

DATE ISSUED: 4/22/80

**IDENTIFIED**

4/22/80

MEETING MINUTES OF THE ACRS  
TMI-2: ACCIDENT, BULLETINS & ORDERS SUBCOMMITTEE  
MARCH 4, 1980  
WASHINGTON, D.C.

On March 4, 1980 the ACRS TMI-2: Accident, Bulletins and Orders Subcommittee met in Washington, D.C., to discuss the NRC B&O Task Force Efforts. The notice of the meeting appeared in the Federal Register on February 15 and 22, 1980. There were no requests for oral or written statements from members of the public and none were made at the meeting. Attachment A is a copy of the meeting agenda. The attendees list is Attachment B. Attachment C is a tentative schedule of presentations for the meeting. Selected slides and handouts from the meeting are Attachment D to these minutes. A complete set of slides and handouts is attached to the office copy of these minutes.

OPEN SESSION (8:40 am - 6:20 pm) INTRODUCTION

Mr. Mathis, B&O Subcommittee Chairman, called the meeting to order at 8:40 a.m. The Chairman explained the purpose of the meeting and the procedures for conducting the meeting, pointing out that Mr. Paul Boehmert was the Designated Federal Employee in attendance. Mr. Mathis called on Dr. Ross (NRC B&O Task Force Chairman) to begin the day's presentations.

Dr. Ross began by noting that the B&O Task Force recommendations have now been incorporated into the NRC Action Plan. He said that because of this, the implementation schedules shown in the B&O NUREG reports will be superseded by the overall implementation schedule developed in the Action Plan.

Concerning the recent transient at Crystal River, Dr. Ross sited some relevant background information. He noted that the May 16, 1979 NRC Order on the Crystal River plant called for a failure mode and effects analysis (FMEA) on the integrated control system (ICS). When the NRC authorized restart of the plant, the restart order specified a NRC review of the ICS. B&O submitted

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a reliability analysis of the ICS, and NRC contracted with ORNL to review the report. The Staff also sent letters to each B&W operating plant stating their concern with the ICS/NNI (non-nuclear instrumentation) power supply reliability. The ORNL review of the B&W report concluded that the ICS/NNI power supply sensitivity warranted further study and stated that loss of all instrument power was possible. Dr. Ross said that the B&O Task Force will continue to be responsible for review of this area. Both Drs. Lipinski and Zudans expressed concern for transients of the Crystal River type where operators are left without information on the plant's status.

#### OVERVIEW OF B&O TASK FORCE ACTIVITY - W. KANE (NRC)

Mr. Kane gave an overview of the B&O Task Force activities. He noted that the group was formed in response to the TMI-2 accident, and review areas included I&E Bulletins, the Orders issued for B&W plants, and the review of small-break LOCA and loss of feedwater events for all operating plants. The scope of activities embraces systems reliability, analysis, emergency operating procedure guidelines, and training of operators in emergency operating procedures. The work products of the Task Force were discussed (Figure D-1). Most of the Task Force efforts are documented in six NUREG reports: a report on the evaluation of RCP trip (NUREG-0623) a summary report (NUREG-0645), plus four reports for each vendor's plant line (NUREGs-0565, 0611, 0626, 0650).

#### SUMMARY OF B&O RECOMMENDATIONS FOR PWRs AND BWRs - P. O'REILLY, C. THOMAS - NRC

Mr. Pat O'Reilly reviewed the B&O recommendations for the PWR plants (Figures D 2-10). These recommendations are broken down into four categories: systems reliability, analysis, emergency procedures, and operator training. During discussion of the recommendations Mr. Mathis asked if any of the vendors had analyzed the proposal to eliminate PORVs. Mr. O'Reilly noted that the CESSA-80 plants have eliminated the PORV. Further discussion lead to the questions of plants gagging PORVs. Mr. Etherington recommended that the NRC determine if the plants are physically gagging PORVs and whether or not this is a preferred mode of operation.

