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CP H Coor 10-22-80
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Dec 1973

UNITED STATES OF AMERICA
ATOMIC ENERGY COMMISSION

LBP-74-71

ATOMIC SAFETY AND LICENSING BOARD

Michael L. Glaser, Chairman
Lester Kornblith, Jr., Member
Emmeth A. Luebke, Member

In the Matter of

CONSUMERS POWER COMPANY

(Midland Plant,
Units 1 and 2)

Construction Permit
Nos. 81 and 82
(Show Cause)

September 25, 1974

INITIAL DECISION

Appearances

Michael I. Miller, Esq., and R. Rex Renfrow III, Esq., of Isham, Lincoln, and Beale; Judd Bacon, Esq., and Paul Koval, Esq., of Consumers Power Company; and Harold F. Reis, Esq., and J. A. Bouknight, Esq., of Newman, Reis and Axlerad for Consumers Power Company

Laurence M. Scoville, Jr., Esq., P. Robert Brown, Jr., Esq., Bartholomew P. Molloy, Esq., and Richard C. Marsh, Esq., of Clark, Klein, Winter, Parsons & Prewitt for Bechtel Power Corporation and Bechtel Associates Professional Corporation

John Gerold Gleeson, Esq., and Leslie F. Nute, Esq., for The Dow Chemical Company

Myron M. Cherry, Esq., for Saginaw-Sierra Intervenors

James P. Murray, Esq., and Roy E. Kinsey, Jr., Esq., for AEC Regulatory Staff

I. INTRODUCTION AND BACKGROUND

1. On December 3, 1973, Consumers Power Co. (Consumers), by Order to Show Cause, was ordered, by the Atomic Energy Commission's Director of Reg.

Regulation, to show cause why all activities under Construction Permit Nos. 81 and 82 for the Midland facilities, Midland Plant, Units 1 and 2, should not be suspended pending a showing by Consumers that it was in compliance with the AEC's regulations governing quality assurance, and that it would continue to comply with such regulations throughout construction. Consumers was granted construction permits Nos. 81 and 82 for the Midland Units by Initial Decision of an Atomic Safety and Licensing Board issued on December 14, 1972. This Initial Decision was ultimately affirmed by the Atomic Safety and Licensing Appeal Board (Appeal Board) after a series of decisions[1] on exceptions taken by certain of the parties to the construction permit hearing proceedings.[2]

2. During the review process, the Appeal Board, because of the history of the failure of Consumers and its architect-engineer, Bechtel Corp., to observe required quality assurance practices and procedures, imposed certain conditions[3] on Consumers relating to Consumers' quality assurance program. These conditions, which the Appeal Board termed as a "predicate for the permits now to remain in effect," called for Consumers to file periodic reports, either with the Appeal Board or Staff, on Consumers quality assurance activities. The Appeal Board requested that, for its information, copies of all reports required to be filed with the Staff be forwarded to the Appeal Board by the Staff on a timely basis, together with any comments that the Regulatory Staff may have. The Appeal Board also indicated it desired to receive Staff comments on the report required to be filed directly with the Appeal Board, and these comments were requested to include the results of any Staff inspection of Consumers. The Appeal Board also indicated it would closely monitor the activities of Consumers and its architect-engineer, Bechtel Corp., with respect to Consumers' quality assurance program. These specific conditions were set forth in the Appeal Board's decision of March 26, 1973 (ALAB-106, *supra*).

A. The December 3, 1973, Order to Show Cause

3. The Order to Show Cause issued by the Director of Regulation specified several instances of non-compliance with quality assurance requirements. More specifically, the Order to Show Cause stated that Commission inspections had revealed Consumers' nonconformance with quality assurance program requirements involving concrete work, had revealed inadequate record-keeping, and had revealed serious deficiencies associated with Cadwelding operations. Cadwelding

[1] In re Consumers Power Company (Midland Plant, Units 1 and 2): ALAB-100, RAI-73-2, 58(Feb. 12, 1973); ALAB-101, RAI-73-2, 58(Feb. 20, 1973); ALAB-106, RAI-73-3, 182(Mar. 26, 1973); ALAB-115, RAI-73-4, 257(Apr. 17, 1973); ALAB-123, RAI-73-5, 331(May 16, 1973); ALAB-132, RAI-73-6, 431(June 28, 1973); ALAB-147, RAI-73-9, 636(Sept. 18, 1973); ALAB-152, RAI-73-10, 816(Oct. 5, 1973); ALAB-160, RAI-73-11, 1002(Nov. 26, 1973).

[2] ALAB-152, *supra*.

[3] ALAB-106, *supra* at 186.

is a process for fusing together metal bars used in reinforced concrete construction, and represents a critical step in construction of the Midland facility. The Order to Show Cause also referred to a memorandum, dated November 26, 1973, from the Atomic Safety and Licensing Appeal Board to the Director of Regulation, which pointed to certain deficiencies in Consumers' implementation of its quality assurance program, and urged that appropriate enforcement action be taken against Consumers. The Appeal Board also referred to the conditions it had imposed on Consumers in ALAB-106, and the history of the failure of Consumers and its architect-engineer to observe required quality assurance practices and procedures. The Director of Regulation indicated that the Appeal Board memorandum warranted examination of whether Consumers would comply with required quality assurance requirements throughout the construction process. Thus, the December 3 Order suspended all Cadwelding operations at the Midland plant site, pending further order and determination by the Director of Regulation.

4. Thereafter, Consumers answered the Order to Show Cause, claiming compliance with AEC quality assurance regulations, and urging that the Order to Show Cause be dismissed. On December 24, the Saginaw-Sierra Intervenors (Saginaw), intervenors to the Commission's construction permit hearing proceedings involving the Midland facilities, requested a hearing on the Order to Show Cause. On December 17, 1973, as a result of a special inspection, the Director of Regulation issued a Modification of Order to Show Cause, which lifted the suspension of Cadwelding activities at the Midland plant site. The Modification, however, provided that all other provisions of the December 3, 1973, Order to Show Cause would remain in effect. On December 18, 1973, the Saginaw filed a petition to revoke the construction permits.

B. The Commission's January 21, 1974, Order for Hearing

5. On January 21, 1974, the Commission issued a Memorandum and Order denying Saginaw's petition to revoke, denying Consumers' Motion to dismiss, and granting Saginaw's request for hearing. The Commission specified the following issues to be decided by this Atomic Safety and Licensing Board (Board):

(1) Whether the licensee is implementing its quality assurance program in compliance with Commission regulations; and

(2) Whether there is a reasonable assurance that such implementation will continue throughout the construction process.

The Commission directed this Board to determine whether Consumers' construction permits should be modified, suspended or revoked, or whether other action is warranted by the record, in the event either of the two issues was decided adversely to Consumers. Consumers, Saginaw, Dow Chemical Company (Dow), and the Regulatory Staff were made parties to the

proceeding. Bechtel Professional Corporation and Bechtel Power Corporation (Bechtel), Consumers' architect-engineer for the Midland facilities, filed a petition for intervention.

C. The Procedural Background of this Board's Conduct of Hearing

6. An initial prehearing conference was held in Chicago, Illinois.[4] The Board granted Bechtel's petition, and permitted it to participate as a party.[5] The Regulatory Staff announced that it no longer supported entry of an order which would suspend, modify or otherwise alter Consumers' construction permits.[6] The Staff's announced position effectively placed Saginaw as the only party to the proceeding supporting modification of Consumers' permits. At this prehearing conference, however, the Board ruled that Consumers had the ultimate burden of proof, and was required to demonstrate why its construction permits should not be suspended, revoked or otherwise modified.[7]

7. The Board also indicated that the two issues specified in the Commission's January 21, 1973, Memorandum and Order covered construction activities beyond the Cadwelding activities which had precipitated the Order to Show Cause,[8] but that the hearing was limited to construction of nuclear power plants as opposed to operation.[9]

8. At this initial prehearing conference, counsel for Saginaw informed the Board that he would be unable to proceed in the active representation of his clients' interests unless he received financial assistance from the Commission. Accordingly, counsel for Saginaw indicated he would file a petition with the Commission within a few days requesting counsel and witness fees.[10]

9. Counsel for Dow informed the Board that his client would not actively participate in the Show Cause proceeding.[11]

10. The Board informed all parties that it would require written testimony and a trial brief be filed with the Board prior to the hearing in connection with the matters proposed to be addressed by evidence,[12] and adopted a procedural

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[4] The Board held the prehearing conference, as well as a subsequent prehearing conference on May 30, 1974, in Chicago, to accommodate counsel for the Saginaw Group, who had indicated that his appearance at any other location would be inconvenient, and would work a financial hardship on Saginaw, Tr. 25.

[5] Tr. 29.

[6] Tr. 32-33, 48-49.

[7] Tr. 68.

[8] Tr. 33.

[9] Tr. 68.

[10] Counsel first indicated he would file such petition with the Board. The Board, however, advised counsel that it had no jurisdiction to act on such petition, and suggested that the petition be filed with the Commission, Tr. 28, 83.

[11] Tr. 31.

[12] Tr. 56-58, 77-83.

schedule for the proceeding. The date of June 25, 1974, was established for commencement of hearing.

11. On April 22, 1974, counsel for Saginaw, Consumers and Bechtel served sets of interrogatories on the various parties to the proceeding, including the Staff. In addition, both Consumers and Bechtel served a Request to Admit Facts on the Staff, and a Notice of Deposition on Saginaw.

12. On May 10, 1974 the Board determined that answers to certain of the interrogatories served on the Staff by Saginaw were necessary to a proper decision in the proceeding and were not reasonably obtainable from any other source. Thus, pursuant to Section 2.718(i) of the Commission's Rules of Practice,[13] we certified to the Commission the question of whether these interrogatories should be answered by the Staff. In our certification, we expressed the view that the attitude of Consumers, especially that of senior management personnel, toward compliance with Commission regulations and license requirements was relevant and material to the resolution of the issue of future compliance, and recommended that the Staff be required to provide whatever available information it may possess respecting Consumers' licensed activities which might reflect upon Consumers' attitude toward compliance with Commission regulations and license requirements. Without awaiting a Commission ruling, on May 22, 1974, the Staff answered the interrogatories which the Board had certified. The Board's ruling with respect to the scope of permissible discovery was subsequently applied to the objections of Consumers to Saginaw's discovery request.

13. On May 10, 1974, the Board also denied Saginaw's Motion for an Extension of Time to file a request for the production of documents. This order was based upon the representation of Consumers that it had voluntarily made available to Saginaw for inspection and copying all documents referenced in Consumers' answers to interrogatories.

14. It was not until May 11, 1974 that counsel for Saginaw filed a Verified Petition and Motion to the Atomic Energy Commission for Expert Witnesses' Fees and Attorneys' Fees. The petition stated that unless such fees were forthcoming, Saginaw would be unable to participate in a meaningful manner in this proceeding,[14] and alleged that the participation of Saginaw was necessary for an adequate airing of the issues and explanation of the facts.[15]

15. On May 22, 1974, all parties, except Saginaw, filed answers to interrogatories which were directed to them by other parties. On May 21, 1974, the day before answers to interrogatories were due from each party, Saginaw filed several motions which, in substance, requested an extension of the

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[13] 10 CFR § 2.718(i) (1974).

