UNITED STATES OF AMERICA

OFFICE OF NUCLEAR REACTOR REGULATION

***

PUBLIC MEETING ON THREE MILE ISLAND UNIT 2

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Ballrooms C & D

Harrisburg Hotel Center City

23 South Second Street

Harrisburg, Pennsylvania

Thursday, April 14, 1994

The above-entitled meeting commenced, pursuant to notice, at 7:00 p.m.

BEFORE:

MICHAEL MASNIK, Panel Member

ARTHUR MORRIS, Panel Member

ANNE TRUCK, Panel Member

NEIL WALD, Panel Member

JOHN LUETZELSCHWAB, Panel Member

P R O C E E D I N G S

[7:00 p.m.]

MR. MASNIK: Good evening.

My name is Michael Masnik and I am the Senior Project Manager for the Office of Nuclear and Reactor Regulation for the United States Nuclear Regulatory Commission.

I am the Project Manager overseeing licensees efforts to clean up the damage to Three Mile Island Station Unit 2 or what we refer to as TMI 2.

We are holding this hearing to give the licensee for TMI 2 General Public Utility Nuclear Corporation an opportunity to address the NRC, the former TMI 2 Advisory Panel members, and members of the public on the recent transition of TMI 2 into postmonitor storage.

There are several other issues on the agenda tonight and the agenda is available on the front to chairs there [indicating] if you have not gotten one already. For those of you who have been here before, this format looks awfully familiar. Most people would say that this looks like a TMI 2 Advisory Panel meeting. But, as you all know, the TMI Advisory Panel for the decontamination of TMI 2 was dissolved at the end of fiscal year 1993. So, there is no longer an Advisory Panel.

Over the past several months, before dissolution

of the Panel, the Staff and former Panel members decided that it would be appropriate to have one last meeting after the licensee of PDMS. This would allow the licensee an opportunity to describe the facility in its safe stable configuration and allow the public one last opportunity to ask questions. The NRC Staff still felt the need for such a public meeting, even after the Panel as terminated. The Staff felt that the Advisory Panel format worked well over the last 14 years and decided to invite former Panel members back to monitor the meeting.

So, for those of you in the audience, this will look remarkably like an Advisory Panel meeting. However, it is not.

At this point, I would like to turn to Art Morris and turn the meeting over to him.

MR. MORRIS: Thank you very much, Mr. Masnik.

Good evening, everyone.

I am sorry that there are not more Panel members here tonight. We did expect more, but I do see that the agenda date was April 14th, and maybe they all came yesterday.

In any event, having said that, we can go right to GPU for the PDMS status.

So, you may proceed, Mr. Long.

MR. LONG: Good evening, Mr. Morris.

All right. Well, as you know, I am Robert Long and I am Director of the Services Division of the Nuclear Corporation. I was Director of TMI 2, until its termination and transfer to PDMS status, which occurred at the end of last year.

I'm going to cover two topics tonight, the first of which will be PDMS and then, I will address some information about the cork seam.

In the PDMS area, I will give you a brief description of the status of the Plant and how it is not staffed, in terms of monitoring and a description of some of the activities going on at the Plant.

The current status is that we received the technical specifications, allowing us to go into the postdefueling monitored storage condition on the 28th of December 1993, and we entered PDMS that afternoon. We took about another two weeks to formally transfer the responsibilities for that PDMS activity from the TMI 2 Division to TMI 1, which is now called the TMI Division. The Director of TMI 1 now, is responsible for the monitoring activities.

Now, this shows just the PDMS piece of his responsibilities. And the Director of TMI 1 is Mr. Gary Brodan and he had been the Plant Director since December of 1990. He has, according to him, as his Senior Staff person,

the Director of Operations and Maintenance and that person is responsible for the operations and maintenance of TMI 1 and for the postdefueling monitored storage activities. There's also a PDMS manager, who has a staff of three persons, including one of those persons being a clerical person. They use the TMI 1 mechanics and electricians and technicians and other technical staff to accomplish the work in the monitoring condition.

The PDMS budget for 1994 is $5 million per year and we think that probably is going to be higher than we actually need, but it certainly will cover all of the work that we projected.

I mentioned that there are the technicians and they are equivalent to about 31 persons. Now, it is not 31 people assigned to the PDMS activities. Those folks are assigned to the TMI 1 Staff and they are used there.

We always have had and will continue to have our various oversight activities going on internal to the Company. We have a group called the General Office Review Board and that is a group required by technical specifications for TMI 1. And they visit senior persons from our staff, as well as officers and department directors and about 5 outside members from national laboratories, universities, and consultant organizations. They meet quarterly and review the activities of the TMI Plant,

including the PDMS process.

On an ongoing basis, we have, at the Plant, an on-site safety review group and this is a technical staff that has, as its responsibilities, monitoring of the nuclear safety aspects of our Plant. And they are there all of the time and they conduct various kinds of walk-down tours and they sit in on Plant meetings and they are kept very closely informed about the activities going on at the Plant. The Plant Review Group is a group that reports to the Director of TMI and they review procedures and any unusual activities for the Plant Director, as part of his staff activities.

We have a Quality Assurance Department that reports to the Director of Nuclear Assurance independent from the Plant. And that Quality Assurance Department does the usual kinds of inspections and audits to insure that we are complying with our requirements.

Of course, you then have the NRC and they do their oversight inspection both through the on-site resident inspectors and other inspectors who come to the sight for inspections from that region or the NRC headquarters in White Flint.

The Pennsylvania BRP maintains a presence at the Plant and again, monitors the activities of both the TMI 1 Plant, as well as the monitoring and storage. We really engage the monitoring staff in several different activities,

one of which is monitoring radiation levels. And second, is monitoring the physical condition of the Plant. And that will become more evident as I talk about the Cork Seam.

The third is maintaining of equipment. There is very little equipment operating, as I explained at the December meeting, but there are a few active components and they have inspection periods and surveillance tests are done periodically to verify their satisfactory performance. The reactor building was placed into its monitored storage condition in September of 1992. So, it had been in the PDMS condition and was monitored on a monthly basis from September of 1992 through the end of 1993. And it is now beginning this year, being monitored on a quarterly basis and we made our first quarterly entry on the 9th of March.

The radiation levels and the contamination levels that we saw were what we expected and there was little change from the last monitoring. The balance of the Plant showed no unexpected trends and we continue to monitor those and we monitor those on a monthly basis, now for the next six months and we look for trends and any indication of difficulties that we have not anticipated.

So, that is basically the walk around of the formal monitoring and that particularly focuses on radiation. And the equipment monitoring schedule is on the basis of the equipment. And I believe I explained in

December that the TMI 2 key parameters are indicated in a controlled CRT in the TMI 1 Control Room. So, if any unusual conditions did occur at the TMI 2 Plant, then the 24-hour ~~man~~ manned TMI 1 Control Room would be able to identify what those problems were and send people to attend to them. We have had an electrical modification to the power supply for TMI 2. And I explained that briefly at the last meeting to the Panel and we basically wanted to separate the power supplies to TMI 1 and TMI 2 to insure that no activity at TMI 2 would in any way cause difficulties on the operations of Unit Number 1. That separation has been completed and TMI 2 now has a separate 13.2 kilowatt supply that comes from the Middletown Substation and supplies power into the appropriate transformer. We reduced the number of transformers in the Plant to a minimum and we have a few local circuits to complete to fulfill the obligation for the separation of power supplies.

In addition to the monitoring activities, we have, going on at the site, some activities, which we call dismantling activities and this would involve equipment, which is basically free of contamination or has very, very little contamination levels. We are slowly but surely working on the dismantlement of the Plant, which would be part of the subsequent decommissioning of the Plant. The dismantling crew uses about 40 people and that number could

vary as time goes on, depending on the need for people at Unit 1.

We move people back and forth between Unit 1 and Unit 2 and they mainly are working crafts people. There is an assigned dedicated dismantling staff that reports to my services divisions and to my site services Director. So, the management of the dismantling activities is under my responsibility.

Perhaps this is a good place to see if there are any questions and then we can move on to the next topic, which would be Cork Seam.

MR. MORRIS: You talked about 37 man years or personal years. Is the 40 people there in addition to that?

MR. LONG: Yes. The PDMS activities are completely separate from the dismantling activities.

MR. MORRIS: Is dismantling part of the overall $5 million budget or in addition?

MR. LONG: It is additional funding.

MR. MORRIS: Are there any questions from any of the Panel Members?

[No response.]

MR. MORRIS: Anyone from the audience have any questions?

MR. EPSTEIN: I just have a couple questions on PDMS.

Now the annual report said that you would spend $1 million annually on PDMS. And I am wondering if the $5 million total is the total for PDMS and dismantlement?

MR. LONG: You mean the GPU annual report?

MR. EPSTEIN: Yes.

MR. LONG: Well, I do not know why there is a discrepancy there. The amount budgeted in the 1994 budget for PDMS, for this year, is $5 million.

MR. EPSTEIN: All right.

That is the only specific question that I had on PDMS.

MR. MORRIS: Are there any further questions from anyone else in the audience?

[No response.]

MR. MORRIS: Then, let's move on to the next agenda, which is status of decontamination of the Cork Seam.

MR. LONG: All right.

I would like to talk a little bit about the Cork Seam. We talked about that some at the December meeting and I will try to tell you as simply as I can what it is and why it presents a nuisance to us and what we are trying to do about it.

Cork Seam is a seam that seals the boundaries between the reactor building and the control building and the service building and the other buildings.

I know that not all of you are used to looking at plan drawings, but this [indicating] is looking at the top of the building and this here [indicating] would be the reactor building and then the other buildings. So, we are looking down on top here [indicating] and this seam [indicating] essentially runs in a continuous wave between the buildings.

Now, the next slide shows a cross-section of the seam itself, which is about three feet high and it is literally a Cork Seam that has been inserted between the two concrete parts of the different buildings. Now over the years, we have had continuing movements of water in that seam and out of the seam. The bottom of the seam is sealed from the ground water.

Now, the ground water level actually comes above the bottom of the seam and that is an important point, because the ground water level or below ground level is higher than the bottom of this seal. Any movement of water from the seam is highly unlikely, because there is a pressure of water that tends to push water into the seam. If this seal were to leak, then the water would most likely move into the seam and not out of the seam.

Now, the main reason that it has been a nuisance to us is that rain water has leaked in through the building when we have had severe weather and that water then wets the

seam again and tends to cause some radioactivity within the seam. If it fills up to the top of the level, then we get some contamination on the floor surfaces.

The initial focus that we have been working on for several years is to get the roof joints repaired to minimize this and that has been accomplished. And we expect to continue to do that and we will continue with the maintenance of the roofs particularly when we have severe weather and winters like the one that we just had.

So, that will be one of our activities, as far as maintaining the roofs and keeping them in good repair to minimize leaks. We have installed some dams at various locations and the dams are the squares with the little circles. And that is just where we removed the cork seal material and under pressure, put in another sealing material to try to minimize the movement of water through and around the various sections.

So, that is one step and we have also installed sampling points and those are indicated by the solid circles. And these are points where we can go in and take a sample of water and we can measure if there's any water in there, as well as withdraw a sample of any water in there to monitor the radiation levels.

We continue to do that monitoring on a regular basis and so far we do not see any trends that are

predictable or identifiable with things going on inside or outside of the Plant. Now, we are going to remove the top three inches of the seal in the areas that are X'ed out. And that would mainly be here [indicating] around the reactor building and along this wall [indicating] between the control building and the control building in the east area. We will take out the top three inches and put in a sealant on the top, which will again, pretty much eliminate any water coming up into the surface and contaminating the floor surfaces. If there was any real pressure buildup, then it would pop the seal out and we would have water leaking onto the floor. We think that will also minimize and contamination. And you have to remember that there is essentially no activity in this building other than the occasional monitoring activity.

And people have become accustomed to the locations of the seals and they are well identified and they look for any changes in those conditions as the walk through the Plant tours.

MR. MORRIS: I just have a quick question.

It appears that the only problem was water from within. Now how does water from the outside create a problem if water is running throughout the full length of the joint?

MR. LONG: We don't expect it to.

So far we find that that seal is intact and we do not have any leakage from the ground water. It would be coming in from the outside and up through that seal. The only water that we have gotten in there comes from roof leakage.

MR. MORRIS: Are there any questions from the Panel?

