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Stenographic Transcript Of

HEARINGS

Before The

SUBCOMMITTEE ON NUCLEAR REGULATION OF THE
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

UNITED STATES SENATE

INTERVIEW OF WILLIAM ZEWE

HARRISBURG, PENNSYLVANIA

WASHINGTON, D.C.

NOVEMBER 15, 1979

MILTON REPORTING, INC.

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INTERVIEW OF WILLIAM ZEWE

U. S. Senate,
Subcommittee on Nuclear
Regulation of the Committee
on Environment and Public
Works,
Thursday, November 15, 1979.
Harrisburg, Pennsylvania

The Subcommittee staff met at 7:15 a.m., on Three Mile
Island.

Staff Present: Drew Arena, Ms. Joan Giannelli, and
Mark Recktenwald.

Also Present: Matias F. Travieso-Diaz, Esquire.

Mr. Arena. Going on the record at 7:15 a.m.

For the record, please, would you state your name?

Mr. Zewe. William Zewe.

Mr. Arena. And Mr. Zewe, prior to the commencement of
this interview this morning, did you execute an advisement and
consent form?

Mr. Zewe. I did.

Mr. Arena. Mr. Zewe how long have you worked for Met-Ed?

Mr. Zewe. Since February of 1972.

Mr. Arena. And in the course of the planning and/or design
phase of Unit 2 here on the Island, did you have any opportunity
to provide input or were you consulted at all about the design
and/or layout of the Unit 2 Control Room?

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1 Mr. Zewe. I was not directly consulted on the design of
2 the Control Room. I did review the design and I did make
3 several comments on the design. But I was not directly
4 consulted on the overall design.

5 Certain little features that had not yet been finalized,
6 I had the time to comment on those, but most of the engineering
7 effort had already been completed by that time, and had been
8 pretty well set.

9 Mr. Arena. In what time frame is that you're talking about
10 when you made these comments on these minor points, approximately?

11 Mr. Zewe. In the Fall of 1973 and part of 1974.

12 Mr. Arena. And what was your position with the company
13 at that time?

14 Mr. Zewe. Shift Foreman.

15 Mr. Arena. And do you recall to whom you made these
16 comments, was it a formalized written thing or was it a verbal
17 discussion?

18 Mr. Zewe. Just general verbal discussions between ourselves,
19 the other shift foreman and shift supervisor, supervisor of
20 operations and some of the technical people.

21 Mr. Arena. Do you remember any of their names, the
22 technical people? Would these be like company engineers or
23 technical --

24 Mr. Zewe. Yes, just company engineers. It was mainly with
25 the supervisor of operations at that time.

1 Mr. Arena. And who was that then?

2 Mr. Zewe. He's no longer here. Frank Gilbert.

3 Mr. Arena. And basically, do you remember the nature of ,
4 these comments, what the points you discussed with these folks
5 was?

6 Mr. Zewe. Well, at that point in time, the Control Room
7 panels weren't installed yet, and then we were just going from
8 proposed layouts and proposed position of the panels, and I
9 recall one comment in particular was to have a separation between
10 two of the panels so that we'd have easier access to the vertical
11 panels. And I'm sure that there were a lot of other more minor
12 type suggestions, but I really can't, you know, dwell on
13 specifics from those particular years, but that was one that was
14 rather major that we thought would be an advantage to the
15 operator.

16 Mr. Arena. And was that changed, the separation between
17 the panels, carried out in the Unit 2 Control Room?

18 Mr. Zewe. No, it wasn't.

19 Mr. Arena. Do you recall being given a reason why that
20 wasn't done?

21 Mr. Zewe. As I recall, the reason was that it was already
22 set to be positioned in that spot, even though it wasn't there
23 in the engineering effort and the design work to change it,
24 that close to installation, just wasn't practical. And we really
25 couldn't show, you know, hard evidence saying that we really

1 needed it, you know, that it would really be detrimental if
2 we didn't have it.

3 It was more in the light that it would just be easier
4 access to the vertical panels from an operational standpoint.
5 That's all.

6 Mr. Arena. Now, as they started assembling the Control Room
7 and put the panels in, did you have an opportunity to observe,
8 and/or comment on that process too?

9 Mr. Zewe. Yes, I did. Not really in a formal manner of
10 written documentation or anything, but more of comments like
11 it should really be like this. But at that point, I think that
12 we rather accepted what we were going to get more so than trying
13 to change it.

14 Well, it could be a little better, but it's acceptable the
15 way it is. Rather accept it, more than try to have it changed.
16 Those sort of comments.

17 Mr. Arena. But again, you didn't fill out a field change
18 request or any formal paperwork on any of these comments during
19 that phase?

20 Mr. Zewe. I did not.

21 Mr. Arena. Did you have discussions with other supervisors,
22 foreman, or operators about suggested changes in the Unit 2
23 Control Room during this time period?

24 Mr. Zewe. We had quite a bit of discussion among ourselves.
25 How we thought the layout could be improved. We listened to each

1 others suggestions, but we really never came up, you know, with
2 one general solution. We all had our own views on it, and for
3 one reason or another, I agreed with some views and others
4 agreed with my views, but they all always weren't the same.

5 Mr. Arena. As best you can recall, could you characterize
6 the nature of some of those suggested changes, I mean, did it
7 have to do with the positioning of things or the way things
8 were displayed or both, or what was the nature of those
9 kinds?

10 Mr. Zewe. Well, it's pretty hard to recall now because
11 from then until the present time, there are various aspects of
12 display and positioning that I would like to change, and I really
13 can't remember if in '73, '74 at the onset of it if I thought
14 about it then or if I thought about it later, or what have you.
15 But, as I recall, we had comments on the position of where the
16 reactor core system pressure was in relationship to the feedwater
17 and ICS stationing themselves, that it was a little bit cumber-
18 some because of the distance involved and how it's displayed.

19 Those sort of things, where you operate something on one
20 panel and the display for it may be on a separate panel or it
21 may be separated by more than what I would consider a prudent
22 distance from the actual controls.

23 Mr. Arena. Now, when Unit 2 went into operation, do you
24 recall any discussions with the operating personnel in Unit 2,
25 in other words, once the Control Room was in place and hooked

1 up and people were actually using it -- do you recall any
2 comments from the operating personnel who were using the Unit 2
3 Control Room saying during '77 and '78 as to suggested changes,
4 modifications, as to layout, alarm systems or other aspects
5 of the Control Room instrumentation?