Mr. C. Thomas reviewed in detail the B&O recommendations for the BWRs (Figure D 11-13). He noted that the bulk of the recommendations fall

in the category of systems reliability. In response to a question from Mr. Ray concerning whether these recommendations are "requirements", Mr. Thomas noted that the recommendations may be made requirements by being incorporated into the NRC Action Plan. Commission action on the Action Plan would make these recommendations requirements. Dr. Zudans asked if the NRC analysis accounts for improper operator action. Mr. Fromm (NRC Staff) stated that the proper operator action will be considered under the inadequate core cooling analyses which the Staff is just beginning to analyze. Mr. Thomas said that NRC is not explicitly considering the proper operator actions under small break LOCA and loss of feedwater analyses. Mr. Etherington raised the concern expressed by Mr. Ebersole over the possible failure of a relief valve tail pipe inside the wet-well air space which would result in loss of pressure suppression capability and a possible overpressurization of the dry well. Mr. Kane (NRC) said that the NRC Staff would look into this concern. Mr. Stark (GE) suggested the NRC Staff look into the resolution of the Mark I & II programs which address this particular concern.

EFFECTIVENESS OF THE B&O RECOMMENDATIONS REDUCING THE LIKELIHOOD OF SMALL-BREAK LOCAs DUE TO STUCK OPEN PORVs - I. VILLALVA (NRC)

Mr. Villalva estimated the effectiveness of the B&O recommendations in reducing the likelihood of small-break LOCAs due to stuck open PORVs. The effectiveness of both the short-term and long-term recommendations were considered. These recommendations were divided into two categories: hardware-type, and software-type (Figures D 14-15).

Mr. Villalva discussed a network of logic diagrams (Figure D-16) to assess the effectiveness of the B&O recommendations. He explicitly stated that the probability numbers used in these diagrams were primarily based on his engineering judgment, and limited statistical data. Because of this, Mr. Villalva said there is a wide uncertainty band on the numbers cited.

In response to a question from Dr. Zudans, Mr. Villalva noted that since the modification in the B&W PORV actuation set point and high pressure scram set point the number of scrams in B&W plants has increased. In response to

another question from Mr. Etherington, Mr. Kane said that preliminary data suggest the B&W scram rate has about doubled. Dr. Rosztoczy said that B&W plants can be properly designed to eliminate the additional scrams.

Mr. Villalva proceeded to review the above logic diagrams. He chose two categories of initiating events: (1) loss of off-site power, and (2) any event causing the PORV to open. The bulk of the presentation focused on B&W plants for both pre-TMI and post-TMI conditions considering the incorporation of Lessons Learned and B&O recommendations. Figures D 17-23 detail the logic diagrams and the assumptions used therein.

The results of the estimated effectiveness of the B&O recommendations show approximately two order of magnitude in reduction in the likelihood of small break LOCAs due to stuck open PORVs for B&W plants with the implementation of the short-term recommendations, and an approximately three order of magnitude reduction in such events after implementation of the long-term recommendations (Figure D-24). For CE and Westinghouse plants there is little change in the likelihood of such events for those reactors given the short-term fixes, but for the long-term fixes there is about one order of magnitude reduction. This is due to the fact that there were few changes made to the W and CE plants.

During subsequent questioning by the Subcommittee, Dr. Zudans asked if NRC had analyzed whether any of the new recommendations have decreased overall plant safety. Mr. Kane responded that NRC will do this in the future, but the B&O Task Force did not examine this question.

THE IMPACT OF INCORPORATING THE B&O RECOMMENDATIONS IN THE TMI ACTION PLAN -  
W. KANE

Mr. Kane commented on the impact of incorporating the B&O recommendations in the TMI Action Plan in light of an A. PS letter written in February 1980 strongly criticizing the Commission for not seeking ACRS comments on an earlier draft of the Action Plan. Mr. Kane noted that the NRC has requested that the Commission not approve the B&O recommendations that have been incorporated into the Action Plan until ACRS comments on these recommendations have been received. Mr. Kane noted that B&O recommendations have been incorporated into Section II K.3 of the Action Plan.