MR. LUETZELSCHWAB: What was the purpose for using cork rather than something less porus?

MR. LONG: Well, it is a sealant that is reasonably pliant and has a long life and basically the intent is that as temperatures change, you get expansion and contraction and you want something that is compressible.

MR. MORRIS: As I understand it, it is not necessarily something meant to keep the water out -- water stoppage is a key element to prevent the flow of water and typically you would not expect water to create a problem from the inside.

MR. LONG: The seal really is just to allow for the expansion of the different parts of the building and the one seal itself is that the water is stopped and prevents any leakage from the ground water.

MR. MORRIS: Are there any further questions from the Panel?

[No response.]

MR. MORRIS: Any questions from anyone in the audience?

MR. EPSTEIN: I have a couple questions, yes.

Now, I was under the impression that this maybe a close out issue for PDMS and obviously the utility is in PDMS and I was just wondering what the agency's position was on the cork seam issue.

MR. MASNIK: What we did is we looked at the plan that the licensee had proposed in removing the contaminated water. I think initially we felt it would be a couple of months' effort.

However, as they got into it, we realized that the water diffuses through the cork seam slowly and rather than pump it dry and declare victory, I think the licensee was planning to monitor it. As water reinfiltrates this area [indicating], it is then pumped out.

Now, I was over there today and I looked at all of the sampling points and I know that periodically they come in and pump out the water and it maybe something that will be done for quite some time.

MR. EPSTEIN: Would this be a follow-up inspection for you?

MR. MASNIK: Yes.

It is something that we are going to look at for a long time.

MR. MORRIS: By the way, how thick is the seam?

MR. LONG: About one inch.

MR. MORRIS: Is the problem related to the radio activity the fact that there is radioactivity in the seam itself and that water going in there and coming out down onto the floor --

MR. LONG: Yes.

The original accident water was highly contaminated and that got into the seam and as it evaporated, it left some of the radio isotopes behind. So, the water is contaminated and if it gets out on the surface, then it dries and contaminates the surface.

MR. MORRIS: Why wouldn't you remove all of the cork seam in there?

Is it such a big problem? I mean, would there be some other problem that is created?

MR. LONG: Perhaps I should ask Mr. Byrne to address that.

MR. MORRIS: I understood that one of the solutions was to seal the top three inches to prevent water from getting in. But, why don't you just remove the cork itself and take out the radioactivity.

MR. BYRNE: Well, back in 1983 and the 1984 time frame, there was a big problem for TMI 2 to remove the cork out of the cork seam. Some places it is three feet deep and

some places it is five feet deep. And if you are in there with a chain saw ~~and lawn mower~~ to try and take ~~a~~ the cork out and the cork is held in by concrete and it is nailed in there and if you take the chain saw and hit a nail and you have chains flying and you break off the chain saw. You don't want to get down too close to the water stop, because if you puncture the water stop, then you are going to have water coming up into the Plant. You can remove the cork in the area of the cork joint, but not all of the total circumference and that does not solve the contamination problem in the joint in that the water is in the joint also reached into the concrete and there is still some contamination in the concrete there. So, clean water comes in and leaches activity back out of the concrete and it becomes contaminated again.

MR. MORRIS: So, there basically is just too much risk associated with attempting to remove the seam?

MR. BYRNE: Definitely.

MR. EPSTEIN: I would like to follow-up on that because I had several conversations with NRC, DER and the utility. I was under the impression that one of the reasons why the cork seam was not removed was because it would be very expensive.

And I was just wondering, because I had a conversation with DER on October 25th, 1993, at 8:30 a.m.,

and they represented to me that there were two options, one of which was: "Remove the whole thing, which would be very costly." Now, they told me that the second option was: "Find where the leaks are and stop the leaks and come up with new materials rather than the foam."

Now, I was wondering if the utility could address the financial issue, because I was under the impression that that was one of the reasons why the cork was not being removed.

MR. LONG: Well, I think as Mr. Byrne just explained, it was not a cost factor as much as our sense of trying to remove it was likely to risk damage to the water seal. He also indicated that the contamination would remain in the concrete. Now, cost was certainly a consideration, but it was not the main reason.

MR. EPSTEIN: Could you estimate how much the cost would be?

GPU (Ms Long or Mr. Byrne)

~~MR. LUETZELSCHWAB~~: I do not know if we ever did a detailed cost estimate on how much it would take to remove the entire cork seam. But, it probably would be in the neighborhood of a million dollars.

MR. MORRIS: All right.

Are there any further questions from the Panel?

[No response.]

MR. MORRIS: Any further questions from anyone in

the audience?

[No response.]

MR. MORRIS: Thank you very much, Mr. Long.

All right. That brings us to the fifth item on the agenda, which is public comment and there was one person that asked for about ten minutes of public comment and that is Eric Epstein and you may proceed at this time.

MR. EPSTEIN: Now, I just have a couple of questions, which I will read into the record and maybe they can be answered by the utility tonight, but I do not know.

Now, this is old business, but I do not know if you got an official total estimated dose assessment as a result of the accident ~~generator~~ Groundwater water process for workers or the public. Now, I do not need that tonight, but I would like to make the request and see if the utility can provide that or the NRC at some point.

The second question that I have is that I learned that Oyster Creek ~~Utility~~ Facility is considering using dry-cast storage for spent fuel. Now, my question is whether that is planned for TMI and would that delay the decommission of TMI 2? I mean, if it is not planned, then it is a moot point.

But, since there is no where to take spent fuel to put it in a dry-cast -- from what I understood, we already linked the fate of Unit 1 to Unit 2 and my concern is the dry-cast storage at TMI has no where for the spent fuel to

go, whether it is dry-cast or not. Now, what I want to know is if that will have an impact on the decommissioning of TMI 2.

MR. LONG: First of all, there are no current plans to have dry-cast storage at TMI 1. Now, if that becomes necessary at some future date, then I do not see how that will impact in any way the decommissioning of Unit Number 2.

MR. EPSTEIN: Now, I noticed in the annual report this year that one of the things raised in the future is that general portfolios corporation, which makes investments, which I believe are unregulated, made investments totally $39 million through 1993. Now, my concern is that they might be risky and therefore impacting decommissioning. I was just curious what the nature of the investments were and why you were all investing in Latin America.

MR. LONG: I think that can be addressed by our Corporate Officer and he can provide that answer for you.

MR. EPSTEIN: Fine.

Now, I would also like to know if the clean-up of TMI 2 is complete.

MR. LONG: I guess I do not know what you mean by the clean-up of TMI 2 being completed. I mean, the work that we were required to do and that we developed and

planned to do, as far as placing the Plant in monitor and storage -- it is known that there still are very high levels of radioactivity.

So, from the standpoint of being clean, it certainly is not at this time and it is in a condition that allows it to be monitored and it is in a condition where we do not expect there to be a release of radiation into the environment.

MR. EPSTEIN: Well, the reason why I asked the question is because in the annual report last year, on page 31, it says, "The clean-up program was completed in 1990."

So, if you were a shareholder and were not familiar with what was happening at TMI, then you would be under the impression that the clean-up was complete. Therefore, I do not feel that it would be my duty to go to the annual meeting this year and advise the shareholders what the condition is.

Now, the other question is for NRC and GPU and I do not know if you are apprised of this development, but Main Yankee, which is going to be apparently decommissioned down the road -- 860 megawatts pressurized water reactor. In January, the cost for decommissioning doubled and went to $317 millon dollars and it is due to be decommissioned in the year 2008, and it is $609 million now. Currently, the cost for decommissioning TMI 1, which is a smaller reactor

and also a pressurized water reactor was projected in 1993 dollars to be between $205 and $285 million and I think recently it has been revised downward to $185 million. So, my question is, why is there such a substantial difference between a facility that is pressurized water reactor and is actually bigger than TMI 1? I am just wondering if you are concerned that the cost for decommissioning this reactor doubled several months ago, because this brings in a concern that we have been dealing with for about the last five or six years.

MR. MASNIK: Eric, we have been over this many times and all that I can say is that I am not intimately familiar with the costs associated with Main Yankee. However, the cost is -- even as we speak, there is an effort to revise the numbers. Now, I know that there was a recent study done by Battelle and those numbers are now being compared very carefully at the Trojan Nuclear Plant. The licensee for Trojan is looking at the Battelle estimates and it is an evolving number.

If the Commission determines in the next couple of years that we were off by a factor of 2, then the rules, 10 CFR 50.75 will be changed and more money will be required by the licensee to be held in escrow for decommissioning.

MR. EPSTEIN: My concern is that the factor of 2 is no longer insignificant. I mean, we are talking about

several hundred million dollars which could adversely effect the material well being of the utility. I mean, we are talking about a nuclear power plant that is actually smaller than TMI and it is now over $600 million.

So, I just want to raise a concern of how volatile projecting economic figures for decommissioning is and I wanted to at least sensitize the Panel to that. Now, I would have two requests for the utility, one of which is what would be the cost of decommissioning TMI 2, in terms of ~~$214,000,~~ $214 million because I believe that is due to be decommissioned and I am wondering what the actual cost of decommissioning is for everything -- not just radiological, but nonradiological and Greenfield. So, I'm just wondering if we have the figure for ~~$214,000~~ $214 million and the figure for the total cost of decommissioning and not just radiological.

MR. LONG: Eric, you can make your own calculations depending on the inflation rate you assume. It is 300 million 1993 dollars and you can escalate that with whatever factor you want to assume and you will get the $214 number.

Now, I do not have that figure off the top of my head.

MR. EPSTEIN: Well, if you could get that to me, then I would appreciate it.

MR. MORRIS: That number is not Greenfield; is it?

MR. LONG: No.

MR. MORRIS: Do you have such an estimate available?

MR. LONG: Not for Greenfield, no.

As Mike and I have both explained a number of times, the numbers that are currently there are not estimates of the actual work. That is done five years before the decontaminating begins when you develop a detailed plan and make detailed estimates.

The numbers are based on guidance from the NRC and there is a correction factor assigned to TMI 2 because of the accident. So, until we do a detailed decommissioning plan, we will continue to use the numbers that are dictated to us by the NRC Department.

MR. MORRIS: Now, one of the weaknesses is that there really is not a follow-up on behalf of NRC. I mean, you are supposed to submit plans but what happens to those plans when you submit them and what the NRC does to enforce the separate requirements. I mean, they just do not have the teeth. At least from the last time that we talked about here, it did not appear that they had any real strong oversight to make sure that, indeed you were following those plans.

MR. MASNIK: That is correct.

MR. MORRIS: Do you have any other questions, Mr.

Epstein?

MR. EPSTEIN: I am a little confused because I am not sure what standards GPU are supposed to follow for final decommission. I mean, is it the EPA guidelines or the NRC guidelines? I have a book here detailing the standard guidelines for soil, water and surface contamination and sometimes they are in conflict.

Now, I wonder which agency has priority when they go to clean up the nuclear power plant. I mean, do they go to the most lenient standard or how is this going to be resolved?

MR. MASNIK: The NRC recently released a staff draft document that basically discusses what the release criteria would be. And this is in the last month or so and it is about a half in inch thick. It went out for comment and I know that EPA did comment on this document [indicating] and I know that these comments in some cases were in conflict with the document.

The plan is to take those comments and to prepare a proposed rule that will go out for comment and this is going to be a multi year effort. But, the hope is that we will issue a regulation ultimately that will take into consideration EPA requirements and be consistent with them. Until that happens, guide 1.86, which is the document that has been around for close to 20 years now, is the one that

is applicable. However, there is a pretty sure bet that by the time the licensee is ready for decommission on Unit 2, there will be some additional guidance.

MR. EPSTEIN: Well, I just will say that if the plan had been decommissioned this year, we would have had conflicted remediation guidelines and really no idea of a funded target.

I hope by the year 2014, we are moving along in a little better direction. I mean, it is a legitimate concern. I mean, Yankee, right now, maybe in the process of being decommissioned and although we may have the luxury of waiting ten or 15 or 20 years, other people don't. And I think that it is an issue that everyone is starting to wrestle with.

I have no further questions or comments at this time and I just would like to thank the Panel for allowing me this time to speak my mind and ask my questions.

MR. MORRIS: All right.

I guess since we are moving along that there is no sense to really take a break at this time and we will move on to item number 7, which is NRC's status of remaining actions.