6 Mr. Zewe. Probably the biggest thing was the alarm system
7 itself. The other general comments were basically the same at
8 this point, where we accepted what we had and once you got
9 familiar with it, it was really not cumbersome to operate as
10 long as you were familiar with it.

11 But the alarm system, as we had it, had several comments
12 that the design wasn't what we would have wanted, and we always
13 compared the alarm system, or at least I did, to the Unit 1 alarm
14 system and I thought that its alarm display and how you would
15 acknowledge an alarm and reset an alarm was many ways much
16 better displayed than Unit 2 was.

17 Mr. Arena. And why was that?

18 Mr. Zewe. Well, in the beginning, we had only one
19 acknowledgment reset button in the entire front console. And,
20 later, we had other one-button reset acknowledgment buttons
21 placed in. But what I felt would have been more helpful was to
22 have a separate reset, a separate acknowledge push-button, not
23 have it all in one. Much like the Unit 1 design is.

24 Mr. Arena. What prompted your dissatisfaction with the
25 Unit 2 alarm system, were there particular events involving the

1 actuation of a lot of alarms that lead you to this conclusion?

2 Mr. Zewe. Well, basically, just the comparison between
3 Unit 1 and Unit 2 and I was more familiar in the beginning with
4 Unit 1 than Unit 2 because I had operated there for several
5 years, and I just naturally always compare one versus the other.

6 Plus, the concept that if you had alarms that were in and
7 the alarm condition would clear and you had other ones coming in,
8 once you pressed the one comment button, you would be
9 acknowledging the alarms that were coming in, and resetting the
10 alarms that were clearing, and you could actually be doing both
11 at the same time, and not realize it.

12 Mr. Arena. And this is in Unit 2?

13 Mr. Zewe. In Unit 2.

14 Mr. Arena. Okay. Were you in the Control Room or on duty
15 during either the April 23, 1978 or the March 29, 1978
16 transients?

17 Mr. Zewe. I was not.

18 Mr. Arena. Did you have discussions with any of the Unit
19 2 operating personnel who may have been on duty during those two
20 events relating to what happened during those transients?

21 Mr. Zewe. I did. My normal crew, and I'm speaking about
22 the shift foreman and the Control Room operators and auxiliary
23 operators, the crew that was on on the 23rd was normally my crew.

24 All right? But that particular day, the shift supervisors
25 were not working with their normal crew, so to speak. So I had

1 left at 3 o'clock that day and the trip had occurred somewhere
2 around 4 p.m. that afternoon. So that shortly after there, I
3 came back then with my normal crew, and that was a very largely
4 discussed point, since they had been there and they were certainly
5 talking about it a lot.

6 So we did discuss that transient quite a bit even though I
7 wasn't there for the actual transient.

8 Mr. Arena. Was part of that discussion anything to do with
9 the alarm system or the instrumentation in the Control Room,
10 having an impact on the speed with which the transient was
11 diagnosed and dealt with that, you recall?

12 Mr. Zewe. I really can't say specifically, no, that any
13 one particular alarm was misleading or anything like that. I
14 really don't recall that that was stressed at all or how much
15 it really made a part. I just don't remember at this point.

16 Mr. Arena. Do you remember any discussions in this
17 context with that crew after the April 23 transient relating to
18 any aspects of the Control Room layout and/or design displays,
19 et cetera, that may have related to that transient?

20 Mr. Zewe. I don't recall specifics, no.

21 Mr. Arena. Did you have any discussions with Ed Frederick
22 at any time after the April 23 transient relating to a letter
23 that he sent to Mr. Seelinger in response to Mr. Seelinger's
24 analysis of that transient?

25 Mr. Zewe. I have seen that letter that he wrote to

1 Mr. Seelinger, but I did not see it until the President's
2 Commission was here some months ago and that was the first time
3 that I had read the letter. Up to that point, I did not know
4 that it existed.

5 Mr. Arena. Now, turning back to the March 29, '78
6 transient. Do you recall any conversations with any of your
7 Unit 2 operating personnel relating to Control Room and related
8 points that may have been a factor in responding to that
9 transient, any discussions about the PORV positioning or any
10 other?

11 Mr. Zewe. Well, the transient was caused by the PORV
12 coming open and there was a lot of discussion and talk about
13 the position indication of it, and how the PORV is controlled,
14 and where the power for it comes from, and that resulted in a
15 changing mode that gave us a little better indication of the
16 valve and it would prohibit the sequence of events that occurred
17 on March 29 from happening again.

18 But, as far as any other indication or anything else, I
19 really don't recall that entering into the discussion. Mainly,
20 on most of the transients, we reviewed the transient for the
21 content, all right, what happened, how low the pressure went,
22 how fast it was, what the response was. More so than any of
23 the other factors that contributed to it, that didn't come out
24 in the factual type report.

25 Mr. Arena. How involved were you in the actual preparing

1 of that modification or change request relating to the PORV
2 position indicator. I mean, did you just note that it was taking
3 place, or did you sign off on it in any way, or pass it up
4 through channels yourself?

5 Mr. Zewe. I did not have anything to do with the change
6 mode that was installed. I certainly knew what was being changed,
7 and when it was changed, why that was changed, like any other
8 change model, but I did not make that my suggestion on how to
9 change it.

10 I didn't really have one other than a general type comment
11 of we need to have good indication. Other than that, and I left
12 it up to engineering to come up with what was the best means
13 that we could provide that accurate indication with.

14 Mr. Arena. And after that change model took place, were you
15 satisfied that the indication that would be provided after the
16 modification took place would be adequate to assist operators
17 in knowing what was going on with the PORC?

18 Mr. Zewe. I felt that it was more reliable than what it
19 was before and just from that standpoint, I felt that we had
20 improved the indication, and I really didn't pass judgment to say
21 is it the very best that we could have had. I just accepted it
22 that it was improved, and that it would be more helpful and
23 more meaningful.

24 Mr. Arena. So that prior to the March 28, '79 accident,
25 did you recall being concerned that an actual indication of the

1 physical position of that valve was needed to give a proper
2 indication of its condition?

