



HOUSE OF REPRESENTATIVES  
COMMONWEALTH OF PENNSYLVANIA

September 6, 1979

MEMO

SUBJECT: SCHEDULE OF TMI WITNESSES-SEPTEMBER 12 and SEPTEMBER 13, 1979

TO: MEMBERS, Select Committee-TMI

FROM: James L. Wright, Jr., Chairman

The following will appear before the Select Committee on TMI on September 12 and September 13, 1979. The Hearings will begin at 10:00 A.M., each day, in the House Majority Caucus Room.

✓ SEPTEMBER 12, 1979

Dr. Harold R. Denton, Director, Office of Nuclear Reactor Regulations, U.S. Nuclear Regulatory Commission, Washington, D.C.

Mr. Harold E. Collins, Assistant Director, Emergency Preparedness Office of State Programs, Nuclear Regulatory Commission

SEPTEMBER 13, 1979

Honorable Harvey Bartle, III, Insurance Commissioner, Commonwealth of Pennsylvania

Mr. Joseph Marrone, General Counsel, American Nuclear Insurers, Farmington, Connecticut

Mr. Ambrose Kelley, Manager, Mutual Atomic Energy Liability Underwriters  
1 East Wacker Drive, Chicago, Ill.

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COMMONWEALTH OF PENNSYLVANIA  
HOUSE OF REPRESENTATIVES  
HOUSE SELECT COMMITTEE - THREE MILE ISLAND

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In re: Three Mile Island Hearing

Verbatim record of hearing  
held in the Majority Caucus  
Room, Main Capitol Building,  
Harrisburg, Pennsylvania, on  
Wednesday,

September 12, 1979  
10:00 A.M.

HON. JAMES L. WRIGHT, JR., Chairman  
Hon. Bernard F. O'Brien, Vice Chairman  
Hon. Nicholas B. Moehlmann, Vice Chairman  
Hon. Eugene Geesey, Secretary

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Reported by: Dorothy M. Malone  
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CHAIRMAN WRIGHT: We will call to order the House of Representatives Select Committee on Three Mile Island. Today the House Select Committee continues its hearings with the appearance of officials from the Federal Nuclear Regulatory Commission, the Federal body responsible for, among other things, the licensing, control and inspection of the nuclear power plants in the United States.

With us today is Dr. Harold R. Denton, Director of the Office of Nuclear Reactor Regulations, Mr. Harold E. Collins, Assistant Director of Emergency Preparedness, Office of State Programs, Mr. John Collins, we have two Collins, Mr. John Collins, Deputy Director of Recovery Operations.

Would you three gentlemen care to rise and raise your right hand.

DR. HAROLD R. DENTON, HAROLD E. COLLINS and JOHN COLLINS, called as witnesses, being duly sworn, testified as follows:

CHAIRMAN WRIGHT: Dr. Denton, I am sure that you have some preliminary remarks that you would like to make to the committee, following which we have some questions to ask of you.

DR. DENTON: Thank you. I am pleased to be here

today. Let me say a word about John Collins. John is the Deputy Director of our Recovery Operations. He has been here since I came up that Friday in the helicopter. I am glad to be here under better circumstances than I was six months ago. I would like to express my appreciation to the organizations of the state for their cooperation and confidence in assisting us in dealing with the accident. It would not have turned out as fortunate as it did without the excellent cooperation of all your state agencies. One person I would like to recognize is Bill Dornsife, who stayed with us in the trailer, a state employee, not only was he effective as a conduit to the various state agencies but provided us a lot of firsthand knowledge about the plant itself. I guess I would especially like to recognize the effectiveness of the confidence of Governor Thornburgh. I thought he was extremely able in translating my scientific and technical judgment into public policy.

With that opening, I would be happy to answer your questions.

BY CHAIRMAN WRIGHT:

Q. We thank you, Doctor. I guess my question at the outset is where are we going? What do you perceive the procedures and methods and technology will be in cleaning up

and disposing of the contaminated water and maybe you might like to make a comment or two about the disposal of low-level wastes, disposal sites, of course, are somewhat limited, the availability of them. Maybe following that, what problem do you see two or three years down the road when we get into the reactor building and take the top off the reactor vessel?

A. I see two separate problems. There is about 300,000 gallons of water in the auxiliary building and that is the water that the system we have named Epicor was designed to process and clean up. The staff has done an assessment of the use of Epicor, compared Epicor to other ways of cleaning up that water and decided that was the proper chemical treatment unit process that water. Our assessment is out for public comment.

I guess my view is I would like to see that system go into operation as soon as possible, start cleaning up that water. The water that it produces, which would meet drinking water standards, could be stored on-site without being released. So the use of Epicor doesn't mean that the water results from the use will necessarily be released at that time. We have a separate assessment underway as to what type of release minimizes the public risk, whether it should be released in the Susquehanna, ocean release, evaporated release to the

atmosphere. And once that is completed, that would be made available to the public for comment.

But the presence of that water in the building presents a continual radiological hazard within the plant. And as you may know, there have been occasional overexposures of people resulting in part due to the fact that that water is still there awaiting clean up. I am interested in getting Epicor on line, getting it in use while we await final decision on what to do with the water that is processed.

That water though is relatively -- has lower activity than the water that is in the containment. The licensee is due to provide us a safety evaluation report and <sup>environmental</sup> report on his plans for reentering and cleaning up the damaged reactor itself. We don't have those plans yet. I plan to issue a new set of licensed conditions for the Unit 2 in the near future and would include in those licensed conditions specific prohibition against any release of the gases in the containment, so-called venting of the containment, until such time we have had a chance to do a complete safety analysis and environmental study on that. So I don't see us authorizing any entry or release of the gases or water that is in the containment for some time. Although I am sort of anxious to get on with the process in cleaning up the water that is in the



auxiliary building today.

The aspects of low-level waste, there are some low-level waste burial grounds in the United States, but it is increasingly difficult to obtain cooperation of the state in shipping these wastes. I think things are moving to improve our requirements for the packaging and shipment of wastes. If those changes are made, I would anticipate that the burial grounds which now take wastes would continue to do so.

Q. My information indicates there are three states available in the United States, South Carolina, Nevada and Washington and two of those three sites are sort of off limits at the moment for waste from TMI Number Two. And the only thing available to TMI Number Two is Washington. I suspect those two sites that are off limits, that the people in those areas are trying to generate other states to establish disposal sites. Is this the responsibility of the Federal Government to determine the location of sites or is it the state's responsibility?

A. It is my understanding that the Department of Energy is charged by law with making sure that both low-level and high-level waste repositories are available in the U.S. I see the Department of Energy has a large role to play in this process. We do not have any responsibility within the



NRC for establishing such sites. - We are responsible for reviewing them once they are proposed.

Q. Proposed by who?

A. Proposed by either the state or by the Department of Energy. The country is fortunate in having places such as Nevada and the state of Washington, very unusual geological conditions. Such as the Nevada test site, for example, being in the Mohave Desert, very dry, the water table is 900 feet below the surface. There are certain states whose properties are such that they make very logical sense for storing of waste and no pathways to man. I guess I would like to see a policy whereby we would encourage the use of these areas of the U.S. which are particularly well-suited for waste rather than requiring every state to develop its own low-level burial ground. I think each of our states have unique resources and certainly some like Nevada and the state of Washington are very well-suited for long term storage of waste.

Q. I suspect as we look over the next couple of years the most severe clean up problem will be the containment building and taking the top off of the reactor vessel to get at this fuel. Do I gather from your comments that we have not as yet developed a plan for that?

A. I understand that the licensee has prepared a plan

or had a plan prepared for him by a contractor. I don't think that plan has been submitted yet to the NRC for review. It may be in draft form. But the normal process would be that they would submit their plans to us, we would review them and go through our normal process, write safety evaluation reports and amend the license, in my view, before we would actually permit entry and any release of any of the gases that are in containment now.

Q. Let's return now to the first step in the entire procedure which would be the decontamination storage and disposal of the water that is in the auxiliary building. What is NRC's involvement in that?

A. Let me outline the general view. Then I can ask John who has been heavily involved in preparing our evaluation of that. The historical way that we and licensees approach each other is that they propose and we dispose. We don't design their plant because then we would be reviewing our own design. So we require that the licensee develop a complete design and complete safety analysis and a complete environmental evaluation and submit that to the staff. Then the staff reviews it, asks questions, requires changes, publicly issues safety evaluation reports, we meet with our Advisory Committee on reactor safeguards, we get public comment on many

of these documents and then finally reach a decision at the end of that process.

Now with regard to the Epicor system, that is the system that was proposed by the licensee, came into the NRC in report form, we reviewed that, compared it to other ways to process the water, clean up the water, and issued what we call an environmental assessment of the use of the Epicor system. And in that assessment we considered such things as personnel exposure in operating this system, potential for accidental releases from the system, effectiveness of the system. So we produced that environment assessment and that is out now for public comment. Once we get the public comment, we will make a final assessment of the operation of Epicor and the Commission has asked that we return to the NRC Commissioners with our views on the use of Epicor and they will make the final decision on whether or not the licensee will be allowed to use the Epicor system. That is separate from the decision as to what to do with the water that the Epicor system will process. That evaluation is just now beginning and will go through essentially the same process.

Would you like to elaborate John?

MR. J. COLLINS: Well, to discuss a little bit more about our involvement, we really have two involvement

programs at the site ongoing. One is our normal inspection and enforcement activity in which our inspectors are reviewing the licensee's programs, his ongoing activities to assure that they are done in conformance with the licensing conditions that are set forth in the technical specifications. Also, in the FSAR a commitment, the safety analysis commitment, and then we are also measuring his performance against the operative procedures which have been developed by him and reviewed by the NRC staff.

The other function we perform is a function very similar to that which we would perform in our Bethesda Office, which would be the review of designs of various systems proposed by the licensee in measuring those proposed modifications against the NRC licensing acceptance criteria. Those are the two main functions that we do perform on-site.

DR. DENTON: Perhaps I should add that the NRC has had a sizable presence at the site ever since I arrived. John heads up a group of 20 people who are on-site today and this includes three secretaries, there are 17 professionals. We are in the plant round the clock today and I hope in the near future to establish an office somewhere in Middletown or nearby that we could call the NRC Recovery Center and would be more publicly visible and accessible. But it is a large group

of people who are continually in the plant reviewing the day-to-day operation. Much of the review of the design and use systems like Epicor and their plans for containment entry will be done at the site in combination with people back in Bethesda.

CHAIRMAN WRIGHT: Representative Piccola.

REPRESENTATIVE PICCOLA: Thank you, Mr. Chairman.

BY REPRESENTATIVE PICCOLA:

Q. First off on behalf of my constituents and the people of the Harrisburg area I would like to thank you, Mr. Denton, for your calming influence that you had on us during your stay with us in March and April. I am only hopeful that the NRC as a whole will continue to or will match your example that you set for us in April.

One of the things that has the people of the Harrisburg area concerned immediately in any event is the proposed venting of the gases that has been proposed by Metropolitan Edison. Could you explain in some detail what the licensee will have to do and what the NRC's response to that will be before any such gases would be emitted?

A. Most of the noble gases that were released in the containment during the accident have short half-lives and have decayed down to very low levels except for one gas, that is,



Krypton 85. That gas has a rather long half-life. It is a low energy beta emitter. So that is the gas that is in question as to how to -- what is the best way to process it. I think the licensee has tended to think along the lines of proposing to vent that gas under proper meteorological conditions and he would hope to show that the off-site doses would be very small in comparison to limits. There are other ways to handle that gas. One is cryogenic distillation, which would mean processing all the two million cubic feet of air and gases that are inside the containment through a cryogenic system and removing the Krypton, actually bottling it up in liquid form. So that is another alternative that we asked the licensee to explore and we will be looking at.

But as I indicated, I intend to modify their license with a new set of licensing conditions in the near future to reflect the real status of the plan and have the license prohibit any venting of those gases without further amendment of the license. This will provide a means to insure that when they do make their proposal, it goes through our normal review process and everyone has an opportunity to comment and access to the proposal.

So at the moment the licensee has submitted no proposals to vent gas. We are awaiting his proposal and then



we will begin our review of his proposals, but it will require specific authorization from the NRC.

Q. You said you were setting up a new set of conditions. Does that mean you are raising the standards for the licensee or just changing the procedure which they would have to go through?

A. Both. The present license is the same license that was in effect prior to the accident and many of the requirements of the license cannot be met because of accessibility limits and they are not really applicable to a damaged core. At the same time, I want to introduce new license requirements to make sure that the additional systems which were built on-site and installed are properly monitored and operated. So there will be a new license that reflects the controls that we would like to have on a plant when it is in the state it is in today.

Q. The biggest concern or one of the biggest concerns that frightened people of this area during the incident was the existence of the hydrogen bubble. And it was -- I believe you stated at one of your news conferences that the existence of this bubble, I think your words were a new twist. It was something you, meaning the NRC, apparently had not anticipated. I am told, however, that there are at least five or more

physics textbooks that state the possibility of such an occurrence happening in a reactor vessel. Given that fact was the existence of the hydrogen bubble properly analyzed by your office and if not, why not?

A. The hydrogen bubble episode is one that I regret and I wish we had been able to handle it differently. We knew, of course, that metal water reactions were possible in reactor cores. That phenomena had been studied extensively. We had equations that calculate the amount of hydrogen that would be involved. And that is why we had required the containment for reactors have hydrogen recombiners. All the thoughts though about the hydrogen bubble had been in connection with large pipe breaks in which you get a large pipe break, you lose all the water in the core, you get high temperatures, hydrogen would be formed and flow out the open break in the pipe. So it would not collect in the reactor vessel. So the new twist, so to speak, in my mind was the fact that we did not have a large pipe break, we had, essentially, intact a primary system, once that valve that was stuck open was recognized and closed so the hydrogen was trapped in the system. But certainly it was not new, the phenomena that generated hydrogen was not new at all and had been extensively studied and calculations made. What was new was that we had that much

hydrogen generated in an intact system with no way to readily remove the hydrogen.

REPRESENTATIVE PICCOLA: Thank you.

CHAIRMAN WRIGHT: Representative Geesey.

BY REPRESENTATIVE GEESEY:

Q. Mr. Denton, I would like to reaffirm Representative Piccola's statement about the calming effect that you had on Central Pennsylvania upon your arrival. It was very clean at that time that there was a credibility gap, that we in this area, indeed, did need a leader who would have a calming effect and you did a very commendable job and I would like to thank you not only for myself but all the people in my district. We really appreciated that.

When you license a plant what criteria do you use to establish the licensing procedure?

A. Our process was really set by Congress with the passage of the Atomic Energy Act of 1954 in that it delegated to the old Atomic Energy Commission the responsibility for reviewing and issuing licenses and it has gotten more complicated over the years. But basically, it requires the licensees, before they are able, before they do any construction at the reactor site, must submit a detailed description of the

reactor and the potential hazards that it would pose and why it is safe to operate that plant. And now we require environmental reports, we require anti-trust matters and we require physical safeguards, all of which have been added to the original safety process. Basically, the licensee submits an application today, say, if a plant were coming in today, it would probably be on the order of 15 to 20 volumes of materials costing, perhaps, \$20 million to prepare. It would be distributed among my staff, among the various technical disciplines and on the staff we have, these range from seismology to metallurgy to a nuclear engineer and reactor physics. These individual groups review these various technical chapters of the design of the plant. The process takes only usually at least two years and maybe longer to do a complete review of the construction permit application.

We are the first level review. Then it is required by law that our product be reviewed by a statutory group called the Advisory Committee on Reactor Safeguards. This group reviews our product, meets with the licensee and they write their own report to the Commission. Then we take that report and we will write a supplement based on views of the Advisory Committee. At that time we are ready then to have a hearing. We are just one party to a hearing and the hearings are full

adjudicatory hearings with discovery, impeachment of witnesses. So the applicant's responsibility in the hearing is to carry the burden for his application. Our role in the hearing is to confirm to the Board that it meets the Commission's regulations. And then quite often the facilities are opposed by people who would prefer not to have the plant built. A decision is reached by the Hearing Board. And if their decision is favorable then I will have the authority to grant the license. Now, that Board decision is appealable to a group called an Appeal Board. And then their decisions are appealable ultimately to the Commissioners themselves. So, it is approximately five steps to get a construction permit and then the process is repeated again when the plan is nearly completed and final design details are available.

Q. Your comments raise one question. You do have a seismology department?

A. Yes.

Q. If that is the case, why then have we built plants where the one fault is where the potential for an earthquake exists that we have since had to shut down?

A. We have tried to avoid building plants near capable faults. The field of seismology has changed so drastically over the past 20 years that it has been remarkable.



I think when I joined the Commission, plants were designed quite often to ten percent or twenty percent of gravity. That was considered sort of a very high design. And the same approach was followed in building high-rise apartment buildings in California and schools and office buildings. Then the earthquakes occurred in California and much larger forces were reported. The seismic design requirements are going up immensely. And there is one plant in California that I have been associated with, that at the time was the most extensively research site in establishing design criteria and at that time design criteria was greater than any other building in California. Then, as a result of advances in offshore technology, they were able to detect faults that were offshore that were otherwise unknown and this resulted in an increase in the design requirements for those plants.

Q. In your licensing procedure do you take into consideration personnel staffing, things of that type?

A. Yes, sir. We issue, it is necessary to have a license from the NRC to operate reactor controls. So there are about 2500 people in the United States who are licensed by us as reactor operators. We specifically license the operator and the then we also look at management and technical capabilities of the company. This is an area, obviously, that is going to be



improved in the future.

Q. The comment surprises me a little because in the Washington Post, Monday, April 9th you were quoted as saying, "They were trying to cope with all demands being placed on them and they didn't have enough staff to turn to. I was concerned that they were so thin technically at that time that I could not find anyone who would give me the kind of information I would have expected."

And that you were getting more facts from your own personnel than you were from personnel at TMI. How do we justify the licensing procedure when we also take into consideration personnel and this particular statement?

A. I think I have used the word operators in two senses. One as a person, the operator who is the man at the controls, and then I have probably used the word operator to mean a power company, Met-Ed, who is the operator of the station.

In looking back I think the thought process that must have gone on was that the machines were so well designed that the people who were trained and hired to run the machine were able to operate under normal conditions, that the machine would not get in trouble itself. In other words, the machine would currently not require a great deal of skill and place a

lot of demands on operators.

I think what we found with this particular reactor design here at the Three Mile Island, it is the most demanding design in terms of operator performance; it placed more requirement for him to think fast and on his feet than it did the former Westinghouse combustion engineering design. So we need to go back and desensitize that type of machine so it doesn't make the demands. I have used the analogy it is like driving a Ferrari versus driving a Chevrolet to operating a B and W plant. We have since modified all B and W plants.

My comments with regard to being very thin was I found this particular utility, maybe there are others in the country in the same general condition, did not have the managerial and technical capabilities immediately available on their staff to cope with this type of accident. And when I made that remark I felt that the same people had been involved in trying to cope with the accident for several days and needed additional support. I mentioned that to the President of the company, Bill Kuhns, I believe, Friday night when I arrived or it was either Mr. Diekarp, I felt he should obtain additional technical assistance from the industry. And then I felt even more strongly Friday night, I mentioned it to the President Saturday morning, I felt that really the industry was standing

by and responding on an as-called basis. And that really all the questions that were outstanding such as the hydrogen bubble, the ability to cool the core down, control releases that had to be addressed and the company was busy fighting brush fires and didn't have time to do long range thinking that I felt was necessary. So he put someone else on the phone and I went through the list of industry executives in the U.S., you may recall Saturday and Sunday a number of people started arriving at the site to supplement Metropolitan Edison's staff.

Q. Who is in charge of establishing the training programs for plant operators? Does the NRC establish the program?

A. We establish the requirements for operators. In the past, we have let the licensee establish his own training program provided the operators met certain minimum requirements. They had to have so many years experience in related fields, they had to possess certain knowledge and background. But we allowed the utility to train the operators themselves and we would give them a final exam. And if they passed our exam, we did not look at the training program of the company and now in looking back, we find wide differences in the approach of various companies. I now have before the Commission a proposal to make several dozen changes in the way that we approach

operator licensing. I don't think the way that we licensed operators in the past is adequate. I think we can do a lot better in the future.

Q. Am I correct in assuming from what you said that what you have at TMI or what you had at TMI was something far more difficult to operate normally than you had anticipated prior to the accident?

A. Yes, sir.

Q. You are familiar with the accident at Toledo?

A. Yes.

Q. Same kind of plant as TMI?

A. Yes.

Q. Was there any kind of similarity between the accident at Toledo and at TMI?

A. In retrospect, we should have recognized the potential for the accident at TMI from the accident, the events that occurred at the Davis Bessie.

Q. Not only TMI but any similarly constructed plant?

A. Yes, it would have the potential at any B and W plant. And in looking back through the history of B and W plants we found that that valve that had stuck open at TMI had opened 150 times in the past at various plants in the United States and it stuck open three times. And that these reports

were buried in the 3,000 reports that we get a year from companies on unusual events and transients that occur. When it occurred at Davis Bessie, the operators responded in a different manner and recognized the valve was stuck open, they closed the valve and so no fuel damage or no untoward events occurred. And we were not smart enough at the time or did not pay enough attention to that event to recognize its true potential. It turns out that a similar case happened in Switzerland that we have now found out, about five years ago, in the Westinghouse plant in Switzerland.

What we have done in response to this is created a special group within the NRC whose sole job is to review the operating experience at the plants which are licensed and to go through these 3,000 reports that we get each year and try to separate out wheat from chaff and find out which ones and what trends so we can do a better job. We are really learning from operating experience. I think the fact that we have gotten 3,000 a year for many years, none of which has resulted in fuel damage, sort of led to an unwarranted confidence that you could have all kinds of things go wrong and yet the inherent protection of the machine you could always control it and TMI proved that is not a correct assumption.

Q. Well this is really what bothers me because some-



thing of this type, whoever reviews these reports, should recognize a great big red flag, what happens if, and apparently that was never pursued and because it was never pursued, TMI happened. Had it been pursued the way it should have been pursued TMI would never have happened. And there is really absolutely no reason if everybody would have done their job to have an accident at TMI. And that really is what bothers me and I think the whole thing comes down to the NRC staff, to a degree the Met-Ed staff because they didn't follow it up either, but as the regulator, the prime responsibility for following information of that type belongs with you and it was not done. And that really is, I think, a very serious consequence at least as far as I am concerned.

A. Let me say, Congressman, I --

Q. No, I am not a Congressman. We work here.

A. I agree completely with the sentiments that you are expressing, and to look back now, you can wonder why it wasn't picked up. My own view is that the industry had adopted a policy that if the NRC did not require it, they weren't going to make the change. So they would report these usual occurrences as they happened, but they would sit back themselves and unless we issued a directive from Washington saying put in another pump, change that procedure, do this, they were not



going to commit any funds to do it. We, ourselves, on our part, did not pay enough attention to the operating clues that were coming in and did not really plot the trends adequately to detect here was an increasing problem with this class plant and if we had spotted it, we could have prevented it.

Q. And that brings us to another problem. The Time, and I don't have the date, has an article on watching the watchdogs and in it -- oh, April 16th, in it they make the following statement, "The UCS also claims that the top staff members of the NRC are too cozy with the industry they are regulating. A 1975 study found that 65 percent of the NRC staffers have been employed by companies that held licenses, permits or contracts with the Commission."

We have the same problem in Pennsylvania in that I had asked Mr. Dornsife when he appeared before us whether or not he, at any point in time, found any fault with the actions of the NRC or Met-Ed and his answer was absolutely none. And then we come to find out that Mr. Dornsife worked for the engineer who designed the plant. And we do have, I think, a very cozy situation which bothers me. It certainly is not unethical, but I just wonder whether or not all parties involved at the NRC, in view of their previous background, are viewing things as analytically as they ought to be viewing them?

A. For <sup>my</sup> own part, I am completely indifferent to the survival of the nuclear industry. I try to carry out the role that Congress has assigned to us. If the costs that result from these requirements or result in a shutdown of the industry, then so be it. I think most of the staff sees it the same way. There may be some people on the staff who think that nuclear somehow is good for the nation. But I don't see that I, as a regulator, am paid to make that decision. Congress tells me to issue licenses only if certain conditions can be met. I make that finding independent of what the costs might be to a utility. The one place we do consider cost is that there may be differing alternatives to achieve the same objective. I would certainly be for the most cost-effective way of meeting that standard. But the setting of the basic standard, I have -- I feel no responsibility to protect the industry so to speak.

I think if the industry is going to make it, they have got to make it on their own. And as you know, I have shut down a number of plants --

Q. They do, indeed, need the help of the NRC, effective help.

A. Let me talk to you about the number of people that work in the agency and maybe elsewhere within the industry. I worked for DuPont, who is not in the commercial industry, before

I joined the Commission. But it is such a young industry almost everyone, in order to gain any experience anywhere, has to come out of the industry to the NPC. And we have made an effort not to assign anyone to plants designed and operated by the companies that they work for. So people might come to us from Westinghouse, be very expert in fuel behavior, and we would put them to work reviewing GE fuel. But it is difficult, except to obtain interns, they are about the only class of individuals and recent graduates who have not worked somewhere in the industry.

Q. We get back to a recent problem we had with water discharge and that occurred, oh, roughly a month ago at TMI. And according to testimony that we previously received, the NRC's staff person told the plant chemist seven days prior to the water discharge that a gross beta analysis test has to take place prior to the discharge of the water. Now the problem is that he told the chemist, he didn't tell Bob Arnold, who is in charge of the clean-up of the plant. He didn't tell the other NRC staff personnel on the site, so that when the water discharge occurred the staff personnel on the site was not aware that the test was suppose to be taken. Why was that procedure followed that we simply tell the chemist, we don't tell the man in charge, why didn't we tell the other staff

members on the site? Had we done that, that would not have occurred without that test first being taken.

A. It was certainly a breakdown of communications with NRC, with the people at the site. It bothered me a lot. It did prompt Vic Stello, who is head of the inspection and enforcement side, and I to get together with our staff and set up an organizational hierarchy so that it won't happen again. But let me ask John who was personally involved in that maybe to respond more fully.