MR. MASNIK: Tonight I have three items that I would like to briefly discuss, which would be the remaining TMI 2 license amendment request, as well as the review of

the licensee postdefueling and fuel survey report and the status of the Patel Advisory Panel study.

Amendment 14 to the postdefueling monitored storage license amendment request to submit it to the NRC by the licensee on August 16th, 1988, requested that TMI 2 license expiration date be changed from November 4th, 2009, to April 19th, 2014. The purpose of this almost five-year extension in the license is to have the TMI 2 license expire on the same day TMI 1 license expires. And at that time, both units, then could be decommissioned simultaneously.

The staff in its February 20th, 1992, safety evaluation on PDMS stated that the request for a license extension was going to be treated as a separate request to be considered after the POL and after the licensee entered PDMS. The staff felt that the proposed extension of the license was outside the grounds of the 1991 Federal Register Notice that offered a hearing on the issue of PDMS. The staff has yet to act on this request and the proposed amendment request to the license will be noticed in the Federal Register in the next several months. And there will be an opportunity as in all license amendment requests for the public to request a hearing on this issue.

Between September 1988 and 1992, the licensees submitted to the NRC a series of postdefueling fuel survey reports for various locations and components at TMI 2. The

purpose of this effort was to document the amount of fuel remaining at each of its locations and facilities. I think that in the past we have heard a lot of discussion of these issues and have actually gone over a considerable amount of this data. Fuel estimates for a total of 26 locations or components were submitted to the NRC and the staff took these reports and asked ~~Patel~~ Battelle Pacific Northwest Laboratories to review the licensees submittal and comment on the results of the fuel measurements. PNL completed the review and they actually have been completed for some time and the staff is currently compiling the individual PNL reports and have forwarded the contractors findings to the licensee. Now this will make the results available on the public docket and we expect to be completed with this effort by the end of next month.

Two days ago, I forwarded to the NRC Commissioners, a copy of the final report of the ~~Patel~~ Battelle Human Affairs Research Center's study on TMI 2 Advisory Panel. Now, although the report is completed and I had hoped to be able to pass it out tonight, I unfortunately cannot release the report until the Commission has an opportunity to comment on it. However, I do expect to be able to release it in about a month and I will leave a sign-up sheet up where I am sitting for any member of the public that would like a copy of the final report. Of course, anyone on the

TMI 2 service list of the former Advisory Panel service list will get a copy automatically. We plan to issue the document as a ~~new regulation~~ so ~~you~~ will get wide distribution both within the agency and I was told also within the Government.

The draft report received extensive review from both inside and outside the NRC and there are several non-NRC people in this room tonight that provided meaningful comments and I thank them. Now, I do not plan to go into the results of the study since the results have really already been summarized at the Advisory Panel's final meeting last September. The conclusions are essentially the same, but suffice it to say that most people that were interviewed felt that the Panel was a success. One thing that we did add to the document was a complete listing of all Advisory Panel transcripts and their associated NRC microfiche address.

So, anyone interested in the Advisory Panel's activities, can access a transcript at any of the hundred plus public document rooms scattered throughout the United States. So, having said that, I believe that takes care of item number 7 on the agenda.

MR. MORRIS: All right.

Then, let's move on to item number 8, which is the PNL confirmatory radiological study.

MR. MASNIK: I will turn that over to Lee Thomas.

MR. ~~THOMAS~~ THOMAS: The NRC contracted with ~~Patel~~ Battelle Pacific Northwest Laboratory to do some confirmatory radiation surveys at TMI 2. And the purpose of the study was to answer the top question on the slide [indicating], "Did GPU Nuclear meet the goals that were stated in the postdefueling monitored storage safety analysis report. 19 cubicals plus one areas of the reactor building were chosen for the surveys.

The second question that we are looking at was, "Were GPU Nuclear measurements reasonable?" Now, the survey that we were doing was supposed to be confirmatory, but not duplicative. We were trying to not do a point-by-point comparison, because when you do a radiation survey, there is a map drawn and you cannot tell, like a treasures map, you cannot tell exactly where the previous person took a survey. So, you might stand one foot to the left and the radiation field is slightly different. So, you are not always going to come with exactly the same answer. Cubicals were selected by our contractor and we tried not to interfere too much with what they were doing. But, we did review just to make sure that the ones they did select were appropriate.

Now, some of the differences in our techniques or I should say that ~~Patel~~ Battelle used different radiation survey instruments. And one of the problems that I was talking

about before with location mapping is if you drew a map of this room [indicating] and someone stood some place out near the speaker tower or exactly where you would draw the circles and numbers in them on the radiation levels -- again, people might be standing a couple of feet apart. Now, the smear techniques were different and I do have a slide that shows that and the smear counting was different. The smear technique, GPU uses a technique where you take a piece of filter paper and you take a two-finger width and you make a 16 to 18 long "S." Now, some people cover 100 square centimeters, which is perhaps about the size of a 2-by-5 card and some people smear a square and some people smear a circular area. Now, it turns out that ~~Patel~~ Batelle uses a technique where they use a circle rather than a S. ~~The smear counting~~ Batelle ~~Patel~~, in all cases determined actual numbers, whereas ~~and~~ the licensee found that if something was less than a releasable number, then they just put less than 1,000 CPM ~~EPM~~ per a hundred square centimeters.

So, when you did the statistics, you were sort of comparing apples with oranges and the number of data points we took per room tended to be a little bit less because we were trying to characterize a room and in some places they were trying to define a room. And they would take, perhaps a few more measurements around the area that was more highly contaminated or had higher radiation levels to define more

clearly the extent of those radiation levels.

Now, this slide [indicating] just shows the survey results for one ~~cubical~~ cubicle and I have color-coded those lines. But, the color coding does not show up terribly well. But, if you look at the left pair of vertical lines, what that shows is two points that ~~Patel~~ Botle surveyed. And if you looked at the top horizontal line [indicating], you will find two places that GPU measured 140 and PNL came out in one case at about 120 and in another case at about 150.

Now, we were trying to survey approximately the same location. So, we do not find that that really is a difference since you normally calibrate a survey instrument about plus or minus 10 or 15 percent. I mean, you cannot ever stand exactly at the right location, because one person will hold it at waist level and he might be six foot tall and another guy could be five foot six. So, the points will never be really exactly the same. But, we found that the agreement was pretty good for ~~GMMA~~ gamma surveys and we previously discussed some of the smear surveys.

Now, the next slide just shows the three techniques, as far as the 16 to 18 inch S or a ten centimeter square or the circle technique and in theory, you should cover the same area. Of course, each particular technique has its proponents and I am sure that proponents of each one thinks that theirs in the one and only best way.

Now, the conclusions that we reached from this is that the goals were met and that the GPU measurements were reasonable. We really did not find any significant disagreement between our measurements and theirs.

So; that pretty much sums it up and I would be happy to answer any questions at this time.

MR. MORRIS: Are there any questions from the Panel?

[No response.]

MR. MORRIS: Are there any questions from anyone in the audience?

[No response.]

MR. MORRIS: Thank you very much, Mr. ~~Thomas~~ Thovus.

All right.

That brings us to item number 9 on our agenda tonight, which is public comment.

And I believe that Bernie Snyder has a comment for us tonight and you may proceed, Mr. Snyder.

MR. SNYDER: Thank you very much, Mr. Morris.

My name is Bernie Snyder and in an earlier life I was the first director of the TMI program office for NRC from starting the period of about just about one year after the accident, which is to say in March of 1980 to the fall of 1985, which I guess was about five and a half years. I then choose to let the younger people take over, like Mr.

Masnik and do the real work.

For those of us who are familiar with Thomas Wolfe's book, "You Cannot Go Home Again," it is a very fine book, which I would recommend anyone to read and if you have read it, I would recommend that you read it again. Now, the theme of that book is that you really never do go home again and although that is true, I feel that coming back here nine years later, it is interesting to come back and see the former Panel. Although, not highly represented here [indicating], it is still performing the functions it was intended to ~~weigh~~ way back 14 years ago when I was one of those who was instrumental in establishing it.

Now, just to go back a little bit to that time period, we were not really sure how this was going to work. But, we knew that something needed to be done in order to provide an appropriate conduit for information to flow from the NRC and from the licensee to a reasonable represented body of individuals who are independent of either of the two organizations, such as the Panel turned out to be.

We were a conduit to the public and that was the objective and I think that although I have not been involved for a long, long time, I did continue to receive, and I usually skimmed through, if not carefully read through, some of the transcript over the many years. And I think that the Panel has admirably served that function and it is a very

unique thing. 14 years is a longer time than anyone ever anticipated being stuck on the Panel. I mean, not that people were on it for that long except for Ann. And if I remember correctly, I believe she was an original member and Mr. Morris came along shortly thereafter.

Actually, he was also an original member; correct?

MR. MORRIS: Yes.

MR. SNYDER: In any event, if you think about all of the trials and tribulations that this project engenders and the extreme technical difficulties that were overcome and the concern, correctly so, that the public had and the need to establish some kind of credible mechanism for communicating information. All I can say is that it is a fantastic process and only in America can you do this. In fact, most times when you try to establish something like this, the Government does not follow through and it has typically a life span memory of one administration of four years and then they go on to other problems and sometimes it is even shorter than that.

But, the Panel has done a fabulous job and I really think that all of the members of the Panel need to be congratulated. Now, I know that you went through all of this at the last meeting and I was not here [indicating] and there was someone more significant than me giving you congratulations. But, the Panel Members and in particular,

I think Art Morris, who has been the Chairman for most of the time, that it was in existence -- all I can say is that they deserve a lot of credit. I really think that the community owes them a lot. Many people may not realize this, but sometimes their expenses were paid and if it did happen, it was many months in arrears and they were not compensated for their time and they hung in there for all of these years and I just think that it is really fantastic.

I must say that if I were in their position, I do not think that I would have stuck around that long of time, frankly, because many, many times it was a thankless task. So, I just want to add my comments to the other words of congratulations and thanks. And I really think that the community here [indicating] should really take note of the fact that this is a group of people who for an extraordinarily long time, devoted themselves to asking the tough questions and not always getting the answers that they wanted and certainly not always agreeing among themselves.

But, they provided a public forum conduit to get the information out on this project. I would bet that the people in Ukraine don't get any kind of information like this on Chernobal and no one really is sure what the situation is there or at least the public. I mean, it just does not work in any place but in a democracy like ours and without being too patriotic about all of this, all I can say

is that it makes me feel good to know that I was party to the establishment of it. And that although I did bow out after five and a half years, the Panel Members did not and they hung in there and I think we really all should give them a handshake and applause and I propose that we do that right now.

MR. MORRIS: Thank you very much, Mr. Snyder.

I would be remiss to say that we had a great relationship with you as we have with Mike and I think that you served the public extremely well and we do appreciate the comments that you just made.

Now, before we go any further, I just want to, at this time, personally thank, for the last time, the citizens for coming out all of these years and being there, because they really were the main element of what this was all about and they kept the vitality of the Panel. I also want to thank all of the federal agencies, particularly the NRC and Mr. Long and his staff. You particularly have always been very patient and listened and tried to answer questions and we do thank you for that.

Lastly, I want to thank all of the Panel Members, particularly Neil Wald, who is here tonight from Pittsburgh. And I am assuming that he flew in today and will fly back tonight and to just sit back and think that he has made this trip monthly for many, many years.

I guess, it has not exactly been monthly, but it has been going on for 14 years and I think that it is something very special for a person to do and there is no pay for it. I mean, I believe that he does get his expenses paid eventually, but that is it. He does deserve a real special thank you for the contribution that he has made and Ann Trunk and John Luetzelschwab and I are kind of neighbors, as far as we might have to travel an hour or so, but Neil puts in more time than we do traveling back and forth. I mean, that is not to undermined or not appreciate the other Panel Members, but I just want to pay a special tribute to Neil Ward.

Now, this is not a formal meeting so that there is not such thing as a quorum. This is the first time that we have never had a quorum for all of these years and I think that it means that it is the twilight hours. So, with that, I will ask if there is anyone in the audience who has any questions or comments at that time that they would like to make.

MS. DAVIS: I have a few questions.

Now, as far as the role of DER Bureau of Radiation Protection at the Plant, I understood from the one comment here [indicating], that they had a role, and I am really not sure what that is.

MR. MORRIS: Well, I do not know if I can answer

that question, but perhaps someone else can.

MR. BARKANIC: Perhaps I can answer her question.