3 Mr. Zewe. I thought of it more in a generic sense; that
4 any indication that wasn't through the use of physical limits
5 which could give indication, anything like the main signal indi-
6 cation, is really not the desired one-hundred percent indication
7 that we should have. But that occurs on other type positioners
8 and it was more of a generic thing; that if I had my choice,
9 I would rather take the position indication directly from the
10 valve other than some demand signal or some other way to monitor.

11 Mr. Arena. Do you recall expressing the concern you
12 just mentioned to anybody, engineers or designers or other
13 people here, say during '78, namely the physical indicators
14 would be better than these indirect indications?

15 Mr. Zewe. Just generically, yes. And just in nonformal
16 conversations, you know, saying, hey, some of these other things
17 should be direct indication. Their demand indication, just on
18 a generic basis.

19 Mr. Arena. Do you recall who you had these kind of conver-
20 sations with, generally, in terms --

21 Mr. Zewe. Generally, anyone that I had contact with that,
22 at the time when the subject came up about it. Really, whoever
23 was there from the startup group to our own technical staff to
24 people from Burns & Roe, GPU, whoever. I really can't remember
25 specific names or times or particular instances, just general

1 type comment.

2 Mr. Arena. What was the reaction to these suggestions of
3 yours from any of these individuals, if you can broadly charac-
4 terize it?

5 Mr. Zewe. I think that everyone realized that direct indi-
6 cation is certainly desirable, but whether it's practical,
7 whether you really need it, whether it's just a convenience, is
8 of some debate. Depending on what particular item you're
9 referring to. And, if you deal with it in generic terms, you
10 really don't reach these specific points to where you can say
11 in this case, you know, it really needs to be done, where in this
12 case, really don't care if it gets done, so that was not done to
13 deal in specifics.

14 Mr. Arena. Was it a question of, when you say it wasn't
15 practical, was it a question of the technology not being available
16 to have that kind of direct indication or rather, that the down
17 time and/or costs associated with changing to those kinds of
18 indications would be prohibitive?

19 Mr. Zewe. I think it's a cost benefit type analysis,
20 where certainly if you need something, cost, I have found, was
21 never an object. If you needed it, and if it was viewed that,
22 yes, you really do need it, cost, I don't think, was a real
23 factor. But, it's just the cost benefit type deal.

24 Mr. Arena. Would have been nice to have had, but you felt
25 pretty satisfied and the people with whom you spoke felt pretty

1 satisfied that the system that you had was, would be adequate
2 enough not to justify the incremental cost to put in physical
3 indicators, is that a fair characterization of what you mean by
4 cost benefit?

5 Mr. Zewe. I believe so, yes.

6 Mr. Arena. Now, after Mr. Frederick sent his letter to
7 Mr. Seelinger, which you said you really weren't aware of at
8 the time, did there come a time when any engineers, either from
9 Reading or Burns & Roe or Babcock-Wilcox, became involved in
10 an evaluation of the alarm system in Unit 2?

11 Mr. Zewe. I'm not sure of the actual time frame, but some-
12 time in the Fall of '78, we were into a program on trying to
13 improve our alarm systems. We had gone through, and every week
14 we had reviewed all of our alarms and we had tried to rectify the
15 numbers of alarms and the meaningful indication of the alarms
16 that we had in the Control Room during normal operations.

17 That was with our own staff, and then, some time shortly
18 after we began this investigation of the alarms and trying to
19 improve them, we had some outside technical help, and outside,
20 meaning someone not from the Island, and I really can't remember
21 now who they actually were employed by. Whether it was people
22 from Reading Engineering or from GPU Engineering, or from
23 Burns & Roe, or from B&W. But there were at least two engineers
24 who were actively working on trying to make the nuisance alarms
25 or the alarms that didn't work right that were in during normal

1 operations more functional, more meaningful. So they had been
2 working on this project for several months prior to the accident.

3 And I'm not sure, several, meaning 3 or 4 or 5 months, I'm
4 not sure.

5 Mr. Arena. So the reason I'm asking you is in talking to
6 Mr. Frederick and others, Mr. Faust, we've, there have been
7 references to what seemed to be two different evaluations, one
8 by engineering personnel from the Island, and then another by
9 sort of as you're describing, others that weren't known to these
10 individuals wandering around the Control Room and asking
11 questions about the alarms. I'm trying to get a sense for
12 whether there were two separate studies and if the one grew
13 out of the other. Could you shed some light on that?

14 Mr. Zewe. I think that the original study and the mainly
15 instrument part, we were trying to correct those, led to the
16 planning of this other group saying that, I think we need some
17 more help to try to evaluate these in a more timely fashion,
18 to augment the group that was working on it here at the Island.

19 These two individuals that I'm referring to at the time,
20 I knew who they were and who they worked for, but I just don't
21 know that now, it wasn't like that they were just two strangers
22 up there to do what they wanted to do. They were to totally
23 aware of what they were doing and what they were working on and
24 who they were.

25 But I think that this group just grew out of the need that

1 was identified by the other group that was trying to rectify
2 the situation on all the alarms. We had made, I felt, very good
3 progress up to that point. We'd -- we were successful in
4 reducing the total number of alarms that were in when we were
5 operating down considerably from the beginning of this program
6 until the accident on the 28th.

7 Ms. Giannelli. Can you quantify that reduction?

8 Mr. Zewe. Well, just in my judgment, I think that there
9 were somewhere around 50 alarms in when we were at 97 percent
10 power that morning. And prior to that, say several months prior
11 to that, we may have had over 100 alarms.

12 Ms. Giannelli. Thank you.

13 Mr. Arena. Now, when you say alarms in, do you mean, well,
14 what do you mean?

15 Mr. Zewe. Well, we had what are called satellite overhead
16 enunciator alarms that light up, and the Control Room horn sounds
17 and then the operator sees a flashing light and he acknowledges
18 it and he takes the appropriate action, when the alarm is in.
19 That means that the window is lit, meaning that there is some
20 alarm condition that he can identify with. And we would every
21 week review every alarm that was in and then have a reason for
22 that alarm.

23 Whether the alarm was wired up wrong, or whether a component
24 was out of service and the alarm indeed should have been in. So
25 we identified them in various categories, all right, that alarms

1 were in; that they were a nuisance; and they required work
2 to correct them.

