1 UNITED STATES OF AMERICA

2 NUCLEAR REGULATORY COMMISSION

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4 In the matter of: :

5 METROPOLITAN EDISON COMPANY : Docket No. 50-289 (Restart)

6 (Three Mile Island Unit 1) :

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9 25 North Court Street, Harrisburg, Pennsylvania

10 Friday, March 27, 1981

11 Evidentiary hearing in the above-entitled

12 matter was resumed, pursuant to adjournment, at 8:35 a.m.

13 BEFORE:

14 IVAN W. SMITH, Esq., Chairman, Atomic Safety and Licensing Board

15 DR. WALTER H. JORDAN, Member

16 DR. LINDA W. LITTLE, Member

17 Also present on behalf of the Board:

18 LAWRENCE BRENNER, ESQ.

19 MS. DORIS MORAN, Clerk to the Board

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1 APPEARANCES:

2 On behalf of the Licensee, Metropolitan Edison Company:

3 GEORGE F. TROWBRIDGE, Esq.
4 THOMAS A. BAXTER, ESQ.
MS. KNOWLES
5 Shaw, Pittman, Potts and Trowbridge,
1800 M Street, N.W.,
6 Washington, D. C.

7 On behalf of the Commonwealth of Pennsylvania:

8 WILLIAM DORNSIFE,
Nuclear Engineer

9 On behalf of Union of Concerned Scientists:

10 ELLYN WEISS, Esq.,
11 ROBERT D. POLLARD
Harmon & Weiss,
12 1725 I Street, N.W.
Washington, D. C.

13 On behalf of Three Mile Island Alert:

14 LOUISE BRADFORD
15 JOHN MURDOCH

16 On behalf of the Regulatory Staff:

17 JAMES TOURTELLOTTE, Esq.
Office of Executive Legal Director,
18 United States Nuclear Regulatory Commission,
Washington, D. C. ,

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EXHIBITS

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

2 (8:35 a.m.)

3 CHAIRMAN SMITH: We have a preliminary matter we
4 want to address before the testimony begins. Are there any
5 other preliminary matters?

6 (No rsponse.)

7 CHAIRMAN SMITH: We are concerned about the state
8 of the record with respect to Mr. Dornsife's cross
9 examination of Mr. Grimes on the coordindation of the
10 federal response with the Commonwealth's emergency
11 procedures. As we stated at that time, I think it is
12 remarkable that such a problem is being raised at this time
13 and at this place. It seems it is something which should
14 and could have been worked out. Nevertheless, it has not
15 been, and the Board believes it should be addressed.

16 Mr. Dornsife is present, so we are going to
17 express our concerns and recommend a solution to it this
18 morning, to give the parties a maximum opportunity to
19 consider the problem, and then we will open it for
20 discussion at the very beginning of the off-site emergency
21 planning session and receive the comments from the parties.

22 In our view, it has been correctly stated that
23 the scheme of regulation calls for the Licensee and the
24 State and local governments to provide for emergency
25 planning without reliance upon the Nuclear Regulatory

1 Commission or other agencies.

2 However, the Nuclear Regualtory Commission holds
3 out the possibility that during emergencies it will act and
4 provide guidance, and more than guidance, perhaps. This
5 guidance could be relied upon by the Commonwealth to the
6 detriment, if the guidance is inadequate, or, even worse,
7 the NRC's response, the federal response, could bring about
8 a confusion and disorder where there would otherwise be
9 orderly emergency procedures.

10 Therefore, we believe that there is a nexus
11 between NRC's radiological emergency response and the
12 Commonwealth, Licensee, and local governments'
13 responsibilities under the law and regulations; and,
14 therefore, we do have jurisdiction and cognizance of the
15 NRC's response to that extent. That is, the opportunity for
16 federal mischief with respect to state emergency actions is
17 within our jurisdiction.

18 As we stated before, we believe that the state
19 and local governments' reliance upon federal response was in
20 our jurisdiction. But this is a slightly different approach
21 to it. The opportunity for federal interference or mischief
22 or contribution to confusion of the Commonwealth's emergency
23 actions are also within our jurisdiction.

24 Under Commission standards and precedent,
25 particularly the floating nuclear case or the offshore power

1 system case, the Appeal Board ruled that we have no
2 authority to rule the staff to perform its ministerial and
3 programmatic duties.
4 We could have several options open to us, and we
5 are exploring what they might be. One is we could find that
6 the state plan is flawed because of the deficiencies
7 referred to by Mr. Dornsife in his cross examination of Mr.
8 Grimes. But the remedy would be to deny restart on that
9 account or to condition restart on appropriate NRC action.
10 And that is not a very appealing alternative, because it
11 holds the Licensee's rights hostage to the actions of other
12 people over which the Licensee has no control. And that
13 approach does not really appeal to us very much.
14 We could, under floating nuclear, report to the
15 Commission that we believe that the staff's plans for the
16 NRC response in this case remains inadequate and recommend
17 to the Commission that the Commission direct the staff to do
18 what is necessary.
19 Mr. Grimes made it clear that it is his desire to
20 take action and to coordinate with the Commonwealth. So we
21 do not see that that is going to be necessary. We hope
22 not. We will do whatver is necessary. But Mr. Grimes seems
23 to be giving assurance that the NRC is prepared at least to
24 do what has to be done.
25 So our approach is that we are going to request

1 the staff to begin promptly the coordination of its nuclear
2 emergency response with the Commonwealth, and we will
3 request that the staff and the Commonwealth report to the
4 Board soon, and we will discuss timing for it that
5 coordination has been accomplished or that the necessary
6 actions leading to coordination are to the satisfaction of
7 the Commonwealth and have been taken.
8 We will bring this up again as the opening item
9 when we begin the off-site emergency planning session.
10 Mr. Baxter.
11 MR. BAXTER: Mr. Chairman, Licensee is recalling
12 to the witness stand Robert W. Keaten, Joseph J. Colitz, and
13 Michael J. Ross, all of whom have testified previously.
14 Therefore, I begin with this panel, though on their prefiled
15 testimony, on Board Question Number 6 we have two items for
16 Mr. Keaten left over from earlier testimony on reactor
17 vessel water level.
18 CHAIRMAN SMITH: I have been hounding you and
19 others. I am not prepared for it. But let's go ahead.
20 Whereupon,
21 ROBERT W. KEATEN
22 JOSEPH J. COLITZ
23 MICHAEL J. ROSS
24 recalled as a witnesses by counsel for Licensee,
25 Metropolitan Edison Company, having previously been duly

1 sworn by the Chairman, were further examined and testified
2 as follows:
3 DIRECT EXAMINATION
4 BY MR. BAXTER:
5 Q On January 22, near the end of the presentation
6 by Licensee's panel, of which you were a member, Chairman
7 Smith posed a question at transcript pages 10,919 to 19,925,
8 which, if I can paraphrase, it asked us to review the
9 testimony and determine whether it was Licensee's position
10 that, given te following hypothetical, a perfect and
11 reliability indicator of reactor vessel water level -- and
12 then leaving aside our concern that from a human-factors
13 standpoint the operator should not be exposed to useless
14 information. Is it our position, Licensee's position, that
15 the operators could not be trained to respond appropriately
16 to accurate information from such instrumentation?
17 A (WITNESS KEATEN) As you requested, Mr. Smith, we
18 have gone back and reviewed the record, and I have had
19 conversations with Mr. Jones and with Mr. Ross as far as our
20 collective opionion. And in summary, we did find that some
21 of the comments made, primarily by Mr. Jones, perhaps need
22 some clarification in terms of the context in which he was
23 making the remarks.
24 There were the comments which he made addressing
25 the possible misuse of the water level information by the

1 operator. It appears accurate to us to state that those
2 remarks should be taken in the context of possible misuse of
3 the information in the absence of adequate training and what
4 to expect to see on the water level instrument in the event
5 of certian transients.

6 As Mr. Jones was pointing out, depending on the
7 size of a loss-of-coolant accident, for example, for some
8 accidents the reactor vessel would remain full of water for
9 an extended period and, in fact, in some cases would always
10 remain full of water. And if the operators were not
11 adequately trained, they would be open to misinterpretation
12 of this information, to say that it would be acceptable to
13 throttle the high-pressure injection when, in fact, that
14 would not be acceptable.

15 It is our position, however, that if an
16 acceptable instrument becomes available and we do install it
17 for use by the operators, that we will provide careful
18 training to the operators on what they can expect to see or
19 not see and how they should or should not use that
20 information in determining the actions to be taken.

21 And it is our uniform position that, given such
22 training, that the operator would not necessarily be misled
23 by that information and could be expected to take
24 appropriate actions.

25 (Board conferring.)

1 DR. JORDAN: Did I understand you to say that if,
2 under some circumstances, that if the water level were to
3 indicate that the vessel was full properly and so indicate,
4 that it would be improper for the -- that the operator might
5 turn off the high-pressure injection and that would be an
6 improper action, so that he could be misled? Did you say
7 that?
8 WITNESS KEATEN: What I was trying to
9 communicate, Dr. Jordan, is that there are certain size
10 loss-of-coolant accidents where the reactor vessel will
11 remain full for a period of time and where nevertheless it
12 is important to keep high-pressure injection flowing. And
13 my comments was intended to say that if he operators were
14 not properly trained, that they might interpret a full
15 vessel as an indication of no continuing need for the
16 high-pressure injection.
17 On the other hand, if they are properly trained,
18 they will be looking at not only the water level indicator,
19 but also the temperature and the pressure and saturation
20 margin, and they will see that under these circumstances,
21 although the vessel is full, they nevertheless still have
22 saturated conditions in the hot legs and will use that as an
23 indication that they need to continue the high-pressure
24 injection.
25 So, with the proper training, they do not need to

1 be misled. But without that training, they could be
2 misled.
3 DR. JORDAN: I see.
4 BY MR. BAXTER: (Resuming)
5 Q Mr. Keaten, on March 19 and 20, Dr. Denwood F.
6 Ross, Jr. appeared on behalf of the NRC staff to present
7 some supplemental testimony on the NUREG-0578 item which
8 addresses additional instrumentation for the detection of
9 inadequate core cooling. And particularly, he presented the
10 staff's position that that reactor vessel water level
11 indication is necessary to provide reasonable assurance that
12 the public health and safety will be protected during plant
13 operation, and concluded that Licensee had not demonstrated
14 reasonable progress on this long-term item.
15 I think it was clear from your presentation and
16 the other members of Licensee's panel earlier that you took
17 the position that additional instrumentation was not
18 necessary beyond that which would be in place when TMI-1
19 restarts. Bub you also testified in response to a question
20 by Chairman Smith, at transcript page 10,919, about the
21 efforts Licensee was making to continue to evaluate the
22 problem.
23 I would like you to elaborate on that response if
24 you can and address in particular whether it is an
25 unalterable position of the Licensee that there will never

1 be uncovered a need for additional instrumentation and what
2 efforts are being followed toward the development of such
3 instrumentation.
4 A (WITNESS KEATEN) As I testified earlier in the
5 evaluations which we have done to date and which Babcock &
6 Wilcox has done to date, we have not uncovered any scenario
7 in which the operator really requires the water level
8 information in order to take the appropriate actions.
9 On the other hand, we do recognize that this is a
10 type of instrument which is attracting a great deal of
11 interest in different quarters, and we obviously cannot take
12 the position that no one will ever find a use for it,
13 because we cannot predict the future.
14 So our position has been and continues to be that
15 we will continue to follow the development where that is
16 being done on instrumentst that might be used to measure the
17 water level and take any additional actions that we think
18 are appropriate.
19 When I testified previously, I believe that I
20 said that we intended to follow the development work and
21 pursue development activities primarily through the B&W
22 owners group. And we still believe that that is a very
23 apropriate line of approach, since the B&W owners have this
24 problem in common and a development problem supported by the
25 owners is an efficient way to explore the possible different

1 instruments that might be used to measure water level.

2 We have, however, taken other actions as well,

3 and these are things which have occurred fairly recently,

4 since the time I testified earlier.

5 In one case, we were approached by a professor at

6 Pennsylvania State University who had developed a concept

7 for measuring water level based upon the use of the existing

8 neutron detectors. And he approached us to know if we were

9 willing to participate with Penn State in development of

10 such instrumentation if they could find a sponsor for the

11 program. We indicated that we would be willing to

12 participate with them.

13 We have reviewed their concept and worked with

14 them in the development of a proposal which they have now

15 submitted to the Nuclear Regulatory Commission to carry out

16 development work starting using the research reactor at Penn

17 State, but which might ultimately progress to the point of

18 doing tests in a commercial power plant.

19 We have committed to Penn State to work with them

20 on that proposal if they are successful in getting the

21 Nuclear Regulatory Commission to sponsor it.

22 The second action which we have taken is

23 recognizing that the work in the B&W owners group has

24 proceeded somewhat slowly. We initiated contact with

25 professors on the staff of the University of California at

1 Los Angeles, specifically with Dr. David Okrent, who is a
2 member of the Advisory Committee on Reactor Safeguards, with
3 respect to whether he could recommend someone to perform an
4 independent evaluation of the work which was going on in
5 development of reactor vessel water level instruments and
6 someone who might then try to identify whether there are
7 other promising methods of measuring water level which are
8 not presently being developed.
9 At the suggestion of Dr. Okrent, we talked to Dr.
10 Dhir, who has a background both in thermohydrodynamics,
11 thermohydraulics and also in instrumentation. And he
12 expressed an interest in doing such an evaluation for us.
13 We have presently requested him to submit a proposal to us
14 for doing such an evaluation, and we are expecting to accept
15 that proposal to do that evaluation for us.
16 So in that case, we ourselves have actively
17 pursued obtaining such an evaluation independent of what is
18 being done by other people. So in addition to the B&W
19 owners group activities, those are the two things which we
20 as GPU Nuclear presently have under way.
21 CHAIRMAN SMITH: All right, Mr. Keaten, you
22 stated at the beginning of this last comment that it is your
23 view that you have been unable -- you and B&W -- have been
24 unable to identify a scenario where water level indication
25 is required. Now, this differs somewhat from the way you

1 characterized it in your original testimony, which was, as I
2 recall, you had been unable to identify a scenario where
3 water level indication would be useful.
4 Now, was that a studied difference? Later on you
5 did talk about the usfefulness of such a measurement.
6 WITNESS KEATEN: I was not consciously making
7 such a distinction. I believe it is correct, Mr. Smith, the
8 earlier testimony, or at least the intent of the earlier
9 testimony, was to say that we could not identify any use
10 that the operator would make of that information in doing
11 something different than he would do on the basis of the
12 presently existing instrumentation. That is still our
13 position.
14 MR. BAXTER: Mr. Chairman, there is one other
15 pending item for Mr. Keaten unrelated to today's testimony.
16 In the February sessions on management, particularly on
17 February 19, Ms. Louise Bradford of TMIA expressed an
18 interest in cross examining Mr. Keaten on a limited basis on
19 some testimony that had been stipulated into evidence in her
20 absence.
21 In particular, she wanted to ask about Met Ed
22 personnel who were present on the date of the accident, are
23 they still part of GPU management; in particular, Mr.
24 Herbein and his assignments on that day. I notice she is
25 here in the audience today, and it might be an opportunity

1 to take care of that limited open item.

2 CHAIRMAN SMITH: Are you prepared to do that

3 now?

4 MS. LOUISE BRADFORD: Yes.

5 CHAIRMAN SMITH: Okay.

6 MS. LOUISE BRADFORD: Mr. Chairman, I did prepare

7 a cross-examination plan. I did not have it duplicated, I

8 am afraid. I did not realize the witness was going to be

9 here today. I can duplicate it and pass it out now.

10 CHAIRMAN SMITH: That is all right. How long is

11 it?

12 MS. LOUISE BRADFORD: About three or four pages.

13 It is not a great deal.

14 CHAIRMAN SMITH: How long is your cross

15 examination going to take altogether?

16 MS. LOUISE BRADFORD: Again, I really cannot

17 estimate. I have about three or four pages of questions.

18 (Board conferring.)

19 CHAIRMAN SMITH: I was just wondering about the

20 scheduling of this.

21 Ms. Weiss, what is your feeling? I just wonder

22 if this cannot be put off until the end of this panel?

23 MS. WEISS: Mr. Chairman, we thought we were

24 going to be first on. We thought we could get through this

25 panel and we could get through Mr. Keaten, the second

1 supplemental piece of testimony. It does not -- I suppose
2 we are going to have to come back Tuesday anyway for the
3 staff, but it does -- I wish I had known before.
4 MR. BAXTER: I did not know she was going to be
5 here.
6 CHAIRMAN SMITH: Well, it is going to be rather a
7 short morning. Would you mind putting your cross
8 examination off and allow Union of Concerned Scientists to
9 proceed with their cross examination?
10 MS. LOUISE BRADFORD: Certainly. I have no
11 objection.
12 CHAIRMAN SMITH: Does this cause any difficulty
13 for you?
14 MR. BAXTER: No, it does not, Mr. Chairman. I
15 would advise the parties now we are not going to present Mr.
16 Keaten's second supplemental testimony today.
17 MS. WEISS: Why is that? The witness is here.
18 MR. BAXTER: We are just not prepared to offer
19 the testimony today. We had planned on presenting all of
20 this next week, and Mr. Keaten has had to be called back
21 suddenly for this appearance, and we need more time.
22 CHAIRMAN SMITH: Well, let's --
23 MR. BAXTER: I did not anticipate we would get
24 there that fast either.
25 CHAIRMAN SMITH: Let's not worry about it until

1 we see if we get there and there is still a problem.

2 MS. WEISS: Mr. Chairman, it really does not

3 matter to us in that case. Ms. Bradford can go ahead. We

4 are going to have to come back on Tuesday, in any case; so

5 it really does not make any difference.