My name is Bob Barkanic and I am with DER and our role is simply oversight. We do routine inspections with the NRC.

MS. DAVIS: Do you have enforcement power?

MR. BARKANIC: The State has no regulatory authority in this matter.

MS. DAVIS: So, you just inspect for information?

MR. BARKANIC: If we have issues, we discuss them with NRC. If there is anything that we do not like that we see, then we will discuss it with NRC, and then NRC looks into it and they do have the authority to act.

MS. DAVIS: Another question was that at the last meeting of the Panel, there was a question as to the PUC had approved certain amounts for the various parties in the corporation ~~contortion~~ here [indicating] to put into the trust fund and I just am wondering if that happened.

MR. LONG: Well, the situation has not changed ince December.

The New Jersey Bureau of Regulatory Commission has approved in Jersey Central's rate base -- Jersey Central is a 25 percent owner of the Plant recovering of the decommissioning funds for a basis of $231 million and $92.00 when that was approved.

The Pennsylvania Utility Commission has approved the recovery for Metropolitan Edison, which is a 50 percent owner of the Plant for a total amount of $300 million. At the present time, Pennsylvania Electric is a 25 percent owner of the Plant and they have not yet had any approval to recover decommissioning funds.

MS. DAVIS: So, that has not changed?

MR. LONG: That is correct.

MS. DAVIS: Now, I do have one question about off-site radiation readings.

Now, there has been some confusion in my mind, because of different reports and articles. And I just want to know if the amount that is considered background in this area changed over the past 15 years. And is that a standard measurement, which is used all over the country, or are we being very specific about what background is in this particular area?

MR. ~~THOMAS~~ THOMAS: Well, the background varies with location around the United States and I do not know of any significant changes in the background of the TMI area in the past 15 years. If you go out and take surveys, then I'm sure that you will get slightly different results from time to time. I know that DOE does, in fact take aerial surveys around nuclear plants on a periodic basis.

In any event, I have not heard of any significant

changes and you develop math that sort of looks like topographic maps and they of course or going to vary from survey to survey. But, as I said, I do not know of any significant changes.

MS. DAVIS: Well, it was my impression that the testing changed.

So, what do you consider to be the background in this area?

MR. THOMAS: What do you mean, that the testing has changed?

MS. DAVIS: Well, when there was testing in the atmosphere of nuclear devices, I would assume that would have changed with more -- we had a number of different things happen in the meantime and I have been confused about that for some, as to whether that is something that is changing every year and if, in fact it has changed locally?

MR. MORRIS: Is there anyone, tonight, who can speak with any authority on that question?

MR. BARKANIC: I think I can, Mr. Morris.

The State does have an environmental monitoring program and what I would recommend that you do is let me get information from you and I will have the Division Chief, who is responsible for that, contact you and I think that she will be able to answer your questions.

MS. DAVIS: It used to be included in the reports

that came out or the NRC reports regularly would have that.

Now, I went back trying to find that and I could not find it in the old ones, as far as trying to remember what they had said in the '80's, and I would appreciate that information.

MR. MORRIS: Perhaps the two of you can get tougher after the meeting and work that out.

MR. BARKANIC: Fine.

MS. DAVIS: Now, I am confused and I tried to read this carefully from the last meeting, but I am still confused about what is coming out of the decommissioning trust fund. I mean, I heard talk about dismantlement and I heard talk about PDMS and decommissioning.

Now, decommissioning seems to be something that is really put off until 2014 and then, somebody mentioned that the dismantlement of what was on-site would come out of the decommissioning and it would be $4 or $5 million per year.

I'm just confused as to what is coming out of that trust fund and who is paying for dismantlement and PDMS.

MR. MORRIS: As far as I know, PDMS and any work and dismantlement that takes place between now and ultimately decommissioning does not come out of the trust fund.

The trust fund is there ultimately for decommissioning.

MR. LONG: Perhaps I can follow-up on that.

Now, ~~PEMS~~ PDMS's activities, which is postdefueling, monitored storage activities is currently budgeted at $5 million per year, which is out of our normal operating budget for our company.

MS. DAVIS: From now until 2014?

MR. LONG: From now until whenever the decommissioning starts.

As long as that monitoring activity continues, then that would be the normal operating cost for the Plant.

The dismantlement activities are currently funds from our reserve capital funds. The Company has reserved capital funds with the expectation, since this is work that would be done as part of the decommissioning, that it will be eventually recovered from the decommissioning fund. At the present time, there is no money being withdrawn from the decommissioning fund. And the current amount at the end of 1993, was $109.7 million in that trust fund.

MR. MORRIS: I do not recall that ever being clarified before to us.

Now, was that mentioned at the last meeting that you were talking about possibly dismantling equipment?

MR. LONG: I do not think that we discussed that at the last session.

MR. MORRIS: Well, I had an article shown to me

here [indicating] that indicated that the NRC has some kind of a draft policy statement coming out of this to permit the withdrawal of monies from the decommissioning trust fund.

Maybe you can address that, Mr. Dudley.

MR. DUDLEY: The NRC has published a draft policy statement, which details the conditions under which we would allow licensees to withdraw monies from their trust funds for certain predecommissioning activities.

These would be activities that could only take place at facilities where they were permanently shut down and that these activities would be in conformance with the existing facility license, the technical specifications, and they would not present any unreviewed environmental questions. So, that draft policy statement has been published in the Federal Register for comment by the public and when public comments are received, then they will be reviewed by the Commission and perhaps incorporated with changes into the final policy statement. Is it possible for former Panel Members to receive a copy of that particular document?

MR. MASNIK: That would be no problem.

MR. MORRIS: So that I understand it, the wording that you used was predecommissioning activities, which might seem to imply not activities related to decommissioning.

MR. DUDLEY: The definition in the Commission's

policy statement is that those activities must be defined under our regulations and must meet the definition of decommissioning as defined in 50.2. We call them predecommissioning activities, because they would be undertaken before the decommissioning plan was submitted or approved.

MR. LONG: As I remember there was another condition that said the activities should be of a nature that they don't make more difficult the future decommissioning -- I am not sure exactly how it is worded, but there is a requirement --

MR. DUDLEY: That is correct.

One of the financial criteria is that the activities could not significantly increase the decommissioning cost and that would prevent those activities from making a significant effect on the overall net cost of decommissioning.

MR. MASNIK: Let me just say that this is in response to at least two facilities that have indicated in one case that they actually begun doing some dismantlement of a facility prior to the decommissioning plan approval.

And they had requested clarification from the Commission as to what activities could be carried out before the decommissioning plan was approved and whether or not they could withdraw funds from the decommissioning fund.

So, that is why this policy statement has come out.

MS. DAVIS: There was a figure of some 4 or 5 million per year for dismantlement and we are talking about a few auxiliary buildings and an intake, which seems like a pretty high cost. I mean, I have no idea what these things cost, but it just seems like it would drain the decommissioning fund very fast if we take $4 or $5 million per year just to take down a few auxiliary buildings and intake valves.

So, I think that it is something that the public should be aware of and be concerned about, that the decommissioning fund maybe frittered away and when we get to the big stuff, it would not be there.

MR. MORRIS: Well, it is only a draft statement and it is not yet approved and there will be an opportunity for public comment.

MS. DAVIS: The other thing I would like to know is would the rule making,

And I know this came up a couple of years ago, and it seemed to come up again at the last meeting here [indicating], but is there a rule making specifically for accident facilities that is different from the rule making from decommissioning of plants in a generic sense?

After the gentleman finished his testimony, from whatever his research group was the last time, it looked as

if everything he said was basically not answering our questions. And I would like to know if there is a rule making that is going to apply specifically to accident plants.

MR. MORRIS: I believe that the answer is no.

I believe that is what was said at the last meeting.

MS. DAVIS: All right.

The last question I have would be the Greenfield concept. I understand that not only do they not -- did I hear correctly that they did not plan to reduce this plant in Greenfield, but that the NRC has not come up with rules for reducing --

MR. MORRIS: I don't think that the NRC requires it.

I have not heard the utility commit one way or the other.

MR. LONG: It is not required and we don't have an estimate of what that would cost.

Perhaps one way of thinking about it is that our former president described it once, if you were able to be on the moon looking down on Earth and you saw the ants and their activities, would it make sense to move radioactivity from one site on Earth to another site on Earth? He was using the example of a bird looking at it from sitting way

back and I think that that is the heart of the issue of Greenfield.

Do you get a site to be clean and protect it to where it cannot release radioactive stuff there or do you take the next step, because it is a society problem and not just a corporate cost. I mean, it is a society cost, because somebody ends up paying for it and that somebody is always we, the public.

MR. MORRIS: I guess it really just depends on where you live.

MR. LONG: Of course.

I mean, it is a very difficult question to answer and it will take a lot of study and time.

MR. MORRIS: In any event, the question has been asked and the answer, basically right now, is that there just is not an answer, at this point in time.

MS. DAVIS: I could not agree more with the last statement.

I think that the only answer is since all we can do is move this radioactivity around, then maybe we should stop making it.

I have no further questions or comments at this time and I just want to thank you all for giving me an opportunity to speak my mind and ask some questions.

MR. MORRIS: All right.

Is there anyone else who would like to make a comment or ask any questions at this time?

MS. PICKERING: I just want to draw your attention to the fact that 15 years since the accident -- several weeks ago, we had a national conference here in Harrisburg and for those of us who attended the conference, there were over 200 people who came from all over the United States. It was a really good session and there were legislators from Pennsylvania, who spoke, as well as other experts in the field.

Now, the tenure was that we activists and citizens better look to the utilities and conservation and get active in the decisions that are made by the utilities on energy use. And that was the pervasive thinking for where we are going with energy use. But, the other issue, of course is the radioactivity question and the waste question that Bev Davis referred to and also what Eric Epstein asked about. All three of us had attended the conference and I think that our community is facing the question of Unit 1 and what is going to happen with all of the waste from Unit 1. I understand that this is your last meeting. Is this your last, last meeting?

MR. MORRIS: This is out last unofficial meeting, yes.

MS. PICKERING: When I heard that there was a

meeting, I was surprised because I did not realize that you had planned another meeting after the last meeting.

And I guess my question would be directed to the NRC, as far as what are the plans for any future meetings or gatherings when issues do arise that the public wants some answers on and some information on?

So, what are the plans for some kind of -- would the Panel be willing to come back or would the NRC be willing to have a public meeting again in the future?

MR. MASNIK: All right.

Well, to answer you question, I think that I would first say that both myself and Lee Thomas and others will be available to answer any of your questions as we have all along. I do not think that we necessarily have to wait until we have a public meeting. We will continue to be responsive to your requests and, as far as public meetings, I think that if conditions warrant it -- I cannot tell you off the top of my head. I mean, public meetings are occasionally held at other facilities when there are significant events.

For example, at some of these facilities that are now undergoing large component removal, we typically have a public meeting and it gives us an opportunity to tell the public what the process is. With the Plant and the condition that it is right now, which is a storage

condition, it would be difficult, in my mind, to come up with a reason to have another meeting, unless of course there is some accident or some sort of a release or something to that effect. So, you can call me and that is about all I can say right now. I mean, I certainly will be more than willing to answer your questions or help in any way that I can, but I really cannot be very specific about any future public meetings.

MS. PICKERING: You do not want to have another meeting to review the report?

MR. MORRIS: All right.

Well, I really have to say that I think for the Panel that this is really going to be it. I mean, just the fact that really so few people showed up tonight, I think is an indicating that the Panel feels that it is over. I mean, if there is ever another public meeting in the future, then I am sure what will happen is NRC will schedule a public meeting in whatever fashion they normally do, but not through the Panel.

I really cannot imagine that happening again. I mean, even if they would ask, my sense is that I doubt the Panel would return now, as it was before.

MS. PICKERING: Well, I just would like to say thank you and I do look forward to reading your report that has been prepared. I thought that you would have been part

of the review --

MR. MORRIS: Well, I have seen a draft of it.

MR. MASNIK: All Panel Members were provided with a copy of the draft report, as well as Eric Epstein and former licensee employees and several other people outside of the agencies and it has gotten a good review.

MS. PICKERING: Well, I just want to thank the Panel for their work and as somebody who has represented the public year after year, I just want to let you know that at the TMI Office, we still get calls and we still get questions and there still is a lot of interest, even though it does not show up by people coming to meetings.