MR. J. COLLINS: Well, I think Harold characterized it right. It was a breakdown in communications. Certainly the inspector who made the recommendation should have communicated that information with the other staff people. However, I think the point here that should be made, that the discharge that was being made was being made in conformance with their planned technical specifications. What our inspector was trying to have the utility recognize, that in a normal operating reactor we don't normally see beta activity that we had seen as a result of this accident. We do perform a beta analysis, but it is an analysis done after the fact. You take a sample out of the discharge water and you composite that sample on a monthly basis and you analyze it for Strontium 89 and 90. Using that historical data, because the beta activities

or Strontium activities remain fairly constant in operating plants. You use that historical data to add to that or add that number in with the gamma activity for the total discharge. So it is not as if the sample had not been taken. But here we were faced with a different situation where we were starting to recognize higher levels of Strontium than one would normally see. Our inspector recommended to the plant people that a gross beta analysis should be done and that truly was not communicated to the rest of the staff people.

BY REPRESENTATIVE CEESEY: (To Mr. J. Collins)

Q. We freely admit and recognize that up to that point all tests were done according to the rules in effect at the time for all plants. The only difference is that here was a test that proved conclusively the kind of radioactive materials that were in the water as opposed to the assumptions drawn from the other tests. It was specifically conveyed to the plant chemist that these tests have to be taken and it was not conveyed to anybody else and was not taken until after the fact. Now it bothers me that not only the fact that the chemist did not make the tests, but that the staff person did not tell the man in charge, Mr. Arnold, that he didn't tell the other staff people. Were you told, Mr. Collins?

A. No, I was not.



Q. --- You're the boss, right?

DR. DENTON: I am bothered by, more than bothered by the fact that he didn't tell John so that John could put it in writing to Mr. Arnold. I would not have expected the inspector to inform Mr. Arnold because that is not the way we operate. He should have gone up the chain of command, put it in writing and have it transmitted over by John to confirm. And he just made the requirement and dropped it and neither of the two parties informed the rest of the people at the site.

BY REPRESENTATIVE GEESEY: (To Dr. Denton)

Q. You would not disagree with the need for the requirement I presume?

A. No, sir.

Q. You understand our problem in this area then with credibility. There is a very definite gap and it is creating a lot of problems not only for Met-Ed, but it is creating a lot of problems for the NRC and there is no question about that.

A. I think it is, I'm concerned about being on top of these kinds of problems. We are going to continue to have a potential for these problems as long as we have as much contaminated water there with relatively volatile fission products in it. That is why I think it is important to get Epicor running as soon as we can to clean up that water. There

is also a potential for water that is in the containment that has this high beta concentration that it can find its way out through small leaks and other sources and it has to result in a change of recognition on the part of plant operators that there is this high beta potential.

And I have formed a select group of health physicists to review the managerial and technical capabilities of the company /in the health physics area to assure myself that over the long haul they have got in place an organization that can deal with the kinds of problems that they have.

Q. I would very quickly like to get your comments on a conversation because my time is up. It is a conversation that we had some time ago with a gentleman who has been involved in the nuclear industry since day one, who has been involved in the first nuclear sub, the plant building, the whole bit. And during that conversation he relayed a conversation that he had with a gentleman who works for a nuclear contractor. And the conversation was that he indicated to the gentleman working for the contractor that he felt some day there would be an accident in this country but not in his lifetime. The gentleman working for the contractor said, you're wrong, not only will it be in your lifetime but it is going to be very shortly and it is going to be one of three places.

One I forget, the other was VEPCO and the other was TMI. I asked him why and he said, he said, he asked the same question. The reason was bad management and sloppy housekeeping. My comment was did he tell the NRC and his comment was it didn't really matter because the NRC knew about it anyhow. Do you have any comment on that? We are talking about people who are pro nuclear, okay?

A. Three Mile Island has opened our eyes to a lot of areas that we assumed we did not need to get into before. Historically, the AEC and the NRC worried mostly about the reactor core and fuel and core physics and those sorts of things. We didn't worry about earthquake design, for example, we thought the industry could handle that. We didn't worry a lot about the organization of the company because they operate large equipment anyway under the PUC guidance and if there are sloppy operators and result in a lot of downtime and equipment damage, they will pay for it and you would think the stockholders would keep the company on its toes.

I became concerned about the same thing immediately after I returned to Washington, partially reflecting my concern that Metropolitan Edison Company was thin and I surveyed the managerial and technical capability of all the companies in the U.S. that are operating power plants with a goal of identifying

the types of management structures and the depth of talents that we would like to see in companies.

Now, we have not developed positions on this yet, but certainly the information data base is now available and we are having some very competent people look at that to try to draw out of it, why is it that Admiral Rickover has been able to operate such a successful program, why is it that other companies whose contracts with the Atomic Energy Commission were able to operate successful programs at Hanford and Savannah River and why aren't we having the same experience in our power companies. And once we get those answers maybe we can effect a structure of the power companies themselves.

REPRESENTATIVE GENSEY: Thank you very much, Mr. Denton. I do appreciate your candor.

CHAIRMAN WRIGHT: Representative Cole.

BY REPRESENTATIVE COLE:

Q. In general, I would like to in general echo my thanks to you and to your staff for the fine job you did during the crisis back in March at Three Mile Island. Last week we had the officials of the General Public Utility come in before us. Now I am starting to look at the future of Three Mile Island rather than to the past and the disaster back in March. They stated that they thought that the NRC proposed consideration

for opening Number One would be a timetable of about two years in the future. And originally, I am sure that the company was hopeful to get Number One back on line by the first of this year. Would you give me your thoughts or your views on the future of Number One at this time, the timetable?

A. You may recall that after I returned to Washington I took action to shut down all the operating B and W plants by order of the Commission until they made certain changes. Since TMI One was the sister to TMI Two, I gave that one last priority knowing that it would take more attention than plants which had a lot of differences between TMI, those plants and TMI Two. While the reactor was designed by Babcock and Wilcox in all cases, the rest of the plant was designed by various companies, Bechtel, Stone Webster, Gillford, etc. I did not issue an order shutting down Unit One at the time because I had a commitment from the company that they would not restart it without our approval. You may recall that there was some furor over the fact that they were not included in the original shutdown order and there were petitions to hold hearings on the restart of Unit One. We met with the Commission several times the Commission reviewed the applicant's position and the position of various intervenors of Unit One and decided to hold a full blown hearing on the restart of Unit One similar to the



type of hearing that was held to allow it to operate in the beginning and they have spelled out in the order the issues which were to be considered in the hearing. And I think that these have appeared in local newspapers that spell out the issues and invite the public to participate. And that is a process which will likely take on the order of a year before any decision is reached by that hearing board.

Q. My concern is that these same officials that told us that their customers are paying 15 percent to replace the fuel that was provided by Three Mile Island. I am sure the customer hasn't felt the effect of the winter bills which are forthcoming due to heating, which is a major factor in our electricity bills. So I am very concerned. I hope that first we are considering the safety of Number One and then to get Number One back on line as quickly as possible.

A. I would have been satisfied if the company had met the requirements that I wanted to lay on Unit One, had met them to my satisfaction and that was the case in the restart of all the other B and W units. If they met staff requirements to our satisfaction, we would allow them to go back in operation and hold the hearing after the fact to determine if the requirements had really been met. But I think the Commission was concerned about the psychic cost, so to speak, in this area of reopening

Unit One without the full public hearing before the fact, and in considering that they did order a full hearing. In that hearing the staff is one party to the proceeding as is the company and others and it will be up to the Board as to the timetable and whether or not Unit One will be allowed to operate.

Q. You feel that the earliest could be one year that a decision could be made on Number One?

A. With the procedure that is in place I just don't see those steps being taken much sooner than a year. These steps, incidentally, sir, are not the mechanical changes. They are more the period of discovery and interrogatories and testimony. They are the legal procedure steps.

Q. The cost of clean-up and to replace any damage to Reactor Number Two is estimated at \$400 million. The cost if Number Two does not come back on line is estimated as high as a billion and half dollars to replace that fuel source for the company. At this time, if all the requirements are met, and I am sure that is going to be further in the future, do you foresee Number Two ever reopening at Three Mile Island?

A. I see that as a possibility with the outcome resting largely on the shoulders of the applicant. If he is willing to meet the requirements of the Commission that are in place at

the time he wants to return the unit to operation and is prepared to repair the unit and make those modifications, then I would think we would not treat him any differently than any other operating plant. But it would be his decision as to whether he wants to make the repairs, conform the plant to the new requirements or not. He would balance the cost and benefits currently and then if he found them favorable, would come to us and if we found that he met the Commission's requirements, I think we would let him operate.

Q. I am sure with the difference in that amount of money that they certainly would consider replacing any damage to it and try to put it back on line.

A. I would like to mention that we require a lot of changes in all of the operating plants in the U.S. already as a result of Three Mile Island. A number of changes, including stationing people of college background in the control room at all times, requiring off-site emergency centers so that in the event of an emergency you don't gather in a trailer and a visitors center which you gather in downtown Harrisburg and some sort of surroundings, and a lot of design changes in the plant and any reopening of Unit Two would have to be in conformance with all these types of new changes that either we or the President's Commission or Congressional Investigations that

are going on may ultimately lay on operating power plants.

Q. It is my understanding that prior to Three Mile Island it was not a requirement to have an NRC safety inspector at our nuclear plants throughout the country?

A. The program had started about two years earlier and a number of resident inspectors were in place. We had not been able to recruit trained inspectors for all locations and there was not one at Three Mile Island. We had started a program that would result in inspectors at all sites.

Q. Are they presently at all sites?

A. Let me ask if either of my associates know for sure.

MR. H. COLLINS: I am not really sure.

DR. DENTON: They are being placed at sites as rapidly as we can find people who are qualified for that job and train them. That is an area which we are being very sensitive to conflicts. We want to be sure that when we put people out at a site they don't become too cozy with the utility that they are living with on a day-to-day basis. And they must recognize that their tenure will be several years and then they will be expected to move to some other site. So that we avoid the occurrence of conflict. We have developed detailed rules about what you can or cannot do such as belonging to the same country club. And when you get to some of the smaller areas

around the United States, it results in a pretty isolated life for the NRC inspector.

Q. It seems to me that the Federal Government requires to have meat inspected at all our slaughter houses and I would think it would be pretty cheap insurance to require that we have a safety inspector, after he is trained by your organization at all our nuclear plants. I am sure it would ease the pain for a lot of people and give them more confidence knowing that you people are at the nuclear sites.

A. I would be happy to provide for the record the status of the resident inspectors across the country.

Q. When do you feel that that program will be completed and a safety inspector will be at every site?

A. The program is being administered by our inspection office, which does not fall under my jurisdiction. That is why I do not know for sure. I would expect that somewhere between 50 and 75 percent of the sites today already have inspectors. We are moving ahead just as rapidly as we can.

Q. Do we have one at Three Mile Island now? I know that you have your personnel there?

A. Well, we have a chief inspector there. I think we have five inspectors from the King of Prussia Office and we have people there around the clock. Actually, John spends 99 percent



of his time there. Let me ask you, John, what is our inspection coverage at the site?

MR. J. COLLINS: At the present time, as Harold indicated, we have about nine inspectors on the site full time, plus then we have an additional six to seven people from our office and the NRR in Washington full time. Around the clock we have one reactor inspector on every shift, a health physicist on the day shift and the afternoon shift. If work requires, we would then put a man on the midnight shift and that is Saturday and Sunday.

REPRESENTATIVE COLE: Thank you very much.

CHAIRMAN WRIGHT: Representative Brandt.

REPRESENTATIVE BRANDT: Thank you, Mr. Chairman.

BY REPRESENTATIVE BRANDT:

Q. Mr. Denton, I, too, echo the words of other members of this committee on the feeling of people around, particularly around Three Mile Island, those days of the first week of April when the gentleman from Washington showed up and gave a better view and better picture of the issue at hand at that time.

A. I guess I should like to recognize a lot of the credit/should go to the citizens of this state and in particular the people who live and worked at that plant, who showed up everyday and we were willing to do their task. Without their

performance, we could not have accomplished anything.

Q. I can understand that. Let me say with tongue in cheek at least you got welcomed back to Pennsylvania. This wasn't the old story of the expert 50 miles from town on the issue of Three Mile Island. And on behalf of the citizens of Pennsylvania I would like to acknowledge and recognize the tie you are wearing today that behooves Pennsylvania. The only question I might have is do you have 49 other ties like that in your closet?

(Laughter.)

DR. DENTON: No, sir, this tie was given to me by the American Legion of this state. And this morning when I was selecting a tie, I thought it would be the appropriate one to wear. It is the only state tie I have.

BY REPRESENTATIVE BRANDT:

Q. I have several questions and perhaps your comments on it, particularly on the issue of water clean-up, the issue at hand on Three Mile Island. What we may look to over the next four years as the time of span, say, on the clean-up of Unit Two. I am glad to be following up with what Representative Cole was talking about, the issue of all the personnel on the island, I am glad to see that. Who pays for all that? Are

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they strictly federal dollars or is this money flowing back from the utility on the NRC operations?

A. There is no direct payment from the companies to the NRC for the people assigned to the site. But there was a recent bill enacted in Congress that required us to charge licensing fees. So anyone who holds a license pays a certain fee to the NRC that is suppose to repay the Federal Government for its share of services it is using. I don't think we are charging Three Mile Island their appropriate share of costs; they are probably paying the standard fee each year to own a license.

Q. The real question would be does a utility pay some type of federal tax for the operation of a plant that is under license from the NRC?

A. There is no federal tax. I don't think that our licensing fees yet result in full repayment to the Commission of all its costs. But there are certain fees associated with issuing construction permits, issuing operating license and in keeping the operating license in effect each year, and my memory is to have an operating license costs the company \$500,000 to a million dollars, somewhere in that range, depending on the size of the plant. We charge all operating plants the same. We don't attempt to vary it with the number of inspectors that

happen to be there.

Q. On the issue of the personnel, there was a suggestion that came from several members of this committee to our local Department of Environmental Resources. The suggestion was that over the next, through this clean-up operation, that perhaps it would be good for DER and the NRC and Metropolitan Edison to have a weekly news briefing for particularly local elected officials so that perhaps there may not be as many surprises as what may happen over this clean-up operation.

A. I think that is an excellent idea. Apparently some members of the state have already contacted my staff and discussed it. I would be concerned if the format was such that it were we and the licensee, and we were telling the public of this and that. But if there can be a format whereby the licensee would describe what he is doing and what his plans are and the NRC can say what it intends to do and the state can say what it is doing, so that the public can see that we are not all in bed together with these activities, I would be in favor of some sort of a periodic briefing, weekly would be fine, if we can reserve the separation of functions that I think are important.

Q. Your staff is aware of that suggestion?

A. We have been talking to, I believe, a Mr. Jones, Mr. Jones of the State Government about initiating such a series.

Q. Very good. I live within less than a mile of Three Mile Island and represent that district that surrounds the portion from Lancaster County. I am asking you how can you help me, what can I tell the people I represent and my friends and neighbors about what we may expect over these next four years on the clean-up of this Unit Two?

A. I think you can tell them that it is one of the safest reactors in the U.S. That it is getting unequal attention at this point in its life that it may not have gotten before. If we are able to locate some office space in Middletown or nearby and put a large part of our staff into the center so that they will be accessible to the public and be able to answer the questions that are bound to arise as day-to-day events unfold, I would like to be able to communicate better with your constituents about these activities and I think a large part of the anxiety levels that are created are the same feelings I had back in Bethesda the first few days. It is a feeling of uncertainty, that you don't know what is happening and maybe you are not being told what is happening. And somehow if we can set up an institution so that the public can be sure that they know what we know and have a chance to ask the questions of various staff members, that would perhaps enable them to make better decisions. We would be happy to cooperate



in any such thing that might seem appropriate.

Q. I appreciate that comment because the type of individuals that are coming to me that are concerned about Three Mile Island and the whole issue of radiation, etc., I don't categorize those people as pro or anti in any issue. We had worked and lived in the area for a lifetime and I have viewed Three Mile Island prior to March 28th, saw all those people working over there, this is great, this is a lot of employment, we are going to have better electricity and we are going to have cheaper electricity. And suddenly after March 28th I realize that I was part of some type of evacuation plan and I might have to move out and it brings that question in an individual's mind that you never thought too much about. And suddenly you have all these questions. I would just like to see that happen as soon as possible, that you do get your staff in place off-site, so to speak, so that people can be more accessible. I have one other question. Have the results of the containment water be returned yet?

A. Yes, they have.

Q. Can you comment on them?

A. They are still being looked at. They show, I think the staff view at the moment of the results, and this is from water inside the containment that was obtained by boring

through one of the penetrations and taking a sample, show overall level of activity somewhat lower than they had expected, but show different distribution of isotopes than they have expected. For example, very high concentrations of Cesium, for example, which is a hazardous isotope and some other isotopes such as Technetium 99 and ones which are not quite as volatile as Cesium are there in surprisingly large amounts. and are still being looked at by our chemists to try to infer what it means about the condition of the core. But I guess what it tells me is that while the level may be a little lower, it may indicate more different isotopes got out of the fuel during the keyed up phase than we initially realized. And it is the presence of some of these other isotopes that emit beta radiation that is causing some of the health physics problems in the plant when drips from the primary coolants get over there and result in very high beta contamination levels.

Q. You say the water is a lot lower --

A. Not a lot lower, somewhat lower. Maybe John would like to, let me ask John if he could amplify on that.

MR. J. COLLINS: Let me just say a bit more about the analysis. We have received the preliminary analysis, as Harold indicated. I met yesterday with the technical people of the licensee's organization to discuss the data. The people

who have performed the analysis for the utility will be on-site tomorrow. We hope then to provide that information to the public once we have reviewed their calculations. I would hope sometime tomorrow that information would be available in a form that we could provide it to the committee.

About the activity level, we had made some projections based on what we believe the core damage had been. As a result of the analysis it shows that it was probably a factor of two less than what we thought. For example, based on our upper bound estimate, we had estimated in the order of 270 micocuries per ml of Cesium. And the number is more like a 170. So we were a little high. Principally, it was in the isotope section that Cesium and Strontium are lower than what we had expected.

DR. DENTON: Just looking down the list there are about ten isotopes that are there in some quantity. And included in the list are those which have lower volatility and don't come off unless the fuel reaches higher temperatures than we had originally thought. I think the data they indicate that some of the fuel got somewhat hotter than our initial estimates were in order to produce this mixture of isotopes. But it will take some time before people are able to go back and recalculate a new mixture. But we expected the Cesium, it

is there, but it's there as John said in somewhat lower quantity, but the other isotopes, Lanthanum, Tellurium, etc., that are somewhat surprising to show up and their significance will have to be assessed.

Q. I have a right to assume on that that clean-up operation of the water containment, that really has nothing to do with the Epicor system, that will be a completely different system?

A. That is my understanding. While many components of the Epicor system will probably be used in any system that cleans up the containment, I think this plan is to have an entirely different system to treat this water and the system would be designed to handle just the isotopes we find in the water.

REPRESENTATIVE BRANDT: Thank you.

DR. DENTON: Let me mention one other part about the island. I find the staff out at the island jokingly worried about whether the island will sink because everything is going on the island and nothing is leaving it. I don't think anything has left the island in six months.

CHAIRMAN WRIGHT: At this point we will take a five minute break.

(Brief recess.)



CHAIRMAN WRIGHT: Representative O'Brien is next.

BY REPRESENTATIVE O'BRIEN:

Q. Doctor, I, too, want to congratulate you for the job you did and I hesitate asking any critical questions. It is like talking against Jesus Christ when you talk against you in Pennsylvania.

(Laughter.)

But I am going to ask you some critical questions.

A. Go ahead.

Q. Getting back to Unit One, Representative Cole was asking you about why it is going to take so long, the hearings. There is seven other plants that were built by Babcock and Wilcox and they are in operation. Why are they in operation if they are of similar design and everything else?

A. None of the other plants are exactly identical to Three Mile Island. And part of the plant that is supplied by Babcock and Wilcox Company, and that is the nuclear steam supply system, the part that is inside the containment, equally important in considering this accident are the parts of the plant that are outside the containment and typically they are designed by the company themselves or with different architects and engineers. So the plant down at Duke Power



Company, for example, is different than the plant in California or the Davis Bessie with regard to these components outside the containment. In those cases, the Commission permitted me to allow those plants to restart once I made the finding they had satisfied the terms of the order. So once my staff had visited the plant and satisfied themselves that they had made the changes we had asked for, we have written safety evaluations and I had a basis for restart, I signed orders lifting the previous order and allowed them to go into operation. With regard to TMI One, the Commission reserved on the authority to permit to restart and delegated that authority not to me but to the Atomic Safety and Licensing Board in order to provide the citizens of the area a complete opportunity to raise issues and be sure those are addressed in an adjudicatory procedure.

Q. When you make the statement, you say it is not really the same design, but basically it is the same design, the same principle, that the other seven plants are similar in design. So when you are talking about major changes, there are not that many major changes involved in the different designs than the Three Mile Island. I am talking about these other seven.

A. I think you're right. In some areas the plans

are identical and in other areas --

Q. In other words, to get to the point I am getting, some are identical. So let's go to the Commission, you are the Director. Do you advise the Commission when they meet what action to take?

A. Yes, I do.

Q. Do they listen to you?

A. Normally.

Q. Are you saying to them that Unit One should not operate until they have hearings?

A. I remember, I advocated treating Unit One in somewhat the same fashion I had treated the other B and W plants. Unit One was the last plant on my priority list and I did not want to return to this until I had completed my review of all the other B and W plants because TMI<sup>One</sup> was certainly the closest to TMI Two and therefore would require the greatest number of changes. Whereas, the other ones, if they differed from TMI One or Two, I would not have as many changes to review. So I put off beginning the action on Unit One to be the last plant that I would work on. But there were a number of petitions before the Commission requesting hearings and laying out their arguments for that and the Commission decided to establish the Hearing Board as a result of that.

Q. What you're really doing is, aren't you really saying to the people of Pennsylvania, you know, we are playing a game. We are saying because of an accident there we are not going to let that operate, we are going to have hearings on that, but that plant is no different than the other seven and the people in those other areas are just as concerned as the people in around Three Mile Island. You know, I'm for nuclear. I think it has to come, but I am very critical of NRC and this is the point I am trying to get across. I think NRC is playing a game with people and at the expense of people, as Representative Cole is bringing out. Not only is it going to be 15 percent, but their increased costs of oil, it may go up 20, 25 percent those people are going to pay in that area. Now I think that a plant should be safe before operating. But why can't they make the major changes that the NRC wants and why can't they get back in line like the other seven?

A. Well, even if the Commission had left -- had delegated me the same authority they had for the other plants, I would not have let TMI One go into operation until I was convinced it was safe. I think what the Commission was attempting to do in setting up a Board here was to afford the citizens around the plant a more formal opportunity to have their views considered rather than just having delegated me the

authority to make the decision.

Q. In other words, you say if the people around the plant have hearings and testify that they don't want that plant to ever open, they are in the majority, NRC is going to take the position that that plant will never open even though they have opened the other seven and operated them?

A. One of the factors that the Commission has set down to be considered by the Board is the psychological cost. That is a new area for the Commission to --

Q. I'm talking about Unit One now. Unit One is ready to operate with the major changes which I don't know they made yet. But if they make those changes are you saying that they are going to take into consideration the cost involved in operating that Unit again?

A. No, the difference as I see it, and I am not a lawyer so I may not have the correct viewpoint, is that in other plants the Commission was content to have the staff exercise its judgment as to when they had made the changes that the Commission and staff wanted made. Now in this case, because of the public interest in the plant and the anxiety levels that would result from reopening, they decided to not delegate that authority to me but delegate it to a three member board to hear and weigh themselves whatever arguments were put



forth. So before that Board the staff of the NRC, which I represent, is just one party. And we will reflect to the Board our views on whether the licensee has complied with the Commission's requirements and should be allowed to operate or not.

Q. What is the Commission going to gain by having public hearings and hearing people? Not that I am opposed to having them heard, but what are they going to gain by the average citizen going down there and testifying about what?

A. They will gain what they would gain in any other public hearing. The Commission has chosen to have public hearings before they issue any construction permit. It is part of our standard operating practice and they are reverting back to that for this reopening.

Q. I have attended public hearings in Wilkes-Barre on the plant. The majority of the people testified that they did not want it, but the NRC approved it. So it bears out that they don't go by what the people say.

A. Well, I guess the argument would be that while the views of the people are not always followed, it provides people who have a differing view or just differing technical knowledge to come forth and make their argument and test the adequacy of the staff views through cross examination.



Q. Okay, let's go to Representative Geesey, and some of the statements you shocked me by making them. You said that the NRC carries out only what Congress regulates them to carry out. Congress set up the NRC Board. Gave you the authority to approve or disapprove any new plant in the country. You have the right to grant them a license or deny it based on the plants admitted to you if you feel they are safe, am I right or wrong?

A. Yes.

Q. Do you make changes in those plans when the plans are submitted to your Board?

A. Yes, we do.

Q. When Congress enacted this and set up the regulation that you are saying that you carry out, the NRC Board drew up their regulations and what you would work under and how you would approve or disapprove plans submitted, am I right or wrong?

A. You are right.

Q. So in other words, Congress only gave you the right to do your duty and you are carrying out orders from Congress to do your duty to protect the people in this country to make sure that any plant plans that are submitted, in your opinion, would be safe, am I right?

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A. Maybe I should say what I understand to be sure we are both discussing the same thing. Clearly, Congress gave to the NRC Commissioners, who are five people, who were confirmed by Congress to hold that job, they delegated to the five Commissioners certain authority. Now these five Commissioners promulgated rules and regulations that govern the issuance of licenses and the operation of the plant. Now I am an agent of the Commission. I direct certain parts of the technical staff and my job is to assess proposals against the Commission's regulations and yeah and nay plans, depending on whether they meet the Commission's regulations. In talking to me, you are not talking to the Commissioners. I work for the NRC Commissioners, who are the ones who have delegated the responsibility --

Q. But you're the director, you are the top man that they look for advice from?

A. They look for advice from me on whether or not proposals meet their regulations. But in the case of TMI One restart, they chose to remove that authority from me for restart and put it in the hands of a board, three member board, that reports to them and that was their decision.