3 Whether the alarms didn't monitor what it should have, and
4 it needed an engineering evaluation to change it to be more
5 meaningful or the alarm was valid and it should be in for the
6 particular component that it was monitoring, because we had it
7 off, we had a high pressure, we had a low pressure, whatever the
8 parameter was.

9 Mr. Arena. So the reduction then in this ballpark range
10 you say 100 to down to 50, took place in the approximately six
11 months from the Fall of '78 until the Spring of '79?

12 Mr. Zewe. Relative terms here again. The time frame may
13 have been two, three, four, five months, I'm not sure, but it
14 was in the fall and winter of the year, yes.

15 Mr. Arena. Do you know what the reason for starting this
16 evaluation relating to the alarms in approximately the Fall of
17 '78 was?

18 Mr. Zewe. The reason was that we would like to have as
19 few alarms in the alarm condition while we're operating so that
20 the alarms are just more meaningful to the operator. If you
21 have as many alarms in for nonalarm reasons, you would certainly
22 want the elimination of those so that you could use that alarm
23 function to your best advantage.

24 Mr. Arena. But in terms of who initiated this evaluation,
25 do you know anything about the decision and who made the decision.

1 to start the evaluation?

2 Mr. Zewe. I think technical staff made the final decision
3 on how to try to correct the problem. The emphasis was just
4 readily apparent, all right, that everyone from operations
5 through the maintenance staff and the technical staff knew there
6 was a need to have alarms and the need to have alarms that you
7 could believe and use effectively, and it was just common
8 knowledge that that was the direction to go; was to try to
9 eliminate them and make it more useful; was sort of a corrective
10 effort in engineering then, or our technical staff, and just
11 lay out the sequence of events to try to correct that problem.

12 Mr. Arena. And in terms of the scheduling of beginning
13 evaluation, say in the fall, do you know why it started in the
14 fall as opposed to the prior spring, was it a question of
15 available time to carry out the study, or was there any
16 particular event which had focused this general need to do
17 something about the alarm system that you're aware of, that
18 served as the trigger to get the study going?

19 Mr. Zewe. I'm not sure if there was any one event that
20 triggered it. It was just generally felt that we needed to
21 continually try to upgrade the alarm systems and it was just
22 worked on methodic-type basis as we had people available to do
23 it, and as the systems were such that they could actually make
24 them meaningful.

25 Mr. Arena. Now, I think you talked about nuisance alarms

1 a few minutes ago. What do you mean by that?

2 Mr. Zewe. Well, you do have certain faults that the alarm
3 system has that it has a shorted-out transistor or a component
4 malfunction, and the alarm comes in and out rapidly several
5 times for one reason or another. Or, if you have a component
6 that's out of service, and the alarm comes in and out and in and
7 out for various reasons, all right, some of these are just
8 nuisance alarms that really don't give you any meaningful infor-
9 mation. So, you have, you would identify the problem to the
10 Maintenance Department and then they schedule it and they work
11 on these items.

12 Mr. Arena. Was this evaluation completed prior to the
13 March 28, '79 accident, that is the evaluation of these alarms?

14 Mr. Zewe. This is purely speculation on my part, but I
15 think that we had identified for the most part what we were
16 going to do with those that remained, on how to make them more
17 meaningful, but they had not been fully corrected, no.

18 Mr. Arena. And what was the nature of the proposed
19 identified changes to make them more meaningful; what was going
20 to be done to make the alarms more meaningful, are you talking
21 about something like the Unit 1 different kind of acknowledgment
22 setup?

23 Mr. Zewe. No, as far as I know, that was not addressed
24 as a change that was going to take place as a result of this
25 rectifying the alarm problem. It was just to try to limit the

1 total number of alarms and then, they would just look at each
2 individual alarm to see what the alarm function should be and
3 if it was good, they would correct whatever the problem was and
4 if it wasn't a meaningful alarm for the condition, then they
5 would change it so that it would be meaningful. So it was a
6 one-on-one alarm-type analysis.

7 Mr. Arena. Did you discuss with any of these engineers
8 the point you raised earlier about the acknowledgment system
9 in Unit 2 and suggested changing it to one like Unit 1 or
10 something else?

11 Mr. Zewe. I have made that suggestion several times to
12 just about everyone that was there.

13 Mr. Arena. And what was their reaction to your suggestion?

14 Mr. Zewe. Overall reaction you mean?

15 Mr. Arena. Yes.

16 Mr. Zewe. Well, we did install several of the one push,
17 button system, all right, in the Control Room at other locations
18 but it was still one acknowledging reset button and I'm not sure
19 if I could generally say what the feeling was, but here again,
20 we had made an improvement over what we had. And again, we
21 accepted it.

22 Mr. Arena. Now, when you say there were several single
23 buttons, in Unit 2 Control Room, do you mean that there would be
24 an acknowledgment button for a particular panel or a group of
25 panels at various places in the Control Room or just that there

1 would be more than one button that would control acknowledgment
2 and clearing of all the alarms at different locations in the
3 Control Room?

4 Mr. Zewe. Your second part. We have had several parallel
5 buttons that would acknowledge or reset all the satellite alarms
6 in the main portion of the Control Room. It was just several
7 parallel places that would do exactly the same function for all
8 the alarms.

9 Mr. Arena. So, was anything done in the course of this
10 evaluation in any of these changes to address the specific
11 problem of being able to know after you acknowledge and clear
12 whether you're clearing a new alarm, if you will, or one that had
13 been lit up for a while?

14 Mr. Zewe. I'm not sure I understand the question.

15 Mr. Arena. I think when you were talking earlier about
16 the Unit 1 and the Unit 2 alarm system and then what, I think,
17 you were saying, I understood you to say, would have been better
18 than maybe either one of those, was a situation where as an
19 alarm was added to the existing alarms that may have already
20 been lit up at a particular time, that with the system in Unit 2,
21 it was hard to know whether a new alarm coming on was, in fact,
22 new or would be cleared at the same time as acknowledging
23 previous alarms, or did I misunderstand what you're saying?

24 Mr. Zewe. That is true, that you could clear some and
25 acknowledge others at the very same time.

1 Mr. Arena. So, was anything discussed or suggested to be
2 done in the Unit 2 Control Room to change that so that an
3 operator could keep track, if you will, of new alarms versus old
4 alarms and differentiate between them and not sort of auto-
5 matically clear all of them?