Actually, I think that most people feel that they discussions here [indicating] are technically above their head and that they really do not understand and maybe don't want to know all of these involved details.

But, it has been helpful and I just want to thank you very much.

MR. MORRIS: Well, I must say that you folks have been there all that way and you have served the public very well. I mean, very few organizations have stayed as active as your's have for this long a period of time on almost anything and we thank you for that.

MS. PICKERING: All right.

Thank you very much, Mr. Morris.

MR. MORRIS: All right.

Are there any other questions or concerns from anyone at this time?

[No response.]

MR. MORRIS: All right.

Then, I guess that that is it and I just would like to thank everyone once again.

So, thank you.

MR. MASNIK: I just want to thank everyone on behalf of the Commission and the Panel an the licensee and other members of the public that have come back year after year.

Thank you.

MR. MORRIS: All right.

If there is nothing further, then this public meeting is over.

Thank you all very much.

[Whereupon, at 8:30 p.m., the above-entitled meeting was concluded.]

REPORTER'S CERTIFICATE

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

NAME OF PROCEEDING: Public Meeting on TMI Unit 2

DOCKET NUMBER:

PLACE OF PROCEEDING: Harrisburg, PA

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

Official Reporter
Ann Riley & Associates, Ltd.

PDMS

- *Agenda*
  - *Status*
  - *Staffing / Oversight*
  - *Activities*

PDMS STATUS

- *Received PDMS Technical Specifications and permission to enter PDMS on 12/28/93*

- *PDMS responsibilities transferred to TMI Division on 1/10/94 (TMI Division replaced the former TMI-1 & TMI-2 Divisions)*

PDMS STAFF

DIRECTOR, TMI

DIRECTOR, OPERATIONS & MAINTENANCE, TMI

PDMS MANAGER

The PDMS Manager oversees overall operations and maintenance of PDMS Systems and ensures compliance with TMI-2 license requirements and PDMS Safety Analysis Report commitments

-PDMS budget - $5M/year

-PDMS staff

- 4 full-time

- 31 effective person years support personnel

PDMS OVERSIGHT

GPUN

- o General Office Review Board
- o Independent Onsite Safety Review Group
- o Plant Review Group
- o Quality Assurance Department

NRC

Pa BRP

RADIOLOGICAL MONITORING/TRENDING

- Reactor Building monitored on a quarterly basis
  - entry on 3/9/94
  - radiation levels and contamination levels exhibited no unexpected trends
- Balance of Plant Monitoring/Trending
  - radiation levels and contamination levels exhibiting no unexpected trends
- Quarterly Report to NRC

ELECTRICAL POWER SUPPLY MODIFICATION

PURPOSE:

- *USE SEPARATE POWER SOURCE FOR TMI-2 TO ELIMINATE POTENTIAL EFFECTS ON TMI-1*
- *REDUCE TOTAL NUMBER OF COMPONENTS IN SYSTEM TO MINIMIZE MAINTENANCE NEEDS AND MAXIMIZE RELIABILITY*

STATUS:

- *MAJOR POWER SUPPLIES IN OPERATION*
- *MINOR CHANGES TO LOCAL CIRCUITS COMPLETED BY END OF 1994*

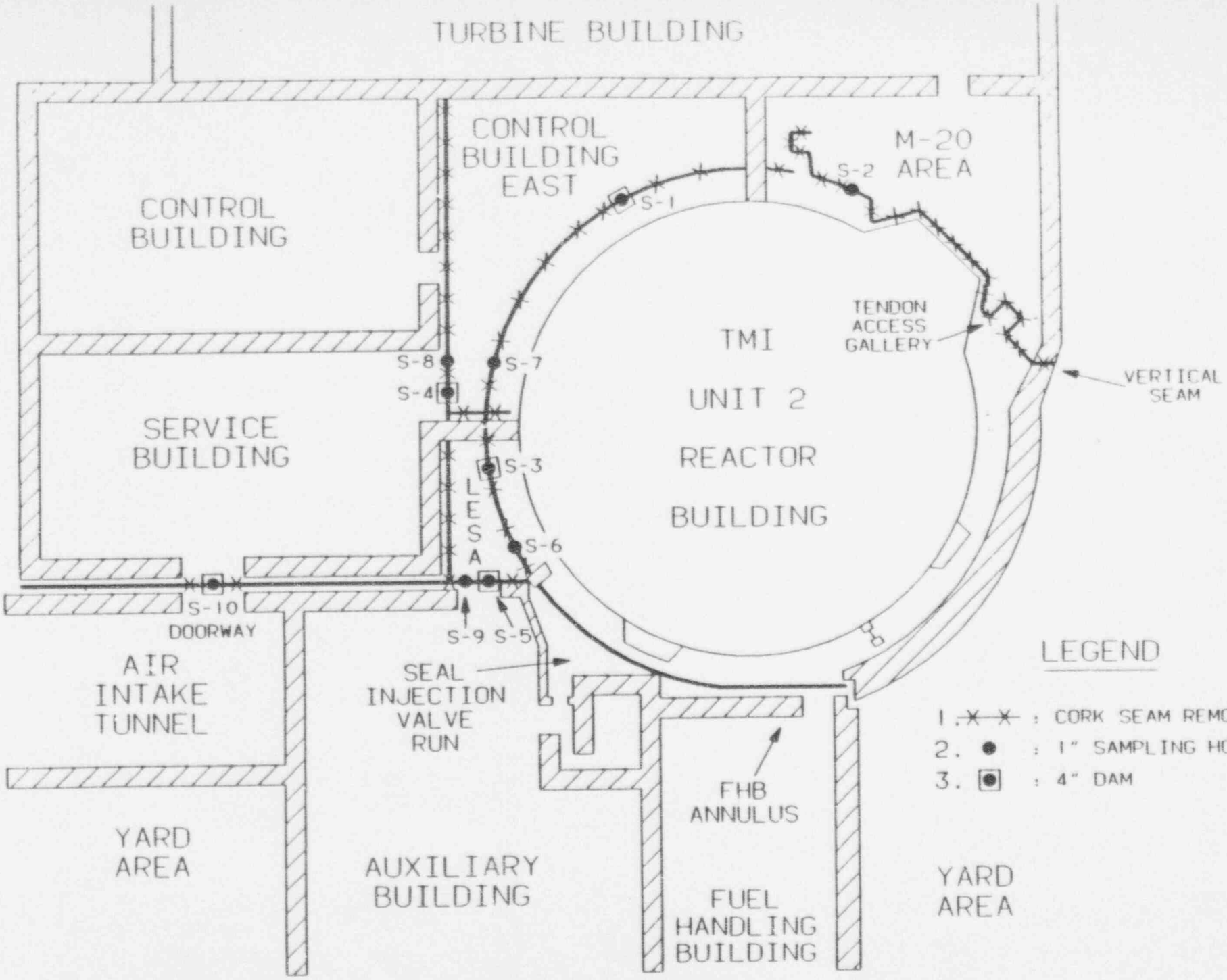
DISMANTLEMENT ACTIVITIES

- *Perform dismantlement of equipment that is unrelated to maintaining PDMS*

- *Dismantlement currently utilizes about 40 people*

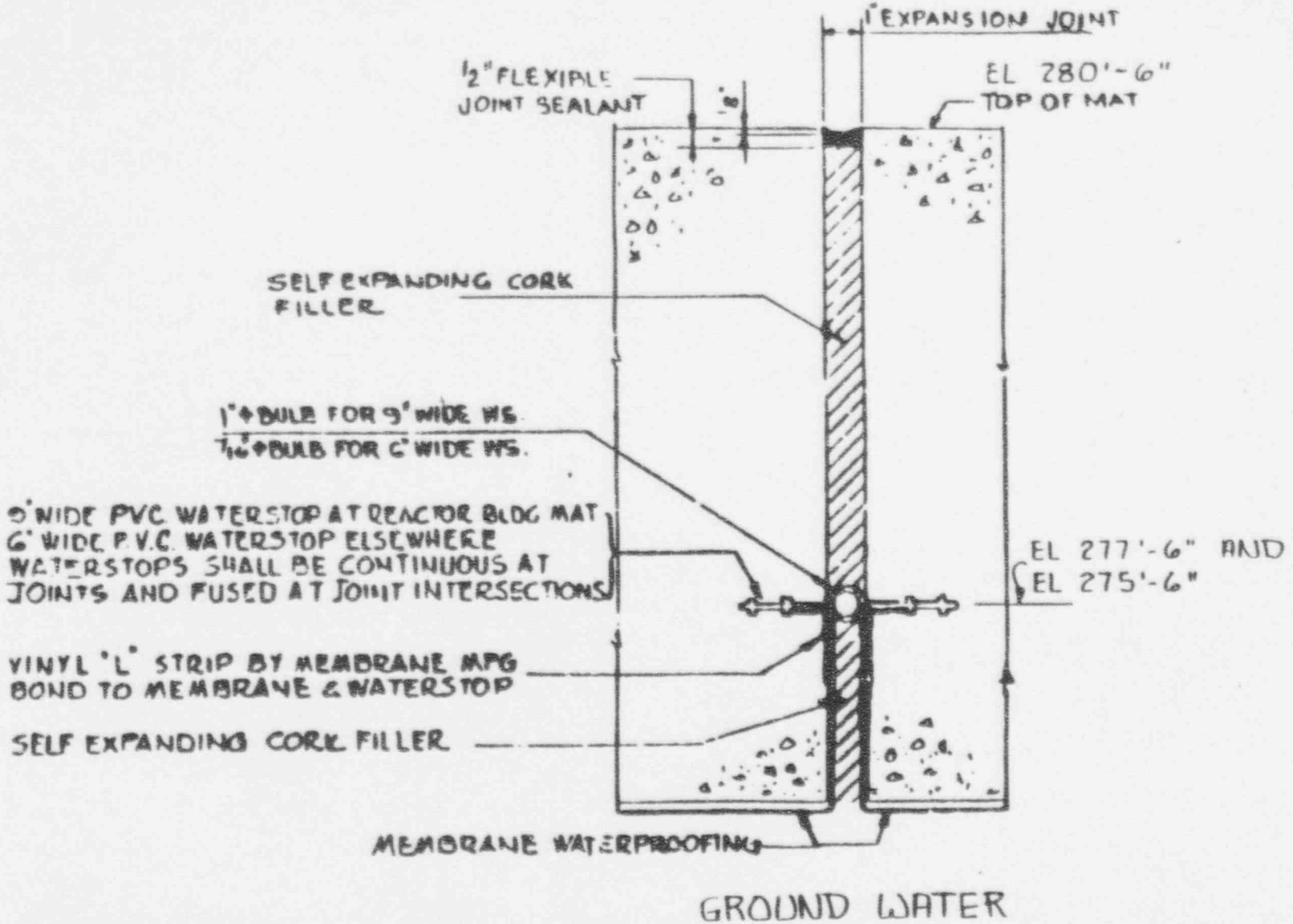
CORK SEAM

- *WHAT IT IS*
- *WHY IT PRESENTS A NUISANCE*
- *WHAT GPUN IS DOING ABOUT IT*



GENERAL ARRANGEMENT OF THE CORK SEAM AREA

ATTACHMENT 1


1" EXPANSION JOINT
1/2" FLEXIPLE JOINT SEALANT
EL 280'-6" TOP OF MAT
SELF EXPANDING CORK FILLER
1" ϕ BULB FOR 9" WIDE WS
7/16" ϕ BULB FOR 6" WIDE WS.
9" WIDE PVC WATERSTOP AT REACTOR BLDG MAT
6" WIDE P.V.C. WATERSTOP ELSEWHERE
WATERSTOPS SHALL BE CONTINUOUS AT JOINTS AND FUSED AT JOINT INTERSECTIONS
EL 277'-6" AND EL 275'-6"
VINYL "L" STRIP BY MEMBRANE MFG BOND TO MEMBRANE & WATERSTOP
SELF EXPANDING CORK FILLER
MEMBRANE WATERPROOFING
GROUND WATER

WHY IT PRESENTS A NUISANCE

- *RAINWATER HAS LEAKED INTO THE CORK SEAM*

- *WETTED CORK SEAM SPREADS EXISTING RADIOACTIVITY ALONG THE SEAM*

- *FLOOR IN VICINITY OF CORK SEAM GETS CONTAMINATED WHEN WATER ACCUMULATES*

GPUN ACTIONS TO DATE

- *REPAIRED ROOF JOINTS TO MINIMIZE INLEAKAGE*

- *INSTALLED DAMS IN SEAM TO STOP WATER MIGRATION WITHIN SEAM*

- *INSTALLED SAMPLE POINTS TO ALLOW WATER LEVEL MONITORING AND PUMPING IF NEEDED*

FUTURE PLANS

- *CONTINUE MONITORING AND PUMPING AS NECESSARY*

- *SEAL THE TOP OF THE JOINT*
  - *PREVENTS ANY WATER INLEAKAGE FROM ENTERING THE SEAM*
  - *PREVENTS CONTAMINATION SPREAD FROM THE SEAM ONTO THE FLOOR*

CONFIRMATORY SURVEYS

DID GPU MEET GOALS?