Q. They look to you?

A. I will do the same job on Unit One that I would

have done if the staff had been making the decisions. But they, by setting up a board, provided a different process for reopening Unit One than they permitted to follow in the others.

Q. What I am concerned about, the NRC and here is where I am very critical of NRC, I have watched PP&L submit plans to NRC. They have public hearings and everything else on it. Originally, that plant was suppose to go -- be built at a billion dollars. The NRC constantly made changes and had them rip out and change plans and specifications as the plant was being built. This makes me believe that the NRC does not know what the hell they are doing.

A. Well, we were attempting to learn from experience with these 3,000 reports that we get and those changes were to prevent some of the accidents from happening again and the one that happened at Davis Bessie is the one that we happened to have missed. And if we had picked it up and made the change at TH1, it would have been one of those cost factors we mentioned. But as I understand it, Congress nowhere delegated to the Commission the need to balance the oil imports or the cost of power. Our mission is to protect the public health and safety.

Q. You just made a statement there that scares me. You're learning from experience. I was always under the impression, you know, I am concerned about nuclear. I have

talked to Westinghouse. They said they had a standardized plant that they put a lot of money into, and I am not trying to sell them, and they feel that that plant is safe, they went over it. With all the technology in America you sit there and make a statement and you say, well, we are learning from experience. But the people of Pennsylvania or this nation cannot stand by a plant and have the NRC learn it from experience and say we don't know what we are doing. Am I right?

A. Well, I would like to think we know what we are doing, but it is a very young technology. It is only 25 or 30 years old. Shipping Port is only 20 years old. And we are not building today the same types of plants that were built and operated years ago. These machines are much bigger and more complicated and there is not very much experience with the larger machines. So as these new machines come on I think it is prudent to look at what happens in their first few years of operation and correct these problems in some of these plants. It would have been in retrospect and perhaps advantageous to have built more plants that were identical and we had a lot of experience on. The Shipping Port plant, certainly we have a lot of experience on the Shipping Port plant. But Westinghouse has elected almost to build every plant different. And only in the past few years have they standardized the plant and so these

standardized plants are now under construction. Where almost every plant operating in the U.S. today is a little bit different and evolved in a little different direction than previous. And that is what makes a review of it much more complicated to the staff.

Q. You testified before the President's Commission that you are going to recommend to Congress to increase your staff personnel by 100 and then another time you testified here also in there that you're going to give training to all the operators, even though you put them on the job you are going to have on-the-job training. But yet you testified here stating that you are learning from experience yourself. Why doesn't Congress or why doesn't the Commission, NRC go to Congress and say look, we don't know enough about nuclear, we think you should spend money and get these answers. I hesitate now saying I am for nuclear when listening to you. Because you sit there and tell me we don't have all the answers.

A. I don't think we ever will have all the answers and there are few technologies which do. But it is interesting, before I took the job, the office that I direct had not had any growth in personnel for three years and the attitude of the over-site committees was that you're doing a fine job, there aren't any accidents, you obviously don't need to get more staff



and do more. And after TMI, Congress passed, without my request, another hundred people because they now want more things done. They want operating experience reviewed far more thoroughly, they want operators trained better, they want procedures reviewed, they want resident inspectors. I just think this is the way our country seems to be something of a crisis management attitude. That without a crisis things are rather dormant and then when there is one it prompts a great burst of action to try to do better. But I don't see that we are a lot different than other regulatory agencies, the FDA that constantly look at new drugs, for example, and new scientific findings come along and new experience. I see that we, as an agency, have to stay abreast of experience and technology and require those changes that reduce the probability of accidents. I don't think we will ever get it to zero, but I think it is incumbent on us to try to press the probabilities down.

Q. You made the statement that each individual plant has to leave it up to itself to prove itself. You don't mean that, do you?

A. That is the way the law is structured, that every case is a separate docket and it goes through the same challenge and potential challenges as the one before it.

Q. Is the NRC constantly the watchdog of any nuclear plant in Pennsylvania or in the United States?

A. I think after Three Mile Island, we did assure that there are resident inspectors in all the plants in Pennsylvania.

Q. But aside from that if some nuclear plant was operating and they are operating in violation, wouldn't the NRC have the authority to go in and shut them down?

A. Yes, they would.

Q. Then they are not really operating on their own. They are inspected constantly; the watchdog is NRC, aren't they?

A. Yes, we are the watchdog and I think it is our standards that we set that determine the performance of the utilities. And if our standards had been higher prior to TMI, we might have averted the accident.

Q. You said you are constantly learning, but yet in the Davis Bessie that was brought up here by Representative Geesey you didn't learn by that because it was not passed on to the seven plants that had the same operation.

A. Well that is the Commission -- all these 3,000 reports that we get a year are automatically distributed to all the other operators of nuclear power plants. And in looking back, some of the people who work for B and W had some concern

following the Davis Bessie event and wrote to their management but it never quite surfaced and B and W never recommended any changes in the way that the plants operate to avoid another one. This is the Dunn and Kelly memos, people who work for B and W, within my own staff some people saw the potential in B and W plants to be somewhat more sensitive, the so-called Novack memorandum, and wrote some memos. Other people, members of the ACRS had some questions about the Davis Bessie plant. In hindsight, when we are dancing around this issue and everyone had a little bit knowledge about the Davis Bessie thing, we just didn't have the insight to put it together and say, hey, we perceive a pattern in this type of plant and we should stop and fix it.

Q. Why back, two years ago I wrote the Congressional group in Pennsylvania telling them that I thought the NRC was not doing their job and did not know what they were doing, why couldn't the Congressmen and Senators know the same thing that the NRC was experimenting or trying to get an education, on-the-job training at the expense of the people of this country?

A. We have at least five over-site committees in Congress and they are quite active in reviewing how we do perform.

Q. They are on-the-job training too, are they?

A. No, I think many of them have been there many years.

(Laughter.)

REPRESENTATIVE O'BRIEN: Go ahead, I'll get you again.

(Laughter.)

CHAIRMAN WRIGHT: Representative Moehlmann.

BY REPRESENTATIVE MOEHLMANN:

Q. Thank you, Mr. Chairman. Dr. Denton, I know that this is no news to you, that many in Central Pennsylvania are not enamored of the idea of discharging water that is at TMI in the Susquehanna River. I am a little curious about the process. The water that is in the auxiliary building will be cleaned up prospectively by Epicor II. When you separate, you stated that the water that would be prospectively discharged or handled in some other fashion would be to drinking water standards. Now, I would like to ask about that portion of the residue, what form will that be and what volume, for example, that part that is not clean water?

A. Let me ask John to give you a detailed answer, but the water will be processed through what are called in the

chemical engineering profession deionizers, somewhat similar to the filters on your swimming pool. These are specially treated deionizers which will remove this radioactive fuel assembly from the water and then will have trapped on them all the activity that was previously dissolved in the water. My understanding of these resins will be vacuum dried as the first step so that the water level is quite low in them and then they will be packaged in a special type of cask and this cask is the type which has withstood -- which passes our test for 30 foot drops and fires and collisions, etc. And the plan would be to ship these resins off-site to one of the three burial grounds that usually accept these resins. And in this form they are not a lot different, if at all, except perhaps in some types of activity from the resins that are being shipped to these sites now by all the power plants in operation. If you would like a more detailed discussion let me have John amplify it.

REPRESENTATIVE NOEHLMANN: Fine, thank you.

MR. J. COLLINS: I can't add too much to what Harold has said. Volume-wise, based on the evaluations submitted to us by Metropolitan Edison we would estimate that between 10,000 to about 15,000 cubic feet of resins would be used to clean up the water from the auxiliary building. I was going to put it



in terms of liners, but that really doesn't mean too much, about 10 to 15,000 cubic feet of resins would be used up and that would contain the activity that was removed from the water during the processing of it. Amounting to -- shipments that would amount to in the order of about 100 to 150 shipments and that would also include other types of wastes; the dry compacted wastes, the clothing, materials that are used in the decontamination process.

BY REPRESENTATIVE MOEHLMANN: (To Mr. J. Collins)

Q. Is that the form that you would also suppose the residue from the containment building would eventually reach?

A. I would expect that the wastes produced by decontamination in the containment building would be larger volumes because once we begin to make an entry into the containment to do decontamination work or clean up the water, we are talking about larger volumes of water and more decontamination than we would have to do in the auxiliary building and the fuel entry. So I would anticipate the volumes would be much larger.

Q. You spoke of the possibility of disposing of the cleaned up water by an evaporation process as opposed to discharging it into the river. What is the technology of that?

A. Well, I believe what Harold was saying is that the utility people are looking at various alternatives. One of

those alternatives would be to place the water into a sealed pond and allow natural evaporation of the water. Thereby it would be an atmospheric discharge and not a liquid discharge. And that is a very common technique that is used in the chemical industry for the evaporation of chemicals. Many of your chemical plants that are using cooling systems with chemicals in them will put them into a sealed solar evaporation pond and allow them to evaporate.

Q. That sounds to me to be relatively inexpensive. What would be the disadvantage of that as opposed to everything but discharge which would be fairly cheap?

A. Well, one of the major disadvantages, and I certainly am not, I don't have any cost figures so I can't really say it is relatively inexpensive, but it does mean that one has to be very knowledgeable about hydrology and geology of the area in which he wants to place that. And then putting it in a pond that you can assure some integrity of that pond over the lifetime that you are going to use it. That is not an easy program.

Then one would have to also include in his design provision for constant monitoring, people are monitoring so you could assure yourself that you were not getting any leakage out of the pond. Just because you had a reduction in volume

there coming from the evaporation, it could also be leaking out the bottom of the pond. So it is one technique that is certainly a feasible alternative. When the utility proposes to us all the alternatives, we will make our own independent evaluation and recommendations, as Harold has indicated.

Q. I hear you saying that after the water is cleaned up it will be able to be used for drinking water. I guess the problem in the downstream area is, one of the problems, is frankly a lot of people just simply don't believe that. And the other side of that problem is that it sounds like too easy an explanation. Will there be a difference, what will be the difference between that water and the water that flows naturally in the Susquehanna?

DR. DENTON: Several years ago the Commission conducted a rule making hearing to set limits on releases from power plants and that resulted in a regulation called Appendix I which controls the level of radioactivity. So that is the level all operating plants in the U.S. are being required to meet and that was what was being met at TMI prior to the accident. But I think in meeting Appendix I, we normally allow some credit for dilution to the nearest receptor. And you are also required to look at fish that may spend their entire life at the outfall and concentrate radionuclides and

this sort of thing. So you don't take credit for the entire river dilution.

What is being proposed here is to meet Appendix I standards with this water before it is discharged into the Susquehanna. The Susquehanna would dilute it further, would be a large factor, before it would get to anyone's drinking water supply. So in essence the water that would be released from Epicor would be, would contain, less radioactivity than comparable water being released at the other operating plants.

Is that a fair assessment, John?

Now I understand downwater users who don't want one atom in their water that comes from TMI even though it meets otherwise Federal standards.

BY REPRESENTATIVE MOERLMANN: (To Dr. Denton)

Q. But it would not be down to background level?

A. No, it would not be down to background. There would be some small incremental amount over background. But the Appendix I levels are set so that someone drinking his full water supply from a power plant would get less radiation from that water than he would from, say, a round trip to California and back. It is five millirem a year. That is the level that is required to be met at reactors by people who consume their

entire dietary intake of water found from a power reactor outfall. It is a very low level of radiation above background.

REPRESENTATIVE MOEHLMANN: Thank you, Dr. Denton.

DR. DENTON: Let me make one other point that I maybe glossed over too quickly and that is the form of the waste, the form of the resins. I mentioned vacuum dried resins. We are also giving some consideration as to whether we would actually want to solidify those resins further to put them into some sort of matrix which would make their escape and transport even more remote. We have not made a final decision in that area.

CHAIRMAN WRIGHT: Looking at my list of committee members who would like to ask questions, it appears this session is going to be more lengthy than I originally anticipated. In addition to which we have a group from Montgomery County who would like to make a presentation. So I have decided we will take one more committee member and then take a half-hour break for lunch and come back and continue this afternoon. Representative Klingaman.

REPRESENTATIVE KLINGAMAN: Thank you, Mr. Chairman.

BY REPRESENTATIVE KLINGAMAN:

Q. Dr. Denton, I feel compelled to add to the accolades to you for what was called here this morning your calming



influence. You at least impressed those of us who at that critical time got our bearings from the media as the fellow at the plant who was worthy of belief. However, contrary to Representative O'Brien's remarks, I do dispute your divinity.

A. So do I.

Q. The question, I'm looking at a copy of this morning's issue of the Lancaster Intelligencer Journal and there is a story in it written by one of their journal staff headlined TMI Accident Determined "Maximum Accident". It reads in the first paragraph, a professor of nuclear physics said here Tuesday night latest official reports, and it doesn't anywhere in the story indicate where the official reports came from, latest official reports indicate that the nuclear accident at Three Mile Island last March was a "Maximum Accident". He says, on a scale of one to nine with nine representing the worst, Dr. Mieko Kaku (phonetic) of the City College of New York said he learned recently that the Three Mile Island accident was termed a class nine accident. Now to me the word maximum is the ultimate, the farthest, the extreme. My question to you is do you think that the accident that we suffered at TMI was the maximum, that is, the worst that could happen to us in a nuclear facility?

A. No, sir, I don't think it is the worst that could

happen to you. But I can elaborate on, perhaps, the class nine aspect of the accident. We have in our regulations a requirement that we consider certain classes of accidents and these are classes one through eight. Class nine is defined in our regulations as an accident involving a series of failures of equipment more severe than assumed in design basis accidents. And it goes on to talk about that these classes are generally arranged in decreasing probability and increasing consequences. We were asked by the Board on the Salem reactor whether or not in the staff's opinion the Three Mile Island accident was a class nine accident. We looked at the events during the TMI accident very carefully and we concluded it did meet the Commission's definition for a class nine accident in that it involved sequences of failures more severe than postulated for the design of the plant. And a series of failures included a great loss of coolant accident, when the valves were stuck open and the operator turning off the emergency core cooling system. That is a series of failures more severe than we require the plant to be designed for. However, we pointed out to the Board that the consequences from this accident were not those that you would normally think of as associated with a class nine accident because normally the class nine you think of containment failing also and all the material that would be in contain-

ment would be released to the public. But in the strict legal sense of regulations we concluded that it was a class nine accident because of a series of failures. However, we noted that consequences were no where near those that could be the maximum. I think probably that is what is being referred to here.

Q. He goes on here to say at one point, Kaku also said latest figures he was able to obtain from officials involved in the TMI incident shows there was 90 percent damage to the fuel in the reactor core when the coolant was lost and that 75 percent or nine feet of the 15-foot tall core was uncovered. He goes on to say, in his illustrated presentation Kaku showed pictures of partial meltdown of other nuclear reactors and a variety of accidents at nuclear power plants in which he said there were fatal accidents to working personnel in the immediate area where the accidents happened. Is that true? Have we suffered any nuclear accidents as a result, an immediate result of the accident in the area?

A. Not in the commercial licensed field.

Q. I am thinking of nuclear power plants, I am not thinking of nuclear submarines and that sort of thing, military applications, I'm thinking --

A. Well the best known was the so-called SL-1 accident

which was a military reactor many decades ago did result in three fatalities out in Idaho. But in the licensed field, the field I am associated with, we have had almost very little field damage much less radioactivity releases that result in threats to public health and safety. But in the early days of the atomic energy field, I am sure other countries had reactor accidents also. I would really have to stop and think about whether there had been fatalities in those early days from experimental type reactors. Is that your --

Q. I was thinking from reading this that there were in the United States in the nuclear power generating industry that there may have been fatalities some place that we haven't heard of?

A. There have never been any fatalities with reactors licensed by the AEC or the Atomic Energy Commission. The only fatalities I am aware of at the moment are the three associated with that military reactor early in the program. Maybe there are some more in that kind of experimental program, I would have to stop and recall.

Q. A little farther on in the article the good doctor of nuclear physics offers a seemingly extreme solution to the issue and from it I am inclined to gather that he may be anti nuclear. He says, the professor of nuclear physics advocated

the sealing in cement of nuclear power plants.

I won't comment on that and I don't ask you to. The one point I would like to clear up in my mind, he said it could easily be done adding that we get only three percent of our total power from nuclear operations.

I have heard in these hearings anywhere now from three percent to twenty, twenty-two percent. To what extent in the United States are we dependent upon nuclear energy for the generation of electric lighting power?

A. That is something we keep statistics on and publish every so often. My memory is that during the past year, 1978, nuclear power supplied something like 13 percent of all the electricity generated in the country.

REPRESENTATIVE KLINGAMAN: Thank you, Mr. Chairman.

CHAIRMAN WRIGHT: Okay, let's break for about half-hour for lunch. A half-hour doesn't give you much opportunity to go downtown. We'll reconvene at a quarter of one.

(Whereupon the hearing was recessed at 12:15 p.m.  
to be reconvened at 12:45 p.m.)



(The hearing reconvened at 12:50 P.M.)

CHAIRMAN WRIGHT: The afternoon session of TMI, Select Committee, is called to order. Our first member to ask questions this afternoon is Bob Hollis.

MR. HOLLIS: I would like to pose my questions to Mr. Collins on Mr. Denton's left, who has had a pretty easy time of it so far, I assume. Mr. Collins, you are Deputy in charge of the State Programs Division, whatever it is in the NRC, and your responsibility is the review and approval of evacuation plans and assembly, that type of function. Correct?

MR. HAROLD COLLINS: I am one of three Assistant Directors in the office of State Programs in the NRC and I'm the Assistant Director for Emergency Preparedness and the function of that particular part of the office deals with the review of state and local government emergency plans, supportive of nuclear power facilities.

MR. HOLLIS: Within your office, directly involved in the review and approval of the emergency evacuation plans for nuclear power plants, how many personnel do you have?

MR. HAROLD COLLINS: Now, or before Three Mile Island?

MR. HOLLIS: Let's go prior to and now.

MR. HAROLD COLLINS: Prior to Three Mile Island, there was myself and two other professionals and my clerical personnel, four, total.

MR. HOLLIS: Four people were responsible for 78

plants, whether they were on line at that time or in various stages of construction? How many nuclear power plants were you directly responsible for the evacuation planning, etc.?

MR. HAROLD COLLINS: Well, I have got to clear up something here. The function of our office is to look at the emergency plans of state and local government on a voluntary cooperative basis. The facility emergency plans are looked at in Mr. Denton's office and I believe prior to Three Mile Island, there were about the same number of people in the office of nuclear reaction relations that dealt with the facility plans. So, when you lump everything together, you are talking about a total of around eight people between the two offices.

MR. HOLLIS: Eight people in the two offices for how many power plants?

MR. HAROLD COLLINS: About 48 sites, about 70 operating units.

MR. HOLLIS: All right, as a result of the accident, how many people are there now?

MR. HAROLD COLLINS: I now have about 16, but most of these people are temporary people that we have hired and also Mr. Denton has loaned us some of these people.

MR. HOLLIS: With 16 people, the new rules and regulations that have been just promulgated as a result of the accident, do you feel that you are capable of performing -- I

am not saying you, personally, but the NRC is capable of ensuring that emergency operations plans are adequate? That the general public is taken care of as a result of the plan that's an effective plan? It's been tested and everything?

MR. HAROLD COLLINS: If we have the right number of people that we have adequate resources, yes, we can do the job. I think the problem prior to the accident was that we were suffering in terms of resources and also in terms of budget. In other words, the wherewithal to provide the necessary training programs and so forth for state and local government, although we did make some progress in the training area. To give you an example, when we first started our training program for emergency preparedness with the state and local governments, my budget was \$20,000 a year. Today, it is about a million dollars a year.

MR. HOLLIS: Out of this million dollar budget, is there any money in there to provide financial assistance to state or local communities in the development, preparation and required equipment that they might need to effectively have an emergency plan?

MR. HAROLD COLLINS: Not through the fiscal '79 budget. The answer to the question is no. For fiscal year '80, we have asked for and the Commission has approved and now it's up to Congress to approve a half million dollars for grants to certain states and local governments that have what

we call problem sites, in terms of emergency planning. An example of this would be communities located around the Indian Point facility in New York and possibly communities around Zion. That is just \$500 for fiscal '80. We also received certain funds for obtaining certain kinds of specialized radiological monitoring instruments for distribution to the states and local governments that have power plants; about \$200,000 for that in fiscal '80.

So, what I am saying here is that we are getting more people. We are getting some more funds. It's not a great deal more increase, but it's certainly better than what we had before. Oh, yes, Mr. Denton just reminded me that the emergency planning picture in the United States is changed as of April and really for sure as of July, with the establishment of the new federal emergency management agency.

MR. HOLLIS: Okay, as a result of the establishment and finally getting under way the federal emergency management agency, do you feel and the GOA has recommended, that this agency assume the responsibility for making policy and coordinating radiological emergency response planning in lieu of the ERC. What is your position and what is the NRC's position in this matter?

MR. HAROLD COLLINS: Well, we have gone on record in a number of letters from the Director of my office and also from Chairman Hendrie FMEA and Chairman Hendrie had a meeting

with Mr. Macey (phonetic) of FMEA, the Director of FMEA, yesterday. We have taken the position that FMEA should assume the coordinating and policy making role for this particular kind of emergency planning and preparedness; that is, the support of nuclear facilities.

However, we also take the position that FMEA will not be able to do this alone, because there are a number of other federal agencies that all have some kind of expertise or ax to grind in the nuclear power plant business. Examples of those, of course are our own agency and the Environmental Protection Agency, the Department of Health, Education and Welfare. So, we are going to be looking to FMEA for leadership and coordination in setting policy and in coming up with the wherewithal, across the whole federal spectrum so that we can get adequate emergency plans into place; but FMEA is still going to need us in this business, although we will step down from the lead agency role that we have had in the past.

MR. HOLLIS: You mentioned a half a million dollar appropriation the next fiscal year's budget for problem plan, one being Zion and the other being Indian Point in New York, which I am familiar with. What are the problems there and why would they be getting the money and what type of equipment or what is the money going for that should not possibly come into this area? The reason I say that is that one of our local directors here, county director in which the plant is located,



has applied for federal grant for communications equipment. It was denied, yet there was over \$700,000 had been appropriated to study effects of the accident, but yet communications equipment, that is the most critical thing in emergency evacuations. Effective communications has been denied.

MR. HAROLD COLLINS: Well, the \$500,000 that the Commission has approved for the next fiscal year for this minor aid money, as it would be, we haven't really identified specifically where that money is going to be sent. Obviously, if we were to divide up the \$500,000 by 50 states or let's say the 40 states that have or ultimately will need these types of emergency plans, each one of the states wouldn't get very much money. We have also completed a funding study in our office which will soon be published as an official NRC report, which indicates to us that there is a great disparity of resources between various counties and various states. Some states and local governments are relatively affluent with respect to having funds to spend on emergency planning. Others are in the poor house. Those that are affluent, one wonders why they haven't spent more money and I think it's been a lack of will or priorities. So, I think we haven't made a decision as to how we are going to spend this money. We will be advising the states and local governments that at the time we have the funds, that it will be available and we will have to take a look at the applications and try to spend the money that we have

in the best possible fashion.

MR. HOLLIS: Well, last week --

MR. HAROLD COLLINS: So, we haven't ruled out Pennsylvania or its local governments.

MR. HOLLIS: Last week in testimony for this Committee from GPU which indicated that they would be willing to have placed into the rate base structure, funding to support local governments, plans for equipment, etc., for emergency evacuation planning, particularly if a county, as you say, did not have the thing. Now, they haven't said who would pay for it. They suggested consumers, but around most nuclear power plants, the electric generated does not go to the local areas as in this case. So, if someone were in New Jersey they were maybe getting the electricity generated by that plant and maybe going to pay for it as a local; but, has the NRC taken any position and maybe I ought to refer this to Mr. Denton, as to they now pay a million dollars or so licensing fee that is part of their fee or something. They will have to pay something toward the development of emergency planning and things like that. Whoever can answer.

MR. HAROLD COLLINS: Well, I think maybe I can. We have certainly been looking at this and as I have mentioned to you, the funding study that we referred to as the Soloman report, prepared by Dr. Stephen Soloman of our office over the past year, which will soon be published, one of the things that

Dr. Soloman recommends in his report, which ultimately will go to the Commission and also will go to the new FMEA, is that perhaps the licensee ought to be required to pay \$1 million upon the licensing of his unit. Also, every time one of these units is licensed, that this \$1 million goes into a fund managed by the federal government, or whoever, and this fund be solely utilized for emergency planning. Dr. Soloman estimates that between the year 1980 and the year 2000, his study reveals that about \$150 million will be required for adequate emergency planning for the whole United States in support of these facilities. That's not a lot of money, \$150 million, when you consider that a new plant today, a single unit, will cost you well over a billion dollars.

So, we have started to look at how we are going to fund it. One of the things I'd like to point out is that two states already have passed Legislation requiring that the nuclear utilities in their state be assessed and provided funds for this kind of emergency planning. Those two states are Illinois and Oregon.

MR. HOLLIS: They have passed Legislation?

MR. HAROLD COLLINS: Yes, they have. Yes, sir, they have.

MR. HOLLIS: My next question would be, in order for a plant to get a conditional or a license, there must be under the new proposed rule or whether it's proposed or actually

placed as such to get a license, there must be an approved state and local emergency evacuation plan, true?

MR. HAROLD COLLINS: Are you referring to the Hart Bill, Senate 562?

MR. HOLLIS: Well, I thought you got a new rule out requiring a ten mile evacuation plan and equipment and that type of stuff, prior to a plant receiving a license that they must have an approved evacuation plan. Is this in rule now?

MR. HAROLD COLLINS: You mean the state plan or local government?

MR. HOLLIS: Right.

MR. HAROLD COLLINS: No, it is not enforced at this time. The Commission did issue an advanced notice of proposed rule making for public comments. That's the status of the --

MR. HOLLIS: Well, there is an eleven week inspection or something going on down at Three Mile Island right now for emergency evacuation planning. You got a two week, five week, you got a team that goes in --

MR. HAROLD COLLINS: Yes, that's being done by the office of the Nuclear Reactor Regulations with the licensee.