6 CHAIRMAN SMITH: Okay. Let's --

7 MS. WEISS: It is your pleasure.

8 CHAIRMAN SMITH: All right, go ahead, Ms.

9 Bradford.

10 CROSS EXAMINATION

11 BY MS. LOUISE BRADDORD:

12 Q Mr. Keaten, within the last week or so a line of

13 questioning was developed by the Licensee directed toward

14 the NRC staff concerning the placement of emergency planning

15 personnel during an emergency. We were able to infer from

16 the Licensee's position concerning the placement of the

17 person responible for liaison between on-site and corporate

18 management personnel should be located on site. Do you

19 agree with that position?

20 A (WITNESS KEATEN) If I understood what you said

21 -- that the person responsible for liaison between the

22 corporate personnel and the on-site personnel?

23 Q Yes.

24 A (WITNESS KEATEN) I honestly am not exactly sure

25 what position you are referering to. The on-site

1 organizations consist of the team which is in the control
2 room and then a supporting technical team which is located
3 in the technical support center.
4 The off-site organization then consists, in part,
5 of personnel which are located in the so-called emergency
6 off-site facility, which would normally be located at the
7 visitors center, plus personnel doing radiological-type
8 activities, plus technical people at the Parsippany
9 headquarters, the liaison -- and the senior corporate
10 official involved directly in the emergency response would
11 be located, as soon as he could get there, at the emergency
12 off-site facility.
13 And he would have staff with him there in the
14 emergency off-site facility who are responsible for liaison
15 with the personnel on site, particularly through the
16 technical support center and also responsible for liaison to
17 the other off-site facilities.
18 CHAIRMAN SMITH: Let me interrupt here. I guess
19 I did not understand what the purpose of this examination
20 was. There is a problem here. The lawyers who have the
21 responsibility for emergency planning are not here. Not all
22 of the parties who have an interest in emergency planning
23 are here. We do not have the necessary documents to go into
24 the emergency planning session.
25 I did not understand that this was the nature of the

1 questions that Ms. Bradford had.

2 MR. BAXTER: Mr. Chairman, I just got a copy of

3 the direct testimony, which was the subject of the

4 stipulation. And it describes management response to the

5 TMI-2 accident at that time and who did what on what day.

6 And that is what I am following, and that is what I

7 understood what Ms. Bradford wanted to question Mr. Keaten

8 about, not about our current emergency management

9 organization.

10 MS. LOUISE BRADFORD: I am getting to that in my

11 next question.

12 CHAIRMAN SMITH: Okay.

13 MS. LOUISE BRADFORD: It was just at the -- this

14 was something I picked up. Unfortunately, I did not have

15 access to transcripts, and it was just a point of

16 information I was asking Mr. Keaten.

17 CHAIRMAN SMITH: Okay.

18 BY MS. LOUISE BRADFORD: (Resuming)

19 Q Mr. Keaten, I have here a copy of your testimony

20 entitled "Management Response to TMI-2 Accident." On page 6

21 of that testimony, on the full paragraph, you have stated,

22 "It was decided that Mr. Herbein should report to the

23 site." Was that a corporate decision? I mean or was that a

24 decision from TMI-2? Who made that decision?

25 A (WITNESS KEATEN) I do not know exactly who made

1 that decision. But to my knowledge, it was not a corporate
2 decision.
3 Q So that Mr. Herbein was contacted by people in
4 the operating room and the decision was his.
5 (Pause.)
6 A (WITNESS KEATEN) As I say, I really honestly do
7 not know who made that decision.
8 Q Further along in the same paragraph you state
9 that, "Mr. Herbein elected not to proceed to Unit 2 control
10 room and insert himself in the command chain." Again, was
11 that Mr. Herbein's own decision, or was it a decision of
12 other corporate management?
13 A (WITNESS KEATEN) To the best of my knowledge,
14 that was Mr. Herbein's decision.
15 Q In Mr. Arnold's testimony, which is titled
16 "Licensee's Command and Administrative Structure," Mr.
17 Arnold has described here Mr. Herbein's background, which
18 includes 15 years of nuclear power experience. Would you
19 agree with that? Are you familiar with that?
20 A (WITNESS KEATEN) I am not familiar with that. I
21 have read the testimony, but I am not personally familiar
22 with Mr. Herbein's background.
23 Q Would you say that a person with 15 years'
24 experience would be well-equipped to understand
25 instrumentation in the operating -- in the control room?

1 A (WITNESS KEATEN) Well, it would depend on the
2 type of experience that was involved in that 15 years.
3 Q Mr. Herbein was a vice president of generation at
4 Met Ed at the time of the accident; is that correct?
5 A (WITNESS KEATEN) That is correct, yes.
6 Q So that --
7 CHAIRMAN SMITH: Excuse me, I think we should
8 interrupt. I think we should go get the testimony that you
9 are cross examining on so that we can follow it. And
10 perhaps we had better take a moment and copy your
11 cross-examination plan.
12 MS. LOUISE BRADFORD: Okay.
13 CHAIRMAN SMITH: What testimony -- when is this,
14 what date?
15 WITNESS KEATEN: The testimony here is dated
16 January 19, 1981. It is "Licensee's Testimony of Robert W.
17 Keaten and Robert L. Long, Regarding CLI-80-5, Issue 10,
18 Management Response to TMI-2 Accident."
19 (Pause.)
20 CHAIRMAN SMITH: May I have the transript cite
21 again, please?
22 MR. BAXTER: 13,242.
23 (Pause.)
24 CHAIRMAN SMITH: Would you give it to me once
25 more?

1 MR. BAXTER: These are my notes. I do not have
2 the transcript myself. My notes say "13,242."
3 CHAIRMAN SMITH: All right, then, it is on the
4 18th.
5 MR. BAXTER: I am afraid I do not have the date.
6 (Pause.)
7 CHAIRMAN SMITH: Okay, while we are interrupted
8 anyway, I think it would be helpful -- if there would be
9 better communication among the parties as to what your plans
10 are, it goes both ways.
11 Ms. Weiss, I know you were inconvenienced today
12 because of this. We did not know until -- you did not show
13 up yesterday -- that you did not have cross examination on
14 diesel -- diesel loading. Now, as it turned out, the Board
15 had questions on it and -- but it took away from us the
16 freedom of scheduling. And it is just a simple matter of
17 increasing the communication and try to anticipate --
18 MS. WEISS: Mr. Pollard told Mr. Brenner that we
19 would not be coming for the -- to cross examine on diesel
20 loading.
21 CHAIRMAN SMITH: Well, we got the message wrong,
22 because we just simply -- you did not know -- you let us
23 know? We never found out.
24 But nevertheless, that is the point I want to
25 stress, that there are many people involved in these

1 sessions, and it is very helpful to communicate your plans
2 in advance. Okay.
3 MS. LOUISE BRADFORD: Mr. Chairman, the other
4 piece of testimony from which I am taking Mr. Herbein's
5 credentials is that of Mr. Robert Arnold, and it is dated
6 December 22, 1980.
7 CHAIRMAN SMITH: All right. Go ahead.
8 BY MS. LOUISE BRADFORD: (Resuming)
9 Q Mr. Keaten, again on page 15 of Mr. Arnold's
10 testimony -- and I do not know that you have a copy of that
11 testimony --
12 A (WITNESS KEATEN) I do not have a copy of it.
13 Q Perhaps I will just read this very brief
14 paragraph. I will just read that:
15 "Mr. Herbein is a graduate of a naval academy
16 with over 20 years of professional experience, about 15
17 years of which have been in nuclear power. He is trained in
18 the Navy's nuclear power program and was assistant
19 operations supervisor at Yankee Row and operations
20 supervisor at Saxton before coming to Three Mile Island in
21 1970 as TMI Unit 1 engineering supervisor.
22 "He has been TMI plant superintendent, manager of
23 nuclear operations, and vice president-generation at Met
24 Ed. He is intimately familiar with the TMI facility and
25 individuals in the organization and, as such, is

1 particularly well qualified to head our nuclear assurance
2 division."
3 I would ask you again, with that kind of
4 background, Mr. Keaten, would you say that Mr. Herbein would
5 be able to interpret instrumentation in the -- in the
6 control room?
7 A (WITNESS KEATEN) Yes, I would think that he
8 would generally be able to interpret the instrumentation in
9 the control room, although he might not have the same
10 intimate familiarity with the readouts that the licensed
11 operating staff would have.
12 Q Why would that be? It seems that Mr. Herbein has
13 had considerable background as operations supervisor, and
14 that would seem to me it would make him also intimately
15 familiar with those systems and also since he has been at
16 Three Mile Island Unit since 1970.
17 A (WITNESS KEATEN) Well, as I said, I would expect
18 him to be generally familiar with the control room
19 instrumentation. But there are a lot of instruments which
20 are read out in the control room and the people who are --
21 who hold a current license and who are dealing with those
22 instruments on a day-by-day basis are clearly more familiar
23 with them than someone who may be in the control room only
24 occasionally.
25 Q Was there an internal investigation done on the

1 accident; that is, an investigation done by GPU?

2 A (WITNESS KEATEN) I think that there were in fact

3 a number of different internal investigations done, yes.

4 Q And was the communications link a topic of that

5 investigation?

6 A (WITNESS KEATEN) If, by "the communications

7 link," you mean the communications between the plant and the

8 state agencies, the plant and the NRC, and the plant and

9 corporate management, yes.

10 Q Did -- what, if any, deficiencies in that

11 communications pathway did that investigation reveal?

12 (Pause.)

13 A (WITNESS KEATEN) There were a number of

14 different pathways involved. To the best of my memory, the

15 results were that as far as communicating radiological

16 information to the state agencies, that that was done in a

17 fashion which appeared satisfactory. As far as

18 communicating knowledge of the current state of the plant as

19 the day progressed -- and I am talking specifically about

20 March 28 -- that while there was some communication of the

21 status of the plant, that some of the people who wanted such

22 information were not satisfied with the total quantity of

23 information which they received.

24 Q On page 5 of your testimony, Mr. Keaten, on the

25 first full paragraph, the center of the page, you state

1 that, "Mr. Miller put the superintendent of technical
2 support in charge of notifications, communications, and
3 technical support." That person was Mr. Kunder; is that
4 true?
5 (Pause.)
6 A (WITNESS KEATEN) Yes, that is correct.
7 Q What exactly was his role in this position?
8 A (WITNESS KEATEN) His role in the position of
9 notifications and communications.
10 Q And Mr. Gary Miller was emergency director, had
11 declared himself emergency director?
12 A (WITNESS KEATEN) That is correct.
13 Q Would you say that both Mr. Miller and Mr. Kunder
14 were key personnel during the time of the emergency?
15 A (WITNESS KEATEN) Yes, I would say they were some
16 of the key personnel, yes.
17 Q And that in fact Mr. Herbein had great confidence
18 in them, so much so that he did not take over the command of
19 the control room; is that true?
20 A (WITNESS KEATEN) I believe it is true that Mr.
21 Herbein had confidence in the complete team that was
22 involved in responding to the emergency in the control room,
23 and he elected to leave that team in direct charge of the
24 control and to carry out his activities from off site. That
25 is correct.

1 Q And he was being fully briefed as to what was
2 going on in the control room; is that true?
3 A (WITNESS KEATEN) He was certainly being kept
4 aware of what was going on in the control room through
5 contacts with the personnel in the control room, yes.
6 Q Could you tell me whose decision it was to take
7 both Mr. Kunder and Mr. Miller out of the control room in
8 order to go to the -- meet with the lieutenant governor?
9 (Pause.)
10 A (WITNESS KEATEN) I believe that it was Mr.
11 Herbein's decision to ask Mr. Miller to accompany him. I am
12 not completely sure who made the decision that Mr. Kunder
13 should go also.
14 Q Do you feel that was an irresponsible decision to
15 take from the control room the person who had been in charge
16 of emergency operations throughout the accident?
17 A (WITNESS KEATEN) No, I do not. You must
18 recognize that by that point in time there were a large
19 number of people in the control room who were very current
20 on the plant status and the plans. And there were personnel
21 that I believe Mr. Herbein and Mr. Miller believed were
22 perfectly competent to continue to manage the response to
23 the emergency.
24 Q What I am really having a difficult time
25 understanding is that if Mr. Herbein was being fully briefed

1 and fully apprised of the situation and the conditions at
2 the plant, why he felt it was necessary to take key
3 personnel from the plant --
4 MR. BAXTER: Mr. Chairman, I am getting confused
5 now as to what the scope of the cross examination is, based
6 on the representations we got from Ms. Bradford back in
7 February. I understood she wanted to know based on Mr.
8 Herbein's extensive experience why he was not the emergency
9 director and then, as you, Mr. Chairman, characterized the
10 broader nature of additional qu stions she might go into --
11 that is, what officials were involved in emergency
12 activities and what is their role in the corporation now.
13 And it seems to me we are going way beyond that.
14 MS. LOUISE BRADFORD: Mr. Chairman, I merely want
15 to examine the events of that day as they took place and
16 since Mr. Herbein is now part of the new management team, I
17 think some of his decisions that he made that day are of
18 great concern to us.
19 CHAIRMAN SMITH: I feel inadequate. The exchange
20 was so long ago. We were not prepared for this this
21 morning. I think that -- I have read the cross-examination
22 plan. I think the direction she is going is covered,
23 generally, by the direct examination and certainly is
24 covered by the CLI-80-5. But I have no memory other than
25 what you just told me about what her stated purpose was.

1 MR. BAXTER: My offer of Ms. Bradford conducting
2 the cross examination this morning was based on the
3 understanding I had from this transcript and from
4 conversation with Mr. Blake that this was going to be a
5 limited inquiry as to who were in what positions on the site
6 that day and what are the positions they hold in the
7 corporation now.
8 I guess I am in the position now of feeling
9 perhaps as inadequate as you do, Mr. Chairman, to have any
10 judgment in whether we are going beyond the scope of the
11 direct testimony or what the import is of the questions.
12 Maybe we are to the point where we should postpone this.
13 CHAIRMAN SMITH: I think -- I think she is not
14 going to go long, and I think the examination may not be
15 appropriate within the narrow limitation that was discussed
16 at the time. I do not know. But at one time or another
17 during the hearing, it would have been appropriate cross
18 examination of Mr. Keaten. Whether the circumstances
19 surrounding Ms. Bradford's failure to cross examine at that
20 time change it, I just do not know.
21 I think the best thing -- it is going to be a few
22 questions, just to get this over with and get the record
23 complete on it.
24 What is the question? "Does he believe it was a
25 responsible act on the part of Mr. Herbein to do something,"

1 then I forget.

2 MS. LOUISE BRADFORD: I am afraid I have lost my

3 own place here. I was asking whose decision, I think.

4 (Counsel for TMIA conferring.)

5 BY MS. LOUISE BRADFORD:

6 Q I was concerned, Mr. Keaten, as I just expressed,

7 that if Mister -- if as we have been told, that Mr. Herbein

8 was being fully briefed, why he made this decision; that is,

9 if he made that decision alone to remove key personnel from

10 the control room and why he was not able to meet with the

11 lieutenant governor?

12 A (WITNESS KEATEN) Even though Mr. Herbein was

13 being kept informed of the conditions in the plant, that

14 clearly does not mean that he knew everything that Mr.

15 Miller knew or, for that matter, that Mr. Miller knew

16 everything that Mr. Kunder knew, or vice versa. And they

17 made decisions as to the depth of information that they

18 wanted to have available to them in the briefing for the

19 governor, and on that basis decided who should go.

20 And I think the point is that they believed that

21 the personnel who were being left in the control room were

22 fully competent to handle the situation as it stood and as

23 it might develop. And with the number of people who had

24 been called in or who had come in by that time of the day on

25 March 28th, there was a large reservoir of talent in the

1 control room, and the decision was made that removing two
2 individuals was acceptable.
3 Q At 1:50 there was a pressure spike that
4 registered in the control room. And was that information
5 passed on to Mr. Herbein?
6 (Pause.)
7 A (WITNESS KEATEN) I do not know.
8 Q Mr. Herbein and Mr. Miller and Mr. Kunder left
9 the plant at 2:00 p.m.; is that correct?
10 (Pause.)
11 A (WITNESS KEATEN) Yes, I believe that is
12 correct.
13 Q And the meeting with the lieutenant governor, I
14 understand from NUREG-0600 -- and I do have the page number
15 but I do not have a copy of the document here. If you need
16 the page number, it is page I-A-89 item 505. And in that
17 document it states that the meeting lasted no more than 45
18 minutes. In fact, it lasted -- the information is it lasted
19 from 30 to 45 minutes. Is that your understanding, Mr.
20 Keaten?
21 A (WITNESS KEATEN) I really do not know. I do not
22 have any basis to challenge what that information is.
23 Q My concern here again is there was a time lapse
24 of 45 minutes where, given a 30-minute drive from Middletown
25 to Harrisburg, there is a 45-minute gap. And I am wondering

1 if your investigation revealed what was going on with those
2 three personnel in those 45 minutes when they were not in
3 contact with the plant?
4 A (WITNESS KEATEN) I am not aware of any
5 investigation which we made to try to determine exactly
6 where they were during the period that they were absent. I
7 believe that it is true that during the period of time they
8 were absent from the plant that they were nevertheless
9 maintaining contact with the control room via telephone.
10 Q That is while they were in the lieutenant
11 governor's meeting. There was an open line, I understand.
12 A (WITNESS KEATEN) I believe that is correct.
13 Q And again I repeat, the area that concerns me is
14 the 45 minutes that are unaccounted for.
15 MR. BAXTER: Is there a question?
16 MS. LOUISE BRADFORD: No, Mr. Baxter, I was
17 merely making a statement.
18 BY MS. LOUISE BRADFORD: (Resuming)
19 Q Mr. Arnold has stated in his testimony, which I
20 referred to before, that Mr. Herbein will be named -- is
21 named director of nuclear assurance division in the proposed
22 GPU Nuclear Corporation. We just recently, in the last few
23 days, heard testimony by Mr. Rogan -- and again, I do not
24 have the transcript -- that in the event of an accident
25 management has the ability to override the emergency person

on site; is that correct?

