awareness of what the circumstances are on a normal basis; it's just a useful place to start, and I think that is all I claimed it to be, really.

CONGRESSMAN ERTEL: Thank you.

CHAIRMAN AHEARNE: Well, I wondered whether you had, if you had any more --

CONGRESSMAN ERTEL: No. I'd be glad to listen to what you had to say, and I appreciate being, I appreciate your having this meeting to look into the system.

CHAIRMAN AHEARNE: As we said in the beginning and a lot of this relook is -- I pointed out that there were some things we hadn't really looked at.

And I thank you guys very much, and you did -- I was, put a lot of work in very quickly. I certainly do know a lot more about this than I did a week ago, probably a lot more I still have to understand. But thank you very much.

And that is the meeting.

(Thereupon, at 4:40 p.m., the meeting was adjourned.)