6 Mr. Zewe. Only from the standpoint of comparison between,
7 with Unit 1, because Unit 1, you can only acknowledge alarms
8 with one button and only reset alarms with a second separate
9 button. So it takes two separate manipulations to accomplish
10 that. And just in comparison, saying, well Unit 1 is better,
11 Unit 2 was just harder from that respect that you had to really
12 look hard at the alarms to make sure that as you were
13 acknowledging, that you didn't have any other flashing lights.

14 Mr. Arena. Now, on the morning of March 28, you were in
15 the Unit 2 Control Room?

16 Mr. Zewe. Yes.

17 Mr. Arena. For some of the time?

18 Mr. Zewe. Yes.

19 Mr. Arena. What was your personal perception and reaction
20 to the functioning of the alarm system on that morning as it
21 related to the operating personnel's ability to doing and dealing
22 with the plant transient?

23 Mr. Zewe. Not very helpful. Because by the time I entered
24 the main portion of the Control Room, which was within the first
25 eight seconds or so, we had at that point, many alarms, I'm not

1 sure of the number, but we had many alarms all at once, and I
2 was really only concerned with a few key alarms, and all the
3 others right now were just alarms that I really didn't prioritize
4 at that time. And we always handled it like we did that day,
5 that we let all the alarms flash until we had time to acknowledge
6 them all and then just go through audio alarms one by one, but
7 the transient was so severe from the standpoint of alarms, that
8 several minutes, it was just intolerable to go through each of
9 the flashing alarms, so I then acknowledged the alarms to silence
10 the alarm in the Control Room and just try to handle the casualty
11 based on plant parameters, more so than alarm responses.

12 And then we were trying to look at some of the more
13 important alarms as we had time to do it. But by and large, it
14 was not very helpful at all.

15 Mr. Arena. Do you think that that situation of the
16 unhelpful alarms could have been changed at all if you had, say
17 a Unit 1 type acknowledgement reset situation in the Unit 2
18 Control Room?

19 Mr. Zewe. No, because at that point, I really wasn't
20 concerned with resetting alarms or acknowledging alarms. Both
21 at the same time. I was more concerned about acknowledging
22 alarms and trying to prioritize the alarms. So, it really
23 didn't have that much meaning at that point. It's just that the
24 overwhelming numbers of alarms, and probably four-fifths of them
25 or so are really secondary type of alarms, that are really not

1 big priority items.

2 Mr. Arena. Now, in terms of the, again, the number of the
3 alarms, was it a question of their being distracting or -- and/or
4 that it was just hard to figure out which were the most signi-
5 ficant alarms in this barrage of flashing lights and alarm indi-
6 cators in terms of the Unit 2 problem on the morning of the 28th?

7 Mr. Zewe. We were trying to deal mainly with the parameters
8 and really not with the alarm system, so, in my own mind, it
9 was more of a distraction for the first several minutes until
10 we had taken some action, and then we had silenced the alarms.
11 Any new and subsequent alarms that came in after that then were
12 a lot more meaningful because they came in at a time fashion to
13 where we could acknowledge them and take action based on the new
14 incoming alarms.

15 But just the sheer volume of alarms to begin with, is not
16 very manageable from a priority standpoint.

17 Mr. Arena. Okay. Was there an understanding, if you will,
18 among operating personnel in Unit 2 that in the event of a
19 transient, the procedure to be followed would be to, I think
20 you said, let the alarms flash, rather than acknowledging them
21 one at a time, before the March 28th accident?

22 Mr. Zewe. It's been my experience to handle it like that
23 and I believe that that is the general philosophy, yes, to
24 let them flash until you take your immediate actions and then
25 try to handle your alarms on the secondary nature, because the

1 turbine trip and the reactor trip and the loss of feed were the
2 obvious large actions taken.

3 The alarms really didn't help us to identify those, except
4 just the presence of all the alarms and then the turbine trip
5 master alarm and the automatic tripper, the reactor, which is
6 four separate alarms, those were the two key ones.

7 So, everything else was all from observation from the
8 panel more so than interpretation of the alarms that were
9 received.

10 Mr. Arena. So in terms of the process of reducing some of
11 these ancillary alarms, that had been part of this engineering
12 evaluation from the fall through the spring, did the changes
13 that were taken help make the situation any better on the
14 morning of the 28th?

15 Mr. Zewe. Once the accident was initiated, it probably
16 didn't make any difference if I had 50 or 60 or more. I don't
17 believe it would have made that much difference, but certainly
18 the steady state operations that we had prior to that, it was
19 certainly helpful, yes.

20 Ms. Giannelli. We were asking you earlier about changes
21 or comments that you were making on the Control Room design
22 during its construction and you seemed to say you didn't remember.
23 you know, some of the changes were in that time frame or later
24 on. Were there other changes that you suggested or thought you'd
25 like to see during the operational phase?

1 Mr. Zewe. Well, the only changes that I really addressed
2 semi-formally were not really with the Control Room itself, but
3 with the feedwater system. But all the things in the Control
4 Room I addressed either generically or specifically at that time,
5 but not really formally or written down or anything.

6 Ms. Giannelli. Do you remember any of the changes that you
7 may have been thinking about informally that you may have just
8 discussed with some of the operators or shift supervisors?

9 Mr. Zewe. Just the changes in relationship to the controls
10 versus the indication that they should be over more to the left
11 or to the right to be displayed easier or to have a digital
12 pressure recorder display rather than the recorder or the meter-
13 type indication. We had discussed that, yes.

14 Ms. Giannelli. Were there any other parameters that you
15 would have liked to have had indicators for in the Control Room,
16 any comments of that nature?

17 Mr. Zewe. Not really, I believe that I felt, and still do,
18 that we have all the necessary parameters there. I can't think
19 of any other ones that I would like to have other than moving
20 them or displaying them in a different fashion. That's all.

21 Mr. Arena. You mentioned your background in Unit 1. Is
22 there any significant difference between the computers in the
23 two units, Unit 1 and Unit 2?

24 Mr. Zewe. No real significant difference in the plant
25 computers, no.

1 Mr. Arena. On the morning of the 28th, did you experience
2 difficulty in terms of the backlog of the Unit 2 computer prin-
3 ting out parameters?

