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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

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

UNION OF CONCERNED SCIENTISTS
COMMENTS SUBSEQUENT TO PRELIMINARY
HEARING OF MARCH 18, 1982, CONCERNING THE "MARTIN REPORT"

On March 18, 1982, the Board held a preliminary hearing to determine whether the UCS "Motion to Reopen the Record..." (hereafter "Motion") of September 10, 1981, should be granted. 1/ The preliminary hearing was essentially in the nature of a deposition, with the Board presiding. (Tr. 27, 044, 1.16-21, Weiss; Tr. 27, 051, 1.16ff, Smith 2/. It was necessitated by the fact that the responses and affidavits produced by the NRC Staff did not dispel the questions raised by the UCS Motion and Reply 3/ and because the Staff refused to make the cognizant authors of the so-called "Martin Report"

1/ See also Union of Concerned Scientists Reply to Staff and Licensee Opposition to UCS Motion to Reopen the Record Oct. 30, 1981, hereafter "UCS Reply."

2/ Unless otherwise noted, all transcript citations are to R.D. Martin.

3/ Memorandum and Order setting Preliminary Hearing, March 2, 1982, Sl. op at 3;



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available for informal questioning by UCS, as suggested by the Board.^{4/}

UCS will not here repeat but will incorporate the arguments set forth in its Motion and Reply. The latter in particular sets out our views on the standards for reopening proceedings (Reply at 8-10) ^{5/}; establishes that the pertinent substantive recommendations of the Martin Report do not appear in the drafts of the Action Plan (Id. at 11-12); that none of the NRC previous witnesses in this case knew of the Martin Report prior to the filing of the UCS motion (Id. at 10-11). As the Board described it, the purpose of this brief is to present our view of how the testimony of March 18 has developed "technical basis" which were not included in the positions presented by the previous staff witnesses. (Tr. 27, 187, Smith). As UCS stated, our view of what the Board should consider as "technical basis" goes beyond the staff and licensee's narrow view of the meaning of the term. A technical basis can be a computer model, as it was in the case of the staff's witness Jensen, or it can be four months

^{4/} Id. at 3-5.

^{5/} Several months after the filing of the motion and reply, the Board issued its Partial Initial Decision. In our view, this should not change the standards for review since to do so would materially prejudice UCS which had timely filed its motion. In any case, the most appropriate general criterion would seem to be the materiality of the evidence to the issues before the Board - a combination of the significance of the issue and the ability of the evidence to affect the decision.

of intense investigation of the TMI-2 accident plus many years of experience in the operation and inspection of working nuclear plants. (Tr. 27, 193 - 27, 194, 27, 042 - 27, 050, Weiss). UCS has never claimed nor believed that the authors of the Martin Report had knowledge of some hitherto secret fact not available to other diligent staff members. What we have consistently argued is that the significance of the Martin Report is that a group of very qualified staff members who performed the NRC's detailed investigation of the TMI-2 accident, and who came to the task with years of pertinent experience reached conclusions that agree with UCS's contentions on a number of central safety issues raised by UCS in this proceeding and in many cases for the same technical reasons advanced by UCS. (Reply at 10-11, 13). This is in stark contrast with the previous staff witnesses who did not closely study the TMI-2 accident, had little if any practical experience in the relationship between equipment failures and operator behavior nor particular knowledge of plant and component design and who dismissed the UCS reasoning out of hand.

This Board was faced time and again in this case with the need to make a choice between competing technical arguments and reasoning. While in many cases acknowledging the strength of UCS's positions, it opted on the pertinent questions to accept the positions of the staff as articulated by the previous staff witnesses on whose testimony the staff case must stand or fall. Had the Board known at the time it

reached its decision that another group of staff members, qualified on the relevant implications of the accident had agreed with UCS for the technical reasons discussed more fully below, would it have reached the same conclusions on these close questions? As a practical matter, that is now the issue because after months of trying in every way to prevent UCS from questioning the Martin Report authors, the staff finally produced them pursuant to the Board's order.

The Martin Report: It's Authors, Their Qualifications, It's Preparation

The authors of the Martin Report appearing on March 18, were Robert D. Martin, Thomas T. Martin, Dorwin R. Hunter, Anthony N. Fasano and Donald C. Kirkpatrick. Their prior experience and professional qualifications are attached to the NRC Response In Opposition to Sholly and UCS Motions to Reopen the Record and for Further Relief, Sept. 30, 1981. Briefly, Robert D. Martin is now Deputy Director of Region II. He was the leader of the Operations Team for the OIE investigation of the TMI-2 accident. Prior to that, he has 20 years of experience as a reactor operator, inspector, license examiner and teacher of nuclear plant systems. Mr. Kirkpatrick is an inspection specialist and nuclear engineer with experience in design, operation and testing. Mr. Hunter is an Inspection Specialist, has been an operator and training supervisor and has experience in design review, testing and operation of commercial PWR's. He is certified to operate a series of naval and civilian reactors and has been working

in this field for over 20 years.