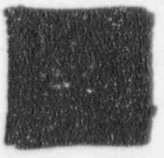
ARE GPU MEASUREMENTS REASONABLE?

CONFIRMATORY NOT DUPLICATIVE

SELECTED CUBICLES CHOSEN

16 - 18" S

10 CM SQUARE



11.3 CM DIA CIRCLE

DIFFERENT INSTRUMENTS

LOCATION MAPPING

DIFFERENT SMEAR TECHNIQUES

DIFFERENT SMEAR COUNTING

DIFFERENT SAMPLE SIZE

CONCLUSIONS

GPU MET GOALS

GPU MEASUREMENTS REASONABLE

The EFMR Monitor

March, 1994 Volume 2, No. 1

Group Records 30,000+ Readings

"The enthusiasm of the volunteers for participating in this project is simply overwhelming," said EFMR's Eric Epstein when asked to look back on the monitoring group's first year. "I never expected we'd have a base of more than 30,000 readings recorded in our first year," Epstein said, "but that provides a solid foundation for moving ahead."

According to Epstein, the EFMR Group is the largest civilian radiation monitoring group in the country. While there has been some turnover in the ranks, Epstein reports he has a waiting list for the monitors and that the level of interest throughout the community remains high.

Epstein also praised the people at Dickinson College. "Nobody realized how difficult it would be to analyze 30,000 readings," he said in complimenting them on the magnitude of their effort. "They've also had to deal with the horrendous weather in going out and collecting samples from the air samplers on a timely basis and I have nothing but praise for the faculty and students at Dickinson," he continued.

Asked if he had any regrets or complaints about the first year, Epstein said he was disappointed that volunteers aren't taking advantage of the Accu-Weather service that's available for documenting weather conditions associated with high readings.

"We're on-line continuously with Accu-Weather so we can provide accurate reports of weather conditions at the time of any high readings," Epstein explained. "While we can pull up weather data at anytime, the sooner people call the easier it is for us to get what we need. I'd really encourage people to take advantage of this service and to call me for a full report on weather conditions whenever they get a higher than normal reading."

EFMR's Mission Continues

The EFMR Monitoring Network is a sterling example of how concerned citizens can make a measurable difference in their communities. A non-profit, non-partisan organization that monitors radiation trends in the Three Mile Island (TMI) area, the Group was formed as a result of a settlement between Eric Epstein and GPU Nuclear.

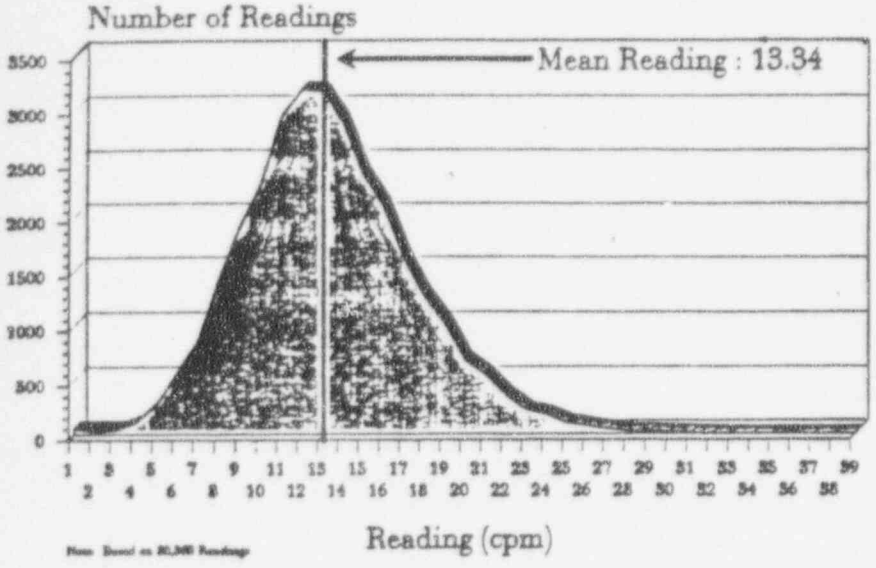
EFMR has deployed 60 Rad Alert radiation monitors at 49 stations in an eight-county area around the TMI nuclear power station. Anyone receiving a Rad Alert monitor must complete a three-hour training session provided by the physics department at Dickinson College.

EFMR has five low-volume air samplers installed on the East and West shores of TMI. Dickinson College's Physics Department collects the filters and cartridges of these monitors on a weekly basis. Analyses performed include, but are not limited to, weekly gross beta and alpha measurements, a monthly gamma isotopic analysis, a weekly Iodine-131 analysis, and a semi-annual Strontium-90 analysis.

The Group also enjoys on-line access to General Public Utilities' Reuter-Stokes gamma monitoring system, an on-line subscription to Accu-Weather from State College, information from the remote temperature detector installed at the

Continued page 2

Summary of Readings: January - November, 1993

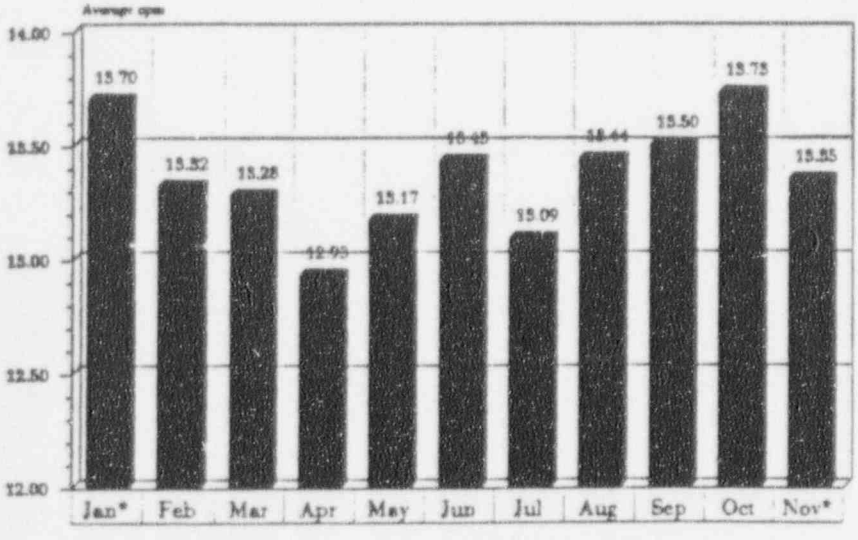


High Readings January - November 1993

Location	Number or readings greater than 26cpm	Percent
Drewmore*	67	29.3%
Harrisburg-5	19	8.3%
Enola	17	7.5%
Airville	16	7.0%
Middletown-6	16	7.0%
Harrisburg-2	14	6.1%
All Others	79	34.6%

*Drewmore is just east of Peach Bottom in York County

Average Monthly Readings: January - November, 1993



The Mission Continues

Continued from page 1

base of the TMI-2 reactor vessel, and meetings with GPU, the NRC and DER relating to matters of concern at TMI-2.

The Group works closely with Los Alamos National Laboratories, GPU Nuclear, the Nuclear Regulatory Commission and the Bureau of Radiation Protection in the Pa. Department of Environmental Resources. As part of the agreement with Epstein, GPU has committed to spend $700,000 over seven years on decommissioning research.

Finally, in case readers are wondering what EFMR stands for, the group's initials are derived from Epstein's grandfather and uncle, Emanual Fievish and Max Rosenberg. Feel free to direct your questions to us at 2308 Brandywine Drive, Harrisburg, PA 17110 or call 717/540-5773.

The EFMR Monitor is the official publication of the EFMR Monitoring Group. Comments or questions should be directed to EFMR, 2308 Brandywine Drive, Harrisburg, PA 17110.

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Eric Epstein

EFMR Monitoring Group
Readings by Alpha Order of Location

Code	Location	No Readings	Mean Reading	Range
AIR	Airville	638	16.10	5-36
ANV	Annville	1,092	14.54	6-31
CCH	Cedar Cliff High School	325	12.83	4-23
CPK	Colonial Park	579	13.80	2-27
DMR	Drewmere	1,300	18.26	5-39
ELA	Enola	1,085	15.29	2-32
ETN	Elizabethtown	1,203	11.95	1-39
ETN2	Elizabethtown 2	281	11.51	4-21
ETT	Etters	1,428	12.26	4-23
FTP1	Fairview Township 1	36	17.00	10-27
FTP2	Fairview Township 2	81	16.58	8-26
FTP3	Fairview Township 3	592	13.54	5-29
GBR	Goldsboro	240	11.44	10-13
HBG1	Harrisburg 1	338	16.81	5-31
HBG2	Harrisburg 2	149	18.93	11-31
HBG3	Harrisburg 3	63	14.11	13-15
HBG4	Harrisburg 4	338	14.66	5-29
HBG5	Harrisburg 5	169	19.61	8-34
HSP	Highspire	1,271	12.96	2-33
HSP2	Highspire 2	201	11.69	5-33
HUM2	Hummelstown 2	327	14.98	5-29
HUM3	Hummelstown 3	328	13.66	4-32
LAN1	Lancaster 1	1,152	13.63	3-27
LAN2	Lancaster 2	726	11.47	3-31
LWN	Lawn	1,251	11.09	1-28
MDT1	Middletown 1	922	12.87	5-18
MDT2	Middletown 2	609	11.38	4-22
MDT3	Middletown 3	1,216	11.26	2-22
MDT5	Middletown 5	50	12.68	8-16
MDT6	Middletown 6	2,369	14.81	3-39
MEC	Mechanicsburg	1,036	14.99	3-33
MTJ	Mount Joy	1,018	13.01	3-26
MTN	Mountville	178	14.03	7-28
MVL	Marysville	894	13.41	4-28
NTN	Newberrytown	1,429	10.51	2-27
PBT	Peach Bottom	1,340	11.52	1-34
PRO	Progress	1,113	12.24	3-28
SQF	Susquehanna Township	1,157	12.97	2-26
STN	Steelton	147	11.53	6-19
WRV	Wrightsville	437	10.58	5-19
YRK	York	478	14.52	5-30
YSP	York Springs	782	13.60	4-28
Total		30,368		

EFMR Monitoring Group
Summary: Readings in Ascending Order of Mean Reading, by Location
January - November, 1993

Code	Location	No. Readings	Mean Reading
NTN	Newberrytown	1,429	10.51
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LWN	Lawn	1,251	11.09
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MDT2	Middletown 2	609	11.38
GBR	Goldsboro	240	11.44
LAN2	Lancaster 2	726	11.47
ETN2	Elizabethtown 2	281	11.51
PBT	Peach Bottom	1,340	11.52
STN	Steelton	147	11.53
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MDT5	Middletown 5	50	12.68
CCH	Cedar Cliff High School	325	12.83
MDT1	Middletown 1	922	12.87
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DMR	Drewmere	1,300	18.26
HBG2	Harrisburg 2	149	18.93
HBG5	Harrisburg 5	169	19.61
Total		30,368	

Late 1993 Marks First Results of Air Sampler Monitoring

The following is a summary of monitoring results from the five air sampling monitors installed within a two-mile radius of Three Mile Island. This material was submitted by Dr. John Leutzelschwab of Dickinson College's Department of Physics and Astronomy.

Sample Collection and Analysis

The five radiation monitors placed within a two-mile radius of TMI have yielded the first results and analysis which includes just four weeks of data in the third quarter of 1993.

Each monitoring station is equipped with a fiber particulate filter capable of collecting particulates larger than five microns in diameter. The fiber filter is followed by a charcoal filter which collects iodine and xenon gas. The air samplers draw 55 liters of air per minute through the filters. In one week, about 555 cubic meters of air flow through them. The flow is regulated so the system corrects for heavy loading on the particulate filter.