4 Mr. Zewe. Yes, we did.

5 Mr. Arena. And I guess I'm under the impression that Unit
6 1 has either a faster printer or an additional computer?

7 Mr. Zewe. Right. Unit 1 has what is called a Mod Comp
8 computer which is a separate computer. That's why that -- I
9 said that the plant computers were the same, but this is a
10 separate, higher speed computer that isn't physically located
11 in the Control Room, it's off in the wings of the Control Room
12 in a separate room.

13 That computer is a lot faster and can display more para-
14 meters in a timelier fashion and can also automatically draw
15 graphs and so forth, of all the parameters.

16 Mr. Arena. Do you know why there isn't a similar computer
17 in the Unit 2 Control?

18 Mr. Zewe. I had heard that we were contemplating adding
19 a similar computer to Unit 2, but I haven't seen any factual
20 substance to support that. But the Unit 1 computer was not
21 installed originally either. It was a modification change that
22 we had made after the first year of operation or so.

23 Mr. Arena. Do you recall ever discussing with any of the
24 company's engineering or technical people the possible instal-
25 lation of a Mod Comp computer in Unit 2 prior to March 28th

1 accident?

2 Mr. Zewe. Yes, we had discussed that and stated that we
3 thought that it would be desirable. We had discussed using the
4 same computer in Unit 2 just tying it into Unit 2 and using part
5 of its capability to monitor both units. But I'm not sure from
6 a technical standpoint how feasible and how displayable that
7 actually was.

8 Mr. Arena. But as a result of these discussions that you
9 had about putting in a Mod Comp in Unit 2, were you given any
10 reason why that shouldn't take place?

11 Mr. Zewe. Not a real reason why it should not, from the
12 standpoint of it, we don't need it or it's too costly or some-
13 thing like that, but I'm sure that it falls into the same scope,
14 a cost benefit type ratio, is it really worthwhile because our
15 computers are strictly used for informational tools, not for any
16 plant control at all.

17 So, it's just a tool for the operator to use.

18 Mr. Arena. But given what you were saying about the
19 primary job on the morning of the 28th being focusing on critical
20 plant parameters, would it have helped you to have had something
21 like the Mod Comp computer in Unit 2 on the morning of the
22 accident?

23 Mr. Zewe. I can only speculate and say, yes, it would. If
24 I had used it in the right manner, it certainly would have.
25 But whether I would have or would not have is purely speculative

1 on my part.

2 Mr. Arena. Do you know if there's any plan now to install
3 this kind of computer in Unit 2?

4 Mr. Zewe. I wouldn't have any idea. We're dealing more
5 with the present condition, I think, at this point, than the
6 future, right now.

7 So, I haven't heard anything about it at all. We have tied
8 in a computer to our main office in Reading that we could use it
9 to store information from our plant parameters. We have that
10 installed now in the shift supervisor's office, we've had it
11 there for the last three or four months now, I guess.

12 Mr. Arena. Did you have any discussions with anybody from
13 the NRC site inspectors or otherwise at any time before the
14 March 28th accident relating to these questions of alarms in the
15 Control Room or Control Room layout or design that you can
16 recall?

17 Mr. Zewe. Not at all. No.

18 Mr. Arena. Do you happen to know if there's any, if there
19 are any NRC regulations or guidelines dealing with Control Room
20 alarm systems?

21 Mr. Zewe. To my knowledge, I don't know of any.

22 Mr. Recktenwald. Just to clarify something about the
23 engineering effort that was going on in the alarm systems in
24 late '78, early '79. Were they actually removing alarms from
25 the Control Room or were they merely trying to improve the

1 actuation mechanisms for these alarms so that they wouldn't come
2 in in a nuisance fashion? Were they actually removing the alarms
3 from the Control Room?

4 Mr. Zewe. I really can't deal in specifics there. Again,
5 they were just evaluating them and then doing what was necessary
6 for the proper display of the alarm. I remember that there were
7 several of them that were totally meaningless, I felt that we
8 could certainly eliminate those with no problem at all.

9 Mr. Recktenwald. But the primary objective of this effort
10 was not to remove large amounts of alarms from the Control Room
11 physically, remove them?

12 Mr. Zewe. Oh, no. Just to make them ore meaningful so
13 that we could use them.

14 Mr. Recktenwald. And coming back to the agreement or under-
15 standing with the operators that you people on your shift had
16 that in the event of a major transient, you wouldn't acknowledge
17 alarms, at least in the early moments, is it correct to say that
18 implicit in that is the idea that you just wouldn't be able to
19 keep up with that many alarms, one person or all the people on
20 the shift just couldn't read the alarms and acknowledge them
21 fast enough during the early stages of the transient?

22 Mr. Zewe. Yes, you couldn't take the immediate action,
23 whatever was dictated, and acknowledge the alarms and try to
24 prioritize them during the same period of time. So you had to
25 take the immediate manual actions for the event. And then look

1 at the alarms and try to prioritize them. You couldn't do them
2 both at the same time, so you certainly couldn't hold off on
3 executing the emergency procedures, so you had to let the alarms
4 go.

5 Mr. Recktenwald. So by letting them go, one problem was
6 you lost the sequence in which the alarms came in?

7 Mr. Zewe. Yes.

8 Mr. Recktenwald. And as far as the printer on the computer
9 was concerned, during a transient such as this, it would be
10 typical for the alarm printer to backlog?

11 Mr. Zewe. During any major transient, I would totally
12 ignore the alarm typewriter, knowing from past experience that
13 it would backlog and I wasn't interested or concerned in past
14 history, more so in current parameters. So I would only use the
15 computer for current parameters or until it caught up to the
16 real time frame of the alarm, then I would start to use it in a
17 normal one-on-one fashion.

18 Mr. Recktenwald. So would you say it's fair to say you
19 weren't going to get a sequence? It could be expected in a major
20 transient, you weren't going to have a sequence of alarms whether
21 from sheer memory from acknowledging the overhead or from looking
22 at the alarm printer?

23 Mr. Zewe. That's right. The computer alarm system at this
24 point would strictly be a historical event thing, which I would --
25 still in the transient itself, and it just didn't have a real

1 validity at that point.