FAILURE OF PROTOTYPE MCGUIRE/CATAWBA PORV ISOLATION BLOCK VALVE - P. O'REILLY  
(NRC)

Mr. O'Reilly discussed the failure of a PORV isolation block valve scheduled for installation on the McGuire and Catawba plants. The valve failed to fully close under design flow conditions during prototype testing. The cause of the failure was determined to be a calculational error made by the valve manufacturer in determining the size of the valve operator. There does not appear to be any generic implications in this failure, since no other plant has been identified which uses this type of valve design, and the Applicant involved (Duke Power) has taken a number of corrective actions.

CRYSTAL RIVER TRANSIENT OF FEBRUARY 26, 1980 - E. BLACKWOOD (NRC-I&E)

Mr. Ed Blackwood (NRC-I&E) discussed the Crystal River transient of February 26, 1980. A transient was initiated by a fault in a 24 volt non-nuclear instrument power supply which resulted in an instrument bus failure and opening of the PORV and pressurizer spray valves. This resulted in a reactor trip, and a rapid cooldown transient which initiated high pressure injection and mandated reactor coolant pump trip. The instrument bus failure resulted in a loss of a large amount of plant instrumentation (about 70% of control instrumentation, Figures D 25-29) for a period of about 20 minutes. However, none of the RPS or nuclear instrumentation was affected.

Mr. Blackwood noted that the Crystal River operators left the HPI running for a long period of time (approximately 1 hour). In response to questions from the Subcommittee, Mr. Blackwood said that the amount of subcooling achieved was about 150 to 200°F. The Subcommittee expressed concern over the fact the HPI was left running for such a long period of time. In response to a question from Dr. Zudans, Mr. Blackwood said that it was not a dangerous action, but rather it was a conservative action.

The running of the HPI, plus the early opening of a safety relief valve, resulted in about 43,000 gallons of water being spilled on the containment floor. Mr. Blackwood noted that the operators had followed the new procedures developed as a result of the B&O Task Force Review of small break LOCA procedures. He also noted that the NRC Staff was (and still is) studying this transient.

RESOLUTION OF UNREVIEWED SAFETY QUESTION RAISED BY NORTHEAST UTILITIES DEALING WITH AUTO-INITIATION OF AUXILIARY FEEDWATER SYSTEMS - T. COX (NRC)

Mr. Cox briefly reviewed a potential unreviewed safety question raised by Northeast Utilities concerning the auto-initiation of auxiliary feedwater systems. Northeast Utilities in particular was concerned that with the steamline break and automatic initiation of AFW, water would be fed to the broken steam generator, thus exacerbating such problems as containment pressurization, equipment qualification, and a possible return to power. NRC requested that utilities with manual systems submit an analysis to show that return to power and containment pressure would be acceptable (Figure D-30). Mr. Cox noted that almost all of the effected plants have submitted an analysis and that the majority of them have shown acceptable parameters, provided there is anywhere from a 2 to 5 minute delay in AFW initiation. Mr. Cox said that delaying AFW initiation would mitigate effects of excessive cool-down and possible return to power. Dr. Zudans expressed concern with the Staff's uniform requirement for auto AFW initiation, pointing out that in his opinion, many of the plants had good arguments for not automating the system.

DEVELOPMENT OF CRITERIA FOR USE OF "FEED AND BLEED" MODE FOR PLANT COOLDOWN AND ANALYSIS OF REACTOR COOLANT PUMP TRIP CRITERIA - B. SHERON (NRC)

Mr. Brian Sheron discussed the feed and bleed mode of cooldown for PWRs in the event of a loss of heat sink, and the advisability of tripping reactor coolant pumps (RCPs) based on operating experience to date. Addressing the use of feed and bleed for cooldown, Mr. Sheron noted that at present there are no NRC requirements for this mode of decay heat removal. He also noted that the ability to use feed and bleed successfully is highly depended upon: (1) relieving capacity of the PORVs, (2) the HPI pump shut-off head, and (3) the time at which the PORVs are opened. In response to a question from Dr. Lipinski, Mr. Sheron said that at present about 1/2 of the operating reactors could make use of feed and bleed cooling.