Thomas T. Martin is the acting Director of the Division of Engineering and Technical Inspection, Region I. His experience from 1963 includes work as a naval officer, a commercial nuclear plant engineer and a reactor inspector for pre-operational and operational plants. Mr. Fasano is the Chief of the NRC's resident section at Three Mile Island. His experience dates from 1953 and includes over 10 years as an inspector.

These men were selected to perform the NRC's intensive investigation of the operational aspects of the TMI-2 accident and wrote those portions of the OIE Report, NUREG - 0600. (Tr. 27, 055, 27, 061, 27, 067) They represent a wide spectrum of relevant experience, including plant dynamics and transients (Mr. Hunter), (Tr. 27, 061), great skills in the area of presumed difficulty with mechanical components (Mr. Fasano) (Tr. 27, 061), accident analyses (Mr. Martin) (Tr. 27, 066), reactor physics, core engineering and general engineering, (Mr. Kirkpatrick) (Tr. 27, 066), reactor engineering and familiarity with the B&W design, (Mr. R.D. Martin) (Tr. 27, 067).

After completing NUREG-0600, which required 4 months of "intense focus" on TMI-2, (Tr. 27, 055, 27, 064-27, 069) they wrote the Martin Report to express their conclusions and recommendations (Id.) They had conducted during their investigation 400 interviews and reviewed all available hard data for the first 16 hours of the accident. (Tr. 27, 069)

They met together and deliberated collegially for approximately 3 days, went home to their various stations and worked separately, then met again for another two days to complete their report. (Tr. 27, 067-27, 069, 27, 173, T. Martin).

The pertinent recommendations of the Martin Report and their relationship to the UCS contentions are as follows:

Martin Report

UCS Contention

C.I.C.(4), p.23

3

Pressurizer heater system should be classified as safety should be classified as safety grade

Pressurizer heater associated controls and instruments should be safety grade

C.I.C.(2), pp. 21-23

5

PORV should receive review with performance tests to demonstrate its use for low and high pressure boundary, applying as is appropriate
10 C.F.R. 50, App.A., GDC, 13, 14, 15, and 30
PORV and all valves constituting reactor coolant pressure boundary should be re-evaluated for safety grade (functional and seismic) classification.

PORV block valves, associated instruments & controls should be safety grade

C.I.C.(3), pp. 22-23

5

PORV block valve should be upgraded to functional safety grade equipment

same as above

C.I.b(6) pp. 19-20

10

Provide a 'lock-in' feature on the ESFAS such to prevent inappropriate operator defeat of the ESF equipment

Modify TMI design so that operator action cannot prevent the completion of an automatically-initiated safety function

C.I.a(1), p.12

In core thermocouples
should be designated
safety grade

14

All systems which can
cause or be called upon
to mitigate an accident
should be classified
safety-grade

C.I.a(17). p.17
Upgrade pressurizer
heater level and
temperature instruments
and displays to safety
grade

3 and 14,
described above

The Martin Report authors have never had any discussion with anyone responsible for preparing the Action Plan concerning the technical bases for TMI-2 their recommendations or any reason why they were not accepted. Ltr. 27, 070-27, 074.)

The testimony was limited to discussion of the bases the Martin Report authors had for their recommendations when they were prepared. (Tr. 27, 095-27,101).

When they used the word "safety-grade," it connoted a "spectrum of specific design and implementational requirements," a "substantial quality upgrade in the engineers design and installation requirements" (Tr. 27, 102) of the entire system in question, including instruments, controls, etc. (Tr. 27, 125-6, 27, 133, 27, 149.) "Functional" safety grade means that the system in question should be able to perform its intended function as well as to retain its physical integrity. (Tr. 27,125). These definitions and their implications are remarkably similar to what UCS has contended throughout this proceeding. There can be no question but that simply providing a connection to emergency

power supplies does not constitute the substantial quality improvement envisioned.

Pressurizer Heaters, UCS Contentions 3, 4

Martin Report recommendation C.I.c.(4), p. 23 ("problem" stated, page 20), Partial Initial Decision ("PID"), 748-757, UCS Proposed Findings ("PF") 38-71, UCS Reply Findings ("RF") 59-65.