2 Mr. Recktenwald. Going back then to your feelings before
3 the March 28 accident, would you in thinking yourself as to how
4 you would want your shift to respond to a major transient, you
5 would not expect them or were not expecting alarms to play a
6 major role in how you would diagnosis a transient, would that
7 be a fair characterization?

8 Mr. Zewe. Well, depending on how severe it was, how many
9 alarms we had and if it was real time-frame alarms.

10 Mr. Recktenwald. If it was a severe transient?

11 Mr. Zewe. No, I wouldn't consider them playing a major
12 role. No.

13 Mr. Recktenwald. Now, did that, now, as a shift supervisor,
14 you're responsible for the plant during the time that you're on
15 duty; is that correct?

16 Mr. Zewe. Yes, it is.

17 Mr. Recktenwald. And did that concern you, did that concern
18 you, did that fact that alarm systems weren't going to be useful
19 to you during a major accident and that you would be held
20 responsible for what would occur during an accident, did that
21 concern you at the time?

22 Mr. Zewe. I never really pondered the thought of not using
23 the alarms in that fashion would cause the accident to be more
24 severe in any way, so I've been involved in several transients
25 and we handled them pretty much the same, whereas we didn't use

1 the alarms and we accepted what we had and we just used it to
2 our best of our ability. So I really didn't worry about that
3 fact; that we would not have the accurate alarms from the computer
4 or from the overhead enunciators.

5 Ms. Giannelli. Did you find not having a sequence was a
6 handicap in dealing with it in any way or didn't you really need
7 to have a sequence of alarms as they came in? Would it have
8 been helpful to have some way of tracking the sequence?

9 Mr. Zewe. I think it would have been ~~Ad~~ helpful to do that,
10 but I am not sure just how we could have effectively used it
11 or display it that would be meaningful. But, certainly, I
12 would like to have some sequence of events right into the
13 accident to see which way the parameters were trending for
14 all those that I did not have recorders on the console themselves.

15 For instance, the drain time pressure or drain time tempera-
16 tures, something like that.

17 Ms. Giannelli. Could that high-speed computer, that Mod
18 Comp, could that have given you the sequence?

19 Mr. Zewe. Yes, if I had it available; that it would have
20 given me a lot more information on a more timely manner, yes,
21 and displayed it in a better fashion.

22 Mr. Recktenwald. Coming back then, you were not unduly
23 concerned prior to the accident about the fact that the alarm
24 system wasn't necessarily going to help you diagnosis an
25 accident?

1 Mr. Zewe. That is correct. I accepted the fact, and I
2 really didn't dwell on the concerns.

3 Mr. Recktenwald. Now, prior to the accident, were you
4 aware that one of the relief valves on the pressurizer was
5 leaking?

6 Mr. Zewe. Yes, I was.

7 Mr. Recktenwald. And how long had that condition existed?

8 Mr. Zewe. Couple minutes at least.

9 Mr. Recktenwald. And at that time, were you aware ~~or were~~
10 ~~you aware~~ of the possibility that leakage through a valve could
11 indicate or could increase the potential for that valve failing?

12 Mr. Zewe. Yes.

13 Mr. Recktenwald. And did you ever, yourself, think about
14 the potential for one of those valves failing, or; first, let
15 me ask that.

16 Mr. Zewe. Did I ever think about potential for the valve
17 failing?

18 Mr. Recktenwald. As a result of that leakage.

19 Mr. Zewe. I believe it crossed my mind, yes.

20 Mr. Recktenwald. Did you ever ~~heard~~ discuss that with
21 anyone else or hear anyone else at the plant discuss that possi-
22 bility with you or mention to you that that was a possibility
23 that you should be aware of?

24 Mr. Zewe. I cannot recall the specific instance, no.
25 During my experience at Unit 1, we had had pressurizer safety

1 valve leakage also for quite a period of time, and we had that
2 experience, and it was just an expected thing in my own mind
3 that we had had that similar problem in Unit 1 and we had
4 operated with that leakage and our leakage was none what our
5 leakage was, and we were not having problems with the leakage
6 itself at all from a standpoint of identifying it or cooling
7 off the RC drain tank or anything. We had changed the design
8 of Unit 2 to include a lower cooling capacity for the RC drain
9 tank to handle some amount of leakage which in Unit 1, it was a
10 problem that we had not designed for the valves to leak at the
11 rate that they leaked and we had a hard time keeping the RC drain
12 tank cool in Unit 1, so we had thought ahead in Unit 2 and had
13 changed the design to allow for some leakage to provide the
14 cooling necessary.

15 So it was something that I felt that we had taken into
16 account and that we were willing to accept the leakage.

17 Mr. Recktenwald. But you don't recall anyone ever expli-
18 citly saying to you, be careful or be aware that one of these
19 valves might stick?

20 Mr. Zewe. I think that it's generically expected that if
21 you do have leakage that the possibility exists, but not speci-
22 fically with those particular valves, no.

23 Mr. Recktenwald. Now, is it correct that if you'd isolated
24 the block valve on the PORV you could have told whether it was
25 a PORV that was leaking?

1 Mr. Zewe. Yes.

2 Mr. Recktenwald. And why wasn't that done prior to the
3 March 28th accident?

4 Mr. Zewe. Well, the temperatures that we monitored every
5 day on the discharge pipes of all three of the relief valves
6 were inconclusive where, which one was the leaky valve, and it
7 was accepted generally, I think, that we really did not have
8 any reason to believe that it was more one valve than another
9 valve. That the one code valve had been consistently, at least
10 a few degrees higher than the other valves.

11 So, I don't know why we didn't isolate it, and just count
12 it from that point. I really can't say that the logic wasn't
13 there to do that, just to eliminate it.

14 Mr. Recktenwald. Could you have done this on a shift
15 yourself?

16 Mr. Zewe. Yes, very easily.

17 Mr. Recktenwald. Was there any concern that if you did
18 that, the isolation valve might stick?

19 Mr. Zewe. Yes, there was, but that wouldn't have prohibited
20 us from doing it if we thought that it was a problem, but the
21 concern always is in a high-temperature fluid system, in a high-
22 temperature atmosphere that the valve could remain shut and we
23 would lose the inability of having that relief valve.

24 We have had other valves on the pressurizer that were
25 motor operated isolation valves similar to that one that have

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1 had failure modes in that direction.

2 Mr. Recktenwald. During the first two hours of the March
3 28 accident, do you recall explicitly considering the possibility
4 that the PORV could fail?