Dr. Sheron said the B&O Task Force had concluded that the capability of plants with low-head HPI pumps to depressurize using PORVs and initiate HPI in time to preclude core damage is highly uncertain. NRC recommended that the Action Plan effort should consider the need for a diverse decay heat removal path

independent of the steam generators. The suggested recommendations should include: (1) increased PORV relieving capacity, (2) high shut-off head HPI pumps, and (3) a high pressure residual heat removal system.

Mr. Sheron went on to discuss the advisability of tripping reactor coolant pumps based on operating experience. Mr. Sheron said that the NRC Staff cannot conclude at this time that continuous pump operation or delayed pump trip during a small-break LOCA using best-estimate assumptions will result in acceptable consequences. However, the Staff did agree that pump trip does not appear to be the best solution to the problem.

The recent experience with pump trip during non-LOCA depressurizing transients was reviewed by Mr. Sheron. As of September 26, 1979, there has been four such transients (Figure D-31). Mr. Sheron said the NRC Staff believes the initiative for development and confirmation of an acceptable "fix" to the problem should come from Industry. He noted that the B&W proposal for pump trip on low pump current, and the current Westinghouse method of tripping pumps on low system pressure either have the potential, or in fact would allow, discrimination between LOCA and non-LOCA transients, and prevent pump trip when it is not desired.

#### TRAINING AND EDUCATION OF OPERATORS - P. COLLINS (NRC)

Mr. Collins provided a brief presentation on the changes in operator training as a result of the TMI accident and the Bulletins and Orders Task Force efforts. He noted that Utilities have been required to develop new operating procedures in coping with small-break LOCAs and inadequate core cooling. Mr. Collins said that Utility training programs have been upgraded with more emphasis on thermal-hydraulics and related subjects. Simulator training has also been upgraded.

#### WESTINGHOUSE TMI OWNER'S GROUP PRESENTATION - D. WATERS (NORTH CAROLINA POWER AND LIGHT)

Mr. Dave Waters, representing the Westinghouse TMI Owner's Group, discussed the B&O Task Force/NRC Action Plan requirements. He referred to a February 22, 1980

Atomic Industrial Forum (AIF) letter that contained a study suggesting priority groups for the NRC Action Plan items. There are three groups (I-III). Group I Items are defined as items that are desirable on a priority basis with realistic schedules. Group II Items are items that may be desirable, but which should not interfere with the accomplishment of Group I Items. Items in Group III are items the AIF believes should be removed from the Action Plan. Commenting on some of the B&O Task Force requirements, Mr. Waters noted that AIF believes the study of the need for RCP trip should be a Priority I Item, however, installation of automatic RCP trip is viewed as a Priority III Item. Mr. Waters also noted that the B&O Task Force requirements concerning the analysis of small-break LOCA models and the conformation of small-break LOCA analysis methods is viewed as a Priority II Item.

GE AND BWR OWNER'S GROUP COMMENTS - D. WATERS (CP&L), S. STARK (GE)

Mr. Waters made some introductory remarks on behalf of the BWR Owner's Group and introduced Mr. Stark, who provided the bulk of the presentation. Mr. Stark's general observations were that GE and the Owner's Groups believe that none of the B&O requirements are essential for plant safety, i.e., the plants as presently structured and operated are sufficiently safe. Mr. Stark also said that the proposed schedule requests too much work in too short a time; however, he took note of the fact that the NRC probably will grant some schedule relief when the B&O requirements are folded into the Action Plan.

Mr. Stark observed that some of the B&O recommendations appear to be changing the licensing basis, and if this is the case, rulemaking should be proposed. There was extensive discussion between the Staff and the Subcommittee on this point. NRC noted that the licensing bases have not changed, but there may be some changes to licensing criteria which GE would have a chance to comment on. Further discussion indicated that there appeared to be a lack of communication between GE and the NRC on these points, and the Subcommittee urged that further discussions be undertaken between the two parties.