MR. HOLLIS: Okay, but that part of this that they have to approve an off-site evacuation plan has to be within --

MR. HAROLD COLLINS: That's tied in with the office of State Programs Review of Pennsylvania plans and local government.



MR. HOLLIS: What I am getting at is it is not the intent of the NRC that prior to the issuance of the license to operate, that the facility must have an approved emergency evacuation plan to include up to ten miles. Is this what the plan is effectually?

MR. HAROLD COLLINS: There are two aspects and you are touching on both of them here. We have revised, right after the Three Mile Island accident, requirements on the licensees. He has to do more. He has to have clearer indication within the plans, such as dropping water level, as to when he would declare a site emergency. Better definition of radioactive releases, we are requiring that he install monitors so that he can determine what is being released from the plant so that we won't be in the situation what we were up here, flying blind. We required additional off-site monitors so that you can be sure that there is no gas in the coverage. We are requiring an off-site response center that you mentioned, where the licensee and the state officials and federal officials can all gather and discuss the strategies for the days ahead.

We are doing this at all operating plants and that plan does require the licensee to contact all the localities out to a distance of ten miles. The ten miles is a recommended distance by the EPA-NRC task force.

We are doing this, while at the same time realizing that Congress may require as a condition of new licenses or



even as a condition of continued operation of existing plants, approval of state emergency plans. That is now in Congress and hasn't been approved by Congress. The Commission has it out for comment. So, we are going ahead with the licensee's part, because we think that has to be done regardless of the outcome of the other part.

MR. HOLLIS: The reason for the question is that the -- it came out again in testimony with the GPU officials last week that if a local community or a state or county, no matter who it was within the emergency -- the off-site emergency evacuation planning and operations, refused to have the right equipment, refused to enter into because of local government's dislike or be what it may for that plan that's there could, in essence, preclude a licensee from operating a nuclear power plant. Now, where does the NRC stand and what is the position going to be if the budget area we are talking about, a rural area, they don't have the money to go out and procure communications equipment. They don't have more alert equipment, whether it be sirens or be what it may. What would happen in that case?

DR. DENTON: In the past, the approval of state plans has not been a preconditioned for issuance or continued operation. The Commission, itself, is considering making it so through their rule making and Congress is considering making it so through federal Legislation. So, the chances look good

for some additional conditions or linkage between state plans and licensee plans. I would say it's extremely likely in the near future.

MR. HOLLIS: But, in essence, though I think the bottom line is that if a local community decided that they did not want to participate for one reason or the other in the emergency planning around the nuclear power plant, then basically the licensee could be precluded from operating that plant because they didn't have an approved evacuation plan.

DR. DENTON: Under some of the schemes proposed, that is exactly correct.

MR. HOLLIS: Well, that's basically what I was trying to get at. It would appear that the emergency planning prior to Three Mile Island had sort of been in the back pocket. Nobody paid much attention to it. They had a plan. They didn't have a plan. There was infrequent -- they have never been tested. Now, under this proposed plan, as I understand it, there has to be an off-site evacuation test once every five years?

DR. DENTON: Yes, sir.

MR. HOLLIS: Now, Congress has recommended also once a year that they have a test. What is your --

DR. DENTON: We have, as part of the licensee's plan, we were going to require a test at least every five years and we thought that was one a month, which was within our capabilities

of the plan and execute and evaluate. That's how we picked five years. I am not sure what Congress is seeing, but it does sound -- one year does sound familiar.

MR. HOLLIS: I am looking at the government operation House report. They suggest once a year.

MR. HAROLD COLLINS: With respect to our guidance documents for state and local governments in emergencies planning which has been out since 1974 and then later amended in 1977, priority guidance documents. We recommend the test once a year and that is the current condition that we operate under in order for a state to maintain its concurrence that it should have an annual test once a year.

Now, this does pose problems for a state like Pennsylvania and a state like Illinois and a state in which there are more than one reactor site. For example, in Illinois or you could say this about Pennsylvania, if you are going to have an exercise at every nuclear facility in a state with maybe nine reactors, you can see you are going to have an exercise about every month. So, our intent was not to have that, because that's quite a burden; but to have one exercise in the state once a year. That would involve the state and its local governments associated with that nuclear facility. Then, the other nuclear facilities, they would conduct exercises once a year involving their local governments with perhaps some limited state participation.

In these states with a lot of reactors, you know, if you want a full blown exercise with every reactor, I think the state people in the Civil Defense organization and the radiological health organization would be doing nothing but exercises. We think that some kind of happy meeting ground has to be arrived at here and make it reasonable, but yet to make it effective.

MR. HOLLIS: But, basically, what I think this Congressional Committee determined was that you people had published rules and regulations and said you would do this and you haven't done it. The rule has been in since 1974 that said you will have all these tests and, in essence, you never did test the plans and things like that. Is this true?

MR. HAROLD COLLINS: No, the licensee plans have been tested every year. Also, typically over the last three or four years, we have observed anywhere between about 12 and 18 state exercises a year. So, testing has been going on, but it hasn't been across the board.

MR. HOLLIS: But the testing has primarily been a communications test with limited people from the outside. Now, we are talking about that it was the nuclear plant notifying their house people. They sent a team out to check instruments. They would notify the state bureau or whatever it was, radiologic protection, and they would notify maybe the state Civil Defense. Primarily from a communications standpoint,



there was never any notification of the local county Civil Defense Director or he, in turn, would then notify his people down the line. They were never brought into the testing standpoint. It was just at the highest level with a minimum of confusion and a minimum of outside notification. There was no blowing the siren or something like that. No one wanted to say anything about what was going on at that plant because people wouldn't have responded anyway.

MR. HAROLD COLLINS: Well, what you say, sir, is only partially true. It varies. The way testing has been going, it varies all over the United States. Some of the tests have been the kind of tests that you have just described. Others of them have been much more comprehensive, involving many local governments, the state government, even the federal government. One of the problems with testing emergency plans in the past has been that, you are quite right, it hasn't been done on a consistent basis. What you describe is accurate for some of them, but it is not accurate for all. What we had proposed now is to provide the state and local governments with standardized exercise scenarios, a book of them, of about 12 that they can select from and the utility can select from. They can pick a different kind of test every year. This is what's been needed all along, was the standardized testing. So, what you say is partially correct.

REPRESENTATIVE GEESEY: Can I just make one comment,



here? Just to follow up Bob, let me tell you how bad the testing really was. The community that I live in did not receive an evacuation plan until the Friday after the accident and then they got it in the mail. The evacuation point was a school building right on that five mile circle. Now, that's the kind of testing that we had in this area. My only comment.

MR. HAROLD COLLINS: May I say something to that? I think the record will show that as far as the office of State Programs and the NRC goes and as far as other federal agencies goes that deal directly with state plans as opposed to licensee plans, our position has always been that these plans ought to be in place. We have been publishing guidance until it's been coming out of the ears all over the place. There is all kinds of guidance out there, booklets, checklists and everything else. One of the problems is getting the state and local governments themselves to do anything with this stuff. So, you know, I would kind of like to bounce that right back in your lap and say, where were the Civil Defense Directors in these communities and why didn't they follow the guidance and why didn't the State of Pennsylvania seek concurrence in its plan? Those are questions that have to be asked and answered by state and local government people. The federal government can't do all of this on its own. So, some state and local governments have been responsive. I regret to say that the communities in this state, on an honest basis and I am being

candid, have not been responsive to our government's plans.

REPRESENTATIVE GEESEY: I can assure you that some of those responsible have been taken to task.

CHAIRMAN WRIGHT: Representative Klingaman.

REPRESENTATIVE KLINGAMAN: Thank you, Mr. Chairman. Dr. Denton, this afternoon's issue of the evening news raises some more questions along the lines of our conversation this morning. There is a headline that says "TMI Accident Exceeded Limit of Plant Design." Then, when the story is continued in the interior of the newspaper, the headline says "TMI Mishap Rated Highest in Severity." Now, when we talked this morning, you said that on this scale of one to nine that was devised by the Commission, we were talking about failures or a succession of failures that determined the classification of the severity of the incident. Now, then, is there any direct correlation between the severity of the equipment failure and what is also called in here, the radiological consequence of the failure? Are they directly correlated as one and nine or another and nine or do you need two different sets of scales? Can you elaborate a bit further?

DR. DENTON: In the TMI accident, it turned out that they were not correlated. When they were originally devised, it was felt that the more successive failure you had, the more likely you would have an occasion to breach the containment and have major releases of radioactivity. This accident, we have

defined as a class nine because it meets the test of successive failures of equipment more severe than the design basis. In terms of consequences, it would fall in the lower end of the scale. It would probably be a class three or four, well within the consequences of many of the lower scales. So, it would be failures that tripped the class nine, not the consequences at all. I think continuing studies have shown that the off-site doses of the north gate was about 100 millirem, as I was saying when I was here, which is no where near the doses that we calculate or even class eight accidents.

REPRESENTATIVE KLINGAMAN: You are saying that in terms of consequences to the people living in the area, it was a three or four?

DR. DENTON: Yes, sir.

REPRESENTATIVE KLINGAMAN: But in terms of -- the number of failures. The number of equipment, it was perhaps beyond your expectations to what might be able to happen?

DR. DENTON: That is correct. The consequences of classes one and two are normal operations. So, in terms of off-site doses of this and the consequences, it's definitely at the bottom of the scale, a little bit above normal operations; but classes six, seven and eight have really made your consequences, assumed to be associated with it. That has been a source of confusion and some of the technical staff think that we shouldn't follow the definition of class nine that's

actually in our regulations, which would base it on consequences and have written descending opinions to the opinion we filed with the board. We have also provided copies of those to the board. We have based our reading of class nine on this mechanical failure sequence and not on consequences.

REPRESENTATIVE KLINGAMAN: Well, so that you don't scare the devil out of us again, I suggest two sets of scales. I gather in this case that actual effect was bad enough, but certainly not a class nine in severity; but that possible effect, possible, could possibly have gone up to nine, if we had two sets of scales?

DR. DENTON: The two sets of scales, in order for this one to cross the threshold from where it was into a larger one, would have required failure of containment and releases of the gases and liquids that were inside. Then, the outside doses would have been markedly different. Some of the staff has since done some comparisons of the off-site doses with other every day hazards. While I wouldn't like to cast them as being absolutely exact and incomparable, one comparison is that the equivalent mortality risk for someone standing at the north gate in the course of the accident is the same that you would incur from smoking two packs of cigarettes during your lifetime. So, the actual consequence is off sides to the maximum exposed individual are small in comparison to every day risks.



REPRESENTATIVE KLINGAMAN: I certainly suggest some effort for clarification on the part of the NRC, because there is a paragraph here described through an individual who says, "the NRC and the board has always maintained that a class nine accident is not worthy of a discussion, since the chances of it happening are so low," according to Harold Schultz (phonetic). This book is for an environmental advocate. So, there obviously is a great deal of misunderstanding between what you perceive to be a number nine severity with the radiological consequences on the area and, frankly, we don't care if the plant fails, but we don't want it to get out of Three Mile Island.

DR. DENTON: In terms of consequences, it was certainly not a class nine accident. It was well within design assumptions.

REPRESENTATIVE KLINGAMAN: That is, the radiological consequences of it were well below nine, in your opinion?

DR. DENTON: Yes, sir.

REPRESENTATIVE KLINGAMAN: Thank you, Mr. Chairman.

CHAIRMAN WRIGHT: Representative Itkin.

REPRESENTATIVE ITKIN: Dr. Denton, I would like to start off by getting into the areas of the NRC originally has or had jurisdiction and cognizance of the design of the particular plant involved in which the Commission said was satisfactory enough to operate from a safety standpoint of view. I would like to ask your opinion in terms of the



automatically activated sump pump, whether that was reviewed and whether that was considered to be an appropriate feature for the safety, in view of what's happened. If the answer is no, then why not?

DR. DENTON: It's not considered an adequate feat for today. I appointed, when I returned, the task force to look into the accident and recommend those short term actions they felt necessary to implement while the longer term investigations were going on. The containment isolation is one that we think was not properly handled in this plant. We would prefer diverse activation, actuation of containment of isolation to begin with, so that the sump pump would not pump water out during these times. The reason it wasn't reviewed goes back to our practice with what we call the standard review plan. In the early '70's, we didn't have detailed procedures for the staff to fall on. We more or less relied on the leadership of the branch chiefs in the individual areas to set the pattern for review. In the early '70's, we developed what we call a standard review plan. These became the bible that a review would follow in looking at a given plant design. There were some plants that were in the pipeline that the decision was made at that time, the grandfather. So, not all plants that came through in that time period were checked against the standard review plan and the standard review plan, if it had been applied at TMI, would have resulted in a

different design.

REPRESENTATIVE ITKIN: But this appears to be from a very simplistic look at the plant. It's something in case that you needed to keep the water in the containment, but why would you want to activate a sump pump to go on automatically? It's just so simplistic, the concept of it, that it really boggles my mind in terms of all of these FSAR, PSAR and 15 volumes that take up shelves, where the subject's simplistic option could have gone under technically. What I guess I am concerned about is if the NRC demands increasingly more and more paperwork from the licensee, that the value of paperwork itself can hide. Design flaws which would not necessarily be hidden and be more easily exposed. Would you like to comment on that?

DR. DENTON: I think a lot of people share your concern, that maybe we have become obsessed with the large loss of coolant accident and we intend to focus one of our resources on paper studies of the behavior of the plant, given the break of the largest pipe. It's been shown by several studies that was a rather improbable event and that more likely causes of accidents were transient and small locus. I think in the future you find us going more out to simulators and being sure that the NRC staff, as well as the licensee staff, runs different kinds of transients through the simulator and get a more hands-on approach to the real problems that are likely to

occur in reactors, rather than spending so much time on hypothetical problems. If you go back and look at the major thing that occupies an operator's time, it's not preparation for the major pipe movement, it's all the small things in the plant that keep happening and occupying. We think inside the NRC that we have diversified with highly competent technical specialists in very narrow fields. We kept stacking them up, specials, as we needed them. Somehow, perhaps we lost the broad overview of one of those events that were really contributed to safety. We have attempted now to pull it back together and take a wholistic view of reactor design, so that the designer of the equipment understands it's got to be operated by humans and maintained by humans and that there have to be procedures written. We are attempting to recover something that perhaps we lost through the years, upon the degree of specialization that we don't do.

REPRESENTATIVE ITKIN: That gives rise to the next question of whether the redundancies that were inherent in design were overwritten because of a linkage of operator errors in doing at times the wrong thing. That aggravated the situation and caused the ultimate problem. Would that be a correct assessment?

DR. DENTON: That would certainly be a major factor and goes, for example, to the very first failure in the accident, the name of the fact that the auxiliary feed water valves were

closed when they were needed. This is the sort of thing that in retrospect could have been easily wired into a status computer that would have prevented operation without all of the valves in the plant being aligned properly. Some of our long term thoughts are things like valve positions and green lights and red lights instead of having the operator remember what's wired for what sequence, we should just wire all of those up in some microcircuits that are available today and relieve them of some of those types of tasks.

REPRESENTATIVE ITKIN: That was the next question that I was going to get you with, with respect to feed water pumps being -- not pumps, but valves being closed. It's never been resolved satisfactorily to my mind. Has it been to yours, why those valves were closed?

DR. DENTON: I think in spite of all the investigations and depositions taken, we have been unable to identify conclusively why they were closed. We found no one who does not think he left them in the correct sequence.

REPRESENTATIVE ITKIN: Do you believe after spending considerable amount of time in the area and in the control room that such valves could have gone unnoticed by the operator, in view of the fact that there are very large lights? They are right on the console in which the operator was performing the test involved in dealing with the particular transient.

DR. DENTON: Well, I have the benefit of hindsight and it's hard to say what I would have thought if I had walked



in the day before the accident. For example, would I have spotted it? It's very difficult to understand why it wasn't spotted.

REPRESENTATIVE ITKIN: You are familiar with the switches involved and you know the location. You know the particular 'display' lights that exists on the console board. It seems to me and apparently it hasn't been satisfied in your mind, why they went so long undetected.

DR. DENTON: That's still an open question with us, yes, sir.

REPRESENTATIVE ITKIN: This gives rise to the next question. We dealt with imperfections in design, dealing with uncertainties in operator performance. The next thing comes with malfunctioning of equipment. For example, the pressurized relief valves not closing properly. That's one part of a redundant situation which wasn't detected. Okay? We hear recurrently the problems of leaky valves of other physical systems in the plant. I shouldn't use the word malfunction. We call it abnormal functions. I am concerned about what the vendor's responsibility to the licensee is, to the utility operator in this regard. It was told last week that the contractual arrangements entered into by the utility and its vendors is simply, you know, the direct liability; that is, if the pump fails, we will replace it free of charge, without being liable for any type of consequential damages that may



occur. Has the NRC looked into this and do they believe that the vendors ought to be non-labile for any malfunctions? Don't they have a product liability responsibility here?

DR. DENTON: I see it as two parts, the fact that the valve was leaking in the first place and I believe it was in excess -- the temperatures in that tailpipe were in excess of what the procedures would have allowed. So, if there had been an excellence of operations concept in place, that valve would have been repaired and the fact that it stuck open could have been readily detected. I think there are also procedures in place that would have reported that temperature on a trend reporter, so that the operators could have more easily seen that it failed to return closed after it opened. I think that somehow we have to institute incentives that encourage excellence of operation by the utility operators. One of the devices that we have proposed to the Commission concerns a situation in which they find themselves operating with a safety system that could not have otherwise performed its safety functions. Suppose there had been no accident but they discovered both auxiliary feed water valves closed. Well, previously we would have permitted them to open those valves and ask for an explanation of what went wrong and how your procedures are going to be improved in the future. We are now considering stronger incentives, such as requiring that whenever they find themselves with a loss of safety functions to cease

operations until there can be public meetings and a real investigation of why we got into this mode. We are looking for a way to enforce an excellence of operation into the industry or maybe it would be the second time we find this occasion.

That's a little different question than the vendor responsibility. The vendor licensee response is one that I think needs some looking into. This is not one that we have looked into in the past. We have always dealt with the licensee and held him responsible. We really didn't look behind how he obtained or what liability suppliers to him had. I don't know if I have answered your question in this vendor liability field. I think it's one in which we just didn't open that door to look at vendor responsibility.

REPRESENTATIVE ITKIN: I take it if you are trying to develop excellence in the industry, that you have to look beyond the licensee; because if his suppliers are very limited, then he must accept the contractual obligations that they force upon him. I don't think that's necessarily proper and I think it's something that the Commission ought to investigate, if excellence in their plant operations is the objective.

It goes to the next question. We talked about putting pressure on the licensee to develop this excellence and certain demands or penalties assessed. One thing that comes to mind, and apparently industry will probably fight you very violently

on, that's the demand that when certain things malfunction that you shut the plant down. You know, that becomes a question just because something is behaving abnormally, should we lose power for so many days or hours in order to correct the situation or can we make that rectification at the earliest convenient times? I would like to know your reaction to the industry criticism to your demands in this regard, that you may come down too tight, too hard and every time an abnormal occurrence, they are going to be shutting that reactor down.

DR. DENTON: Well, our original proposal was to require that our reactor shut down every time. That sure has gotten industry's attention. I think we now have the attention of the senior management of every utility in the country. It may be too harsh a penalty to require for every such occurrence. In other words, there could be occurrences in which the operator makes a momentary goof in following procedures and immediately restores the plant to the right operation and the system was only out of service for three seconds. Maybe there would be some others, then. The utility has proposed to do anything but remove the unit from operation. Fine us. Very large fines, that will get stockholders' attention and the attention of management. Initiate show cause proceeding as to whether the license should be issued and the issue being lifted. Do anything other than cease operations.

I think that the commission will go out for public

comment before it adopts any view in this area. There certainly is a down side to ceasing operation. I think the staff latched onto that idea originally because it was the most powerful lever that we could think of. There may be other ways to assure this excellence of operation that we are seeking, other than forcing the unit down and forcing additional costs onto the rate payers.

REPRESENTATIVE ITKIN: You talked about operators and training earlier and apparently your organization is going to make some attempts to improve operator training and performance?

DR. DENTON: Yes, sir.

REPRESENTATIVE ITKIN: Let's get down to the specific point where the concern was the pressurizer and whether or not the reactor was going solid. It seemed to me, with an engineering background, with the check of the temperature and the pressure that a primary coolant system would have determined immediately that it was nowhere near going solid. In view of that particular, very simplistic appreciation for the system that something had to be wrong either in the meter reading or pressurizer or what was going on, how do you intend to bring the operator up to that level of sophistication so that they can deal with that?

DR. DENTON: I think operators are at a level where they understand steam tables and would recognize that at certain temperatures you don't have a solid system performing.



We used to, in our testing of the operators after they had been trained by the company, we had a passing grade of 70. Seventy was the average grade in half a dozen categories. You add up the average grade and the average of 70 would pass. That permitted some operators to have very low scores in some categories such as thermodynamics, perhaps, or heat transfer or -- provided the average was okay. The theory was that the crew -- it was important that the shift crew have among them all of the skills needed. One of the changes we have made, and I think it's very important, is that we are going to require that the operators make at least 70 in every one of the test categories in which they are supposed to be trained and have an 80 passing grade overall. We are also going to require that they be trained on a simulator where the simulator has introduced multiple failures, such as occurred at TMI, to be sure that they can respond to things beyond the design basis. They have largely been trained to respond to single failures and equipment, which is the kind of plant that we have designed for; but by increasing our requirements so that they really are trained to respond to many different failures all at once, maybe we can raise them to this level.

The final thing that we are doing is requiring what we call a shift safety engineer in the control room at all times. This would be a college level trained individual with a lot of experience, whose sole job would be to advise the



senior control room supervisor on matters of safety importance if they arise and to look at just things as has happened during the first few minutes of TMI. He will, at other times, when nothing is happening and life is so boring, he could be looking at some of these 3,000 licensing event reports that we get each year and calling out those that are appropriate to his type of plant and tell us what he is doing to prevent those things. So, I think by adding a really knowledgeable individual to each shift crew whose sole job is safety and not operation, we will make a significant change.

REPRESENTATIVE ITKIN: Well, that's different than the resident inspector that you are talking about?

DR. DENTON: Yes, sir.

REPRESENTATIVE ITKIN: Well, what is the function of the resident inspector?

DR. DENTON: The function of the resident inspector is to be the policeman on the beat, to audit the licensee's performance to the licensed conditions.

REPRESENTATIVE ITKIN: So, he is an employee of the Commission, where the resident engineer is an employee of the utility?

DR. DENTON: That is correct.

REPRESENTATIVE ITKIN: Now, I have difficulty getting this really highly trained super duper engineer to go down to Three Mile Island and park his rear on a seat in that control

room, particularly on the third shift. Now, I can appreciate a young, gung ho, college graduate that has the last degree of engineering to go, feeling that that is important, at least in short term to pick up a variety of experience. I would think that that would probably would be the area in which you would draw it. Do you think that that would be sufficient from your perspective and what you expect of this individual?

DR. DENTON: I think I see the individual that I have described as shift safety engineer as a temporary fix, until we can increase the standards for those individuals that we call senior control room operators so that we require control. Eventually, I would like to get the same expertise into the senior reactor operators that we have and at present we don't differentiate that much, in my view, between reactor operators and senior operators. Ultimately, I think we could combine one person in the function of command of the crew, as well as its detailed knowledge of reactor performance and safety. I don't want to add another person just for the sake of another person. I saw him as a stop-gap measure while we devised new requirements for the senior reactor operators and industry brings them into performance.

REPRESENTATIVE ITKIN: My reaction is not the stop-gap, but one of a classification measure by the NRC to the general public. That's how I interpret it in terms of what you are going to get out of it. First of all, I don't think you are

going to have the people willing to be employed by this particular activity. You talked about college level. The only person I have in college is the one getting right out of college or shortly thereafter.

DR. DENTON: I think we saw that the company would send engineers from its headquarters down on some sort of rotating basis and require that they all serve a month or something as a shift and then back to their normal operations.

REPRESENTATIVE ITKIN: You know, they may be learning from the operators. You know, many times in experience we have someone who has more academic training than somebody else, but the other one has the on-the-job training and the reliance shifts the other way to the person sophisticated with the equipment and not the person with more knowledge. I have my doubts as to the success of that particular plan.

DR. DENTON: A lot of people have doubts about it. I guess we are trying to adopt a daisy approach which has shift engineers or officers --

REPRESENTATIVE ITKIN: But they want to become admirals, you know, and they have to do that.

DR. DENTON: I thought money might be an adequate enticement, though, for these shift safety --

REPRESENTATIVE ITKIN: How much are you offering? You mentioned earlier today about the containment water samples. Apparently from the analysis that's been performed, it seems that

the core damage was not as severe as your calculations might have -- or worst calculations that you might have anticipated?

DR. DENTON: No, I left, I guess, the wrong impression. From some of the samples we had of the primary coolant in the auxiliary building, but didn't actually have a sample of the water in the containment before we estimated what the level of cesium might be. It turns out that we did underestimate -- I mean, we overestimated what might be there by a factor of two. Then, we did find some other elements in the water that are not as volatile as cesium, indicating the core temperatures might have been a little higher than we originally expected. I don't think we reached any determination yet about the extent of the core damage. It's still a lot of calculations going on as to what went on during the transient period. Industry is doing the calculations and we are, too. I was just trying to characterize the initial interpretation of this one sample. I have cautioned against too much reliance on one sample. There could be played out along the sample lines and I think we would want to try another sample again in maybe a different technique. There are some elements in the water that I have found a little bit surprising, who aren't as volatile as cesium.

REPRESENTATIVE ITKIN: These elements would be from what part of the system?

DR. DENTON: They would be from the reactor fuel, technetium, lanthanum; ones that have some volatility, they



cool off before melting, but --

REPRESENTATIVE ITKIN: So that there may be some -- I heard you use the word melting. When you say less volatile, that means that they would probably be more housed in the fuel pellet rather than be caught bounds within the clad so that if there was clad rupture, you would not necessarily see those elements present unless there was something more damaging that occurred actually to the --

DR. DENTON: Well, these could get out, though, without actually reaching fuel melting. As the temperature of the fuel goes from 3,000 to 3500, more and more of these kinds of elements could come out. So, they are not necessarily indicative of melting. They just confirm the fact the very high temperatures were reached, but whether melting or not, it's still kind of an academic question.