A (WITNESS KEATEN) I am sorry, I did not completely hear the last part of that sentence, that "management has" what?

Q Management has the ability to override the emergency personnel on site.

MR. BAXTER: Objection. Outside the scope of the direct.

CHAIRMAN SMITH: Well, no; she is going to tie that up to the purpose of her -- overall purpose of her cross examination. The testimony she is referring to is that the emergency support director will have the ultimate authority to make decisions for the company in an emergency as compared to the emergency director on site.

Okay.

WITNESS KEATEN: In terms of the overall response to the organization, I believe that is generally correct, although there are certain, as I understand it, rules and regulations regarding the degree to which nonlincensed personnel can give directions to licensed personnel as to what activities they must or may take.

CHAIRMAN SMITH: I think the purpose is not to ask you to go review Mr. Rogan's testimony on it, but to place the next few questions in context.

WITNESS KEATEN: Fine. I understand that.

1 CHAIRMAN SMITH: Is that right, Ms. Bradford?

2 MS. LOUISE BRADFORD: Yes, it is.

3 BY MR. LOUISE BRADFORD: (Resuming)

4 Q Also, we heard during that -- Mr. Rogan's

5 testimoy -- that the chain of command would be Mr. Arnold --

6 that is, those persons who had this ability to take over

7 that -- override the emergency personnel -- were to be Mr.

8 Arnold, Mr. Clark, Mr. Herbein and, I believe it was, Mr.

9 Hovey, I am not sure.

10 Our concerns lie in the fact that we feel that

11 there were some decisions made by Mr. Herbein on the 28th

12 and that he will again quite possibly be placed in a

13 position to make like decisions. What assurance can GPU

14 Nuclear give us that this will not in fact take place?

15 A (WITNESS KEATEN) I am really not sure what you

16 are referring to in terms of "the decisions on the 28th," in

17 that I am not aware of any decisions made by Mr. Herbein on

18 March 28th which contributed to the severity of the accident

19 in any way.

20 Q I am again -- I think the points that I made

21 before, Mr. Herbein's decision not to come on site when

22 possibly he could have interpreted instrumentation --

23 A (WITNESS KEATEN) I would --

24 CHAIRMAN SMITH: I think there is an impasse

25 here. Go ahead and answer the question.

1 WITNESS KEATEN: I would not -- I would not agree
2 that that was a bad decision. I would like to point out
3 that, in fact, the role that Mr. Herbein assumed on March
4 28th in operating from the visitors center is very similar
5 to the role that the emergency support director is supposed
6 to assume today. And so he did on March 28th exactly -- in
7 that respect at least -- the same thing that he would be
8 expected to do in responding to an emergency; namely, not to
9 go to the control room, but to stay at the off-site
10 facility.
11 MS. LOUISE BRADFORD: Again, I am trying to
12 remember. It seemed to me that Mr. Baxter was arguing that
13 that person should be on site.
14 CHAIRMAN SMITH: All right.
15 MS. LOUISE BRADFORD: I am really having trouble,
16 because we have not had access to the transcripts.
17 CHAIRMAN SMITH: Do you mind if I paraphrase what
18 I see your point to be? We have had -- there is a dispute
19 between the NRC staff and the Licensee as to the time of the
20 opening of the emergency off-site facility. And the staff
21 has generally taken the position that for the first six
22 hours following declaration of an emergency, that the
23 function of the emergency support director can be adequately
24 performed on site and that they will allow six hours for the
25 emergency off-site facility to be opened up.

1 Now, she is trying to point out that this seems
2 to be inconsistent with Mr. Herbein's actions during the
3 accident. So either the staff, as I understand your point,
4 is wrong about the opening up of the emergency off-site
5 facility so late following an emergency, or Mr. Herbein's
6 actions on the 28th were -- now I have lost the thread --
7 Mr. Herbein's actions were irresponsible; that the two
8 viewpoints are inconsistent.
9 WITNESS KEATEN: I believe I understand what you
10 said, Mr. Smith. But I would disagree that they are
11 inconsistent in that I would like point out, as is said on
12 the testimony on page 6, that Mr. Herbein arrived at the
13 location of Three Mile Island only at approximately 10:00
14 a.m., which was approximately six hours into the accident,
15 and he then went to the visitors center, which today would
16 be the primary location of the emergency off-site facility.
17 So, if today the same type of situation arose, it
18 would be that six-hour time frame.
19 CHAIRMAN SMITH: Okay. But now would it be
20 consistent with the current planning on emergency off-site
21 director for the emergency off-site director to leave the
22 emergency off-site facility, as Mr. Herbein did, and go to
23 any place? Is that a part of your point, too?
24 MS. LOUISE BRADFORD: Yes, sir.
25 (Pause.)

1 WITNESS KEATEN: I am not intimately familiar
2 with the exact definition of the duties and responsibilities
3 of the emergency off-site -- the emergency support
4 director. But I do not recall having seen anywhere in the
5 emergency plan a requirement that the emergency support
6 director stay in the emergency off-site facility. I just do
7 not remember having seen it.
8 MS. LOUISE BRADFORD: I have no further
9 questions. As you said, we seem to have reached an
10 impasse.
11 CHAIRMAN SMITH: The best you can do is argue
12 from the record you have.
13 (Board conferring.)
14 CHAIRMAN SMITH: The Board, Ms. Bradford, is
15 aware of the point you are making, of course. And we have
16 not taken up this issue on our own to pursue, because it has
17 been very thoroughly investigated by both the I&E people who
18 had conclusions on it in 0600, and Rogovin and Kemeny. It
19 is pointless for us to duplicate such investigation.
20 Number one, it is pointless for us to duplicate
21 it. Number two, it is not possible for us to duplicate it.
22 So we are just going to take the record as it is presented
23 to us.
24 We have, however, examined the investigation
25 reports to see if there are any conclusions which would

1 require us to pursue it further, if we had the practical
2 ability to do it. And we have not been able to identify it.
3 All right, I guess we will go to the testimony
4 now.
5 Mr. Dornsife -- I forgot -- do you have
6 questions?
7 MR. DORNSIFE: Yes, sir, I have a short question
8 on the core water level.
9 CHAIRMAN SMITH: All right.
10 CROSS EXAMINATION
11 BY MR. DORNSIFE:
12 Q Mr. Keaten, I recall Mr. Jones' concern about the
13 core water level giving misleading indication under the
14 scenario where under certain small-break LOCAs the top of
15 the core is approached by the water level and because of
16 frothing, particularly the differential pressure-type of
17 meter could give an indication that the core was in fact
18 uncovered and the operator could think he was in an
19 inadequate core-cooling situation and do things like start a
20 reactor coolant pump and worsen the scenario.
21 And I recall that as being his major concern
22 about misleading the operator, rather than the way you
23 characterized it. Would you comment on that, please?
24 A (WITNESS KEATEN) I frankly do not particularly
25 remember that one. But maybe my memory is simply faulty.

1 But the first point is that I was answering in
2 the context of the Board's hypothesis that there is an ideal
3 instrument in place that will give exactly the corret
4 information. So I was not attempting to address any of the
5 practical problems that might arise from real
6 instrumentation such as delta-p type of device.
7 I think the other part of the answer is that one
8 of the challenges posed in designing the correct training
9 program on how to use water level instrumentation is how to
10 teach the operator to respond to those classes of LOCAs
11 which indeed do uncover the core for a period of time, but
12 where nevertheless the appropriate action of the operator is
13 to leave the systems alone to take care of it.
14 So part of the training program wold be to make
15 sure that the operators were aware that under a sufficiently
16 large LOCA they would in fact see a real water level down
17 below the top of the core and they should not take action
18 contrary to the design basis of the safety system. So this
19 would have to be part of the training program.
20 MR. DORNSIFE: Thank you.
21 CHAIRMAN SMITH: All right. Anything else before
22 we get to the prepared testimony?
23 (No response.)
24 CHAIRMAN SMITH: All right.
25 DIRECT EXAMINATION--Resumed

1 BY MR. BAXTER: (Resuming)

2 Q Gentlemen, I call your attention to a document

3 which bears the caption of this proceeding dated November

4 25, 1980, entitled "Licensee's Supplemental Testimony of

5 Robert W. Keaten, Joseph J. Colitz, and Michael J. Ross, in

6 Response to Board Question Number 6, Emergency Feedwater

7 Reliability."

8 I will ask you a series of questions. Please

9 respond from Mr. Keaten through to Mr. Ross. Does this

10 document represent testimony prepared by your or under your

11 supervision for presentation at this hearing?

12 A (WITNESS KEATEN) Yes, it does.

13 A (WITNESS COLITZ) Yes, it does.

14 A (WITNESS ROSS) Yes, sir, it does.

15 Q Do you have any corrections or additions to make

16 to your written testimony?

17 A (WITNESS KEATEN) Yes, I do. There are two

18 changes which are typographical in nature. On page 7 of the

19 testimony, the tenth line from the top, the next-to-the-last

20 word in that line is "or" and it should be "of," o-f.

21 On page 8, the next-to-the-last line, the second

22 word in the testimony is "is," and it should be "if," i-f.

23 Q Does anyone else have any changes or

24 corrections?

25 A (WITNESS COLITZ) Bob picked up the two I had.

1 There is one other one that Mike is going to address.

2 A (WITNESS ROSS) I do have one other additional

3 correction. On page 11 of the testimony, the second

4 paragraph. The seventh line of that paragraph that

5 presently reads "The TMI-1 technical specifications require

6 that two licensed operators be in the control room," please

7 change that to read as follows: "The TMI-1 technical

8 specifications require that two licensed operators be in the

9 control room," delete everything else in that sentence, and

10 make it read, "during startup, shutdown, and recovery from a

11 reactor trip."

12 Q What is your current practice, however, Mr. Ross,

13 with respect to control room staffing, and what new

14 requirements are being addressed in response to the NRC

15 staff?

16 A (WITNESS ROSS) Our current practice and internal

17 procedures are based on the interim staff licensing letter

18 on control room staffing, which would require two control

19 room operators licensed above 200 degrees in the reactor

20 coolant system.

21 MS. WEISS: Mr. Ross, when you read it in its

22 changed form, you deleted the word "reactor," and you said

23 "two licensed operators." Was that intentional? Instead of

24 "two licensed reactor operators." When you read it the

25 second time in its corrected form, you read the sentence to

1 read "The TMI-1 technical specifications require that two
2 licensed operators be in the control room," et cetera,
3 deleting the word "reactor." Was that just unintentional
4 omission?
5 WITNESS ROSS: It was unintentional. It should
6 read "reactor operators."
7 BY MR. BAXTER: (Resuming)
8 Q Are there any other changes or corrections?
9 A (WITNESS ROSS) I have no further corrections.
10 Q As corrected, is the testimony true and accurate
11 to the best of your knowledge and belief?
12 A (WITNESS KEATEN) Yes.
13 A (WITNESS COLITZ) Yes.
14 A (WITNESS ROSS) Yes, sir, it is.
15 MR. BAXTER: Mr. Chairman, I move that the
16 testimony described be received into evidence and be
17 incorporated into the transcript as if read.
18 CHAIRMAN SMITH: Are there any objections?
19 (No response.)
20 CHAIRMAN SMITH: The testimony is received.
21 (The document referred to, the "Licensee's
22 Supplemental Testimony" of Messrs. Keaten, Colitz, and Ross,
23 dated November 25, 1980, follows.)
24
25

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LIC 11/25/80

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
METROPOLITAN EDISON COMPANY	)	Docket No. 50-289
	)	(Restart)
(Three Mile Island Nuclear	)	
Station, Unit No. 1)	)	

LICENSEE'S SUPPLEMENTAL TESTIMONY OF

ROBERT W. KEATEN, JOSEPH J. COLITZ AND MICHAEL J. ROSS

IN RESPONSE TO BOARD QUESTION NO. 6

(EMERGENCY FEEDWATER RELIABILITY)

OUTLINE

This testimony supplements Licensee's Testimony of Gary R. Capodanno, Louis C. Lanese and Joseph A. Torcivia in Response to Board Questions 6.a, 6.b, 6.c, 6.g, 6.h, 6.i, 6.j and 6.k dated October 21, 1980 and Licensee's Testimony of Robert C. Jones, Jr. in Response to Board Questions 6.e and 6.f, dated October 28, 1980. In particular, this testimony is in response to the Board's clarification of Board Question 6 and addresses the means by which the emergency feedwater system brings the plant to cold shutdown, the complexities and problems involved in the operation and termination of the feed and bleed cooling mode, and initiation of an alternative cooling mode to the feed and bleed mode.

INDEX

INTRODUCTION

Licensee's initial response to Board Question No. 6, which addresses emergency feedwater reliability, was presented in "Licensee's Testimony of Gary R. Capodanno, Louis C. Lanese and Joseph A. Torcivia in Response to Board Questions 6.a, 6.b, 6.c, 6.g, 6.h, 6.i, 6.j and 6.k," dated October 21, 1980, "Licensee's Testimony of Robert C. Jones, Jr. in Response to Board Questions 6.e and 6.f," dated October 28, 1980, and "TMI-1 Emergency Feedwater System," Licensee's Exhibit No. 15.

The Board, at the hearing session of November 5, 1980, clarified the issues which it intended to be addressed in Board Question No. 6, to include the following:

> How would the emergency feedwater system, if relied upon, bring the plant to cold shutdown?
>
> If emergency feedwater fails, what are the complexities and problems involved in the operation and termination of the feed and bleed cooling mode?
>
> How is an alternative cooling mode, such as restoration of emergency feedwater, initiated in order to bring the plant to cold shutdown?

See Tr. 4812, 4813.

This testimony, by Mr. Robert W. Keaten, GPU Manager of Systems Engineering, Mr. Joseph J. Colitz, TMI-1 Manager of Plant Engineering, and Mr. Michael J. Ross, TMI-1 Supervisor of Operations, is addressed to the Board's inquiry in Board Question No. 6.

SUPPLEMENTAL RESPONSE TO BOARD QUESTION NO. 6

BY WITNESSES KEATEN, COLITZ AND ROSS:

Earlier witnesses on behalf of Licensee have discussed the various processes available for core cooling and removing residual heat from the primary coolant at TMI-1. In order to summarize these processes, and to assist in responding to the Board's inquiry, a diagram is attached (Figure 1) which illustrates the core cooling and heat removal processes. A simplified schematic drawing of the plant which illustrates the key features of these processes is also attached (Figure 2).

Description of Core Cooling and Heat Removal Processes

The fuel, in the reactor pressure vessel, is contained in a closed system of circulating water known as the primary or reactor coolant system (RCS). The reactor coolant normally removes heat from the fuel and transports it through two piping loops (hot legs) to the top of the two steam generators (also called, Once Through Steam Generators (OTSGs)); the cooler fluid then goes out the steam generator cold legs, through four reactor coolant pumps, and back into the reactor vessel and the lower portion of the core. The nominal capacity of either steam generator to remove heat is 50% rated reactor power and is, therefore, more than adequate to remove all residual heat. The reactor coolant system can transfer residual heat to the steam generators with or without reactor coolant pumps operating.

The two steam generators are large, vertical, tube-in-shell heat exchangers that transfer the primary system heat through tubing walls into a secondary system. The primary coolant, normally in liquid form, passes through the inside of the steam generator tubes. Heat is transferred through the tube surface to the outer, or secondary, side of the tubes where the cooler secondary fluid is heated. The secondary coolant boils in the steam generators. Secondary side makeup water (feedwater) is normally provided by the main feedwater system. The feedwater system contains two main feedwater pumps, three condensate pumps and three condensate booster pumps located in the turbine building which supply the two steam generators. This system can supply enough feedwater to remove residual heat with only one main feedwater, one condensate pump and one condensate booster pump supplying one steam generator. The steam produced in the steam generators is normally piped through the containment structure and through the turbine bypass valves to the shell side of a condenser where it is condensed to liquid water. From there the water is returned to the steam generator by the main feedwater system. Cooling for the condenser is supplied by a circulating water loop, which finally discharges heat to the atmosphere via the natural draft cooling towers.

The Emergency Feedwater (EFW) system at TMI-1 is an alternate source of steam generator secondary side water supply. In the event main feedwater is not available (e.g., the proper combination of the condensate pumps, condensate booster pumps,

main feedwater pumps, or the main condenser are not available), the EFW system would supply water from either or both of the condensate storage tanks to the secondary side of the steam generators. The steam produced would be removed through the turbine bypass valves to the main condenser, if available, or through the main steam relief valves or the atmospheric dump valves to the atmosphere. The two motor driven emergency feedwater pumps can be powered from either on-site or off-site AC power sources. The steam driven emergency feedwater pump requires neither off-site nor on-site AC power sources to operate. Any one of the three EFW pumps supplying water to either of the two steam generators has sufficient capacity to remove residual heat.

The primary system normally operates at a pressure above that at which boiling occurs; i.e., the coolant is subcooled, or below the saturation temperature. A pressurizer, which contains a cushion of steam, is attached to the primary system to maintain pressure within normal operational limits by heating its volume of water with electric heaters (pressurizer heaters) or by cooling the steam region with a water spray (pressurizer spray). Two code safety valves, located at the top of the pressurizer, are designed to open (automatically) without external signals or power and to release steam when primary system pressure approaches normal design operational limits. In addition, a power-operated relief valve (PORV) is present to open prior to the code safety valves, thus minimizing the frequency of operation of the code safety valves.