CE OWNER'S GROUP COMMENTS - G. LIEBLER (FLORIDA POWER AND LIGHT)

Mr. Liebler provided comments addressing the subject of Industry resources, vis-a-vis the NRC post-TMI recommendations. Mr. Liebler cautioned that we need to take a very careful look at the Action Plan items and assure the proper priority because of the strain on Industry resources. Mr. Liebler also expressed concern that items in the Action Plan had not been evaluated for their overall impact on plant safety. He also cited an instance where he believed the NRC was requesting too much too soon on items that could be postponed so that more important items are addressed.

There was a brief caucus during which Subcommittee discussed items that should be included in a letter on the B&O Task Force Efforts. The NRC noted that B&O recommendations were scheduled for discussion at the March ACRS meeting.

The meeting was adjourned at 6:20 p.m.

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Note: Additional meeting details can be obtained from a transcript located in the NRC Public Document Room, at 1717 H Street, N.W., Washington, D.C., or can be obtained from the International Verbatim Reporters, Inc., 499 South Capitol Street, S.W., Suite 107, Washington, D.C. 20002.

## NUCLEAR REGULATORY COMMISSION

### Advisory Committee on Reactor Safeguards; Ad Hoc Subcommittee on Three Mile Island; Unit 2 Accident Bulletins and Orders; Meeting

The ACRS Ad Hoc Subcommittee on the Three Mile Island, Unit 2 Accident Bulletins and Orders will hold a meeting on March 3, 1980 in Room 1046, 1717 H St., NW, Washington, DC 20555 to continue its consideration of NRC Office of Inspection and Enforcement Bulletins and NRC Orders pertaining to the TMI-2 Accident.

In accordance with the procedures outlined in the Federal Register on October 1, 1979 (44 FR 56408), oral or written statements may be presented by members of the public, recordings will be permitted only during those portions of the meeting when a transcript is being kept, and questions may be asked only by members of the Subcommittee, its consultants, and Staff. Persons desiring to make oral statements should notify the Designated Federal Employee as far in advance as practicable so that appropriate arrangements can be made to allow the necessary time during the meeting for such statements.

The agenda for subject meeting shall be as follows:

*Monday, March 3, 1980, 8:30 a.m. Until the Conclusion of Business*

The Subcommittees may meet in Executive Session, with any of their consultants who may be present, to explore and exchange their preliminary opinions regarding matters which should be considered during the meeting.

At the conclusion of the Executive Session, the Subcommittee will hear presentations by and hold discussions with representatives of the NRC Staff, the nuclear industry, various utilities, and their consultants, and other interested persons.

In addition, it may be necessary for the Subcommittee to hold one or more closed sessions for the purpose of exploring matters involving proprietary information. I have determined, in accordance with Subsection 10(d) of the Federal Advisory Committee Act (Public Law 97-463), that, should such sessions be required, it is necessary to close these sessions to protect proprietary information. See 5 U.S.C. 552b(c)(4).

Further information regarding topics to be discussed, whether the meeting has been cancelled or rescheduled, the Chairman's ruling on requests for the opportunity to present oral statements and the time allotted therefor can be obtained by a prepaid telephone call to the cognizant Designated Federal Employee, Mr. Paul A. Boehner, (telephone 202/634-3267) between 8:15 a.m. and 5:00 p.m., EST.

Background information concerning items to be discussed at this meeting can be found in documents on file and available for public inspection at the NRC Public Document Room, 1717 H Street, N.W., Washington, DC 20555 and at the Government Publications Section, State Library of Pennsylvania, Education Building, Commonwealth and Walnut Street, Harrisburg, Pa. 17126.

Dated: February 14, 1980.

John C. Hoyle,

Advisory Committee Management Officer.

[FR Doc. 80-2850 Filed 2-14-80; 8:45 am]  
BILLING CODE 7580-01-M

### Advisory Committee on Reactor Safeguards, Subcommittee Meetings Scheduled for March 3-4, 1980; Change

The March 3, 1980 meeting of the ACRS Ad Hoc Subcommittee on Three Mile Island, Unit 2 Accident Bulletins and Orders has been rescheduled to be held on March 4, 1980. Notice of this meeting was published in the Federal Register on February 15, 1980 and all other items regarding the meeting remain the same as published at that time.