REPRESENTATIVE ITKIN: You have a definition for melting?

DR. DENTON: Melting is where the uranium oxide pellet itself turns to liquid. That's more than the 5,000 degree range. We have previously calculated the fuel temperature as 3,000, 3500 range. As you get in that range, a little higher, some of these other elements begin to diffuse out of the pellet, without the pellet actually melting.

REPRESENTATIVE ITKIN: Well, there have been certain statements made that things aren't as bad as they were thought



to be.

DR. DENTON: There have been statements on both sides. I have heard some people look at the same day and to have analyzed the accident to date that it's not as bad, the damage, as the NRC says. Other people said the damage was greater than we originally thought. We have a group of people, the group headed up by Mitchell Rougaman, who is doing a special inquiry for the Commission, who is looking at the very question of the extent of the fuel damage. I don't think we in the NRC have reached any different conclusion than we have had months ago, but there are a lot of different groups, industry and others doing these studies. We probably won't know for sure, until someone looks at the fuel as it comes out of the core.

REPRESENTATIVE ITKIN: The reason I raise the question is because I am concerned about adequate time in case an evacuation may be necessary. It was originally assumed that as soon as the <sup>amount</sup> of the coolant falls below the level of the fuel rods, then immediately -- define immediately. I don't know. In terms of a very small time frame, the fuel started to melt. I think it's very, very important that to be able to gauge just how much time we have. I think people were saying that we have 12 hours before we would have to make a decision like this. In fact, the Governor made that statement, I think, before the county commission in that regard that he was advised that he didn't have to make an evacuation decision immediately.

DR. DENTON: Well, that's true, because by Wednesday night, the water level had been recovered above the top of the fuel. So, I gave them numbers after I arrived that were based on if we lost all of the water altogether, how long would it be before the fuel would melt and melt through the bottom of the vessel and you might rupture the containment. So, I did all those calculations and you can do them independent of the extent of damage that occurred Wednesday morning, if you follow me.

REPRESENTATIVE ITKIN: I understand.

DR. DENTON: If you take the amount of heat that was in the fuel, so that as days wore by, it would take longer and longer periods of time for a release of radioactivity.

REPRESENTATIVE ITKIN: Although, the cooling properties of the steam obviously was completely void, even for those two hours. It must have been a pretty heavy water quality under that pressure.

My final question, because my Chairman is giving me the business here. My final question is, the Chairman of the Reactor Safety Commission, I think it was August 15, in his report, they were reviewing the report concerning about the risk assessment. What is the chance of having these types of accidents? One in a million, one in 10,000, one in a billion. The interesting thing that I derived, just by the summary statement is that that Commission -- well, they are concerned

because of it. The Wash 14 report doesn't apply to Germany because they have a higher population density. Therefore, the perimeters mentioned in Wash 14 wouldn't necessarily apply, but they compensated that by saying that we don't have to worry about it because we have more redundancy in our system than the reactors in other states. Why don't we have the same degree of redundancy, if it's true?

DR. DENTON: They calculate a core melt probability about a factor of four higher than the core melt probability calculated in Wash 1400. They do, in some systems, have systems which are more reliable, but not in all. They sought them with the same basic reactors that are available in this country and in some areas they have added equipment and in other areas they have subtracted. I think I would be very interested in looking at that. There is one thing they have got that we haven't and it's a so-called bunker system, in which you make a single system where you put all the equipment needed to cool the core and get water in the core and have its own emergency power and its own controls and make this separate from the control room, to be operated out of the control room. So, whatever goes wrong in the control room, if it's attacked by terrorists, if it has fires, whatever happens to disable the control room, there is one dedicated system that is ready to go and keep the core covered. They haven't done that at all plants, but we are looking at that same sort of system, ourselves.

REPRESENTATIVE ITKIN: Thank you very much. It's been very enlightening. Thank you.

CHAIRMAN WRIGHT: Representative DeWeese.

REPRESENTATIVE DeWEESE: I would like to ask Dr. Collins some questions. Sir, what was the state of readiness of the Pennsylvania Emergency Management Agency and how well did they coordinate with the other state agencies in the accomplishments of their mission?

MR. HAROLD COLLINS: Well, first of all, I am not Dr. Collins. I want to get that straight. That happens to be my nickname. Anyway, with respect to the State of Pennsylvania's readiness, say, days of Wednesday, Thursday and Friday, we could only assess that from Bethesda by virtue of telephone conversations and so forth. So, I am not so sure that, you know, any impression that we had there was an entirely accurate impression. Probably, the people from our regional office that were on site by that time and some of the other people that were here in Pennsylvania would have much more insight into that; but we, as the days went by, we did find out that there were certain things being done within the Pennsylvania Emergency Management Agency, itself; and some things which had not been done in the Department of Environmental Resources that were starting to be done on an ad hoc basis as the accident scenario progressed. So, what this told us was that on Wednesday morning when the accident occurred, from an emergency preparedness standpoint,



there were indeed certain things that the state and local governments did not have in place at that time. I think most of the state authorities, Colonel Henderson and Tom Gerusky and some of the other people are totally aware of what these things are. I don't know if I have answered your question. There were some things which we noticed were going on which probably should have been done before Wednesday.

REPRESENTATIVE DEWEESE: Thank you. My number two question, final question, who made the decision to recommend an evacuation to state officials in the morning of the 30th and what was that decision based upon and subsequently, did you find that it was a wrong decision?

MR. HAROLD COLLINS: Well, I guess what you are referring to is my telephone call to Colonel Henderson. I was the one that called him and what I did was that I transmitted the recommendation of the senior management people that were in the operation center in Bethesda, the NRC operation center at the time. At the time that that recommendation was made and the people there decided to make it to the state, I think it was a good recommendation, based on the information that they had at that moment. Then later, as more information came in, people thinking, of course, started changing; but at the time that it was done, I think it was -- I would stand by it myself, based on the information. Mr. Denton probably wants to say something.



DR. DENTON: I think I had gone home from the response center Thursday, feeling rather sad when the accident had crested that the situation was fairly well understood and came in Friday morning to find that the situation had worsened considerably in the eyes of those of us in the emergency response center. By that time, we realized that there were high temperature readings above the reactor core and the steam was being super-cooled. The steam was being generated in the reactor vessel because of flow blockage. There were continuing high reports of radiation levels within the reactor building. We were concerned that the licensee might attempt to lower the pressure of the system in order to get on what they call the residual heat removal system, that would expand the bubble and uncover more fuel. Then, I guess the final blow was the report came in somehow to us from our man at the site that said that there was a helicopter over the containment and just reported a reading of 1250 MR an hour. He didn't know where it came from, how long it would continue or how it could be stopped. Putting all of these factors together and the fact that our perception of the core damage had increased markedly, the fact that there was a radiation dose that was extremely high, would have been on a class range a lot higher than what really had happened, and the uncertainty about what the real status of the core was and whether containment was leaking and when it might be terminated is what promoted me to recommend to the

state an evacuation in a down wind direction.

It wasn't too long after Paul made that call and we were still on the phone with people at the site, we began to get information back that the oversite doses weren't that high. Eventually, I think within an hour, we got word that the release had been stopped. By this time, we were on the phone with our own Commission and I think our Commissioners got on the phone with Governor Thornburgh.

I was reacting to just the increasing uncertainty about the status of the core that morning. I recommended an evacuation based on avoiding radiation exposure beyond that recommended by the EPA guidelines. I have never been able to verify that 1250 reading. We did find in the records of the plant readings of more than 350 MR by helicopter above the plant.

REPRESENTATIVE DEMBSE: Thank you, Mr. Denton, Mr. Chairman.

CHAIRMAN WRIGHT: Five minute break.

(The hearing recessed at 1:15 and reconvened at 1:20 P.M.)

CHAIRMAN WRIGHT: Representative Schmitt.

REPRESENTATIVE SCHMITT: Mr. Chairman, I will try to be brief because I know we have been going a long time.

I would like to ask some questions that really apply

more to the future than for the present and I think I will skip a great deal which has already been covered this afternoon by Mr. Geesey and Mr. Itkin, Mr. O'Brien and Dr. Denton. Let me ask this question in this way. I've changed my format here a little bit. This question is asked of you, Dr. Denton, not antagonistically, but really for a point of information because I think the public at large are concerned with what might happen in the future. May I ask you, sir, what are your special abilities that make you qualified for the job that you now hold in the NRC?

DR. DENTON: I am not sure I have any special ability. I went to North Carolina State College, which did offer degrees in nuclear engineering. I have a bachelor of science degree in nuclear engineering. I have taken graduate level courses in the University of Maryland and courses in England. I went to work with Dupont Company, which operated the Savannah River plant for the Atomic Energy Commission. I was there for approximately five years and I spent several of those years next to the control room of operating large reactors. Those five years were involved in the design and the analysis of operation of large reactors. I joined the Atomic Energy Commission in 1962 as a reactor inspector. I think at one time I had visited and inspected every operating power reactor in the U. S., back when there were only a few in existence. I gradually moved up through the hierarchy of management

positions and assumed the position I have today, approximately a year ago.

REPRESENTATIVE SCHMITT: Outside of that, what have you done in your spare time? That's quite a background. Those that come under you are not on the same level as yourself, occupationally, but they are fairly close. What are the qualifications, requirements for the people of that type of personnel?

DR. DENTON: We have a very highly qualified staff. I looked several years ago at data. I think about two-thirds of the staff has advanced degrees in on the order of ten or 12 years experience in the field. We have recently begun to hire recent graduates in order to keep our grade levels down. We are the highest paid government agency in town, I am sad to say, from one standpoint; but it's because we have had to offer salaries like these to attract the caliber of people that we want. So, I think when we have contested hearings, we have to produce witnesses who are really knowledgeable in the various areas because people who oppose the plan are free to bring in their own expert witnesses or attest our conclusions. So, we have attempted to hire and train the very best people that we can get to join the government. I don't know if this gives you a complete answer, but --

REPRESENTATIVE SCHMITT: That was leading up to my next question. There are a great -- I am sure there are not a

great many people walking around the United States like yourself and Dr. Ivan Itkin and a few others like that. There isn't a whole great quantity, we will say, of workers of that type that can be drawn upon. In other words, they are limited.

DR. DENTON: Some of the skills, we are very limited and to explain people such as nuclear control systems, for example, I think everyone with knowledge in this area is continually sought after. There are certain sub-specialties which demand rotates with the marketplace. We are having trouble filling the abilities that we are assigned.

REPRESENTATIVE SCHMITT: The reason I am asking that question is that I am leading up to the question that a personnel director in any instance, especially in this instance, must surely know more than the ones that they hire. If there are not people of that quality and caliber around to hire other people, then they are going to get a throwback group of people in the operation, which is going to be dangerous. This, I think, is one of the concerns of the people. For example, you can train men academically and philosophically, but without practical, active experience, they are not of a special value to you.

Now, how do you get -- back to appearances. Perhaps you need a simulated model of what you have out there and I think that the man that comes out of college with a degree and put him shoulder to shoulder with somebody who knows what he



is doing, otherwise, you will have 25 years from now if he's been taught that when these three green lights light up, you push these three red buttons. If he doesn't know what that does, 25 years from now he will still be doing the same thing, pushing the buttons. I think that is a problem.

Now, anyone can evacuate this room. Those of us that are here can do it. We can nearly all of us, I would say, can apply first aid. We can all arrange transportation, etc., but when it comes to an ineptitude, we are at a disadvantage to the people that are inept. In other words, we can easily be wiped out next week if the people that are working in the plant do not know what they are doing. This is a problem that I don't know whether it has been attacked yet, but should be attacked in the near future, if we are going to have nuclear energy. I am not sure that we are going to have it, I would say, at this point.

Speaking, incidentally, of evacuation systems, this is a question that was addressed to Mr. Collins. This has concerned me for some time. Was it you, sir, that made the recommendation to evacuate?

MR. HAROLD COLLINS: I transmitted the recommendation to the evacuation to Colonel Henderson of Pennsylvania Emergency Management Agency.

REPRESENTATIVE SCHMITT: What?

MR. HAROLD COLLINS: To Colonel Henderson, who is

your State Director of your emergency services agency.

REPRESENTATIVE SCHMITT: And why was that recommendation not accepted?

MR. HAROLD COLLINS: The recommendation at the time was made by the senior management people in the center, which included Mr. Denton and I think Colonel Henderson, when I talked to him on the phone, accepted the recommendation. Now, what transpired between Colonel Henderson and the Governor of the state, I don't know; but I think that's where it got turned around.

REPRESENTATIVE SCHMITT: In other words, we better ask the Governor?

MR. HAROLD COLLINS: I would suspect either that or ask Colonel Henderson.

REPRESENTATIVE SCHMITT: Well, there are a number of other things that I would like to ask, but I realize it's late and you men have been through a great deal and I apologize for adding to your discomfort here, but let me say that we are going to have to have a foundation in the universities to turn out the type of people that are needed to supervise and operate these things, if we are going to have them. Even on the lower echelon, the man who pushes the wheelbarrow, I think should know what's going on around him. So that in case something happens, he knows exactly what to do. I want to thank you for your attention.

CHAIRMAN WRIGHT: Representative Cohen.

REPRESENTATIVE COHEN: Thank you, Mr. Chairman.

Dr. Denton, during your employment with the NRC, did you ever encounter the attitude that emergency planning should not be emphasized because such an emphasis might hurt the growth of nuclear power?

DR. DENTON: No, I haven't.

REPRESENTATIVE COHEN: What is the attitude of the NRC towards emergency planning and how have you tried to encourage that?

DR. DENTON: I think that prior to Three Mile Island, the emergency planning was something of a back water of the area; not because of its impact on the nuclear industry, but because people felt like it wouldn't be needed. There was a continual battle to justify the resources to go into that area. The general feeling was that we should put more of our apples into preventing accidents and designing better and better equipment, than it was in actually assuming the accident had occurred and planning to cope with it. I think there has been a reversal of that feeling throughout the agency as a result of the accident.

REPRESENTATIVE COHEN: Governor Thornburgh said there was a recommendation that was transmitted in favor of evacuation. He felt that it was a hoax. Now, in these kinds of crises, there has to be a lot of telephone communications. I guess it

would be possible for any jokester to call in and say he is representing the NRC and he has got this following recommendation. What steps are being taken or have been taken to see that it will be well known by all the decision makers in the state and local governments who represent the NRC and who doesn't?

DR. DENTON: I am not sure that I can identify them all, but you have certainly identified the key area. Those first few days when we sent up carloads of people to the site, we were relying on commercial telephone service. It was as though the people we sent up here fell into Einsteinium black holes. You never hear back. That Friday when I made the recommendation, I was getting information from our man in the control room, but I had not talked to anyone in the company in a senior management position to tell me what he was doing or whether there was a planned release or an accidental release or an ongoing release. We have made a lot of changes since then. We have required dedicated phone lines between all the plants and our regional offices and all the plants in Bethesda. That is the first move.

We have also required that requiring the companies organized themselves so that there is a senior incident response manager in the company that we communicate with and find out in advance what's happening or what action the company plans to take, rather than being in the response mode. During those

first few days, we were always reactive rather than proactive. I think ultimately, it will require the on-site response center that we talked about, as well as an off-site response center where the senior officials of the utility can gather with government officials and lay out for the media and interested citizens each day what the situation is and what will be the next thing.

For my own part, the next time the phone rings, I intend to get a diagnostic team of people to the site much earlier than we did here. We are looking at ways to have people whose special job is to understand how to diagnose unusual reactor occurrences to have the instrumentation to monitor off-site doses and require that the utility have instrumentation that stays on scale during sudden changes in the water level and sudden releases. There is a multitude of changes and I don't think we have seen the end of them yet.

REPRESENTATIVE COHEN: So, to summarize that, you wanted to emphasize front communications and have on-site people?

DR. DENTON: First, I want to provide the instrumentation that would give information. One of the big defects is that we didn't have information about what was really going on inside the reactor core. So, to get to that information, well at this point and then get channels of communication so that everyone can have access to it.

REPRESENTATIVE COHEN: What rules does the NRC have



in regulating the transporting of nuclear waste?

DR. DENTON: This is not an area that I am well versed in. Several years ago, we assigned memorandums of understanding with the Department of Transportation whereby, I believe, that we were responsible for the design of the package that is transported and they are responsible then for protecting the public during the transport of that material. Then our staffs worked together to be sure the packages are adequately designed.

REPRESENTATIVE COHEN: You don't limit the amounts of weight to be transported?

DR. DENTON: Yes, and there are different classes of packages, all the way from carrying just a few fuel assemblies have to be in a package that would withstand fires and sudden temperatures and drops all the way down to packages that carry low level weight. Let me ask Mr. Collins. If you could, John.

MR. JOHN COLLINS: I think Harold characterized it properly, unless you want to get into the specifics of the regulations themselves. The intent in the program we have under way right now is to -- there are two basic regulations that are in effect on packaging and transportation. Our program at the present time is to make them both compatible which they have not been in the past and also to give the NRC enforcement responsibility for 40CFR 170, which would then

give our people, our inspectors enforcement rights to impose all of the conditions of the DOT regulations. Right now, you have the NRC enforcing its own, which has narrowly covered the packaging requirements; DOT covers limited transportation. Through a letter of understanding right now, we handle the implementation of the DOT regulations.

REPRESENTATIVE COHEN: There were radio reports that a truck with radioactive waste got into some sort of an accident at Bedford County and at least one house has had to be evacuated and some other area has to be quarantined or may have to be quarantined. The reports were not clear. Do you also inspect -- do you have a system for inspecting the trucks so that the trucks won't disfunction or malfunction?

MR. JOHN COLLINS: Well, that's part of the DOT inspection, is to look at the mechanical parts of the trucks, too; not only the type of the package on the vehicle, but also the condition of the vehicle.

REPRESENTATIVE COHEN: Do those vehicles have to meet higher standards than normal vehicles do?

MR. JOHN COLLINS: I am not really an expert in that part of the regulation.

REPRESENTATIVE COHEN: Well, ought those to meet higher standards than regular vehicles do?

MR. JOHN COLLINS: I am not -- as I say, I am not an expert in that phase of transportation of vehicle inspections.

I wouldn't want to make a statement to that effect.

REPRESENTATIVE COHEN: Dr. Denton, could you be able to shed any more light on that?

DR. DENTON: I handled just reactors and the other offices handle everything but reactors. For transporting some materials, there are very high standards and we require patrol cars, front and back and carriers and this sort of thing; but I think there are some classes of waste which I think would be allowed to be transported more or less by commercial carrier because they represent a hazard comparable to the types that DOT allows with other materials. I can't really comment on this particular bill without --

REPRESENTATIVE COHEN: I am aware that there is no information for you to do that. When we went to visit the TMI site, we saw that there were many error cards on the control board panel. I am not sure if error cards are a technical name or not, but it indicated that this switch wasn't functioning and this one was. After the accident, there were whole slues, I think well over 100 of those cards indicating various errors, various malfunctions. I started walking around and making notes. Most of the errors, right around TMI, fine; but there were significant numbers that showed errors there for September of 1978, October of 1978 and apparently these things were not fixed and they were just there for six or seven or eight months with a notification that there

was some kind of malfunction. Now, it seems to me that this kind of situation creates an awesome difficulty for whoever is operating that system. You have to know how it works, how each one of those switches is supposed to work and then how each one of those switches is supposed to work, taking into account whatever is wrong with it. It just seems like that's a very, very dangerous situation and I wonder how the NRC could allow such a situation to take place?

DR. DENTON: Many of the day to day problems in a nuclear power plant come from not from the nuclear power plant, but from the conventional part of the system. It's the part of the system that would be there if they were running coal and steam over coal. I think we had typically not worried much about the secondary part of the system. We have tried to design a plant within the containment that would be immune to whatever went on in the secondary system. I have been looking back and it shows that the bulk of an operator's time is spent attending all of these details and the secondary part of the system, there is always the feed water reheater valve leaked somewhere and it did seem to me that we would have a normal amount of secondary system equipment that was out and out of service at TMI. Apparently, that's the way they operate their coal fire plant. What it reflects back, though, is that it tends to give an information overload to the operator, which were consumed with these hundreds of details about the system



and then you have overly on that, an important nuclear valve sticking open and other things happening. Somehow, we need to relieve him of those kinds of things so, in a way to focus more, I think, on protecting the nuclear power plant, itself. Maybe John would like to comment about the number of tags, per se.

MR. JOHN COLLINS: I just wanted to say that many of those tags are put there -- all of the tags are put there very deliberately and it's usually different colored tags. You will note that some are red, some are green and some are yellow. They all have a special meaning to them and they are put there to alert an operator, because that's the way the procedure is written; that is, if a valve alignment is changed from its normal, then you must have some kind of tag, whether it be a caution tag or red tag that says you don't operate that system. You must go back. It forces you to go back like playing dominoes or monopoly. You go back at the beginning and start over again. You look at the procedure before you move that valve. So, everyone of them has a significance. That may seem like a lot there, but that doesn't mean that the system is not functioning properly. That means that the system is out of its normal.

REPRESENTATIVE COHEN: What's the difference between not functioning properly and out of its normal?

MR. JOHN COLLINS: For example, you may be transferring water from one system to another system via a secondary



pathway. Then the primary pathway is now bowed out of service. That primary pathway would have a technique to it, such that you would not move water in two directions at the same time.

REPRESENTATIVE COHEN: And these tags, would you say that they would stay there for six or seven months under normal conditions?

MR. JOHN COLLINS: Yes, some of those tags could be there for some time, because that particular system may not be used. Now, I don't know in the time that you were there what tags there were. The fact that you have a number of tags does not necessarily mean that systems are not functioning properly.

REPRESENTATIVE COHEN: Now, one of the problems in terms of discovering the accident on March 28th was apparently that the tags covering up the buttons indicating that something was wrong. If tags are going to be a regular necessary part of operations, the tags are going to stay there for six, seven months, maybe even longer, shouldn't there be a way that the tags won't cover up normal operating conditions?

DR. DENTON: It certainly is troublesome to find that there were some secondary sort of systems that were out of their normal alignment at the time of the accident. That's partly what confused trying to figure out what had really happened. I think a lot of the NRC staff was leaning toward the system I mentioned of running wires on all valve positions back to a master status computer which would scan the status

of all valves in the plant ten times a second and make sure that all the systems that had to operate for whatever condition the plants were in, were actually in the right condition and relieve the operator from having to do it with the tag system.

REPRESENTATIVE COHEN: One subject before the Pennsylvania Legislature right now is product liability. There is a movement to limit the liability of products to 12 years. Do you think that if we did it for part of atomic plants to limit liability to 12 years, do you think this would be a gift to the nuclear power industry?

DR. DENTON: I don't confess to know much about the product liability laws. I know that they are changing fast, but I really don't know enough about the whole system, the whole legal system for product liability, to comment.

REPRESENTATIVE COHEN: So, the Price-Anderson law does not preclude state action on product liability as far as nuclear power plants, does it?

DR. DENTON: Not to my knowledge.

REPRESENTATIVE COHEN: Another subject --

DR. DENTON: I think we have normally left questions of product liability to be settled through the normal court systems between the utility and the effective parties.

REPRESENTATIVE COHEN: And then that would be basically through the state courts?

DR. DENTON: Yes.

REPRESENTATIVE COHEN: On another subject that interests me, the training of the personnel. Basically, the utilities do train, don't they; or the utilities are in charge of contracting out to have the training done?

DR. DENTON: Yes.

REPRESENTATIVE COHEN: To be a doctor, you don't have any kind of apprenticeship system where you could work in a medical office with a doctor. If you were training to be a lawyer, you don't have that kind of system? Even things that are less down on the scale of complexity such as a beautician and barber, other prescribed courses, instructions that people have to go through and their employer is not the one who is going to supervise it because the employers may have a vested interest in seeing that their people are qualified to do it, to work there. Governor Thornburgh has indicated from time to time that he favors the changes in the training system. I wonder what your feelings are on the training system? Should the utilities be allowed to supervise the training of their future employees or should this be in schools of one kind or another like it is for almost every other occupation?

DR. DENTON: I think it's in need of graphic overhaul. It's the process that's been in place for at least a decade or more and it was put in place back when the utilities themselves had a lot of very experienced technical people around the clock in the plants to sort of supplement the operators. Our focus

was on establishing minimum requirements for the operators in terms of education and experience in the field and then a final exam; but the final exam, as I mentioned, would sort of an average grade. We didn't look at any of the steps that led to that final grade. I think most educators would just say that you can't just give a person a final score and rank. You have got to train them and test them in each step. Our proposal to the Commission is that we go back to playing an advocate role in reviewing and alternating the training program, ordering the quiz that's given after the simulators, so that each one of these training steps -- and it's an interesting idea whether it should be done by the utility or by some third party.

REPRESENTATIVE COHEN: The recommendation that you made doesn't deal with that specifically?

DR. DENTON: It doesn't deal with the third party training, but it does inject the staff into areas that the board elects.

REPRESENTATIVE COHEN: The Price-Anderson Act does not preclude state action in this area, does it?

DR. DENTON: I guess I would have to rely on counsel for -- I don't know that the Price-Anderson would, but since we issue licenses for the operators, there might be some --

REPRESENTATIVE COHEN: For the Atomic Energy Act of 1954, as amended, would that do it?



DR. DENTON: I would have to defer to counsel on that.

REPRESENTATIVE COHEN: Okay, your office monitors state legislation. You have a booklet that comes out periodically, perhaps once a month on that. What is the role you see in your office in dealing with state government?

DR. DENTON: Let me ask Harold Collins, who is in the state program office and is responsible for that publication.