Three high pressure injection pumps located in the Auxiliary Building are provided to add inventory via the RCS cold legs to the primary system at high pressure. One pump normally operates to replenish water which is continually being removed from the reactor coolant system for purification, chemistry control and by reactor coolant pump seal leakage.

At low reactor coolant system pressures and temperatures during normal shutdowns, residual heat is removed by the decay heat removal system. Low pressure injection (LPI) pumps (also called Decay Heat Pumps) are used to provide closed loop cooling by circulating primary coolant through a heat exchanger. The residual heat from the LPI coolant loops is transferred to the river via a second system, the Decay Heat Closed Cooling Water system. There are two independent heat removal trains as described, each capable of removing all residual heat. The pumps in these trains are operable from either off-site or on-site power.

In the event of a loss-of-coolant accident, the emergency core cooling system (ECCS) cools the core by replenishing reactor coolant inventory. The ECCS includes the high pressure injection (HPI) and low pressure injection (LPI) systems, and two core flood tanks (CFTs). Under accident conditions when the HPI system is called upon to operate, it injects water, taken from the Borated Water Storage Tank (BWST), into the reactor coolant system at high pressure. The CFTs and LPI system inject water at lower system pressures. The CFTs are pressurized with nitrogen, require no power to function and automatically inject a limited volume of water into the primary system when the primary system

pressure drops below 600 psia. The LPI system can operate in two modes. It can pump water into the reactor pressure vessel, in a manner similar to HPI operation, from the BWST and in the longer term from the reactor (containment) building sump. It can also feed the HPI pumps from the sump, if RCS pressure remains above the capability of the LPI pump. Following a loss-of-coolant accident, the primary coolant which collects in the reactor building is cooled by the decay heat system heat exchangers before being reinjected into the reactor coolant system by the LPI or HPI pumps.

In the case of a normal reactor trip, the process of removing the decay or residual heat from the primary or reactor coolant system would be through the steam generators to secondary coolant provided by either of the feedwater supply systems. Assuming an end of life, equilibrium full power history before the time of trip, the decay heat level is approximately 7% of full power at the time of trip. This heat level quickly decays to 4% within 40 seconds and roughly to 1% in an hour. An equivalent percentage of main feedwater flow would be required to maintain equilibrium RCS temperature, or approximately 720 gpm of emergency feedwater 40 seconds after trip. The flow requirements and capabilities of the main feedwater pumps are above 50% of full rated power. Consequently, there is abundant capacity in either of the two main feedwater pumps to provide feedwater flow for residual heat removal.

If main feedwater is unavailable, the EFW system will provide sufficient secondary coolant. The EFW system has two flow paths, supplied by one turbine-driven pump and two motor-driven pumps, which can supply emergency feedwater to either or both of the steam generators. (See Licensee's Exhibit No. 15 for a complete description of the TMI-1 EFW system.) The turbine-driven pump has a rated capacity of 920 gpm, and each motor-driven pump has a rated capacity of 460 gpm. Either one turbine-driven or both motor-driven pumps exceed the requirements to remove the 7% residual heat that exists at the time ~~or~~ of reactor trip. By 2 1/2 minutes after trip, one motor-driven pump has enough capacity to remove the decay heat. Even if only one motor-driven pump were available initially, adequate heat removal would be provided. RCS temperature and pressure would initially increase, possibly resulting in lifting a relief valve. As decay heat drops, the EFW pump would supply enough water to overcome the temperature/pressure rise and restore normal conditions.

The TMI-1 EFW system at restart will have redundancy, diversity and sufficient capacity to act as a water supply for reactor coolant system cooling under the normal single-failure assumptions applied to safety-grade systems. (See Licensee's Testimony of Gary R. Capodanno, Louis C. Lanese and Joseph A. Torcivia in Response to Board Questions 6.a, etc., October 21, 1980.)

Finally, as discussed in Licensee's testimony in response to UCS Contentions 1 and 2, even if no feedwater is available (i.e., all main feedwater and all emergency feedwater flow has been lost) the core can be adequately cooled simply by maintaining a sufficient inventory of water in the reactor vessel. This is accomplished by using the high pressure injection pumps to feed water from the Borated Water Storage Tank into the reactor coolant system, so that the core is covered with water or a two-phase mixture of water and steam. If no feedwater is available, the reactor coolant system pressure will increase to the setpoint of the relief valves, at which point one or more relief valves will open to control the pressure. This combination of use of the high pressure injection system to maintain adequate water inventory and use of relief valves to control system pressure is referred to as feed and bleed cooling.

Methods of Achieving Cold Shutdown

The above processes basically describe the methods available for decay heat removal immediately following reactor trip while the system is still at or near normal system temperature and pressure. Several methods are available to proceed to cold shutdown from this condition depending on the remaining operable equipment. However, it should be noted that the plant can remain in the hot condition for extended periods with any of these methods ~~is~~ if the decision to transition to cold shutdown is deferred.

The normal method for cooldown from operating pressure and temperature is to remove steam from the steam generators at a rate greater than decay heat, using the main feedwater system, the turbine bypass valves, and the main condenser. This is accomplished by taking manual control of the turbine bypass valves and opening the valves to a position where the resulting steam flow to the condenser yields the desired cooldown rate of the reactor coolant system. This method can be maintained despite single active failures in the process train including single failures in offsite power feeds. The reactor coolant system can be cooled by this method to the point that the decay heat removal system is put into operation (about 250°F/320 psig). The decay heat removal system can then continue the normal shutdown cooling process until the conditions of cold shutdown are reached (Tave $<$200°F).

If the main feedwater system is lost, the Emergency Feedwater System can provide the same capability to ultimately cool down the reactor coolant system. If the condenser is available, the secondary system will function as a closed loop by steaming through the turbine bypass valves to the condenser and water drawn from the condenser by the emergency feedwater pumps and returned to the steam generators. If the condenser is not available, steam can be released to the atmosphere via the atmospheric dump valves. These valves can be controlled in the same manner described above for the turbine bypass valves in order to achieve the desired cooldown rate. In this cooling mode

water from the condensate storage tanks is fed to the steam generators by the emergency feedwater systems and then released to the atmosphere. The condensate storage tanks are required by the technical specifications to have 150,000 gallons in each tank during reactor operation. This amount of water is more than adequate to allow the reactor coolant system to be cooled to the temperature and pressure where the decay heat removal system can be placed in operation, prior to the depletion of inventory in the condensate storage tanks.

Operation and Termination of Feed and Bleed Cooling

Initiation of the feed and bleed cooling mode is a very simple operation. If neither main nor emergency feedwater is available, the operator will initiate and maintain full high pressure injection until feedwater is restored. He can open the RC-RV-2 (PORV) and RC-V2 or allow the code safety valves to open to provide a flow path.

Once initiated, the feed and bleed cooling mode will automatically continue without need for additional short term operator actions. In the long term the operator must transfer the suction of the high pressure injection pumps from the BWST to the containment building sump via the low pressure injection pumps. If ESFAS has automatically initiated, this transfer requires opening 4 valves and closing 4 valves all of which can be done at the main control console. If ESFAS has not automatically initiated, the LPI pumps must be started manually but this also can be accomplished from the main control console.

Termination of the feed and bleed cooling mode is also very simple. Once the appropriate criteria are met the HPI discharge valves are throttled and eventually the HPI pumps are turned off. These actions are also performed from the main control console. Such throttling and/or termination of high pressure injection, however, is only permissible when specific criteria regarding RCS conditions are met. (See Licensee's testimony in response to UCS Contention 10.)

It should be noted that the simple actions associated with initiation, continuation and termination of feed and bleed cooling would be performed by an operator assigned to this portion of the control panel. Any parallel actions being taken in an attempt to restore main or emergency feedwater would be taken by a different operator assigned to the feedwater control panel. The TMI-1 technical specifications require that two licensed reactor operators be in the control room during startup, shutdown, and recovery from reactor trip ~~at all times the plant is in operation~~. The normal control room practice is that immediately upon reactor trip one operator goes to the portion of the console from which HPI and LPI are controlled, and the other operator goes to the feedwater control portion of the panel. This allows actions to be carried out in parallel under the supervision of the senior watchstanders.

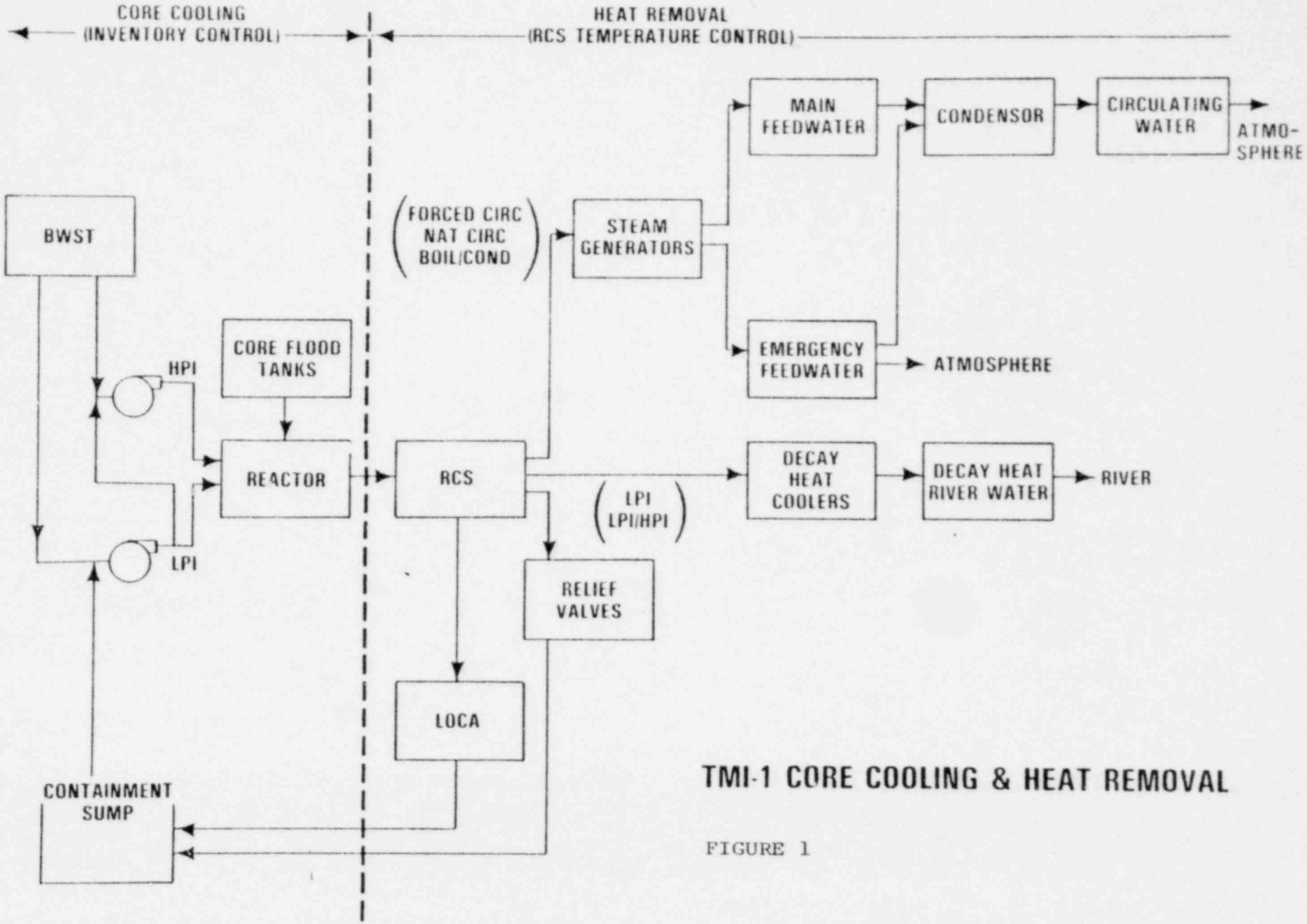
Restoration of Emergency Feedwater

If no feedwater is available, and the plant is operating in the feed and bleed mode, the normal steps taken would be directed at restoring emergency feedwater flow, as described in

the follow-up action section of EP 1202-26A. The exact steps depend upon the reason why no feedwater is available and generally consist of verifying that valves are in the correct position, verifying that the pumps have started and taking manual actions where pump or valve actuation have not occurred correctly.

Assuming emergency feedwater is made available, the steam generator can be restored as a heat sink by adding emergency feedwater to the steam generator(s) and relieving steam through one or both atmospheric dump valves or through turbine bypass valves to the condenser. These pumps and valves are normally operated from the control room but the valves can also be operated locally and the steam-driven emergency feedwater pumps can be started locally. With the steam generator in operation, primary system temperature can be reduced below system saturation temperature and a 50° subcooling margin will be maintained or reestablished. HPI can then be throttled, and a bubble can be formed in the pressurizer by energizing pressurizer heaters and reducing high pressure injection flow to allow the PORV or primary safety valve(s) to close. The normal makeup system can be used.

Once the bubble has been reformed in the pressurizer, the plant has been returned to a normal shutdown condition and cooldown may continue using normal plant cooldown procedures.



