JAN 18 1980

MEMORANDUM FOR: Chairman Ahearne

(Signed) T. A. Rehm

THRU: Lee V. Gossick, Executive Director for Operations

FROM: Harold R. Denton, Director
Office of Nuclear Reactor Regulation

SUBJECT: B&W ANALYSES OF THE SEPTEMBER 24, 1977 ACCIDENT AT DAVIS-BESSE

This is in response to question number 4 (of four questions) identified in your memorandum of July 19, 1979 to Lee V. Gossick. Question numbers 1 thru 3 were addressed in the Office of Inspection and Enforcement (I&E) memorandum to you dated August 6, 1979. In that memorandum, I&E noted that the Office of Nuclear Reactor Regulation would be asked to respond to question number 4.

Your July 19, 1979 memorandum referred to two newspaper articles which indicated that internal Babcock & Wilcox (B&W) analyses of the September 24, 1977 transient at Davis-Besse uncovered information which, if transmitted to operators of B&W plants in a timely fashion, might have prevented or significantly reduced the consequences of the accident at Three Mile Island, Unit 2. Question number 4 of your July 19, 1979 memorandum is repeated below:

> In the staff's judgement, if the information uncovered in these analyses had been available to the NRC and/or Metropolitan Edison in a timely fashion, to what extent would the consequences of the TMI accident have been mitigated or avoided?

As we are sure you appreciate, our response to this question is, of necessity, a highly subjective one. Therefore, we are unable to state with any degree of certainty what events would actually have taken place and how effective they might have been if these analyses had been available to us prior to the TMI-2 accident. However, we will attempt to provide a qualified answer to the question.

All things considered, I believe that if we had received information as explicit as that contained in the February 9, 1978 internal B&W memorandum from Bert Dunn to Jim Taylor, we would have taken action which may have prevented or mitigated the TMI accident. I think that we would have informed licensees of the problem and required that procedures caution against early termination of HPCI.

Contact:

There are two important aspects to the question, however, which significantly bear on the answer:

- o The manner in which the information was brought to our attention
- o The time interval between the date the information was brought to our attention, and the date of the TMI-2 accident

The first of these is important because it would have affected the degree to which the information would have been analyzed by this office. For example, if the information had been provided to the NRC staff (NRR or IE) by B&W pursuant to 10 CFR Part 21, or a utility pursuant to 10 CFR Part 50.55e, or other reporting requirements, it would have led to a high priority effort on our part to assess its generic implications. On the other hand, if the information had become available to us without endorsement by either B&W or a utility, our assessment of its generic implications would have proceeded, but on a much lower priority.

The other aspect, i.e., timing, is also very important. It has to do with the time it takes for us to assess the significance of information of this type as well as the time it takes to implement the results of our assessment.

Considering each of these aspects, it is our opinion that the period of time (about one year) between the date of the B&W engineer's memoranda and the date of the TMI-2 accident would have been sufficient for us to have effected actions at B&W plants such that, to a large extent, the TMI-2 accident consequences could have been avoided. More specifically, we believe that these actions would have resulted in the TMI-2 operators being better aware of the behavior of that plant, as well as the requisite recovery procedures, during a loss of feedwater event with a consequential failure of the power-operated relief valve. However, we would note that there is some uncertainty associated with this answer considering the staff's lack of emphasis on procedures prior to the TMI-2 accident.

We would also point out that there were other errors that occurred during the accident, such as locking out the auxiliary feedwater system and failure to close the PORV block valve. In our view, we would not have taken action in these areas as a result of the disclosure to the NRC of the B&W engineer's memoranda since the information contained in these memoranda was not directly related to these errors.

The timing aspect is difficult to deal with. Receipt of clear information from any source, as much as a year before the accident, would probably have been sufficient time for us to react. Receipt of clear information from B&W or a licensee with much less than one year lead time also should have been sufficient. At some lead time interval, longer for an "outside" source than from B&W or a licensee, we probably would have not reacted soon enough. I am confident, however, that clear information from any source would now be acted upon promptly.