MR. HAROLD COLLINS: The function of our office that deals with the state legislatures and general state matters is not under my purview, but I will try to respond as best I can. We have an area in the office called program development, which maintains cognizance over staying on top of what the states are doing in terms of legislation; not only in nuclear matters, but in other matters that pertain to nuclear matters, just so that we are kept informed. We do publish this document that you spoke about on a periodic basis. I think it comes out once a month or twice a month or something. I'm not sure. I think the function of that part of the office of state programs is to provide for the NRC a window, if you will, to the state so that we know what their concerns are. We know what they are thinking and in turn, also, serves as a window to pass information from the Nuclear Regulatory Commission to the state. So, I think if our director was here, I think he would reply that it's a two-way street, the function of the office in this area, to both give the state information from the NRC and also to acquire



information from the state concerning nuclear matters and radiological matters.

REPRESENTATIVE COHEN: Who are the main subscribers to this publication?

MR. HAROLD COLLINS: Every office in the NRC gets this publication. I think right down to all the professional employees. It goes right down to branch level and from there it goes down to every staff person.

REPRESENTATIVE COHEN: Is the NRC lobbying before state legislatures at all?

MR. HAROLD COLLINS: Have we ever lobbied before state legislators?

REPRESENTATIVE COHEN: Yes.

MR. HAROLD COLLINS: No, I know of no cases. We could have, but I have no knowledge of it.

REPRESENTATIVE COHEN: Have you ever notified utilities that it might be in their interest to lobby before the state legislatures?

MR. HAROLD COLLINS: Our office, no. I have never done that to my knowledge.

REPRESENTATIVE COHEN: Does your office discuss state legislation with utilities?

MR. HAROLD COLLINS: No, our office has very little to do with utilities. We really talk to utility people in the office of state programs. We mainly talk to the states.

REPRESENTATIVE COHEN: Pardon?

MR. HAROLD COLLINS: We mainly talk to the states.

REPRESENTATIVE COHEN: Do you make representation to the states on legislation?

MR. HAROLD COLLINS: No, I can't think of any areas, at least not in my area on emergency preparedness. I know of nothing in any of the other areas.

REPRESENTATIVE COHEN: So, your testimony is that the word of your office is limited to compiling information about what states are doing and this information is not evaluated in any way?

MR. HAROLD COLLINS: No, it's evaluated.

REPRESENTATIVE COHEN: What happens with the evaluation?

MR. HAROLD COLLINS: It depends on what the information is. If the state -- if we see that the states are interested in doing something or a group of them or a state has an idea, our office is the place that they can try to get into and see that it gets a fair go around at the federal level; maybe not in the NRC itself, but maybe we can provide the avenue to see that it gets into another federal agency where it belongs. So, our office used to be called the office of government liaison. Perhaps that was a more accurate title than the office of state programs, but it's called the office of state programs now, but it's a liaison function pretty much.

REPRESENTATIVE COHEN: There is legislation before

the General Assembly right now, which would seek to shut down Three Mile Island. Do you have any opinion about that legislation? Do you have any opinion about its legality, whether the courts would uphold it or not?

MR. HAROLD COLLINS: You mean the Pennsylvania Legislation?

REPRESENTATIVE COHEN: Yes.

MR. HAROLD COLLINS: I don't have any. Maybe Mr. Denton has one.

DR. DENTON: There are a number of decisions that the NRC is called upon by statute to make. I personally am not sure that we are the right place in government to be making them. You know when we prepare environmental impact statements, we need to make a finding whether or not there is a need for power and additional need for electricity. That duplicates the action of the local PUC. They made that finding locally. I don't see why we should do it and occasionally advance that. I am told that the action of the Environmental Protection Act requires that we make that finding.

Another finding that we must make is to whether that power is to be produced by burning uranium, burning coal, solar or what have you. You local PUC once again has made that finding of what's in the interest of the local citizens. I think it sounds promotional for the NRC to be making a finding that uranium is the best way for electricity. I have advocated --

we got to get us out of that one. I would like to see my role be more that if a state wants nuclear power and decides where they want the plant built, I think it makes some sense to have federal expertise review the design of that plant from a safety standpoint; but I am not sure that we could get involved in all of these decisions about whether to build a plant, whether it's to be uranium, where it's to be located and I would like to see a system evolve that would delegate those decisions to the state.

REPRESENTATIVE COHEN: Okay, before the legislature is the suggestion that the Pennsylvania consumer advocates ought to lobby before the NRC. Do other states have that representation before you?

DR. DENTON: I know of at least one state, New Jersey, that the consumer advocates office is quite active in proceedings.

REPRESENTATIVE COHEN: Had you had contact with anti-nuclear groups? Do they talk to you at all or your people there? Who does the NRC contact with?

DR. DENTON: When I first assumed office, I met with some of the better known intervener groups to see what their views are and what they would recommend that I do differently. Many of our contacts were after we got to the hearing process and walked in in the adversary role. We are always looking for ways to increase our contact in the non-adversary sense.

One of the things that we are trying to do is to hold some of our meetings out where the site or plant is being proposed, so that the public and interveners and others can see us in action and raise questions at an early date, rather than only seeing us after we have been under review for years thinking that we and the licensee are arm in arm. I would guess that the actual degree of contact is largely dictated by the formal legal route, rather than the informal route.

REPRESENTATIVE COHEN: I would like to ask you -- I realize my time is running out, but I would like to ask you a question about evacuation procedures. We have been told by some advocates of the nuclear industry that the gas shortage is the reason why we need more nuclear power plants. Suppose we had to evacuate Three Mile Island or of greater concern to me, since that is my district, Philadelphia, and we hit a gas shortage in that current time. It would seem to me that that would seriously aggravate the problems faced in terms of getting the people out of there. Do you have any plans or do you have the capability right now to quickly get huge amounts of gas into an area, in order for a means of evacuation?

DR. DENTON: I doubt if we do. Let me ask Mr. Collins.

MR. HAROLD COLLINS: I know of no plans that the NRC has for getting special gas allocations for evacuations. Certainly there are a number of problems with evacuations.



There are a number of problems even more serious than the one that you mentioned, which I wouldn't be too concerned about because on a statistical basis, everybody's gas tank ought to be half full. So, that ought to carry them at least 150 miles. If you just look out in everybody's car today, you will probably find that everybody has got a half a tank of gas. Those that have a full tank will balance out the ones that have empty tanks.

REPRESENTATIVE COHEN: No, no, that does not do the person with an empty tank a lot of good to know that somebody has a full tank and therefore the average is that they have a half a tank. I think that's an example of a lack of use of obscuring and understanding problem. If one-quarter of the people in an area have an empty tank, that one-quarter of the people, even though they are out numbered three to one, have the tremendous problem in terms of getting out of an area. It would be unlikely that they all would be wanting to buy gas in the same day.

MR. HAROLD COLLINS: Well, it would be my recommendation then that those folks with the full tanks take those with the empty tanks along with them. I mean, you know, you can postulate all kinds of things. There are a number of other serious problems with evacuations, such as what do you do with nine feet of snow. Obviously, you are not going anywhere. So, your best protective measure there, is to seek shelter which you probably are already doing at that time anyway. We are not

saying that evacuation doesn't cause some other peripheral problems. We certainly recognize it, but it is the ultimate protective measure.

REPRESENTATIVE COHEN: I agree with you and I don't think it's such an impossible scenario, but I think we were very fortunate that it did not happen at TMI two months later when we did have a major gas shortage. The idea that we could have had a gas shortage and the accident at the same time is not a one million to one thing. I would hope that the Nuclear Regulatory Commission would think very, very seriously into this.

Finally, one question, the last question. In the attitude of the utilities for anti-nuclear people, does the NRC have any regulations dealing with the actions of utilities and taking pictures of anti-nuclear protesters or following their movements or investigating them or harassing them in any way? Does the NRC deal with this area?

DR. DENTON: I don't think we have any rules in that area. I would prefer that it not be done. I don't think we have adopted any rules that govern the performance of companies in this area other than whatever the general rules are regarding civil liberties anyway.

REPRESENTATIVE COHEN: So, your failure to adopt rules means that any action taken by the companies will not violate your rules, since there are no rules?

DR. DENTON: Well, there are certain rules that apply to all of us. We will not adopt any special rules to utilities any more than people have for General Motors.

REPRESENTATIVE COHEN: Okay, thank you very much.

CHAIRMAN WRIGHT: Representative Reed.

REPRESENTATIVE REED: Dr. Denton, it's been suggested by the nuclear physicist that the production of hydrogen in Three Mile Island indicated that the place was approaching a melt down condition. Is that accurate?

DR. DENTON: It may have been suggested, but -- and certainly it indicated that high fuel temperatures had been reached and extensive metal water reaction. We have discussed this question of a melt down. The staff's best estimate which I have heard indicates that the temperature was quite high, but did not reach melting. This remains to be confirmed through additional chemical tests and analysis.

REPRESENTATIVE REED: Earlier today you testified that temperatures apparently were higher than what you had thought at the time and as a consequence, different isotopes indicating that high temperature had now been attempted, at least, through that one sampling. Have you any estimate of what type of temperature we are talking about?

DR. DENTON: No, this is very preliminary information and it has been turned over to our staffs and laboratories to calculate.

REPRESENTATIVE REED: How much experience have we had really in dealing with that whole type of question of being able to detect temperatures on the basis of samples and so forth or is this kind of a guesswork with some background?

DR. DENTON: We have no experience in the licensing field, but in the test reactor as operated by the old Atomic Energy Commission, it was routine to take fuel assemblies up to melting. So, we are really relying on those of national laboratories for expert assistance for interpreting the results we are getting here.

REPRESENTATIVE REED: I am interested in some of the comments attributed to you in the transcripts of the Nuclear Regulatory Commission that have been issued subsequent to the first critical days of the accident. From the comments you made, including one that you felt that the licensee had little, if any, perception of the social and other kinds of ramifications of what they were doing or not doing. Has that assessment of their performance at that time changed any?

DR. DENTON: I am not sure even today that it is as I would like for it to be. What I think at the time my concern was related to the need to move faster on plant modifications that would get the plant, I am sure, in safe position so that we could stand down the high state of readiness that the federal government had and the Defense Department in the state had, so that we wouldn't be at this continually high

anxiety level. I kept urging the licensee faster and faster. We were trying to get him to rebuild the essential parts of the plant in a matter of weeks, where it would take them years to rebuild the plant. Within that kind of a vein that I was frustrated, you may recall that day after day would go by and we wouldn't get the filter bank changed and we couldn't bring that strain into operation. I kept urging them to put more men on the job to get it done faster.

REPRESENTATIVE REED: You kept urging them to put more personnel on the job to get it done faster?

DR. DENTON: Yes.

REPRESENTATIVE REED: Why did they not do that?

DR. DENTON: Well, their view was that they had everyone that they could obtain throughout the country and were working as hard as they could.

REPRESENTATIVE REED: Since that time --

DR. DENTON: Since they were burying the costs of keeping the federal establishment at the highpitched that it was and having the Air Force standing by and whatever the state costs were and the costs I felt the public was feeling due to the anxiety level, I was reflecting that side of the tally sheet and being sure to urge them to move as fast as they could and all the things we wanted were done.

REPRESENTATIVE REED: In other words, you are saying that they weren't really assessing that side of the tally sheet?



DR. DENTON: I don't think they had the perception of that side that I had.

REPRESENTATIVE REED: I am interested, Dr. Denton, in Metropolitan Edison's performance in this entire matter. The first two days of the accident resulted in a series of press conferences, which led to conflicting and confusing and in the opinion of some, outright incorrect, information being disseminated to the media and to the public. As a matter of fact, it was because of that condition that President Carter requested that the NRC send someone in and that someone was you, to come to Pennsylvania and become the single source of technical information, which you subsequently did and did well. The Vice President of Metropolitan Edison on March 28th at 1:24 P.M. and the following day, Thursday, March 29th, made a series of comments, including that there was a small amount of radiation inside the plant, that there had been only minor problems experienced, that they expected the plant to be back in working order in several days or at the most, several weeks. I don't ask you to comment necessarily on those statements, per se, but I am interested in whether or not you and the NRC received comprehensive and accurate information or was there an inability to obtain that information by Metropolitan Edison?

DR. DENTON: I have not personally read all of the transcripts and interviews with the operators that our inspection team has to try to assess those first few days. However, in

looking back, there were several indicators early on of severe core damage. You may recall the fact that the exceedingly high temperatures were reported to people in the control room, even Wednesday morning. Temperatures were in excess of 2,000 degrees. Then there was the question of hydrogen burning and containment pressure spike that I heard that day. There were several indicators on Wednesday that in hindsight and in today's view, it could have been recognized early on as indicating damage. These were inexplicably, in my view, overlooked or felt to be erroneous; which to each one, there was some explanation as to why it should probably be disregarded. If you look at the total chain of information that was available and the hindsight that I got today, it's not clear why the extent was not more readily recognized.

REPRESENTATIVE REED: In determining whether or not Unit 1 should return on line and in the event it's ever cleaned up, Unit 2 the same, will the NRC be looking beyond the technical aspects as to whether or not the plant meets the technical specifications, rather than the attitude that promotes this excellence of operations concept that you referred to this afternoon. Are you going to be taking a look at that? I guess my real question is should we put our faith and trust in the owners and operators based on their performance prior to and since March 28th, 1979?

DR. DENTON: The management capability is one of the

issues to be addressed in a hearing. So, I expect the questions you are raising will be fully addressed.

REPRESENTATIVE REED: In the releases of radiation on Friday, March 30, which resulted in considerable anxiety, not the least of which was the recommendation for evacuation to the Commonwealth of Pennsylvania based on the 1250 millirems above the stack readings from a helicopter, that became a subject of controversy where it was suggested that that was an uncontrolled release of radiation, Metropolitan Edison, three and a half hours later said, in fact, that it was not uncontrolled. They had planned it. They further clarified that the following day that the plant, in a sense, that they were doing something, moving water or air or something. I am not sure which. That resulted in the venting of that radiation. Was the NRC at any time informed in advance of releases of that radiation, that they were planning an event which could have brought about that release?

DR. DENTON: I don't know whether we were or not. It's been alleged by some of the operators in -- that NRC persons at the station early Friday morning was informed. I have asked our inspection offices to attempt to verify that. Today, they have not been able to establish it, from their interviews that we were.

REPRESENTATIVE REED: That there was any advance notice whatsoever? Are not their on-site plant radiation

detectors that should have shown up in the control room indicating that there was a release of radiation occurring, not necessarily a 1250 millirem, but at least a 350 millirem?

DR. DENTON: That's one of the deficiencies of the design is that those radiation monitors were not properly shielded in design for the level of releases that were present in the auxiliary building. They are all off scale.

REPRESENTATIVE REED: What is their maximum scale, since this is one of the main areas that is being modified?

DR. DENTON: Well, I think it's on the order of an ability to detect something on the order of one -- after TMI we surveyed all the capabilities of all the technical plants in the U. S. and it seemed to range from the best plant that could detect about 100 curies per second, which we hope to extend. The poorest plants would be off scale about one. Let me ask -- I would anticipate that the Three Mile Island monitors were off scale about a curies a second and it's my understanding that they have been -- went off scale fairly early in the accident and were off scale Friday morning.

REPRESENTATIVE REED: I see. Met Ed has established a staging dump at Three Mile Island. Was the NRC contacted in advance of that staging dump?

DR. DENTON: I guess that doesn't ring a familiar bell.

MR. JOHN COLLINS: I am not sure what you mean by

staging dump. Metropolitan Edison has designed and constructed an interim staging area.

REPRESENTATIVE REED: Where they are storing hot materials that were too hot to move?

MR. JOHN COLLINS: No, that's not the reason that they are being stored, not because they are too hot to move. The staging area was constructed because when you start processing the water, we are starting to generate resin, liners, at a much faster rate than the availability of licensed casks to move them to a burial ground so, you cannot permit them to just stand idly on the side, unprotected. The staging area was designed to handle them in some shielded walls until a cask could make its trip to a licensed burial ground and return to pick up the next load.

REPRESENTATIVE REED: Their establishment of that station, was that done with advance notice of the NRC, what they planned to do?

MR. JOHN COLLINS: Yes, it was. It was submitted to us. The staff did review and approve the design of that.

REPRESENTATIVE REED: Dr. Denton, with regard to the cleanup operations that were given, too, on the basis of what we all now know about the level of contamination and radiation within the building, do we presently have the technology to clean it up?

DR. DENTON: I will let John address that, since he



REPRESENTATIVE REED: You are not allowed any credit for dilution?

DR. DENTON: That's right. So, we meet the size standards that's released into the river and therefore the actual dose received downstream by anybody, assuming that it would be much less.

REPRESENTATIVE REED: Do you have an appendix H or J or whatever for air?

DR. DENTON: The same part of the regulation applies to air. The main potential exposure route by air, assuming venting of the containment release of krypton. That's the issue that I said -- I am not sure of the technology for removing krypton from that air. I think the licensee calculates that it goes to less than one millirem, if that krypton is released under controlled atmospheric conditions; but I don't want to imply that we have concurred with that calculation at all. In fact, I said this morning that I intended to impose the licensed condition that prohibits any release of any gases from the containment until he has gone through a route of providing us with the information.

MR. JOHN COLLINS: I would just like to add a little bit to Harold's comment. He had some concern about the technology for the krypton removal. The process for removing - other methods for removing krypton are well known and they have been used in the industry for other types of processes,

cryogenic dissulation has been one that we have used on several occasions, at the national laboratories. Another alternative method would be used in low temperature charcoal absorption, which has been used in the industry both in the chemical industry and also in the nuclear power industry. Many of the boiling water reactors use charcoal absorption systems. So, there are methods that could be used. The problem one has is the design, construction and operation and installation of and the cost of those systems.

Then you have continuing surveillance problems. Now, you have taken a large vacuum of air to two million cubic feet of air and pressed it down into a small source. You have got a surveillance problem on that. So, there are benefits and disadvantages to each of those methods.

REPRESENTATIVE REED: The NRC will not permit the release of any contaminants, including krypton, from the containment building that would exceed the maximum amount allowed by Appendix I. Is that right?

DR. DENTON: That is correct and we are looking for ways to do it better.

REPRESENTATIVE REED: Okay, the final two questions, very quickly, Mr. Chairman, had to do with the lack of performance of Metropolitan Edison during those several days. Would the NRC have a view with regard to the three hour delay between the occurrence of the accident and the final off-site notifica-

has looked in detail, but to clean up the liquids involved with the same type of equipment that is present in every reactor waste cleanup system. It involves the ionizer and the evaporators. It's just a big chemical operation to process all that water. The only area that I would say is not clear to me yet about the availability of technology is the technology that would be required is to cryogenically remove the krypton from the containment atmosphere.

REPRESENTATIVE REED: What are the risks associated with this cleanup operation to the public now? There are some risks on site which the licensee must deal with in connection with his employees. What are the risks to the public in the cleanup operation, the cleanup of removal of krypton from the atmosphere and removal of isotopes from the water, etc.?

DR. DENTON: I think the risks from the cleanup operation to the public outside is very small. It will be largely an issue of protecting the workers inside the plant, unnecessary exposure as a result of operating this equipment. Let me turn to John who has done some of the calculations and the object with regard to water is to clean the water out to a minimum size standard at the point of discharge that would form any dilution. There would be water which would be discharged in all the other reactors in the U. S. and some of these other reactors dilution credit is available and we are not allowing any credit for dilution than we are at TMI.

tion?

DR. DENTON: What aspect? Do we have a view with regard to --

REPRESENTATIVE REED: It was three hours between the time of the accident and the first notification to any off-site personnel. In this case, it was Civil Defense or emergency management we call it now. That seems an unreasonable delay to some who understand that in the event of a serious accident, that we obviously have to be implemented in the order for such issue long before a three hour delay. I'm curious if the NRC has a view on that?

DR. DENTON: The office of inspection and enforcement is looking at the entire first few days for possible items of non-compliance or faulty operations. They have identified a number of areas in which they claim the licensee has violated the terms of his license or the rules of the Commission. I just don't know what that determination was on that one. I don't think they have, as yet, issued that final finding of non-compliance during those first few days.

REPRESENTATIVE REED: And the final question deals with how familiar you may be, Dr. Denton, with the Saxton on experimental nuclear power plant that was located in Bedford County, Pennsylvania and in operation during 1970 and '71. It was owned and operated by Met Ed and GPU.

DR. DENTON: I am not very familiar with that.

REPRESENTATIVE REED: Thank you very much.

DR. DENTON: Excuse me, I guess I misinterpreted. I have visited the Saxton nuclear power plant once, but it was shut down many years ago and I am not very familiar with the details of its operation.

REPRESENTATIVE REED: Well, then that would lead me to this next question. Are you familiar with the heretofore confidential reports which just in the last months have been released, I think, through a freedom of information filing in federal court that relates to unreported releases of radiation occurring twice in 1970 and once in 1971 -- or two in 1971 that one of those particular releases exceeded and went off scale as the maximum measurable level of radiation. Are you at all familiar with those occurrences?

DR. DENTON: No, that hadn't been called to my attention.

REPRESENTATIVE REED: Okay, thank you.

CHAIRMAN WRIGHT: Representative Geesey.

REPRESENTATIVE GEESEY: Dr. Denton, is it possible that prior to TMI in the training of plant operators that an undue emphasis was placed on the actual passage of the tests as opposed to the overall standing of the operations of the plant?

DR. DENTON: I think it's possible, yes.

REPRESENTATIVE GEESEY: Do you have any specific



instances where that might have occurred?

DR. DENTON: I don't know of any instances, but certainly now there are a lot of examinations by the people involved in operator licensing by the industry, itself. What may be a feeling emerging that the training of operators was intended to get them by the test and since we didn't look at how they were trained, we just looked at the final product and maybe we had an educational system that was faulty. That's what led to the proposed different approach in the future. Many of our operators are very well trained.

REPRESENTATIVE GEESEY: I agree with you.

DR. DENTON: But somehow, perhaps the system did permit some individuals or some classes of companies who have less than desirable levels of training.

REPRESENTATIVE GEESEY: When the Bessie Davis report came into the NRC, did it receive a critical rating of any kind on the one to nine scale that we talked about earlier?

DR. DENTON: You may recall that one has unusual history in that the reactor inspector was very concerned about the performance of the Davis Bessie plant and the Davis Bessie management and wrote several reports that were critical of the company and that type of reactor. All these reports were handled in the regional offices and I did not become aware of this concern until after I returned from Three Mile Island.

REPRESENTATIVE GEESEY: Well, this happened before

you had your present position and I understand that and I wasn't aware of that until you mentioned it. When that report came in, did it receive any kind of critical rating when the Washington offices of the NRC got the report that there was a problem?

DR. DENTON: "I don't think it did because it -- no untoward damage resulted. The operator took the proper action and closed the valve and the pressurized level was recovered and so compared to reports where there were fires or pipe breaks or real hardware breakdowns, they were the things I think that staff concentrated on and didn't use the tools that were available to them to ask what if the operator had not closed the valve. Now, in the future, they will be looking at all the reports that come in and assuming -- let's don't look at what happened in this case where everything turned out all right, supposed there had been one more failure or suppose they left the valve open another ten minutes. What would be very useful to the staff would be to have a simulator which you could set up each occurrence as it's reported and walk through it and see what differences would occur if certain actions were delayed or occurred at a slightly different time frame. We might find other instances that we have not picked up and have been reported to us, than if the occurrence would have been somewhat different.

REPRESENTATIVE GEESEV: Would you care to give us

examples of any other kind of expense that was red flagged as opposed to those that you just illustrated?

DR. DENTON: There are a lot things that come in which we reacted to immediately. For example, there was a report of containment pressure valves not operating properly. That would have dropped the containment open in the event of an accident. That's the kind of thing where the safety implications are obvious and we would fire off loaders to the plant, the next day, saying please either fix this or shut down within the next 48 hours. There is a certain class of things which is very easy to say for the sake of significance and there is a certain class of things which it's obvious there is not much. We are establishing within the Commission a separate office of about 20 senior individuals who report to the Executive Director of Operations, whose sole job is to review operating experience and to be somewhat comparable to the safety transportation board. It will be out of my office, separate offices and they will review operating experience and report to me and the rest of the Commission what changes we could accomplish in our process.

REPRESENTATIVE GEESEY: Just so I understand what you had said a little earlier, if I heard you correctly, you indicated that you would be in favor of the state having a say in licensing, plant site, and whether or not they want a nuclear plant within the confines of the boundaries of that

state. Is that reasonably correct?

DR. DENTON: Certainly the latter two and the first one with a bit more discussion, I could probably agree on, too. I think states ought to determine whether or not you want a nuclear plant at all and I think you ought to decide where they ought to get built in the state, this side of the river or that side of the river. I can see that you would have difficulty retaining the level and the number of staff that the federal government entertained when it does review for a number of plants. Even then, there is room for a safe role and I recall several years ago being involved in negotiating a small contract with the states called Independent Measurements Program, in which the state would sample the environment, which is sort of a beginning. I would be in favor of more state involvement in the process. You certainly have special interests to protect. I guess I see the federal role, at least my own view of an appropriate federal role would be that if you decide you want a reactor operator in your state, the federal government could assist you in assuring that that plant could be operated safely. I think the decision of whether the plant should be operated or not is one for you to make, because it's your citizens that go without the power or pay higher costs or whatever.

REPRESENTATIVE GEESEY: What other changes do you think should be made to the Price-Anderson Act, because that



would require that that Act be changed?

DR. DENTON: You know, I think it's not just the Price-Anderson Act. I guess I have a feeling that the Environmental Protection Act requires us to duplicate state decisions in any areas such as the finding and need of power or finding as we build a nuclear plant to build a heater. In many areas, as the federal government has ejected itself into areas under the Federal Species Act, if you try to locate a plant there or the federal rules say no. It's probably some proper boundaries between the state and federal government and I think in the past that states have been not sufficiently involved in this case process. I am sure it goes back to the fact that the early agency was all government owned, is all classified and involved weapons and secret information and people tend to leave it alone. Then, we gradually move into the commercial possession of nuclear. The other institutions such as states, didn't move along with it. It was sort of left to the agency and the NRC to --

REPRESENTATIVE GEESEY: Well, we would certainly like to move along with it now, I will tell you. If I am wrong, please correct me, but I think in our early discussions this morning, we were pretty much in agreement in the fact that if the NRC would have paid attention to not only the information coming in from the Bessie Davis plant, but also the internal reports submitted by staff about that plant, that the accident



would not have happened. Since the regulator did not fulfill its intended role for whatever reason, who then do you think should wind up paying the bill for TMI, inasmuch as the whole country has learned a lesson and it really wasn't the fault of the operators who are in the Met Ed area? Who should pay the bill? Should it be the rate payers?