[14] In the Matter of Consumers Power Company (Midland Plant, Units 1 and 2), Verified Petition, at pp. 2, 5(May 11, 1974).

[15] *Id.* at p. 7.

discovery period. These requests were premised on the fact that the Commission had not acted upon Saginaw's petition for fees which had been filed 10 days earlier.

16. On May 30, 1974, the Board held a second prehearing conference in Chicago, Illinois. After hearing oral argument, the Board denied Saginaw's several requests, including a motion for continuance pending a Commission decision on Saginaw's petition for fees. The Board, however, gave Saginaw leave to renew its motion for continuance in the event a favorable ruling on its petition was forthcoming from the Commission.[16] The Board ordered Saginaw to answer interrogatories served upon it by June 5, 1974.[17] The Board also reiterated its earlier ruling on the burden of proof, but accorded Consumers until June 10, 1974, to present the Board with a memorandum of law on the burden of proof in an administrative show cause proceeding.[18]

17. The Board also adopted a revised schedule for the proceeding, as follows:

A. Discovery to close on June 17, 1974;

B. Written testimony from all parties due on June 28, 1974;

C. Trial briefs due on July 8, 1974; and

D. Hearing to commence in Midland, Michigan, on July 16, 1974.[19]

18. On June 5, 1974, Saginaw filed its answers to the interrogatories propounded by Consumers and Bechtel. Shortly thereafter, Consumers filed a Motion to Compel Answers to Interrogatories, on the ground that the answers of Saginaw were unresponsive and incomplete.[20] The Board granted this motion,[21] but Saginaw did not respond.

19. On June 5 and 6, 1974, Bechtel and Consumers filed with the Commission responses to Saginaw's petition for fees requesting that the petition be denied. The Staff filed its answer to Saginaw's petition for fees on June 10, 1974.

20. On June 10, 1974, Consumers also filed a "Motion to Impose the Burden of Proof on the Proponent of an Order Suspending, Revoking or Otherwise Modifying Construction Permit Nos. 81 and 82", in which Consumers argued that the proponent of an order modifying the construction permits bears the ultimate burden of proof. On June 12, 1974, Bechtel filed a brief in support of Consumers' motion, arguing that the burden of proof in this proceeding should properly be placed on the Staff and/or Saginaw. On June 18, 1974, the Staff also responded by stating that the burden of proof lay with the proponent of the Order to Show Cause. Saginaw filed no response.

[16] Tr. 116.
[17] Tr. 115.
[18] Tr. 114, 135-136, 139.
[19] Tr. 128, 133.
[20] Tr. 157.
[21] Tr. 158.

21. On June 28, 1974, Consumers, Bechtel and the Staff filed written testimony and exhibits with the Board and other parties. Saginaw filed no written testimony. On this date, the Board also initiated a conference call to all counsel, and advised them that the Board, upon considering Consumers' motion to change the burden of proof, had reversed its earlier ruling with respect to burden of proof, and was placing the burden of proof on the Staff and Saginaw.[22]

22. On July 8, 1974, trial briefs were filed by Consumers, Bechtel and the Staff. No trial brief was filed by Saginaw, despite a specific order to do so from the Board at the May 30, 1974, prehearing conference:

> If you have no witnesses, your trial brief ought to reflect that fact, or if you don't have a direct case, other than the case you make in cross-examination, you should indicate this in your trial brief. We would want something from you along these lines.[23]

23. On July 9, 1974, the Board placed another conference call to counsel for all parties, for the express purpose of determining whether Saginaw intended to go forward with a presentation, or otherwise appear, at the evidentiary hearing. Counsel for Saginaw advised the Board and the other parties that he would not be participating on behalf of Saginaw, unless the Commission were to grant his petition for fees.

24. On July 10 1974, the Commission issued a Memorandum and Order denying the Saginaw petition for fees. The Commission concluded that the petition must be denied for lack of a proper showing of need.[24]

25. On July 10, 1974, the Board placed another conference call to counsel for the parties to determine whether Saginaw's counsel or Saginaw, in view of the Commission's July 10, 1974, Memorandum and Order,[25] intended to go forward. Counsel for Saginaw advised the Board that he would not be present at the evidentiary hearings. However, counsel did indicate he would participate further in the proceedings to the extent of filing proposed findings of fact and conclusions of law, as well as a memorandum requesting the Board to take official notice of certain documents Saginaw intended to rely upon to carry its burden.[26]

26. On July 10, 1974, the Board issued its written Memorandum and Order ruling that the burden of proof in this proceeding was on the Staff and Saginaw to the extent that these parties desired that Construction Permit Nos. 81 and 82 be modified or revoked.

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[22] Tr. 124-125.

[23] Tr. 152.

[24] Memorandum and Order, RAI-74-7, 1(July 10, 1974).

[25] See n. 24, *supra*.

[26] Tr. 153.

27. On July 16, 1974, the Commission issued a Memorandum and Order[27] on the question certified to it on May 14, 1974, concerning whether or not the Staff was required to answer Saginaw's interrogatories. The Commission ruled that the Staff should answer all interrogatories with respect to which the Board had determined that answers were necessary to a proper decision, and were not reasonably obtainable from any other source. As we have noted, these answers had already been provided by the Staff on May 22, 1974.

28. On July 16, 1974, pursuant to a *Notice and Order for Commencement of Evidentiary Hearing*[28] dated June 17, 1974, the evidentiary hearing commenced in Midland, Michigan, and continued through July 18, 1974. All of the parties to the proceeding were present except for Saginaw. Each of the other parties presented testimony and participated in cross-examination. The Board required both Consumers and the Staff to present witnesses[29] in addition to those who had submitted prepared testimony. The Board also questioned various witnesses that had been presented.

29. The Staff presented four witnesses—Mr. Walter E. Vetter, the technical assistant to the Director of Directorate of Regulatory Operations, Region III; Mr. Roger Rohrbacher, Principal Reactor Inspector for Directorate of Regulatory Operations, Region III; Mr. Cordell C. Williams, Reactor Inspector for Directorate of Regulatory Operations, Region III; and Mr. Dolphus E. Whitesell, Reactor Inspection Specialist for Directorate of Regulatory Operations.

30. In addition, Mr. James G. Keppler, the Director of Directorate of Regulatory Operations, Region III, appeared and gave testimony at the specific request of the Board.

31. Consumers presented four witnesses, including Mr. Russell C. Youndahl, Senior Vice President, and Mr. Stephen H. Howell, Vice President. The Board requested that Consumers make available Mr. Ralph Sewell, Nuclear Licensing Administrator for Consumers, to answer the Board's questions concerning statements he had given to the Directorate of Regulatory Operations in connection with an investigation of Consumers' Palisades facility.

32. Bechtel presented ten witnesses, as well as a panel comprised of five persons.

33. Neither Saginaw's counsel nor anyone representing Saginaw appeared at the evidentiary hearing.

34. Following the Staff's direct case, and after no evidence was offered by Saginaw, Consumers moved:

(1) That the Board issue an order holding that Saginaw was in default under 10 CFR §2.707; and

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[27] Memorandum and Order, RAI-74-7, 4 (July 16, 1974).
[28] 39 *Fed. Reg.* 22447.
[29] Tr. 155, 439.

(2) That the proceeding be dismissed, since the burden of proof had not been met.[30]

The Board denied this motion.[31] The Board also indicated it would give Saginaw until July 25, 1974, to file its memorandum requesting official notice to be taken of certain documents.[32] At the close of the evidentiary hearings on July 18, 1974, Consumers renewed its motion to hold Saginaw in default and to dismiss the proceeding on the grounds that the burden of proof had not been met.[33] The Board indicated it would take this renewed motion under advisement.[34] Our ruling on this motion is set forth below.

35. On July 25, 1974, the Board, having received no memorandum from Saginaw, issued an Order closing the record. Proposed findings of fact and conclusions of law were submitted by Consumers and Bechtel jointly, and by the Staff, on the specified date of August 12, 1974. No reply findings were filed. Saginaw did not file proposed findings of fact or conclusions of law. However, Saginaw filed a "Motion" on August 12, 1974, requesting a two-week extension in the deadline to file proposed findings. The Board denied the "Motion" for lack of good cause shown. Saginaw renewed its "Motion" on August 26, 1974, and the Board again denied it for lack of good cause shown.

D. Consumers' Renewed Motion

36. The Board has considered Consumers' renewed motion to hold Saginaw in default, and to dismiss this proceeding on the grounds that the burden of proof has not been met. We deny this motion. While there appears to be ample precedent for this Board to grant Consumers' motion, the Board believes that in the circumstances here present, a determination is warranted on the record respecting Consumers' compliance with Commission quality assurance requirements and the implementation of Consumers' quality assurance program. Indeed, we would not have ordered hearings to proceed were it not for the fact that the Board believed substantial public interest questions existed regarding Consumers' compliance with Commission quality assurance requirements and Consumers' implementation of its quality assurance program.

II. FINDINGS OF FACT

A. Issue No. 1

Whether the licensee is implementing its quality assurance program in compliance with Commission regulations.

[30] Tr. 429-438.
[31] Tr. 432.
[32] Tr. 590-593.
[33] Tr. 705.
[34] Tr. 707.

37. The first issue is whether Consumers is implementing its Quality Assurance Program in compliance with the Commission's regulations. The regulations governing quality assurance are set forth in 10 CFR Part 50, Appendix B. Although the language of Appendix B has not been amended in any significant way since it originally became effective on July 27, 1970,[35] the interpretation of its requirements has been changing in an evolutionary process over the years. Licensee compliance with the Appendix has been evaluated by the Staff consistent with the interpretation which was in effect at the time of evaluation.

38. The function of the Directorate of Regulatory Operations, as it relates to this case, is to conduct field inspections of the activities of Consumers (and its contractors) to obtain, by means of selective sampling inspections, reasonable assurance that licensed activities are in accord with the AEC's requirements[36] and are not, or will not be, inimical to the health and safety of the public. This function, which in this case is carried out by personnel of the Region III Office in Glen Ellyn, Illinois, is executed in accordance with guidelines provided by the Directorate of Regulatory Operations Headquarters Staff by experienced and knowledgeable Regional Office inspectors, assisted by various specialists and consultants. The principal activities by these personnel with respect to the Midland facility have included:

(a) Examination of Consumers' and its contractor's QA and QC programs to compare the requirements and controls actually imposed by Consumers with commitments made to the Commission;

(b) Inspections of quality control records;

(c) Observations of construction work in progress; and

(d) Selective examinations of construction procedures.[37]

39. Limited preconstruction permit activities at the Midland site commenced under an AEC exemption issued in July of 1970 and were suspended by Consumers in November, 1970, when extensive delays in issuance of a Construction Permit became apparent. Construction was resumed in June, 1973, and has continued, with the brief suspension discussed herein, to the present.[38] Quality assurance activities, both by Consumers and by the Regulatory Staff, however, began even before the start of construction in 1970.

40. The Midland Preliminary Safety Analysis Report (PSAR) was issued on January 13, 1969. Appendix 1B of the PSAR (which predated Appendix B of 10 CFR Part 50) was a very brief description of the Quality Assurance Program for

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[35] 35 *Fed. Reg.* 10498.