TMI-1 CORE COOLING & HEAT REMOVAL

FIGURE 1

SIMPLIFIED SCHEMATIC of TMI UNIT 1

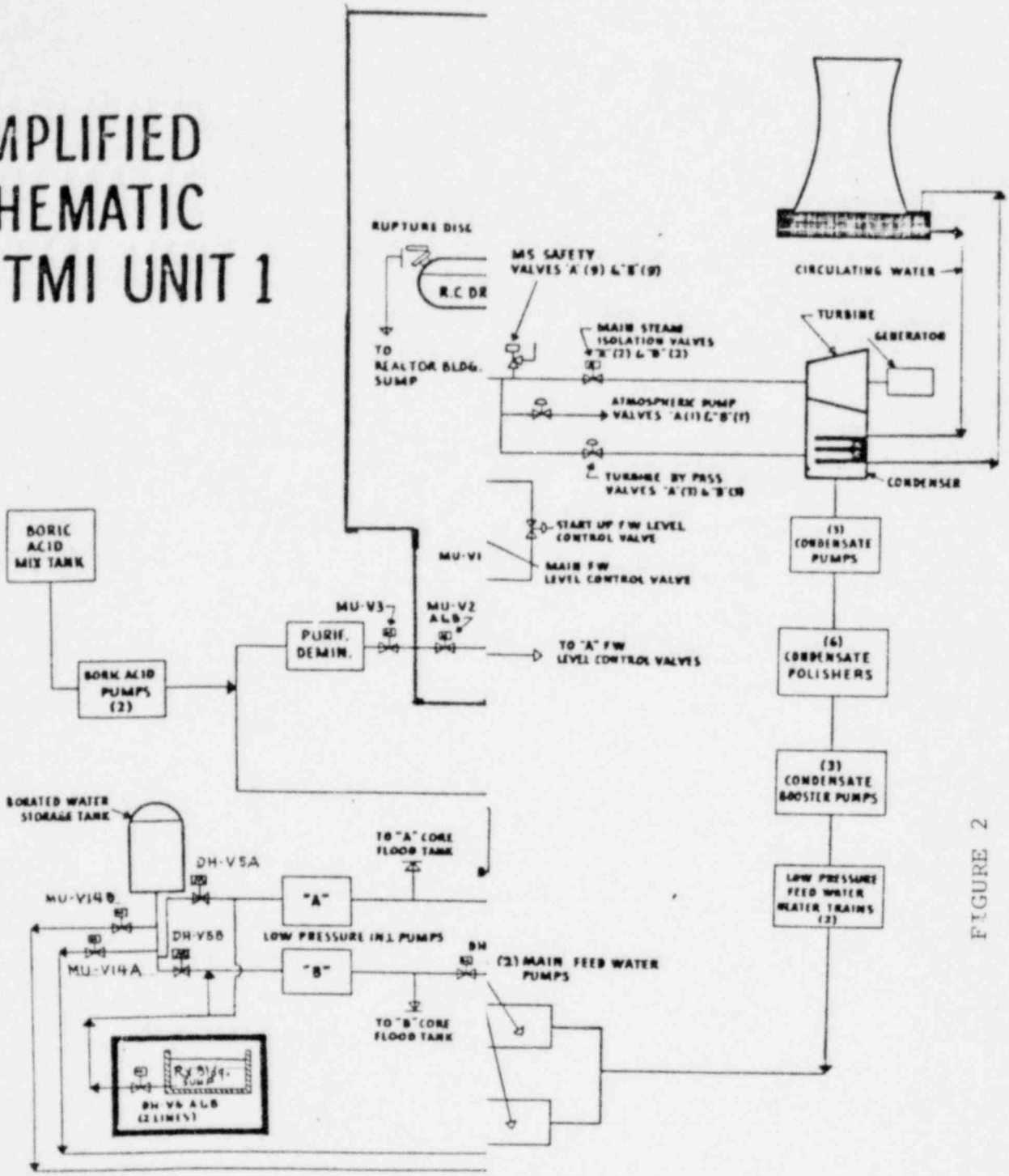


FIGURE 2

SIMPLIFIED SCHEMATIC of TMI UNIT 1

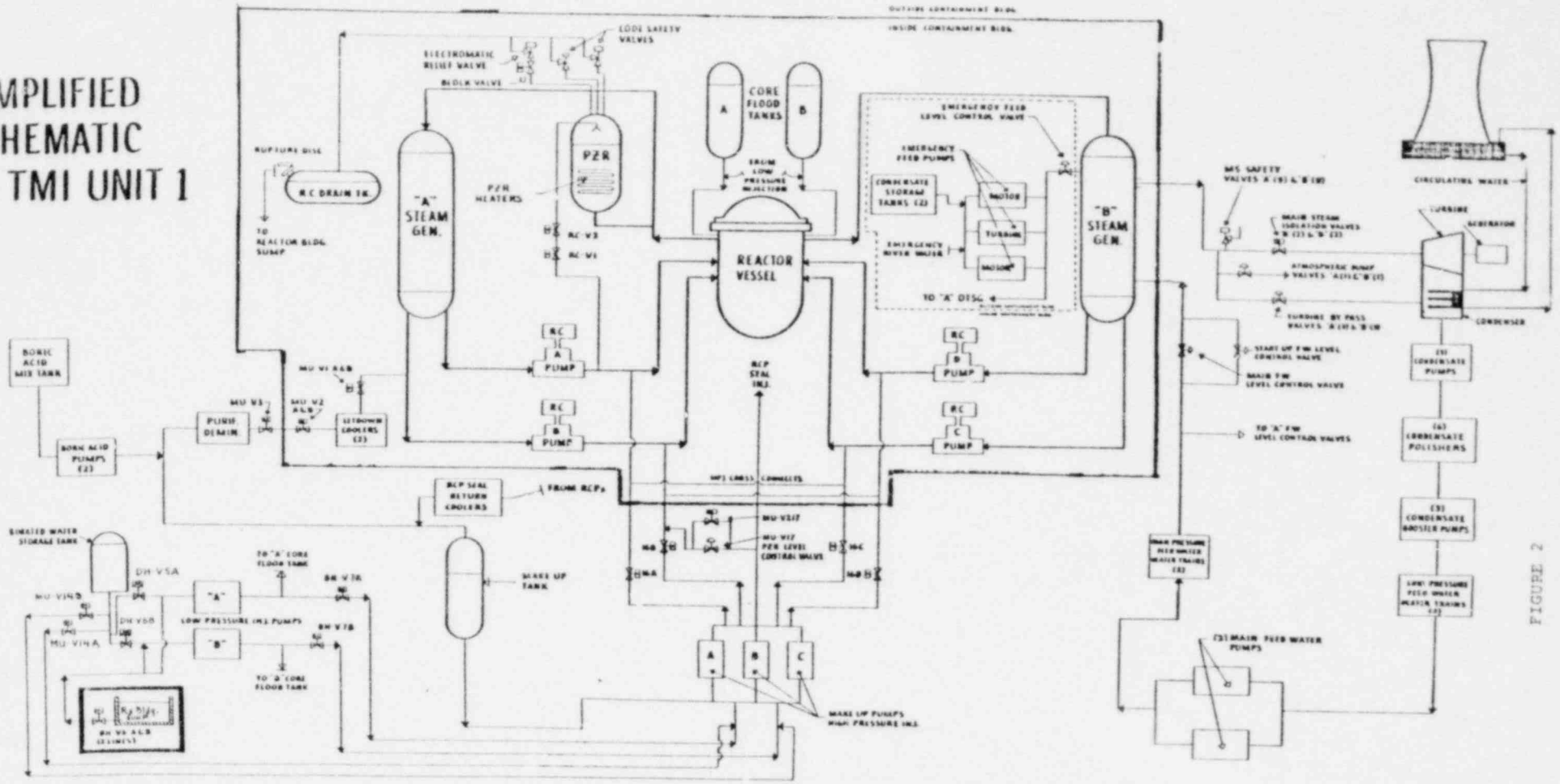


FIGURE 2

JOSEPH J. COLITZ

Business Address: Metropolitan Edison Company
Three Mile Island Nuclear Station
P.O. Box 480
Middletown, Pennsylvania 17057

Education: B.S., Mechanical Engineering, Villanova University, 1963
Post-graduate courses in Reactor Engineering and Health Physics, University of Michigan

Experience: Manager - Plant Engineering, TMI-1, Metropolitan Edison Company, 1979 to present. Responsible for providing technical engineering support for all aspects of TMI-1 operations via review and evaluation of changes to procedures, systems and equipment and their relationship to licensing design basis criteria.

Director of Projects, Generation Department, Metropolitan Edison Company, Reading, Pennsylvania, 1977 to 1979. Responsibilities included industrial waste plants at company fossil units, the backfit of a cooling tower to a fossil unit and the installation of the TMI security system. Following the TMI-2 accident, served as the back-shift senior on-site representative for TMI-2 activities.

TMI-1 Unit Superintendent, Metropolitan Edison Company, 1974 to 1977. Responsible for the overall operation and maintenance of TMI-1, including plant engineering and health physics. Licensed as a Senior Reactor Operator on TMI-1.

Plant Engineer, TMI-1, Metropolitan Edison Company, 1973 to 1974. Responsible for all mechancial, electrical, nuclear and instrumentation and control engineering for TMI-1.

Supervisor of Operations, Three Mile Island Nuclear Station, Metropolitan Edison Company, 1968 to 1973. Involved with the initial selection and training of operating personnel, preparation of plant operating procedures and support for the startup and test program.

Engineer, Metropolitan Edison Company, 1967 to 1968. Spent 1 1/4 years at the Saxton Nuclear Station in training on the operation and maintenance of a nuclear station. Licensed by the NRC as a Reactor Operator.

Cadet Engineer and Engineer, Metropolitan Edison Company, Reading, Pennsylvania, 1963 to 1967. Served in various positions relating to fossil plant engineering, including Plant Engineer of the Crawford Generating Station.

Professional Affiliations: Member, American Society of Mechanical Engineers.

ROBERT W. KEATEN

Business Address: GPU Service Corporation
100 Interpace Parkway
Parsippany, New Jersey 07054

Education: B.S., Physics, Yale University, 1957. Post-Graduate and Professional Courses in Mathematics, Engineering and Business, UCLA, 1960-1972.

Experience: Manager, Systems Engineering Department, GPU Service Corporation, April 1978 to present. Responsible for the development and application of specialized analytical skills in such areas as nuclear core reloads and fuel management; plant dynamic and safety analysis; system generating plant process computers; control and safety systems analysis, and analysis of plant operating performance for nuclear and fossil plants. Served as Deputy Director of Technical Support at Three Mile Island during the post-accident period.

Program Manager, Light Metal Fast Breeder Reactor Technology, Atomics International Division of Rockwell International, 1974 to 1978. Managed research and development programs performed for U.S. Department of Energy, including programs in reactor physics, safety and component development.

Manager of Systems Engineering, Light Metal Fast Breeder Reactor Program, Atomics International Division of Rockwell International, 1968 to 1974. Responsible for performance of safety analyses, development of safety criteria and development of instrumentation, control and safety systems design.

American Representative to the OECD Halden Reactor Project in Norway, 1965-1968. Participated in research on nuclear fuel performance, application of digital computers to nuclear reactors, and on development and application of in-core instrumentation.

Supervisor of Engineering, Sodium Reactor Experiment, Atomics International, Division of Rockwell International, 1962-1965. Responsibilities included analysis and measurement of the nuclear heat transfer and hydraulic parameters of the reactor core and process systems; specification and installation of nuclear and process instrumentation; design and installation of new control systems.

Senior Physicist, Sodium Reactor Experiment, Atomics International, Division of Rockwell International, 1959-1962. Performed measurements and analyses of the nuclear and thermal parameters of the reactor.

Experimental Physics Group, DuPont Savannah River Plant, 1957-1959. Performed measurements and calculations of the nuclear parameters of the reactor lattices.

Honors and Professional Affiliations:

Member of the Nuclear Power Plant Standards Steering Committee of the American Nuclear Society.

Member and past Chairman of the LMFBR Design Criteria (ANS-54) Standards Committee of the American Nuclear Society.

Registered Professional Engineer (Nuclear Engineering), California.

Publications:

"Analysis of TMI-2 Sequence of Events Operator Response," presented to a special session of the American Nuclear Society Conference, San Francisco, November 1979; and to Edison Electric Institute Conference, Cleveland, October 1979.

"The Role of Instrumentation in the TMI-2 Accident," presented at the American Nuclear Society Conference, June 1980.

Safety and Environmental Aspects of Liquid Metal Fast Breeder Reactors" 35th Annual American Power Conference, Chicago, Ill., May 1973.

"Safety Aspects of the Design of Heat Transfer Systems in LMFBR's" International Conference on Engineering of Fast Reactors for Safe and Reliable Operation, Karlsruhe, Germany, October 1972.

"Safety Criteria and Design for an FBR Demonstration Plant," ASME Nuclear Engineering Conference at Palo Alto, Calif., March 1971.

"Evaluation of Thermocouples for Detecting Fuel Assembly Blockage in LMFBR's," American Nuclear Society Annual Meeting, Los Angeles, California, June 1970.

"A Mathematical Model Describing the Static and Dynamic Instability of the SRE Core II," Reactor Kinetics and Control, AEC Symposium Series 2. (Also published as NAA-SR-8431.)

"Reactivity Calculations and Measurements at the SRE," ANS Topical Meeting: Nuclear Performance of Power-Reactor Cores, September 1963.

"Measurement of Dynamic Temperature Coefficients by Forced Oscillations in Coolant Flow," Trans-American Nuclear Society 5, No. 1, June 1962.

"Analysis of Power Ramp Measurements with an Analog Computer," Trans-American Nuclear Society 5, No. 1, June 1962.

"Reflected Reactor Kinetics," NAA-SR-7263.

Many other reports covering analytical and experimental work.

MICHAEL J. ROSS

Business Address: Metropolitan Edison Company
Three Mile Island Nuclear Station
P.O. Box 480
Middletown, Pennsylvania 17057

Education: U.S. Navy Nuclear Power School, 1961. U.S. Navy Nuclear Power Prototype School, 1961.

Experience: Supervisor of Operations, Three Mile Island Unit 1, Metropolitan Edison Company, 1978 to present. Responsible for directing the day-to-day operation of the plant to ensure compliance with the conditions of the plant operating license and technical specifications, including supervision of the Radioactive Waste Processing and Shipment Group and coordination of operations and related maintenance activities with the Superintendent of Maintenance.

Shift Supervisor, Three Mile Island Unit 1, Metropolitan Edison Company, 1972 to 1978. Responsible for the management of all operations and maintenance activities, including the manipulation of any controls, equipment or components in physical plant systems on his shift.

Shift Foreman, Three Mile Island Unit 1, Metropolitan Edison Company, 1970 to 1972. Responsible for performance of various pre-operational activities, including preparation of procedures and start-up equipment checks.

Reactor Plant Technician, Saxton Nuclear Experimental Corporation, 1968 to 1970. Held position of reactor operator; additionally, was responsible for training operations staff.

U.S. Navy, 1960 to 1968. Positions held include reactor operator aboard USS Haddo, Instructor at the Nuclear Power Training Unit, and AEC Field Representative at the Nuclear Power Training Unit

Professional Affiliations: Babcock & Wilcox Owner's Group, Fuel Handling Subcommittee.

1 MR. BAXTER: The panel is available for cross
2 examination.
3 CHAIRMAN SMITH: Ms. Weiss.
4 MS. WEISS: Thank you, Mr. Chairman.
5 CROSS EXAMINATION
6 BY MS. WEISS:
7 Q Gentlemen, can you tell me, please, which one of
8 you is responible for each section of the text of the
9 testimony?
10 A (WITNESS KEATEN) We are all sponsoring all of
11 the testimony.
12 Q I believe we had a practice established in the
13 case that the person who was primarily responsible would
14 indicate that for each piece of text. Is it possible to do
15 that?
16 MR. BAXTER: I do not recall that practice, Mr.
17 Chairman. This testimony is jointly sponsored because there
18 are general principles of core and heat removal and decay
19 heat removal processes being described; they involve
20 interactions between systems engineering, plant engineering,
21 and operations, which are the three disciplines we have
22 there.
23 I think if Ms. Weiss would simply pose her
24 questions to the panel as other parties have been doing, the
25 appropriate witness will be able to respond. We cannot

1 divide it up.

2 CHAIRMAN SMITH: Well, your answer is: if it is

3 the testimony of the witnesses is an appropriate answer.

4 However, the order of the Board does require that

5 where individual parts of the testimony are sponsored by an

6 individual only, that that be indicated. But your

7 representation is that is not the case?

8 MR. BAXTER: That is right.

9 BY MS. WEISS: (Resuming)

10 Q Would you tell me what the process was of writing

11 the testimony? Did you all sit around a table and write it

12 together, or did one of you make a first draft subject to

13 the review of the others?

14 A (WITNESS KEATEN) Several different people worked

15 on the first draft, including people who are not members of

16 this panel, and the draft testimony was reviewed by all of

17 us. All of us commented, corrected it, and it eventually

18 arrived in the final form. It is not the case that one of

19 us sat down and wrote the first draft of this testimony.

20 Q This is a collegial effort among persons who are

21 here and other persons who are not here?

22 A (WITNESS KEATEN) That is correct.

23 Q Would you refer to Figure 1, which follows the

24 end of your text, please? It is the figure labeled "TMI-1

25 Core Cooling and Heat Removal." Mr. Ross, is it accurate

1 that the -- let's look at the upper right-hand, the train
2 which begins main feedwater, proceeds to the right,
3 condenser, circulating water, atmosphere. Is it true that
4 that is a nonsafety grade of equipment?
5 A (WITNESS ROSS) My knowledge of that, yes, that
6 is true.
7 CHAIRMAN SMITH: And the smaller arrow beneath
8 that, particularly the last arrow to atmosphere, does that
9 contain the atmospheric dump valves?
10 A (WITNESS ROSS) It does.
11 Q And those are also nonsafety, nonsafety grade?
12 A (WITNESS COLITZ) I think there was previous
13 testimony that I have not gone back through yet, to
14 determine in the emergency feedwater chain what is and what
15 isn't. I know there are certain issues still open on
16 safety-grade equipment.
17 Q My question to you --
18 A (WITNESS COLITZ) I do not know specifically if
19 the atmospheric dump valves are or are not right now.
20 Q Does anyone on the panel know whether the
21 atmospheric dump valves are nonsafety-grade? I do think
22 that we have that on the record. I am just trying to
23 reaffirm it. The authority of last resort is generally Mr.
24 Keaten on these subjects.
25 A (WITNESS KEATEN) To the best of my knowledge, we

1 have not had any testimony which represented that they were
2 safety-grade. I personally am not sure to what extent they
3 do or do not meet all of the requirements of being safety
4 grade. I do not to the best of my knowledge believe that
5 they are classified as safety grade.
6 Q None of you would have any reason to change any
7 of the testimony which has previously been given with
8 respect to these components; would you?
9 A (WITNESS KEATEN) No.
10 Q And the train directly below that, on the right
11 side, the decay heat coolers, decay heat river water and
12 into the river, what temperature and pressure does the
13 system have to be at in order to allow you to use those?
14 A (WITNESS COLITZ) We put the decay heat system on
15 at approximately 250 degrees, 320 pounds pressure.
16 Q Is that -- I seem to recall that is very close to
17 the definition of cold shutdown. What is the difference, if
18 you remember?
19 A (WITNESS ROSS) The technical specification
20 definition of cold shutdown is the reactor ois shut down by
21 at least 1 percent reactivity and temperatures less than 200
22 degrees.
23 Q I would like to proceed now to the three
24 questions which the testimony is responsive to. They are
25 stated on the first page, labeled "Introduction." The first

one is: "How would the emergency feedwater system, if relied upon, bring the plant to cold shutdown?" Is it true that this plant can be brought to cold shutdown only if, one, natural circulation is effective to transfer heat to the steam generators and, two, nonsafety equipment is relied upon to remove heat from the steam generator?

(Pause.)

A (WITNESS KEATEN) No, I do not believe that is true.

Q Tell me in what way that is not true.

(Pause.)

A (WITNESS KEATEN) As we have testified previously, there are several methods of removing heat from the primary coolant system, which natural circulation to the steam generators is only one.

(Counsel for USC conferring.)

Q Okay. Let me rephrase the question. I meant to include as a condition the condition that is contained in the question; that is, if emergency feedwater is being relied upon. So let me rephrase it then: is it true that if emergency feedwater is being relied upon, you can bring the plant to cold shutdown only if natural circulation is effective to transfer heat to the steam generators and if nonsafety equipment is relied upon to remove heat from the steam generators?

1 A (WITNESS KEATEN) The answer is still "No." As
2 we testified previously, there are three methods of
3 transferring heat from the reactor core to the steam
4 generators. One is forced circulation with the reactor
5 coolant pumps. One is natural circulation with a
6 single-phase fluid, which has been the defintion we have
7 used of natural circulation. And the third is the so-called
8 boiler condenser mode of cooling, which is also sometimes
9 referred to as a "two-phase natural circulation."
10 And we have previously testified that any one of
11 those three methods is adequate to transfer the decay heat
12 from the core to the steam generators.
13 (Counsel for USC conferring.)
14 Q Assume that there is a loss of off-site power.
15 In that case, isn't it true that only two of those methods
16 would remain possible; that is, natural circulation and the
17 single-phase or fluid natural circulation would be one
18 method, and then the other method would be the boiler
19 condenser circulation?
20 A (WITNESS KEATEN) With loss of off-site power,
21 those are the two methods that are available to transfer
22 heat to the steam generators; that is correct.
23 (Counsel for UCS conferring.)
24 Q And is it true that in order to remove the heat
25 from the steam generators, you must rely on certain

1 equipment which is not safety-grade or not classified as
2 related to safety?
3 A (WITNESS KEATEN) Given your hypothesis that the
4 emergency feedwater system is being used to remove heat from
5 the steam generators, and given the further hypothesis of
6 the loss of off-site power, the normal method of relieving
7 the steam from the steam generators to atmosphere would be
8 through the atmospheric dump valves.
9 Q Even if you have got off-site power, you are
10 still going to use nonosafety equipment to remove the heat
11 from the steam generators; aren't you?
12 A (WITNESS KEATEN) It is true that if you have
13 off-site power, the normal method of removing heat from the
14 steam generators would be through the condenser, and the
15 condenser is a nonsafety-grade component.
16 Q At page 9 of your testimony you list the means of
17 removing the heat from the steam generator. You just told
18 me the condenser is nonsafety. Is that also true of the
19 turbine bypass valves?
20 A (WITNESS KEATEN) So far as I know, the turbine
21 bypass valves are not safety-grade.
22 Q And is it true that both the turbine bypass
23 valves and the atmospheric dump valves are to be operated
24 manually?
25 (Panel of witnesses conferring.)