DR. DENTON: That's a question that I haven't thought about. Being the federal government normally reserves -- you can only see the government if they concur with something of the sort. I really have not really thought about that question of equity. Certainly, any time something goes wrong in society that the federal government regulates, you can find that it is due, at least in part to inadequate regulations.

REPRESENTATIVE GEESEY: Well, in giving a brief consideration now, do you think that the federal government ought to participate in the payment of the costs?

DR. DENTON: You know, it's clear to me that if we had been regulating on a different basis or if we had been prudent enough to pick up the Davis Bessie plant which required changes, that would not have occurred. Likewise, if the Babcock & Wilcox individuals had persevered and gotten their recommendations out of that company, which apparently didn't get out due to any financial concern, just sort of bureaucratic you know, sir, it might not have happened. Likewise, if the operators of the plant had had a little bit better procedure, little bit better

maintenance, a little less tags around, it might not have occurred. So, it's not -- I don't think you would be able to isolate a single person to place the liability on.

REPRESENTATIVE GEESEY: No, but under the circumstances that we have all agreed to, at least at this point, unless counsel wants to change some words here, do you think that the federal government ought to participate in helping to resolve this problem financially, as opposed to leaving it to the rate payers of GPU?

DR. DENTON: I guess I would want more considered thought than the few minutes I have given it. It's a fundamental question of equities. It seems to me that typically the government does not pay in these circumstances in other things.

REPRESENTATIVE GEESEY: This is not a typical circumstance.

DR. DENTON: I guess the swine flu episode is the one in which the government is being sued and I guess that's really a question for the courts and lawyers to decide. As a technical person, my judgment wouldn't be worth two cents, anyway.

REPRESENTATIVE GEESEY: No, but I would be interested in it.

DR. DENTON: I would like to reserve and think about it. That's an interesting question.

REPRESENTATIVE GEESEY: No further questions.

CHAIRMAN WRIGHT: Representative O'Brien.

REPRESENTATIVE O'BRIEN: Doctor, Representative Bennett was questioning you about management. You said there was an area that you were going to look at because maybe they did not operate right. Does NRC rate any plants in the way they are operated? There is approximately 72 plants in the United States. They are under your jurisdiction. Don't you rate them the way they do operate that plant or do you throw them on their own?

DR. DENTON: The office of inspection and enforcement did attempt a rating of the various plants several years ago and they asked their inspectors to grade the companies in various categories based on the number of unusual occurrences reported and occupational exposure and some releases. Most of the management of the NRC had difficulty with those gradings in that they really weren't reflective for the true mode of operation, that maybe that company was in the early stages of operation or was in a very late stage. I have requested and have obtained from all of the companies, detailed information on their management technical capabilities as a company, apart of their performance in the operation. We have just begun to compare how companies are all realized and the amount of technical staff and management staff, how many people they have at the station, how many people they have back at headquarters. Do they obtain all of their advice through contracts or

consultants or do they have an in-house? We have not attempted in our art to rate utilities and I think we are not entirely satisfied with this rating that was done several years ago.

REPRESENTATIVE O'BRIEN: Let me bring you up to date. Management testified before our Committee and they claim under oath that everything that NRC told them to do, they did. They gave them a time schedule to do it. The top operator of the plant has got the training, the graduate of the Navy, highly recommended. He has probably got maybe moreso than some of your people. So, why would you publicly state now that management has to be investigated? Do you know that they did not perform the areas where you asked them to do, NRC? I am not looking after management, but management is saying one thing and NRC is saying something else.

DR. DENTON: Licensees always met the minimum requirements --

CHAIRMAN WRIGHT: Let me butt in a second.

(An off-the-record discussion was held.)

DR. DENTON: Certainly licensees always intended to operate within the conditions set forth in the technical specifications of their license. They run the risk of being cited, if they were found not to be in compliance with the regulations. Many licensees went beyond the minimum requirements of the Commission. I think some licensees, though,

didn't think it was cost effective to operate one iota more safely than the minimum required by the Commission. If you look at the size of the companies, some companies have very large technical staffs and have a lot of know-how and a lot of background in this field. Let me just name one, for example, the Yankee organization. The Yankee plant in New England, they have a large headquarters of people. Other plants have gotten in the nuclear business quite small and didn't have the background of historical record performance to draw upon. The reason we are doing the survey is just to compare how companies are organized, the number of people they have in the companies within the training in this field and the type of contracts they have for outside assistance. It's too early to tell whether these changes are needed or not, but it was obvious to me that I really should look into this area a little more closely.

REPRESENTATIVE O'BRIEN: Well, can you produce for this Committee any citations, whether it's cited in any way at all for violations?

DR. DENTON: We could certainly produce the record of items of non-compliance found at Three Mile Island.

REPRESENTATIVE O'BRIEN: I am not talking about that. That's, you know, after effect, as you stated earlier. I want to know before, when NRC went in and made inspections, what your personnel are being paid for, do they cite Met Ed for any



violations at the Three Mile Island?

DR. DENTON: I don't know first hand. I would have to --

REPRESENTATIVE O'BRIEN: Would you check your records, because they claim there is no violations and you are saying it's poor management. Why is it poor management? That's what I want to know.

DR. DENTON: I think my own view is not shaped by combing through the inspection history of the plant and I have no recent knowledge of the inspection history before the accident. It's more shaped by reading the reports of the plant at the time of the accident and the fact that there were a lot of systems that were aligned in manners that were not normal. The fact that this very important pressurized release valve had been leaking some time, just a sort of housekeeping detail that I found in other plants to do much better.

REPRESENTATIVE O'BRIEN: Okay, I want to go into inquiry on radio waves. I know it's a political decision, but you have appeared before the President's Commission and you were recommending, as I said, one more hundred personnel. You also recommended, which should change your opinion later of new plants coming in line of being licensed. Do you think that NRC is doing their job when they know that the political decision is not being made under nuclear waste and what's to be done with it? You are responsible right arm for the

government and you are going ahead and recommending future plants in the United States to be built and you are sitting back and not saying to Congress and not saying to the government, we absolutely do not know what to do with it. Do you think you are doing your job?

DR. DENTON: I am equally concerned about the lack of progress in the way of disposal area. The Commission has made a legal finding that it's not a barrier at the moment to continue licensing, but there was a recent court case that questioned whether the NRC had laid a proper basis for that finding and remanded it. The Commission has now instituted a new proceeding to decide if there is adequate confidence whether of the nuclear waste problem will be solved or not. That's a proceeding that the Commission has instituted and it's ongoing. My recommendation to resume licensing is under the present directions of the Commission that that's not to be a factor in my decision. When the President's Commission objected to a resumption of licensing, I deferred on pending applications until I could get the use of the NRC Commission. I did meet with them about a week ago. Their view was that I should assign staff to begin the reviews of impending plants, but the Commission wants every application brought back to them for final approval before issuance of licensing.

The question of waste disposal is certainly an Achilles heel of this industry. It's been too long neglected.

There are about 15,000 fuel assemblies sitting in fuel storage pools around the country and we make sure they are stored safely, but it's only for the short term that fuel storage pools are <sup>not</sup> intended to be long term repositories. Now, switching to the technical side of waste disposal, I was out in the Nevada test site recently and went down to some of the mines where they are doing experiments with fuel and simulated fuel tests. I have seen the facilities of Hanford. It appears to me that both of those sites certainly have a technical capability to isolate and store both low and high level waste for very long periods of time. The question I think is one of institutions. Will this country and its institutions ever come to permit fuel to be transported out there and will those states agree to take the country's high level waste. That's the question that's before the Commissioners now.

REPRESENTATIVE O'BRIEN: I see where you are in this spot, but I have to continue to put you on the spot. Your position in the NRC, you advise the board and I still don't understand. Congress regulated the laws who put you people in that position. They have to look to you for advice. Why would you continue -- you say it's not your responsibility. I say it is your responsibility. If Congress is not going to make the decision on nuclear waste, you should not regulate or give any other license to another plant to be built. I think the ones in line, spend the money and then there has to be something

done there. I don't think that you should sit back and not go to Congress and say to Congress, you absolutely cannot issue any more licenses until that problem is solved. How is it going to be solved otherwise?

DR. DENTON: I certainly try to urge that the problem be addressed. At the moment, the legal structure of the Commission is that they have issued rules that say that you don't have to face that issue in a case by case proceeding; but they have instituted a general rule making to come to a conclusion as to whether or not there is reasonable confidence of long term waste solutions that will be found in that. I think the Congress gave this authority to the Department of Energy to resolve. There has been a lot of conversation between the Chairman of NRC and the people of DOE. Ultimately, if we don't achieve a satisfactory answer, Congress may solve it for us.

REPRESENTATIVE O'BRIEN: I have one short question and then the court stenographer is going to run out of tape. What is the future, the bottom line? What do you think the future of nuclear waste is in the United States? No one has been killed. I think it's been neglect on the government for not spending the money to get the technology. What is your opinion? What do you feel for the future of nuclear energy in this country?

DR. DENTON: I guess with regard to the question of

waste, I think that technical solutions can be found to isolate waste for long periods of time, but whether or not these will be permitted to work or whether or not states can work together or not, it is in my mind an open question and is subject to hearing.

I think the ultimate question of nuclear energy in this country is one for society to make. There are certain alternatives, certain costs of going without it and certain advantages of doing without it. As a technical person, I can try to make sure that the plants that are built are built safely; but I think the issue if more are needed or less needed, is really one for society to decide through the political process and elected representatives such as yourself.

CHAIRMAN WRIGHT: We will take five minutes.

(The hearing recessed at 3:30 and reconvened at 3:35 P.M.)

CHAIRMAN WRIGHT: Representative Jeffrey Piccola.

REPRESENTATIVE PICCOLA: Dr. Denton, how would you characterize, since there seems to be an increased interest in the management capabilities, how would you characterize -- how would you assess their handling of the Three Mile Island accident and I understand that you have already made your assertion that your opinion on their performance in part is based upon the reports about the way they have handled the



accident; and that you found that they did not have the excellence of operation as to what you spoke about. How would you generally characterize and assess their performance beginning with 4:00 A.M. Wednesday, March 28, and since?

DR. DENTON: Well, you may recall that there were two instances which I felt the need to be above their capabilities. One was conveyed to the President Saturday morning and resulted in the White House calling in a number of leaders of the industry and the Assembly Hearing in Harrisburg of the so-called Industry Advisor Group. A day or two later, I felt that the -- / <sup>I've</sup> forgotten how long the event was. I felt like the number of people actually at the plant that were working for GPU had worked too long of hours and were unable to go on without some substantial relief in the operations area as opposed to the analytical area. I called the number of people I knew in the industry from Youth Power Company, Commonwealth Edison Company and so forth. Many of these companies responded voluntarily to the call, brought up their own shift supervisors and operators and integrated themselves right into the company. It seemed to me at the time that the resources of GPU and the people they had working at that plant and who understood B&W plant operations were just very near the end of their rope. This is not a reflection, per se, on the management of GPU. Probably, the same thing would have happened in half of the utilities of the U. S. if they had encountered

this type of accident. GPU is not one of the bigger companies that operated the power plant, neither are they among the smallest groups. I would say they are somewhere in terms of size and managerial capabilities, somewhat below the average but a long way from being at the bottom of the list.

REPRESENTATIVE PICCOLA: The need to beef up their capabilities that resulted in your conversation with President Carter and his subsequent forming of the advisory group down there, that was Saturday morning. I am curious as to why, in your opinion, Metropolitan Edison would not have also perceived the necessity of having that increased capability to deal with, surely by a situation that they surely knew must have been serious by Saturday morning.

DR. DENTON: I had explored with Mr. DieKamp by Friday night, the need for such a group. I think he generally concurred with it. I just don't think they had the wherewithal to bring it all about. There was more, as I recall of Friday night, it was something that GPU concurred that it was a good idea. I didn't see any action moving and I didn't seem to have the clout to pull it off. That's why I went the White House route that I did.

REPRESENTATIVE PICCOLA: Then that was suggested by you on Friday evening and Mr. DieKamp concurred in that and thought it was a swell thing to do. Had they at any point prior to Friday evening come up with the assessment that maybe

they were in over their heads and maybe needed a little outside assistance and should have been making plans accordingly? Was there any assessment on their part, until your observation on Friday evening that they were in trouble?

DR. DENTON: I guess I have not gone back and read the history of that area, but my recollection of the period is whatever they had done by that time wasn't very reassuring to me. I had the feeling from phone calls to the Babcock & Wilcox Company, for example, that they were in more of a response when asked mode than when they were actively participating. I think it's fair to say that the company was just not prepared for the demands that were being placed on analytical people or procedure writers or health physicists and the multitude of skills required to cope with this accident.

REPRESENTATIVE PICCOLA: Dr. Denton, then if they weren't prepared for this and hadn't maintained the excellence of operations concept that you have referred to, their ability to recognize and assess this situation left something to be desired? Their response to the emergency was apparently less than adequate. Am I accurate in saying less than adequate? I assume that your experience in this regard, as well as the specific findings in the enforcement division report are all going to be matters recalled at the time when Unit 1 operating license comes up for an NRC decision?

DR. DENTON: Yes, that is correct.

REPRESENTATIVE PICCOLA: I will be waiting with great interest to see what that decision is.

CHAIRMAN WRIGHT: Representative Itkin.

REPRESENTATIVE ITKIN: Dr. Denton, I only -- I have two questions, but they are in different lines. Over the past few months since the accident at TMI, there have been recurring instances involving abnormal exposure of plant workers. Most of the attention has been focused on the general public and practically little, if anything, has been addressed to the protection of the workers exposed to the high amounts of radiation. I am somewhat concerned about that issue. It started to re-occur more and more. I addressed this issue with the utility management when they appeared before us and I would like to know what the NRC is going to do to protect the health and safety of the plant workers?

DR. DENTON: We have urged upgrading of the GPU's health attention. I think from the day I got here it seemed that that was an area in which our own staff braced early on Friday, showed the need of upgrading. I think they did take a number of steps during the summer. They brought in additional help, contractors. At that time they were coping with water in the auxiliary building, which didn't have a lot of the beta emitters in it. I think here in the past few weeks they have begun to get some of the water that's in the containment that was spilled up and repairs to let down the line. I assume that

the ratio of gamma to beta in there were the same as they were in the old sort of water and ended up with high contamination levels of beta emitters. This has happened several times. I think recently it's the type of contamination that can be washed off and removed.

It led me to form task force of highly competent health physicists who are going -- who are charged to review the management and technical capabilities of the company in the radiological protection area over the next month or so and provide me with a report on what needs to be done. This is a long term problem. It's going to be here until it's cleaned up. So, to give John some assistance who has been working this problem with his own staff, I want an outside group to come in and take a fresh look at what needs to be done in this area. John, would you like to say more about it?

MR. JOHN COLLINS: I certainly won't minimize the exposures that have occurred, but there are categories of exposure and I think that the press media, itself, has caused some undue concern. I think you referring to a number of cases where we have reported contamination of workers. There are very low level contaminations, as Harold indicated; most often, this can be washed off very simply. This is a normal occurrence that happens in every power plant.

Because of the sensitivity of the operations down there, this type of occurrence is being reported out to the



and you talk about what the potential exposure is going to be and MR's and everything else that is practically nil. You go through this whole song and dance about it. Then, you go down to the workers and you talk about a normal occupational exposure, which if that was falling on the average Joe out in Front Street here, it would be a whole different trip. I'm saying that you are obviously putting the workers in a different class as you are treating the public. What's right? Is the treatment of the public right or the treatment of the workers right? They both can't be correct.

MR. JOHN COLLINS: Both of them are correct. There are two sets of standards. We do have occupational standards and you do have public health standards. We are measuring the workers exposure against those occupational health standards. It's the same way in non-radiological materials. You have an occupational threshold and you have a public threshold.

REPRESENTATIVE ITKIN: Well, I understand what you are saying but I am concerned that the same degree of insurance is not being afforded to the worker, just because he happens to make a paycheck.

MR. JOHN COLLINS: I think the only thought process -- not only the thought process, but the programs that are in effect that requires careful review and analysis by the management, by the groups, health physics groups, within the utility and our own people before any particular job is done.

public. We have not suppressed any of this information. So, if one has to differentiate between that type of normal contamination to a worker in a nuclear power plant versus the type of exposure that we had to six workers to the beta radiation, I think the health physics programs has been upgraded. We have had numerous discussions with the utility people on this very subject and I do see an increased awareness on the part of management, now, to recognize that we are changing modes of operations.

In the early days, we were faced with radiation, mostly gamma radiation. The beta radiation was a minor problem at that time. Because of the change in radio-nuclear concentration, the beta now became very important. It was not recognized immediately and that program was not geared to handle that change. I think that unfortunately that you had to have an exposure, which I personally believe should never have occurred, to now fall back, regroup and go forward with a much stronger health physics program. I have seen that turn around since that time. I think it's unfortunate that it took that to do it.

REPRESENTATIVE ITKIN: On the one hand you talked about very, very -- you said normal occupational exposure to --

MR. JOHN COLLINS: Normal contamination.

REPRESENTATIVE ITKIN: Normal contamination material and on the other hand, you walked through the tulips when it

comes to a few MR in the atmosphere. This is what -- it's like they are a different class of people and therefore, they are, you know, can accept this type of radiation because you obviously believe it's not harmful. I assume so.

MR. JOHN COLLINS: No, I don't want to leave you with that impression. I am just as concerned about the workers in the plant as I am about the general public.

REPRESENTATIVE ITKIN: I mean because of the current Magee (phonetic) situation, you begin to wonder about work as normal and health physics area has always been in my judgment neglected, not given the attention that it should be given. I just wonder whether the workers or the employers have identified any areas or concerns about this particular situation?

MR. JOHN COLLINS: I think the workers are concerned. What I was trying to say is that -- I was trying to put it in perspective that there is low level contamination that does exist in the plant, just from small leaks and systems. You have small contamination. In terms of that impact on his health and safety is small, compared to the type of exposure that they were exposed to in the case of --

REPRESENTATIVE ITKIN: You are talking about having months of hearings in deciding whether it is released, krypton 85, into the atmosphere, right?

MR. JOHN COLLINS: That is correct.

REPRESENTATIVE ITKIN: Now, you are aware about that

I think this is being carried out right now and being more effective than it has in the past.

REPRESENTATIVE ITKIN: Well, now is the time for the stance to be determined, because once you start getting into -- well, all of this, hundreds of thousands of radioactive material, you are just going to have -- you are bound to have accidents. I don't know how you can avoid it, unless you take stringent precautions in the protection of the workers. In fact, I don't know how the workers are treating this or whether there is a cavalier fashion about how they -- you know, with respect to their own health. They talked to the utility executives and they have a bunch of supermen down there who their commitment is like they belong to the green berets on Three Mile Island. That's what the utilities feel. They got no problems down there. The boys, they are 100 percent right down the line for us and they know what they are doing and they just think it's a tremendous job that they are doing. You might be able to cite people for doing that, but it may not be in their best interest.

MR. JOHN COLLINS: Well, my own opinion is that first of all, I do not recognize a cavalier attitude among the workers, among the mill line management or among the management. I totally agree with you that we have yet to face some of the big problems in decontamination of the water, the containment entry problem and finally the core problem. It is going to

require -- I would hope that the programs in effect in constant reminding of the potential problem, not only to management and the supervisors, but also to the workers is going to minimize the potential problems. I am not saying that we are never going to have any more exposures down there. I think that would be naive. I think we are trying to implement a program to minimize those potential exposures and we are going very carefully. I am not in a hurry to go to work down there.

REPRESENTATIVE ITKIN: Are you the principal official responsible at the plant site for health safety?

MR. JOHN COLLINS: I am responsible for the NRC activities at the site, yes, madam.

REPRESENTATIVE ITKIN: What does that mean? Do you react or do you approve?

MR. JOHN COLLINS: That means we approve and review prior to their implementation.

REPRESENTATIVE ITKIN: Do you also monitor the activities of the personnel?

MR. JOHN COLLINS: Yes, we do. We have our own on-site inspectors that do that, to ensure that they are carrying out the procedure that they have submitted to us for review and approval.

REPRESENTATIVE ITKIN: And when workers are exposed to any abnormal amount, how is that recorded?

MR. JOHN COLLINS: Well, if they exceed the regulatory



limits, they must report that within 24 hours to us and then submit a detailed report of their investigation within 30 days. We don't wait until after we get that report. We have our own investigations under way into those concerns so that we can take immediate action, if this is warranted.

REPRESENTATIVE ITKIN: Well, obviously, if you wait around for all the paperwork to get signed, the damage is going to be done. As I understand it, you work by the quarter. Is that correct? At least in certain cases?

MR. JOHN COLLINS: That is correct.

REPRESENTATIVE ITKIN: So that a person can receive their dose, whatever, at the end of the quarter and then come back to work the next day. It happens to be the next quarter. So, according to the rules, he has got a whole new quarter to be exposed. In the end of March, March 31st, you have got people that have got exposed and then the quarter ended March 31st and the licensee had them back working the 1st of April.

MR. JOHN COLLINS: Within the regulations, that is correct.

REPRESENTATIVE ITKIN: I know it's within the regulations.

MR. JOHN COLLINS: You also have a lifetime dose to consider, too. You are always accumulating that dose, so that your total lifetime dose has to be considered. You are right, the regulation is written that way on a quarter basis.

REPRESENTATIVE ITKIN: I would just hope that this is not ignored, okay, because this is not the activity that people are focusing on and something that can get, you know --

MR. JOHN COLLINS: I can't emphasize it enough. I think it is one of the prime concerns that we have at the site and it has receive more attention than I think any other particular subject since the accident, itself.

DR. DENTON: I think it's been one of the solid concerns. There was a concern of ours the very first day. It's not one that receive a lot of attention, except when there are over-exposures; but it's been one that we have afforded a heck of a lot of effort in and will continue to do so. I want to relook at this area before we get further into operations. I would be happy to send you a copy of whatever report I get back on this area.

REPRESENTATIVE ITKIN: Okay, but what I am concerned about, you have those regulations that say a worker may get so much. I mean, that may be a situation that while one might accept as being on the job and being exposed to it, one should not necessarily have to receive. In other words, just because you are entitled to three MR's, you are not supposed to get it.

DR. DENTON: Well, I agree fully in that we implement the same as low as practical approach to occupational exposures that we implement on external exposures. We certainly push the licensee about preplanning, by tests mock-ups, by training

people in non-radioactive performance so that when he is called upon to perform in a radioactive field, he can go to it with a minimum of exposure.

REPRESENTATIVE ITKIN: I am sure the monitoring will be given to the actual processing of the radioactive wastes. The final question I have came out of a conversation you had with Representative Geesey. The same being made -- I assume that it's a personal statement, that as far as nuclear power goes, your own personal opinion would be that each state should be given the option of deciding if they want nuclear power and if they are saying fine, we don't want it. Something like that. It's something like a state's right?

DR. DENTON: I recognize the actual legality of the situation incurred by the federal laws and state laws and I was expressing my own opinion on the subject. Things that affect local groups should be determined locally.

REPRESENTATIVE ITKIN: But you see, we don't have that license, that opportunity, because what happens is that we are directed that they can't use oil. Then we were directed that we can't use coal, because of the EPA. Now we are directed that we can't use gas. So, you are giving us either windmill or -- only place you can produce windmills is probably in this Capitol Building and we don't have any. I think we don't have any capacity for hydro-power here. So, basically, if you give us on paper the freedom, we still don't have any other direction

to go, particularly in view of the national policy. It's probably being set by the President and Congress in terms of energy dependents. It might be fine for one state to choose not to go, but it's putting a problem on the other 49. Therefore, I don't think it should be a state by state policy. Since energy is a national policy, it has to be a national decision.

DR. DENTON: Well, Commissioner Dapp (phonetic) wants to propose that every state should be energy sufficient and that every state should commit to having the coal mines, the oil fields or the petroleum distilleries -- you know, they would carry their share of the energy needs of the country. He was probably recently coming up with such a suggestion ten years ago. Certainly there has got to be a way to bring together all of the diversities of this country and to focus on what the objectives are. I can see the ability of the states to handle waste, for example, very greatly because the geographic parameter of the states vary greatly. My opinion was more on the nuclear question.

Personally, I would prefer if I had a vote in the matter to individual states who did or didn't want it. I think, in effect, that's about the way that it works through the political process now, is that the majority of the people in the state really opposed the plant, their public utility commission could also oppose it.

REPRESENTATIVE ITKIN: But their constraints on the way they cool the states is more intense than ever. So, it really -- and I think it is a national policy if expressed by the President through the Department of Energy, that the planning going on is going to require more than anything being developed on the basis that that is going to be additional electrical generation or additional percentage of electrical generation. Therefore, free us from the importation of a less importation of foreign oil. I just don't see how we can do it.

Thank you, Mr. Chairman.

CHAIRMAN WRIGHT: Marshall Rock.

MR. ROCK: Dr. Denton, relative to the startup of TMI-1, what's the deadline for the public to register as a witness?

DR. DENTON: I just received a copy of a notice that was published in all of the newspapers up here. I don't remember the date. Let me ask counsel if he happens to recall.

MR. CHRISTENBURY: September 14th.

MR. ROCK: Thank you very much.

CHAIRMAN WRIGHT: Bob Hollis.

MR. HOLLIS: I just have one followup question, sir, on the question that Representative Geesey had. That was on your review of these 3,000 incidents and all that sort of thing. Well, the federal aviation authorities commission had a similar



type thing, but there was no cross-checking. They found out that once they put all these incidents on a computer, that after the DC-10 crash, they found there was a zillion reports of cracks and everything else like that. If they had this stuff on a computer, they would have been able to find out immediately if there was a problem. Do you intend to do this with a computer, that not only does somebody read and evaluate it, that somehow this data is going to be stored and if immediately another one comes in, you can push a button and see how many similar types of ones you have on file?

DR. DENTON: I think that's exactly what this group would intend to do, classify them somehow so they can spot a trend. Just one every few years would be very interesting, but -- in our present system, it's easy to misread them because if you are not in the office that day, you might miss a few.