The March 4, 1980 meeting of the ACRS Subcommittee on Babcock and Wilcox Water Reactors scheduled to be held on March 4, 1980 has been postponed indefinitely. Notice of this meeting was published in the Federal Register on February 15, 1980.

MEETING OF THE ACRS  
TMI-2: ACCIDENT, BULLETINS & ORDERS SUBCOMMITTEE  
MARCH 4, 1980  
WASHINGTON, DC

- Attendees List -

ACRS

W. Mathis, Chairman  
H. Etherington, Member  
J. Ebersole, Member  
J. Ray, Member  
W. Lipinski, Consultant<sup>+</sup>  
Z. Zudans, Consultant  
P. Boehnert, Staff\*

\*Designated Federal Employee

EXXON NUCLEAR

J. N. Morgan  
G. Owsley

FLA P&L CO (CE OWNERS GROUP)

G. E. Liebler

GE

S. Stark

MITSUBISHI

K. Okabe  
A. Hoizumi

EPRI

Leyse

IVRI

J. Smith  
A. Young

NRC

C. Thomas, DPM  
Z. R. Rosztoczy, NRR  
T. H. Cox, NRR-DPM  
W. F. Kane, NRR  
D. F. Ross, NRR

WESTINGHOUSE

W. J. Johnson  
J. A. Gresham  
B. M. Bowman

BALTIMORE GAS & ELEC CO

K. C. L. Olson

CAROLINA POWER & LIGHT

D. B. Waters

TOKYO ELECTRIC POWER CO

H. Hamade

BECHTEL

R. McDermott

CE

J. M. Westhoven

ACRS BULLETINS AND ORDERS (B&O) SUBCOMMITTEE MEETING  
MARCH 4, 1980  
WASHINGTON, D.C.

Tentative Schedule of Presentations

	<u>Presentation*</u> <u>Time</u>	<u>Actual</u> <u>Time</u>
I. Introductory Remarks W. Mathis, Chairman	10 min	8:30 am
II. NRC B&O Task Force Presentation		
A. Overview of B&O Recommendations D. Ross, W. Kane	60 min	8:40 am
- Break -	10 min	9:55 am
B. Effectiveness of B&O Recommendations in Reducing Small-Break LOCAs Due to Stuck- Open PORVs I. Villalva	60 min	10:05 am
C. Impact of Folding B&O Recommendations into the NRC Action Plan in Light of Recent ACRS Comments on the Action Plan W. Kane	10 min	11:30 am
D. Potential for PWR Block Valves Upstream of PORVs to Fail to Close Against Design Flow/ Pressure P. O'Reilly	15 min	11:45 noon
- Lunch -	60 min	12:00 - 1:00 pm
E. Discussion of Crystal River Transient of February 26, 1980	15 min	1:00 am
F. Development of Criteria for Use of "Feed and Bleed" Mode for Plant Cooldown, Given Loss of all Secondary Side Cooling B. Sheron	15 min	1:30 pm

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\*Time has been allotted for Subcommittee questions

Attachment C

## - Tentative Schedule of Presentations -

	<u>Presentation*</u> <u>Time</u>	<u>Actual</u> <u>Time</u>
G. Resolution of Unresolved Safety Issue Raised by Northeast Utilities Dealing with Auto- Initiation of Auxiliary Feedwater Systems  T. Cox	30 min	2:00 pm
H. Analysis of Reactor Coolant Pump Trip Criteria in Light of Recent Transients at Prairie Island and ANO-2  B. Sheron	30 min	2:45 pm
- Break -	10 min	3:30 pm
I. Training and Education of Operators  P. Collins	30 min	3:40 pm
III. Owner's Group Presentations		
A. General Electric Owner's Group  D. Waters - Carolina Power & Light S. Stark - GE	30 min	4:10 pm
B. Westinghouse Owner's Group  D. Waters - CP&L	30 min	5:00 pm
C. CE Owner's Group  G. Liebler - Florida Power & Light	30 min	5:30 pm
IV. Caucus/Discussion	15 min	6:00 pm
V. Adjourn		6:15 pm

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\*Time has been allotted for Subcommittee questions