[36] These requirements are found in the construction permit, the application, the provisions of the Atomic Energy Act, and the rules and regulations of the Commission (Tr. 1851).

[37] Tr. 184-188; 341-342; 347-351; 357-366.

[38] Testimony of Howell, following Tr. 485, pp. 6-7, 13.

the proposed facility.[39] Amendment No. 4 to the PSAR was issued on October 2, 1969, subsequent to the publication[40] on April 17, 1969, of the proposed Appendix B. This amendment was a complete revision of the original quality assurance program.[41] Amendment No. 6 to the PSAR was issued on December 29, 1969, to respond to the Commission's request for a description of the manner in which the Midland Quality Assurance Program would be implemented. Amendment No. 8 was issued on February 9, 1970, to provide, pursuant to the Commission's request, documentation of interface responsibilities during design, procurement, construction and pre-operational testing. These amendments provided more details than described in the initial issuance of Appendix 1B and spelled out more specifically the responsibilities of Consumers, Bechtel, and B&W and the interfaces between these organizations.[42] During 1970, the Directorate of Regulatory Operations (RO), then the Division of Compliance, carried out a number of inspections. During the period September 29 to October 1, 1970, shortly before Consumers' suspension of construction, RO conducted a site inspection during which deficiencies relating to the placement of concrete were identified. Consumers and Bechtel evaluated the findings and took the actions they considered appropriate.[43] RO was not able at that time to complete its inspection and evaluation of these corrective actions because of the cessation of construction. Re-inspection of these activities, however, did not occur in September 1973.[44]

41. During the 1970 -1973 suspension of construction, Consumers and Bechtel made numerous changes in the Quality Assurance Programs, some for internal reasons and some in response to the AEC's developing interpretation of Appendix B.[45] After resumption of construction, inspections continued. In some cases deficiencies in the Quality Assurance Program were found and corrective actions taken.[46] On December 3, 1973, the Director of Regulation issued the Order to Show Cause, identifying three specific examples which indicated a possible failure of Consumers to implement its Quality Assurance Program in compliance with Commission regulations. These examples, each of which is discussed below, were:

(a) Inspections occurring on September 29–October 1, 1970, revealed several instances of Consumers' non-conformance with quality assurance program requirements involving concrete work. These matters were discussed by the Appeal Board in its Memorandum and Order of March 26, 1972

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[39] Licensee's Exhibit K-5.

[40] 34 *Fed. Reg.* 6599.

[41] Licensee's Exhibit K-6.

[42] Testimony of Keeley, following Tr. 458, pp. 8-14.

[43] *Id.* at p. 14.

[44] Tr. 266-268.

[45] Keeley, pp. 14-19; Howell, pp. 8-13.

[46] Keeley, pp. 19-35.

(ALAB-106), in which the Appeal Board imposed certain additional conditions on Consumers with respect to its quality assurance program;

(b) Inspections conducted on September 10, 11 and 27, 1973, revealed several additional violations of 10 CFR Part 50, Appendix B, Criteria II and V, involving inadequate record keeping procedures relating to quality assurance and unavailability of certain quality assurance records; and

(c) Inspections conducted on November 6-8, 1973, identified serious deficiencies associated with Cadweld spliging of concrete reinforcing bars. These constitute violations of 10 CFR Part 50, Appendix B, Criteria II, V, XIII, XV and XVII.[47]

Concrete Placement

42. On September 29 and 30, and on October 1, 1970, RO conducted the site inspection, mentioned *supra*, during which they found certain deficiencies in concrete placement activities, including the improper use of vibrators.[48] Immediately following this RO inspection, Consumers and Bechtel evaluated the findings and took the following corrective action:

(a) Bechtel committed itself to review the applicable ASTM specification regarding concrete sampling;[49]

(b) Bechtel established a special crew of craft personnel to do the vibrator work. This crew had been trained in the proper use of vibrators,[50]

(c) Bechtel assigned a Quality Control Engineer to full-time monitoring of all Q list concrete pours,[51]

(d) Consumers field personnel were instructed to provide increased surveillance during concrete pours to insure compliance with established requirements, including taking of samples, and additional documentation was required to transport between the batch plant and the pour location.[52]

43. Although construction at the Midland site was by then suspended, RO conducted an inspection at the job site on January 6-7, 1971. At that time, the inspectors were informed of the corrective action undertaken by Consumers and Bechtel regarding the concrete deficiencies noted in the previous RO inspection. However, due to the fact that construction had been halted, the inspectors were not able to observe implementation of the corrective action and, therefore, informed Consumers that these items would remain in the follow-up status until

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[47] In the matter of *Consumers Power Company* (Midland Plant, Units 1 and 2), Order to Show Cause, December 3, 1973.

[48] *Id.* at p. 14.

[49] Licensee's Exhibit CP-2.

[50] *Id.*

[51] *Id.*

[52] Keeley, p. 14.

construction resumed and RO could verify that the corrective procedures had been implemented.[53]

44. Prior to the actual resumption of concrete activities in 1973, the Bechtel Quality Assurance group conducted a review of inspection reports and other documentation to determine whether or not further corrective action was required in order to satisfy the commitments made in 1970. As a result of this review, an intensive indoctrination and training program was implemented for personnel involved in placing and inspection of concrete work. This program contained, among other things, detailed instructions in the proper use of vibrators. Detailed inspection plans were developed and implemented and quality assurance personnel were instructed to promptly identify and to take necessary actions to correct any discrepancies noted during concrete operations. In addition, Bechtel assigned a Quality Control representative to full-time monitoring of test lab activities. Additional training and indoctrination requirements for Quality Control personnel were established, and the Bechtel specification governing testing of concrete was updated to the latest revisions of industry codes and standards.[54]

45. On September 5-7, 1973, at its first inspection following re-activation of construction at the Midland Plant, RO observed the corrective action relative to the concrete deficiencies. RO determined that the deficiencies had been corrected but that certain of these activities would be further observed in subsequent inspections.[55] This was finally considered by RO to be resolved as a result of an inspection on March 6-7, 1974.[56]

Record Keeping Procedures

46. On September 10, 11 and 27, 1973, RO performed an inspection of Bechtel Engineering to evaluate compliance with the applicable quality assurance criteria for design and procurement activities at Midland. In its report of that inspection, RO cites deficiencies in documentation control procedures.[57] Although each of the discrepancies identified by RO had been previously identified by Bechtel's Quality Assurance Group and corrective action had been initiated,[58] Bechtel completed corrective action in each of the following areas:

(a) Retention of records common to area affecting quality;

(b) Maintaining current drawings in the Project Engineering stick files;

(c) Procedures to prescribe control of interface activities between design groups;

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[53] Tr. 267-9; Licensee's Exhibit CP-2.

[54] Testimony of Dotson, following Tr. 597, pp. 18-20.

[55] Licensee's Exhibit CP-3.

[56] Licensee's Exhibit CP-19.

[57] Licensee's Exhibit CP-12.

[58] Bechtel's Exhibits Dotson-17, -18, -19, -20A, -20B, and -21.

(d) Procedures to prescribe control, issuance and changes to Bechtel's Internal Procedures Manual; and

(e) Amending the Nuclear Quality Assurance Manual to provide Project Engineering the flexibility to impose evolving quality assurance requirements on vendors.[59]

47. During its inspection of January 10-11, 1974, RO reviewed the actions taken to correct the deficiencies in the above areas and concluded that the corrective action taken was adequate and was being properly implemented.[60]

Cadweld Splicing

48. On November 1, 1973, the Bechtel Field Quality Assurance Engineer found several completed Cadweld splices from which the asbestos packing had not been completely removed.[61] He issued an open Quality Assurance Daily Log to the Bechtel Project Superintendent[62] which required corrective action prior to covering the Cadwelds with concrete.[63]

49. On November 6-8, 1973, RO carried out an inspection at the site that indicated to them that serious deficiencies existed with respect to Cadwelding. These deficiencies related to void measurement techniques and the associated acceptance criteria, the comprehensiveness of records to demonstrate correct performance of Cadwelding, and the adequacy of the existing procedures for proper control and documentation of Cadwelding activities. Mr. Vetter testified that as a result, the Staff, on November 9, requested in a telephone call to Consumers' Project Manager that Cadwelding be suspended pending corrective action and review by the Staff of the corrective action. The Project Manager responded that he, also, had felt that there had been major QA/QC problems associated with the Cadwelding, that a hold had been placed on the activities the previous day, that Consumers personnel had thoroughly reviewed the matter, and that, as a result of their subsequent actions, they felt that the hold should be lifted. He was informed that it was the Staff position that all existing Cadwelds should be re-inspected and requalified by properly qualified personnel and that a determination should be made by the regional office that an acceptable program for Cadwelding had been developed and implemented before work was resumed. Shortly afterwards, the Project Manager confirmed that the Cadwelding had been suspended in accordance with the Staff's request.[64]

50. As a result of that inspection, Consumers took a number of actions. In addition to requalifying the Cadwelds, Consumers undertook the following additional steps:

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[59] Dotson, pp. 23-28.
[60] Licensee's Exhibit CP-16; Tr. 327.
[61] Dotson, p. 5; Bechtel's Exhibit Dotson-2.
[62] Keeley, p. 28.
[63] Tr. 602.
[64] Tr. 188-190, 289-290; 317-321.

(a) An increase in the number of Consumers' Field Quality Assurance personnel from one, prior to the November 6-8 RO inspection, to four during the early part of December;

(b) Consumers' quality assurance personnel were provided with procedures requiring audits to determine that all safety-related activities would be accomplished in accordance with the requirements of 10 CFR 50, Appendix B and ANSI N45.2. In addition to these program type audits, Field Quality Assurance personnel were also provided procedures requiring verification, by actual observation, that Bechtel work and inspection Procedures for quality-related activities were being implemented;

(c) Consumers' field quality assurance personnel were made responsible for reviewing and approving all Bechtel Master Inspection Plans to determine whether these inspection plans adequately assure the quality of work function by providing adequate Quality Control acceptance parameters, adequate detail of the inspection function and adequate evidence that all quality-related activities were being properly observed and documented; and

(d) Procedures for regular meetings between Consumers' General Office personnel and Consumers Field Quality Assurance personnel were written and implemented. These procedures require one-day visits every two weeks by the Midland Quality Assurance Supervisor to the Midland Site, one-day visits every two months by Consumers' Director of Quality Assurance Services, and quarterly meetings between Consumers' Midland Quality Assurance Services personnel with the Vice President of Electric Plant Projects, the Director of Quality Assurance Services and members of the Midland Project Organization.[65]

51. Bechtel management also took steps to verify that the Cadwelds were of proper quality, to determine necessary revisions to the Bechtel Quality Assurance program for Midland and to insure that similar situations would not recur.[66] This action included:

(a) Development of more formalized procedures for specialized work processes;

(b) Requiring Quality Control Engineers to conduct quality acceptance and verification inspections;

(c) Implementation of an action program to provide more timely response to Quality Assurance/Quality Control findings;

(d) Qualification of Quality Control Engineers in accordance with written procedures covering qualifications, indoctrination, training, testing and certification in accordance with requirements of ANSI N45.2.6 and AEC Regulatory Guide 1.58; and

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[65] Keeley, pp. 29-30.