1 A (WITNESS COLITZ) The turbine bypass valves, the
2 atmospheric dump valves, when you go directly to operate
3 manually, normally those valves are controlled by the ICS.
4 We have put in additional stations so that in case -- well,
5 first, they are controlled by the ICS and automatic. If for
6 some reason the operator had to take manual control of those
7 valves from the control room, he could switch the ICS
8 control stations to manual control.
9 We have also added switches in the control room
10 independent of the ICS NNI power supply so that in case of
11 failure there the operator can take manual control of either
12 the turbine bypass valves or the atmospheric dump valves
13 independent of ICS NNI.
14 We have added air bottles to give a two-hour air
15 supply to these valves in the event we lost instrument air
16 and we also lost the backup to instrument air, which is
17 service air.
18 And as a final resort, the operator could go down
19 to the valve physically and take manual control of these
20 valves. So you have about five options to control those
21 valves.
22 Q Then your answer is, I take it, that the valves
23 are either controlled by the ICS, which as we know is
24 nonsafety, or they have to be manually controlled?
25 Correct?

1 A (WITNESS COLITZ) That is correct.

2 Q And is it also accurate that the emergency

3 feedwater system is only automatically controlled so long as

4 you have liquid natural circulation? And perhaps I ought to

5 ask that the other way: isn't it true that then the boiler

6 condenser mode of cooling emergency feedwater is manually

7 controlled?

8 A (WITNESS ROSS) It may or may not be manually

9 controlled. The boiler condenser side refers to the vapor

10 on the primary side of the reactor coolant system. Steam

11 generator level is still maintained on the secondary side.

12 With level in there, it would still be under automatic

13 control. I would have an option at that point of whether I

14 wanted automatic or manual control.

15 (Counsel for UCS conferring.)

16 Q My understanding of earlier testimony or

17 recollection of earlier testimony is that the automatic

18 level control for emergency feedwater is at a lower level

19 and the emergency procedures require the operator to take

20 manual control, raise the level, and then operate the system

21 manually when he is in boiler condenser. Is that wrong?

22 A (WITNESS ROSS) It is not wrong. Let me just

23 kind of qualify for you. The automatic control maintains

24 generator level at a set point when the reactor coolant

25 pumps are running. It automatically goes to a higher set

1 point as soon as the reactor coolant pumps are secured. It
2 goes to 50 percent on the operating range.
3 What we tell our operators to do if we are into a
4 reflex type boiling, to automatically assist us in -- we
5 tell the operators to assist us in removing decay heat
6 removal. We would manually raise the generator level even
7 further. But partially, this has already been completed by
8 the automatic control.
9 Q Raised it from is it 50 percent to 90?
10 A (WITNESS ROSS) It is 50 percent to 95 percent,
11 yes, ma'am.
12 Q That is a manual operation?
13 A (WITNESS ROSS) That is correct.
14 Q On page 10 of your testimony, beginning at the
15 third line, you state that the condensate storage tanks are
16 required to have 150,000 gallons in each tank. This amount
17 of water is more than adequate to allow the reactor coolant
18 system to be cooled to the temperature and pressure where
19 the decay heat removal system can be placed in operation
20 prior to the depletion of inventory in the condensate
21 storage tanks.
22 My question is, simply, what assumptions have you
23 made regarding the amount of time required to get to decay
24 heat removal? Could you put some time parameters on that?
25 (Panel of witnesses conferring.)

1 A (WITNESS KEATEN) It is not necessarily strictly
2 a time-related phenomenon. You can think of it, rather, in
3 terms of a mass energy balance phenomenon, in which you have
4 to supply a certain amount of water and convert that to
5 steam in order to remove enough energy from the core and the
6 primary coolant system to get it down to the conditions that
7 Mr. Colitz mentioned earlier.
8 If you are supplying water faster, you will cool
9 down faster. If you are supplying water slower, you will
10 cool down slower. But the net amount of energy that has to
11 be removed is not strictly a time phenomenon.
12 BY MR. POLLARD:
13 Q If I could just follow up, Mr. Keaten, assuming
14 that the plant was cooled and depressurized to the point
15 where the decay heat removal system could be placed in
16 operation, then some of the continuing release of energy
17 from decay heat would be removed by the decay heat removal
18 system. And it was my understanding that, for example, if
19 you remained above the temperature and pressure at which
20 decay heat removal could be placed in operation, the heat,
21 of course, would still be generated and could only be
22 removed by the further boiling of water and removal from the
23 steam generators.
24 And that was the reason Ms. Weiss asked the
25 question. If you stay at a temperature and pressure higher

1 than that at which you can use the decay heat removal
2 system, doesn't this then mean that the statement in the
3 testimony could be changed, that the inventory in the
4 condensate storage tanks would in fact be exhausted if you
5 stayed -- if you kept the plant in a condition where you
6 could not remove the heat by the decay heat removal system,
7 that this would require more feedwater to the steam
8 generators?
9 A (WITNESS KEATEN) There are sort of several parts
10 to that question. Let me see if I can address them.
11 It is certainly a true statement that a finite
12 amount of water, 150,000 gallons per tank, cannot be used
13 forever to remove decay heat. I believe that the number
14 150,000 gallons in one tank is set to be adequate to remove
15 decay heat and cool down the system under very conservative
16 assumptions of the amount of emergency feedwater flow which
17 is available to the steam generator.
18 For example, I believe it assumes only one
19 emergency feed pump in operation. And so it is a slower
20 rate of cooldown than would be normal.
21 But I also do want to point out that even if the
22 condensate storage tanks were to be depleted through some
23 event far beyond design basis, there is river wate for
24 supply.
25 Q Yes, I understand that. That is why I will go

1 back now to the original question which was asked. In
2 preparing your testimony, the statement that you could place
3 the decay heat removal system in operation before the
4 150,000 gallons in each condensate storage tank was
5 expended, what assumptions did you make about how long it
6 takes to reach the conditions where decay heat removal can
7 be placed in operation?
8 A (WITNESS KEATEN) To the best of my knowledge,
9 the 150,000 gallons is, as I stated, adequate to cool down
10 to the point where the decay heat system can be placed in
11 operation, assuming that only one condensate storage tank is
12 available and only one emergency feedwater pump is
13 available. So that is at a slower rate than is the normal,
14 say, 100 degrees per hour cooldown rate.
15 Q Let me ask the question a different way. How
16 long can you stay in a hot shutdown condition, removing heat
17 by blowing steam through the atmospheric dump valves before
18 the condensate storage tank inventory is depleted?
19 A (WITNESS KEATEN) I frankly do not remember the
20 number.
21 (Panel of witnesses conferring.)
22 A (WITNESS KEATEN) I do not remember. I am sure
23 it has been calculated, but I just do not know.
24 Q Am I correct in understanding, then, that no one
25 on the panel knows what assumptions went into the statement

1 in your testimony about how long it takes to get to the
2 plant conditions at which decay heat removal can be
3 removed?
4 A (WITNESS KEATEN) No, I do not think that is
5 correct. It is true that apparently no one on the panel
6 remembers the time interval involved. But the assumption
7 was not the time interval. The assumption was associated
8 with the amount of emergency feedwater flow which was
9 available.
10 Q Do you agree with me that if you stayed in a hot
11 shutdown condition and were not able to use decay heat
12 removal, at some point the inventory in the condensate
13 storage tank would be exhausted or depleted?
14 A (WITNESS KEATEN) Yes.
15 Q And so that when you make the statement in your
16 testimony that you can get to the condition, the conditions
17 necessary to use decay heat removal before the inventory in
18 the condensate storage tanks is exhausted, that that is --
19 the accuracy of that statement is influenced by the time it
20 takes to get the plant in a condition where you could use
21 decay heat removal.
22 A (WITNESS KEATEN) Yes and no. We are saying the
23 same thing, but we are saying it from two different sides.
24 Yes, time is a factor that comes into it. But you can get
25 there without assuming the time interval.

1 Let me see if I can make that clearer by an
2 example. If I assume that the normal emergency feedwater
3 flow rate is available in each of the two trains and I have
4 heat removal capability from two steam generators, and I can
5 cool down at a certain rate and that cooldown rate then
6 determines how long it takes me to get down to the
7 conditions where I can put the decay heat system into
8 operation, if I have less emergency feedwater flow available
9 -- for example, if I have only one train of emergency
10 feedwater flow available -- then my heat removal capability
11 from the primary system is only half as much as it takes me
12 twice as long to cool down.
13 And what I am saying is that, to the best of my
14 knowledge, the assumption that was made was that there was
15 only one train of emergency feedwater flow available and
16 then the calculation was done of whether the plant could be
17 cooled down with that amount of emergency feedwater prior to
18 the time that one condensate storage tank would be
19 depleted. And the answer was "Yes."
20 DR. JORDAN: It is not quite clear. I understand
21 now what I think he said: that either tank is enough.
22 WITNESS KEATEN: That is correct.
23 DR. JORDAN: The 150,000 gallons in either tank.
24 WITNESS KEATEN: In either tank; that is right.
25 (Counsel for UCS conferring.)

1 BY MS. WEISS: (Resuming)

2 Q The second question to which your testimony is

3 responsive is: "If emergency feedwater fails, what are the

4 complexities and problems involved in the operation and

5 determination of the feed-and-bleed cooling mode?"

6 I think a couple of times in this testimony you

7 refer to the operation as "very simple." Have you reviewed

8 Mr. Jones' testimony, I believe -- I believe that is the

9 witness with whom we had a great deal of discussion about

10 emergency procedures 1202-26(B) and 1202-39, which are the

11 procedures which describe the actions involved in operation

12 and termination of bleed-and-feed if there is an emergency

13 feedwater failure.

14 A (WITNESS KEATEN) Speaking for myself personally,

15 I was sitting here beside Mr. Jones when he gave that

16 testimony.

17 Q Would you -- do you feel any need to change

18 anything that he said that day, or you heard that day?

19 MR. BAXTER: Anything that was said that day by

20 Mr. Jones?

21 BY MS. WEISS: (Resuming)

22 Q Do you agree with his testimony on the subject?

23 A (WITNESS KEATEN) To the best of my knowledge,

24 Mr. Jones' testimony was correct as he gave it. I think I

25 would have to add to that, however, that the procedures in

1 question have subsequently -- at least one of the two -- has
2 subsequently been revised.
3 Q Which one is that?
4 A (WITNESS KEATEN) 1202-39, I am sure about. I am
5 not sure about 26.
6 Q Can we have the most recent versions of those,
7 please?
8 MR. BAXTER: Could we go off the record for a
9 second?
10 (Discussion off the record.)
11 CHAIRMAN SMITH: I think we should go on the
12 record with this information.
13 MS. WEISS: Yes, let's go on the record, and
14 let's indicate that you have just given me these.
15 (Counsel handing documents to Board and
16 parties.)
17 MR. BAXTER: We have provided UCS and will
18 provide the Board and parties with updated versions of the
19 following emergency procedures. I will give the numbers:
20 1202-4 --
21 MS. WEISS: I think the record ought to indicate
22 either the revision number or the date of the revision, or
23 both.
24 MR. BAXTER: 1202-4, entitled "Reactor Trip
25 Revision 20," dated 3/13/81. I ask that be marked for

1 identification as a Licensee exhibit. Is 45 the right
2 number?
3 MR. TOURTELLOTTE: I am sorry, I could not hear
4 that. Licensee's exhibit what?
5 MR. BAXTER: I was asking whether 45 was the
6 correct number. That is what I have on my list.
7 CHAIRMAN SMITH: Yes.
8 (The document referred to was
9 marked Licensee Exhibit No.45
10 for identification.)
11 MR. TOURTELLOTTE: I just got that package. 1202
12 dash what?
13 MR. BAXTER: 4. "Reactor Trip."
14 DR. LITTLE: Mr. Baxter, is there any reason for
15 the sequence in which we were given the procedures?
16 MR. BAXTER: No.
17 DR. LITTLE: Okay.
18 MR. BAXTER: I decided to take them in numerical
19 order, which is probably not going to help anybody.
20 The next one would be Emergency Procedure 1202-5,
21 entitled "OTSG Tube Leak/Rupture, Revision 11," dated
22 February 25, 1981.
23 I request it be marked for identification as
24 Licensee's Exhibit 46.
25 (The document referred to was

1 marked Licensee Exhibit No. 46
2 for identification.)
3 MR. BAXTER: Nexnt would be Emergency Procedure
4 1202-6(A), "Loss of Reactor Coolant, Reactor Coolant
5 Pressure within the Capability of Makeup System, Revision
6 8," dated 3 -- dated March 13, 1981. Licensee's Exhibit
7 Number 47.
8 (The document referred to was
9 marked Licensee Exhibit No. 47
10 for identification.)
11 MR. BAXTER: The next is Emergency Procedure
12 1202-6(B), "Loss of Reactor Coolant, Reactor Coolant
13 Pressure Causing Automatic High-Pressure Injection, Revision
14 7," dated March 19, 1981. This will be Licensee's Exhibit
15 48.
16 (The document referred to was
17 marked Licensee Exhibit No. 48
18 for identification.)
19 MR. BAXTER: Emergency Procedure 1202-26(A),
20 entitled "Loss of Steam Generator Feed to Both OPSGs,
21 Revision 12," dated March 13, 1981. This will be Licensee's
22 Exhibit 49.
23 (The document referred to was
24 marked Licensee Exhibit No. 49
25 for identification.)

1 MR. BAXTER: Emergency Procedure 1202-29,
2 "Pressurizer System Failure, Revision 15," dated March 13,
3 1981. It will be Licensee's Exhibit Number 50.
4 (The document referred to was
5 marked Licensee Exhibit No. 50
6 for identification.)
7 MR. BAXTER: Finally, Emergency Procedure
8 1202-39, "Inadequate Core Cooling, Revision 4," dated March
9 13, 1981, Licensee's Exhibit 51.
10 (The document referred to was
11 marked Licensee Exhibit No. 51
12 for identification.)
13 MS. S: Do I infer correctly that 1202-26(B)
14 has not been revi since it is not included in this new
15 package?
16 MR. BAXTER: We attempted to identify all the
17 procedures that UCS previously marked for identification.
18 And I do not have that one on my list. Is it on yours?
19 MS. WEISS: Yes. It is in evidence. I think it
20 is one of our exhibits. I do not have my exhibit list with
21 me here, either. But I am quite sure it is.
22 MR. BAXTER: We have ours. We do not have it on
23 our list.
24 WITNESS COLITZ: 1202-26(B), it probably is,
25 because the -- it probably has been revised, because I have

1 Revision 7 dated 2/10/81 here.

2 MR. BAXTER: What is the name of the procedure?

3 WITNESS COLITZ: "Loss of Feed to One Steam

4 Generator."

5 MS. WEISS: We may have -- we may have a mistake

6 on our list. I will check that before Tuesday.

7 MR. TOURTELLOTTE: Mr. Chairman, would this be a

8 good time --

9 CHAIRMAN SMITH: I have 26A. I cannot find --

10 MS. WEISS: We seem to have a mistake on our

11 exhibit list. I am going to check it when we get back to

12 our office.

13 CHAIRMAN SMITH: Mr. Tourtellotte.

14 MR. TOURTELLOTTE: I suggest perhaps this would

15 be a good time to take our morning break.

16 CHAIRMAN SMITH: Yes, it is. Let's take a

17 15-minute morning break.

18 (Brief recess.)

19 CHAIRMAN SMITH: We will go for a few minutes on

20 the two-member quorum. So, proceed.

21 MR. BAXTER: Excuse me, Mr. Chairman. Mr. Colitz

22 advised me over the break that he would like to correct a

23 statement he made under examination this morning.

24 WITNESS COLITZ: Just one item. When I went

25 through the different stations and capabilities that the

1 operator had to operate the turbine bypass valves and the
2 atmospheric dump valves, when I made the statement that we
3 added stations in the control room independent of the ICS
4 NNI for the atmospheric dump valves, that is correct.
5 The other stations we added, though, were for the
6 emergency feedwater valves and not the turbine bypass
7 valves. But I think I made the statement that we added it
8 for the turbine bypass valves. So I wanted to stand
9 corrected on that. It was the atmospheric dump valves.
10 MS. WEISS: Thank you for the correction.
11 BY MS. WEISS: (Resuming)
12 Q When you made the statement that the operations
13 involved in operating and terminating feed-and-bleed in the
14 event of an emergency feedwater failure were very simple,
15 did you have in mind the emergency procedures which we
16 mentioned earlier 1202-26(A) and 1202-39?
17 A (WITNESS ROSS) The answer to that is "Yes."
18 Q Is it true that you cannot terminate
19 bleed-and-feed until you have restored either main or
20 emergency feedwater?
21 A (WITNESS ROSS) It is preferred that terminate it
22 when restoring main or emergency feedwater. But you may
23 also terminate it once you have another mode of decay heat
24 removal, like the low-pressure injection system in the decay
25 heat removal mode.

1 (Counsel for UCS conferring.)

2 Q If you are operating in bleed-and-feed, how would

3 you get to the conditions where you could go on to decay

4 heat removal unless you had, in the interim, restored

5 feedwater, either main or emergency?

6 A (WITNESS ROSS) By allowing PORV cooling to take

7 you cold enough to accomplish that.

8 Q So you would use the PORV to accomplish this, and

9 that, I think the record is clear, is a nonsafety valve;

10 correct?