The impact of the testimony of March 18, 1982, must be considered in concert with the UCS findings and reply findings and the PID, in order to identify the heart of the issues in controversy. In view of the limitations on the time and length of this brief, we ask the Board to review those findings as it considers the issues.

The Martin Report ("MR") recommends classifying the pressurizer heaters as safety grade. (M.R. at 23). The "problem" this responds to is the failure of non-safety grade equipment to function properly during the accident. "The accident has shown that such equipment is required to be functional to mitigate circumstances encountered and/or to allow for diversity of action." (M.R. 20, Tr. 27, 085). This non-safety equipment such as pressurizer heaters was used and was necessary to be used. (Tr. 27, 087). The pressurize heaters failed not only during the accident but had a history of failure from tripping in the circuitry apparently related to their lack of environmental qualification. (Tr. 27,087-27,090)

The thrust of the testimony was that it is extremely difficult, as UCS contended, to control pressure with the RCS in a solid water condition and that operators should not be forced to contend with either those problems or with the "distraction" of trying to get a bubble back into the pressurizer while they are in the middle of an accident. (Tr. 27,092-27,094, 27,104,, Hunter). Based on the accident investigation and much relevant background and experience, the maintenance of a bubble in the pressurizer is critical. (Tr. 27, 104-5, Hunter) The authors keyed on natural circulation (Tr. 27,104, Hunter). They were concerned about the operator having to cope over prolonged periods with complicated actions as are required in solid operation, which would have "substantially aggravated" the TMI-2 situation. (Tr. 27,104; See also Tr. 27,106, 27,107, Hunter, (it requires "100%" of operator attention.)). 6/

In addition, during solid operation, there is a likelihood of lifting the safety valves which one wants to avoid since there is always a chance they won't reseal. This makes the bubble "very very important for routine, normal operations." (Tr. 27,107-8, Hunter).

6/ The witness refers specifically to the critical need for the bubble in a loss of offsite power event. In context, it is apparent that he is saying that we must look beyond merely what happened at TMI-2 where there was no loss of offsite power and both increase reliability and connect to on-site power. These are both standard for safety-grade equipment. Ironically the Action Plan does not address the quality and environmental qualification problems. Thus, the provision of a connection alone means that non-functioning heaters connected to on-site power-precisely what UCS contended.

In contrast, the PID relied heavily on the availability of pressure control via the HPI pumps in a water-solid condition, despite UCS's testimony about the serious safety disadvantages thereof. (PF 60) UCS testified about the important safety advantages of making the system which the operator is familiar with sufficiently high-quality be that it can be relied upon. (Tr. Hearing, 8185-6, Pollard). This was a general basis that pervaded the Martin Report, (Tr. 27,092ff, 27,106ff, 27,137, 27,145-6) and is a technical basis that reflects knowledge of the relationship between operators and equipment during an accident and under normal conditions. UCS also talked about the need to prevent unnecessary opening of the safety valves, as these witnesses did. Moreover, the connection of the heaters to on-site power does nothing to even address the reason why the heaters failed during and prior to the accident. One test or even several tests of pressure control in a water solid condition, as required by the PID at 755 will not alleviate these fundamental problems. During an accident, reliance on this mode for cooling is a serious detriment to safety, given the other demands on the operator and the probability of lifting the safety valves. There should be no question but that maintaining a bubble in the pressurizer is important to safety, as UCS contended.

PORV and Block Valve, UCS Contention 5
Martin Report Recommendations C.I.C(2) and C.I.C.(3)
pp 21-23, PID 744-791, UCS PF 148-240, UCS RF 66-77.

The Martin Report recommendations were based on the clear and significant role of the PORV in the accident (Tr. 27, 119), both in terms of its initial malfunctioning and subsequent malfunctions (Id.) The "driving impetus" was that any valve which is part of the reactor coolant boundary should be re-evaluated as safety grade. (Id.) In addition, the PORV is used for overpressure protection at both low and high temperature (and pressure) (Tr. 27,120-27,121). For the latter functional use, clearly an "important function," (Tr. 27,121, 1.3-4) you seek redundancy (Tr. 27,121-27,122). For the PORV particularly what was sought was clearly "functional" safety grade. (Tr. 27,125). As far as its role in the RCS pressure boundary, a valve failure introducing a break in the RCS in that unique location with unique consequences deserves prompt attention. (Tr. 27,124).