5 Mr. Zewe. No, I did not.

6 Ms. Giannelli. I've got sort of a follow-up question.
7 ID a previous interview with our staff, you stated that you
8 realized the existence of superheated steam on Wednesday, the
9 28th. What time did you first realize that?

10 Mr. Zewe. Sometime later that morning and I'm not sure of
11 the time frame, 8, 9 o'clock, I'm not sure, certainly not within
12 the first one or two hours.

13 Ms. Giannelli. So, 8, 9 o'clock is your recollection?

14 Mr. Zewe. It's probably as close as I could remember now.
15 I really couldn't say. It may have been later than that, I
16 really couldn't recall, but that would probably be the earliest.

17 Mr. Recktenwald. Going back again to the first two hours,
18 do you recall what you thought was going on; what kind of
19 accident you thought you had prior to the time that the block
20 valve was closed on the PORV?

21 Mr. Zewe. Well, all kinds of items went through my mind.
22 we had, of course, the low pressure coolant system and the high
23 pressurizer level, and I could not conclusively come up with one
24 single failure that would cause all the indications that we had.
25 We had thought that we had a secondary steam generator leak that

1 was contributing to the pressure increase in the building, and
2 also --

3 Mr. Recktenwald. A steam line rupture?

4 Mr. Zewe. Some secondary side leak from the steam generator.
5 Either being feedwater or steam. We suspect it's steam, and
6 that contributed to the higher temperature and the increasing
7 pressure. And I felt that we did have a hole of some type
8 in the RC drain tank because of the low pressure, low level in
9 the elevated temperature.

10 I felt that the loss of feedwater transient, as rapidly as
11 it was initiated, in that the pressure spike was high enough to
12 possibly lift the code safety valves. And I thought that while
13 maybe that the valves blew and it ruptured something in the tank,
14 not thinking that it was the rupture disc or the relief valve,
15 but it could have been something else in the tank.

16 So, that would account for the high temperature and the low
17 pressure, but I felt that the relief valves had lifted and that
18 they had receded, I did not realize that it was an ongoing --

19 Mr. Recktenwald. Can I ask. What prior to the accident
20 would you have said, how would the reactor coolant drain tank
21 look after a normal reactor trip and turbine trip?

22 Mr. Zewe. It would have an elevated temperature, elevated
23 pressure, and an elevated level.

24 Mr. Recktenwald. And when you went back to look at it this
25 time -- and how would you have expected it to look? Had the POMV

1 stuck open?

2 Mr. Zewe. As it did.

3 Mr. Recktenwald. Did you think during the accident that you
4 might have had a LOCA, were you considering the possibility?

5 Mr. Zewe. I never really considered that we had a LOCA.
6 The automatic actuation of the engineering safety feature system,
7 I felt at the time was because of feedwater initiation. And I
8 really didn't realize that we actually had a hole in the reactor
9 coolant system until we shut the block valve for the electro-
10 matic relief valve.

11 Mr. Recktenwald. Do you recall what radiation alarms you
12 got in during the first two hours of the accident?

13 Mr. Zewe. During the first two hours, the only alarms that
14 I recall are the intermediate monitogs that monitor each of
15 the letdown coolers. Those were the only two that I can recall
16 that were in alarm.

17 Mr. Recktenwald. And if you had gotten an alarm on the
18 HPR 227, alarm, what would that have told you about the accident?

19 Mr. Zewe. That would have told me that we had activity in
20 the atmosphere of the building.

21 Mr. Recktenwald. In terms of diagnosing the accident?

22 Mr. Zewe. Yes, because one of the things that you look
23 for if you do have a LOCA is that you have activity indicated
24 on the atmospheric monitor in the building, so that certainly
25 would have been a key. And I know that Ed Frederick and I

1 talked, at least at one point, we had checked the monitor and had
2 seen no increase at all at that point.

3 Mr. Recktenwald. Any idea what time that was?

4 Mr. Zewe. I really can't, because shortly after the
5 accident, we realized that our sense of time was very much
6 displaced and I really couldn't say.

7 Mr. Recktenwald. Would it have been possible for you to
8 miss an alarm on the 227 if it came in?

9 Mr. Zewe. I would not think so because we looked at the --
10 I can clarify that -- I looked at the panel several times during
11 the first two hours into the accident and the alarm would have
12 been very evident. Plus, I had a shift foreman that was right
13 at the primary plant controls which is directly across from the
14 alarm panel and I'm certain that he would not have missed an
15 alarm, because you would have had to acknowledge it and it has
16 its own alarm sound.

17 Mr. Recktenwald. Right. Okay. Well, the reason I'm asking
18 is that the President's Commission has determined, I don't know
19 exactly how they determined it, that that alarm should have
20 come into an alarm state at 77 minutes into the accident.

21 Mr. Zewe. Should have come in?

22 Mr. Recktenwald. Should have come in. That's the question,
23 whether it did or did not, and, as far as you can tell, if it
24 had sounded in the Control Room, in all likelihood you guys
25 would have seen it?

1 Mr. Zewe. I'm certain of it.

2 Mr. Arena. That's all we have. Many thanks for your
3 cooperation.

4 (Whereupon at 8:25 a.m. the interview was adjourned.)
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December 10, 1979

00005034

Drew C. Arena, Esquire
United States Senate Committee on
Environment and Public Works
Three Mile Island Investigative Team
Room 4024, Dirksen Building
Washington, D.C. 20510

Dear Drew:

I am enclosing copies of corrections sheets and signature pages for
the interviewees listed below:

Joseph DeMan
Jack Herbein
William H. Zewe
James Floyd
Ivan Porter

Sincerely,

Matias

Matias F. Travieso-Diaz

EE
Enclosures

COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
SUBCOMMITTEE ON NUCLEAR REGULATION

Corrections to November 15, 1979, Interview of William Zewe

<u>Page</u>	<u>Line</u>	<u>Change</u>	<u>To Read</u>
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NO CHANGES

00000540285

William H. Zewe
William Zewe

CERTIFICATE

I certify that I have reviewed the attached transcript of my interview with the staff of the Senate TMI Investigation and have made such corrections as necessary to make it an accurate verbatim record of said interview.

00000510206

Dec 4 1979
Date

William H Zewe
Signed