While the flow is measured with a gas meter, those analyzing the data correct the volumes for the slight negative pressure the pump generates when drawing the air through the filters. Each week students check and adjust the flow as needed. They also check the initial and final masses of the particulate filters.

A gamma analysis of the five particulate filters is done together to allow any particulate matter that may contain short-lived radionuclides to be seen. Because the gamma analysis detects the individual gamma ray peaks, TMI-generated radionuclides can be distinguished from the radon "daughters" in the particulate matter. The monthly analysis of the filters will more readily detect any radionuclides collected at one station and not the others.

The gamma analysis system calculates the activities of any radionuclides detected in the gamma spectrum. Analyzers use procedures that call for a visual inspection of the gamma spectrum. If this inspection shows a possible gamma peak at an energy characteristic of a radionuclide possibly released by TMI, the sample is counted again for a longer time to verify if it is actually a peak or a normal fluctuation on the "background."

Particulate filters are also analyzed for gross alpha and beta activity at least 72 hours after collection. This time period is necessary as one of the radon daughters has a half-life of 10.6 hours; it takes 72 hours for it to decay to less than one percent of the initial activity.

Calibration Procedures

Prior to each gamma counting (which includes five charcoal and five particulate filters), an energy calibration is performed to assure the gamma ray peaks are properly identified. An efficiency calibration is done annually for both the charcoal and particulate filters.

Prior to each alpha/beta counting, the plateau voltage is determined along with the discriminator voltage, the "crosstalk" (to correct for the alpha counts recorded as beta counts), the efficiency of the system for counting both alphas and betas, and the alpha and beta backgrounds. These values are checked periodically for significant changes.

Results

No detectable activity was shown from analyses of the charcoal filters. The program has yet to include the minimum detectable activity (MDA) for iodine-131. The MDA's of other radionuclides with gamma energies near that of the iodine-131 energy are about 0.02 pCi/m^3 (picocuries per cubic meter); it is expected the MDA for iodine-131 would have the same approximate value.

The gamma analysis of the particulate filters has shown no detectable activity other than the expected radon daughter, Pb-212. The MDA's for some radionuclides that we might see from TMI are: Cs-134: 0.014 pCi/m^3, Cs-137: 0.02 pCi/m^3, Co-57: 0,08 pCi/m^3, and Co-60: 0.02 pCi/m^3.

The gross beta and alpha activities are shown in the table and graph (Page 6). Because

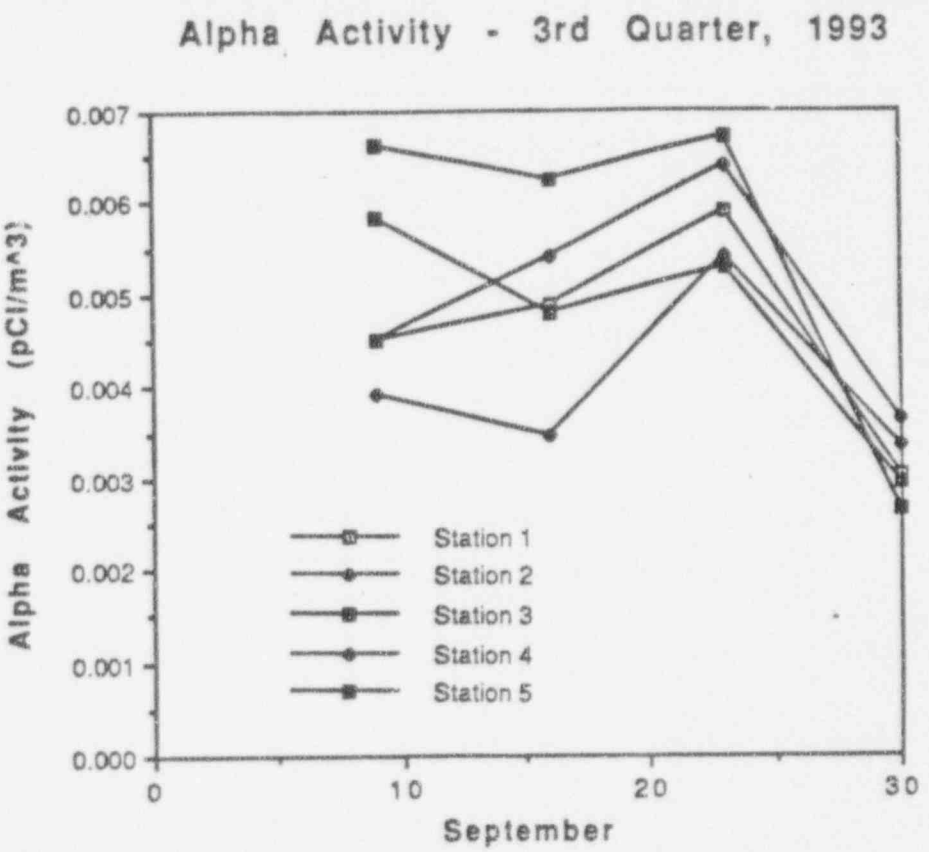
Late 1993 Marks First Results of Air Sampler Monitoring (continued)

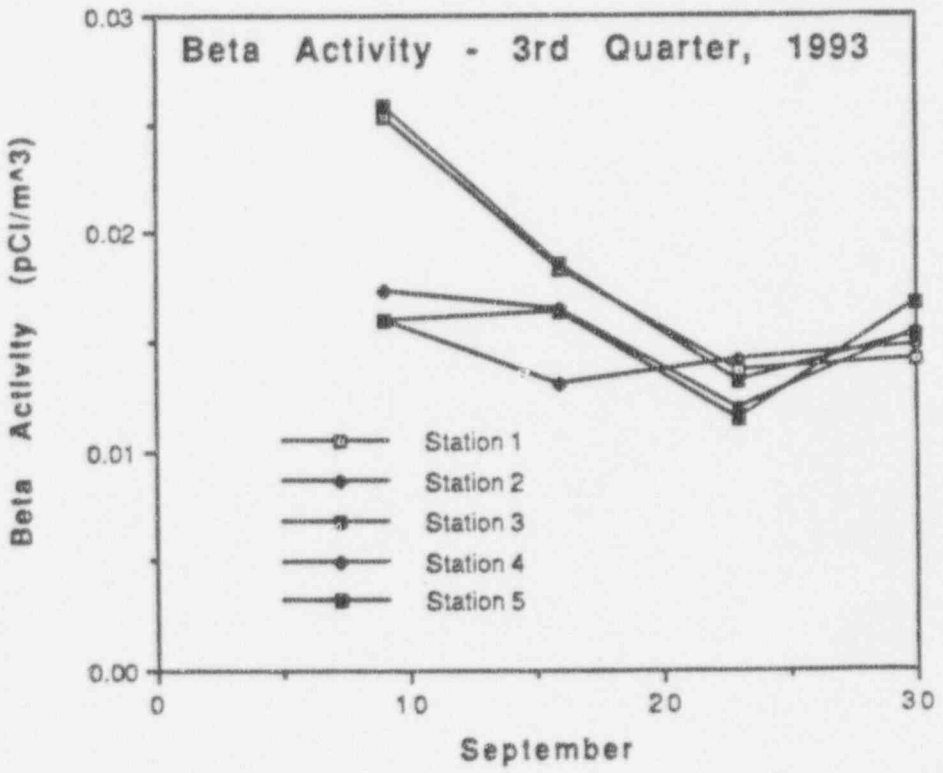
there is no control station, the data must be considered on its own and not in comparison with anything else. However, to verify their validity, they can be compared to the typical values found by the GPU monitors. The four week period analyzed was too short to use for any real comparisons; this system and the GPU system, therefore, may differ slightly.

Outstanding Work

Calibration checks must still be done. One check was made of the charcoal gamma counting system by counting the charcoal standard as a charcoal source. The system then computed the activities on the source. Excect for one radionuclide (Cd-109), the calculated values were within plus or minus five percent of the given values. This is repeatedly checked for accuracy. A similar check of the filter and alpha/beta counting systems needs to be done.

Thus far, there seem to be efficiencies lower than expected. Some work has been completed with the crosstalk to see how it varies with the crosstalk setting. Though the crosstalk function eliminates the alpha counts that fall in the beta channel, there are still beta counts that fall in the alpha channel. This must be corrected. An MDA calculation for the alpha and beta activity must also be completed.





Students Cited for 4th Quarter 1993 Monitoring Success

The following is a summary report from Dr. John Luetzelschwab of Dickinson College who is responsible for the oversight and analysis of the five radiation monitors installed within a two-mile radius of Three Mile Island.

Sample Collection, Analysis, and Calibration

Samples were taken at the five air sampling stations on each Thursday during October through December, 1993. The sample consisted of a fiber particulate filter followed by a charcoal filter. The flow is set at 55 liters per minute and checked and re-adjusted each week if necessary. The mass of the fiber filter is measured before and after use to determine the mass gain of the filter.

A gamma analysis is performed on the charcoal filters and on the five filters on the day they are collected. The gamma analysis consists of a computer-generated analysis of the spectrum and a visual check of the displayed spectrum to determine if any peaks are visible that may be below the set detection limits.

An alpha/beta analysis is performed on the fiber filters at least three days after collection to allow the radon "daughters" to decay. Problems have arisen with the crosstalk from the beta countings flowing into the alpha channel. An extensive analysis was done of the system, therefore. It was determined the operating voltage was set too high. Also, the discriminator voltage was fixed at the value of 900 V each time. The net result has been a less than one percent beta-alpha crosstalk and counting efficiencies closer to the values given by the manufacturer.

Results

No detectable activity attributable to TMI has been indicated by the gamma analyses of the charcoal and particulate filters. Tables associated with this report indicate gross beta and alpha activities. This data must be considered on its own merit because there is no control station.

The Goldsboro monitoring station was out of service for one week due to a failed starter switch. There was also a blown fuse on the monitor at the Harrisburg International Airport, but only six hours of down time resulted.

Progress Since the Third Quarter Report

Much of the outstanding work noted in the Third Quarter Report has been completed. Remaining work includes checking the efficiencies of the gamma system. This has not had a bearing on the work completed as there were no detectable activities this quarter.

With the changes in the alpha/beta operating voltage, the alpha efficiency is now about 29 percent and the beta efficiency is about 43 percent. These are close to the expected values of 35 percent and 42 percent, respectively.

Kudos to Students

Much of this monitoring project's success is directly attributable to the two students working with Luetzelschwab. Dina Harp and John Tice continue to be dedicated, conscientious, and hard-working. They have been valuable in refining procedures, finding errors, and making suggestions for improvements. Dina will graduate this May; two additional students may be trained for the first quarter of 1994.

Free Radon Testing Available from DER

Interested in checking radon levels in your home or business? At no charge to you, EFMR will provide the radon charcoal filter ; DER will test the filter and provide you with the results. For a free radon filter, contact Eric Epstein at (717) 541-1101.

John Tice Featured on WGAL-TV

Scholar-athlete John Tice, a Dickinson physics major, was recently featured on WGAL-TV 8 for his athletic and academic achievements. We are delighted John also collects and analyzes data from the EFMR low-volume air samplers.

How EFMR Detects Radionuclides from TMI

Prepared by
John Luetzelschwab

Nuclear power plants can emit a variety of radioactive materials that have different chemical and radiological characteristics. Some of the materials released are in the form of a gas, others are in the form of small particles (particulates), and others are in forms that tend to stick to dust particles in the air. Because of this, the task of monitoring radioactivity released from a nuclear power plant requires several different methods.

The overall monitoring network for the EFMR Monitoring Group consists of citizen monitors using RadAlerts and five air sampling stations that use fiber particulate filters and a charcoal filter. Because the air sampler filters are collected and analyzed once a week at Dickinson College, any radioactivity that is released from TMI that has a short half-life and /or is not in a form that can be collected by the filters, will not be detected by the weekly filters samples. However, they may be detected by the RadAlerts, so we can see that each component of the network serves an important function.

As EFMR volunteers learned in the training sessions, the RadAlerts can detect radioactivity that emits beta and gamma radiation, but the radiation source needs to be close to the RadAlert to be detected. Therefore, citizen monitors have the function of detecting radioactivity that is in the air around the plant and which emits beta and gamma radiation. In order to know the exact amount of radioactivity in the air, we need to have much more information than the RadAlert can give us, so we are not able to tell what radioactivity is present or how much is there, we can only detect its presence.