Harold R. Denton, Director
Office of Nuclear Reactor Regulation

cc: Commissioner Gilinsky
Commissioner Kennedy
Commissioner Hendrie
Commissioner Bradford
L. V. Gossick
V. Stello

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DATE	1/ /80	1/11/80	1/ /80	1/ /80	1/11/80	1/17/80

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MEMORANDUM FOR: Chairman Ahearne

THRU: Lee V. Gossick, Executive Director for Operations

FROM: Harold R. Denton, Director
Office of Nuclear Reactor Regulation

SUBJECT: B&W ANALYSES OF THE SEPTEMBER 24, 1977 ACCIDENT AT DAVIS-BESSE

This is in response to question number 4 (of four questions) identified in your memorandum of July 19, 1979 to Lee V. Gossick. Question numbers 1 thru 3 were addressed in the Office of Inspection and Enforcement (I&E) memorandum to you dated August 6, 1979. In that memorandum, I&E noted that the Office of Nuclear Reactor Regulation would be asked to respond to question number 4.

Your July 19, 1979 memorandum referred to two newspaper articles which indicated that internal Babcock & Wilcox (B&W) analyses of the September 24, 1977 transient at Davis-Besse uncovered information which, if transmitted to operators of B&W plants in a timely fashion, might have prevented or significantly reduced the consequences of the accident at Three Mile Island, Unit 2. Question number 4 of your July 19, 1979 memorandum is repeated below:

> In the staff's judgement, if the information uncovered in these analyses had been available to the NRC and/or Metropolitan Edison in a timely fashion, to what extent would the consequences of the TMI accident have been mitigated or avoided?

As we are sure you appreciate, our response to this question is, of necessity, a highly subjective one. Therefore, we are unable to state with any degree of certainty what events would actually have taken place and how effective they might have been if these analyses had been available to us prior to the TMI-2 accident. However, we will attempt to provide a qualified answer to the question.

We believe there are two important aspects to the question which significantly bear on the answer:

- The manner in which the information was brought to our attention
- The time interval between the date the information was brought to our attention, and the date of the TMI-2 accident

CONTACT:					
W. F. KANE, DPM					
492-7745					
SURNAME					
DATE					

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The first of these is important because it would have affected the degree to which the information would have been analyzed by this office. For example, if the information had been provided to us by B&W pursuant to 10 CFR Part 21, or Metropolitan Edison pursuant to 10 CFR Part 50.55e, it would have led to a high priority effort on our part to assess its generic implications. On the other hand, if the information had become available to us without endorsement by either B&W or a utility, our assessment of its generic implications would have proceeded, but on a much lower priority.

The other aspect, i.e., timing, is also very important. It has to do with the time it takes for us to assess the significance of information of this type as well as the time it takes to effect the results of our assessment.

Considering each of these aspects, it is our opinion that the period of time (about one year) between the date of the B&W engineer's memoranda and the date of the TMI-2 accident would have been sufficient for us to have effected actions at B&W plants such that, to a large extent, the TMI-2 accident consequences could have been avoided. More specifically, we believe that these actions would have resulted in the TMI-2 operators being better aware of the behavior of that plant, as well as the requisite recovery procedures, during a loss of feedwater event with a consequential failure of the power-operated relief valve. However, we would note that there is some uncertainty associated with this answer considering the staff's lack of emphasis on procedures prior to the TMI-2 accident.

We would also point out that there were other errors which contributed to the accident, such as locking out the auxiliary feedwater system and the inadequacy of the containment isolation scheme. In our view, we would not have taken action in these areas as a result of the disclosure to the NRC of the B&W engineer's memoranda since the information contained in these memoranda was not directly related to these errors.

This answer assumes that the information had been provided to us with the endorsement of either B&W or a utility. For the case in which the information had been brought to our attention without the endorsement of either B&W or the utility, we believe the pace of our assessment would not have been sufficient to prevent or substantially mitigate the consequences of the TMI-2 accident.

If any additional information or clarification is desired, I or a member of my staff will be pleased to meet with you to discuss this matter further.

Harold R. Denton, Director
Office of Nuclear Reactor Regulation

cc: Commissioner Gilinsky
Commissioner Kennedy
Commissioner Hendrie
Commissioner Bradford

*See previous yellow for concurrences

OFFICE	B&OTF	B&OTF	DPM	NRR	NRR	EDO
SURNAME	WFKane:jk	DFRoss *	RJMattson*	EGCase	HRDenton	LVGossick
DATE	01/04/80			1/4/80	1/ /80	1/ /80

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If any additional information or clarification is desired, I or a member of my staff will be pleased to meet with you to discuss this matter further.