[66] Testimony of Yates, following Tr. 5770, pp. 10-11.

(e) Increased management and supervisory personnel attention including visits to the site at least twice per year by the Bechtel Vice President and Deputy Division Manager, San Francisco Power Division, each quarter by the Vice President and Area Manager of the Ann Arbor area office, and once every other month by the Ann Arbor Office Manager of Construction.[67]

Implementation of these actions was verified by Bechtel management[68] and directives were issued to re-emphasize Bechtel's commitment to Quality Assurance.[69]

52. Special inspections were carried out by the Staff at the site on November 20 and 21 and December 6 and 7, 1973, after Consumers had notified the Staff that necessary corrective actions had been completed. At the first of these inspections, the Staff found that, although substantial corrective action had been taken with respect to the specific Cadwelding problems, further action was necessary by Consumers with regard to its analysis of the implications of the Cadwelding problems to the overall implementation of the Midland quality assurance program. Although it appeared to the Staff that attention had been addressed to this latter matter, the Staff did not find adequate documentation of such action.[70]

53. The fact that the actions taken by Consumers and its contractors between November 9 and the November 20-21 inspection did not entirely fulfill the Staff's requirements appears to have resulted, at least in large part, from a lack of mutual understanding of what was required.[71] On November 21 the Staff further clarified its position to include the requirement that:

> Consumers Power Company ... demonstrate that the Midland quality assurance/quality control programs had been analyzed for shortcomings by Consumers Power Company and ... corrective action, indicated to be necessary as a result of [the] quality assurance/quality control program shortcomings analysis had been adequately prescribed.[72]

54. As a consequence of this clarification, Consumers formally documented its analysis of the programmatic aspects of the Cadweld deficiencies[73] and another RO inspection was scheduled for December 3, 1973. This inspection was subsequently cancelled by RO and Consumers was notified shortly thereafter of the issuance of the Order to Show Cause. The cancelled inspection was rescheduled and held on December 6 and 7, 1973.[74] During this inspection, RO concluded that the programmatic deficiencies, including management involve-

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[67] Bechtel's Exhibit Yates-5.
[68] Yates, pp. 10-11.
[69] *Id.*, Bechtel's Exhibits Yates-6, -7, and -8.
[70] Tr. 191, 290, 321-322.
[71] Tr. 191, 213-216, 222-225, 369-370, 509-511.
[72] Tr. 191.
[73] Howell, p. 19, Licensee's Exhibit K-7 and K-8.
[74] Howell, *id.*, Licensee's Exhibit CP-14.

ment, and special problems relating to Cadwelding at Midland had been satisfactorily resolved.

55. On December 13, a Memorandum was sent by Dr. Knuth (Director of Regulatory Operations) to Mr. Muntzing (Director of Regulation) recommending that the Order to Show Cause, which had been issued on December 3, 1973, be modified to permit Cadwelding activities to resume. The Order to Show Cause was so modified on December 17, 1973.[75]

56. An additional re-inspection was made on January 10 and 11, 1974, to determine the degree of implementation of the commitments made earlier, including those made in Consumers' answer to the Order to Show Cause. The Staff found that Consumers had taken appropriate action.[76]

57. Based upon the testimony of the witnesses presented by the Regulatory Staff and the testimony of Consumers' and Bechtel's witnesses, the Board finds that Consumers is implementing its quality assurance program in compliance with the Commission's regulations.

B. Issue No. 2

Whether there is a reasonable assurance that such implementation will continue throughout the construction process.

58. The second issue that must be decided by this Board is whether there is reasonable assurance that Consumers' implementation of its quality assurance program in compliance with Commission regulations will continue throughout the construction process. The Board has analyzed the evidence of record and has classified such evidence into three general areas, which it believes will be useful in deciding this issue. The first is the actions that Consumers and its contractors have taken in the past to establish an effective program and to search out and put into effect improvements in it. The second is the expressed points of view and intents of the senior personnel involved. The third is the opinions of the Staff's expert witnesses and the bases for these opinions. With respect particularly to the latter two areas, the Board realizes that its judgments will necessarily be somewhat subjective and will be based in part on the demeanor of the witnesses, which the Board has carefully observed and considered.

Actions by the Licensee

59. The actions taken by Consumers and its contractors to improve their quality assurance programs prior to the November 1970 suspension of construction have been discussed *supra*.[77] Subsequent to the suspension, on February 1, 1971, a corporate reorganization was instituted by Consumers, in

[75] Tr. 192-193; 291; 322-324; 342; 402-404.
[76] Tr. 196-201; 291-292; 325-326.
[77] Paragraph 40.

which overall responsibility for specific corporate projects was delegated to specified individuals. The philosophy underlying the new organization structure was that if total responsibility for each project was delegated to specified individuals, projects could be properly supervised without the complexity of coordinating corporate activity through various departmental interfaces.[78] On August 31, 1971, and again on December 8, 1971, Consumers' Quality Assurance Program Audit Manual was voluntarily upgraded to provide more detailed procedures for implementation.[79] Similarly, Consumers' Departmental Communications Guideline Manual was issued in December of 1971 and revised in March of the following year.[80] The Midland Project Procedures Manual, which was required by these guidelines, was issued in October, 1972.[81]

60. In March of 1972 Bechtel submitted to Consumers for review and concurrence a policy statement revising and defining the policy and responsibilities for the Quality Assurance Program of its Power and Industrial Division. Consumers' comments on this statement were resolved and the statement was accepted by Consumers in February of 1973.[82]

61. In an effort to obtain another perspective regarding Commission quality assurance requirements, Consumers employed the NUS Corporation as a consultant to examine the Quality Assurance Program. NUS submitted its report on December 15, 1972, stating that Consumers had a complete and detailed audit plan. NUS recommended that the Quality Assurance organization be given complete independence from those groups having cost and scheduling functions and that Quality Assurance activities be expanded beyond its auditing function. As a result of this report, Quality Assurance activities were expanded and the Quality Assurance organizations were given greater, although not complete, independence. Under the new organization, which became effective February 15, 1973, the title of the Quality Assurance Engineer was changed to Quality Assurance Administrator and he reported directly to Mr. Howell, the Vice President in charge of Electric Plant Projects.[83] Soon after this reorganization the QA Administrator inferred from a statement in an RO inspection report that the Commission did not correctly understand the new organization. Discussions were held with the RO staff to rectify this and as a result, a further reorganization was made on October 1, 1973. The position of Director of Quality Assurance Services was created on the same level as all project managers and directors of service organizations and reporting directly to the Vice President, Electric Plant Projects. This reorganization resulted in a separation of the Quality Assurance organization from the Midland Project organization which

[78] Keeley, pp. 14-15; Howell, pp. 8-9.
[79] Keeley, p. 15; Howell, p. 9.
[80] Keeley, p. 18.
[81] *Id.*, p. 19.
[82] *Id.*, pp. 15-18; Yates, pp. 2-3; Bechtel's Exhibit Y-1.
[83] Howell, pp. 11-13; Licensee's Exhibits H-3 and H-4.

had cost and scheduling responsibilities. This independent Quality Assurance organization was given responsibility for all aspects of Quality Assurance including policy and implementation. The organization and responsibilities remain essentially the same today.[84] Also, during 1973, additional staffing was provided for the quality assurance organization, the Quality Assurance Manual and the Policies and Procedures Manual were revised, and a new Quality Assurance Services Department Procedures Manual was written to provide procedures for the new organization.[85]

62. Shortly after the reorganization, Consumers asked NUS to make a new review of the QA program[86] and, after the Cadwelding problem arose, expanded the assignment to include a recommendation regarding the desirability of using a third-party inspection organization independent of both Consumers and Bechtel. NUS recommended against such use of a third-party inspection group.[87] They did recommend, however, that Consumers (1) incorporate pertinent requirements of ANSI N45.2 standards into its Quality Assurance Program, (2) consolidate Quality Assurance procedures into a single Quality Assurance Manual, (3) consolidate all Quality Assurance activities (including operational) under a single Quality Assurance Manager, (4) clearly define Quality Assurance responsibilities during pre-operational testing, (5) perform a detailed review of the Bechtel and B&W Quality Assurance Program, (6) conduct a baseline audit of principal vendors using a third party organization, and (7) establish a Quality Assurance/Quality Control Surveillance Inspection Program tied to the Midland construction schedule. With the exception of the consolidation of both construction and operational Quality Assurance functions under one Quality Assurance Manager, and the recommendation regarding third-party baseline audits of principal vendors, an activity already completed by Consumers' Project Quality Assurance Services Department (PQASD) personnel, these NUS recommendations have been fully implemented by incorporation into a revised Consumers' Quality Assurance Manual.[88]

63. In recognition of the usefulness of a periodic third party review, Consumers has retained the General Electric Nuclear Engineering Services Apollo group to review and comment on the revised manual. That review process is underway and upon completion of the review, a revised manual and implementing procedure will be issued. In addition, General Electric has reviewed the audits which Consumers has completed.[89] To date, General Electric Apollo has not indicated that any major changes in the Consumers Quality Assurance

3rd party review useful in review of the QA manual, but not in the QA program itself

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[84] Howell, pp. 14-15; Licensee's Exhibit H-5.
[85] Howell, p. 15.
[86] *Id.*, p. 16.
[87] *Id.*, p. 20.
[88] *Id.*, pp. 20-22; Licensee's Exhibit H-10.
[89] Howell, p. 22.

Program would be desirable.[90] General Electric Apollo has also been asked to conduct annual reviews of the Consumers Quality Assurance Program for the purpose of determining whether that program is being properly implemented and to offer recommendations for updating the Program to meet evolving regulatory and industry standards.[91]

64. Consumers also has directed Bechtel to assure that their procedures used on the Midland Project comply with both 10 CFR 50, Appendix B and ANSI N45.2 and to consider ANSI N45.2 as the controlling document in evaluating the Bechtel Quality Assurance Program. When a major audit of Bechtel activities was conducted during March of 1974, ANSI N45.2 was used as one of the bases of the audit. In NCR-61, dated April 1, 1974, Consumers directed Bechtel to revise its Nuclear Quality Assurance Manual to specifically state policy requirements supporting the procedures which Bechtel had established in order to comply with the requirements of ANSI N45.2. Bechtel has complied with the corrective action of this nonconformance report.[92]

65. Similarly, in August of 1973, Consumers directed B&W to apply its newly revised Quality Assurance Program to the Midland Project. Thus, Consumers became the first utility to put into effect the upgraded B&W Quality Assurance Program.[93]

66. As a consequence of the Cadwelding problem, additional steps were taken by both Consumers and Bechtel to upgrade quality assurance. These steps have been described in connection with Issue No. 1.[94]

67. Consumers has also instituted two types of field audits to assure that Bechtel construction and Quality Control personnel have received effective training, that Bechtel inspection procedures are adequate and that proper documentation is provided. The first of these audits, the program audit, consists of using a checklist provided in the Quality Assurance Services Procedures manual to review Bechtel field activities prior to commencement of work at the site. The program audit procedures also require a comparison of the Bechtel Master Inspection Plan with the requirements listed in the Preliminary Safety Analysis Report, Commission regulations, specifications and drawings. PQASD also approves the Master Inspection Plan prior to commencement of work in the field. In addition to these program audits, an implementation audit surveillance is also performed by Consumers' PQASD personnel to assure that Bechtel work and inspection activities are being accomplished in accordance with approved procedures and that approved specifications are being met.[95]

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[90] Tr. 490-491.
[91] Keeley, pp. 32-33.
[92] *Id.*, pp. 33-34.
[93] *Id.*, p. 35.
[94] Paragraphs 50 and 51 *supra*.
[95] Keeley, pp. 5-6.