However, the analysis of the particulate and charcoal filters can give more detailed information of what and how much radioactivity is in the air. Dickinson College analyzes the filters from air samplers that pull air through the fiber particulate filter and then through the charcoal filter. Two different kind of filters are needed because of the different forms that radioactivity can have in the air. For example, some materials tend to stick to dust particles, so by just trapping the dust on the fiber filter we can detect the radioactivity. However, other materials are in the form of gases which cannot be trapped by a fiber filter, but may be collected by a charcoal filter.

Radionuclides emit different types of radiation. Most of the radioactive materials produced by the fission process in a nuclear reactor emit beta radiation. Some of these materials also emit gamma radiation at the same time. The uranium fuel for the reactor emits alpha radiation as do some other radioactive materials produced by interactions with the fuel. For example, during the fission process neutrons are emitted and if an atom of uranium-238 absorbs a neutron then it will change to uranium-239 (this is the same process we used in the training session to produce radioactive vanadium-52) which changes, by radioactive decay, to plutonium-239 (Pu-239). Pu-239 then emits alpha radiation when it decays.

In the Dickinson College laboratory we have the ability to detect alpha, beta, and gamma radiation. However, what we can actually determine from these detection methods is somewhat limited by the characteristics of the radiation. Gamma radiation provides the most information; it is very penetrating so it can pass through sample holders and detector covers to reach the gamma detector. Gamma rays also have distinctive energies; they are like fingerprints of a given radionuclide. By determining the energies of the gamma rays

Continued on next page

Continued from page 8
we can determine which radionuclide is present. Also, using the number of gamma rays detected in a measured time, we can determine the amount of the radionuclide present.

Alpha radiation also has distinctive energies and could also provide information about what and how much of a radionuclide is present, but alpha radiation has one bad characteristic. Recalling the demonstration we did with the absorption of radiation, we found that alpha radiation is absorbed by a piece of paper. Therefore, to measure the energies of the alpha particles we must have a very thin sample that has nothing (or very little) between it and the detector. The detector we use to detect alphas is actually a Geiger-Mueller tube (just like the one in the RadAlerts) and we insert the source inside the detector so there is only a thin covering between it and the detecting gas. However, the sample is the dust on the surface of a paper filter and the dust is thick enough to absorb sufficient alpha energy so we cannot accurately measure the energy. Thus, we lose the ability to determine what radionuclide is present, but we can measure the number of alphas per time and determine the amount of radioactivity that is present.

Beta radiation, as you recall, is more penetrating and does not have any distinctive energy when it is emitted; it comes out with a range of energies from zero to some maximum that is characteristic of the specific radionuclide. Therefore we cannot use the beta energy to determine what radionuclide is emitting the beta radiation. However, like alphas, we can determine the amount of radioactivity that is present using the same detector used for the alpha.

Now let's look at what has been released from TMI in the past and see what we might be able to detect. The specific radionuclides released during 1991 and 1992 are listed in the accompanying table (see page 10). The table gives information on each radionuclide's half-life and its pathway to the environment; either through water or air. These two bits of information are critical to what we can detect. Obviously our air samplers will not detect anything that is released to water, however, we cannot assume that that is the only pathway in the future; it might be possible to have a release to the air so if this were the case, then we would detect it.

Then we need to investigate the chemical characteristics of the radionuclides. Looking at the table we see that many of the radionuclides are gasses (argon, krypton, and xenon) and most likely not detectable by the air samplers. However, when these gasses are released they float through the air emitting beta and gamma radiation and can be detected with a RadAlert. Therefore, the daily counting by the citizen's network is important for the detection of these gasses. However, the RadAlert cannot measure the energies of the gamma radiation so it does not give any information about what gas is being detected.

Iodine in the body tends to collect in a person's thyroid gland. Therefore, radioactive iodine can produce a significant radiation dose to the thyroid and therefore is important to detect. Iodine is an unusual chemical element; at normal temperatures it is in the form of a solid, but it can vaporize (like water) at temperatures well below the boiling point of water. As a vapor it is not collected by a fiber filter. But the charcoal filter can absorb iodine. Iodine is trapped by charcoal so any iodine released to the air will be collected by the charcoal filter. Iodine-131 is the particular nuclide of interest and because it emits a characteristic gamma ray energy we can readily detect it with the gamma detection system. In addition, the charcoal filter can collect xenon.

Another important radionuclide is strontium-90 (Sr-90). Sr-90 is chemically similar to calcium so it tends to locate in the bones of anybody who ingests or inhales it. The beta radiation emitted (actually by Sr-90's daughter, yttrium-90) has a significant energy so it can produce a radiation dose to the bone tissue, especially the bone marrow. Therefore it is important to determine if and how much Sr-90 is present in the air. However, measuring Sr-90 is not an easy task because it emits only beta radiation; there is no gamma radiation to identify it. Therefore, every six months the paper filters will be sent to an outside laboratory for a chemical separation process to remove the strontium and then to measure the Sr-90 activity in the sample.

Now lets consider the importance of the half-life. The air filter samples are collected once a week but the particulate filters are not counted for alpha and beta activity until three days after collection. The three-day delay is to allow time for the radon daughter radionuclides to decay. As we discussed in the training session, the radon daughters we usually consider have half-lives in the order of 20 to 30 minutes, so these would completely decay away in several hours. However, there is an-

Continued on next page

Guide to Radionuclides, their Half-lives, and more

Radionuclide	Half-life	Released in Water (W) or Air (A)	Alpha (α) Beta (β) or Gamma (γ) Radiation
Hydrogen-3	12 years	W,A	β
Carbon-14	5700 years	A	β
Argon-41	1.8 hours	A	β, γ
Manganese-54	313 days	W, A	γ
Iron-55	2.7 years	W	—
Iron-59	45 days	W	β, γ
Cobalt-57	270 days	W	γ
Cobalt-58	71 days	W,A	β, γ
Cobalt-60	5.3 years	W	β, γ
Krypton-85	1.1 years	A	β
Krypton-85m	4.5 hours	A	β
Krypton-87	7.6 minutes	A	β, γ
Krypton-88	2.8 hours	A	β, γ
Strontium-89	51 days	W	β
Strontium-90	29 years	W,A	β
Niobium-95	35 days	W	β, γ
Silver-110m	250 days	W	β, γ
Antimony-125	2.8 years	W	β, γ
Iodine-131	8 days	W,A	β, γ
Iodine-132	2.3 hours	A	β, γ
Iodine-133	21 hours	W,A	β, γ
Iodine-135	6.6 hours	A	β, γ
Xenon-133	5.3 days	W,A	β, γ
Xenon-133m	2.2 days	A	β, γ
Xenon-135	9.1 hours	W,A	β, γ
Xenon-138	1.4 minutes	A	β, γ
Cesium-134	2.1 years	W	β, γ
Cesium-137	30 years	W,A	β, γ
Lanthanum-140	40 hours	W	β, γ
Tungsten-187	24 hours	W	β, γ
Plutonium-239	24000 years	A	α
Plutonium-240	6600 years	A	α
Curium-242	160 days	A	α
Curium-243	29 years	A	α

other form of radon in the air that comes from thorium and not uranium. One daughter of this radon has a half-life of about 11 hours, so we need to wait the three days for it to decay to less than 1 percent of the original activity on the filter.

Therefore, waiting for the radon daughters to decay may cause a loss of information about the alpha and beta activity on the particulate filter. However, the particulate and charcoal filters are counted for gamma activity on the same day they are collected, so any radioactivity with a short half-life that was in the air passing through the filter just prior to the analysis will be detected if it emits gamma radiation. For example, in the case of iodine, three of the iodine radionuclides (iodine-132, -133 and -135; half-lives of 2.3, 21, and 6.6 hours respectively) emit gamma radiation. These will be detected by the gamma analysis only if they were deposited on the filters just prior to the time the filters were removed from the air sampler. Iodine-132 will decay to five percent of its initial activity within 10 hours, iodine-135 will decay to five percent in about one day, but iodine-133 will take about four days to reach five percent of the initial activity.

Putting all these factors together we see that the air sampler analysis should be able to detect the following radionuclides that have previously been released to the air: manganese-54, cobalt-58, strontium-90, niobium-95, iodine-131 and -133, xenon-133, and cesium-134 and -137. If the ones with short half-lives are deposited on the filters just prior to filter collection, we would be able to detect those also. These would include iodine-132 and -135 and xenon-133m and -135. And, if some of those previously only released to water are released to air, then we would be able to detect them also. These would include iron-59, cobalt-60, niobium-95, silver-110m, antimony-125, and tungsten-187. Of course, if other radionuclides not on this list are released and they emit gamma radiation, we will be able to identify them also. And, even if we cannot identify the particular radionuclides, we will be able to detect the presence of radioactivity using the alpha and beta system. In fact, using a gamma detection system to measure the radioactivity in a soil sample taken just after the 1976 Chinese atmospheric nuclear weapons test, Dickinson College detected niobium-95, iodine-131, cesium-134 and -137, and lanthanum-140 in the soil. And, during the TMI accident in 1979 Dickinson was able to detect xenon-133 and -135 in the soil after a rain had washed the xenon out of the air and into the soil.

From the above discussion you can see that with all the systems working: the air samplers and the alpha, beta, and gamma detectors, the Sr-90 analysis, and the citizens' RadAlert network, we have the capability of detecting any significant release of airborne radioactivity from TMI. However, we should point out that the program does not cover all possible areas at all possible times. It is possible for a release to slip through gaps between the air samplers and come at times when RadAlerts in the area are not on. Therefore, do not feel that this system is a complete safety net.

Attention Monitors:

When making your RadAlert readings, please remember to include the following information in your reports:

1) Specify AM or PM when recording time.

2) Round each number to the nearest whole number.

3) Use the Location Code, e.g. Harrisburg 1, to specify location on each sheet.

4) Use the "Day" column to indicate the date of the month.

5)Call 541-1101 for weather conditions. Leave your name, number, and the specific date of your elevated reading.

Thanks!

Reuter Stokes Monitors Continue to Record High Rain Readings

There were frequent rain elevations recorded on the sixteen Reuter-Stokes gamma radiation monitors located around TMI. Interestingly, there were even more elevated readings when it was not raining.

The non-rain elevations were "mini-rain rolls," that returned to normal levels when the plant shut down to repair a pressure safety valve which would not reseat and a condenser leak. Whether these repairs were related to the elevated readings is unknown. As in the past, the highest readings were recorded at Crawford Station and at TMI's north gate.

Glossary of the EFMR Monitor's Terms

The EFMR Monitoring Report contains terms some of you may not have seen since a high school mathematics or college statistics course. Let us refresh your memory.

The *mean* is the average. Add up all the numbers and divide by as many numbers as you added. For example the average of 3, 6, 9, and 10 is 7, representing the total (28) divided by 4.

Standard deviation refers to the expected number of readings which fall above or below the *mean*. In a *normal distribution*, this number is equal.

CPM refers to "counts per minute" or the number of times a radioactive isotope was detected on the Rad-Alert monitors used by EFMR participants.

Alpha, beta and gamma radiation. We generally report on three kinds of radiation. Alpha is the least penetrating of the three types. Beta radiation may cause skin burns and beta-emitters are harmful if they enter the body. Beta particles are easily stopped by a thin sheet of metal. Gamma radiation (gamma rays) are very penetrating and are best stopped or shielded against with dense material, such as lead.

Cross-talk - Unwanted signals in a communication channel that originate from another channel.

Of Special Interest to Rad-Alert Monitors

• **Group Tours of TMI:** All participants in the EFMR Network are eligible to tour TMI. To schedule a tour, contact Eric Epstein at (717) 541-1101.

• **Get your envelopes?** If you did not receive six EFMR envelopes for filing your reports for calendar 1994, please contact Eric Epstein at (717)541-1101.

• **Need report forms?** You got it, call Eric at the number above.

• **Free Radon Testing** - As noted on page seven, those participating in the monitoring are eligible for free radon testing.

EFMR Welcomes Your Ideas

This is only the second edition of the *EFMR Monitor* We hope you found it interesting. If you have suggestions as to how to make it more interesting, please call EFMR at 717/541-1101