Harold R. Denton, Director
Office of Nuclear Reactor Regulation

cc: Chairman Hendrie
Commissioner Gilinsky
Commissioner Kennedy
Commissioner Bradford
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Date: 1/15/80
Originator: NRR:Kane
EDO No.: 6898
Incoming Date: 7/19/79

ACTION:

Thru Line - Memo

SUBJECT: Memo for Chairman Ahearne fm Denton thru Gossick re B&W ANALYSES OF THE ~~SPETE~~ SEPTEMBER 24, 1977 ACCIDENT AT DAVIS-BESSE

TOM E special

CONCURRENCES RECEIVED:

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NRR Denton 1/11	SD	CON	PE
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IE	IP		

ACB COMMENTS: ☐ Admin. check

1. Rehm

2. Cornell — Back to ☐ Rehm

3. Gossick — Back to ☐ Rehm ☐ Cornell

4. Return to ACB ☐ Courier ☐ OCA - Bring to attention of: Hart ____ Dingell ____ Udall ____ Moffett ____

Due 11/16

AUG 6 1979

MEMORANDUM FOR: Commissioner Ahearne

THRU: (Signed) T. A. Rehm
Lee V. Gossick, Executive Director for Operations

FROM: Victor Stello, Jr., Director, Office of Inspection and Enforcement

SUBJECT: B&W ANALYSES OF THE SEPTEMBER 24, 1977 ACCIDENT AT DAVIS-BESSE

IE initiated an investigation on July 19, 1979 upon learning of the testimony before the Presidential Commission by B&W employees, described in your July 19 memorandum to Mr. Gossick. We anticipate approaching the investigation in the following manner:

(1) IE will examine the question of B&W's handling of this information in light of their responsibilities under 10 CFR 21. Particular attention will be focussed upon whether either the memorandum in question or the substance of the information was provided to NRC in any fashion.

(2) If our investigation establishes that such information was made available to NRC prior to March 28, 1979, we may ask OIA to look into the handling of the information within NRC. This procedure is being followed during the Michelson investigation.

(3) We will ask NRR to respond to your question (4) regarding the significance of these analyses vis a vis the TMI accident when the full facts of the matter are clear.

We have held initiation of interviews in abeyance until we have had the opportunity to evaluate both the testimony at issue as well as any formal rebuttal or amplification by more senior B&W officials. Upon completion of

CONTACT: W. J. Ward, IE
49-27246

dupe of 8004240637

our investigation which will receive priority attention, we will forward all of the information that we develop. We will also provide you with copies of the documents that you requested as we obtain them ourselves.

Original signed by

Victor Stello, Jr.
Director
Office of Inspection
and Enforcement

cc: Chairman Hendrie
Commissioner Gilinsky
Commissioner Kennedy
Commissioner Bradford
SECY
OPE
OGC
OCA
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Distribution:
L. V. Gossick, EDO
R. G. Smith Acting Dep., EDO
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JOB H	Date	/ /79	/ /79	/ /79	8/1 /79	8/1/79	/ /79

8/ /79

FROM:	ACTION CONTROL	DATES	CONTROL NO.
Commissioner Ahearne	COMPL DEADLINE	7/26/79	6898
	ACKNOWLEDGMENT		DATE OF DOCUMENT
TO:	INTERIM REPLY		7/19/79
Lee V. Gossick	FINAL REPLY		PREPARE FOR SIGNATURE OF: ☐ CHAIRMAN ☐ EXECUTIVE DIRECTOR OTHER: Stello
	FILE LOCATION		

DESCRIPTION ☐ LETTER ☐ MEMO ☐ REPORT ☐ OTHER

B&W analyses of the 9/24/77 accident at Davis Besse & the TMI accident - req response to questions ¢ cys of the B&W memoranda and analyses & staff reviews

Encls: clippings

SPECIAL INSTRUCTIONS OR REMARKS

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555

OFFICE OF THE
COMMISSIONER

July 19, 1979

MEMORANDUM FOR: Lee V. Gossick, EDO

FROM: John Ahearne

SUBJECT: B&W ANALYSES OF THE SEPTEMBER 24, 1977 ACCIDENT AT DAVIS-BESSE

The two attached newspaper items, which appeared this morning, indicate that internal B&W analyses of the September 24, 1977 accident at Davis-Besse uncovered information which, if transmitted to operators of B&W power reactors in a timely fashion, might have prevented or significantly reduced the consequences of the TMI accident. These newspaper items raise many questions, among which are the following:

1. Were the memoranda referred to, or the information in them, made available by B&W to the NRC prior to the TMI accident? If so, when? What action did the staff take as a result?