68. In addition to these field activities, PQASD schedules and conducts (1) audits of Bechtel Engineering, Procurement, Inspection and Quality Assurance; (2) audits of B&W Engineering, Procurement, Quality Assurance and fabrication facilities; and (3) audits of major suppliers.[96] Consumers and Bechtel have both also instituted additional training activities. Consumers instituted a formal training program for all of its Quality Assurance personnel in 1973.[97] It was expanded in 1974 to include the use of outside, as well as Consumers, personnel to conduct the training. The training of new employees and the retraining of present employees will be a continuing process.[98]

69. Similarly, Bechtel's indoctrination and training program continued to evolve through the addition of more detailed and comprehensive requirements. Presently, each Quality Assurance Engineer is required to complete an in-depth, comprehensive training program consisting of classroom preparation, on-the-job experience and participation in different kinds of audits. Quality Control Engineers are certified under a program designed to comply with ANSI N45.2.6 and Regulatory Guide 1.58.[99] The training program for Engineers and Designers has become more formal and more comprehensive.[100] Bechtel's Procurement Inspection training program also has continued to evolve to the point where it presently includes certification, recertification and supplementary sessions tailored to meet specific needs. This program is currently being upgraded to meet the requirements of ANSI N45.2.6 and N45.2.12.[101]

Licensee's Management Position

70. Russell C. Youngdahl, Senior Vice President in charge of all aspects of Consumers' electric generating and transmission planning, construction, operation and maintenance, including nuclear generating stations, presented testimony on this subject. Mr. Youngdahl is one executive level below the chief executive officer. Mr. Youngdahl's perception of the attitude of the President and Chairman of the Board of Directors toward Quality Assurance has been one of insistence on the highest standards of Quality Assurance; this attitude has been expressed in the presence of representatives of the Commission.[102] Mr. Youngdahl testified that the Commission's rules and regulations, as well as license requirements, are regarded by Consumers' management as the equivalent of statutes and, as such, are considered binding on the Company and its employees.[103] Mr. Youngdahl stated that, although the management has always

[96] *Id.*, p. 6.
[97] Howell, p. 22.
[98] *Id.*; Keeley, pp. 4-5.
[99] Testimony of Tucker, following Tr. 663, pp. 7-9.
[100] Testimony of Martinez, following Tr. 626, pp. 11-12.
[101] Testimony of Southard, following Tr. 641, pp. 5-6.
[102] Tr. 528-529.
[103] Testimony of Youngdahl, following Tr. 519, p. 6.

demanded quality in its work at least equal to industry standards, its approach has evolved from one of primary reliance on its engineering constructor to a more formalized reliance upon its own Quality Assurance organization and program.[104] In order to formally document this approach, Mr. Youngdahl, on March 29, 1974, issued a Quality Assurance Policy statement which committed the entire electric organization, including both the operating group and the projects group, to implement a Quality Assurance plan which meets both 10 CFR 50, Appendix B and ANSI N45.2. In order to make certain that this policy is implemented by the operating group, a Director of Quality Assurance Operations was named on June 1, 1974.[105]

71. Mr. Youngdahl's personal involvement in the QA process ranges from daily review of EPP activities to monthly review of PQASD activities. He participated in meetings with Bechtel senior management following the November 6-8, 1973, RO inspection at which it was stressed that Quality Assurance implementation must be improved and that Bechtel management must be more closely involved in quality assurance at Midland. It was his suggestion to procure a third party review of the Midland Quality Assurance Program.[106]

72. The Palisades Nuclear Plant investigation by the Commission and the United States Department of Justice stimulated the publication of a management directive which explicitly set forth responsibilities for reporting violations of Commission rules, regulations and license requirements. This directive requires notification to the Commission by Consumers of all items which are deemed to be violations and also of all items which are subject to interpretation as to whether or not they are in fact violations.[107]

73. The Board requested that Consumers make Ralph B. Sewell, Nuclear Licensing Administrator for operating nuclear power plants, available for questioning on the attitude of senior management personnel toward compliance with Commission rules and regulations.[108] The Board questioned Mr. Sewell regarding statements given the RO staff in connection with the operation of the gaseous radwaste system at the Palisades plant during 1972.[109] The Board's concern was that, in this instance, extraordinary steps may have been required to direct the attention of Consumers management to important safety matters.[110] Mr. Sewell testified that it was Consumers' intent to fully comply with all Commission rules, regulations and licensing requirements.[111] Mr. Sewell's

[104] Youngdahl, pp. 3-4.
[105] Youngdahl, p. 5; Licensee's Exhibit Y-2.
[106] Youngdahl, pp. 4-5.
[107] Youngdahl, p. 6; Licensee's Exhibit Y-3.
[108] Tr. 399-402; and 439.
[109] Tr. 546-547.
[110] Tr. 563.
[111] Tr. 564.

statement described his normal channels of communication within the company.[112] Mr. Sewell emphasized that he did not have to take extraordinary steps to direct management's attention to his request to the Palisades operating staff to perform corrective maintenance on the gaseous radwaste system.[113] Soon after he communicated his concerns, the operating personnel at Palisades performed extensive maintenance on the system,[114] and therefore, he did not seek management affirmation on his position.[115]

74. Stephen H. Howell, Vice President in charge of Electric Plant Projects, having direct responsibility for design, construction and construction quality assurance activities for nuclear power plants, testified at the hearing. He stated that the policy of Consumers is and has always been to comply with all laws, ordinances, regulations and rules and to require its contractors to do the same.[116] Mr. Howell stated that his perception of the attitude of his superiors toward Quality Assurance was that they believed it to be important and that they had manifested this belief to him on numerous occasions.[117]

75. The attitude toward compliance with Commission rules and regulations was set forth by Gilbert S. Keeley, Director of Project Quality Assurance Department Services in response to a Board question as to why the future implementation of the Midland Quality Assurance Program will be better than its past implementation in terms of effectiveness:

> Now there is no doubt in my mind [that] we have been implementing [the upgraded QA program carried out since Oct. 1, 1973], if the AEC feels that they want us to provide more visibility on any of these functions we are doing, we're going to do it as far as I am concerned.
>
> As I say, I have been given that responsibility to implement or to set QA policy and to see that the policy is implemented, not only by Consumers Power Company but by B&W and Bechtel.[118]

76. In order to insure that management personnel remains informed of Quality Assurance activities at the Midland site, Consumers has had periodic in-depth status meetings among its management personnel for a number of years.[119] On February 1, 1974, the requirement for these meetings was formalized so as to require at least quarterly meetings between Vice President, EPP, and representatives of General Office Quality Assurance, Midland Field Quality Assurance and the Midland Project. Reports of these meetings are

[112] Tr. 559-562.
[113] Tr. 564-565.
[114] Tr. 548-550.
[115] Tr. 563-565.
[116] Howell, pp. 4-5.
[117] Tr. 502-503, 507.
[118] Tr. 477.
[119] Howell, p. 24.

submitted to the Senior Vice President.[120] These formal procedures further require one-day visits every two weeks to the Midland site by the Midland Quality Assurance Supervisor and one-day visits every two months by the Director of Quality Assurance Services.[121] In addition, PQASD submits a monthly resume of Quality Assurance activities to the Vice President, EPP and through him, to the Senior Vice President. The Vice President, EPP, further reviews all audit reports, nonconformance reports and RO inspection reports.[122] For example, when a Consumers nonconformance report (NCR) is issued and the responsible Quality Assurance individual has made the initial analysis as to whether the deviation is reportable under 10 CFR 50, 55(e), the Vice President, EPP, is contemporaneously advised.[123]

how many NCRs deemed reportable

Staff's Views on Future Compliance

77. The Staff's views on the question of future compliance are embodied primarily in Mr. Vetter's prepared testimony and in the Boards direct examination of Mr. Vetter and Mr. Keppler. After testifying that:

> (1) shortcomings in implementation of the Midland quality assurance/quality control programs have been identified and corrected, and (2) Consumers Power Company Management personnel have demonstrated awareness of the need to become involved, and stay involved, with quality assurance/quality control programs designed to assure proper construction of the Midland Plant,[124]

Mr. Vetter concluded that "reasonable assurance now exists that compliance will continue throughout the construction period".[125]

78. Mr. Keppler was asked by the Board to characterize quality assurance program at Midland as it compared to that at other facilities under construction in his region. He stated as his opinion that it was "probably comparable",[126] but suggested that his inspectors might be in a better position to make such a judgment. When polled, they concurred with Mr. Keppler's assessment.[127]

ALAB 106 dismisses similar as good as any other usual plant arguements

79. Mr. Keppler was asked by the Board what evidence he would look for in order to determine whether or not it was likely that a licensee would comply with the rules and requirements in the future.[128] After pointing out that with a new licensee he can only inspect to determine whether the licensee is satisfying

[120] Youngdahl, p. 4; Licensee's Exhibit Y-1.
[121] Keeley, p. 30.
[122] Howell, p. 24.
[123] Tr. 504.
[124] Tr. 201-202. The bases for this statement appear at Tr. 194-201.
[125] Tr. 201.
[126] Tr. 377-378.
[127] Tr. 393-395.
[128] Tr. 379.

Q to Keppler- what future evidence did Lock point to?

commitments made to the Directorate of Licensing,[129] he went on to say that in the case of a licensee who has had previous nuclear experience, he looks at "the past performance of the utility in terms of their ability to comply with their commitments in the past." Among the actions that he considers are:

> the action that management has taken with respect to making sure that the commitments are being met, that appropriate instructions have been provided, that there's a plan of action laid out to see that the commitments are fulfilled and that there is a program of audit developed to follow up and assure that the commitments are fulfilled.[130]

80. After responding affirmatively to the question of whether he had considered the past performance of Consumers Power Company from this standpoint, he was asked for his views on the performance.[131] He prefaced his answer by pointing out that one must consider this question in the light of changes in the regulatory inspection and enforcement programs. He pointed out that the Big Rock Point facility was "over ten years old" and that the Palisades plant "was licensed around 1970".[132] During the intervening time, many changes, in addition to adoption of the quality assurance criteria, have taken place. Originally there were very few plants and the program for dealing with violations and noncompliance matters "was less structured than it is today", being based more on efforts to bring licensees into compliance than on resort to enforcement actions. As there came to be more and more licensees and their performance was not "as good as had been hoped for" stronger enforcement practices were adopted.[133] With this introduction, Mr. Keppler testified that there had been "many situations that we dealt with on Big Rock Point and in the early stages of Palisades which I would characterize as a negative attitude on the part of a licensee" and that he is "on record as having been concerned about the performance of Consumers Power Company". He then testified that, despite the serious reservations about past performance, "it is my view that we have seen a very discernible change over the past several months . . . that has been factored into our thinking on this case: changes in organization structure, changes in facing up to commitments, and dealing with commitments" and that "they had seemed to face up to this problem in a much more professional way than I have seen them face up to any other problem; that they had convinced themselves of

Keppler

[129] Tr. 380.