11 A (WITNESS KEATEN) I would agree that the record,

12 I believe, is clear with respect to the extent to which the

13 PORV is or is not safety-grade. I would also like to point

14 out that the Licensee is planning to install a new motor

15 operator for a presently manual vent valve on the top of the

16 pressurizer. And it is my understanding that that valve as

17 a component is safety-grade.

18 (Counsel for UCS conferring.)

19 Q It is true -- I think the record has established

20 that that valve itself is designed to safety-grade

21 standards. Isn't it true that the vent at the top of the

22 pressurizer has no redundancy or diversity; there is simply

23 one vent up there?

24 A (WITNESS KEATEN) Well, let's see. Once the

25 motor operated -- motor operator is installed, then there

1 are at least two paths. One is through that valve, and one
2 is through the PORV.
3 DR. JORDAN: Review for me, please, Mr. Keaten,
4 in the case that was just described by Mr. Ross, whereby one
5 establishes feed-and-bleed through the PORV to get to the
6 low-pressure system, what is the source of the water then
7 for the high-pressure injection system?
8 WITNESS KEATEN: Initially, the water would be
9 taken from the borated water storage tank. And then after
10 that is completed, if it were not replenished, which it
11 might very well be, but if it were not replenished, then the
12 water would be drawn from the reactor building sump in a
13 recirculation mode.
14 DR. JORDAN: Yes, I remember that now. Now, is
15 there enough water in the borated water storage tank to take
16 you to the low-pressure injection system by operating the
17 PORV in feed-and-bleed?
18 WITNESS KEATEN: Dr. Jordan, I do not believe I
19 have ever seen a calculation on that, so I will have to say
20 I really do not know.
21 DR. JORDAN: All right.
22 WITNESS ROSS: Dr. Jordan, there is a calculation
23 that does show if you dump the borated water storage tank
24 through anything in the reactor coolant system resulting in
25 putting water in the reactor building, there will be

1 sufficient water to give you reliable suction to
2 low-pressure injection system which would be our long-term
3 cooling system. So I think there is an answer for that
4 particular question.
5 DR. JORDAN: So the answer is there is enough
6 water?
7 WITNESS ROSS: To provide long-term cooling,
8 maybe not necessarily to cool it down totally and not reuse
9 all of that water. If you reuse the water, there is
10 sufficient water to accomplish that.
11 WITNESS KEATEN: By using the recirculation mode
12 as well as the borated water storage tank.
13 DR. JORDAN: If you go to the recirculation mode,
14 you can go forever?
15 WITNESS KEATEN: Yes, sir. And Mike's point was
16 that by the time that the borated water storage tank is
17 depleted, the water level in the building is higher enough
18 to provide adequate suction for the low-pressure pumps.
19 DR. JORDAN: Yes. I see. All right.
20 WITNESS KEATEN: What I do not know is the extent
21 to which the cooldown is completed prior to the time that
22 you have transferred to the recirculation mode.
23 DR. JORDAN: I understand. Thank you.
24 BY MR. POLLARD:
25 Q Mr. Keaten, could I just follow up on the use of

1 this motor-operated pressurizer vent valve being used as
2 portions of the feed-and-bleed cooling mode or as a method
3 of bringing the reactor coolant system to the point where
4 decay heat removal could be used. In preparing your
5 testimony, I believe you said you had referred to these
6 procedures, particularly 1202-39, that is one, are these
7 revised procedures, do those incorporate instructions for
8 use of the pressurizer vent valve in this mode?
9 (Panel of witnesses conferring.)
10 A (WITNESS ROSS) They presently do not recognize
11 the pressurizer vent valve at this particular time. When a
12 valve is installed, we will recognize that and so include it
13 in our procedures.
14 Q Will this be installed prior to restart?
15 A (WITNESS KEATEN) It is my understanding that our
16 present plans are to try to install this valve prior to
17 restart. I do not believe that that is a licensing
18 commitment on our part.
19 Q Am I correct then that after the pressurizer vent
20 valve is installed, it is your intention to revise the
21 emergency procedures?
22 A (WITNESS ROSS) That is correct.
23 Q And then you would then have to retrain your
24 operators on the revised emergency procedure?
25 A (WITNESS ROSS) When you say "retrain," yes, we

1 would have to notify the operators this change was in and
2 notify them that we would plan to use this particular vent.
3 But the training is essentially done. The concept is the
4 same, and the requirements to use it are the same.
5 Q What testing do you plan for the pressurizer vent
6 valve in terms of demonstrating its capability to operate
7 under these conditions for use in the bleed-and-feed mode?
8 A (WITNESS KEATEN) I do not know.
9 A (WITNESS COLITZ) One thing I might say on that.
10 We have a startup and test group that has looked at all of
11 the testing that we have to do prior to going back to power
12 operation, mainly in the area of the modifications. That
13 has not been addressed right now, since it is not an
14 installed mod, nor do we know if it will be installed prior
15 to restart. So I do not know if any testing has been
16 formally thought out on that particular item yet.
17 Q I am sorry, perhaps my question was not clear. I
18 was not referring to any periodic or startup testing in the
19 plant. I was referring to qualification testing of the
20 valve itself. Do you have any palns to do testing of this
21 pressurizer vent valve similar to the tests that are
22 required for the block valve and the PORV?
23 A (WITNESS KEATEN) I do not know.
24 (Counsel for UCS conferring.)
25 BY MS. WEISS: (Resuming)

1 Q So it is accurate, in summary, that you believe
2 the pressurizer vent valve will be a substitute partly for
3 the PORV in bleed-and-feed, but you have not installed it,
4 you do not know when you will install it, and you do not
5 know what qualification tests are planned for it?
6 A (WITNESS KEATEN) As I said earlier, it is our
7 present plan to install it prior to restart, although that
8 is not a licensing commitment, to my knowledge, on our part;
9 and I do not know what the plans, if any, are for
10 qualification testing.
11 Q On page 10 of your testimony, the second
12 paragraph, fifth line, you designate two valves by number.
13 The first is RC-RV-2. That is the PORV?
14 A (WITNESS KEATEN) That is correct.
15 Q The second is RC-V2. What valve is that,
16 please?
17 A (WITNESS ROSS) That valve is the block valve
18 that is in series with the PORV valve.
19 (Counsel for UCS conferring.)
20 Q You say you can allow the code safety valves to
21 open to allow a flow path. Those safety valves do not have
22 block valves and, in fact, are not permitted to have block
23 valves; is that correct?
24 A (WITNESS KEATEN) Yes, that is correct.
25 Q And in the bleed-and-feed mode, one would have to

1 rely on their opening and closing more than a few times; is
2 that correct?
3 A (WITNESS KEATEN) From the standpoint of
4 accomplishing bleed-and-feed cooling, I do not think it is
5 necessarily correct in the sense that the valve could go
6 open and stay open, thereby providing the relief path from
7 the system. In practice, it might happen that the valves do
8 cycle open and closed. But I am not sure that is a
9 requirement.
10 (Counsel for UCS conferring.)
11 Q Have you done any endurance testing cycling the
12 PORV and the safety valves?
13 A (WITNESS KEATEN) I am not sufficiently familiar
14 with the valve test program that is going on right now to
15 give a very meaningful answer to that.
16 Q Does anybody have any more information on that?
17 A (WITNESS COLITZ) Did you say endurance testing?
18 Q Yes. I mean opening, cycling them open and
19 closed for more than a few times.
20 A (WITNESS COLITZ) I do not have any specific
21 information. But the EPRI test program that I think there
22 was previous testimony on -- and we are involved with -- I
23 think is addressing that subject. I do not have any more
24 specifics on it right now.
25 (Counsel for UCS conferring.)

1 Q In the bleed-and-feed mode, you are pumping
2 through the high-pressure injection pumps up to 2500 pounds
3 of pressure. I think that is about the set point of the
4 safety valves. Have you done any tests on the high-pressure
5 injection pumps to determine how long they can operate at
6 that level?
7 A (WITNESS COLITZ) I would have to go back to the
8 initial test program that we did years ago to see exactly
9 what tests we did on those pumps. I know we did extensive
10 testing on them. But without reviewing that, I do not think
11 I could answer your question.
12 Q Did anybody go back and check at any point -- you
13 have been analyzing bleed-and-feed; there has been a fair
14 amount of testimony on it. I am surprised nobody went back
15 and looked at the original tests on the HPI pumps.
16 A (WITNESS COLITZ) I have not. There may have
17 been other people that have. You know, I think the design
18 covered -- I cannot believe that we got operating guidelines
19 on these without people looking at that. I just have not
20 really done it myself.
21 Q And, Mr. Ross, are you aware of any effort to go
22 back and check the qualification of the HPI pumps for this
23 type of operation?
24 A (WITNESS ROSS) I am not aware. But it is clear
25 that the design of those pumps are well above what we are

1 looking at as far as the set point of the relief valves.

2 Q The last question that your testimony addresses

3 is: "How is an alternative cooling mode, such as

4 restoration of emergency feedwater, initiated in order to

5 bring the plant to cold shutdown?"

6 MS. WEISS: We are changing horses in

7 mid-question.

8 BY MR. POLLARD:

9 Q The question which Ms. Weiss read of how is an

10 alternative cooling mode such as restoration of emergency

11 feedwater initiated in order to bring the plant to cold

12 shutdown, my question is: is there any other alternative

13 other than restoration of emergency feedwater by which the

14 plant can be brought to cold shutdown?

15 A (WITNESS KEATEN) Well, yes. For example,

16 restoration of main feedwater.

17 Q Okay. Other than feedwater?

18 A (WITNESS ROSS) If the pressure is sufficiently

19 low enough, you may even have secondary pressure such that

20 the condensate booster pump may be able to be used. So it

21 is another method, in reality. It is part of the feedwater

22 train, but it is another component of it.

23 Q Is there any way to bring the plant to cold

24 shutdown without restoration of some water flow to the

25 secondary side of the generators?

1 A (WITNESS KEATEN) Well, as Mr. Ross described
2 earlier, by using a vent valve such as the PORV or the vent
3 valve at the top of the pressurizer, one can in fact
4 depressurize the primary system that way.
5 Q But there are no safety-grade systems that you
6 plan to have installed at the time of restart by which you
7 could get the cold shutdown other than restoration of some
8 sort of water flow to the secondary side of the steam
9 generator; is that correct?
10 A (WITNESS KEATEN) Well, as I said earlier, it is
11 my understanding that the new vent valve which is being
12 installed is safety grade and that -- and we presently plan
13 to have it installed prior to restart, although I do not
14 believe that that is a commitment on our part.
15 Q Is it possible to bring the plant to a cold
16 shutdown condition using the feed-and-bleed method of
17 cooling without relying on the PORV and assuming that you do
18 not have this vent valve installed, am I correct then that
19 if you are operating in feed-and-bleed with the safety
20 valve, that you must restore some type of feedwater in order
21 to get to cold shutdown?
22 A (WITNESS KEATEN) I am not aware of any analysis
23 that has been done that would show that you could go to cold
24 shutdown by the feed-and-bleed mode using the code safety
25 valves.

1 Q And is it correct -- I understood your testimony
2 earlier today that even if feedwater was restored, using
3 that as a method for going to cold shutdown, relies in all
4 cases upon nonsafety-grade equipment?
5 A (WITNESS KEATEN) The method of relieving steam
6 from the steam generators is via either the turbine bypass
7 valves to the condenser, which is not a safety-grade path or
8 through the atmospheric dump valves -- and we testified this
9 morning that we were not prepared to say that those were
10 safety grade.
11 CHAIRMAN SMITH: While there is a moment here,
12 Ms. Bradford, Mrs. Moran this afternoon is calling up,
13 trying to call up, Dr. Johnsrud, Gail Bradford, and Mrs.
14 Aamodt to warn them that emergency planning can start as
15 early as Thursday morning, April 2. And we want you to know
16 about that, too.
17 Also, I wonder if we could ask, in case we can't
18 get a hold of those people, if you would make an effort to
19 talk to Ms. Bradford about it. Will you have an opportunity
20 to meet with those people?
21 MS. LOUISE BRADFORD: I think I will, yes.
22 CHAIRMAN SMITH: I would appreciate it very much,
23 as a double guarantee that they will be informed, if you
24 would pass that on. So it could be that as early as
25 Thursday morning, April 2, we will begin emergency

1 planning.

2 MS. LOUISE BRADFORD: Fine. I will pass on the

3 information.

4 CHAIRMAN SMITH: Good.

5 (Board conferring.)

6 BY MR. POLLARD:

7 Q Referring to the last two paragraphs in your

8 testimony on page 12, which assumes that emergency feedwater

9 is made available, your testimony then describes how

10 eventually the plant would be cooled down. Are there any

11 written emergency procedures and have you trained your

12 operators on how to bring the plant to a cold shutdown

13 condition if the primary system is solid?

14 A (WITNESS ROSS) The answer to both of those is

15 "Yes." Our method of training has taken place in January at

16 the B&W simulator. There are procedures that talk about

17 operation of the plant in a solid condition.

18 Q That was not my question. My question is not --

19 is specifically: take the plant from a hot condition to a

20 cold shutdown condition while the primary system is solid.

21 A (WITNESS ROSS) There is no specific procedure

22 that says cooldown while the plant is solid. However, we

23 feel there is sufficient guidelines and guidance within the

24 existing procedures, those including solid plant operation

25 that allow the operator to do that.

1 Q Specifically, has any of the training that the
2 operators have gone through train them on how to take the
3 plant from a hot condition to a cold shutdown condition
4 while the plant is solid, primary system is solid?
5 A (WITNESS ROSS) Our training in B&W included
6 training at cooling while solid. It may have not included a
7 cooldown from the beginning to the end, but that exercise
8 was in fact practiced on the simulator.
9 Q I just want to make sure I understand you
10 precisely. In your testimony you are describing in answer
11 to the Board question how to go from the bleed-and-feed mode
12 to then restore emergency feedwater to then draw a bubble in
13 the pressurizer and proceed with no mal plant cooldown
14 procedures.
15 Has there or has there not been specific training
16 where the operators have practiced going from a
17 bleed-and-feed cooling mode to restoring emergency feedwater
18 and then going to cold shutdown with the primary system in a
19 solid condition?
20 A (WITNESS ROSS) I will try and answer it again
21 for you. The answer is, "Yes, we have practiced." The
22 answer was, "We may have not gone the total distance, but we
23 have facilitated the control that would be necessary."
24 Q So then you hve done partial training. You have
25 never done the whole sequence. You have no written

1 emergency procedures. But it is still your testimony that
2 this can be accomplished?
3 MR. BAXTER: The witness did not say there were
4 no emergency procedures. I think the testimony is being
5 mischaracterized.
6 MR. POLLARD: Excuse me. I thought I heard
7 that.
8 BY MR. POLLARD: (Resuming)
9 Q Are there any emergency procedures written to
10 describe how to take the plant from the bleed-and-feed
11 cooling mode to cold shutdown condition with the primary
12 system solid?
13 A (WITNESS ROSS) That question was answered with a
14 "Yes." There is sufficient guidance in our existing
15 procedures to do that.
16 Q Please tell me which specific procedures, whether
17 there is one or more that provide this guidance?
18 A (WITNESS ROSS) The guidance is included in the
19 following procedures. I guess you could start with loss of
20 feedwater, 1202-26 procedures. You could proceed down,
21 including the 1202-39, inadequate core cooling procedures.
22 You could also include the 11035 procedure, pressurizer,
23 which talks about solid plant operation. And you could also
24 include the plant normal cooldown procedure.
25 (Counsel for UCS conferring.)

1 Q Would you say that the problems and complexities
2 involved in bringing the plant to a cold shutdown condition
3 are significantly greater when the primary system is solid?
4 A (WITNESS ROSS) If I could, I would answer that
5 question in two ways. The answer to your question is
6 "Yes." I would also answer that we do not advocate
7 necessarily cooling down every time solid. We do attempt to
8 get a bubble back in the pressurizer first.
9 MS. WEISS: We have no more questions at this
10 time.
11 CHAIRMAN SMITH: Mr. Dornsife.
12 BY MR. DORNSIFE:
13 Q When you discuss the amount of time it would take
14 to drain a condensate storage tank under conservative
15 conditions, under what circumstances would not the other
16 condensate storage tank be available?
17 A (WITNESS ROSS) There is no normal circumstance
18 where the condensate storage tank would not be available in
19 that the tech specs require both condensate storage tanks to
20 have that amount of water in them when there is greater than
21 250 degrees in the reactor coolant system.
22 Q Would it require another passive failure for that
23 tank not to be available? In other words, is it normally
24 lined up, are the valves normally lined up, to feed the
25 suction?

1 A (WITNESS ROSS) The answer to that is "Yes," Mr.
2 Dornsife.
3 Q So that would indeed be outside the design basis,
4 assuming you had a LOCA?
5 (Pause.)
6 A (WITNESS KEATEN) I think the answer is probably
7 "Yes." I am not familiar with the details of all the valve
8 lineup, but I believe the answer is "Yes."
9 Q It may help if you look at the restart report,
10 flow diagram 081. I am going to be using it again, so you
11 may want to get it available, that in conjunction with
12 C-302101 and 302181.
13 A (WITNESS KEATEN) Mr. Dornsife, let me also call
14 to your attention that Figure 1 in Licensee's Exhibit 15 is
15 a flow diagram of the emergency feedwater. It is not part
16 of this present testimony, but it is part of the previous
17 testimony that was submitted by Mr. Capodanno.
18 And this figure shows that the normal valve
19 lineup is with the valves from the condensate storage tanks
20 to each of the emergency feedwater trains are normally open
21 and, furthermore, that there is an interconnect line between
22 the two condensate storage tanks which also has two normally
23 open valves in it.
24 Q So, based on conservative conditions, assuming
25 you did not have another passive failure, that would give

1 you more than sufficient time to, let's say, go down and
2 manually open the atmospheric dump valves, assuming that
3 other tank were available?
4 A (WITNESS KEATEN) I think it is true in either
5 case that you would have the time to open the atmospheric
6 dump valves if they were closed due to a failure of an
7 electrical system or something. During the time before
8 someone were able to get down here and manually open them,
9 of course, the code safety valves on the secondary side of
10 the system would relieve pressure, and then once the
11 atmospheric dump valves were manually opened, then they
12 could be used to the control pressure at whatever set point
13 was desired.
14 Q What power is required for the atmospheric dump
15 valves? Does it require AC power?
16 A (WITNESS KEATEN) They are air-operated valves.
17 Q They require no electrical power?
18 A (WITNESS KEATEN) That is correct. And as Mr.
19 Colitz was describing this morning, this is one of the types
20 of valves where we are installing a dedicated two-hour
21 supply in case of loss of the instrument air system.
22 Q Do you know what the capacity of those
23 atmospheric dump valves are? How much decay heat would they
24 remove? At what point would they be capable of removing
25 sufficient decay heat?