As for the block valve, it actually lost power during the accident. (Tr. 27,128-9, 27,129-130, Hunter). Operation of these valves was critical to many of the operational maneuvers. (Tr. 27,132). Loss of control of the block valve is of vital concern because if the PORV fails to close, the break could not be isolated and if the PORV failed to open, the required operational maneuvers could not be performed. (Tr. 27,131-2).

These questions were all raised by UCS. While the Board appeared to agree that the non-safety PORV is inconsistent

with GDC 14, it ordered no action to correct this (PID 785-786), yet this was the very reason why the Martin Report recommended prompt attention to the PORV. (Tr. 27,124).

The Board apparently disagreed that the PORV is needed for overpressure protection at low temperature, accepting witness Jensen's argument that it is a "backup" to operator action. (PID 790). But see our response to the Affidavit of Walton L. Jensen, Jr., UCS Reply at 19-22, and attachment demonstrating that, as the Martin Report authors recognized, (Tr. 27,117) and UCS argued, (PF 198-207) the PORV presents a potential single failure when needed to protect against overpressureization at low temperatures.

There are transients for which operation action is needed in less than 10 minutes, thus, according to NRC criteria, the PORV is not a back-up. (UCS Reply at 20-22). Moreover, this function cannot physically be performed by the safety valves. (Pollard, ff.Tr. 9027 at 5-10, 5-11).

Moreover, it is apparent that the Martin Report authors agree with the general position espoused by UCS that if particular equipment is in fact to be used in accident mitigation as the emergency procedures call for in the case of the PORV, (UCS PF 224, 227) they should be safety grade so that they are reliable and can be relied on. (Tr. 27,132, 27,134, 27,154-5). Operators don't trust non-safety equipment. (Tr. 27,152 (T. Martin). Nor is it an acceptable substitute to rely on the safety valves, as the Board has

suggested. (PID 753). It is a "basic precept" that safety systems - including safety valves should not be unnecessarily challenged. (Tr. 27,113, 27,107-8, Hunter). See also UCS PF 188, 208-214. If they fail to reseal, the loss of coolant cannot be stopped.

The Martin Report author's evidence, in combination with earlier UCS evidence should convince the Board that the PORV and block valve should be directed to comply with GDC 14 and that the PORV should be made "functional" safety grade. This is even more unimportant if bleed-and-feed is to be relied upon as the system which compensates for the problems with assuring maintenance of natural circulation, the lack of high points vents non-safety-grade emergency feedwater system and non-safety-grade pressurizer heaters. The basic equipment used for bleed and feed, including the PORV, must be safety-grade. The safety valves have simply never been tested or qualified to perform the many openings and closings that would be called for under bleed and feed and the current testing program cannot simulate these conditions. (PF 210-211).

ESFAS Lock-In, UCS Contention 10
Martin Report Recommendation C.l.b.(6), pp 19-20,
PID 722-747, UCS PF

On this issue, the Martin Report authors testified to the following pertinent propositions:

1. If the operator has to become intimately involved in performing manuevers during an accident he is no longer able to objectively review the situation. (Tr. 27, 140-1)
2. The recommendation - like UCS's - was for a physical hardware lock-in device to "prevent" interference with the "operation" of ESF equipment. (Tr. 27,141, Hunter). This comes from people familiar with the capabilities of and complications presented to operators during accidents. None of the previous witnesses on this subject could claim similar expertise.
3. Interlocks to perform this general task are used at other plants and are not a particular source of failure (Tr. 27,142-27,144, Hunter), in contrast to the unsupported fears of the previous witnesses. (PID 741).
4. Such a system could be over-ridden under pre-determined management controls. (Tr. 27,142, Hunter). This responds to the licensee's fear about permanently "locking out" the operator. (PID 743, 744, 746).7/

The weight given to these recommendations should be much greater than that accorded the testimony given by previous witnesses who never even considered the implications of the accident. (UCS PF 263-266).

7/ In any case, UCS never advocated permanent lock-out of the operator--just interlocks which prevented him from terminating the operation of ESF until pre-determined conditions stipulated in the design basis are met. UCS PF 274,301-302. And no witness was ever able to give one example of any harm that might result from such a lock-in system. UCS PF 271-285.

Incore Thermocouples Pressurizer
Level and Temperature Instruments, UCS Contentions 14
 Martin Report Recommendations,
 C.I.a(1), p. 12, C.I.a (17), p. 17,
 PID 971-1004, UCS PF 472-549

No extensive discussion will be offered on these subjects. The bases for making the pressurizer safety-grade, discussed above, apply equally to its instrumentation, since it is the functioning of the equipment, in this case, the pressurizer, that is important. (Tr. 27,126, 1.16-20, 27,149) See also Tr. 27,149-50: the operators during the accident didn't believe the indications from non-safety instruments; Tr. 27,152: this additionally complicated the accident. The same would not be true in the future.