[130] Tr. 380-381.

[131] Tr. 383.

[132] The Board notes that the construction permit for Big Rock Point was issued May 31, 1960, and the operating license August 30, 1967, and that the comparable dates for Palisades were March 14, 1967, and March 24, 1971. These differences from Mr. Keppler's recollections enhance, rather than detract from his point.

[133] Tr. 383-384.

what it took to do the job and they were taking steps to do it."[134] Mr. Keppler identified the recent events that characterized the "very discernible change" as including the careful consideration on the part of the company reflected in the commitments regarding the Quality Assurance Program contained in the response to the Order to Show Cause, the discussions between the Staff and Consumers' senior management personnel regarding the Palisades matter, the reorganization both at the site and at the home office to focus more management involvement in the problems being experienced and changes in attitude on the part of the people with whom inspectors had been dealing.[135]

81. Because of the fundamental role played by the RO inspection program in reaching conclusions such as those of Mr. Keppler stated above, the Board asked Mr. Keppler to provide a general description of the inspection program for reactors under construction.[136] His description, and the testimony regarding the program by the other Staff witnesses, has led the Board to conclude that the Staff has an active and effective program that is capable of detecting significant deviations from the Commission's requirements. Although the Board does not consider it necessary to recite the details of the program here, we note that the general approach includes enlarging the inspection effort in cases where the findings indicate a need for such intensification.[138] As one Staff witness characterized it, "we give the oil to the squeaky wheel". This philosophy, in the view of the Board, should assist in the detection of incipient adverse quality assurance trends before they become major problems and before they result in difficult-to-correct hardware deficiencies. In this respect we also note the increasingly effective enforcement procedures of the Staff[139] and Mr. Keppler's assertion that "if the company fails to live up to its obligations that we're not afraid to step in and stop construction just like we did this time."[140]

82. Based upon consideration of the entire evidentiary record in this proceeding, the Board concludes that although there have been questions of compliance and of attitude regarding QA in the past, there is reasonable assurance that implementation of the Midland QA program will continue to be conducted in compliance with Commission requirements during the remainder of the construction process. We take particular note of Mr. Keppler's statement that "... if the company fails to live up to its obligations that we're (the Staff) not afraid to step in and stop construction. ..." (Tr. 386).

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[134] Tr. 385-386. The other Staff witnesses were asked for their characterizations of Consumers' attitude. Their answers, which agree with Mr. Keppler's, appear at Tr. 417-421.

[135] Tr. 388-389.

[136] Mr. Vetter's description of the program as it relates to this case (Tr. 184-188) has been discussed with respect to Issue No. 1.

[137] Tr. 357-361. See also Tr. 347-351 and 405-407.

[138] Tr. 347-349; 372-376.

[139] Tr. 384-385; 387; 391-393.

[140] Tr. 386.

III. CONCLUSIONS OF LAW

83. Based upon the foregoing findings of fact, and upon consideration of the entire evidentiary record in this proceeding, the Board concludes as follows:

1. Consumers is implementing its quality assurance program in compliance with Commission regulations;

2. There is reasonable assurance that such implementation will continue throughout the construction process;

3. Construction Permit Nos. 81 and 82 issued to Consumers Power Company for the Midland Plant, Units 1 and 2, should not be suspended, modified or revoked.

IV. ORDER

WHEREFORE, it is ORDERED, in accordance with the Atomic Energy Act of 1954, as amended, and the Commission's Rules and Regulations, that this proceeding is terminated.

It is further ORDERED, in accordance with Sections 2.760, 2.762, 2.764 2.785 and 2.786 of the Commission's Rules of Practice, that this Initial Decision shall be effective immediately, and shall constitute the final action of the Commission forty-five (45) days after the date of issuance hereof, subject to any review pursuant to the Commission's Rules of Practice and the Commission's Memorandum and Order and Notice of Hearing, dated January 21, 1974. Exceptions to this Initial Decision may be filed by any party to this proceeding within seven (7) days after service of this Initial Decision. Within fifteen (15) days thereafter (twenty (20) days in the case of the Regulatory Staff), any party filing such exceptions shall file a brief in support of such exceptions. Within fifteen (15) days after service of the brief of the party or parties filing exceptions (twenty (20) days in the case of the Regulatory Staff), any other party to this proceeding may file a brief in support of, or in opposition to, exceptions which have been filed.

ATOMIC SAFETY AND LICENSING BOARD

Emmeth A. Luebke

Lester Kornblith, Jr.

Michael L. Glaser

Issued at Bethesda, Maryland,
this 25th day of September, 1974.

NRC ~~Staff~~ Dep Ex 2
Keeley (10-23-80)

RESUME OF PROFESSIONAL AND
EDUCATIONAL EXPERIENCE

Gilbert S. Keeley

Residence: 6108 Crest Road
Jackson, Michigan 49203
(517) 784-6742

Work: Consumers Power Company
1945 West Parnall Road
Jackson, Michigan 49201
(517) 788-0321

I. Professional Experience

a. July, 1975 to Present. Project Manager on Midland Nuclear Power Plant which is a dual-purpose nuclear plant designed to supply 1300 Megawatts electrical to the Consumers Power system and up to 4,000,000 lb/hr of process steam to the Dow Chemical Company. Up until March, 1980, I had overall responsibility for the licensing, design, construction, testing, costs, scheduling and contract administration of contracts between Consumers and its principal suppliers and between Consumers and Dow Chemical for this $3.1 billion Project until fuel loading takes place. Upon appointment of a Vice-President for Midland in March of 1980, my responsibilities as Project Manager were changed to include design, construction, testing and administration of contracts.

b. November, 1973 to July, 1975. Appointed Director of Quality Assurance Services for nuclear and conventional power plants' design and construction. Responsibility for: Building up staff of QA personnel, seeing that they were given training, setting QA policies for the Company, and preparing necessary QA Program Manuals and Procedures. Supervise staff of 11 people (6 in General Office and 5 at Midland Plant Site) who have expertise in areas of Mechanical, Electrical, Civil, Instrumentation and Control, and Non-destructive Examination (NDE). This staff reviews and approves QA Programs of Architect-Engineers, Suppliers, and Construction Contractors and conducts audits and surveillance for implementation of quality-related activities. The staff is spokesman for Consumers Power on NRC Regulatory Operations inspections on site.

1970 to November, 1973. Director of Electric Plant Projects Engineering. Supervised staff of four Nuclear Engineers, three Mechanical Engineers, one Metallurgical Engineer, two Civil Engineers, one Instrumentation and Control Engineer, and one Electrical Engineer. This staff was responsible for: Developing Consumers Power design bases for Nuclear and Conventional power plants; developing inputs for specifications for Consumers Power prime contractors such as

boiler, NSSS, and turbine/generator; reviewing designs and specifications produced by Architect-Engineer; writing pre-operational and hot functional tests and reviewing test results; reviewing recommendations made by Architect-Engineer on procurement of power plant equipment; technical review of potential suppliers for placement on Consumers Power Approved Bidders List; and assisting in licensing activities with the NRC or State.

c. 1968 to 1970. Supervisory Nuclear Engineer. Supervised staff of two Engineers. Responsible for: Writing up specifications for nuclear fuel; performing evaluation of fuel bids and recommending supplier; review of engineered safeguards systems, reactor protective systems, radwaste systems, and nuclear instrumentation systems to assure they met latest industry standards and AEC criteria; assisted in AEC licensing activities; and compiled site meteorological data and made dose calculations.

d. 1963 to 1970. Nuclear Engineer. Reviewed designs of nuclear plant engineered safeguards systems, reactor protective systems, radwaste systems, and nuclear instrumentation systems to assure they met latest industry standards and AEC criteria. Wrote up specifications for nuclear fuel, did fuel cost calculations, recommended fuel supplier, and assisted in writing fuel contract. Initially performed as Project Engineer on Palisades Plant for assembly and review of PSAR and organized Start-up Test Program for Palisades.

e. 1961 to 1963. Start-up Engineer at Big Rock Point Plant. Responsible for Consumers Power review of preoperational test procedures. Responsible for running tests. Evaluated test results with assistance from other Consumers Power personnel, NSSS personnel and AE personnel. Obtained AEC Cold License on the plant and functioned temporarily as Shift-Supervisor until additional Consumers Power personnel were qualified.

f. 1955 to 1961. Engineer in Atomic Power Division of Westinghouse Electric Corporation. From 1955 to 1956, I was Reactor Engineer on the S1W Plant at the Navy Reactor Test Facility (NRTF), Idaho, with responsibilities in the areas of reactor operations and plant instrumentation, including the qualification of Navy reactor plant operators. From 1956 to 1957, I was Senior Engineer in the S1W Engineering Group, concerned with the design and procurement of nuclear instrumentation and reactor protective system equipment. During part of 1957, I was a member of the Westinghouse start-up crew at the Shippingport Atomic Power Plant responsible for various phases of reactor plant check-out and had prime responsibility for qualification of the utility's reactor plant operators and for initial criticality operations. In 1958 and 1959, I was plant Reactor Engineer for the A1W Plant at NRTF, Idaho, responsible for reactor plant instrumentation testing and qualification of Navy reactor plant operators. From 1959 to 1960, I was Supervisor of the A1W Instrument Shop with responsibility for setting up all instrumentation for A1W Plant testing. From 1960 to 1961, I was A1W Chief Operator Trainee, receiving training in all aspects of A1W Plant operation.

g. 1949 to 1955. Electrical maintenance and start-up with Pacific Gas and Electric in conventional steam plants. Four years of this time was as Electrical Maintenance Foreman at PG&E's Antioch Steam Generating Plant supervising five electricians.

h. 1943 to 1949. Test Engineer for General Electric Co in Schenectady, New York. Assigned as Test Engineer in areas of induction motors, electronic control and armament controls.

II. Educational Experience

a. 1940 - Graduate of Topeka, Kansas High School.

b. 1942 - Graduate of Kansas City, Missouri Junior College with Associate Science Degree in Engineering.

c. 1946 to 1948. Attended University of Missouri at Rolla and graduated with B.S. in Electrical Engineering. "B+" average. Member of Tau Beta Pi and Phi Kappa Phi national honorary fraternities.

d. 1953 - Taught relay courses to PG&E Electricians.

e. 1958 to 1961. Post-graduate courses from University of Idaho extension at Idaho Falls. 18 hours' credit towards Masters in Electrical Engineering for such courses as Advanced Engineering Math, Pulse and Digital Circuits and Transistor Circuits.

f. 1965 - 2-semester course at University of Michigan on Computer Solutions to Transmission Line Problems.

g. 1968 - 2-semester Welding Technology night course at Jackson Junior College.

h. 1974 - Assisted in conducting training of Consumers Power QA personnel on nuclear power plant systems; AEC and Industry QA requirements. Attended courses we arranged in QA Program Evaluation, ASME Section 3, and NDE.

i. 1974 - Taking one semester Jackson Junior College night course in NDE (Radiography, Diepenetrant and Magparticle) with lab work.