2. If not, does this failure to transmit the results of these analyses constitute a violation of 10 CFR Part 21?

3. If the answer to Question 1 is no, did the NRC staff learn of the analyses between March 28, 1979 and today? If so, has the staff reviewed the analyses and what are the results of those reviews?

4. In the staff's judgment, if the information uncovered in these analyses had been available to the NRC and/or Metropolitan Edison in a timely fashion, to what extent would the consequences of the TMI accident have been mitigated or avoided?

I would appreciate receiving the answers to these questions as soon as possible. If the staff has not yet obtained the memoranda and analyses or completed its review of them, please provide preliminary answers now and more complete answers as soon as the staff reviews can be completed. In addition, I would like to receive copies of the B&W memoranda and analyses and the staff reviews of them.

cc: Chairman Hendrie
Commissioner Gilinsky
Commissioner Kennedy
Commissioner Bradford
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Engineers Warned Builder of Danger Year Before Three Mile Island Accident

By B. DRUMMOND AYRES
Special to The New York Times

WASHINGTON, July 18 — Two engineers for the company that supplied the nuclear reactor that broke down at Three Mile Island said today that they had warned their superiors a year earlier that a serious accident was possible but that the warning had not been passed on.

"It just slipped through the crack," a third engineer said.

The engineers, all employees of the Babcock & Wilcox Company of Lynchburg, Va., testified before the Presidential commission that is investigating the March 28 accident, the worst in the history of this country's nuclear power program. All had been subpoenaed. More company officials were scheduled to testify today and Friday.

Under questioning by committee members, one of the engineers, Bert M. Dunn, said, "Had my instructions been followed, we would not have had core damage. We would have had a minor accident." A spokesman for Babcock & Wilcox said that he was unable to reach company officials for elaboration.

Some Radiation Escaped

The accident severely damaged the fuel rods in the reactor. In the aftermath, some radiation escaped into the air above the central Pennsylvania electric plant.

Mr. Dunn and Joseph J. Kelly Jr., another Babcock & Wilcox engineer, told the six commission members that more than a year before the Three Mile Island accident they had warned their superiors, in separate memoranda, of a dangerous sequence of events that had occurred when a Babcock & Wilcox reactor twice broke down at Toledo, Ohio. The two engineers suggested that other operators of Babcock & Wilcox reactors, including the one at Three Mile Island where a somewhat similar sequence of events took place, be sent guidance about how to handle such emergencies.

At the Toledo plant, a pressure release valve stuck open, threatening loss of the cooling fluid around the fuel core. Special safety pumps began to replace the fluid, but plant officials turned off the pumps prematurely because a meter connected to the malfunctioning valve indicated there was no problem. The pumps were restarted in a short while, however, when the operators realized the meter reading was not correct.

At Three Mile Island, the sequence was somewhat similar, but the faulty meter reading was not correctly analyzed for a considerably longer time. As a result, so much fluid escaped from the reactor that parts of core were exposed and began to overheat.

Warning Issued a Week Later

Seven days after the Three Mile Island accident, Babcock & Wilcox instructed its customers, including Metropolitan Edison, the Three Mile Island operator, about how to handle such emergencies.

Mr. Kelly's memorandum, written about a week after the second Toledo accident, was dated Nov. 1, 1977. Mr. Dunn's memorandum was dated Feb. 9, 1978, more than a year before the Three Mile Island accident.

Mr. Kelly told the committee that he had been seeking the "thought" of other engineers and some of his superiors. However, his memorandum suggests that "guidelines" be sent plant operators and asserts that "two recent events at the Toledo site have pointed out that perhaps we are not giving our customers enough guidance" about the operation of some safety pumps.

In Mr. Dunn's memorandum, he tells of his "serious concern" for "potential" future cooling accidents. He states that the Toledo situation "points out that we have not supplied sufficient information to reactor operators." And he concludes that "this is a very serious matter and deserves our prompt attention and correction."

Information Not Volunteered

Mr. Kelly and Mr. Dunn did not volunteer information about the memorandums and for the most part revealed information only under questioning or when confronted with subpoenaed documents, such as the memorandums. They were at a loss to explain why the company had taken more than a year to follow up on their recommendations. Mr. Kelly said that at one point when he checked on the progress, and was told that his company was training reactor operators properly.

The third Babcock & Wilcox engineer to testify, James F. Walters, said that there had been a considerable amount of discussion of the memorandum and the Toledo accidents within the company. But before anything could be done, he conceded under questioning the matter "just slipped through the crack."