The common technical and logical thread running through all of the Martin Report Recommendations becomes quite clear throughout this general section of the testimony, Tr. 27,144-27,156. That is, if instrumentation or equipment is beneficial or important, it should be safety grade so that it can be relied upon. (E.q. Tr. 27,154-5, 27,145-6).^{8/} This is irregardless of whether there is another theoretical way of controlling the plant--such as water-solid operation. In fact, many of the pertinent suggested upgrades were precisely to avoid water-solid operation. (E.q. Tr. 27,149-50) This is probably the key point which the previous staff witnesses

^{8/} The fact that the operators are told to use equipment in their emergency procedures is part of the reason. Tr. 27,156. This, of course, was a major point made by UCS. (UCS PF 210, 215-216, 219, 225, 227, re: PORV)

disregarded in their reliance on theory over practice and history: if a system is used to perform important functions, it should be highly reliable, hence safety-grade.^{9/}

This is also the general thrust of UCS Contention 14. Systems actually used to mitigate accidents (and TMI-type accidents in particular) or which can cause accidents should be safety grade.

The Staff witness on this subject had no direct experience with TMI-1, nor knowledge of the plant systems. (UCS PF 493). In our review, his general qualifications were extremely weak (UCS PF 493-524). At best, he constructed a facially logical meaning of the terms safety-grade and important-to-safety which has little or no relationship to actual conditions during an accident or the stresses faced by operators during such conditions.

Staff Witnesses Jensen and Sullivan

We have briefly described above a comparison of the relative experience and qualifications of Mr. Conran and the Martin Report authors. The Board should see generally, the UCS Proposed Findings on Contention 14, UCS PF 472-549. The Staff's witness in both the pressurizer and PORV issues was Mr. Jensen. He had very little knowledge of the accident

^{9/} The testimony also casts doubt on Mr. Conran's understanding of safety-grade as applying only to equipment "required" for "critical" safety functions. (PID 976). Could all of the authors of the Martin Report be wrong and Mr. Conran right? One must conclude so to sustain the Staff position both with respect to how the term has been applied in the past and what lessons should be learned from the accident. Comparing Mr. Conran's pertinent qualifications (UCS PF 493-524) with those of these witnesses, we suggest that the answer is clear.

(UCS PF 21-23, 69), did not consider the conditions present during the accident (UCS PF 65), and has experience almost entirely in computer modeling. Nether did Mr. Sullivan, the Staff's witness an UCS Contention 10, base his testimony as an evaluation of the accident and its implications. (UCS PF 263-266, 273). Thus, their "technical bases" were abstract and theoretical in contrast to the practical bases presented in the Martin Report and in the testimony of March 18, 1982.

Almost without exception, each time one of the Martin Report authors described a recommendation, he related it directly to the events of the accident and/or to prior experience with operators and component failures in real plants. These are credible technical bases--more credible than computer models, particularly when one considers that the licensee's and staff's basic position now is that the TMI-2 accident taught us to focus on the role of operators.

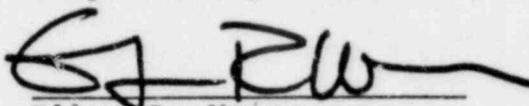
Conclusion

Until now, this Board has only heard from those who sought to justify the decisions made in the Action Plan, one group of witnesses hermetically sealed from the lessons learned as seen by the OIE investigation team. (Tr. 27,191 ff. Weiss). Their testimony was prepared after the Action Plan was written, after portions were hardened and UCS was the "adversary". Now the Board has heard from another group of witnesses who reached conclusions remarkable similar to UCS's, often for the same reasons, who reached them after

intense investigation of the accident and years of practical experience and before the positions had become adversary. They had no interest at the time the recommendations were made in "disproving" UCS. The Board should weigh this testimony and the recommendations heavily.

UCS urges the Board to re-open the record.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'E. R. Weiss', with a horizontal line underneath the signature.

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DATED: March 26, 1982

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING APPEAL BOARD

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

CERTIFICATE OF SERVICE

I hereby certify that on this 26th day of March 1982,
a copy of the Union of Concerned Scientists Comments Subsequent
To Preliminary Hearing of March 18, 1982, Concerning the "Martin
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