III. Committee and Society Membership

a. 1964 to 1973. Member of Consumers Power Company Safety, Audit and Review Board for its Nuclear Power Plants.

b. 1964 to 1970. Member of IEEE Nuclear Power Standards Group involved in writing electrical standards for nuclear power plants.

c. 1970 to 1975. Member of ASME N45.2 Standards Committee writing QA Standards to supplement Appendix B to 10 CFR 50.

d. 1972 to 1975. Chairman of ASME N45.2.13 Work Group writing QA Standard "Quality Assurance Requirements for Control of Procurement of Items and Services for Nuclear Power Plants."

e. Member of Tau Beta Pi, National Engineering Honorary Fraternity.

f. Registered Engineer in State of Michigan.

g. Member of Michigan Society of Professional Engineers.

NRC Ex #1 id. 10/22/80 (Cooke)

Resume
Thomas C. Cooke

Education and Training

1953 - Graduation, LaGrange H. S., LaGrange, Ohio
1957 - Graduation, Ohio University, Athens, Ohio, BSCE
1957 - Engineer Officer Basic Course, Ft. Belvoir, VA
1961 - Hobart Welding Inspection Course, Troy, Ohio
1963 - CPM Seminar
1966 - Fallout Shelter Analysis, Grand Rapids, MI
1968 - Nuclear Steam Supply Design Lecture Series, Windsor, CT
1968 - Public Utilities Report, Home Study
1970's - Various Utility Sponsored Management Courses, MI

Experience

Upon graduation from Ohio University, I served as Second Lieutenant and eventually as First Lieutenant in the U.S. Army Corps of Engineers in the capacity of Platoon Commander and Assistant Operations Officer in a construction battalion. Typical projects included roads, bridges, rifle ranges, cottages, rock crushers, transmission lines, etc.

My career with a major utility has provided me with the opportunity to become involved in many varied construction projects with progressively more responsible assignments. I have worked as part of the owner's team responsible for significant portions of several large projects and have often had sole responsibility on smaller projects involving reciprocating and jet compressors, steam heating plants demolition and rebuilding, underground steam mains, associated electrical, mechanical and instrumentation for the above and modifications projects. At my last assignment, I was responsible for management of the entire checkout and preoperation test program at a 790 MW nuclear facility to the point of fuel load. After fuel load, I was assigned to modifications work at that facility as Project Superintendent. Presently, I am Project Superintendent responsible for construction of a twin nuclear co-generation facility.

Typically the above assignments have included working with contractors, subcontractors and various architect engineer organizations. I have been very involved in inspection, testing, coordination, procurement, technical problems, invoice approval, permits, safety, security, fire protection, public relations, labor relations, expediting, scheduling, permits and startup. Much of the work has been accomplished utilizing cost plus, unit price, lump sum and incentive contracts. During the past few years, I have also gained considerable experience in dealing with financial slowdowns, changing government regulations, regulatory enforcement, legal proceedings, hearings and changes in design.

Chronology

Jun 57 - Aug 57	-	Graduate Student in Training Program	Utility
Aug 57 - Aug 59	-	U.S. Army Corps of Engineers	Ft. Belvoir, VA Ft. Hood, TX
Sep 59 - Feb 60	-	Graduate Student in Training Program	Utility
Feb 60 - Oct 60	-	Field Construction Assistant - Gas	24" and 26" Cross Country Pipeline
Oct 60 - Mar 61	-	Field Construction Assistant - Electric	265 MW Fossil Civil Work
Mar 61 - Jun 62	-	Field Construction Assistant - Electric	265 MW Fossil Piping
Jun 62 - Jun 63	-	Field Construction Supervisor - Electric	265 MW Fossil Piping & Startup
Jun 63 - Jun 64	-	Field Construction Supervisor - Electric	Gas Compressor Station
Jun 64 - Jun 65	-	Field Construction Supervisor - Electric	Steam Heating Plant
Jun 65 - Oct 65	-	Field Construction Supervisor - Electric	380 MW Fossil UP Boiler Instrumentation & Piping & Startup
Oct 65 - Mar 67	-	General Engineer	
Mar 67 - Jul 67	-	Assistant Field Construction Superintendent	
Jul 67 - Aug 68	-	Assistant Field Construction Superintendent	790 MW Nuclear
Aug 68 - Mar 71	-	General Supervisor	790 MW Nuclear Startup
Mar 71 - Dec 72	-	Project Superintendent	790 MW Nuclear Modifications
Jan 73 - Present	-	Project Superintendent	Twin 800 MW Nuclear Cogeneration

Miscellaneous

High Schocl Valedictorian

College Graduate Cum Laude

Organizations:

Phi Eta Sigma	Freshman Honorary
Tau Beta Pi	Engineer Honorary
American Nuclear Society	

Registration:

Michigan Progessional Engineer
Ohio Professional Engineer

Publications:

Article for "Military Engineer"
Co-authored paper for 1976 ANS convention

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Jul 67 - Aug 68	-	Assistant Field Construction Superintendent	790 MW Nuclear
Aug 68 - Mar 71	-	General Supervisor	790 MW Nuclear Startup
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Registration:

Michigan Progessional Engineer
Ohio Professional Engineer

Publications:

Article for "Military Engineer"
Co-authored paper for 1976 ANS convention

NRC Ex #2 id 10/22/80 (Cooke)

TCC

Consumers Power Company

Midland Project: P.O. Box 1063, Midland, Michigan 48640 - Area Code 517 631-0951

September 8, 1977

Mr. J. F. Newgen
Bechtel Power Corporation
P.O. Box 2167
Midland, MI 48640

MIDLAND PROJECT GWO-7020--ADMINISTRATION BUILDING/GRADE BEAM FAILURE
File: 0130 Serial: 2538

On August 25 we became aware of the situation regarding settlement of the subject beam. Inasmuch as this particular item could fall under the provisions of Article 9 of the Bechtel Power/Consumers Power Company contract regarding repair of defective work at contractor's expense, we are requesting that you advise us as to the reasons for this failure and set up a separate account for costs incurred for removal and repair of same (engineering and construction).

I would anticipate that your response to this office would include some discussion as to why the incident should or should not come under the provisions of Article 9 of the contract.

T. C. Cooke
Project Superintendent

TCC/pp

Bechtel Power Corporation

Post Office Box 2167
Midland, Michigan 48640

September 23, 1977

Consumers Power Company
P. O. Box 1963
Midland, MI 48640

Attention: T. C. Cooke

Job 7220 Midland Project
Administration Building
Grade Beam Failure
BCCC 2794

Dear Mr. Cooke:

Reference: T. C. Cooke's letter to J. F. Newgen, Serial No. 2538 dated September 8, 1977

We are in receipt of the reference correspondence and wish to advise that we are still investigating the failure to determine the reason.

A separate account for the cost of remedial work has been established. This does not, however, include distributables and design engineering support which would require modification to our present costing system.

We will keep you advised of all developments regarding this matter and provide you with a response to your letter once the investigation is complete and a determination made.

Very truly yours,

J. F. Newgen

JFN/JDO/af

RECEIVED

Post Office Box 2167
Midland, Michigan 48640

MIDLAND PLANT PROJECT
MIDLAND, MICHIGAN

December 30, 1977

Consumers Power Company
P. O. Box 1963
Midland, MI 48640

Attention: Mr. T. C. Cooke

Job 7220 Midland Project
Settlement of Administration
Building Grade Beam at
0.4 Line
BCCC-3010

Dear Mr. Cooke:

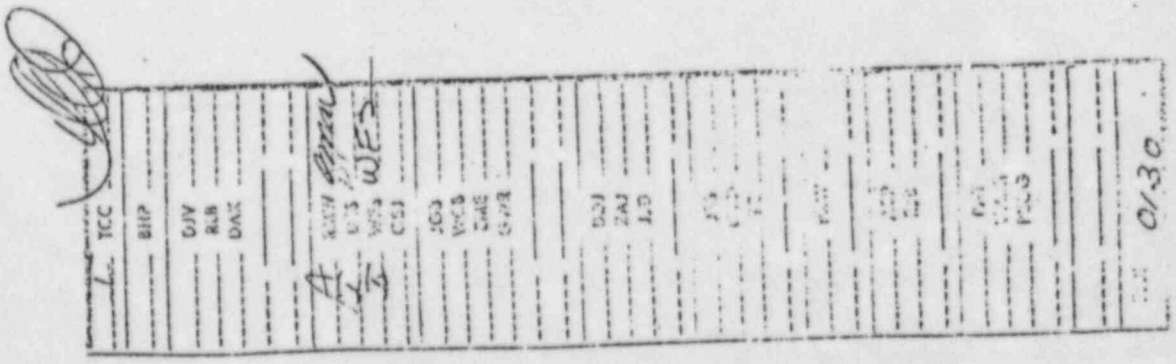
Reference: T. C. Cooke letter to J. F. Newgen - CCBC-1155 - dated September 8, 1977 (Serial 2538)

This letter is written in response to the reference letter and provides an update on our investigation of the subject incident. Investigation of the area during the removal of the fill and testing performed on this material indicates that the major contributing factor to the failure was compaction at a value lower than that required by the specification. Since United States Testing Company was directly involved with the testing of the material during installation, we are investigating their liability. We will keep you apprised of subsequent actions in this matter. Per your request, the costs associated with the removal and repair of the grade beam have been maintained in a separate account.

Very truly yours,

J. F. Newgen

JFN/AJB/jae



NRC Exhibit 10/22/80 (Cooke)

TCC

Consumers Power Company

Midland Project: P.O. Box 1063, Midland, Michigan 48640 - Area Code 517 631-0951

September 8, 1977

Mr. J. F. Newgen
Bechtel Power Corporation
P.O. Box 2167
Midland, MI 48640

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Project Superintendent

TCC/pp

Bechtel Power Corporation

Post Office Box 2167
Midland, Michigan 48640

September 23, 1977

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Job 7220 Midland Project
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RECEIVED

Post Office Box 2167
Midland, Michigan 48640

MIDLAND PLANT PROJECT
MIDLAND, MICHIGAN

December 30, 1977

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Attention: Mr. T. C. Cooke

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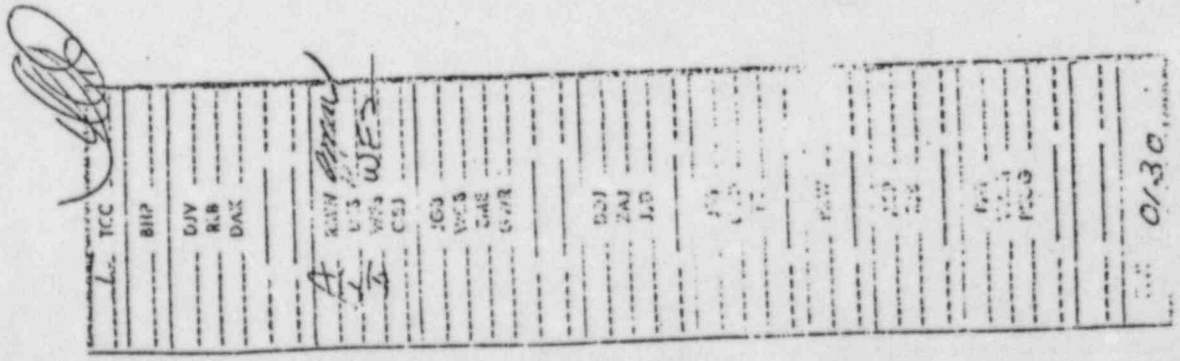

NRC Ex. #3.d
10/22/80 (Cooke)

Midland P SAR

1.4 PRINCIPAL ARCHITECTURAL AND ENGINEERING CRITERIA FOR DESIGN

The principal architectural and engineering criteria for design for the plant are summarized below. (See also Appendix 1C.) The specific architectural and engineering criteria and design features are detailed in later sections.