Associated Press Photo

Joseph J. Kelly, an engineer for Babcock & Wilcox, testifying yesterday.

Engineers Say Reactor Builder Ignored Warnings

By Thomas O'Toole
Washington Post Staff Writer

Two nuclear safety engineers at Babcock & Wilcox Co. testified yesterday they tried unsuccessfully to warn customers of the possibility of a nuclear accident similar to the one that crippled Three Mile Island.

The engineers, Joseph J. Kelly and Bert M. Dunn, told the Kemeny Commission investigating Three Mile Island for the White House that they wrote memos to Babcock superiors and had repeated discussions with managers over what they felt was a need to warn Babcock customers of the possibility of a loss-of-coolant accident like the one eventually suffered at Three Mile Island.

The date of Kelly's first memo was Oct. 31, 1977, while Dunn wrote his first memo Feb. 8, 1978 more than a year before Three Mile Island. Babcock customers were never notified of their contents.

"I wrote follow-up memo and had discussions with people about the need to notify customers and I operated under the assumption that new instructions would be distributed to customers," said Dunn, who is manager of emergency core cooling system analysis for Babcock & Wilcox in Lynchburg, Va. "But to my knowledge customers were never notified."

Kelly and Dunn told the Kemeny Commission their concerns were triggered by an accident Sept. 24, 1977, at the Davis-Besse nuclear plant of Ohio Toledo Edison Co., which, like [illegible] Metropolitan Edison, had bought its nuclear plant from Babcock & Wilcox.

The Davis-Besse accident involved a sudden loss of cooling water that shut down the nuclear reactor. The accident occurred when a pressure relief valve stuck open, venting thousands of gallons of cooling water away from the reactor, and plant operators mistakenly throttled back the pumps pouring emergency cooling water onto the reactor to make up the difference.

While the nuclear core at Davis-Besse was never exposed the way the core at Three Mile Island was, there were striking similarities in the events that led to both accidents. The pressure relief valves at both places stuck open, releasing essential cooling water from the reactor; the pumps feeding emergency coolant to the cores were throttled back or turned off, denying replacement cooling water to the cores.

"One difference in the two accidents was that the Davis-Besse operator quickly realized his emergency valve was stuck open and closed it after 20 minutes," Kelly testified. "The other difference was that the Davis-Besse people throttled back two pumps; the Three Mile Island people stopped all four. To me, that's a significant difference."

The accident at Davis-Besse prompted Kelly to write a memo to seven B&W supervisors in which he recommended that all Babcock customers be given guidance as to how to avoid a similar accident at their plants.

"Do not bypass or otherwise prevent the actuation of high or low pressure injection (emergency cooling) under any conditions except a normal, controlled plant shutdown," Kelly said the new instructions should read. "Once injection is initiated, do not stop it unless temperature is stable or decreasing and pressurizer level is increasing..."

Kelly said that 10 days after he wrote his memo he received a memo from F. J. Walters, a supervisor in the Nuclear Service Division, who said he disagreed with Kelly's concerns. Walters told Kelly he thought the operators at Davis-Besse had acted correctly; besides, he said, the accident was "of no magnitude."

"He was confused," Kelly said of Walters. "In (the Walters memo) only value to me was to escalate the problem to Mr. Dunn."

Kelly and Dunn said they talked over the "lack of response" among Babcock supervisors to Kelly's memo and decided to pursue the issue more vigorously. Dunn said he wrote a memo to Jim Taylor, manager of the licensing office at Babcock, urging him to address the accident at Davis-Besse in a more constructive way.

"I believe that Toledo (Davis-Besse) was fortunate," Dunn said in the memo. "Had this event occurred in a reactor at full power . . . it is quite possible, perhaps probable, that core recovery and possible fuel damage would have resulted."

Dunn said Taylor responded by routing his memo back to the Nuclear Service Division, where Kelly had run into his original obstacle. Dunn said he never heard back and assumed that customers had been notified of his concerns.

THE NUCLEAR REGULATORY COMMISSION

7-23-79

Stella

Mr. Gossick:

Please provide Commissioner Gilinsky with the same information requested in Commissioner Ahearne's Memo of July 19 (attached).

Sylvia Elizondo
Administrative Aide
to Cmr Gilinsky

Attachment

Rec'd Off. EDO
Date 7/24/79
Time 1958

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