1 A (WITNESS ROSS) They remove about 7 percent decay
2 heat. Immediately after trip they would be sufficient to
3 remove the decay heat we have.
4 Q That would be both together?
5 A (WITNESS ROSS) That is correct. 3-1/2 each.
6 DR. JORDAN: I did not understand the answer. I
7 did not get the answer quite. Would you say it again?
8 WITNESS ROSS: The answer I gave, sir, was: they
9 are ra' about 7 percent of thermal power, which means
10 that they would remove essentially all the decay heat
11 immediately upon trip. Our normal decay heat after trip is
12 around 7 percent, dropping off very rapidly from that
13 point.
14 DR. JORDAN: You say they will remove 7 percent?
15 WITNESS ROSS: That is correct.
16 DR. JORDAN: All right.
17 WITNESS KEATEN: Dr. Jordan, that is the two
18 valves together.
19 DR. JORDAN: Two valves together, yes. That is
20 essentially the full decay heat right immediately after
21 trip; is that what you said?
22 WITNESS KEATEN: Yes, sir.
23 DR. JORDAN: All right.
24 BY MR. DORNSIFE: (Resuming)
25 Q If only one were available, do you have any idea

1 how long it would take before it would be -- the 3-1/2 would
2 be sufficient to remove enough decay heat?
3 A (WITNESS KEATEN) My memory is that -- let me
4 first describe the scenario. If they are -- if only one
5 valve is available immediately after reactor trip, the
6 pressure will start to rise. And my memory is that the
7 analysis was that it was pretty close whether or not the
8 safety valves would lift because the decay heat is droppingg
9 off and then a point is reached, and it is in a few
10 minutes. And I do not remember the number where it is
11 adequate to level it off at a higher pressure than the
12 normal pressure. And then at some subsequent time they have
13 cooled enough to get the pressure back to normal.
14 And I am not sure about this, but my memory is
15 that the time to get the pressure all the way back to normal
16 to start the cooldown is like about 20 minutes with one
17 valve.
18 Q On the new procedures that you handed out, the
19 1202-5, steam generator tube rupture, the pages that are
20 attached to the procedure, the evaluation -- Mr. Ross, I am
21 going to direct these to you because you apparently signed
22 the evaluation -- I just have one question.
23 The environmental impact evaluation, block 3 of
24 that evaluation, the details say that exclusion distance
25 dose total integrated does may inccrease slightly from

1 previously analyzed event. And I am wondering what you mean
2 by that and why it may increase.
3 (Panel of witnesses conferring.)
4 A (WITNESS ROSS) What we meant by that, as I
5 recollect, is the new procedure calls for steaming the steam
6 generators to maintain level less than 95 percent. All we
7 are saying is there may be additional amount of activity put
8 in the air. At no point does it exceed the guidelines nor
9 the regulations.
10 Q Which regulations are you talking about?
11 A (WITNESS ROSS) Dose at the site boundary under
12 Part 100.
13 Q Have you done additional dose calculations for
14 this particular procedure, or is this -- not based on
15 analysis, but just someone's best guess?
16 A (WITNESS ROSS) It is not based on a detailed
17 analysis, but the feeling here with the procedure, it kept
18 you from getting into this situation, but if you did get
19 into it, the impact would be very minimal. It did not
20 warrant additional analysis is all we were trying to say
21 there.
22 Q Would you think this procedure would be more -- a
23 change in the procedure would be more apt to cause the code
24 safety valve to lift on the secondary side and that may
25 indeed -- that may also increase the dose above that

1 analyzed? Was that a consideration also?

2 A (WITNESS ROSS) It was a consideration in that we

3 elected to steam the generator to prevent that from

4 happening, if we had to. We, in our thinking, have made

5 every to keep that event just from happening. We did not

6 want that to happen.

7 Q The new vent valve you talked about on the

8 pressurizer or the motor-operated vent valve you mentioned,

9 you say that would be installed prior to restart?

10 A (WITNESS KEATEN) I think -- what I hope I said,

11 at least -- was that that is our present plans. We are

12 running into some kinds of problems with equipment delivery

13 and so forth. I think I said that that was not a regulatory

14 commitment on our part. But in terms of our internal

15 planning, we are trying to get it done prior to restart.

16 Q Would you refer to flow diagram 302650 in the

17 restart report. Is this valve you are planning on using the

18 one-inch line as it shows in that diagram, the normally

19 closed globe valve?

20 A (WITNESS ROSS) My understanding is that we will

21 put in that one-inch line that you referenced.

22 Q It will not replace one of the globe valves? You

23 are saying it will be an additional valve?

24 (Panel of witnesses conferring.)

25 A (WITNESS KEATEN) I do not think any of us are

real familiar with the details of it. I think it is possible that it is adding a motor operator to the valve that is shown as RCV-1, either adding a motor operator or -- excuse me -- 17, or replacing that valve with a motor-operated valve.

Q And the other valve then would be normally open?

A (WITNESS KEATEN) No. There is another motor-operated valve in that line already, RCV-28.

Q That is shown on, I guess, 694; right?

A (WITNESS ROSS) It is shown on 650.

A (WITNESS COLITZ) It is shown on 650 in the upper left-hand corner.

(Pause.)

Q But is that RCV-28?

A (WITNESS KEATEN) Right.

A (WITNESS ROSS) There is a connection there between 17 and 18 to RCV-28. It is not really clear on some of the drawings.

Q But it looks like the source of water going into V-28, at least the way from my reading of the diagram, is coming out of the RCV-1B, and that the vent valve is really coming through RCV-17.

A (WITNESS KEATEN) That is right. That is right. It is coming through RCV-17, which presently is a manually operated valve.

Q So you are not planning on using the dotted line going to vent; you are indeed going to use the on-inch line that goes to the reactor coolant drain tank, the discharge of the relief valve line?

(Panel of witnesses conferring.)

A (WITNESS ROSS) The dotted line, we are not planning on using. We plan to use the line going to the RC drain tank, yes, sir.

Q Then, in fact, this valve will meet the NUREG-0737 item 2(b)(1) on page 3-56. Do you have that document? It says basically you have to -- if the line is larger than that necessary to cause a LOCA, you need a backup block valve.

A (WITNESS KEATEN) And that is right. Our intention here is to have two motor-operated valves in series.

Q RCV-28 is already a safety-grade valve; is that correct?

(Panel of witnesses conferring.)

A (WITNESS KEATEN) I guess we are not sure.

Q But that would also have to be safety-grade in order to make the system as you quote it somewhat safety-grade. If it indeed were not a safety-grade power supply, for example, it would not matter whether the down -- upstream valve would meet that particular qualification?

1 A (WITNESS KEATEN) That is right. The path is the
2 grade of its weakest link, yes.
3 Q Is the size of the line sufficient to relieve
4 enough -- a similar amount of capacity as the PORV? Is the
5 orifice of the PORV approximately equal to the orifice of
6 the globe valve?
7 A (WITNESS KEATEN) I am not sure, Mr. Dornsife.
8 It is my impression that this is smaller than the PORV.
9 Q I believe in previous testimony it was
10 characterized based on further questions about the
11 qualifications of the block valve that except for its
12 redundancy, it met almost all, if not all, requirements for
13 a safety-grade system; is that not correct?
14 A (WITNESS KEATEN) I was not here when that
15 testimony was given. My memory of it is not real good.
16 Q But in fact, if that were the case and if this
17 particular vent system also satisfied that requirement of
18 being fully safety-grade except for its redundancy, then the
19 two systems together would indeed be a safety-grade system;
20 is that correct?
21 A (WITNESS KEATEN) On your hypothesis, yes.
22 MR. DORNSIFE: I have no further questions.
23 CHAIRMAN SMITH: Mr. Tourtellotte.
24 MR. TOURTELLOTTE: We have no questions.
25 BOARD EXAMINATION

1 BY DR. JORDAN:

2 Q Just one or two clarifying questions.

3 Your testimony you have presented here today did

4 not address the possibility of going to cold shutdown using

5 the feed-and-bleed and PORV, is that correct?

6 A (WITNESS KEATEN) That is basically correct, Dr.

7 Jordan, in that this testimony was really directed toward

8 the emergency feedwater system.

9 Q That was the next question as to why it was, if

10 that was the case.

11 A (WITNESS KEATEN) There was some discussion that

12 appears on pages 10 and 11 of the operation and termination

13 of feed-and-bleed cooling. But this was in response to a

14 specific Board question and was not meant to be a general

15 treatise on feed-and-bleed cooling.

16 Q Yes. Now, and therefore, your main intent in the

17 case of failure of the emergency feedwater system would be

18 to use the high-pressure injection system, feed-and-bleed

19 cooling, and restoring the emergency feedwater system. That

20 is to give you extra time for that. Is that the main reason

21 for the feed-and-bleed system?

22 A (WITNESS KEATEN) If I can say it in a slightly

23 different way, which I think says just about the same thing,

24 certainly the preferred cooldown mode and the normal

25 cooldown mode is to remove heat from the steam generators --

1 and the plant procedures, I believe, instruct the operators
2 if they have lost feedwater -- that while they are using
3 feed-and-bleed cooling, they should try to reestablish feed
4 flow to the steam generators.
5 So that certainly would be what I would describe
6 as the normal cooldow mode.
7 Q All right. Fine. Now, then, do the procedures
8 -- and this was the subject of Mr. Pollard's questions, but
9 I am not quite sure -- do the procedures consider the
10 possibility that they will not be able to regain emergency
11 feedwater or main feedwater and instruct the operators as to
12 how to go to cold shutdown using the feed-and-bleed?
13 A (WITNESS ROSS) The answer to that is, "Yes,"
14 sir.
15 Q They do. All right. That was what was not
16 clear. All right.
17 DR. JORDAN: I believe that is all the questions
18 I have.
19 CHAIRMAN SMITH: Ms. Weiss, do you have
20 additional follow-on?
21 MR. POLLARD: Just two clarifying questions.
22 CROSS ON BOARD EXAMINATION
23 BY MR. POLLARD:
24 Q When you were speaking to Mr. Dornsife, I became
25 a little bit confused over the relief valves versus safety

1 valves on the steam generators. On page 4 of your
2 testimony, about the sixth line or so, fifth or six line,
3 you say that through the main steam relief valves -- and
4 then I thought I heard discussion of the code safety valves
5 on the steam generators. If you could just describe for me
6 the arrangement of the pressure-relieving devices on the
7 steam generators and just tell me what kind of valves we
8 have and how are they operated.
9 A (WITNESS ROSS) Some of us at times use
10 interchangeably the term "relief valve" and "code safety
11 valve." Just let me take you through the -- the main steam
12 lines themselves, four lines. They have a total of 18
13 relief valves. Those relief valves, in fact, are code
14 safety valves. They are required by the code. So we
15 sometimes tend to use them interchangeably.
16 Q But these are valves which are operated solely by
17 the pressure actuating; they are not controllable, like the
18 PORV, for example?
19 A (WITNESS ROSS) That is correct, sir.
20 Q Just one other question. On page 8 of your
21 testimony, about the middle of the page, it says: "If no
22 feedwater is available, reactor coolant system pressure will
23 increase to the set point of the relief valves, at which
24 point one or more relief valves will open."
25 Is it again here a case where you are referring

1 to the safety valves?

2 A (WITNESS KEATEN) In this case, we are talking

3 about the pressurizer.

4 Q Yes. But as I understood, there was only one

5 PORV.

6 A (WITNESS KEATEN) There is one PORV, and there

7 are also the code safety valves. And I think the intent

8 here was to say that either the PORV or the code safetys

9 would lift.

10 Q Okay. Very fine. If I can ask one simple

11 question on the exchange over the pressurizer vent valve

12 that you had with Mr. Dornsife. Am I correct in

13 understanding that exchange that you are going to use

14 existing valves and you are going to add a motor operator to

15 them?

16 A (WITNESS KEATEN) Mr. Pollard, I believe that

17 that is correct, although it could be the case that we are

18 actually going to replace an existing manually operated

19 valve with a remote operable valve.

20 MR. POLLARD: Thank you. I have no further

21 questions.

22 CHAIRMAN SMITH: Mr. Baxter.

23 MR. BAXTER: I have no redirect.

24 CHAIRMAN SMITH: Okay. Anything further?

25 (No response.)

1 CHAIRMAN SMITH: Okay.

2 MR. BAXTER: I would like, Mr. Chairman --

3 earlier, when this testimony was made available, because of

4 schematic, which is also in the hearing room, was useful, it

5 was also marked for identification as Licensee's Exhibit 17,

6 even though it has gone into the transcript today with the

7 testimony, just to make sure its status is clear, I would

8 like to move the admission of Licensee's Exhibit 17 as

9 well. It is a duplication.

10 CHAIRMAN SMITH: Okay. But there is going to be

11 a void -- oh, all right, I guess I missed the point.

12 MR. BAXTER: Before these witnesses appeared but

13 after this testimony was provided to everyone last November,

14 the schematic that is attached to it became so useful that

15 it was marked for identification as Licensee's Exhibit 17 at

16 that time as well. I would like to have it received now,

17 just to eliminate any confusion about its status, even

18 though it is in the transcript.

19 CHAIRMAN SMITH: All right, we will receive

20 Exhibit 17.

21 (The documents referred to,

22 previously marked for

23 identification as Licensee

24 Exhibit No. 17,

25 was received in evidence.)

1 MR. BAXTER: I would like to offer into evidence
2 then those procedures which are updates of procedures
3 previously received into evidence. That would be:
4 Licensee's Exhibits 45 and 47 through 51.
5 CHAIRMAN SMITH: Without objection, we will
6 receive Licensee's Exhibits 45 through 51.
7 MR. BAXTER: The offer did not include 46. 45
8 and 47 through 51.
9 CHAIRMAN SMITH: 46 is not in?
10 MR. BAXTER: That is correct. The original
11 procedure for which this was an update was not received
12 either.
13 CHAIRMAN SMITH: All right. We will receive 45
14 and 47 through 51.
15 (The documents referred to,
16 previously marked for identi-
17 fication as Licensee Exhibits
18 No. 45 and 47 through 51, were
19 received in evidence.)
20 CHAIRMAN SMITH: Would you explain the problem
21 with 46?
22 MR. BAXTER: Well, these are UCS exhibits
23 originally, these procedures, when they were offered in
24 their original form. And my records show that one was never
25 offered and received. I think I would have an objection to

1 its relevance. At the time we were talking about the
2 Contention on pressurizer heaters, it was being used by Mr.
3 Pollard as an illustrative procedure on how that piece of
4 equipment comes into being.
5 I do not think the overall procedure is
6 relevant. So I am not offering the update. The old one is
7 not in also, because I do not think it is germane.
8 CHAIRMAN SMITH: All right, anything further?
9 (No response.)
10 CHAIRMAN SMITH: Ms. Bradford, we had overlooked
11 the fact that Newberry Township also has an interest in the
12 beginning of the emergency planning. So if you could
13 remember to tell them about it, too.
14 If there is nothing further, we will adjourn then
15 until 10:00 a.m. on Tuesday.
16 Would you like to have the ruling on the Elmer
17 Patterson affidavit? You probably do not. The objection,
18 the objection of the Union of Concerned Scientists that they
19 will not accept it without cross examination, is
20 controlling. There is no substitute method of confrontation
21 that I can identify. And so we will have to sustain their
22 objection.
23 So if you want it in, you will have to bring him
24 and make him available for cross or work out something
25 else. I just could not identify any substitute for it.

1 MR. BAXTER: I understand the ruling, Mr.
2 Chairman. I would only comment that these kinds of
3 objections -- and I understand UCS has a perfect right to
4 present them -- may inhibit the kind of informal panel
5 arrangement the Board decided would help the record, and in
6 fact was done at their request to present surrebuttal.
7 CHAIRMAN SMITH: That was our recommendation, but
8 I do not think we have any discretion whatever to receive
9 any testimony in over objections without the opportunity for
10 confrontation.
11 (Board conferring.)
12 CHAIRMAN SMITH: Mr. Baxter, it was not just a
13 blanket objection, even though if it had been a blanket
14 objection I don't know if we could have done anything else.
15 But they did identify particular areas in which cross
16 examination was desirable.
17 We are off the record. We are adjourned.
18 (Whereupon, at 11:47 a.m., the hearing was
19 adjourned, to reconvene at 10:00 a.m. Tuesday, March 31,
20 1981.)
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NUCLEAR REGULATORY COMMISSION

This is to certify that the attached proceedings before the

in the matter of: METROPOLITAN EDISON COMPANY (TMI Unit 1)

Date of Proceeding: March 27, 1981

Docket Number: 50-289 (Restart)

Place of Proceeding: Harrisburg, Pa.

were held as herein appears, and that this is the original transcript thereof for the file of the Commission.

David S. Parker

Official Reporter (Typed)

(SIGNATURE OF REPORTER)