1.4.1 PLANT DESIGN

Principal structures and equipment which may serve either to prevent accidents or to mitigate their consequences are designed, fabricated, and erected in accordance with applicable codes and to withstand the most severe earthquakes, flooding conditions, windstorms, snow loads, temperature and other deleterious natural phenomena which could be expected to occur at the site during the lifetime of these units. Principal structures and equipment are sized for the maximum expected NSS and turbine generator outputs. Each NSS will be housed in a separate reactor building and will function independently such that failure of one unit will not result in unsafe condition of the other.

1.4.2 REACTOR

The reactors are of the pressurized water type, fueled with slightly enriched uranium dioxide. The reactors and associated auxiliary systems are essentially identical.

Neutron absorption for reactivity control is provided by control rods and by dissolved boric acid in the coolant. The boron chemical shim system is functionally independent of the control rod system.

For all operating conditions, the control rods are capable of providing an adequate shutdown margin at hot, zero power conditions following a trip, even with the most reactive rod stuck in the fully withdrawn position.

The boron chemical shim system is capable of adding boric acid to the reactor coolant at a rate sufficient to maintain an adequate shutdown margin during reactor system cooldown at the maximum design rate following a reactor trip.

The combined response of the Doppler (fuel temperature coefficient), the moderator temperature coefficient, the moderator void coefficient and the moderator pressure coefficient to an increase in reactor thermal power is a decrease in reactivity. In addition, the reactor power transient remains bounded and damped in response to any finite changes in any operating variable.

Automatic and redundant reactor trips are provided to prevent anticipated plant transients from producing fuel or clad damage.

1.4.3 REACTOR COOLANT AND AUXILIARY SYSTEMS

Heat removal systems are provided which can safely accommodate core heat output under all credible circumstances. Each of these heat removal systems has sufficient redundancy to provide reliable operation under all credible circumstances.

1.4.4 REACTOR BUILDING

The reactor buildings, including the associated access openings and penetrations, are designed to contain the maximum pressures resulting from postulated

loss-of-coolant accidents (LOCA) in which (a) the total energy contained in the reactor coolant system water is assumed to be released into the reactor building through a double-ended break of any one of the primary coolant pipes, (b) there is a simultaneous loss of external electric power, (c) heat is transferred from the reactor to the reactor building atmosphere by water supplied from the emergency core cooling system (ECCS), (d) either the reactor building air recirculation and cooling units function or the reactor building spray system functions, and (e) the engineered safeguards including safety injection do not operate until 25 to 40 seconds following the accident.

Selected penetrations are provided with either a seal water injection system or are continuously pressurized with air at a pressure greater than building design pressure.

Means are provided for pressure and leak rate testing of the reactor building system including provisions for leak rate testing of piping and electrical penetrations that rely on gasketed seals or sealing compounds.

1.4.5 ENGINEERED SAFEGUARDS

Engineered safeguards systems with redundant features are incorporated in the plant design which, in conjunction with the reactor building system, provide a high degree of assurance that the release of fission products to the environment following any credible loss-of-coolant accident will not exceed the reference doses set forth in 10 CFR, Part 100.

1.4.6 INSTRUMENTATION AND CONTROL

Interlocks and automatic protective systems are provided along with administrative controls to insure safe operation of the plant. A reactor protective system is provided to initiate reactor trip if the reactor approaches an operating limit. An engineered safeguards actuation system is provided to initiate these systems upon detection of LOCA.

Sufficient redundancy is installed to permit periodic testing of the reactor protective systems and so that failure or removal from service of any one protective system component or portion of the system will not preclude reactor trip or other safety action when required.

1.4.7 ELECTRICAL SYSTEMS

Normal, standby and emergency sources of auxiliary electrical power are provided to assure safe and orderly shutdown of the plant and the ability to maintain a safe shutdown condition under all credible circumstances.

1.4.8 RADIOACTIVE WASTES

The radioactive waste treatment system is designed so that discharge of radioactivity to the environment is in accordance with the requirements of 10 CFR, Part 20.

1.4.9 SHIELDING AND ACCESS CONTROL

The plant is provided with a centralized control room having adequate shielding to permit occupancy during all credible accident situations. The

radiation shielding in the plant, in combination with plant radiation control procedures, insures that operating personnel do not receive radiation exposures in excess of the applicable limits of 10 CFR, Part 20, during normal operation and maintenance.

1.4.10 FUEL HANDLING AND STORAGE

Fuel handling and storage facilities are provided for the safe handling, storage, and shipment of fuel and will preclude accidental criticality.

1.4.11 PROCESS STEAM

Process steam from the plant will meet regulations as to radioactivity content, within the applicable limits of 10 CFR, Part 20.

1.5 RESEARCH AND DEVELOPMENT REQUIREMENTS

The research and development programs that have been initiated to establish final design or to demonstrate the capability of the design for future operation at a higher power level are summarized as follows:

1.5.1 XENON OSCILLATIONS

An analysis to evaluate the possibility of xenon oscillations throughout core life is under way. A modal analysis to determine critical parameters has been completed, and the detailed spatial calculations are in progress. If it is determined that such oscillations may occur, appropriate design changes to eliminate or control the oscillations will be incorporated.

See also 3.2.2.2.3.

1.5.2 THERMAL AND HYDRAULIC PROGRAMS

B&W is conducting a continuous research and development program for heat transfer and fluid flow investigations applicable to the design of the Midland units. Two important aspects of this program are:

a. Reactor Vessel Flow Distribution and Pressure Drop Tests

   A 1/6-scale model of the vessel and internals is under test to measure the flow distribution to the core, fluid mixing in the vessel and core, and the distribution of pressure drop within the reactor vessel.

b. Fuel Assembly Heat Transfer and Fluid Flow Test

   Critical heat flux data have been obtained on single-channel tubular and annular test sections with uniform and nonuniform heat fluxes, and on the multiple rod fuel assemblies with uniform heat fluxes. These data have been obtained for a range of pressure, temperature, and mass velocities encompassing the reactor design conditions. This work is being extended to

NRC Ex. #3.1
10/22/80 (Cooke)

Midland P SAR

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The reactor buildings, including the associated access openings and penetrations, are designed to contain the maximum pressures resulting from postulated

loss-of-coolant accidents (LOCA) in which (a) the total energy contained in the reactor coolant system water is assumed to be released into the reactor building through a double-ended break of any one of the primary coolant pipes, (b) there is a simultaneous loss of external electric power, (c) heat is transferred from the reactor to the reactor building atmosphere by water supplied from the emergency core cooling system (ECCS), (d) either the reactor building air recirculation and cooling units function or the reactor building spray system functions, and (e) the engineered safeguards including safety injection do not operate until 25 to 40 seconds following the accident.

Selected penetrations are provided with either a seal water injection system or are continuously pressurized with air at a pressure greater than building design pressure.

Means are provided for pressure and leak rate testing of the reactor building system including provisions for leak rate testing of piping and electrical penetrations that rely on gasketed seals or sealing compounds.

1.4.5 ENGINEERED SAFEGUARDS

Engineered safeguards systems with redundant features are incorporated in the plant design which, in conjunction with the reactor building system, provide a high degree of assurance that the release of fission products to the environment following any credible loss-of-coolant accident will not exceed the reference doses set forth in 10 CFR, Part 100.

1.4.6 INSTRUMENTATION AND CONTROL

Interlocks and automatic protective systems are provided along with administrative controls to insure safe operation of the plant. A reactor protective system is provided to initiate reactor trip if the reactor approaches an operating limit. An engineered safeguards actuation system is provided to initiate these systems upon detection of LOCA.

Sufficient redundancy is installed to permit periodic testing of the reactor protective systems and so that failure or removal from service of any one protective system component or portion of the system will not preclude reactor trip or other safety action when required.

1.4.7 ELECTRICAL SYSTEMS

Normal, standby and emergency sources of auxiliary electrical power are provided to assure safe and orderly shutdown of the plant and the ability to maintain a safe shutdown condition under all credible circumstances.

1.4.8 RADIOACTIVE WASTES

The radioactive waste treatment system is designed so that discharge of radioactivity to the environment is in accordance with the requirements of 10 CFR, Part 20.

1.4.9 SHIELDING AND ACCESS CONTROL

The plant is provided with a centralized control room having adequate shielding to permit occupancy during all credible accident situations. The

radiation shielding in the plant, in combination with plant radiation control procedures, insures that operating personnel do not receive radiation exposures in excess of the applicable limits of 10 CFR, Part 20, during normal operation and maintenance.

1.4.10 FUEL HANDLING AND STORAGE

Fuel handling and storage facilities are provided for the safe handling, storage, and shipment of fuel and will preclude accidental criticality.

1.4.11 PROCESS STEAM

Process steam from the plant will meet regulations as to radioactivity content, within the applicable limits of 10 CFR, Part 20.

1.5 RESEARCH AND DEVELOPMENT REQUIREMENTS

The research and development programs that have been initiated to establish final design or to demonstrate the capability of the design for future operation at a higher power level are summarized as follows:

1.5.1 XENON OSCILLATIONS

An analysis to evaluate the possibility of xenon oscillations throughout core life is under way. A modal analysis to determine critical parameters has been completed, and the detailed spatial calculations are in progress. If it is determined that such oscillations may occur, appropriate design changes to eliminate or control the oscillations will be incorporated.

See also 3.2.2.2.3.

1.5.2 THERMAL AND HYDRAULIC PROGRAMS

B&W is conducting a continuous research and development program for heat transfer and fluid flow investigations applicable to the design of the Midland units. Two important aspects of this program are:

a. Reactor Vessel Flow Distribution and Pressure Drop Tests

   A 1/6-scale model of the vessel and internals is under test to measure the flow distribution to the core, fluid mixing in the vessel and core, and the distribution of pressure drop within the reactor vessel.

b. Fuel Assembly Heat Transfer and Fluid Flow Test

   Critical heat flux data have been obtained on single-channel tubular and annular test sections with uniform and nonuniform heat fluxes, and on the multiple rod fuel assemblies with uniform heat fluxes. These data have been obtained for a range of pressure, temperature, and mass velocities encompassing the reactor design conditions. This work is being extended to

NOTE:

The contents of this package are maintained in a three-ring notebook by William Paton