MR. HOLLIS: But that is your plan, to get it on a computer?

DR. DENTON: Yes, sir.

CHAIRMAN WRIGHT: I think it's my privilege to wrap it up, but I have a few questions.

Does NRC -- I may be redundant in asking these questions, but does NRC require emergency management planning from the State of Pennsylvania?

DR. DENTON: I will let Mr. Collins answer.

MR. HAROLD COLLINS: Right now, we are still operating

with the states on a voluntary cooperative basis, because the only significant piece of legislation that is coming down the pike on state emergency plans is the Hart Bill, S562 that passed the Senate 97 ayes to one no, and it's now in the House. Even that bill tells us to do our business with the state and local governments in helping them develop plans and review in conferring plans in the same manner in which we are doing it now; in other words, using our current deck of cards or current guidelines until about June of 1980. Then, from there, in the provisions of that bill, we shift to a regulatory mode with respect to state plans. So, we are still operating the same way we always had, voluntary cooperation and I understand Pennsylvania Emergency Management Agency is going to be sending us their plan soon for review.

CHAIRMAN WRIGHT: We have not done that to date? Has Pennsylvania ever submitted a plan?

MR. HAROLD COLLINS: The only thing we ever saw in Pennsylvania prior to Three Mile Island and even since that time was in 1975, the Lieutenant Governor of the State at that time did send us some draft emergency planning documents relating to nuclear facilities for the Commonwealth of Pennsylvania. We reviewed those against our voluntary guidelines standards, since we have no statutory basis for the program. Within 30 days, we sent a letter back to the Lieutenant Governor and thanked him for the draft emergency

planning documents and essentially told him that it was a nice start, but it fell short of the mark of meeting all the guideline standards. They were only draft documents to begin with.

After that, we never heard anything from the state, except that about a year or two after that, the -- I believe it was the Pennsylvania Bureau of Radiological Health, which is in your Department of Environmental Resources. They were called something else in those days. They and the Civil Defense organization which preceded your current PEMA, requested a meeting with the federal regional advisory committee that was set up for this region in which Pennsylvania is in, to come into the state and sit down with them. This is the regional committee that does the review of state plans, and discussing a number of emergency planning matters. I don't think a heck of a lot came out of that meeting, because the Commonwealth of Pennsylvania representatives at that time were more interested in questions about Price-Anderson and indemnity and things like that.

So, we didn't see a lot of activity on the part of the agencies in the state involved in this kind of emergency planning and having a very small staff and not seeing much interest, we took our business elsewhere, where the action was and worked with the states who wanted to work with us. I guess Pennsylvania for some reason or other didn't want to work with

the federal government in this area.

In December of last year, we did get a copy of the Pennsylvania emergency plans for nuclear facilities through the side door. What I mean by that is one of our staff people got a copy of this plan from another Pennsylvania government staff person under the table. For some reason or other, they didn't want to submit it to us formally, but we did have it at the time of Three Mile Island, the plan as it existed at that time; but it was never formally submitted for our review and concurrence. There wasn't much interest there, I guess.

CHAIRMAN WRIGHT: Dr. Denton, you expressed an opinion that the state should have a role in approving the locations of nuclear power plants or whether to have nuclear power or not. Apparently from your opinion, as I understand it, under the existing federal statutes and under several court decisions, the decision making process is almost exclusively a decision making process. Is that correct?

DR. DENTON: I think historically that's been the case, that the NRC has claimed federal preemption over matters of great logical safety, although the state does have a considerable voice in many of the environmental impacts of planning.

CHAIRMAN WRIGHT: Referring to some of the testimony in regard to the consoles in the control room, I have been somewhat confused as I go through them. I have some background

in industrial engineering and work station layout. Going through control and locking at that array of switches and levers and maintenance tags, gauges and indicators, just blows my mind. I will be frank to admit that I have the same confusion when I go into a fossil fuel plant. I am wondering if anybody in industry, the people who install and design control rooms, are they looking at a, for want of a proper term, the psychological effects -- psychological systems that should go into an easy work flow system? I think I appreciate the fact that that may not be easy, because the scenarios will be changed from one hour to the next hour and where the proper place to put an indicator may be somewhat difficult. In your opinion, though, are the designers of these control rooms taking into consideration the human problems that are involved in supervising a mass array of controls that would fill up this whole room?

DR. DENTON: This was a control room layout. I think it was an early concern when the admiral was building submarines and ships and had very confined quarters. A lot of attention went into human factory engineering and how to best make the process go. As it got commercialized, the control room layout was left to the dictates of the individual utility, who you would think from operating large industrial complexes would be rather expert in it. It evolved in a totally different approaches in different companies. If you visit different plants, you will



Just be amazed at the different approaches to this.

There have been over the last decade or so a few lone voices saying that we have really got to be better. I think they recognize this and they are forming an institute for operations. They are finding this and this is going to be an institute who deals with the operational aspects of power plants right from the management, staffing, control room layout, human factors and procedures and maintenance. Utilities never cooperated in this manner before with each other and they buy the hardware from one of the vendors and hire an architect engineer and describe what sort of plans they want and they get one built to their specifications.

Within the NRC, we intend to increase our staff in this area greatly. It is an area that I think has a lot of payoff. We are putting in more pumps and valves and equipment. It may not lower the risk from accidents and I think we need to start looking at this human factor and the detail attention of the operational aspects in terms of lower probabilities.

CHAIRMAN WRIGHT: Thank you. It's been a long day and we very much appreciate your being with us -- Representative Davies.

REPRESENTATIVE DAVIES: I just have one question. In lieu of the number of shutdowns that Peach Bottom has had in the past few months and the fact that I understand that you now have a full-time person on the scene at Peach Bottom and

the occurrence of the gas is released, do you have all the confidence that that particular move that you made does give it its greatest safety factor or as far as the problems that they have had in recent months?

DR. DENTON: I don't think they are sufficient in and we will be sending out a letter to all the operating plants within the next day or so that spells out the so-called lessons learned from Three Mile Island, which were about to affect 12 different areas of operations. It will be required of all utilities in the U. S. that have operating plants make the majority of these changes by January 1, 1980 and commit to making the rest of them which requires longer term procurements by the end of 1981. There are dozens of changes that I want to accomplish in all plants, including Peach Bottom, by the end of this year. I think they will substantially reduce the risk factors and have them commit to making these longer term changes and then we will await what recommendations from out of these long going investigations and perhaps there will be further changes.

CHAIRMAN WRIGHT: We thank you for being with us. Your patience, your understanding, your frankness is greatly appreciated by the Committee. I think most of your attention to the problems of Pennsylvania, not only today but during the accident and subsequent to the accident, has been greatly appreciated not only by us, but by the citizens of the state.

Thank you very much.

DR. DENTON: Thank you.

CHAIRMAN WRIGHT: As they leave the table, we have a group from the Old York Road Keystone Alliance, who are going to present some comments and they are here at the table with Representative Hoeffel. I believe we have a Mrs. Inouye, Richard Pollini, Mark Breslow and Harry Hoeffel. Would all four of you like to come to the table,

(All witnesses were duly sworn.)

CHAIRMAN WRIGHT: I don't know which you would prefer each one of you speak, please identify yourself and your last name and if you wish to, state your occupation and a short statement for the record. I need the names that this stenographer can pick it up.

MRS. INOUYE: My name is Eleanor Inouye, I-N-O-U-Y-E. I am a former teacher, the wife of a surgeon on the staff at the University of Pennsylvania. I would like to express our appreciation to those of you who have remained here all day to hear what we have to say.

I would like to commend the Select Committee for giving us this opportunity to be heard. It suggests that there is a high level of concern among your constituents that will come of your deliberation.

POOR ORIGINAL

Three Mile Island has acted as the catalyst to bring together people from diverse age and ethnic groups, every economic and social strata. An organizing element in our area is the Keystone Alliance of which some of us have recently become active members. This, in turn, is in coalition with similar groups statewide and nationwide. Our elected representatives are wise to listen to our message.

For years, during the early development of nuclear industry, it was difficult to know whether to believe the experts who told us of nuclear power that it was safe enough or those who kept warning us that it isn't. During the past year, significant evidence has been accumulated to support the anti-nuclear position.

In January, the NRC accepted the conclusions of a review group headed by Dr. Harold Lewis, which sharply criticized the Rasmussen report. Proponents of nuclear power have relied heavily on the Rasmussen report conclusions on the relative safety of nuclear plants. These conclusions have been shown to be invalid.

In March, there was Three Mile Island. As this committee sifts the evidence to determine what our state should do to avoid a nuclear catastrophe in the future, I believe it behooves each member of this committee to consider carefully the merits of the argument that nuclear power is inherently unsafe; has a potential for disaster, which should delete it



from the list of options for sources of power for the future; and can be shown to be unnecessary.

We have brought to share with you materials. I understand that these materials will be duplicated and circulated to each one of you. First, a paper by Dr. Michio Kaku. Dr. Michio Kaku's name was addressed earlier in this morning and I would like to try to clear up what appears to be a lingering misunderstanding about figures. The three percent figures refers, I am sure, to percentage of total energy production in the United States; not to percentage of electrical production. The 13 percent is the nuclear percentage of electrical production. As you note, he is the Professor of Theoretical Physics at City College of New York and he has produced this paper which helps to clarify the kinds of accidents that can be expected to occur in nuclear plants.

Broadcasts on public radio of the Kemeny Commission hearings have revealed many problems with plant safety. To hear today that the nuclear accident at TMI has been classified in the non category, certainly underscores for us the luck element that existed in the results of that accident not having been much, much worse than they were.

Another source of disturbing information has been internal memos of the NRC which were obtained under the Freedom of Information Act through the efforts of the Union of Concerned Scientists. In a case which hits very close to home



for those of us in the Philadelphia area, they reveal that the NRC regional director, Boyce Grier, apparently ignored warnings by his inspectors of the plorable conditions at Peach Bottom 2 and 3 and at Salem 1. Salem 1 was described in an inspector's report as a disaster waiting to happen. Peach Bottom was described as the least safe site in regional northeastern United States.

So much as come out in the press recently on the dangers of nuclear plants that's difficult to keep up, but we are submitting for your attention representative articles from the Philadelphia Bulletin of June 9th and the Inquirer of September 8th, the latter an editorial which states the conclusions we believe must be drawn about nuclear power.

In addition to the risk of catastrophic accidents resulting from imperfect technology, irresponsible management and control, and human error, the risk posed by routine emissions of low level ionizing radiation is increasingly apparent. For years we have been assured that normal low level radioactive emissions are well within government safety standards. Now, an angonizing re-appraisal is in process, undergirded by reports such as the study by Thomas Mancuso of the University of Pittsburgh, whose study of atomic workers at Hanford, Washington concluded that government standards of permissible radiation exposure should be reduced by nine-tenths.

Included among the reprints we are leaving with you

is the description of cooperation of Dr. Mancuso's conclusions by Karl Z. Morgan, who directed the health physics division of the Oakridge National Laboratory until 1972 and whose credibility is long established within the nuclear industry.

We also leave with you a copy of a recent book by Dr. Helen Caldicott, physician, entitled "Nuclear Madness", as well as an article adapted from the book which gives a condensation of her information for your convenience. We have found this to be a penetrating and convincing analysis of the hazards of the whole nuclear industry, with a careful description of the way low level radiation accumulates in the environment, eventually becoming concentrated in amounts sufficient to cause cancerous growths and genetic defects.

MARK BRESLOW: My name is Mark Breslow, B-R-E-S-L-O-W. I have a bachelor's degree in economics and public policies studies and did graduate work in public policy at Harvard University. I have been employed by the federal counsel on environmental quality as an environmental reviewer, and by the public interest economic center in Washington, D. C., as an economic analyst. I am currently employed part-time by the mathematics department of Community College of Philadelphia.

What I am going to speak about is the economics of nuclear power. I think that's appropriate for three reasons to this investigation. One reason is that despite the supposed focus only on the safety of nuclear power plants, it's clear

that this investigation and others going on take into account whether or not we need that power and what the costs of shutting down the plants are and that you are evaluating that as you go along. There is an assumption made by many people that we do need those plants, whether or not they are safe.

Secondly, we believe that the economic costs of making the nuclear power plants safe, of really doing all the things that you talked about today that would change the methods of operations of those plants are so great that they simply cannot be done and still let nuclear power be a viable economic industry. The industry will never do them and it will continue to implement such standards as to really protect the public.

Finally, that the unsafe nature of nuclear plants translates directly into economic cost for consumers such as Three Mile Island when it shut down and replacement power must be bought.

My testimony is a summary of a paper that I have written entitled Nuclear Power is Uneconomical, which I will leave with you. It also corresponds closely to work done in other areas, including an article written by the Secretary of State of Wisconsin entitled the Economic Myth of Nuclear Power.

The major point that I want to make is that nuclear power, contrary to myths, is not a cheap source of energy. It is not the only source of energy we have and it is not the best replacement for oil. In contrast, because of its many

hidden costs, nuclear power is the most expensive way of meeting our energy needs. It is far more expensive in meeting our needs for conservation and renewable energy sources.

To being with, nuclear power plants in their construction phase have tremendous increases in cost. Three Mile Island plants themselves had 200 percent costs over what was built. In the Philadelphia our concern are the two plants being built at Limerick, Pennsylvania, which were originally supposed to cost \$730 million and are now projected to cost over \$3 billion, more than a 400 percent increase in cost. That goes along with continued rate hikes that we have had in Philadelphia.

There are several reasons why that is happening. One is that the price of the -- well, this is not a construction reason, but the price of uranium has increased from \$7 to \$42 a pound from 1973 to 1976 and further since then. The same companies which are making oil and natural gas skyrocket in price are doing the same thing with uranium.

The cost of constructing the plants, as I said, have gone up from \$134 per kilowatt in 1967 to more than \$1,000 per kilowatt today. Whereas it's estimated that conservation measures even save energy at a cost of 300 to \$400 per kilowatt, approximately one-third of the cost of constructing a plant.

Thirdly, we, of course, know that nuclear plants are not reliable, that despite the assumptions that they would

operate 80 percent of the time, even greater reliability than coal or oil plants, in reality, they have operated only 59 percent of the time, often being shut down.

We also know that in current times electric utilities across the United States have tremendous electrical generating excess capacity. We simply don't need more electricity today. During the last six years, energy crisis has skyrocketed and as a result people have been cutting back. In the Philadelphia region, Philadelphia Electric has over 40 percent excess generating capacity. Nationwide, utilities have about 30 percent excess capacity on average; whereas the federal government recommends only ten to 15 percent excess.

We, as consumers, pay for those plants whether they are used or not. We say that you got all these plants sitting idle and projections for the future with higher energy prices say that they are going to remain idle so why do we need to build nuclear plants?

Also, nuclear plants through the past 25 years have received tremendous research subsidies from the federal government, greater than any other industry. One estimate said that if nuclear power had to pay directly for the cost of research in our electric bills, the cost of nuclear generated electricity would be 50 percent higher. Also, nuclear plants as are other centralized generating plants, are the beneficiaries of extremely substantial tax loopholes. In Philadelphia,



Philadelphia Electric never winds up paying any federal income tax because of those loopholes they have in construction. In reality, were those loopholes not to exist, we would find other energy sources would tend to look more economically beneficial.

One area that relates most closely to the safety issue of the Price-Anderson Act, which I suppose you have heard of. That's the act that limits the liability of utilities from accidents to \$560 million. Although, an old atomic energy commissioner report from 1965, way before the current inflation, estimated that the damage from a nuclear power accident, property damage only, would be \$20 billion. That neglects all health costs. So, utilities do not have to pay the costs of accidents.

It's clear and has been admitted to the industry that if that protection did not exist and it does not for any other industry, no utility would ever operate a nuclear power plant because it would be too expensive to insure.

There are also the unknown costs of dealing with waste disposal and decommissioning of the plants. We do not know how to do either of those things yet and we do not know what the costs will be. In Wisconsin, the state Civil Service Commission in looking at those unknown costs, banned further nuclear construction in that state because it was likely to be too great a burden on the consumers.

Also, nuclear power is not good for jobs. Nuclear power plants are the most capital intensive way of meeting our

energy needs. We can provide three to four times as many jobs at lower costs through conservation and solar energy.

Finally, it's often argued that nuclear power is a renewable source of energy. That's clearly untrue. All studies show that uranium is in short of supply in the world today and in the United States than are oil and natural gas. The only way of getting around that is through breeder reactors. As we all know, breeder reactors cannot be proved to work and they have a potential need, much greater capacity of risk than reactors do. Unlike conventional reactors, which can have a core meltdown and spew fuel up into the air. Breeder reactors can theoretically have a full scale atomic explosion, just like a bomb.

Finally, I want to say that all studies that have been done recently by the federal and energy agency and the federal Department of Energy, by Harvard Business School, by the Council on Environmental Quality and other groups have shown that money put into conservation and solar energy can save energy at much lower costs and provide more jobs and, of course, without the environmental hazards that nuclear power does. There is no reason to take those risks if we can get our energy cheaper. Thank you.

MR. HOLLIS: Where were you employed? Can you tell me that again?

MR. BRESLOW: I was employed by the council on

environmental quality, which is the federal agency in Washington that reviews environmental impact statements and by the public interest economic center.

MR. POLLINI: My name is Richard Pollini, P-O-L-L-I-N-I. I would like to thank everyone of you for allowing me time to speak. I am going to speak on the alternatives of nuclear power.

State and federal governments could expand the tax incentives for conservation measures. Auto registration fees could be based on the EPA mileage figures. This action would encourage drivers to buy more fuel efficient cars thus making more oil available for use in electric generating plants.

The expanded use of solar heating for space and water would lessen the need for oil and natural gas, making more available for electrical uses. Many states have enacted extensive legislation in the area of sunshine rights, exemption of property taxes for installed solar devices, and tax incentives for installation of solar equipment. The committee should recommend that the legislature consider the same.

I am enclosing an article in the New York Times which describes what various states have done.

Wind generators are cost effective now. A man from Allentown has been selling several sizes to homeowners and large users, such as the Dorney Amusement Park. There are miles of high tension towers crossing our state. Wind.

generators could be installed on them and feed directly into those lines. Estimates have been made that 23 percent of the nation's electricity could be generated by wind power by the year 1990.

The Corp of Engineers has stated that many abandoned hydro-electric dams could be revitalized to supply power into the grid. Many communities have passed legislation to permit an individual small wind generator and hydro-electric plants to feed into a utility's grid with equitable returns to the individual by the utility.

The utilities could burn biomass in lieu of fossil fuels in their generating plants. Communities could build methane gas digesters for use locally. In New Jersey a gas company is tapping a garbage dump for methane and supplying it to an industrial user. Digesters are made small enough to be used by homeowners.

The next topic will be co-generation. If small local power plants are built to supply electricity then the waste heat could be piped to homes and industry for heating or process heat. A company that uses large amounts of heat could run a small generator to supply its electrical needs and at the same time use the waste heat for its other needs. In Europe co-generation is being used widely. Now, why I mention this is because it's a more efficient use of fuel and more would be available for electricity.

The last thing I would like to speak about is coal. Demands that nuclear power plants be shut down are immediately countered by the statement that the investment has either been made in completed plants or has proceeded so far in plants that are near completion that the economy cannot tolerate the loss of the capital expended. The answer to this predicament is to alter the nuclear plants with a minimum additional investment to salvage the plant as a viable source of electrical energy until it reaches its intended life.

The alternative for Pennsylvania could be substituting nuclear fuels with coal using the fluidized bed system of burning. This system burns so cleanly that scrubbers and other smokestack equipment to clean the effluents are unnecessary. Since the combustion temperatures are lower with the fluidized bed, fewer, if any, oxides of nitrogen are produced, which are significant pollutant in urban areas. If high sulfur coal is available the fluidized bed will allow the use of it without environmental hazards because limestone in the bed captures the sulfur dioxide before it goes into the stack and into the atmosphere. Treatment of the limestone later produces sulfur and allows the limestone to be used once again in the fluidized bed.

It is my understanding that there is an ongoing study in the State of Pennsylvania of an operating fluidized coal bed today. An increase in coal mining would mean more



Jobs for Pennsylvanians. The committee should recommend that a study be made to determine the cost of converting existing nuclear plants and those under construction to coal burning fluidized beds.

I am also including an article that appeared in the Popular Science this year that is very well written and describes the fluidized bed in detail and all the research that has gone into it.

I forgot to mention that I am a graduate of Drexel University in mechanical engineering and I work for the Navy in main propulsion systems and I currently have my own business in automotive machine shops. Thank you.

MR. SHAFER: My name is Harris Shaffer, S-H-A-F-F-E-R. I am a retired supervisor from the Fischer & Porter Company, manufacturers of instruments for industry, including some of those that have been used in power plants. I have been reading magazine articles as part of my job and have seen many, many articles in there on the subject of plant safety and radiation and waste disposal, all the way back to 1973.

You have heard from my friends who have presented a broad picture of the reasons why we feel that nuclear power is not to be continued. You have heard alternates. A few weeks ago, having read the article on fluidized beds, I enclosed a letter which through Representative Hoeffel was forwarded to Robert Shane (phonetic) of the Governor's Energy

Council.

The essence of that proposal is simple. Since TMI has closed down plants and people need electricity, why not have the federal government, Department of Energy and the Pennsylvania State Department of Energy and TMI management go together and build a fluidized plant which would replace the closed TMI-2. Maybe it's too simple, but it's a thought that you might consider.

My special concern is, as expressed by one of your members, has been for the safety of the workers, too. The exposure that these workers are getting, I have a feeling is not being properly monitored. Examples of that cropped up today.

So, taking all of our testimony and putting it together, we have put together a list of suggestions which we feel that the committee would be interested in considering as a positive action to help correct the problems that we have presented to you and some of the alternatives that we have mentioned. Of course, we would prefer that radiation be eliminated altogether, but until that has been brought about, there are some things that can be done to alleviate at least some of the radiation problems.

One of the things that we are suggesting is that the state entertain the idea of mandated standards for exposure and for handling and for transporting and storing of radioactive materials. Let the state get its own measuring equipment and

its own operators and its own monitors for radioactive releases from nuclear power plants and require the utility company to provide a trust fund to care for all of the workers exposed to radiation should cancer and other illnesses from radiation exposure show up after a period of years. Care for the families of workers and residents of nearby communities might be considered as being included.

Provide proper insurance against loss due to contamination by radiation. Require owners of nuclear power plants to post a bond to assure funds for the commissioning of the plants. Provide education in the public schools on the hazards of radiation.

When certificates of need are requested by the utilities, require the public utility commission to consider the health risks as well as the full cost of waste disposal and its long term security.

Finally, I would suggest strongly that the committee consider hearings from other qualified experts representing Harrisburg area groups opposing the re-opening of Three Mile Island as nuclear plants. I would submit a list, which is being copied, of people you might consider hearing.

Thank you.

CHAIRMAN WRIGHT: We would appreciate your leaving the material, of course, with us. We will circulate it and file it. A question for you, sir. You mentioned that there

are fluidized beds in Pennsylvania?

MR. POLLINI: Yes.

CHAIRMAN WRIGHT: Do you know where?

MR. POLLINI: One of them is --

CHAIRMAN WRIGHT: We have been to the one in West Virginia.

MR. HOLLIS: Georgetown.

MR. POLLINI: There is one in Allentown, PA. I don't know where it's at. It's constructed at GPTC, Sylvania. I guess --

CHAIRMAN WRIGHT: And it's producing steam for what purpose? Do you know?

MR. POLLINI: No, I am not sure.

CHAIRMAN WRIGHT: Do you have another one?

MR. POLLINI: Oakridge National Lab, made by Westinghouse Electric Company. There is another one with Energy Limited USA. I don't know where it's located.

MS. INOUE: Perhaps we could get that to the committee.

CHAIRMAN WRIGHT: There is a rather large sized one down in West Virginia that we visited a year or so ago. I think it was a federal plant, private plant type of thing.

MS. INOUE: What was your reaction to it, if I may ask?

CHAIRMAN WRIGHT: Well, according to the people, it

was an acceptable type of technology. I have not heard any arguments on the other side.

MR. SHAFER: In the article of Popular Science, it is mentioned that the State of Ohio is funding a power generating station to use their high sulfur coal. In the article, it mentions also Hazelton, a fluidized bed is being funded by the federal Department of Energy.

CHAIRMAN WRIGHT: Hazelton, Pennsylvania?

MR. SHAFER: Yes, for use in a paper mill; but these are small projects. However, in a later issue of the magazine, I believe the July or August magazine, it did state that there are two major construction companies in the United States today who are willing to supply full engineering and construction to guarantee of any size nuclear bed power generating plant or for any other purpose.

CHAIRMAN WRIGHT: Ivan.

REPRESENTATIVE ITKIN: What do you do with the limestone after --

MR. POLLINI: It's treated mechanically. It forms calcium sulfate in the limestone. It's just treated chemically. The sulfur is removed and I think that when they remove it, it's actually a refining technique so that it can be sold commercially.

REPRESENTATIVE ITKIN: Is that basically what goes to the scrubbers?



MR. POLLINI: Yes, but they are not energy efficient. They require large volumes of water and then you have to remove the water and then you have to remove the fly ash and whatever from the water. It becomes rather expensive.

CHAIRMAN WRIGHT: George, would you go through your files upstairs and see whether you got any material on the trips that we made up there?

MR. ELLIS: Sure.

CHAIRMAN WRIGHT: Okay, we thank you very much. Most of all, we thank you for your patience. It was a long day that you had to wait to testify.

MS. INOUE: It was a very fascinating performance. We were impressed with the quality of questions that were put.

CHAIRMAN WRIGHT: We thank you.

I hereby certify that the proceedings and evidence taken by me before the House Select Committee - Three Mile Island are fully and accurately indicated in my notes and that this is a true and correct transcript of same.

*Joyce Rae Schwarz*

Joyce Rae Schwarz, Reporter/nc

I hereby certify that the proceedings and evidence taken by me before the House Select Committee - Three Mile Island are fully and accurately indicated in my notes and that this is a true and correct transcript of same.

*Dorothy M. Malone*

Dorothy M. Malone  
Registered Professional Reporter